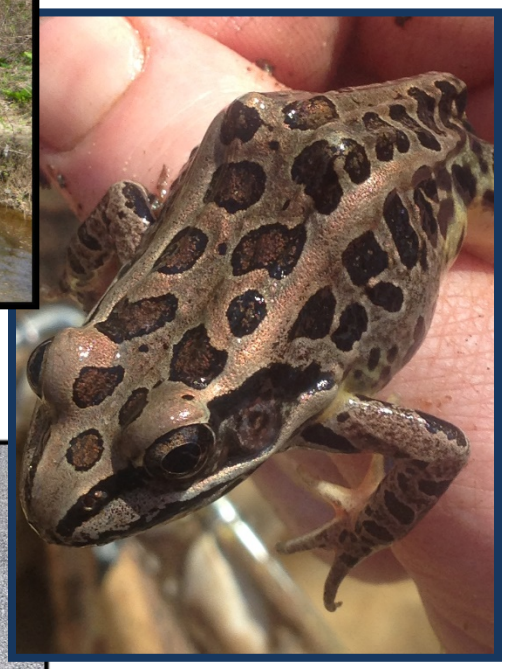
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Municipal Separate Storm Sewer System Discharge Permit
Permit Number MD0068306
Effective Date: February 12, 2014

FISCAL YEAR 2018 ANNUAL REPORT



Anne Arundel County
Department of Public Works
2662 Riva Road
Annapolis, Maryland 21401

FEBRUARY 12, 2019

Fiscal Year 2018 Annual Report for Anne Arundel County Storm Water National Pollutant Discharge Elimination System

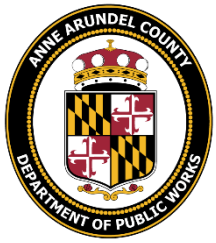
Permit Number MD0068306

Submitted to:

Water Management Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

February 2019

Submitted by:
Anne Arundel County
Department of Public Works
2662 Riva Road
Annapolis, MD 21401



Prepared by:

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I. INTRODUCTION

This Annual Report describes compliance activities for the County and State Fiscal Year (FY) 2018 (July 1, 2017 – June 30, 2018), in association with Anne Arundel County's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit (Permit Number: 11-DP-3316, MD0068306). The current permit was issued on February 12, 2014 and this is the fifth Annual Report prepared under this permit.

The Annual Report describes the components of the stormwater management program and associated implementation status and summarizes the monitoring programs implemented by Anne Arundel County including data collection and analysis. Digital data and specific reports for the major programs conducted during the reporting term can be found within the report's **Appendices**, which are provided in electronic format on the enclosed DVD. Digital data found in **Appendix A** is submitted in the format consistent with the MS4 Geodatabase structure as described in the May 2017 document entitled *National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4), Geodatabase Design and User's Guide, Version 1.2* (MDE 2017).

II. STORMWATER MANAGEMENT PROGRAM

Components of Anne Arundel County's stormwater management program were established to address the requirements outlined in the County's NPDES MS4 permit. The major components also address stormwater Waste Load Allocations (WLAs) associated with Total Maximum Daily Loads (TMDLs), and overall water quality improvement within the County's waterways. Program components include the following features:

- Storm Drain Infrastructure and Impervious Area Inventory;
- Erosion and Sediment Control Program;
- Stormwater Management Program;
- Illicit Discharge Detection and Elimination;
- Litter and Floatables;
- Management and Maintenance of County-owned Facilities (e.g., roads, parking lots);
- Public Education and Outreach;
- Watershed Assessment;
- Watershed Restoration Plans;
- TMDL Compliance;
- Watershed Restoration Assessment;
- Stormwater Management Assessment; and
- Program Funding.

The County believes the above programs address the major water quality interests within County watersheds. Monitoring efforts have shown that implementation of these programs results in the improvement of water quality, which motivates the County to continue its dedication to these programs. Efforts in these program areas during the reporting period are described under the appropriate permit condition sections in **Part IV** of this report.

III. WATER QUALITY

The NPDES MS4 Permit issued to Anne Arundel County in February 2014 requires implementation of a stormwater management program to effectively prohibit pollutants in stormwater discharges, to attain applicable WLAs as set forth in approved TMDLs, and to comply with all provisions of the permit. Compliance with permit conditions shall constitute compliance with the Clean Water Act (§402(p)(3)(B)(iii)) and adequate progress toward compliance with Maryland's water quality standards and any U.S. Environmental Protection Agency (EPA) approved stormwater WLAs.

Anne Arundel County endeavors to manage, implement, and enforce a stormwater management program in accordance with the Clean Water Act and corresponding NPDES regulations. The activities undertaken in support of permit compliance, and documented herein, show progress toward reducing pollutants in stormwater discharges, prohibiting unauthorized discharges to the County's storm drain system, and attaining stormwater WLAs for established TMDLs.

IV. STANDARD PERMIT CONDITIONS

A. Permit Administration

Anne Arundel County shall designate an individual to act as a liaison with the Maryland Department of the Environment (MDE) for the implementation of this permit. The County shall provide the coordinator's name, title, address, phone number, and email address. Additionally, the County shall submit in its annual reports to MDE an organizational chart detailing personnel and groups responsible for major NPDES program tasks in this permit. MDE shall be notified of any changes in personnel or organization relative to NPDES program tasks.

Status:

Coordination of Anne Arundel County's NPDES MS4 Permit was performed by the Department of Public Works (DPW) Watershed Protection and Restoration Program (WPRP) for FY2018 (FY18). The program coordinators during this reporting year are listed below:

Mr. Erik Michelsen
Administrator
Watershed Protection and Restoration Program
Anne Arundel County Department of Public Works
2662 Riva Road, MS 7409
Annapolis, MD 21401
410-222-7520
pwmich20@aacounty.org

Ms. Ginger Ellis
Environmental Planning Administrator
Watershed Protection and Restoration Program
Anne Arundel County Department of Public Works
2662 Riva Road, MS 7409
Annapolis, MD 21401
410-222-4240
pwelli16@aacounty.org

Ms. Janis Markusic
Program Manager/Senior Planner
Watershed Protection and Restoration Program
Anne Arundel County Department of Public Works
2662 Riva Road, MS 7409
Annapolis, MD 21401
(410) 222-4240
pwmark02@aacounty.org

Figure 1 shows the County's organizational chart for FY18. Information on specific positions and personnel responsible for permit compliance and stormwater program tasks follows.

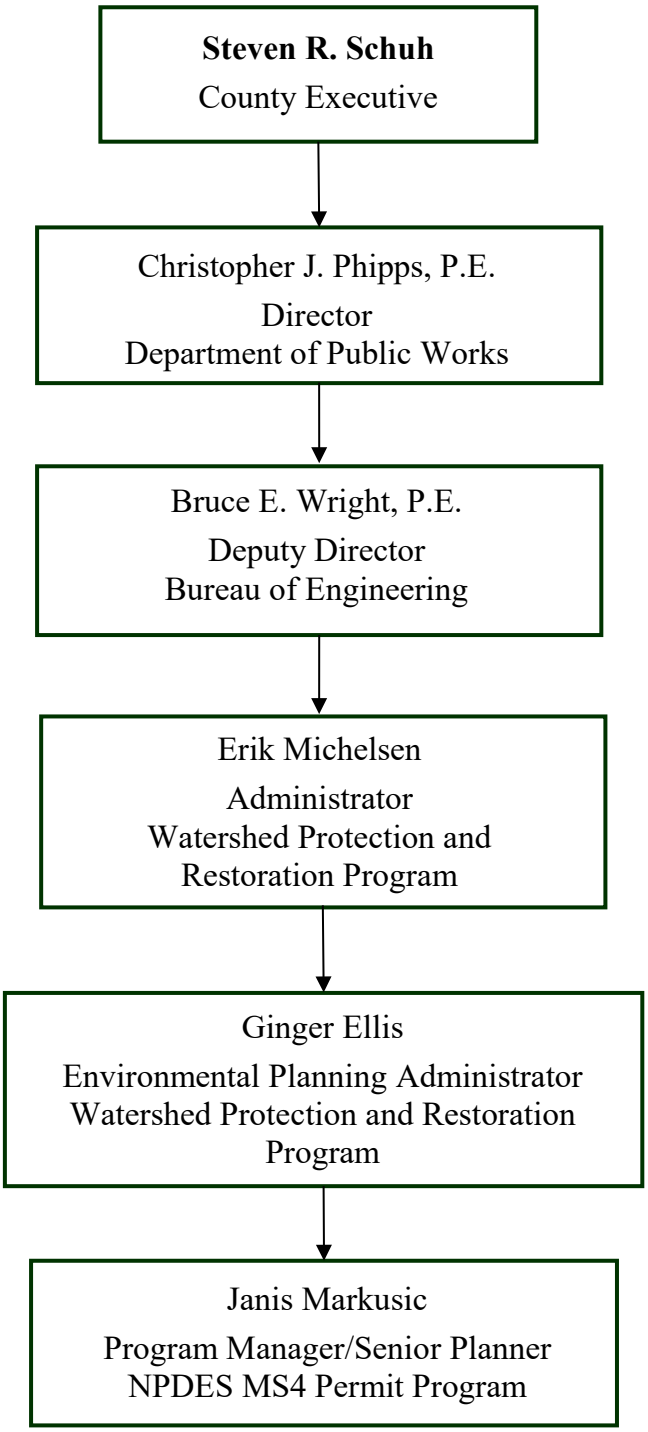

Figure 1. Organization Chart for NPDES Permit Administration (7/1/2017 through 6/30/2018)

Additional County staff members responsible for components of the NPDES MS4 Permit requirements during FY18 are listed below.

Department of Public Works (DPW)

- Sheri Lott, Engineer Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the CIP Restoration Project Implementation unit responsible for design and construction of WPRP BMP restoration projects.

- Jens Geratz, Engineer Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the CIP Restoration Project Implementation unit responsible for design and construction of WPRP stream restoration projects.

- Karen Jennings, Senior Engineer
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- James Woods, Senior Engineer
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Nasrin Dahlgen, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Gerry Inglesby, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Larry Mathena, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Joe Ports, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Jeff Ratteree, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Gregory LeBlanc, Project Manager
  Bureau of Engineering, Watershed Protection and Restoration Program

Manages design and construction of watershed restoration projects.

- Masoud Ghatineh, Senior Engineer
  Bureau of Engineering, General Engineering
  Manages design and construction of watershed restoration projects as required through the County's tidal waters dredging program.

- Raghu Badami, Engineer Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the Modeling and Analysis Unit responsible for providing water quality, pollutant loading, and impervious area data management, analysis, tracking and reporting for NPDES MS4 permit, TMDL and the County's Phase II Watershed Implementation Plan (WIP); and Stormwater Remediation Fee oversight and support.

- Rick Fisher, Senior Engineer (held position until 11/16/2017)
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the TMDL Support Program; manages watershed assessment contracts; manages the technical engineering and water quality models in support of NPDES MS4 Permit activities, individual TMDL compliance, and the Phase II WIP; coordinates data, tracking, and reporting of impervious surface reduction and pollutant load credit; manages the County's impervious surface and land cover GIS layers; and documents the locations and descriptions of watershed restoration projects.

- Melissa Harlinski, Engineer III
  Bureau of Engineering, Watershed Protection and Restoration Program
  Maintains, updates, and provides quality control of GIS data layers (e.g., impervious surfaces, land cover) that support the engineering and water quality models utilized for supporting NPDES MS4 and TMDL Restoration Plan activities.

- Melissa Bragg, GIS Specialist
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides GIS analysis to support the engineering and water quality models utilized for supporting NPDES MS4 and TMDL compliance activities. Maintains, updates and provides quality control of GIS data.

- Brenda Morgan, Program Manager
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the SW Remediation Fee Support Unit, oversees fee assessment, appeals and credit processing and tracking. Assists with Historic BMP record database update and input into MS4 Geodatabase.

- Sally Szydlowski, Program Specialist II,
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides program management support to the Modeling and Analysis Stormwater Remediation Fee Unit carrying out assignments related to fee assessment, appeals and credit processing and tracking, and stormwater Best Management Practice (BMP) performance review.

- Bertha Berrios, GIS Specialist,
  Bureau of Engineering, Watershed Protection and Restoration Program
  Assists the Stormwater Remediation Fee Unit with researching and tracking fee assessment, appeals and credits.

- Chris Victoria, Water Quality Compliance Specialist
  Bureau of Engineering, Watershed Protection and Restoration Program
  Assists in documenting ecological condition of County watersheds and waterways and conducts applied research to ensure the credibility of WPRP monitoring and assessment. Assists with NPDES MS4 Permit compliance and TMDL and watershed support.

- Douglas Griffith, Planner II
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides consultant oversight for stormwater monitoring, biological monitoring, and geomorphic assessment of County stream reaches including those identified in Part IV. F of this permit. Assists Program Manager with implementation of the Illicit Discharge Detection and Elimination (IDDE) Program as identified in Part IV.D.3 of this permit.

- Bryan Perry, Program Specialist II
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides program support for surface water and biological monitoring projects and coordinates projects with ecological restoration permit requirements.

- Rachel Denby, Program Specialist I
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides technical support for surface water, stormwater, and ecological monitoring projects.

- Robb Fish, Public Education and Outreach Specialist
  Bureau of Engineering, Watershed Protection and Restoration Program
  Fulfills the public education and outreach requirements of the County's NPDES MS4 permit ensuring that continual outreach regarding the development of watershed assessments and restoration plans, and TMDL compliance, is achieved and public input is solicited and incorporated.

- Katherine Hart, Grants Administrator
  Bureau of Engineering, Watershed Protection and Restoration Program
  Identifies and secures grant funding for watershed restoration projects and projects that further the mission of the Watershed Protection and Restoration Program.

- Mike Hrubiak, Financial Services Management Assistant II
  Bureau of Engineering, Watershed Protection and Restoration Program
  Provides management, oversight and accountability for all revenue and expenditures associated with the Watershed Protection and Restoration Fund (WPRF). Ensures that the integrity of the dedicated revenue fund and structure is maintained to support compliance with the MS4 permit.

- Maria Ramallosa, Financial Services Clerk
  Bureau of Engineering, Watershed Protection and Restoration Program
  Supports the Financial Management Assistant in tracking revenues and expenditures associated with the WPRF, processing procurements for restoration work, and maintaining established reports to ensure Fund integrity.

- Doug Burkhardt, Engineer Manager
  Bureau of Engineering, Technical Engineering
  Provides managerial support and oversight for geographic information systems (GIS) data collection and geodatabase development activities associated with urban best management practices (BMPs) and closed storm drain system records.

- Michele Polino, GIS Specialist
  Bureau of Engineering, Technical Engineering, Watershed Support
  Provides Quality Control services for GIS data collection for BMPs created through the grading permit process.

- Richard Beier, GIS Specialist
  Bureau of Engineering, Technical Engineering, Watershed Support
  Performs BMP GIS data capture for newly constructed BMPs created through the grading permit process. Assists with updates to GIS layers for Closed Storm Drain system piping and structures.

- Steve Britschge, Program Manager
  Bureau of Engineering, Technical Engineering
  Provides direct oversight of the Closed Storm Drain and BMP GIS layers maintenance and publishing processes.

- Darryl Hockstra, Engineer Administrator
  Bureau of Highways, Infrastructure Management Division (IMD)
  Administers the Infrastructure Management Division and oversees the capital program associated with publicly owned stormwater management practices that include repair and maintenance; and the storm drain/culvert conveyance system inspection, repair and maintenance program.

- Jeff Cox, Program Manager
  Bureau of Highways, Infrastructure Management Division
  Programs and maintains GIS databases for the closed storm drain system, associated infrastructure databases, and the County's roads inventory.

- Wayne McCready, GIS Specialist
  Bureau of Highways, Infrastructure Management Division
  Maintains associated infrastructure databases, develops GIS inspection tools, and creates CADD drawings of closed storm drain system and culverts.

- Ken Pensyl, Senior Engineer
  Bureau of Highways, Infrastructure Management Division
  Administers the Stormwater Management Section that is responsible for the inspection, repair and maintenance of IMD maintained (public) stormwater management practices

- Rich Olsen, Program Specialist II
  Bureau of Highways, Infrastructure Management Division
  Manages, inspects and maintains a subset of urban stormwater BMPs that are the responsibility of DPW. Investigates stormwater management practices complaints and provides construction inspection services for resulting projects.

- Chuck Henney, Program Specialist II
  Bureau of Highways, Infrastructure Management Division
  Manages, inspects and maintains a subset of urban stormwater best management practices that are the responsibility of DPW. Investigates BMP and SWM pond complaints and provides construction inspection services for resulting projects

- Rick Davis, Senior Engineer
  Bureau of Highways, Infrastructure Management Division
  Administers the Culvert & Storm Drain Section that is responsible for the inspection, repair and maintenance of publicly owned storm drain/culvert systems.

- Bob Murphy, Engineer III
  Bureau of Highways, Infrastructure Management Division
  Northern District storm drainage and culverts project manager.

- Robert Savidge, Engineer III
  Bureau of Highways, Infrastructure Management Division
  Central/Southern District storm drainage and culverts project manager

- Ron Rose, Construction Inspector Supervisor, Northern District
  Bureau of Highways, Infrastructure Management Division
  Investigates storm drainage complaints and provides construction inspection services for drainage projects in the northern district

- Daniel Verrette, Construction Inspector Supervisor, Central & Southern Districts
  Bureau of Highways, Infrastructure Management Division
  Investigates storm drainage complaints and provides construction inspection services for drainage projects in the central and southern districts.

- Clark Rosendale, Contractual Inspector,
  Bureau of Highways, Infrastructure Management Division
  Video inspection of culverts and closed storm drain systems.

- Alex Baquie, Assistant Chief Road Operations
  Bureau of Highways, Road Operation Division
  Administers the County's Road Operation Division; maintains the Bureau's permit coverage under the MDE General Permit No. 12-SW (General Discharge Permit for Stormwater Associated with Industrial Activity); develops and implements Stormwater Pollution Prevention Plans (SWPPPs) associated with seven Road Operations district yard facilities; documents the use of pesticides, herbicides, fertilizers, and de-icing materials associated with road maintenance activities; implements the County's street sweeping and inlet cleaning programs; directs the County's winter weather de-icing program, conducts roadside litter clean-up activities; and provides support for volunteer watershed and stream clean-up activities.

- Christian Tait, Program Manager, Regulatory Compliance Officer
  Bureau of Utility Operations
  Responsible for maintaining the Utilities Operations facilities' permit coverage under the MDE General Permit No. 12-SW (General Discharge Permit for Stormwater Associated with Industrial Activity) and the development/implementation of SWPPPs associated with Water Reclamation Facilities. Oversees Utility Operations compliance with individual NPDES point source permits for County Water Reclamation Facilities.

- Rhody Holthaus, Assistant Director
  Bureau of Waste Management Services
  Responsible for ensuring implementation of the Waste Management Services facilities' permit coverage under the MDE General Permit No. 12-SW (General Discharge Permit for Stormwater Associated with Industrial Activity) for the County's three landfill facilities.

- Mark Morris, Environmental Monitoring Manager
  Bureau of Waste Management Services
  Responsible for maintaining the Waste Management Services facilities' permit coverage under the MDE General Permit No. 12-SW (General Discharge Permit for Stormwater Associated with Industrial Activity), and for the development and implementation of SWPPPs associated with the County's three landfill facilities.

<u>Department of Inspections & Permits (I&P)</u>

- Eva Kerchner, Assistant Director
  Oversees components of the County's Erosion and Sediment Control Program and Stormwater Management Program that are the responsibility of the Department of Inspections and Permits

- David Braun, P.E., Engineering Manager, Engineering Division (7/1/17 – 2/7/18)
- John Igbinovia, P.E., Acting Engineering Manager, Engineering Division (2/8/18 – 9/20/18)
  Oversees the review of stormwater management on development projects and ensures that the requirement for all proposed new stormwater management plans comply with the new Environmental Site Design (ESD) standards in accordance with the County Code, State Code, and the current edition of Maryland Stormwater Management Design Manual.

- John Peacock, Code Enforcement Administrator (7/1/17 - 8/31/17)
- John Igbinovia, P.E., Acting Code Enforcement Administrator, (effective 9/1/17)
  Administers the County's Stormwater Management Program and the County's Erosion and Sediment Control Program to ensure compliance with State regulations. Tracks, inspects, and enforces all permits for private and public stormwater management BMPs related to new development and redevelopment projects. Oversees triennial inspection of stormwater BMPs. Tracks development projects disturbing more than one acre and reports this information to MDE as required by the Program and the NPDES MS4 Permit. Oversees staff who respond to County Environmental Compliance Hotline and provides follow-up enforcement for IDDE Program.

- Stephen Trumpler, Watershed Program
  Stormwater Inspection Supervisor
  Manages stormwater inspection staff responsible for inspecting private stormwater BMPs and conducting illicit discharge enforcement.

- Stormwater Inspection Staff
  Seven (7) inspectors are dedicated to the stormwater management program. The FY18 inspection staff is listed below. Several turnovers occurred in FY18 and the County is working diligently to fill those vacancies.

Tyler Smith (through 11/22/17)	Bradlee Burnham (through 4/18/18)
Joseph Maxwell (through 2/21/18)	Robert Branch
Mary Ford	Mike Schindler
Dennis Gills	

<u>Anne Arundel Soil Conservation District (SCD)</u>

- John Czajkowski, District Manager
  Oversees development plan review for erosion and sediment control compliance.

<u>Anne Arundel Department of Health</u>

- Don Curtian, Deputy Director
  Bureau of Environmental Health
  Oversees the Housing and Food Protection Services and Sanitary Engineering divisions of the Environmental Health Bureau, including Environmental Sanitarian response to hotspots associated with food service facilities that are identified through the IDDE program. Oversees programs associated with administering the Bay Restoration Fund within the County, and recreational water quality monitoring at designated bathing beaches.

B. Legal Authority

Anne Arundel County shall maintain adequate legal authority in accordance with NPDES regulations 40 CFR Part 122.26 throughout the term of this permit. In the event that any provision of its legal authority is found to be invalid, the County shall notify MDE within 30 days and make the necessary changes to maintain adequate legal authority. All changes shall be included in the County's annual report.

Status:

Anne Arundel County maintains the authority to comply with the terms of this permit. As documented in prior Annual Reports, this includes implementation of the 2000 Maryland Stormwater Design Manual (MDE 2009) as well as the 2007 Stormwater Management Act. Over the past decade, and as reported in previous Annual Reports, the County Code was revised to incorporate these stormwater management requirements and subsequently renumbered. The entire County Code can be found online through the County website at http://www.aacounty.org/our-county/county-code/, under the link for the County Code. There were no updates or revisions to County Code, affecting the County's legal authority pertaining to this permit, during the reporting year.

The County Stormwater Management Practices and Procedures Manual (Manual) was revised May 1, 2017. The revised Manual became effective October 30, 2017 (A copy of MDE's approval letter accompanies this annual report in **Appendix B**). The revised Manual incorporates a new "Temporary Stormwater Management Policy" (Section 7.1.7) which is required for all new grading permits submitted on or after March 1, 2017.

MDE conducted a triennial review of the County stormwater management program in 2015, noting that the program performance was acceptable (MDE's review letter accompanies this annual report in **Appendix B**). The next program review is slated for spring of 2019.

On January 24, 2017, MDE granted Anne Arundel County's request for continued delegation of erosion and sediment control authority. This delegation of authority is effective through June 30, 2019. A copy of MDE's letter granting continued delegation was submitted with the County's FY17 Annual Report and is not enclosed herewith. The County applied for continued delegation of erosion and sediment control authority in fall of 2018.

As reported in previous Annual Reports, Anne Arundel County established a Watershed Protection and Restoration Program in 2013 as mandated by §4-202.1 of the Environment Article of the State Code for the purpose of supporting compliance with the requirements of the County's NPDES MS4 permit, the Chesapeake Bay TMDL, local watershed TMDLs, and stormwater Watershed Implementation Plans (WIPs) through stormwater management practices and stream and wetland restoration activities. The Program also maintains and administers the Watershed Protection and Restoration Special Revenue Fund established under Article 13. Title 7. §4-11-119 of the Anne Arundel County Code. During FY18, no changes were made to this enabling legislation.

Following the State of Maryland adoption of Water Quality Trading Regulations (effective July 16, 2018), the County requested a permit modification, per Maryland Code (COMAR 26.08.04.10) to allow for the inclusion of nutrient trading as a means to achieve compliance with the restoration requirements found in Part IV.E.2.a of this NPDES MS4 Permit. Public notice of MDEs tentative determination to modify the County's permit appeared in the Maryland Register on August 31 and September 14, 2018 and in the Capital/Gazette Newspapers on September 5 and 9, 2018. MDE conducted a public hearing regarding the proposed permit modifications on October 18, 2018 at which three individuals representing various environmental groups provided testimony. Following the end of the public comment period (November 29, 2018), MDE issued a final determination to modify the County's NPDES MS4 Permit. Public notice of this final determination appeared in the December 7, 2018 Maryland Register and also in the Capital/Gazette Newspapers on December 12 and 19, 2018. Information regarding this permit modification is found on the MDE webpage:
https://mde.maryland.gov/programs/water/stormwatermanagementprogram/pages/storm_gen_permit.aspx The County's permit modification became effective on December 7, 2018. The permit expiration date remains unchanged (February 11, 2019).

C. Source Identification

Sources of pollutants in stormwater runoff countywide shall be identified and linked to specific water quality impacts on a watershed basis. The source identification process shall be used to develop watershed restoration plans. The following information shall be submitted annually for all County watersheds within the permit area in geographic information system (GIS) format with associated tables as required in PART V of this permit.

1. ***Storm drain systems: all infrastructure, major outfalls, inlets, and associated drainage areas delineated;***
   Status:

In 2008, Anne Arundel County completed a County-wide inventory of storm drain inlets, manholes, outfalls, culverts, and pipes for all County watersheds. This inventory is continuously updated and the information is incorporated into County storm drain maps and the County GIS.

As of June 2018, there were 37,255 storm drain inlets, and 6,161 storm drain outfalls, based on storm drainage inventory. The major storm drain outfalls, a subset of all storm drain outfalls (see definition below), were then identified in the GIS by querying for storm drain structures with no hydraulic connection to any other downstream storm drain structure and based on outfall diameter. Next, the upstream contributing areas of these major storm drain outfalls were delineated using GIS. According to 40 CFR 122.26, a major municipal separate storm drain outfall is defined as a single outfall pipe with an internal diameter of 36 inches or greater or its equivalent (discharge from other than circular pipe which is associated with a 50-acre or greater drainage area); or a single outfall pipe with an internal diameter of 12 inches or greater or its equivalent (discharge from other than a circular pipe associated with a 2-acre or greater drainage area) that discharges storm water from industrially zoned lands. Of the 6,161 storm drain outfalls in the FY18 County inventory, 2,267 are categorized as major outfalls.

Major outfalls added to MS4 Geodatabase *Outfall* feature class in FY18 result from the following inputs:

- The construction of 23 new major outfalls;
- The reclassification of 24 existing outfalls as major, due to the County's continued refinement of the storm drain inventory and improvements to the data attribution; and
- For reporting purposes, an additional 18 minor outfalls are included with the major outfalls in the MS4 Geodatabase *Outfall* feature class because these minor outfalls were screened as part of the Illicit Discharge Detection and Elimination (IDDE) Program in FY18 (Part IV.D.3); thus, the total number of outfalls included in this feature class is 2,285 for the current reporting year.

The major storm drain outfalls and the corresponding drainage area are included in the accompanying MS4 Geodatabase (feature classes *Outfall* and *OutfallDrainageArea*). An additional geodatabase is included in **Appendix A** of this report that contains the County's complete storm drain system, including major and minor outfalls, inlets, pipes, and other storm drain infrastructure.

Lastly, during FY18, modifications were made to six previously submitted major outfall records (Table 1).

Table 1. Changes to existing outfall database records in FY18

MDE_OUTFALL_ID	LOCAL_OUTFALL_ID	COMMENT
AA16OUT000835	Q24O021	Deleted. Pipe extended. Q24O028 added as the downstream outfall.
AA16OUT000979	P23O013	Deleted. Correction made to storm drain system inventory.
AA16OUT001991	R19O011	Deleted. Pipe alignment corrected. R19O069 added as the downstream outfall.
AA17OUT000098	N08O037	Deleted. Structure is an inlet.
AA17OUT000087	V16O041	Deleted. Structure is a weir.
AA17OUT000086	V15O024	Deleted. Structure is a weir.

The County will continue to update the storm drain inventory and incorporate the information in the County storm drain maps and the County GIS.

2. Industrial and commercial sources: industrial and commercial land uses and sites that the County has determined have the potential to contribute significant pollutants:

Status:

The NPDES MS4 Permit requires that sources of pollutants in stormwater runoff be identified and linked to specific water quality impacts on a watershed basis. Compliance with this permit requirement includes the annual submittal, in GIS format with associated tables, of the

"…industrial and commercial land uses and sites that the County has determined have the potential to contribute significant pollutants." A methodology for determining these land uses and the associated outfalls is described below. These outfalls and land use data are included in Industrial & Commercial Sources Geodatabase in **Appendix A.** The outfalls are a subset of the major outfalls found in the *Outfall* feature class of the MS4 Geodatabase of this report.

Attachment 2 to the Basis for Final Determination to Issue Anne Arundel County's NPDES MS4 Permit (11-DP-3316; MD0068306) is a memorandum from the U.S. EPA to MDE dated November 29, 2012. This memorandum lists specific objections to draft language proposed for the 4th generation NPDES MS4 Permits. Specific to the development of the above methodology, is a paragraph on Page 4 of this memorandum that addresses Industrial/Commercial Monitoring as a component of the MS4 permit. In this paragraph, EPA objects to the permit on the basis that it does not require the permittee to maintain an inventory of industrial and commercial sites having the potential to contribute pollutants to the storm drain system. EPA proposes the language (above) included in the permit as part of the Source Identification Section (**Part IV.C.2**), further indicating that these identified sites correlate to the required visual surveys of commercial and industrial areas that are conducted under the Illicit Discharge Detection and Elimination (IDDE) program as described in the NPDES MS4 Permit (**Part IV.D.3**).

Page 6 of the Anne Arundel County NPDES MS4 Permit Fact Sheet, developed by MDE as a companion document to the Permit, describes requirements for an effective IDDE program. Included in this program description, is the requirement that the County routinely survey commercial and industrial areas, and monitor major storm drain outfalls to identify illicit discharges. Major storm drain outfalls are defined by the Clean Water Act (40 CFR 122.26) as follows:

> A municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of two acres or more).

To meet the **Part IV.C.2** requirement of identifying commercial and industrial land uses and sites that have the potential to contribute pollutants to the storm drain system, and to correlate this requirement with that found in **Part IV.D.3.b**, the County has developed a GIS coverage and geodatabase predicated on intersecting the following GIS layers and data:

- Industrial and commercial polygons from Anne Arundel County 2014 Land Cover; and
- County closed storm drain system inlets, pipes, and outfalls.

Specifically, inlets intersecting designated industrial and commercial land cover polygons were identified, and the closed storm drain pipes connecting to these inlets were selected, as were the outfalls. Minor outfalls were removed, and only major outfalls are reported.

In addition, all existing outfalls were reviewed based on 2014 County land cover GIS coverage (initial analyses were performed using the 2011 County land cover GIS coverage). The County identified 25 outfalls submitted in FY17 that no longer contain commercial or industrial land use within their drainage areas; these are not included in the FY18 submittal (Table 2). This review also found an additional 178 existing major outfalls where more than 5% of the contributing drainage area fell under commercial and industrial land uses; as such, these were also included in the FY18 data set. The final updated data set, with a total of 1,232 commercial and industrial outfalls, is included in the Industrial & Commercial Sources Geodatabase in **Appendix A**.

Table 2. Changes to the commercial & industrial outfalls database in FY18

MDE_OUTFALL_ID	LOCAL_OUTFALL_ID	COMMENT
AA16OUT001444	K04O028	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000045	A11O009	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000046	A11O008	Removed. Outfall does not drain land used for commercial or industrial purposes.
	L04O021	Deleted duplicate record. Outfall is now L05O030.
AA16OUT000159	H05O001	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001493	Q06O001	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001499	K10O018	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001576	M04O029	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000492	L07O011	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001747	Q19O026	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000634	N08O008	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001797	Q21O013	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000726	A12O003	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000785	L10O028	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT000835	Q24O021	Deleted. Pipe realignment. Q24O028 added as the downstream outfall.
AA16OUT001859	O38O001	Removed. Outfall does not drain land used for commercial or industrial purposes.
	O35O004	Deleted. Also deleted from County's Outfall data set in 2016. Pipe realignment. O35O005 added as the downstream outfall.
AA16OUT001863	S31O001	Removed. Outfall does not drain land used for commercial or industrial purposes.

Table 2. Changes to the commercial & industrial outfalls database in FY18

MDE_OUTFALL_ID	LOCAL_OUTFALL_ID	COMMENT
AA16OUT000927	P21O017	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001168	L09O018	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT001991	R19O011	Deleted. Pipe alignment corrected. R19O069 added as the downstream outfall.
AA16OUT002007	T16O014	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA16OUT002025	O19O007	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA17OUT000003	Q10O021	Removed. Outfall does not drain land used for commercial or industrial purposes.
AA17OUT000051	R13O007	Removed. Outfall does not drain land used for commercial or industrial purposes.

3. ***Urban best management practices (BMPs): stormwater management facility data including outfall locations and delineated drainage areas;***

Status:

Information on the County's stormwater management facilities (e.g., urban BMPs, alternative BMPs, restoration BMPs) is incorporated into the MS4 Geodatabase included as part of the County's FY18 NPDES MS4 Annual Report submittal (**Appendix A**).

This year the County is submitting 14,815 BMP POIs (BMPPOI feature class); as noted in the comments of this feature class, 106 of these POIs solely represent restoration BMPs and therefore have no associated record in the BMP table. The BMP table includes records for 24,859 BMPs, including 636 BMPs constructed in FY18 and 191 BMPs with a status of "Removed." There are 14,533 drainage areas delineated for these BMPs (BMPDrainageArea), with multiple BMPs represented by a common drainage area to a single POI.

The County completed its comprehensive Urban BMP Database Historic Records Review and Update project in July 2018. This work effort was introduced in the FY15 Annual Report and the project's scope of work was included as an appendix to that report. This project achieved several goals for the County. First, the County needed to modernize its BMP data management structures and practices. The BMP inventory could no longer be effectively managed using spreadsheets and GIS shapefiles. The implementation of ESD to the MEP led to a significant increase in the number of BMPs that the County is required to track and inspect. Second, the County needed to address a substantial amount of missing BMP information; some information was missing because the BMPs were constructed before current reporting standards were established and other information was missing because the old BMP inventory system could not accommodate collection of the information. And third, the County needed a comprehensive BMP data set, collected in a consistent manner and subjected to rigorous quality assurance and quality control (QA/QC) procedures, to

meet its modeling needs for various TMDLs and to accurately account for managed impervious surfaces.

The project outcome included:

- The creation of a database structure and geospatial framework for the collection and QA/QC of BMP information, including, but not limited to: BMP type, location, drainage area, water quality treatment, built date, and any modifications to a BMP resulting from subsequent land development or other changes in site condition.

- The review of 9,728 grading permit files, during which information on over 24,000 stormwater BMPs was collected from as-built drawings, stormwater management reports, stormwater infrastructure data sets, and historical data sources and recorded in the database and in GIS.

- The development and documentation of standard operating procedures to standardize the review of grading permit files and QA/QC procedures during all steps of the BMP data development process.

Even after this intensive data collection exercise, the County recognizes that there are still data missing from the BMP inventory. Currently, most existing data sources have been exhausted. The scanning and electronic storage of as-built drawings and stormwater management reports only became feasible and common practice within the past ten years. Any older drawings and reports that were located have now been scanned and stored electronically, but there are some plans which simply no longer exist. The County will continue its efforts to fill in data gaps as time and resources allow, whether through the further research/discovery of missing drawings or review of aerial imagery to approximate a built date for visible BMPs. As new data becomes available, the County will reevaluate if there are additional BMPs with sufficient information to support TMDL or managed impervious surface crediting.

The County continues to work on the challenge of data formatting for loading into the MS4 Geodatabase. Particularly for older BMPs, there are mandatory data fields that will never be populated because either the data is missing from the plan drawings or the design of the BMP pre-dated the type of information required. For example, sometimes certain practices are identified on a set of as-built drawings as contributing to the stormwater management required for a site, but these practices no longer fit into a current suite of BMP practices; or BMP practices are only vaguely indicated on the plans and lack clear drainage areas. The County understands that certain data are mandatory for crediting purposes, but the County is also required to perform triennial inspections and report on all BMPs regardless of their contribution to TMDL or managed impervious surface crediting. In our efforts to report on all BMPs and to account for these data formatting issues, this year the County continued its practice of incorporating error codes into the MS4 Geodatabase and the reader is referred to the ReadMe document in **Appendix A** for explanations of null and/or blank values and for explanation of error codes. For example, the "99999" error code represents a missing descriptive value (e.g., location, permit number). Dates coded as "1/1/1899" are used for missing or inapplicable values. For example, in the *BMP* table,

projects that are proposed but not complete will not have the mandatory built-date and are coded "1/1/1899".

4. ***<u>Impervious surfaces</u>: Public and private land use delineated, controlled impervious areas based on, at a minimum, Maryland's hierarchical eight-digit sub basins;***

Status:

During FY18 the County continued efforts to maintain an accurate impervious surface dataset. In the fall of 2017 the County initiated a contract with Sanborn Map Company, Inc. to update its impervious surface and land cover datasets utilizing imagery captured in early 2017 for the state of Maryland's High-Resolution Aerial Ortho-photography. This project was completed in January 2019. For this FY18 reporting year impervious surface calculations are based on the 2014 impervious surface dataset.

<u>Non-Jurisdictional Land within the County</u>

For NPDES MS4 reporting, the County is responsible for accounting for all impervious and BMP information pertaining to County-owned land and private lands directly under the jurisdiction of the Anne Arundel County government. Land areas that are outside the stormwater authority of Anne Arundel County include the City of Annapolis, Baltimore Washington International Thurgood Marshall Airport (BWI), Fort George G. Meade (FGGM), the Patuxent Research Refuge, State Highway and Federal Highway roads, and State and Federal facilities. Total land area and impervious cover by land ownership/jurisdiction is shown in Table 3.

Table 3. Land Cover and Impervious Distribution by Land Ownership/Jurisdiction

Anne Arundel County Land Cover Categories	City of Annapolis	State	Federal	County	Private	City of Annapolis	State	Federal	County	Private	City of Annapolis	State	Federal	County	Private
	Land Acres					Impervious Acres					Percent Impervious				
Airport	0	1,032	0	68	105	0	832	0	47	74	0%	81%	13%	69%	71%
Commercial	976	653	1,410	1,832	7,687	671	319	861	1,070	5,202	69%	49%	61%	58%	68%
Industrial	39	346	349	419	4,087	13	233	168	213	2,636	34%	67%	48%	51%	65%
Transportation	191	3,886	707	3,304	1,551	151	2,865	381	2,193	423	79%	74%	54%	66%	27%
Pasture/Hay	0	111	362	229	5,312	0	1	5	9	46	0%	1%	1%	4%	1%
Row Crops	0	135	477	253	11,208	0	3	1	13	110	0%	2%	0%	5%	1%
Residential 1/2-acre	112	47	39	1,191	9,475	30	10	11	649	1,851	27%	22%	27%	55%	20%
Residential 1/4-acre	1,786	89	112	2,724	14,779	677	11	28	1,635	3,621	38%	13%	25%	60%	24%
Residential 1/8-acre	569	111	624	3,071	15,707	251	22	201	1,744	5,053	44%	20%	32%	57%	32%
Residential 1-acre	46	87	2	846	10,614	9	10	0	376	1,654	21%	12%	5%	44%	16%
Residential 2-acre	32	172	15	1,020	22,471	10	20	1	379	2,897	30%	12%	7%	37%	13%
Open Space	242	2,975	2,653	3,618	11,358	13	183	176	394	609	5%	6%	7%	11%	5%
Water	22	185	198	365	1,594	1	0	0	2	11	3%	0%	0%	1%	1%
Open Wetland	6	242	29	400	903	0	0	0	0	1	0%	0%	0%	0%	0%
Forested Wetland	0	64	93	53	75	0	0	1	0	0	0%	0%	1%	0%	0%
Woods	798	8,361	11,002	13,229	72,404	12	93	92	282	668	1%	1%	1%	2%	1%
Utility	0	33	220	48	1,630	0	1	7	6	67	0%	4%	3%	12%	4%
SubTotal	4,818	18,529	18,292	32,670	190,959	1,837	4,605	1,934	9,012	24,924	38%	25%	11%	28%	13%
SubTotal (%)	2%	7%	7%	12%	72%	4%	11%	5%	21%	59%					
Total	**265,268**					**42,312**					**16%**				

5. ***Monitoring locations: locations established for chemical, biological, and physical monitoring of watershed restoration efforts and the 2000 Maryland Stormwater Design Manual; and***

Status:

Parole Plaza, Church Creek, and Picture Spring Branch

In compliance with the NPDES MS4 Permit, **Part IV.F**, the County maintains three monitoring sites, Parole Plaza, Church Creek, and Picture Spring Branch, where the required chemical, physical, and biological monitoring of watershed restoration efforts and stormwater management application is conducted. A summary of the FY18 monitoring efforts at these sites is found in **Part IV.F**, and the complete monitoring reports for the reporting year are included in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018*) and **Appendix D** (*Biological and Geomorphological Condition in the Picture Spring Branch Subwatershed, Severn River Watershed, Anne Arundel County, Maryland: 2017-2018*).

The *MonitoringSite* feature class contained in the MS4 Geodatabase represents the locations of the Parole Plaza, Church Creek, and Picture Spring Branch monitoring sites. The *ChemicalMonitoring* table contains results from FY18 and is included in the MS4 Geodatabase provided in **Appendix A**.

County-wide Biological Monitoring Program

Since 2004, the County has implemented a County-wide biological monitoring program focusing on benthic macroinvertebrates and modeled after the Maryland Biological Stream Survey (MBSS). The program uses a probability-based stratified random sampling design so that overall watershed condition can be evaluated and comparisons between different watershed units can be made. A total of 24 Primary Sampling Units (PSUs) are sampled in a five-year rotation called a Round. Round 1 began in 2004 and ended in 2008. Round 2 began in 2009 and concluded in 2013.

In 2017, the County re-launched its County-wide Biological Monitoring Program (Program) following an extensive reevaluation and update, which was completed during the 2016 reporting period. Complete information on the Program update can be found in the Quality Assurance Project Plan – Round 3 at https://www.aacounty.org/departments/public-works/wprp/ecological-assessment-and-evaluation/biological-monitoring/index.html . In summary, fish and water quality sampling have been added to the benthic macroinvertebrate sampling already conducted under the Program. In addition, a second set of random sites was established using a finer scale stream coverage to supplement sample sites established on the coverage used in Rounds 1 and 2. This was done in an effort to better evaluate small streams in the County.

Surface Water Quality Monitoring Program

In addition to the work performed in the Church Creek watershed, the County assesses water quality in two other locations: Cowhide Branch, a tributary to tidal Weems Creek and the Severn

River; and Furnace Branch, a tributary to Curtis Bay and the Patapsco River. Continuous flow and rainfall data are collected at both stations, and monthly stormwater and baseflow monitoring are performed at these sites. Parameters currently analyzed include the following:

Calcium	TKN	Hardness
Copper	NH3	Alkalinity
Lead	TP	Total Phenols
Zinc	TSS	Oil and Grease
Magnesium	PO4	*E. coli*
Iron	COD	VOC (EPA 624)
BOD5	Turbidity	TPH
NO_3/NO_2	TOC	

Cowhide Branch: This stream receives runoff from the Parole Town Center drainage area. One continuous monitoring station is maintained by the County on Cowhide Branch. As part of the Parole Town Center, this site has been monitored since the late 1980s. The automated station was taken out of service in September 2016 due to planned stream restoration work. Before being taken out of service, a total of three storm and two baseflow samples were collected in FY17. The station remained out of service during FY18 for construction and will be re-sited, and a new rating curve developed, in FY19. Post-restoration monitoring will begin in early spring 2019 (FY19).

Furnace Branch: This stream receives discharge from a highly developed drainage area, most of which is routed through a closed storm drain system before discharging into a concrete flood channel which finally discharges to a natural channel reach. The County will restore the concrete channel and downstream area to a more natural stream and wetland system. Prior to construction, a monitoring station was established to characterize pre-restoration water quality, and geomorphic and biological conditions were assessed. During the reporting period, benthic macroinvertebrate samples were collected at two locations and a total of ten storm samples and nine baseflow samples were collected. The station was taken out of service in June 2018, prior to the start of construction. The County anticipates re-siting this station and initiating post-restoration monitoring in Fall 2019 (FY20).

6. Water quality improvement projects: projects proposed, under construction, and completed with associated drainage areas delineated.

Status:

The NPDES MS4 Permit requires the reporting of watershed restoration projects that are under design, under construction and completed during the reporting year. The County continuously updates the inventory of watershed restoration projects as new projects are planned or completed. These projects are documented in the MS4 Geodatabase (**Appendix A**) across four feature classes: *RestBMP*, *AltBMPLine*, *AltBMPPoint*, and *AltBMPoly*.

Because this is the final annual report under the current permit term, this report section covers two time periods: the FY18 reporting year (07/01/2017 – 06/30/2018), and the first half of FY19 (07/01/2018 – 12/31/2018). In addition to the FY18 MS4 Geodatabase, an additional FY19 MS4

Geodatabase is included in **Appendix A** to document the restoration actions undertaken by the County through the end of Calendar Year 2018. The following feature classes and tables are included in this FY19 MS4 Geodatabase:

RestBMP	*RestBMPInspections*	*AltBMPLine*	*StrRestProtocols*
ShorelineManagementPractices	*AltBMPLineInspections*	*AltBMPPoint*	*AltBMPPoly*
AltBMPPointInspections	*AltBMPPolyInspections*		

This report section summarizes the inventory of the watershed restoration projects. **Part IV.E.2** (Restoration Plans) describes the corresponding water quality improvements.

New watershed restoration projects were added to the FY18 and FY19 MS4 Geodatabases. During the FY18 project and data review, the County identified existing restoration projects that were either not previously reported or were reported but updates were needed for certain fields. These projects were added or updated as follows:

- Existing projects were added that had not been previously reported.
- Several projects were updated, based on updated as-built data (e.g., drainage area).
- Several projects were updated, based on revised calculations for reductions in impervious area and pollutant loading.
- Several projects previously categorized as stream restorations were reclassified as SPSCs, based on stream type (ephemeral).

Tables 4 and 5 provide a summary of FY18 and FY19 projects. In FY18 a total of 221 new restoration projects were completed, with a cumulative total of 1,219 projects completed from FY14 through FY18, and an additional 93 projects under design and under construction. In FY19 (first six-months) 91 new restoration projects were completed, with a cumulative total of 1,310 projects completed from FY14 through FY19, and an additional 91 projects under design and under construction.

Table 4. FY18 Restoration BMP project summary

	Projects Completed in FY18	Projects Completed – Cumulative through FY18	Project Under Design or Under Construction in FY18*
Restoration BMPs			
- ESD	0	20	3
- Structural	27	117	60
Alternative Restoration BMPs			
- street sweeping *(annual practice)*	361 tons	1,267 tons	-
- impervious surface elimination	1	3	0
- catch basin and storm drain cleaning *(annual practice)*	108 tons	349 tons	-
- stream restoration	1 (440 ft.)	18 (14,518 ft.)	22 (35,360 ft.)
- outfall stabilization	12 (580 ft.)	25 (1,675 ft.)	0

Table 4. FY18 Restoration BMP project summary

	Projects Completed in FY18	Projects Completed – Cumulative through FY18	Project Under Design or Under Construction in FY18*
- shoreline management	2 (786 ft.)	63 (14,923 ft.)	8 (8,361 ft.)
- septic pumping *(annual practice)*	7,780 units	18,644 units	-
- septic denitrification	168	855	-
- septic connections to WWTP	10	118	-
Total number of projects (excl. annual practices)	221	1,219	93

*Two ESD and six structural BMPs in the *RestBMP* feature class listed as "Under Design" are on hold or cancelled (see comments in MS4 Geodatabase) and are not included in these tallies.

Table 5. FY19 restoration BMP project summary (first two quarters of FY19 only)

	Projects Completed in FY19	Projects Completed – Cumulative through FY19	Project Under Design or Under Construction in FY19*
Restoration BMPs			
- ESD	0	20	3
- Structural	14	131	52
Alternative Restoration BMPs			
- street sweeping *(annual practice)*	N/A	1,267 tons	-
- impervious surface elimination	0	3	0
- catch basin and storm drain cleaning *(annual practice)*	N/A	349 tons	-
- stream restoration	2 (1,420 ft.)	20 (15,938 ft.)	28 (57,215 ft.)
- outfall stabilization	10 (840 ft.)	35 (2,515 ft.)	0
- shoreline management	1 (165 ft.)	64 (15,088 ft.)	8 (8,496 ft.)
- septic pumping *(annual practice)*	N/A	18,644 units	-
- septic denitrification	58	913	-
- septic connections to WWTP	6	124	-
Total number of projects (excl. annual practices)	91	1,310	91

Note: The FY19 reporting period refers to the first 2 quarters only (07/01/2018 - 12/31/2018).
*Two ESD and six structural BMPs in the RestBMP feature class are listed as "Under Design" are on hold or cancelled (see comments in MS4 Geodatabase) and are not included in these tallies.

D. Management Programs

The following management programs shall be implemented in areas served by Anne Arundel County's MS4. These management programs are designed to control stormwater discharges to the maximum extent practicable (MEP) and shall be maintained for the term of this permit. Additionally, these programs shall be integrated with other permit requirements to promote a comprehensive adaptive approach toward solving water quality problems. The County shall modify these programs according to needed program improvements identified as a result of periodic evaluations by MDE.

1. Stormwater Management

An acceptable stormwater management program shall continue to be maintained in accordance with the 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. Complying 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 processes to comply with the requirements of the Act.

Status:

The 2000 Maryland Stormwater Design Manual was fully implemented by the County. However, this condition was superseded by the Maryland Stormwater Management Act of 2007. During FY18, the Department of Inspections & Permits (I&P) continued the requirement for all proposed new stormwater management plans to comply with the Environmental Site Design (ESD) standards in accordance with the County Code, State Code, and the current edition of Maryland Stormwater Management Design Manual.

A comprehensive review and update to the County's Stormwater Management Practices & Procedures Manual was completed in FY18. A draft revision of the updated Manual was submitted to MDE in May 2017, and initial comments were received from MDE in August 2017. The final draft was provided in September 2017, and approval was received from MDE on October 30, 2017 (see **Appendix B**).

As of September 2011, the County has an MDE-approved Stormwater Management Code, which incorporates the current edition of the Maryland Stormwater Management Design Manual.

Copies of the County legislation (Bill 74-11) and the MDE approval letter were provided in the 2011 Annual Report. During this reporting period, no modifications to the Code were required to address programmatic problems.

MDE conducted the triennial inspection of the County's stormwater management program during FY15 finding, overall, that the program is acceptable. The County continues to implement the recommendations from this inspection. As noted in the FY17 MS4 Annual Report, the County's development review engineers were relocated from the Office of Planning and Zoning (OPZ) to I&P, improving communication and interaction between the review engineers and the field inspectors. The next stormwater management program triennial inspection is scheduled for 2019.

The County Department of Inspections & Permits coordinates routine (e.g., monthly) meetings with the County's Stormwater Workgroup, a group comprised of developers, engineers, homeowners' association and Non-governmental Organization (NGO) representatives, realtors, and representatives of the building trades. The purpose of these meetings is to convey information regarding stormwater management facilities that are located on residential lots and are the responsibility of the property owner. Specific information discussed and conveyed (with descriptions) to the non-County attendees includes stormwater facility maintenance requirements, maintenance checklists, and as-built documentation.

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 as a separate project;
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.

Status:

During FY18, County records indicate the following information regarding stormwater management program data (Table 6).

Table 6. Concept, site development, final development, and redevelopment plans received during FY18

Type	Number of Projects Received
Concept Plan[(a)]	94
Site Development Plan[(a)]	149
Final Development Plan[(b)]	97
Final Redevelopment Plan[(c)]	38
Stormwater Exemptions	0
Waiver Requests Received	0
Waiver Requests Approved	0

Notes:
[(a)] Concept Plan and Site Development Plan based on submittal date for each unique Project Number (e.g., P2015-0050-00-NF)
[(b)] Final Plan based on unique Grading Permit No.
[(c)] Redevelopment data only available for Final Redevelopment Plan

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 Anne Arundel County.

Status:

Stormwater construction inspections are conducted by the County's erosion control inspectors in conjunction with the required erosion and sediment control plan inspections. All stormwater construction violations must be resolved and abated prior to the completion of the associated grading permit. For the reporting period, the following inspections were performed:

- 642 Stormwater Construction Inspections
- 48 Stormwater Correction Notices

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 inspections, 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.

Status:

The State and County Stormwater Management Codes require preventive maintenance inspections once during the first year of operation and every three years thereafter for all stormwater

management facilities. For the reporting period, the following maintenance inspections were performed:

- 6,676 Three Year Maintenance Inspections
- 359 Three Year Maintenance Correction Notices
- 27 Three Year Maintenance Violation Notices

Review of the *BMPInspections* table of the MS4 Geodatabase (**Appendix A**) indicates that 6,676 three-year inspections were conducted during the reporting year, equating to roughly 7.5% more inspections than the previous reporting period. In response to property owner requests for site visits and guidance, to gain permission for site access in some situations, to conduct the inspections and to follow-up on required maintenance activities the County's dedicated stormwater management inspection staff performed numerous stormwater maintenance related visits during the reporting period. The County is successfully increasing the number of inspections completed each fiscal year and this can be attributed to the increase in stormwater management inspection staff dedicated to this program.

In July 2018, as documented in **Part IV.C.3**, the County completed the review/update of historic BMP records. Using the information and data resulting from this work effort, the County identified historic/active BMP records that represent more than one stormwater management facility ("stacked" BMPs) and create new records such that each individual stormwater management facility now has a unique record with updated and complete-as-possible data fields as required by the MS4 Geodatabase. The FY18 maintenance inspection information was extrapolated from the stacked BMP records to the resulting individual BMP records.

In prior reports the County has documented the inspection process, including issuance of correction notices and Phase 1, 2, and 3 violation notices. During the FY18 reporting period, all correction notices were successfully enforced at the Phase 1 and Phase 2 levels; there were no Phase 3 violation notices required. Additional information relating to inspection and enforcement activities in FY18 is provided in the *SWM* table of the MS4 Geodatabase submittal (**Appendix A**).

Alternative stormwater facility inspections are also documented in the MS4 Geodatabase. As noted earlier, with this annual report the County is submitting FY18 inspection data as well as FY19 data for those inspections completed as of 31 December 2018.

For FY18, the following alternative BMP inspection data are provided.

- FY18 *AltBMPPointInspections* table contains 265 records associated with inspections of alternative BMPs such as septic system upgrades, connections to Water Reclamation Facilities (WRF), and septic pumpouts. Septic system upgrade (SEPD) inspections are conducted via a service provider visit from MDE's Best Available Technology Management Network (BATMN); inspection results are housed in MDEs BATMN database. It should be noted that thirteen (13) of the SEPD inspection records reported in the County's FY18 *AltBMPPointInspections* table are annotated with an error code in the inspection date field to indicate that the MDE inspection record is incomplete and should be revisited by MDE.

- The FY18 *AltBMPPolyInspections* table contains 1014 inspection records associated with vacuum street sweeping, inlet and catch basin cleaning and other associated alternative BMPs.
- The FY18 *AltBMPLineInspections* table contains 24 inspection records associated with stream restoration and shoreline stabilization projects.

For FY19, the following alternative BMP inspection data are provided. The County will continue inspection and inspection documentation for these BMPs throughout the rest of FY19.

- FY19 *AltBMPPointInspections* table contains 208 inspection records associated with the 227 FY16 implemented BMPs currently ripe for inspection.
- The FY19 *AltBMPPolyInspections* table contains three inspection records associated with impervious surface elimination, vacuum street sweeping, and inlet and catch basin cleaning.
- The FY19 *AltBMPLineInspections* table contains 43 inspection records associated with stream restoration and shoreline stabilization projects.

Lastly, restoration stormwater BMPs are also subject to maintenance inspection to ensure their efficacy within the landscape. The FY18 *RestBMPInspections* table contains 51 restoration BMP inspection records; nine of these inspections occurred in previous reporting years, but are included this year to demonstrate triennial inspection compliance of BMPs constructed in FY15. The FY19 *RestBMPInspections* table contains 15 restoration BMP inspection records; four of these inspections occurred in previous reporting years, but are included to demonstrate triennial inspection compliance of BMPs constructed in FY16.

2. Erosion and Sediment Control

An acceptable erosion and sediment control program shall continue to be maintained and implemented in accordance with the Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland. Activities to be undertaken by the County shall include, but not be limited to:

a. Implementing program improvements identified in any MDE evaluation of the County's erosion and sediment control enforcement authority;

Status:

In FY18, the County continued to address and implement the identified program improvements documented in the November 2016 Delegation Review. The current MDE delegation of authority continues through June 30, 2019. In early FY19, the County completed and submitted the Application for Delegation of Authority to continue administration of the Erosion and Sediment Control Program. The next Delegation Review is anticipated in FY19.

b. At least three times per year, conducting responsible personnel certification classes to educate construction site operators regarding erosion and sediment control compliance;

Status:

Anne Arundel County continues to require a valid Responsible Personnel Certification be held by construction site operators and includes a place on the approved construction plans for the cardholders' name and certification number. Moreover, the County checks for a designated card-holder at the project pre-construction meeting.

Responsible Personnel Certification classes are no longer conducted by County staff. Beginning in FY15, MDE assumed responsibility for this training, which is offered on-line via the MDE website. The optional MS4 Geodatabase table *RespPersonnelCertInfo* is not submitted with the FY18 Annual Report.

c. Program activity shall be recorded on MDE's annual report database and submitted as required in PART V of this permit; and

Status:

As noted above Anne Arundel County is no longer responsible for providing Responsible Personnel Certification training as it is available on-line on the MDE website. Therefore, no certification information is submitted in this narrative or with the MS4 Geodatabase. Other relevant program information is found in the *ErosionSedimentControl* table within the MS4 Geodatabase.

d. Reporting quarterly, information regarding earth disturbances exceeding one acre or more. Quarters shall be based on calendar year and submittals shall be made within 30 days following each quarter. The information submitted shall cover permitting activity for the preceding three months.

Status:

Based on previous guidance from MDE, submission of quarterly reports is not required provided that the Construction General Permit Activity Database continues to be submitted with the annual report. Information regarding grading permits from the County's Construction General Permit Activity Database is provided in the *QuarterlyGradingPermits* feature class and *QuarterlyGradingPmtInfo* table of the MS4 Geodatabase submittal (**Appendix A**).

3. Illicit Discharge Detection and Elimination (IDDE)

Anne Arundel County shall continue to implement an inspection and enforcement program to ensure that all discharges to and from the MS4 that are not composed entirely of stormwater are either permitted by MDE or eliminated. Procedures shall include, but not be limited to, the following activities.

a. The County shall conduct field screening for at least 150 outfalls annually. A sample from each outfall having a discharge at the time of the inspection shall be tested using a chemical test kit. Within one year of permit issuance, an alternative program may be submitted for MDE approval that methodically identifies, investigates, and

eliminates illegal connections to the County's storm drain system.

Status:

Anne Arundel County has developed, and continues to maintain, an extensive program designed to detect and eliminate illicit discharges into the municipal storm drain system and upland pollutant sources resulting from dumping, poor housekeeping, and other non-permitted activities. The program includes the dry-weather inspection of a minimum of 150 storm drain outfalls annually. This outfall inspection records the presence of dry-weather flow, the structural integrity of the outfall, and relevant maintenance issues.

Each year, the Anne Arundel County NPDES MS4 Permit Program Manager, or a delegated staff member, coordinates with the support consultant to identify priority assessment areas in the County that should be investigated for possible illicit discharges to the stormwater system. GIS desktop analysis is used to identify target outfalls primarily draining commercial and industrial land uses. Occasionally, and as deemed appropriate, the County also revisits outfalls that had exhibited illicit discharge during previous assessments to confirm illicit discharge elimination. By assessing a different area of the County each year and incorporating the option of returning to sites that exhibited possible illicit discharge conditions in previous survey periods, the County achieves an area-wide review of likely sources of dry-weather discharge throughout the permit period.

The areas targeted for the FY18 field effort included areas near I-97 just south of I-695, near the intersection of Route 100 with I-97, along Route 3 south of Route 32, and south of U.S. Route 50. Field crews successfully inspected 150 outfalls draining commercial, industrial, and residential land uses. For the FY19 effort, the County will return to the areas of Bodkin Creek and Broadneck, generally along the east side of MD Route 2 north and northeast of Annapolis (e.g., Cape St. Claire and Riviera Beach).

Anne Arundel County's GIS coverage of storm drains and closed storm drain utility grids provided the base data for maps to guide field activities. These maps assisted field crews in identifying the extent of the storm drain systems, locations of outfalls, and any contributing businesses or facilities. The maps included parcels for commercial and industrial facilities and their storm drain systems for screening efforts, as per the guidance provided by MDE (MDE 1997).

Field crews recorded the physical condition of each outfall structure and conditions surrounding the outfall on field datasheets for each site visit. When crews found a dry-weather discharge, they tested the discharge using a Chemetrics color comparator test kit (tested parameters included detergents, phenols, copper, chlorine, fluoride, and ammonia), an Extech single analyte tester (for fluoride), and a YSI sonde (for water temperature and pH). Physical parameters noted at each outfall included structural condition, vegetative condition, erosion, floatables, algae growth, discharge odor, and discharge clarity.

If field tests determined that an outfall's discharge had a concentration above the action criteria for any of the analytes during the first visit, the protocol stipulated that crews revisit the outfall within 24 hours, but at least four hours after the first test. The second visit helps determine if the

initial result was an anomaly, or, if the outfall continues to exhibit flowing discharge, confirm the results of the chemical tests conducted on the first visit.

If both inspections revealed dry-weather flows and concentrations above the action criteria, the outfall is qualified as having a possible illicit connection. Another site condition that implied possible illicit connections included any situation where an observable pollutant had been discharged through a storm drain system, but, at the time of inspection, the system was not flowing, or the discharge test did not reveal detectable levels of the pollutant.

To identify the source of any possible illicit discharge, the field crews followed the storm drain system upstream, testing flows through manholes and inlets as necessary and practical, until either the source was identified, or the discharge could not reasonably be tracked further. Field crews photo-documented evidence of illicit discharges, including the probable cause(s). Staff prepared site-specific reports for each identified potential illicit discharge and structural issue found in the field; staff submitted the reports to the Anne Arundel County MS4 Program Manager. The potential illicit discharge reports were then forwarded to I&P, the County's Infrastructure Management Division (IMD), or the Anne Arundel Health Department for further investigation and enforcement.

Of the screened outfalls containing dry-weather flow during the 2018 reporting period, seven yielded a result above the action-criteria limit for one or more of the tested contaminants. Field crews re-screened each of the seven outfalls and, of those, six had concentrations that were above action level for at least one contaminant when re-tested. The County inspectors performed follow-up site visits and inspections for the outfalls with reported potential illicit discharges. Complete investigation details, including site-specific reports and detailed corrective actions, are found in the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix E**). The report also includes details regarding the resolution of previously unresolved cases described in the 2017 reporting year.

The County consultant's field teams identified three locations where physical issues significantly affected stormwater infrastructure within the targeted areas of Anne Arundel County during the 2018 reporting period. Staff reported these conditions to the County MS4 Program Manager, as appropriate. The site-specific reports were then forwarded to IMD for distribution to the appropriate agency's personnel. Complete investigation details, including site-specific reports and corrective actions, are found in the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix F**).

b. The County shall conduct annual visual surveys of commercial and industrial facilities, as identified in PART IV.C.2 of the current MS4 Permit, for discovering, documenting, and eliminating pollutant sources. The County shall submit reports for the inspected facilities annually.

Status:

During the permitting period, field personnel perform a visual inspection of accessible commercial and industrial sites within the target areas that have the potential to contribute significant

pollutants. The inspections are designed to identify poor housekeeping, dumping, and other non-permitted discharges (e.g., vehicle wash water) that may be intercepted by the County's storm drain system.

Field crews identified 29 upland pollutant sources within the target areas during the 2018 reporting period; these sources demonstrated the potential to discharge pollutants into County storm drains or Waters of the United States. Staff reported upland pollutant sources to the County MS4 Program Manager; the Program Manager typically sent copies of the reports to I&P or the Health Department, as appropriate, to initiate plans for correction. A full report of the procedures and data collected from the illicit detection and elimination field investigations is found in the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix E**); relevant digital data are included in the *IDDE* table of the MS4 Geodatabase provided in **Appendix A**. The complete report (**Appendix E**) contains details of the findings from the 2018 reporting period, and the corrective actions associated with these sites; the report also includes details regarding the resolution of previously unresolved cases described in the 2016 and 2017 reporting years.

c. The County shall maintain a program to address, and, if necessary, respond to, illegal discharges, dumping, and spills.

Status:

There are two departments within the County government that address reports of illegal dumping and spills. I&P is the County agency primarily responsible for enforcing regulations regarding spills and illegal dumping into both publicly and privately-owned storm drain systems. The Anne Arundel Department of Health addresses complaints specifically relating to food service facilities (e.g., overflowing dumpsters or waste grease containers) and documents violations during regular facility inspections.

Over thirty illicit discharge, dumping, or storm drainage complaints were reported to I&P during the 2018 reporting period. These include referrals from the Department of Public Works as part of the department's IDDE Program and referrals from other sources. Illicit discharge complaints and referrals are logged into the I&P Compliance Case Database; this is used to track cases from the receipt of a complaint or referral to closure. Case numbers facilitate tracking the progress of any individual Illicit Discharge complaint or referral received by I&P.

Compliance case data pertinent to the complaints received during the 2018 reporting year are documented in Appendix F of the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix E** of this annual report). All complaints and referrals were investigated and enforced as appropriate.

I&P utilizes a phased approach to eliminating and enforcing illicit storm drain discharges. Phase I Enforcement consists of a Violation Notice sent by first class and certified mail to the property owner. The Phase I Violation Notice includes an explanation of the violation and requests a written commitment to immediately cease the illicit discharging activity. Upon written receipt of the commitment to comply, the Department monitors the site for up to 60 days. If compliance is maintained, the violation is considered abated. Should the Department fail to receive the written

commitment to comply, or if further violations are observed, the Department proceeds to Phase II Enforcement.

At the Phase II level of enforcement, I&P posts a Stop Work Order on the property and issues a $1,000 civil citation to the property owners. The civil citation must be paid and the violation abated, or the civil citations are litigated in court. If a violation were to remain unabated by the court date, the Department requests the full payment of the fines and an abatement order from the District Court judge. The failure to comply with any Court-issued abatement order results in Contempt of Court charges being filed by the County Office of Law.

Significant violations are screened with the County Office of Law for possible criminal enforcement as authorized in the County Code, or for referral to MDE for enforcement under the State Code. During the 2018 reporting period, it was not necessary to issue any civil citations for failure to eliminate illicit storm drain discharges.

As part of its general activities associated with food service facilities, the Department of Health has protocols for abatement of leaking or overflowing dumpsters. Enforcement is conducted under State of Maryland Regulations dealing with Food Service Facilities (COMAR 10.15.03.19) which requires that each facility retain a sufficient number of durable refuse containers capable of holding the facility's garbage between periods of removal; the containers must be adequately covered and not leaking. Violation of this regulation would be marked on the food facility inspection report and would require correction typically within 30 days of the investigation. Failure to comply by the second re-inspection would result in $175 re-inspection fees until compliance is achieved.

The Anne Arundel Health Department also routinely inspects food service facilities to monitor the sanitary and physical conditions of each establishment. If the County receives a complaint about a specific issue relevant to a food service facility, the Health Department conducts an investigation applicable to the issue; these inspections fall outside of the routine schedule for facility assessments. The Health Department also conducts re-inspections, as necessary, to supplement routine inspections or complaints; these ensure corrective actions and facility compliance.

For the FY18 reporting period, issues with dumpsters or waste grease bins, specifically related to food service establishments, were sent to the Health Department for further inspection and enforcement. The Health Department successfully addressed 26 issues reported to the Department by County consultants during the reporting period. Please refer to the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix F**) for details.

d. The County shall report significant illicit discharges to MDE.

Status:

During the FY18 reporting period, no illicit discharge complaints were referred to MDE. Two of the illicit discharge complaints and referrals received in FY18 were successfully enforced by I&P; several conditions required additional monitoring due to inadequate evidence. I&P also resolved four compliance cases that were carried over from the previous reporting period, while County Health Department and Zoning Enforcement successfully addressed two cases from the previous

reporting period. These cases are more fully described in Tables 5-1 and 5-2 of the *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix E)**.

e. The County shall report illicit discharge detection and elimination activities as specified in PART V of the current MS4 Permit.

Status:

The *Illicit Discharge Detection and Elimination – 2018 Annual Report* (**Appendix E)** provides descriptions of all activities completed as part of the County's 2018 IDDE program. In addition, the County follows the requirements in the Permit for reporting IDDE data. The *IDDE* table in the MDE Geodatabase included in **Appendix A** contains information related to screenings of 150 outfalls conducted during FY18. Additional information related to IDDE activities of FY18 can be found in the *Illicit Discharge Detection and Elimination – 2018 Annual Report* included in **Appendix E** of this report.

4. Litter and Floatables

This section of the permit requires Anne Arundel County to address problems associated with litter and floatables in waterways that adversely affect water quality. Increases in litter discharges to receiving waters have become a growing concern both nationally and within Maryland and cannot be ignored. Anne Arundel County needs to evaluate current litter control problems associated with discharges from its storm drain system and develop and implement a public outreach and education program as needed on a watershed by watershed basis.

a. As part of Anne Arundel County's watershed assessments under PART IV.E.1 of this permit, Anne Arundel County shall document all litter control programs and identify potential sources, ways of elimination, and opportunities for overall improvement.

Status:

In FY18, the County completed the Herring Bay, Middle Patuxent River, and Lower Patuxent River Watershed Assessments (see Part IV.E.1). These watershed assessments included a summary of potential sources, and locations of dump sites and areas where concentrations of trash and litter were observed. In addition, the watershed assessments summarized the County's programs for reducing trash and litter from roadways, open space, streams, and other areas; and identified additional methods for controlling and eliminating certain types of litter (e.g., source reduction, recycling, and treatment and disposal options). Please see Section 5 of the final watershed assessment report (found at www.aacounty.org/departments/public-works/wprp/herring-bay-middle-patuxent/index.html) for detailed information and a map of the dump site locations within the study areas.

Overall, these watershed assessments identified 84 discrete dump sites having mostly minor to moderate accumulation of debris. The most common materials found at these locations were tires, appliances, and large metal items (e.g., cars, old farm equipment). The trash and debris observed

did not appear to be recently discarded and clean-up efforts would likely require equipment to remove heavy and/or large pieces. Specific areas with concentrations of new trash or litter (e.g., related to commercial areas, schools, or roadways) were not observed during the study.

During the reporting period, the County explored additional methods of eliminating or reducing certain types of trash and litter on a County-wide basis. From an implementation perspective, the County investigated the use of catch basin inserts for controlling the amount of trash and litter blown or washed into the storm drain systems. Additionally, in those areas of the County without closed storm drain systems, trash traps placed in ephemeral channels are being investigated as an option for eliminating or reducing the occurrence of trash and litter in County waterways. Coordination with NGOs that are actively managing trash trap programs (e.g., South River Federation, Anacostia Watershed Society) has provided insight into locating, building, and maintaining these facilities.

b. Within one year of permit issuance, as part of the public education program described in PART IV.D.6., Anne Arundel County shall develop and implement a public education and outreach program to reduce littering and increase recycling. This shall include:

i. Educating the public on the importance of reducing, reusing, and recycling;
ii. Disseminating information by using signs, articles, and other media outlets; and
iii. Promoting educational programs in schools, businesses, community associations, etc.

c. Evaluating annually the effectiveness of the education program.

d. Submit annually, a report which details progress toward implementing the public education and outreach program. The report shall describe the status of public outreach efforts including resources (e.g., personnel and financial) expended and the effectiveness of all program components.

Status:

Anne Arundel County has implemented public education and outreach programs addressing litter, recycling, and overall waste management. These programs are integral to the services provided by the DPW Bureau of Waste Management Services (WMS) and the DPW Bureau of Highways (BOH). In FY18, the County reviewed and updated the Litter and Floatables Comprehensive Plan. This Plan details existing conditions in the County, highlights all County and County-supported programs pertaining to reduction of litter and floatables, and describes future actions the County may take towards preventing litter from entering waterways. A copy of this plan is found in **Appendix F**.

Documented below is a summary of the County's litter and recycling education and outreach programs for FY18.

Litter Cleanup, Waste Management, & Recycling

The County's Waste Management Services (WMS) developed and operates a robust public education and outreach program targeted to waste reduction and recycling, as well as household hazardous waste disposal.

WMS Recycling Division's successful recycling program is achieved through effective, consistent communication and education. Maintaining adequate program promotion and education are key to keeping customers informed and motivating them to continue and improve recycling as programs change and evolve. Lack of a comprehensive communication strategy can result in higher contamination levels in collected recyclables; less recycling by new residents; and existing customers may lose interest or become frustrated with changing program guidelines. Therefore, the Recycling Division has made communication and education its primary focus and the mechanism by which to cause a steady incremental growth in the residential recycling rate.

WMS recognizes the importance of keeping citizens educated about its programs, particularly in regard to its changes and advancements, and to encourage residents to recycle more often. Recycling Program Specialists attend fairs, festivals, homeowners' association (HOA) meetings, community outreach events, and more. WMS also provides technical assistance with recycling at larger-scale events such as the County Fair, the Annapolis Greek Festival, and more. A total of 24 fairs and festivals were attended in FY18, and recycling assistance was provided to 16 events in the County. Anne Arundel County promotes its recycling program to the public through several methods including:

- Providing technical assistances, and services when possible, to small business and multi-family units;
- Improving communication with customers by maximizing the use of various media including direct mail, broadcast media, social media (e.g., www.recyclemoreoften.com), and newspaper advertisements;
- Attending civic and community meetings and events, workshops, displays, and special promotions;
- Specially designed programs and contests for school aged children; and
- Educating customers on new programs, changes to existing programs, source reduction, schedule updates, and holiday collections.

Education programs are offered to students, faculty, parents, and more throughout Anne Arundel County's public and private schools, as well as day care and home schooling groups. Technical assistance with recycling is also provided upon request, as well as assistance with obtaining Green School Certification through the Maryland Association for Environmental and Outdoor Education (MAEOE) program. In FY18, Recycling Program Specialists provided information to 35 elementary school programs, 18 middle school programs, and 13 summer camps, as well as providing 22 tours of the County Landfill. The Recycling Division also administers three contests annually for County students, including a poster contest for elementary schools, a sculpture contest for middle schools, and a fashion contest for high school students. This helps generate even more excitement about the importance of recycling. The County utilizes a multi-media outreach approach. In addition to attendance and participation in the multiple community events, recycling-

themed mailers and brochures are distributed and advertisements supporting recycling can now be heard on music streaming services. Additional information on the County's recycling and household hazardous waste programs may be found at the following websites:

- www.recyclemoreoften.com/
- www.aacounty.org/services-and-programs/household-hazardous-waste-drop-off-days
- www.facebook.com/annearundelrecycling/

This ongoing and extensive outreach effort has proven to be very successful. Since the inception of the education and outreach program in 2008, the County-wide recycling rate has increased from 31% to 43%. Increases in recycling indicate less material being contributed to the landfill stream and, thus, less material (e.g., potential litter) that could be distributed by wind at pick-up locations or blown out of private vehicles traveling to a landfill for disposal.

The WMS Recycling Division offers a Small Business Recycling Program for offices looking to recycle. This operation is an extension of the residential program with contractors servicing the businesses on the roster with weekly pick-up of containers up to 96 gallons. In FY18, 200 small businesses were signed up for Small Business Recycling and more than 1,300 tons of single-stream recycling was collected.

With recycling being so heavily promoted in the County, it is only fitting that the County employees lead by example and practice recycling as well. The County Office Recycling Program (CORP) was developed to assist in providing County offices and facilities with the necessary tools behind an effective recycling program (e.g., containers, signage, and pick-up service); all offices and facilities have a Recycling Coordinator that directly communicates with the recycling program office. Approximately 1,200 tons of single-stream recycling was collected at 142 County sites (offices, parks, pools, etc.) in FY18.

In FY18, there were six household hazardous waste events (two at each of the three Recycling Centers). These successful events kept 115 tons of household hazardous waste materials out of the landfills, roadside ditches, and County waterways. These events also discourage illegal dumping of hazardous materials. All hazardous waste collected at the facilities during these events is packaged, transported, and disposed of by a licensed hazardous waste contractor. The County does not accept hazardous waste for disposal at their landfill.

The County also provides 40 cubic-yard roll-off bins throughout the year for citizen groups, communities, and the County WPRP to aid in community and watershed cleanup activities. WMS assists in hauling the trash and recyclable material collected from these activities. In FY18, roll-off bins were provided for four communities, removing 4.35 tons of trash.

In support of activities designed to capture and eliminate litter before it enters County waterways, in 2018 the County purchased custom designed storm drain stencils for loan to NGOs, schools, and other organizations. The stencils can be used to mark County-owned storm drain structures.

In an effort to bring awareness to litter issues throughout Anne Arundel County, WPRP and the Recycling and Waste Reduction Division have proposed to engage Anne Arundel County public

high schools students to participate in the "Anne Arundel County Litterati Challenge" utilizing the Litterati application ("app") for smartphone or tablets (www.litterati.org). The Litterati app is used by over 20,000 people worldwide and as of October 2018 has resulted in nearly 2 million pieces of litter being picked up around the globe. Participating students will be able to use the app to track the time and place of litter they pick up, upload photographs, and tag the type of litter collected using hashtags which are already hardcoded into the Litterati app. Participants can then attribute the total number of items collected to their high school using a hashtag. Items collected must be disposed of properly (i.e. trash, recycling, compost).

The County program is still in its developmental phase but is anticipated to launch in fall 2019 with hopes that the program may be incorporated into the classroom curriculum in the future. The Litterati Challenge will mesh technology, school pride, and social and environmental awareness to bring attention to the litter issue that is pervasive throughout Anne Arundel County. In addition to engaging students in litter removal, the app may prove to be helpful in identifying litter "hotspots" due to its geotagging capability.

The County Bureau of Highways (BOH) is responsible for all maintenance activities associated with County-maintained roads. Litter is collected from County roadways on a routine basis. In addition, BOH conducts weekday and weekend roadside litter and trash removal throughout the year, using supervised inmate labor in partnership with the County Department of Detention Facilities. The program was first started in 2007 with a focus on high-litter-count road segments, dump sites, and illegal roadside signs that were proliferating across the County. Since the inception of the program, BOH has constructed a list of high-litter areas based on staff and citizen observations.

Weekend roadside litter pickup occurs every other weekend throughout the year, dependent on weather. The overall effectiveness of the program ultimately depends on the number of inmates eligible for the program. The goal of the weekend pickup program is to realize an improvement in the condition of roadsides in Anne Arundel County without a reduction to other Highways services. Weekend litter removal activities follow a programmed frequency throughout the year. Litter removal crews bag recyclables and other trash items separately, and crews are asked to empty the recyclable items out of their collection bags into containers provided by the WMS Recycling Division.

A total of 9,640 thirty-gallon bags of litter were removed from roadsides from July 1, 2017 to June 30, 2018, with 7,087 bags collected during the routine work week and 2,553 bags collected by the weekend litter removal program. This represents a 1.1% decrease from the last reporting period in which 9,751 bags of litter were removed. For the reporting period, the decrease in litter removal is attributed primarily to the availability of inmate support for this program as evidenced by the decrease in bags collected on the weekends (FY17: 2,996 bags; FY18: 2,553 bags). Since FY10, the County's roadside litter cleanup program has removed an average of 10,834 30-gallon bags of litter from roadsides each fiscal year.

The County BOH also collects large debris from roadsides (e.g., discarded appliances, tires, furniture, tree limbs). In FY18, over 1,500 tons of roadside debris was collected representing a 9% increase over FY17.

In late FY17, the BOH began litter and debris pickup in alleys in certain communities in the northern region of the County (i.e., Brooklyn Park, Arundel Village, portions of Glen Burnie) as part of a rodent control initiative in cooperation with the County Health Department. In FY18, 116 30-gallon bags of litter and debris were collected from 48 alleyways in these three neighborhoods.

The Anne Arundel County Local Development Council (LDC) works with and provides grant funds to the BWI Business Partnership to facilitate an LDC Beautification Project in the Arundel Mills Commercial District. This project focuses on combating trash accumulation on the roads surrounding Arundel Mills and Live! Casino & Hotel. Through the funding provided by LDC, the BWI Business Partnership oversees a landscape team that maintains the aesthetics of roads, median strips, and exit ramps surrounding Arundel Mills Mall and the hotel/casino. This team clears litter; mows grass, removes weeds, plants perennials and annuals, and trims trees and shrubs. This Beautification Project also allows the partnership to identify unusual accumulations of trash that can indicate a larger problem to be addressed and to also alert the police if issues, altercations, or suspicious activity is observed. Between July and December 2018 (FY19), this project removed 2,781 33-gallon trash bags of litter. The LDC Beautification Project at Arundel Mills is anticipated to continue through FY19, funded through a local impact grant to BWI Business Partnership from the LDC and Live! Casino & Hotel.

Stream Cleanups

BOH and WMS supported several watershed cleanup initiatives during the reporting period. In partnership with these efforts, the County supported seven events and hauled away more than 29 tons of material for proper disposal. Specific examples of clean-up events supported by the County are listed in Table 7.

Table 7. Community clean-up activities supported by the County in FY18

Date	Organization/Location	Location	Amount of Trash Removed
7/21/17	Patapsco Heritage Greenway	841 Hammonds Ferry Rd N	0.50 tons
2/21/18	Patapsco Heritage Greenway	841 Hammonds Ferry Rd N	2.50 tons
4/7/18	Project Clean Stream	1343 Cape St. Claire Rd	1.84 tons
4/7/18	Project Clean Stream	55 Forest Plaza Dr	0.59 tons
4/14/18	Restore Rock Creek	Chaucer Ct. & Saltwood Glen	0.54 tons
4/20/18	Forks of Patuxent	1100 Patuxent Rd	1.38 tons
4/26/18	Patapsco Heritage Greenway	841 Hammonds Ferry Rd N	22.10 tons

5. Property Management and Maintenance

a. Anne Arundel County shall ensure that a Notice of Intent (NOI) has been submitted to MDE and a pollution prevention plan developed for each County- owned municipal facility requiring NPDES stormwater general permit coverage. The status of pollution prevention plan development and implementation for each County-

owned municipal facility shall be reviewed, documented, and submitted to MDE annually.

Status:

Anne Arundel County's Water Reclamation Facilities (WRFs) NPDES discharge permits are current or continue in force pending MDE issuance of a revised permit. The County-owned WRFs with NPDES discharge permits are listed in Table 8 below.

Table 8. County Water Reclamation Facility discharge permits

Facility	Permit	Permit Coverage Period
Annapolis WRF	12DP0838	Oct. 1, 2015 – Sept. 30, 2020
Broadneck WRF	14DP0677	Nov. 1, 2017 – Oct. 31, 2022
Broadwater WRF	14DP0813	Nov. 1,2017 – Oct. 31, 2022
Cox Creek WRF	07DP0698	Jan. 1, 2010 – Dec. 31, 2014
Maryland City WRF	11DP2393	April 1, 2015 – Mar 31, 2020
Patuxent WRF	11DP0132	April 1, 2015 – Mar 31, 2020
Mayo Large Communal WRF	02DP2291	Oct. 1, 2013 – Sept. 30, 2018

NPDES wastewater discharge permit renewals for the Cox Creek WRF, the Maryland City WRF, and the Patuxent WRF were submitted to MDE and are pending issuance. Until the new permits are issued, the current permits remain in force.

The Mayo Large Communal WRF, permit number 02DP2291, was decommissioned and now serves as a regional pumping station. There is no permit reapplication for this facility.

The State's General Discharge Permit for Stormwater Associated with Industrial Activities, Permit 12-SW, became effective January 2014. County-owned facilities requiring general discharge permit coverage submitted NOIs to MDE. These facilities, their General Permit Number, the date MDE received the NOIs and Stormwater Pollution Prevention Plans (SWPPPs), and the permit coverage period is listed in Table 9.

Table 9. County 12-SW-permitted facilities

Facility	Permit	NOI & SWPPP Received by MDE	Permit Coverage Period
Bureau of Highways (BOH) – Northern District Road Yards			
200 Dover Rd	12-SW-1176	July 8, 2014	Sept. 12, 2014 – Dec. 31, 2018
318 Mountain Rd	12-SW-1181	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
BOH – Central District Road Yards			
1427 Duckens St	12-SW-1177	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
1847 Crownsville Rd	12-SW-1179	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
415 Broadneck Rd	12-SW-1182	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
BOH – Southern District Road Yards			

Table 9. County 12-SW-permitted facilities

Facility	Permit	NOI & SWPPP Received by MDE	Permit Coverage Period
350 West Central Ave	12-SW-2298	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
6657 Old Solomons Island Rd	12-SW-1180	July 8, 2014	Aug. 21, 2014 – Dec. 31, 2018
Bureau of Waste Management Services (WMS)			
Millersville Landfill & Resource Recovery Facility (MLFRRF)	12-SW-1304	July 3, 2014	Aug. 15, 2014 – Dec. 31,2018
Northern Recycling Center (NRC)	12-SW-0298	July 3, 2014	Aug.15, 2014 – Dec. 31, 2018
Southern Recycling Center (SRC)	12-SW-0297	July 3, 2014	Aug. 18, 2014 – Dec. 31, 2018
Bureau of Utility Operations (BOU)			
Annapolis WRF	12-SW-0756	May 20, 2014	June 16, 2014 – Dec. 31, 2018
Broadneck WRF	12-SW-0758	June 27, 2014	July 30, 2014 – Dec. 31, 2018
Broadwater WRF	12-SW-0757	June 18, 2014	June 26, 2014 – Dec. 31, 2018
Cox Creek WRF	12-SW-0760	June 30, 2014	Aug. 11, 2014 – Dec. 31, 2018
Patuxent WRF	12-SW-2459	June 27, 2014	Aug. 6, 2014 – Dec. 31, 2018
Maryland City WRF	12-SW-0761	June 11, 2014	July 14, 2014 – Dec. 31, 2018
Anne Arundel County Utility Operations Center	12-SW-2345	July 16, 2014	Sept. 8, 2014 – Dec. 31, 2018

At a minimum, each facility performs quarterly and annual inspections as well as staff training on stormwater pollution prevention plans. Compliance documentation, as required by General Permit 12-SW, is maintained at each facility and is available for inspection upon request. Information specific to these facilities and their permit compliance activities is presented in the *MunicipalFacilities* table of the MS4 Geodatabase. Copies of the annual comprehensive site inspections for the above-listed facilities are found in **Appendix G**.

Bureau of Highways (BOH) Stormwater Pollution Prevention Plan Development and Implementation

During the period July 1, 2017, through June 30, 2018, the following items related to General Permit 12-SW at the County's Road Operations Yards were completed:

- Implemented each SWPPP, including:
  - Performed routine facility inspections of each facility, at least quarterly.
  - Completed quarterly outfall visual assessments of each facility.
  - Completed comprehensive annual inspections of each facility in June 2018.
  - Provided training to Road District personnel during the reporting period to support SWPPP implementation.
  - Completed an internal document review during comprehensive annual inspections of

each facility. These records are maintained at each facility.
    - Continuation of maintenance improvements to further prevent stormwater impacts, including:
        - Use of coir log wattles and/or straw bales to protect inlets.
        - Use of asphalt curbing to contain bulk road maintenance materials.
        - Added wooden bulkheads to entryway of salt barns, in addition to straw bales
- Completed underground storage tank testing and inspection of Bureau of Highways facilities using Maryland Department of the Environment Certified UST Inspectors for the following conditions:
    - Annual testing of spill buckets (catchment basins) at two facilities in March 2018.
    - Third Party Inspections at two facilities in calendar year 2017 based upon MDE notification.
    - Five-year tank tightness testing and five-year containment sump testing were completed at all applicable facilities.
- Completed capital improvements to underground storage tank infrastructure at the following facility:
    - 200 Dover Rd, waste oil tank removed 9/8/2017.
- Completed capital improvements to Road Salt storage infrastructure at the following facility:
    - Northern District, 318 Mountain Rd., Salt Storage Bin Roof Addition, October 2018.

Bureau of Waste Management Services Stormwater Pollution Prevention Plan Development and Implementation

The State's General Discharge Permit 12-SW also applies to the three County-owned facilities managed by Waste Management Services (WMS) identified in Table 9. During the reporting period annual comprehensive SWPPP compliance inspections were performed at these facilities in November 2017 and will be performed again in November 2018; visual inspections occur on a quarterly basis. In addition, the stormwater management facilities at these sites are routinely inspected and all identified repairs are immediately undertaken. WMS employs two technicians who inspect and manage the stormwater facilities to ensure proper function.

In FY18, MDE conducted Permit 12-SW compliance inspections at the three WMS facilities. These inspections resulted in MDE concurring that these facilities should be reclassified to the following subsectors (see MDE Reclassification Letter WMS (06/07/2018) in **Appendix G**):

- Millersville Landfill & Resource Recovery Facility – reclassified as Subsector L.1 (Landfill Site) and Subsector N.2 (Source-Separation Recycling Facility);
- Northern Recycling Center – reclassified as Subsector L.3 (Landfill Site) and Subsector N.2 (Source-Separation Recycling Facility); and
- Southern Recycling Center – reclassified as Subsector L.3 (Landfill Site) and Subsector N.2 (Source-Separation Recycling Facility).

On June 19, 2018, the County submitted updated NOIs for each facility (see WMS to MDE Updated NOIs (06/19/2018) in **Appendix G**). Updated SWPPPs for each facility will be submitted to MDE on or before November 1, 2018.

Bureau of Utility Operations Stormwater Pollution Prevention Plan Development and Implementation

During this reporting period, Anne Arundel County's Bureau of Utility Operations continued SWPPP implementation specific to the six WRF facilities and the Utilities Operations Center site listed in Table 9 (above). In support of the NOI and in compliance with the SWPPP, staff perform monthly inspections, quarterly dry weather inspections, quarterly wet weather inspections, annual comprehensive site inspections, annual record review, and annual training. These records are maintained at each facility. It should be noted that the Cox Creek WRF is undergoing ENR upgrades and associated construction. As such, the SWPPP documents for the Cox Creek WRF will be reviewed, revised, and updated accordingly once construction is completed. Similarly, the Patuxent, Annapolis, and Broadwater WRFs are experiencing active construction on-site. Staff at these facilities are aware of the need to maintain a current and accurate SWPPP and will make any necessary revisions as soon as possible following construction completion. In the interim, these WRF staff continue to conduct routine inspections and take appropriate action to ensure SWPPP and 12-SW compliance.

b. The County shall continue to implement a program to reduce pollutants associated with maintenance activities at County-owned facilities including parks, roadways, and parking lots. The maintenance program shall include these or MDE-approved alternative activities:

i. Street sweeping;

Status:

Anne Arundel County's street sweeping program is intended to provide a continuous level of street cleanliness while keeping debris (including litter and floatables) and pollutants out of storm drains, our creeks, rivers and ultimately the Chesapeake Bay.

The County's neighborhood streets are relatively clean because of the work of conscientious residents who assist us by keeping the areas in front of their homes free of litter and debris. Residential streets were not included in the County's program for routine street sweeping during the reporting period. Roads with higher traffic volumes are prioritized to maximize collection. The primary focus of the County's street sweeping program is on main thoroughfares (arterial roads, local and collector streets, roads with high traffic volume), business parks and industrial areas, County park and ride lots, NPDES priority areas, and facility parking lots subject to SWPPP implementation. These areas were scheduled for twice-monthly street sweeping.

The County completed the transition from in-house to contracted street sweeping. During Fiscal Year 2018 the County swept 6,779 curb miles, which equates to 565-curb miles per month - a 5% decrease from the last reporting period. Accomplishments may vary 5% annually depending on disposal costs and other factors. The current funding level supports sustainable accomplishment of approximately 6,800 curb miles annually, a 40% increase over FY16 levels. This contracted

street sweeping program collected more than 360 tons of material from County-maintained streets in FY18.

ii. Inlet inspection and cleaning;

Status:

Anne Arundel County BOH conducts manual and mechanical storm drain inlet cleaning throughout the county. For FY18, the County manually cleaned and removed debris from catch basins, inlets, and outlets of pipes to maintain proper drainage for 7,432 structures. This is an 8% increase from the previous reporting period in which 6,879 structures were cleaned by hand.

In addition, the County inspects catch basins, manholes, and associated pipes to identify structures for cleaning with a sewer vacuum or power rodder. A total of 4,135 structures required cleaning with a sewer vacuum, an increase of 67% from the last reporting period in which 2,477 were cleaned with a sewer vacuum. A total of 89,773 feet of pipe were cleaned, an increase of 81% from the last reporting period in which 49,710 feet were cleaned.

Ditch & Curb-line Cleaning

During the reporting period, the County cleaned and removed debris from roadside inlet and outlet ditches and concrete swales, removed leaves from ditch lines and curbs using a leaf vacuum, and cleaned and reshaped roadside ditches by machine for a total of 159,421 feet during the reporting period. This is a decrease of 8% from the last reporting period in which the County cleaned 172,460 feet. Year-to-year variability in linear feet of ditch and curb-line cleaning is routinely around 30%.

iii. Reducing the use of pesticides, herbicides, fertilizers, and other pollutants associated with vegetation management through increased use of integrated pest management;

Status:

Pesticides & Herbicides

Anne Arundel County makes a financial contribution annually to support Maryland Department of Agriculture (MDA) programs for gypsy moth control (http://mda.maryland.gov/plants-pests/Pages/gypsy_moth_program.aspx) and mosquito control (http://mda.maryland.gov/plants-pests/Pages/mosquito_control.aspx). The County does not maintain information regarding the quantity of materials used by these State programs.

Herbicide use associated with road maintenance performed by the BOH is limited to the application of glyphosate (e.g., Roundup ™) on County rights-of-way to control vegetative growth around guardrails, concrete structures, and prior to crack sealing operations in the traveled portion of the roadway. A total of 25 gallons of glyphosate was used during the reporting period. This is a 9% decrease over the previous reporting period in which a total of 27.5 gallons was applied. The reduction can be largely attributed to the total number of application cycles scheduled during the

reporting period. The Bureau of Highways recorded no other herbicide, pesticide, or fertilizer application.

The Bureau of Highways employs a contractor who holds a Pest Control Applicator Certificate. The applicator categories are 3A - Ornamental, 3C - Turf, and 6 - Right-of-Way. The contractor is required to attend re-certification training per MDA guidelines to include Integrated Pest Management and pesticide safety. Each time there is chemical use, a pesticide report is completed and filed, which is available to be reviewed during MDA's biennial inspection.

Anne Arundel County Recreation and Parks (AACRP) is committed to providing parks with pest-free environments through the implementation of preventive methods, integrated pest management (IPM), and chemical strategies when necessary. Because AACRP properties, facilities, and programs are often contiguous physically, programmatically, geographically, and operationally to Anne Arundel County Public School properties, it was deemed imperative that there be a high degree of standardization, commonality, and uniformity in pest management philosophy. As such, AACRP Turf Division has reported using the compounds listed in Table 10 at AACRP properties during FY18.

Table 10. Herbicides used at AACRP-managed properties during FY18

Trade Name	Active Compounds	Applied Conc.	Units	Total Amount Applied
Ranger Pro	Glyphosate	20%/gallon	Gallons	423
Solitare	Sulfentrazone - Quinclorac	1.5 lbs/acre	Gallons	360
Prodiamine	Prodiamine	0.037%	Pounds	2400
Oxadiazon 2G	Oxadiazon	0.12 lbs/acre	Pounds	4300
3-D	Dimethylamine Salt of 2, 4-D - 30.56% Dimethylamine Salt of (+)-R-2-propionic acid - 8.17% Dimethylamine Salt of Dicamba - 2.77%	0.75 oz/gallon	Gallons	160
4-Speed XT	2,4-D (41.9%), Triclopyr (4.8%), Dicamba (3.46%), Pyraflufen-ethyl (0.067%)	3 pints/acre	Gallons	60
Fiesta	Iron HEDTA (FeHEDTA) 26.5%		Gallons	16
Momentum FX2	Triisopropanolamine Salt of 2,4-Dichlorophenoxyacetic Acid-44.20% Triethylamine Salt of 3,5,6-Trichloro-2-Pyridinyloxyacetic Acid 3.86% 1-Methylheptyl Ester of Fluroxypyr: [(4-amino-3-5-dichloro-6- fluoro-2-pyridinyl)oxy]acetic Acid, 1-methylheptyl Ester 4.20%		Gallons	102
Burnout II	Citric Acid 11.00% Clove Oil 6.50% Sodium Lauryl Sulfate 3.00%		Gallons	84
Round up Pro	Glyphosate 50.2%		Gallons	16
Prosecutor	Glyphosate 36.5%		Gallons	91

Anne Arundel County Facilities Maintenance Division (FMD), Horticulture Unit, maintain landscaping on County properties including all Administrative Buildings, Libraries, Police and Fire Stations, Senior Centers, and Health Centers throughout the County. In FY18, the following compounds and quantities were reported by the FMD Horticulture Unit:

- 3 gallons of liquid Round-up (Glyphosate)
- 28 pounds of granular Round-up (Glyphosate)
- 15 pounds of granular Prosecutor (Glyphosate)

Landfills and recycling centers managed by WMS do not use herbicides to control unwanted woody and herbaceous vegetation. Weeds and other problematic vegetation at these facilities are removed entirely by physical and mechanical means.

Integrated Pest Management (IPM)

The maintenance plan for all FMD properties and rights-of-way include IPM. Key elements include the following:

- Use of herbicides only when pulling or cutting weeds have not proven effective;
- Use of insecticides only when natural methods have not proven effective;
- Elimination of fertilizer use, proper use of hand weeding and mulching, and sparing use of herbicides on roadway medians;
- Limiting fertilizer use on FMD properties, and using only when grass needs nutrients to encourage proper growth that helps with the prevention of soil erosion and limits runoff;
- Selecting disease- and insect-resistant plants for new plantings; and
- Selecting the least toxic product available, using appropriate storage facilities and techniques, and compliance with all applicable laws and regulations.

During the reporting period, the AACRP continued implementation of an IPM program for County parks and athletic facilities. The IPM plan is required pursuant to County legislation that became effective July 1, 2013, and that modified Article 14 of the County Code by adding §14-1-105 (Integrated Pest Management Plan). The updated Article 14 of the County Code can be found online at http://www.aacounty.org/our-county/county-code/index.html. Pursuant to this legislative requirement, the public is provided prior notification of pesticide application at Recreation and Parks public facilities. Key elements of the IPM program at AACRP facilities include the following actions:

- Minimize the amount and toxicity of pesticides used in the park facilities;
- Eliminate unnecessary pesticide applications;
- Provide IPM education to the public, park users and park staff;
- Improve landscape and grounds cleanliness;
- Utilize only Licensed, Certified and Registered Technician pesticide applicators;
- Reduce or eliminate exposure of children, vulnerable adults, nursing mothers with infants and pets to pesticide applications; and
- Provide universal public and staff notification.

iv. Reducing the use of winter weather deicing materials through research, continual testing and improvement of materials, equipment calibration, employee training, and effective decision-making; and

Status:

Snow and Ice Control

The amounts of de-icing chemicals used by the County BOH during FY18 are found in Table 11. De-icing chemical data for the three previous reporting periods are provided as a comparison. The quantity of de-icing chemicals used each year is highly variable because it is based on actual winter

weather conditions including precipitation type, precipitation frequency, and factors such as road surface temperature.

Table 11. De-icing material applied by the Bureau of Highways, fiscal years 2014–2018

Material	2014–2015	2015–2016	2016–2017	2017–2018
Road Salt (tons)	32,250	11,318	5,361	17,420
Liquid Salt Brine (gal.)	0	71,500[a]	139,000[a]	142,850[a]
Total Salt (tons)	32,250	11,390	5,500	17,582
Liquid Calcium Chloride (gal.)	11,925[b]	6,578[b]	1,046[b]	2,900[b]
NWS Snow Totals – BWI (in.)	28.7[c]	35.1[c]	3.0[c]	15.4[c]
NWS Avg. Winter Temp (°F)	32.0	39.4	40.5	36.4

[a] One ton of rock salt produces 1000 gallons.
[b]Average winter temperature at BWI Thurgood Marshall Airport is 35.1 degrees per the National Weather Service (NWS). Calcium Chloride depresses the freezing point and is used more extensively during colder periods to prevent ice formation and to deice road surfaces. Increased use is likely when average temperature is near or below freezing, or in cases of ice and heavy snowfall.
[c] Average long-term annual snowfall total at BWI Thurgood Marshall Airport is 20.1 inches per the National Weather Service (NWS). Winter 2017-2018 snowfall total at BWI was 15.4 inches. Below-normal snowfall, moderate temperatures, anti-icing, and sensible salting practices partially offset three additional salting storm events and an ice event in 2017-2018; this resulted in a modest increase in salt use above that recorded in the 2016-2017 winter season.

In 2014, subsequent to the promulgation of a Statewide Salt Management Plan, the County's BOH developed the Department of Public Works Salt Management Plan to outline the practices intended to effectively manage road salt for winter maintenance activities within the County. The Salt Management Plan is organized into the following areas:

- Winter maintenance policies;
- Trends and data analysis;
- Materials ordering, delivery, storage, handling and record keeping;
- Equipment upgrading, calibration and washing;
- Snow and ice control training;
- Weather forecasting, storm response, environmentally sensitive areas;
- Technology review; and
- Public outreach and education.

Near-Term Goals incorporated in the Salt Management Plan include:

- *Winter Maintenance Policies:* The Department has established level of service and maintenance standards which have been generally accepted by the community at large. These policies form the foundation for program delivery and can have a significant effect on the environment. The goal is to review the various departmental standards relating to the winter maintenance program and seek endorsement for the level of service and maintenance policies.

- *Record Keeping:* One of the keys to an effective winter maintenance program is to place the right amount of material in the right place at the right time. At the present time, the record of material usage is tracked manually and reconciled with the residual inventory but should be enhanced to document salt usage by route, by vehicle, and by storm.
- *Winter Maintenance Training:* A thorough understanding of good housekeeping practices, the measures of snow and ice control and the expectations of program delivery will result in a greater probability of success with the salt management plan. For this reason, it is essential that all staff involved with winter operations be provided with Winter Maintenance and Operations Training.
- *Communications:* The goal in this area is to communicate the Department's winter maintenance program and salt management initiatives to staff and to the public. The prime focus in this area will be to increase public awareness in the role of de-icing materials in snow and ice control through the development of appropriate information on the Department's webpage.
- *GPS Upgrade:* It is recommended that the Snow Operations fleet be upgraded by installing an Automated Vehicle Location system (AVL). Strategic and tactical decision making during a storm response, informed by an AVL system, improves effectiveness, resource allocation, and potentially reduces storm response duration. The GPS data provided by an AVL can assist with the analysis of complaints, trouble spots, and claims against the County. This is possible because the location of a truck can be pinpointed in time throughout the storm with a high level of accuracy.

Longer Term Goals identified in the Salt Management Plan include:

- *Equipment Upgrading:* It is intended that the winter maintenance fleet be capable of delivering appropriate levels of de-icing materials within a full range of climatic conditions. The most cost-effective way of fleet upgrading is to consider changes as vehicles within the fleet come up for replacement. In this regard, as the salt spreader fleet comes up for replacement within the County's heavy equipment replacement program, the vehicles are to be equipped with electronic controllers, infrared thermometers and pre-wet capabilities. The equipment upgrades will improve the capability of placing the right amount of de-icing material in the right place, at the right time and allow for an increased level of data collection which, in turn leads to more effective use of salt.
- *Environmentally Sensitive Areas:* Concentrations of chloride in the environment can have negative environmental impacts and the Statewide Salt Management Plan suggests a program to assess the levels of impact due to winter maintenance. Initially, the environmentally sensitive areas can be identified and ranked starting with the most vulnerable areas (highest ranked); a monitoring program can be developed, where appropriate, to explore the level of impact resulting from the County's winter maintenance practices. Over time, where appropriate, action plans are to be developed to reduce the chloride impacts on the environment.

In 2017–2018, the Bureau continued its efforts to reduce the use of winter weather de-icing materials through application of best practices and improvement of materials, equipment calibration, employee training, and effective decision making. The County issued contracts to continue a County-wide anti-icing program during the 2018–2019 season, procured additional

heavy-duty dump trucks equipped with the latest spreader controller technology and on-board liquid application capability, and continued to equip its plow fleet with AVL tracking hardware to monitor and optimize snow removal operations.

The Bureau continued its use of a maintenance decision support system (MDSS) which uses real-time data from our Road Weather Information System (RWIS). The RWIS system is a series of pavement and bridge deck sensors and other instruments installed along certain County-owned bridges and roadways. The integration of RWIS data into an MDSS allows the management team to select the most appropriate winter treatment for actual weather conditions in each area of the County during a winter storm event. Studies have shown use of an MDSS can help reduce the use of de-icing chemicals.

Annual training on proper snow plowing techniques and safety is also offered to both County and contractor personnel responsible for maintaining the County's roadways during inclement winter weather. The training includes information on the application of de-icing products and proper application rates. Training sessions are held in October and November each year. Approximately 150 County personnel and 115 contractors attended the training sessions in FY18.

These training sessions present the concept of "Sensible Salting" to all winter operations personnel (County and contractors). "Sensible Salting" training creates an awareness of the need to protect the environment and is another way of saying "Enough and no more." Sufficient salt is required to produce the desired safety and mobility to achieve the level-of-service goal. "Excess" applications add cost but no further benefit, and harm the environment.

The Department's Sensible Salting Practices include:

- Limited Salting During the Late Evening/Early Morning Hours (11:00 p.m. – 4:00 a.m.): Salting is not as effective at this time due to low traffic volumes. During these hours, the goal is to ensure passable roads which means only intersections, hills, curves, and bridges will be salted. Beginning at 4:00 a.m., the Department prepares the roads for rush hour.
- Limited Salting on Secondary Roads: Secondary Roads (local streets) will be plowed as often as possible, but will only be salted at intersections, hills, curves, bridges, and school zones. "Spot Salting" will also be used when necessary.
- Proper Calibration of Equipment: All equipment will be calibrated to ensure that desired application rates are applied correctly and over-salting is avoided.

Activities at WMS facilities also require the use of de-icing materials. The amount of salt used at each facility in FY18 was as follows:

- Millersville Landfill and Resource Recovery Facility & Central Recycling Center – 86.88 tons;
- Northern Recycling Center – 1.87 tons; and
- Southern Recycling Center – 3.75 tons.

v. Ensuring that all County staff receive adequate training in pollution prevention and good housekeeping practices.

Status:

The Bureau of Highways held quarterly staff training sessions with Road District personnel during the reporting period to support SWPPP implementation, as summarized in Table 12.

Table 12. SWPPP training summary for Bureau of Highways facilities in FY18

Training Number	Training Location	Training Date	# Attendees	Training Session Topic
17282186	1311CO	08/17/2017	13	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282182	1310ND	08/21/2017	13	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282183	1310NM	08/21/2017	21	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282193	1312SD	08/22/2017	17	MODULE #3: OUR SWPPP - PART II
17282190	1311CC	08/23/2017	12	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282192	1311CS	08/25/2017	4	MODULE #4: SECONDARY CONTAINMENT
17282205	1311CO	10/16/2017	8	MODULE #2: OUR SWPPP - PART I
17282206	1311CC	11/08/2017	11	MODULE #2: OUR SWPPP - PART I
17314123	1312SD	11/16/2017	18	MODULE #3: OUR SWPPP - PART II
17282209	1311CS	11/21/2017	6	MODULE #3: OUR SWPPP - PART II
17282198	1310ND	11/22/2017	17	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282202	1310NM	11/30/2017	16	NOVEMBER 2017: CREW ATTENEDED SWPPP TRAINING 11-30-17 TC///
17282224	1310NM	02/14/2018	19	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282221	1310ND	02/16/2018	17	MODULE #: E&S CONTROL - PROPER USE AND INSTALLATION OF EROSION CONTROL MAT
17282227	1311CO	02/16/2018	10	MODULE #4: SECONDARY CONTAINMENT & POLLUTION PREVENTION TEAM
17282232	1311CS	02/26/2018	7	MODULE #2: OUR SWPPP - PART II
17282230	1311CC	03/01/2018	10	MODULE #4: SECONDARY CONTAINMENT
18341794	1312SD	04/25/2018	20	MODULE #2: OUR SWPPP - PART II
17282435	1311CO	05/11/2018	15	MODULE #4: SECONDARY CONTAINMENT
17282449	1312SD	05/22/2018	23	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP

Table 12. SWPPP training summary for Bureau of Highways facilities in FY18

Training Number	Training Location	Training Date	# Attendees	Training Session Topic
17282439	1311CC	05/24/2018	7	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282447	1311CS	05/24/2018	6	MODULE #1: WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP
17282243	1310ND	05/25/2018	17	MODULE #: E&S CONTROL - MULCHING & PROPER USE AND INSTALLATION OF EROSION CONTROL MAT
17282432	1310NM	05/31/2018	16	CLEANING UP SPILLS.

The County's WMS staff continued their training on stormwater pollution prevention with formal SWPPP training sessions held in January, February, and March 2018, as summarized in Table 13 below.

Table 13. SWPPP training for Bureau of Waste Management Services in FY18

Training Date	# Attendees	Course #	Course Title
01/10/2018	6	CRS0001627	Industrial Stormwater Management: Keeping Up with Compliance (MLFRRC)
03/08/2018	6	CRS0001684	Stormwater Technology for the 21st Century (MLFRRC)
02/14/2018	23	CRS0001191	Solid Waste Permit – SWPPP Training (MLFRRC)
02/16/2018	14	CRS0001191	Solid Waste Permit – SWPPP Training (MLFRRC)
02/22/2018	10	CRS0001191	Solid Waste Permit – SWPPP Training (SRC)
03/02/2018	13	CRS0001191	Solid Waste Permit – SWPPP Training (NRC)

The Bureau of Utilities conducted SWPPP staff training sessions at the WRFs and Utility Operations Center facilities. Stormwater pollution prevention training sessions occurred on August 17, 2017, October 31, 2017, December 7, 2017, June 11, 2018, June 12, 2018, September 25, 2018, and October 25, 2018.

MDE Compliance Review – Property Management and Maintenance Program

On January 22, 2018, MDE conducted a compliance assessment of the County's Property Management and Maintenance Program. The assessment included an in-office meeting with County staff to discuss the program and site visits to three County-owned facilities. Two of the facilities visited were BOH Road Operations Yards and one was a Fire Station (Non-Permit 12-

SW facility). The compliance assessment focused primarily on snow and ice control, including application of de-icing material, training, equipment technology, and general winter maintenance policies; the assessment also covered pertinent SWPPP documentation and good housekeeping practices. The MDE compliance assessment report (**Appendix G**) noted the new technologies and the anti-icing programs that are being phased into the County's snow and ice control routine operations and recognized the County's proactive long-term approach to winter weather maintenance policies. Additional observations included the use of SWPPPs to identify and implement corrective actions on-site as well as the County's successful implementation of good housekeeping practices.

6. Public Education

Anne Arundel County shall continue to implement a public education and outreach program to reduce stormwater pollutants. Outreach efforts may be integrated with other aspects of the County's activities. These efforts are to be documented and summarized in each annual report. The County shall continue to implement a public outreach and education campaign with specific performance goals and deadlines to:

a. Maintain a compliance hotline or similar mechanism for public reporting of water quality complaints, including suspected illicit discharges, illegal dumping, and spills.

Status:

The Department of Inspections & Permits maintains a 24-Hour Environmental Hotline for citizens to report environmentally related complaints including critical area violations, spills, and illegal dumping into the County storm drain system. The Hotline has been in existence since 1988 and has been advertised in numerous ways including the County Inspections and Permits webpage: www.aacounty.org/departments/inspections-and-permits/index.html. In August of 2017, the Hotline number was changed. The new number is 410-222-7171.

In addition to the 24-hour environmental hotline, the County webpage provides a link for citizens to submit on-line requests for investigation of environmental concerns or any other observation or issue of concern: https://www.aacounty.org/services-and-programs/report-a-concern. This on-line reporting interface is in addition to the options for reporting concerns and issues through the mobile app SeeClickFix.com© (SeeClickFix,Inc., 2008-2017) or by dialing 311 (Mon–Fri from 8:00 to 4:30) to reach a County customer service representative. The County is committed to customer services and promptly responds to reported concerns.

In August of 2018, the County implemented a new complaint management system whereby complaints received via the above reporting mechanisms are entered into a database based on one of three major categories (Building, Environment, or Zoning) and assigned to one of numerous subcategories within each major category (e.g., Illegal Discharges is an Environmental subcategory). The complaint is then assigned to an inspector for follow-up and enforcement action, all of which is documented within the database. Information on complaints received and the subsequent actions taken can be viewed via the County's Inspections and Permits webpage by

clicking on the hot link "Code Compliance Database" found on the right side of the webpage. This link takes you to: https://www.aacounty.org/departments/inspections-and-permits/code-compliance/review-system/index.html where case information can be searched by address, Tax ID, or Case ID number. Of note, the Case ID for all environmental complaints begins with "E" followed by the calendar year opened (e.g., 2018).

During this reporting period over 1,500 building, zoning, and environmental complaints were documented via the new compliance database. Of the complaints opened during FY18, roughly 49% were environmental concerns that included illegal discharges (32 complaints), stormwater management issues (20 complaints), grading without a permit (179 complaints), and general drainage concerns (209 complaints) among other subcategories.

b. Provide information to inform the general public about the benefits of:

i. Increasing water conservation;
ii. Residential and community stormwater management implementation and facility maintenance;
iii. Proper erosion and sediment control practices;
iv. Increasing proper disposal of household hazardous waste;
v. Improving lawn care and landscape management (e.g., the proper use of herbicides, pesticides, and fertilizers, ice control and snow removal, cash for clippers, etc.);
vi. Residential car care and washing; and
vii. Proper pet waste management.

Status:

The County continues to provide residents with information necessary to make informed decisions regarding water quality issues and environmental stewardship. Several County departments have public outreach programs tailored to their specific discipline. Examples of some of the outreach activities are described in this section of the report.

The Anne Arundel County DPW webpage provides water quality-related information associated with County-provided services (https://www.aacounty.org/departments/public-works/index.html). In FY18, information available through this website included the County's Annual Drinking Water Quality Report https://www.aacounty.org/departments/public-works/utilities/forms-and-publications/water-quality-reports/index.html.

Relevant information to help residents reduce stormwater pollution is provided on the County's WPRP website (https://www.aacounty.org/departments/public-works/wprp/index.html) and its "Think Bay" webpage (https://www.aacounty.org/departments/public-works/wprp/think-bay/index.html). Topics include rainwater reuse, rain gardens, permeable paving materials, car maintenance, household hazardous waste, pesticide and fertilizer use, litter and recycling, pet waste cleanup, septic system maintenance, boating, and de-icing.

During the reporting period, the DPW Bureau of Utilities attended numerous community events to promote water conservation and conducted tours of various County-operated water treatment plants and wastewater reclamation facilities (Table 14).

Table 14. Bureau of Utilities community events and tours in FY18

Date	Organization/Event	Topic
8/5/17	Odenton Library	Outreach Event
9/15/2017	Anne Arundel County Fair	Outreach Event
9/16/2017	Riviera Beach Memorial Appreciation Day	Outreach Event
9/23/2017	Emergency Preparedness Day	Outreach Event
10/7/2017	Community Day - Crofton	Outreach Event
10/18/2017	Water Presentation for Children - School	Outreach Event
11/1/2017	Water Presentation for Children - School	Outreach Event
11/3/2017	GBHS Environment Sustainability Tour	Facility Tour
11/4/2017	STEM Day	Outreach Event
11/14/2017	Phipps @ Greater Severna Park	Outreach Event
11/22/2017	School of the Incarnation	Facility Tour
1/18/2018	Sunset Elementary School	Outreach Event
2/20/2018	Brooklyn Park IA	Outreach Event
3/11/2018	Groundwater Awareness Week	Outreach Event
3/19/2018	Fix-A-Leak Week	Outreach Event
4/15/2018	National Water Week	Outreach Event
5/1/2018	Water Sampling Event	Outreach Event
5/6/2018	Drinking Water Week	Outreach Event
5/20/2018	Public Works Week	Outreach Event

The DPW Bureau of Highways developed information to act as a Resident's Guide to Rain Gardens in Anne Arundel County. The materials, available at www.aacounty.org/services-and-programs/rain-gardens, explain relevant County requirements and outline opportunities for homeowners to use rain gardens to provide flood control, groundwater recharge, and water-cooling benefits, while removing many types of pollutants and other contaminants from stormwater runoff.

Relating to sediment and erosion control practices, the I&P website contains general information available to the public regarding this topic including buffer management, grading and permits, the Chesapeake Bay Critical Area, invasive species, and sensitive areas. This information can be found at https://www.aacounty.org/departments/inspections-and-permits/permit-center/index.html.

The Anne Arundel Watershed Stewards Academy (WSA) provides information about maintenance of residential septic systems (www.aawsa.org), as does the County's Department of Health (www.aahealth.org).

The County's DPW WMS Bureau administers an extensive outreach campaign geared toward residential recycling as well as proper disposal of household hazardous waste (HHW) materials. Outreach pertinent to HHW disposal has been reported in previous annual reports and is also documented in the County's Litter and Floatables Comprehensive Plan **(Appendix F)**; a summary of events related to HHW is located in Part IV.D.4. of the Annual Report. Additional information

on HHW disposal is available on the County's website at: www.aacounty.org/departments/public-works/waste-management/. WPRP has also developed a 'tip card' for distribution to residents regarding proper household hazardous waste management (available at https://www.aacounty.org/departments/public-works/wprp/think-bay/HHW.pdf). Literature outlining alternatives to hazardous household chemicals, and safe disposal of such chemicals, is also provided to the public through many different venues, including the WSA website (aawsa.org/choose-non-toxic-products).

In FY18, WMS held six resident-only HHW collection events. These events accounted for the proper disposal of 115 tons of HHW, successfully keeping these materials out of our landfills, roadside ditches, storm drains, and waterways. These collection events are vital to keeping harmful toxins out of our landfill, and also discourage the improper disposal of hazardous materials. All HHW materials collected at the events are packaged, transported, and disposed of by a licensed hazardous waste contractor.

DPW WMS also provides information such as what can be recycled; ways to get recycling and composting bins; dealing with yard waste and grass cycling; amounts recycled in different areas of the County; local events that promote recycling; and question-and-answer forums at outreach events, in County offices, through the County website, on the "Recycle. More. Often." website (www. recyclemoreoften.com), and on the Anne Arundel County Recycling Division Facebook page (https://www.facebook.com/annearundelrecycling/). Since the program's inception in 2008, the County-wide recycling rate has increased from 31% to 43%.

Lawns make up a significant portion of individual properties and have been shown to produce more runoff than their forested counterparts do. As such, in addition to the information provided on the WPRP website, the WSA promotes the use of "Bay Friendly" lawn care and landscaping practices both on their website (www.aawsa.org) and through community outreach. WPRP has also developed a 'tip card' distributed to residents regarding proper lawn management; the document is available at https://www.aacounty.org/departments/public-works/wprp/think-bay/Lawn%20Maint.pdf.

The Bureau of Highways has authored a webpage dedicated to Leaf Removal/Recycling at https://www.aacounty.org/departments/public-works/highways/road-maintenance/Roadside_Maintenance/leaf-removalrecycling . The page explains relevant County services, and suggests opportunities for homeowners to manage leaves responsibly.

The County's winter de-icing strategy and resources are well explained on the County webpage at www.aacounty.org/departments/public-works/highways /snow-information/index.html. The County is dedicated to ensuring the safety of the traveling public while also providing timely service to County residents and businesses during inclement weather. This webpage succinctly explains the County's efforts toward winter preparations, what citizens and business should expect during snow storms, what County citizens can do to help during inclement weather events, and general winter weather tips. Some excerpts from this webpage are provided below:

Getting Ready Early:
The dedicated staff of the Bureau of Highways (BOHs) is busy preparing for winter snow and ice control activities long before the first hint of snowfall. During the summer months, we first evaluate our fleet and staffing needs for the upcoming season. Our fleet of vehicles and equipment are then serviced and maintained to meet the demands of the winter season.

Controlling Costs:
Snow and ice removal activities and the expense of our operations are reviewed each year. One cost control effort employed by the BOHs is the use private contractors. The process of securing snow removal contractors begins in July. Similar to the County fleet, contractor equipment is inspected and prepared for winter service. Snow removal information designed to educate our citizen and businesses is also developed and prepared in the fall. During the spring months, a thorough review of the previous year's snow removal outreach activities is conducted. Necessary changes are documented for implementation in the upcoming snow season

Salt Storage:
"Anne Arundel County uses covered storage facilities for its road salt and stores a total of approximately 13,000 tons of salt at the following locations: Dover Road (Glen Burnie), Mountain Road (Pasadena), Crownsville Road (Annapolis), Broadneck Road (St. Margarets), Duckens Street (Odenton), West Central Avenue (Davidsonville), and at a storage yard in Friendship, MD. At the present time, a small portion of Anne Arundel County's fleet is also equipped with liquid calcium chloride pre-wetting equipment. Pre- wetting dry salt during its application helps the salt to adhere to the roadway. In contrast, dry salt can "bounce" and blow off the roadway and be less effective."

Environmentally Responsible De-icing:
De-icing materials are an effective tool for maintaining safe winter road conditions. However, the County is aware that excessive use can have negative impacts on the environment. Heavy use of road salts has been assessed to cause damage to vegetation, organisms in soil, birds and to other wildlife. Chloride ions from road salts find their way eventually into waterways, whether by direct runoff into surface water or by moving through the soil and groundwater. In surface water, road salts can harm freshwater plants, fish and other organisms that are not adapted to living in saline waters. The BOHs strives to only apply as much salt as necessary to achieve safe driving conditions.

In addition, WPRP utilized social media to promote how the County has reduced the amount of rock salt, by use of salt brine, to residents. Lastly, WPRP utilized social media and its website to present information on the proper use of de-icing materials for homeowners.

Residential car care and residential car washing can readily contribute pollutants to the storm drain system as can improper boat cleaning and maintenance actions. Information on proper maintenance and cleaning of these vehicles is provided on both the County WPRP webpage (www.aarivers.org) and through the WSA. In addition to outreach by individual stewards, information on proper car and boat repair is found on the WSA webpage (www.aawsa.org/maintain-cars-and-boats/). The WPRP has developed a "tip card" distributed to residents regarding proper car washing techniques; the document is also available at https://www.aacounty.org/departments/public-works/wprp/think-bay/Vehicle%20Maint.pdf

As Anne Arundel County has over 530 miles of shoreline, WPRP continues to promote "Responsible Boating" to provide boaters with information on the impacts boating can have on water quality. Water pollution problems associated with boating include discharges of oil, fuel, sewage, trash, fishing line, toxic cleaning and maintenance products, bottom paints, and invasive aquatic species. Anne Arundel County has over 40 certified Maryland Clean Marinas. These marinas meet the rigorous pollution prevention standards established by the Maryland Clean Marina Committee and the Department of Natural Resources. The operators have voluntarily adopted measures to control pollution associated with marina operations and stand as notable examples of the conservation ethic: individual responsibility for healthy land and water. An interactive mapping application has been added to the WPRP website which maps the locations of certified Maryland Clean Marinas in Anne Arundel County (http://www.aacounty.org/departments/public-works/wprp/clean-boating/index.html).

The Public Safety article of the Anne Arundel County Code includes regulations governing animal control. Code section §12-4-909 is specific to the removal of animal excreta and requires that "A person shall remove excreta deposited by an animal owned by that person on public walks, recreation areas, or private property other than the owner's." DPW WMS advises residents on the proper disposal methods for a variety of problematic household waste products, including pet waste. In addition, education regarding pet waste management is included on the "Think Bay" section of the WPRP webpage (www.aarivers.org) and the WSA webpage (www.aawsa.org/pick-up-pet-waste/). These webpages include links to information regarding pet waste removal stations as well as local services that will clean up pet waste. WPRP has also developed a "tip card" distributed to residents regarding proper pet waste management; the document is available at https://www.aacounty.org/departments/public-works/wprp/think-bay/Pet%20Waste.pdf.

Watershed Stewards Academy

During this reporting year, Anne Arundel County DPW, the County Board of Education's Arlington Echo Outdoor Education Center, The Keith Campbell Foundation, the Chesapeake Bay Trust and National Fish and Wildlife Foundation continued to provide leadership and funding to the WSA. The WSA was established in 2008 as an organized framework to educate community leaders to become "Master Watershed Stewards."

WSA trains citizens in Anne Arundel County to help neighbors reduce pollution in local creeks and rivers. WSA's hands-on training course gives Stewards the tools to bring change to their communities, by turning knowledge and good intentions into action. Stewards work with communities to install projects such as rain gardens or conservation landscapes that capture polluted runoff.

Once certified, Master Watershed Stewards complete about 40 hours per year in volunteer community watershed restoration, and have networking opportunities through five continuing education classes and three networking sessions annually. All certification and continuing education courses were instructed by stormwater professionals or Master Watershed Stewards and consisted of 50-plus volunteer instructors logging over 120 hours of volunteer time spent on instruction.

WSA recruited 29 Stewards as part of the 10th Certification Course. Of the 29, 20% were from under-represented and priority communities, particularly in Northern Anne Arundel County. This year's course was completely re-vamped to offer a third of the content online, and with this change, coupled with specific recruiting techniques, we attracted 24% of our class from the millennial generation. The WSA Certification Course was held from October 2017 to June 2018, encompassing 10 sessions, with independent studies and additional networking and learning opportunities, for a total of 70 hours of training for each participant. The Environmental Literacy Track was expanded to include the investment of several professional educators, including Bob Kedell of Motivation Education, who mentored Environmental Literacy Stewards to create modules, complete with educational kits that follow topics covered in the WSA class. In all, nine educational modules were developed and piloted with local schools. The modules lead a Steward or other educator to explore one of the WSA Certification Course topics and to take a relevant environmental action.

Many networking and continuing education events were held through the year. The events covered various topics including a Community Steward training program (a compressed version of the Master Watershed Steward Certification Course), maintenance and monitoring workshops, environmental regulations and permitting, environmental literacy, and field trips to tour practices representing innovative approaches to stormwater management. Especially popular was a trip to "Forested," a food forest in Bowie, MD. Founder Lincoln Smith provided a very powerful conference session, which we followed with that field visit. This session and field trip engaged many Stewards and friends that were not engaged by other events. We have also partnered with the Master Gardeners and Chesapeake Bay Landscape Professionals to offer joint continuing education sessions for volunteers and professionals. Our annual conference in February brought together over 200 Stewards, Consortium, and environmental advocates.

During this period, WSA supported Certified Stewards to install/reach:

- 82 rain barrels (4,670 gallons)
- 9,605 Native Plants and Trees
- 574,079 square feet of new projects
- 8,713 citizens of Anne Arundel County received technical assistance or environmental education
- Stewards donated 8,154 volunteer hours towards restoration and education in their communities
- 106,290 square feet of invasive species removed
- 627 bags of trash collected

WSA RiverWise Congregations Program

The second phase of RiverWise Congregations wrapped up this year with the design and installation of a set of practices at the Islamic Society of Annapolis, including seven rain barrels and 66 native trees, shrubs, and plants. The large project at Asbury Broadneck United Methodist Church proceeded through permitting and should break ground in fall 2018. WSA has worked to engage existing congregations and Stewards with assistance for outreach, education, and maintenance of projects. WSA assessed eight congregational projects and provided maintenance

support for these congregations, including the delivery of a workshop for congregants on maintenance.

Clean Water Communities

A new version of Clean Water Communities was created and piloted in two communities (Pines-on-the-Severn and Glen Isle) this year. This new version includes the following benchmarks:

- Community Stormwater Assessment;
- Minimum of two Master Watershed Stewards certified;
- 10-15 Community Stewards trained;
- Launch a "Habits that Help" campaign, and secure pledges from 20% of residents; and
- Install rainscaping projects on 10 residential properties.

Pines-on-the-Severn Clean Water Community Accomplishments

- South River Federation and WSA conducted an assessment of community property in November 2017 and delivered their report to Stewards in January 2018. This report detailed and ranked large-scale restoration opportunities, restoration best practices and pollution reducing behavioral changes.
- Two residents are Master Watershed Stewards in WSA's Class 10.
- 15 Community Stewards received "Community Steward" Training over 4 Sessions (10 total training hours) from December 2017 to February 2018. This was a compressed version of the Master Watershed Steward Certification Course and focused primarily on how to launch a behavior change campaign in the neighborhood.
- Pines-on-the-Severn Stewards launched their "Habits that Help" campaign in March 2018, focusing on 4 behaviors: Pet Waste Pick up and Disposal, Proper Leaf Management, Septic Maintenance, and protecting canopy trees by removing English Ivy from trees. They created some of their own outreach materials and used additional materials provided by WSA. They have performed outreach at four major neighborhood events. Stewards also hosted their own event, which targeted pet waste and invasive plants. To date, Community Stewards have secured pledges from 20% of residents, and plan to continue collecting pledges through the end of the year.

The program helped to improve conditions at several properties in the Pines-on-the-Severn community. Completed projects installed 3,754 square feet of conservation landscaping, nine rain barrels, and two steep-slope stabilization projects across 10 residential lots in the community. An 11^{th} property will have its rainscaping projects installed in fall 2018. The steep topography of the Pines landscape has made it challenging to find the right rainscaping practices, but WSA has worked on innovating solutions for steep slopes that are badly eroded, and is monitoring various plantings carefully to see if these practices can be adopted in communities that have experienced similar issues.

In addition to meeting these benchmarks, Pines Master Watershed Stewards assisted several residents with stormwater issues. Their outreach and networking resulted in site visits by Chesapeake Bay Trust, Anne Arundel County's WPRP, the Severn Riverkeeper, and Underwood & Associates. WSA provided crucial assistance with a disputed piece of waterfront community property that had been clear cut, arranging for plantings of grasses on a steep hillside that have greatly reduced erosion into Chase Creek.

Glen Isle Clean Water Community Accomplishments

Glen Isle also completed the Community Steward Training with 14 Community Stewards completing the process. A community stormwater assessment was also completed by South River Federation and WSA. The report detailed and ranked large-scale restoration opportunities, restoration best practices, and pollution-reducing behavioral changes.

Reflection on Clean Water Communities by Noelle Chao, Master Watershed Steward In-Training

"The Clean Water Communities program has invigorated our neighborhood. In the process of working toward the common goal of cleaner water for Chase Creek and the Severn, we've formed friendships, strengthened deep-rooted connections, and energized new leaders who will serve our community for decades to come.

For a long time, residents in Pines have known about the problems caused by stormwater runoff and erosion, but have been unsure what to do. WSA has empowered our neighborhood by giving us the knowledge, the resources, and the connections to chart the best path forward.

We have a team of seventeen dedicated stewards, which includes seniors, young professionals, working parents, and a middle school student. Together, we're adopting best practices for our own properties and encouraging other residents to do the same. Our "Habits that Help" campaign is reminding everyone to pick up pet waste and regularly pump septic systems; it's also alerting residents about the importance of managing leaves and protecting the tree canopy by removing English Ivy. Our 10 grant-funded rainscaping projects on residential property will showcase the benefits of conservation landscapes and rain barrels, and explore native planting methods for controlling runoff from steep slopes.

We can already see the concrete results of WSA's impact on our neighborhood—quite literally! Just last week, the County repaired an asphalt berm on a steep road that has caused major erosion issues on a family's property. Last month, representatives from the Severn Riverkeeper and Underwood & Associates visited a ravine created by runoff and are considering design options.

Our residents are beginning to participate in Severn River Association events. These projects, meetings, and connections would not have happened without our partnership with WSA, and we recognize the value of these connections going forward.

Clean Water Communities is transforming Pines-on-the-Severn for the better, and we're so grateful we were given a chance to participate."

Community Stewards created a "Habits that Help" campaign and began to address the following habits: Pet Waste Pick up and Disposal, Covering Bare Soil, Septic Maintenance and protecting canopy trees by removing English Ivy. Site assessments have been completed for 8 properties, with the final two properties to be completed in fall 2018. In fall 2018, residential projects will be designed and for spring 2019 installation.

As noted in previous Annual Reports, the WSA developed and refined training and resources for stewards to employ community-based social marketing to affect pollutant reducing behavior changes such as pet waste disposal, removal of leaves from impervious surfaces, and reduction in fertilizer use. Using face-to-face surveys, Stewards are taught to measure a baseline of behavior

and measure a behavior change. They are also supported with template tools and sample behavior change campaigns for use in their own community.

The WSA continued to facilitate the networking of Anne Arundel County restoration resources via involvement of watershed organizations, the WSA Consortium of Support Professionals, County restoration projects, and private communities to avoid duplication and further common goals.

From stormwater design and land-use planning, to public opinion research and engineering, the WSA Board members bring a diverse set of skills to lead the organization. The Board is united in their passion to support the mission of WSA; each member contributes in a unique and significant way. The Board roles include strategic planning, partnership building, and fund-raising. In addition, Board members led several stormwater tours designed to raise awareness of WSA and educate citizens of Anne Arundel County about the stormwater issues facing our county and successful solutions to those issues.

WPRP Website and Social Media

In an effort to increase stormwater pollution awareness throughout Anne Arundel County, the WPRP has developed a comprehensive web-based informational program. A major component of this initiative was the development of the WPRP's webpage (www.aarivers.org) to provide residents with an overview of the WPRP program and stormwater fee, environmental restoration plans, watershed assessments and information about stormwater pollution in general. The webpage also provides links to other County departments such as Utilities for water conservation tips and Inspections and Permits for stormwater management and Chesapeake Bay Critical Area information.

Since the development of the WPRP webpage, several enhancements have been integrated. Residents are provided with educational resources to reduce stormwater pollution from their property. Residents learn how their everyday actions can have an impact on our local waterways and provide recommendations on how they can minimize these impacts. The following topics are addressed:

- Rain barrel benefits and installation;
- Rain garden benefits and installation;
- Permeable pavement and paver benefits and installation;
- Bay-friendly car maintenance tips;
- Household hazardous waste disposal tips;
- Fertilizer and pesticide application tips;
- Recycling, litter reduction and source reduction tips;
- Pet waste management tips;
- On-site septic tank maintenance tips;
- Green boating tips;
- Bay-friendly de-icing tips;
- Effects of various types of pollutants on water quality; and
- Real-time tracking of restoration project goals and impervious surface treatment goals.

For FY18, WPRP introduced an enhanced restoration projects map which shows detailed locations of planned and completed restoration projects throughout the County. In addition to showing WPRP projects, the map includes projects by non-profits, HOAs, businesses, and state agencies. The map has become a centerpiece of information for public and private stakeholders to identify restoration locations. The map can be viewed at http://annearundelmd.maps.arcgis.com/apps/webappviewer/index.html?id=e7e7fb6733e448a8809938140bed9e18. In the coming months, several additional enhancements are planned for the webpage. The goal is to provide residents with the most up-to-date information regarding the WPRP in the most convenient way.

In addition to the WPRP webpage, several social media outlets including Facebook (https://www.facebook.com/aawprp) and Twitter (https://twitter. com/AAWPRP), were also introduced to help educate residents about water quality issues and to provide an avenue for timely updates of restoration projects, educational materials, links to local watershed groups, and newspaper articles. These social media sites are updated on a daily basis and provide residents with an outlet to discuss local stormwater issues and allow the WPRP to continually educate residents about the program.

Chesapeake Connections Partnership

The Arlington Echo Outdoor Education Center is operated by the Office of Environmental Literacy and Outdoor Education Program of Anne Arundel County Public Schools. Arlington Echo Outdoor Education Center offers Anne Arundel County students year-round opportunities to experience the natural environment. The Outdoor Education programs at Arlington Echo use environmental and outdoor learning to enhance, extend and enrich classroom curriculum. Arlington Echo mainly hosts fourth grade elementary students on day and overnight trips, but also hosts middle and high school groups.

While developing a positive environmental ethic and sense of stewardship, students learn the meaning of respecting each other and respecting the environment. By the end of their residential experience, students are given the tools necessary to become Chesapeake Stewards, and have gained the knowledge to protect and preserve the Chesapeake Bay and its watershed at home, school, and on their own.

Chesapeake Connections is the Outdoor Education outreach program of Arlington Echo which connects classroom instruction with a series of relevant hands-on experiences that lead to environmental stewardship. The staff at Arlington Echo Outdoor Education Center provides support and expertise to complete yearlong environmental service-learning projects as part of Chesapeake Connections with many Anne Arundel middle and elementary schools. The service-learning projects are infused into each school's curricula and involve using community areas or school grounds for environmental restoration activities. The program works to restore and/or create bogs, gardens, and runoff areas on school grounds or in the community. These projects meet growing environmental needs in our area and help protect the Chesapeake Bay.

The WPRP has partnered with the Chesapeake Connections program to provide hands-on experiences for Anne Arundel County students through the planting of native trees and other vegetation at several restoration projects. In 2018, about 2,700 Anne Arundel County Public

School students participated in planting events at four newly restored water quality project sites around the County. The numbers of students engaged in each project are listed below:

- Winchester on the Severn Outfall Repair: Severna Park Middle (435 students), Old Mill South Middle (310 students), Crofton Middle (410 students);
- Fox Cub Court Pond Retrofit: Marley Middle (320 students), Corkran Middle (240 students);
- Cowhide Branch Stream Restoration: Central Middle (330 students), Lindale Middle (220 students); and
- Briarwood Pond Retrofit: Magothy River Middle (240 students), Lindale Middle (160 students).

WPRP Watershed Restoration Grant Program

Successful conservation and preservation of Anne Arundel County's watersheds takes teamwork. To that end, in FY18 the Anne Arundel County Department of Public Works, in partnership with the Chesapeake Bay Trust, continued the Anne Arundel County Watershed Restoration Grant Program. This is a community grant program supporting watershed restoration activities throughout the County to improve water quality in local streams and rivers.

The grant program was created to engage local nonprofit organizations, landowners, and communities in efforts to restore the County's waterways; to provide resources to these groups to enable them to implement greening and water quality projects; and to assist Anne Arundel County's efforts to meet the requirements of its State and Federal stormwater pollution permit and local waterway cleanup plan. This program encourages on-the-ground restoration activities that reduce stormwater flow and pollutants and engage Anne Arundel County residents in these activities. In FY18, Anne Arundel County awarded $671,272 to three partner organizations for implementation of stormwater management and water quality improvement projects. Table 15 below lists those organizations awarded the FY18 grant funding.

Table 15. Projects awarded WPRP grant funding in FY18

Organization	Project Description	Watershed	Funding Amount	Match Amount	Anticipated Impervious Acres Treated
Alliance for the Chesapeake Bay	Asbury United Methodist Church SPSC/Broadneck Park BMPs	Severn River	$136,404	$297,635	0.88
South River Federation	Bacon Ridge Stream Restoration	South River	$164,122	$438,766	43.50
South River Federation	Broad Creek Health Dept. Phase II Restoration	South River	$370,746	$125,893	7.50
TOTAL			**$671,272**	**$862,294**	**51.88**

WPRP in the Community

The WPRP strives to keep residents apprised of current accomplishments of the program. One of the most effective ways to communicate those milestones is through the local media. Below are two select articles about the WPRP that were published during the reporting period:

- "A Windfall For Our Waters" – March 1, 2018 What's Up Annapolis,
- "Mayo Peninsula Project Aims To Improve South River Quality" – April 23, 2018 Patch.com, http://bit.ly/2zWhDJa

The following (Table 16) is a list of informational presentations and events in which the WPRP participated during the reporting period:

Table 16. WPRP events during FY18

Date	Organization/Event	Topic
7/15/2017	CBF 50 Forward Event	Actions citizens can take to improve the Bay
7/17/2017	CBT	Overcoming permit obstacles for NGOs
7/20/2017	Broadneck Council of Communities	WPRP Program
7/25/2017	Oyster Harbor HOA	WPRP Program
7/26/2017	Millrace Community	Project update
8/30/2017	StormCon	WPRP Program
8/31/2017	Tri-Con Conference	Full Delivery RFP
8/31/2017	Tri-Con Conference	WPRP Program
9/11/2017	Shipley's Choice HOA	Shipley's Area Projects
9/15/2017	Congressman Brown Tour	Dividing Creek
9/15/2017	Anne Arundel County Fair	WPRP Program
9/20/2017	Mid-Atlantic Stream Restoration Conference	Project Implementation
9/21/2017	Mid-Atlantic Stream Restoration Conference	Furnace Branch
9/21/2017	Mid-Atlantic Stream Restoration Conference	Project Implementation
10/5/2017	Severn River Commission	Capital Projects
10/23/2017	Robinson Retreat HOA	Capital Projects
10/24/2017	Brooklyn Park community	Brooklyn Park area projects
10/27/2017	St. Jane Frances	WPRP Program
10/28/2017	WSA	WPRP Program
11/1/2017	Bolivian stormwater delegation	WPRP Program
11/6/2017	McKinsey Park HOA	North Cypress Branch
11/13/2017	Dr. Ailstock's Restoration Ecology class (AACC)	WPRP Program
11/15/2017	Environmental Science students (AACC)	WPRP Program
11/30/2017	Center for Watershed Protection	Full Delivery RFP

Table 16. WPRP events during FY18

Date	Organization/Event	Topic
12/6/2017	Patuxent River Conference	WPRP Program
12/13/2017	CWEA	Stormwater: Too Simple?
1/11/2018	MD Society of Professional Engineers	WPRP Program
1/23/2018	CEPA	Stream restoration
2/8/2018	Four Seasons Community Association	Towsers Branch Outfall Restoration
2/10/2018	Admiral's Walk HOA	Cat Branch
2/13/2018	Greater Severna Park Council	Capital Projects (Shipley's Choice Dam Removal)
2/14/2018	Heritage Harbor	WPRP Projects
2/20/2018	ASHE	Full Delivery RFP
2/23/2018	State of the Magothy	Discuss Magothy restoration projects
2/24/2018	WSA	WPRP Program
3/1/2018	Cape St. Claire HOA	WPRP Projects
3/24/2018	Davidsonville Green Expo	WPRP Program
4/4/2018	P3 Water Summit	Full Delivery RFP
4/6/2018	Bay Stewardship Workshop	
4/10/2018	Mid-Atlantic Stream Restoration Conference	Stream restoration
4/12/2018	Leadership Anne Arundel	WPRP Program
4/14/2018	Severn Elementary Spring Event	WPRP Program
4/16/2018	Southgate Elementary IB Program	WPRP Program
4/21/2018	Arlington Echo 50th Celebration	WPRP Program
4/24/2018	Lower Patuxent/Herring Bay Watershed	Lower Patuxent/Herring Bay Watershed Assessment
5/4/2018	AA County Employee Earth Day	WPRP Program
5/19/2018	Turtlefest at Harbour Center	WPRP Program
5/22/2018	Property owners	WPRP Project/Crofton Golf
6/4/2018	Bay Program	Stream restoration permitting
6/13/2018	Harmans Woods Civic Association	Modification presentation for Harmans Woods #2/#4 (BMP 803/805)
6/14/2018	Towsers Community meeting	Towsers outfall restoration
6/18/2018	MDE WIP Meeting	Local government perspective
6/18/2018	Admiral's Walk HOA	Cat Branch
6/18/2018	Queens Park HOA	Queens Park Stormwater Pond retrofit status report

In addition to the above public outreach events and meetings, WPRP Project Managers provide continuous updates to members in the communities where our restoration projects occur. In some

cases, feedback from the local community is taken into account from the design process through construction.

To help local Anne Arundel County residents begin to recognize the uniqueness of our network of streams throughout the County, and to build community pride, WPRP, in partnership with the Bureau of Highways, have started signage installations at various creek crossings along County-owned roads. Initially the signage is being installed along major thoroughfares but, if successful, the program could easily be expanded. The signs identify the creek name, major watershed, and the WPRP logo to improve branding of the program. The program is aiming to install signs at over 60 creek crossings by the end of FY19.

Environmental Health Initiatives

The Anne Arundel County Department of Health has published a fact sheet series entitled "Health Matters" (see examples in 2014 Annual Report). These fact sheets are distributed at events run by the Department of Health. Information can also be found on their website (www.aahealth.org). Some of the subjects covered in the series include the following:

- Water quality and swimming or fishing in Anne Arundel County rivers and creeks;
- On-site sewage disposal systems and private water wells;
- Bay Restoration Fund (BRF) Program, for nitrogen-reducing pretreatment units for septic systems to be installed within the Chesapeake Bay Critical Area;
- Collapsed septic tanks, overflowing septic systems and failing septic systems interim health and safety requirements; and
- Application procedures for property improvements where well or on-site septic systems are utilized.

The Anne Arundel County Department of Health continues to publicize a seasonal water quality information line (410-222-7999) on the Department of Health's website (www.aahealth.org). The water quality information line alerts the public to current advisories and closures of recreational water as the result of sewage spills and bacterial exceedances from over 80 bathing beaches that the department monitors from Memorial Day through Labor Day. The Department also promotes an e-alert system so an individual can be notified by e-mail when the Department has an advisory or closure of recreational waters. Individuals can sign up for the e-alert system on the Department of Health's website. In addition, water quality advisories are communicated via the Department's Facebook and Twitter pages. The Department continued to recommend no direct water contact for 48 hours after a significant rain event due to predicted elevated bacteria levels.

The Department of Health, in conjunction with MDE and the Maryland Department of Health and Mental Hygiene, promotes the Maryland Healthy Beaches campaign (www.marylandhealthybeaches.com). The campaign makes people aware of everyone's impact to the waterways in the State of Maryland. One of the campaign's major focus areas is the importance of picking up pet waste. In 2013, the Department of Health created a 'Beach Swimming Guide' on its website to keep the public abreast of recreational water quality in the County.

The Department of Health also publicizes information about on-site sewage disposal systems and private water wells. The Department also provides a DVD on the maintenance and care of an on-

site sewage disposal system to each individual homeowner at the time of installation for each newly installed system. The videos are also available to view on the department's website.

The Department of Health promotes the Bay Restoration Fund Program. This program provides grant funding to qualified applications for assistance to install nitrogen reducing pretreatment units in conjunction with an onsite sewage disposal system that is in the Chesapeake Bay Critical Area. The grant funds the entire cost off the treatment unit and a five-year service and maintenance program for repairs of failing systems in the Critical Area. Additionally, the grant funds can be used to help qualified applicants connect to existing public sewer system. These connections can be funded if the existing dwelling, currently served by a septic system, are located where public sewer is available and immediately abuts the property. The Department of Health administers this grant, awarded by MDE.

In FY18, the Department of Health used the Bay Restoration Fund to subsidize the installation of 146 pretreatment units. These treatment units reduce the nitrogen load from an on-site sewage disposal system by at least 50 percent. This is a direct reduction to the nitrogen load that is reaching the Chesapeake Bay. Additionally, the Fund subsidized four new septic connections to the public sewer system.

There are many other environmental health information topics located on the Department's website, under Environmental Health, including:

- The Bay Restoration Fund;
- Environmental Assistance Programs;
- Environmental Health Fees;
- Public Pool and Spa Discharge requirements;
- Recreational water quality; and
- Well and Septic Systems.

c. Provide information regarding the following water quality issues to the regulated community when requested:

i. NPDES Permitting requirements;
ii. Pollution prevention plan development;
iii. Proper housekeeping; and
iv. Spill prevention and response.

Status:

Managers at each of the County-owned facilities subject to the stormwater general discharge permit (Permit 12-SW) updated their SWPPPs following the issuance of the new General Permit by MDE in January 2014 and perform pollution prevention training as set forth in their SWPPP. Training is performed yearly at a minimum, which is critical to ensure staff are fully knowledgeable of the potential pollutant sources at each facility, how to properly store and handle these sources, and the procedures for responding to a spill or emergency. The County provides

training for staff working at County facilities with stormwater discharge permits as discussed in **Part IV.D.5.b.v.** Refresher trainings are provided when necessary.

E. Restoration Plans and Total Maximum Daily Loads

In compliance with §402(p)(3)(B)(iii) of the CWA, MS4 permits must require stormwater controls to reduce the discharge of pollutants to the MEP. By regulation at 40 CFR §122.24, BMPs and programs implemented pursuant to this permit must be consistent with applicable WLAs developed under EPA approved TMDLs (see list of EPA approved TMDLs attached and incorporated as Attachment B).

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

1. Watershed Assessments

a. By the end of the permit term, Anne Arundel County shall complete detailed watershed assessments for the entire County. Watershed assessments conducted during previous permit cycles may be used to comply with this requirement provided the assessments include all of the items listed in PART IV.E.1.b below. Assessments shall be performed at an appropriate watershed scale (e.g., Maryland's hierarchical eight or twelve-digit sub-basins) and be based on MDE's TMDL analysis or an equivalent and comparable County water quality analysis;

b. Watershed assessments by the County shall;

- ***i. Determine current water quality conditions;***
- ***ii. Include the results of a visual watershed inspection;***
- ***iii. Identify and rank water quality problems;***
- ***iv. Prioritize all structural and nonstructural water quality improvement projects; and***
- ***v. Specify pollutant load reduction benchmarks and deadlines that demonstrate progress toward meeting all applicable stormwater WLAs.***

Status:

Anne Arundel County developed a TMDL Support program within the Watershed Protection and Restoration Program (WPRP) to comply with the conditions outlined in the NPDES MS4 permit. One component of the program is to perform watershed assessments, as stipulated by the permit requirements (**Part E.1.b**), for each of the County's 12 watersheds. The watershed studies involve

a partnership between the County, various consultants, and citizen stakeholders. The field data collection is performed primarily by consultants specifically for each watershed study effort. All modeling, analysis, prioritization, and reporting are performed in-house by County staff. Once the data are collected and analyzed for a watershed, the TMDL support staff collaborates with the consultants and other citizen stakeholders in a series of professional management team meetings to thoroughly review the information and reach consensus pertaining to assumptions and data interpretations. Once consensus is reached, the County publishes the study, including recommended restoration/preservation actions and desired implementation strategies. Prior to final acceptance, watershed assessments are advertised for a 30-day public comment period. A summary of comments received and the County's response to comments are incorporated into each assessment. Environmental concerns and recommendations are portrayed in GIS files published on the County website and are viewable on the interactive mapping application found at the following website address:
http://gis-world3.aacounty.org/HTML5Viewer/index.html?viewer=WPRP

Recommendations developed during watershed studies are used to advise and prioritize land use decisions and Capital Improvement Program (CIP) expenditures relating to environmental restoration and preservation. To expedite implementation, preliminary restoration designs are developed as part of the watershed assessment and planning effort for some of the highest priority recommendations.

In FY18, the County completed the Herring Bay and Middle Patuxent River watershed assessments. With completion of these watershed assessments, the County satisfied the permit requirement for completing watershed assessments of all 12 of its eight-digit sub-basins (Table 17). The watershed assessment documents, for all 12 watersheds, are found on the County's website:
https://www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/watershed-studies/index.html

Table 17. Watershed Assessment Schedule

Watershed	MDE 8-Digit Watershed Code	Timeline for Targeted Bioassessment Completion (Calendar Year)	Timeline for Habitat Assessment Completion (Calendar Year)	Timeline for Analysis Completion (Calendar Year)
Severn River	02131002	Complete	Complete	Complete
South River	02131003	Complete	Complete	Complete
Upper Patuxent River	02131104	Complete	Complete	Complete
Magothy River	02131001	Complete	Complete	Complete
Patapsco Non-Tidal	02130906	Complete	Complete	Complete
Patapsco Tidal	02130903	Complete	Complete	Complete
Bodkin Creek	02130902	Complete	Complete	Complete
Little Patuxent River	02131105	Complete	Complete	Complete
Rhode River	02131004	Complete	Complete	Complete

Table 17. Watershed Assessment Schedule

Watershed	MDE 8-Digit Watershed Code	Timeline for Targeted Bioassessment Completion (Calendar Year)	Timeline for Habitat Assessment Completion (Calendar Year)	Timeline for Analysis Completion (Calendar Year)
West River	02131004	Complete	Complete	Complete
Herring Bay	02131005	Complete	Complete	Complete
Middle Patuxent River	02131102	Complete	Complete	Complete

2. Restoration Plans

a. Within one year of permit issuance, Anne Arundel County shall submit an impervious surface area assessment consistent with the methods described in the MDE document "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits" (MDE, June 2011 or subsequent versions). Upon approval by MDE, this impervious surface area assessment shall serve as the baseline for the restoration efforts required in this permit.

By the end of this permit term, Anne Arundel County shall commence and complete the implementation of restoration efforts for twenty percent of the County's impervious surface area consistent with the methodology described in the MDE document cited in PART IV.E.2.a. that has not already been restored to the MEP. Equivalent acres restored of impervious surfaces, through new retrofits or the retrofit of pre-2002 structural BMPs, shall be based upon the treatment of the WQv criteria and associated list of practices defined in the 2000 Maryland Stormwater Design Manual. For alternate BMPs, the basis for calculation of equivalent impervious acres restored is based upon the pollutant loads from forested cover.

Status:

Anne Arundel County's NPDES MS4 Permit (Permit), issued in February 2014, requires the County to complete implementation of restoration efforts for twenty percent (20%) of the County's impervious surface area that has not already been managed to the maximum extent practicable (MEP).

In 2015 the County submitted to the Maryland Department of the Environment (MDE) an impervious surface area assessment and the associated baseline for impervious area restoration (*Establishing Baseline – Impervious Area Assessment; Anne Arundel County, May 2015*). MDE approved[1] the County's impervious surface area assessment and baseline. The impervious area

[1] MDE approval letter dated July 07, 2015.

assessment identified 1,639 acres as managed to the MEP[2] (i.e., the baseline of managed impervious area) and 29,311 acres as either having no stormwater management or only partial management (i.e., the baseline of unmanaged impervious area). This resulted in the 20% impervious surface restoration (ISR) goal of 5,862 acres, to be achieved by the County on or before February 2019.

2018 Baseline-Impervious Area Assessment Revision

The County is proposing a revision of its baseline unmanaged impervious area and the resulting 20% ISR goal. In the 2014 baseline impervious area analysis, only 263 impervious acres associated with 238 existing BMPs were identified as managed to the MEP using the criteria outlined in the MDE guidance (MDE 2014). This represented only 2.2% of the existing BMPs in the County's Urban BMP database. The County has since invested a significant amount of time and resources into the review and cleanup of its historic BMP data (**Part IV.C.3**). As a result, the County may now properly account for the impervious acreage managed by existing BMPs.

Based on the County's new BMP inventory, 3,607 impervious acres were managed by existing BMPs (10,912 BMPs represented by 7,360 BMP POIs). In addition, the County identified an additional 62 shoreline restoration projects and revised the crediting for previously submitted stream restoration projects according to the MDE memorandum dated October 17, 2018, Re: Stream Restoration Crediting for MS4 Permitting Purposes.

The County's updated proposed baseline for impervious area restoration is summarized in Table 18; complete data and supporting documentation for the updated impervious area assessment are provided in **Appendix H.** The updated impervious area assessment identified 5,970 acres as the baseline of managed impervious area and 24,981 acres as the baseline of unmanaged impervious area. This results in an updated 20% restoration goal of 4,996 acres (vs. 5,862 acres in the 2014 analysis).

[2] In the 2015 assessment only 238 out of the 10,500 existing BMPs were counted as managed, as only these met MDE's triennial inspection requirement.

Table 18. Update to baseline for impervious area restoration

Item	Acres	Source
County MS4 impervious area	30,950	From 2014 Baseline analysis.
Managed impervious area		
Existing BMPs	3,607	Results of historic BMP data cleanup, reported in Appendix H.
Impervious disconnect in rural areas	660	From 2014 Baseline analysis.
Septic Connections to WWTP	70	From 2014 Baseline analysis.
Septic Upgrades	185	From 2014 Baseline analysis.
Water quality projects	461	From 2014 Baseline analysis.
Additional water quality projects	987	Reported in Appendix H.
Total managed impervious area	**5,970**	
Total unmanaged impervious area	**24,981**	
Restoration requirement	**4,996**	**20% of unmanaged area (2014 value was 5,862 acres).**

Progress Impervious Area Restoration Plan

The County previously submitted an *Impervious Area Restoration Plan* (Appendix I of the FY15 Annual Report). This document provides a narrative description of the County's impervious area restoration completed to date, and projection of progress through the end of the permit term. Included in the County's *Impervious Area Restoration Plan* are County CIP restoration projects, alternative urban BMPs (e.g., street sweeping, septic system connections to WWTP, and septic systems upgraded to enhanced denitrification systems), County-funded restoration grant projects, and other NGO restoration projects.

This report section summarizes the County's progress toward meeting the 20% ISR goal. **Part IV.C.6** (Water Quality Improvements Projects) describes the inventory of the watershed restoration projects. Because this is the final annual report under the current permit term, this report section covers two time periods: the FY18 reporting year (07/01/2017 – 06/30/2018), and the first half of FY19 (07/01/2018 – 12/31/2018). Table 19 provides a summary of FY18 and FY19 restoration projects and impervious restoration credits, including new completed projects and cumulative completed projects (since FY14). Credits for annual BMPs (e.g., street sweeping, inlet cleaning, and septic pumping) are updated yearly and are not cumulative but are averaged values since the time of each programs' full implementation (FY16-FY18 for street sweeping and septic pumping; FY17-FY18 for inlet cleaning).

Table 19. FY18 and FY19 impervious restoration credit acres

Restoration Project	Impervious Acres Credited			
	Projects Completed in FY18	Projects Completed – Cumulative through FY18	Projects Completed in FY19	Projects Completed – Cumulative through FY19
Restoration BMPs				
- ESD	0	17	0	17
- structural	216	568	160	729
Alternative Restoration BMPs				
- street sweeping*	143	169	169	169
- impervious surface elimination	0	0	0	0
- catch basin and storm drain cleaning*	43	70	70	70
- stream restoration	9	247	58	306
- outfall stabilization	6	17	6	23
- shoreline management	31	597	7	604
- septic pumping*	234	186	186	186
- septic denitrification	44	222	15	237
- septic connections to WWTP	4	46	2	48
TOTAL	730	2,139	673	2,389

*For annual practices, cumulative and FY19 progress values are based on the average equivalent impervious treatment achieved after full implementation of the programs. Averages for street sweeping and septic pumping are based on FY16-FY18, and catch basin cleaning is based on FY17-FY18.

Impervious Areas Restored: In FY18, new completed restoration projects provided a total of 730 equivalent impervious acres restored/managed, with a cumulative total of 2,139 impervious acres for projects completed between FY14 through FY18, and an additional 2,398 impervious acres for projects under design and under construction. In FY19 (first six-months), new completed restoration projects treated a total of 673 impervious acres resulting in a cumulative total of 2,389 equivalent impervious acres restored/managed for projects completed between FY14 through the first half of FY19. An additional 2,102 equivalent impervious acres restored/managed are identified for projects currently under design and under construction. The County has also identified restoration projects that are proposed for design and construction but for which design contracts are not yet in place. These projects, when constructed, will provide an additional 1,627 acres of equivalent impervious management.

Per MDE's letter to the Maryland Association of Counties, dated December 26, 2018, the County calculated the equivalent impervious credit for stream restoration projects using the Chesapeake Bay Program (CBP) protocols. Credit was capped by the amount of impervious surface within a project's drainage area. The County used an example set of its stream restoration projects from Fall 2019 to investigate the difference in available credit when the impervious area cap was applied. As shown in Table 20, the application of the impervious cap leads to the under-crediting of stream restorations that repair highly impacted streams. This approach to crediting

disincentivizes stream restorations in areas that have less impervious surface, but still have impaired streams that need attention and deliver significant pollutant loads to the Chesapeake Bay. The County has multiple regulatory and permitting requirements it must meet; for this reason, it must allocate resources towards projects that best meet multiple requirements. In addition, there are watersheds within Anne Arundel where direct treatment of impervious surface is not a viable option and where the only feasible solution is the indirect management of impervious surface via stream restoration The County looks forward to exploring this topic further with MDE.

Table 20. Potential stream restoration credit using CBP protocols.

Stream Restoration Project Status	Project Length	Drainage Area (acres)	Impervious Area (acres)	Impervious Equiv. Credit - Current WLA Guidance (0.01 ac/ft)	Impervious Equiv. Credit Acres - CBP Protocols (Capped at IA)	Impervious Equiv. Credit Acres -CBP Protocols (Uncapped)	Impervious Equiv. Credit - Proposed Future WLA Guidance (0.084 ac/ft)
Completed	15,938	7,168	2,090	159	273	362	1,339
Under Construction	9,422	6,571	634	94	190	336	791
Under Design	45,857	7,466	2,505	459	1,112	2,763	3,852
Totals	71,237	21,205	5,229	712	1,575	3,462	5,982

Attainment of the 20% ISR Goal

As of the end of this permit term, February 11, 2019, the County has met its 20% ISR goal of 4,996 acres. This goal was attained through implementation of restoration and alternative BMP practices (2,389 equivalent impervious acres), a revision of the County's 2014 baseline impervious area assessment (**Part IV.E.2.a** – above), and the acquisition of nutrient credits generated by Anne Arundel County's wastewater reclamation facilities (equivalent to 2,607 impervious acres) from mid-July through December 2018 (see **Part IV.E.3**). The County recognizes that equivalent impervious surface restoration credit achieved through nutrient trading must eventually be replaced with impervious restoration credit provided through on-the-ground restoration and alternative BMP practices. The County is confident that this is achievable based on the pipeline of projects shown in the FY19 MS4 Geodatabase (**Appendix A**) that are under design or under construction, and with the inclusion of projects currently proposed but not yet in design (see the FY2018 Financial Assurance Plan). These projects are conservatively estimated to provide 2,102 and 1,627 acres of impervious restoration credit, respectively.

Strategy to Maintain Attainment of the 20% ISR Goal

As noted above, the County has met its goal of restoring or providing equivalent stormwater management for 20% of unmanaged impervious surfaces in the County. To maintain attainment of its goal, the County's understands it must continue its restoration efforts, as described below:

Restoration Projects in Progress: While the County has already completed a large number of restoration projects, a large number of projects are also currently under design and under

construction (Tables 4 and 5 in Part IV.C.6 and Appendix A). Additional proposed projects are slated for design in FY 19 and beyond. Credits for these projects are continuously tracked, verified, and will be documented in future reports. The projects currently under design and construction will provide an additional 2,102 equivalent impervious acres of treatment as well as reductions of 25,409 lbs. per year of total nitrogen, 4,667 lbs. per year of total phosphorus, and 7,079,835 lbs. per year of total suspended solids. The proposed restoration projects will provide, upon project completion, an additional 1,627 equivalent impervious acres of treatment as discussed above.

BMP Maintenance Inspection: The County is continuously enhancing its BMP maintenance inspection program, ramping up field inspection efforts, and increasing inspection and maintenance of existing and new BMPs to meet triennial inspection requirements. In the future this effort will be further enhanced as the County is currently in the process of automating and fully integrating the County's asset and work order management system (AWOM); stormwater BMP maintenance inspection is slated to be a part of this system. In addition, the County will continue to work, in the coming year, to inspect BMPs newly identified through the historic BMP cleanup project.

Full Delivery Water Quality Improvement Projects: In FY17 the County solicited proposals for full delivery design-build water quality improvement projects, and a firm was selected. Three full delivery projects were completed in FY19 (all three pond retrofits), with a total impervious area credit of 119 acres. Three full delivery stream restoration projects are currently in the design phase; projects are expected to be completed in FY20 with an estimated impervious area credit of 57 acres. In FY18, the County solicited a second round of proposals and awarded a contract for a large scale, commercial septic to sewer conversion project that is anticipated to deliver 113.5 acres of treatment in FY20. In early FY19 the County again solicited proposals for full delivery projects, and the firm(s) will be selected before the end of the fiscal year with projects slated for completion in FY20 and FY21.

Alternative Strategies to Attain Restoration Goal: The County anticipates attaining the 20% ISR goal through a combination of the strategies discussed above, and recognizes the need for adaptive management to continue attainment of this goal. Adaptive management includes utilizing all available restoration opportunities and enhancing alternate strategies including, but not limited to, identifying additional CIP projects with restoration potential or restoration components, the possibility of expanding the County restoration grant program, and nutrient trading/offset mitigation. Nutrient trading/offset mitigation has been approved by MDE for the remainder of this permit term (see **Part IV.E.3**). These and other alternative strategies will help to close any identified "gap" as the restoration goal is tracked annually. The restoration goal tracking will be provided with each annual report, the strategies employed to meet the goal will be evaluated, and adjustments made if necessary.

b. Within one year of permit issuance, Anne Arundel County shall submit to MDE for approval a restoration plan for each stormwater WLA approved by EPA prior to the effective date of the permit. The County shall submit restoration plans for subsequent TMDL WLAs within one year of EPA approval. Upon approval by MDE, these restoration plans will be enforceable under this permit. As part of the restoration plans, Anne Arundel County shall:

i. ***Include the final date for meeting applicable WLAs and a detailed schedule for implementing all structural and nonstructural water quality projects, enhanced stormwater management programs, and alternative stormwater control initiatives necessary for meeting applicable WLAs;***
ii. ***Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;***
iii. ***Evaluate and track the implementation of restoration plans through monitoring or modeling to document progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and***
iv. ***Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, program enhancements, new and additional programs, and alternative BMPs where EPA approved TMDL stormwater WLAs are not being met according to the benchmarks and deadlines established as part of the County's watershed assessments.***

Status:

Pursuant to its NPDES MS4 Permit requirements, Anne Arundel County is obligated to develop and submit to MDE restoration plans for every EPA approved TMDL having a stormwater wasteload allocation. These restoration plans identify a suite of structural and non-structural projects and programs necessary for meeting the WLAs identified in the Chesapeake Bay TMDL and the individual TMDLs and include cost estimates and a schedule for implementation. These restoration plans were developed pursuant to the following MDE guidance documents:

- *"Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated – Guidance for National Pollutant Discharge Elimination System Stormwater Permits". August 2014*
- *"General Guidance for Developing a Stormwater Wasteload Allocation (SW-WLA) Implementation Plan". May 2014*
- *"Guidance for Developing a Stormwater Wasteload Allocation Implementation Plan for Bacteria Total Maximum Daily Loads". May 2014*
- *"Guidance for Developing a Stormwater Wasteload Allocation Implementation Plan for Nutrient and Sediment Total Maximum Daily Loads". November 2014*
- *"MDE Recommendations for Addressing the PCB SW-WLA". 2015*

A summary of all TMDLs approved for Anne Arundel County is provided in **Appendix I** to this annual report.

Described below are EPA-approved TMDLs for Anne Arundel County that have a stormwater WLA, the status of each TMDL restoration plan and, as applicable, associated FY18 implementation progress. **Appendix I** contains individual TMDL restoration plans completed in FY18. Restoration Plans completed prior to FY18 can be found at https://aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/ .

EPA set 2025 as the final date for meeting the applicable stormwater WLAs set forth in the Chesapeake Bay TMDL. For consistency purposes, Anne Arundel County has also set 2025 as the final date for meeting the Stormwater WLAs for individual nutrient and sediment TMDLs with the exception of PCB and bacteria TMDLs.

Chesapeake Bay Nitrogen, Phosphorus, and Sediment TMDL

The Chesapeake Bay TMDL, as noted in Table 21, was approved on December 29, 2010 and applies to all of Anne Arundel County.

Table 21. Chesapeake Bay Nitrogen, Phosphorus, and Sediment TMDL

Location	Approval Date
County-wide	December 29, 2010

Sixty-six (66) of the ninety-six (96) individual impairments associated with nitrogen, phosphorus and total suspended solids are included in the *Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment, December 29, 2010*. Anne Arundel County's Phase II Watershed Implementation Plan (WIP) serves as the restoration plan for the Stormwater WLAs for these impairments. Anne Arundel County's Phase II WIP and 2-Year Milestone Progress Reports can be found at: https://mde.maryland.gov/programs/water/TMDL/TMDLImplementation/Pages/WIPPhaseIICountyDocuments.aspx

On September 15, 2011 MDE finalized its Phase II Load Allocations. Anne Arundel County's Phase I NPDES MS4 load allocations are set forth in Table 22.

Table 22 Anne Arundel County (Non-Federal) Stormwater Wasteload Allocation for the Bay TMDL *

	Total Nitrogen (TN) (lbs/yr)	Total Phosphorus (TP) (lbs/yr)
2009 Baseline	657,383	56,531
2017 Interim Target	511,963	38,062
2025 Final Target	449,641	30,147

*Per Maryland's Phase II WIP, if TP is met, TSS target will be met.

FY18 Progress:

Anne Arundel County submitted an interim progress report to MDE on January 16, 2019 for its 2018-2019 2-Year Programmatic Milestones. This year MDE integrated 2-Year Implementation Milestone reporting into the NPDES MS4 annual reporting process and is therefore no longer requiring the submittal of 2-Year Implementation Milestone reports.

The County's progress toward meeting its Bay TMDL goals through FY18 is summarized below (Table 23, Figure 2). The pollutant load reductions are determined using an in-house spreadsheet model where the suite of implemented BMPs works in concert to determine load reduction. The

County used MDE's guidance document: *Accounting for Stormwater Wasteload Allocation and Impervious Acres Treated; Guidance for National Pollutant Discharge Elimination System Stormwater Permits, August 2014* (MDE 2014), and individual expert panel reports for BMPs, to calculate pollutant loads and reductions.

Table 23. Summary of Bay TMDL Pollutant Load Reductions for TN and TP in Anne Arundel County, MD[1,2]

Pollutant	2009 Baseline (lbs/yr)	2025 Target (lbs/yr)	Required Reduction (lbs/yr)	Current Reduction (lbs)	% Reduction Achieved through FY18
TN	657,383	449,641	207,742	21,255	10.2%
TP	56,531	30,147	26,384	6,134	22.9%
TSS	14,218,000	4,646,000	9,572,000	4,039,976	42.2%

Note:
[1]For BMPs designed, under construction or completed prior to the final FY18 report, guidance from draft expert panel report or guidance from MDE 2014 has been used.
[2]Maryland's Phase II WIP assumes that if TP reduction is met TSS reduction is met

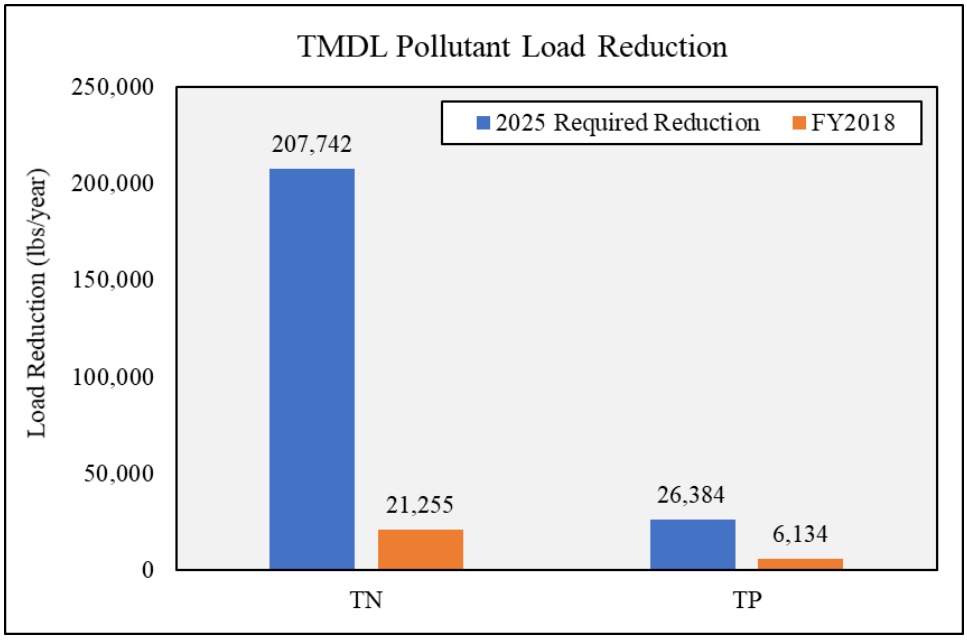

Figure 2. Summary of Bay TMDL pollutant load reductions for TN and TP in Anne Arundel County, MD

Individual Bacteria TMDLs

There are currently nineteen (19) approved bacteria TMDLs associated with Anne Arundel County watersheds. Fecal coliform is the impairing pollutant for fifteen (15) of the TMDLs, while E. coli or Enterococci are identified as the impairing pollutant for the remaining four (4). Each of the

TMDLs set forth a Stormwater WLA that is noted as a percent reduction in the table below. Table 24 characterizes the individual bacteria TMDLs in the County.

Table 24. Bacteria TMDLs for Anne Arundel County

Location	Approval Date	% Reduction Required*
Magothy River Mainstem	February 20, 2006	12.8
Magothy River/Forked Creek	February 20, 2006	26.3
Magothy River/Tar Cove	February 20, 2006	0.0
Patapsco River/Furnace Creek	March 10, 2011	77.7
Patapsco River Lower North Branch, 8 Digit WS 02130906	December 3, 2009	20.7
Patapsco River/Marley Creek	March 10, 2011	75.7
Upper Patuxent River, Subsegment of 8 Digit WS 0213114	August 9, 2011	22.3
Rhode River/Bear Neck Creek	February 20, 2006	43.3
Rhode River/Cadle Creek	February 20, 2006	72.2
Severn River Mainstem, Subsegment of 8 Digit WS 02131002	April 10, 2008	19.0
Severn River/Mill Creek	April 10, 2008	86.0
Severn River/Whitehall & Meredith Creeks	April 10, 2008	90.0
South River/Duvall Creek	November 4, 2005	45.6
South River, Subsegment of 8 Digit WS 02131003	November 4, 2005	29.5
South River/Ramsey Lake	November 4, 2005	59.3
South River/Selby Bay	November 4, 2005	0.0
W. Chesapeake Bay/Tracy & Rockhold Creeks	February 20, 2006	81.6
West River, Subsegment of 8 Digit WS 02131004	February 20, 2006	35.3
West River/Parish Creek	February 20, 2006	53.1

*Based on the MDE published TMDL documents for bacteria impaired watersheds in Anne Arundel County and Anne Arundel County's *Total Maximum Daily Load Restoration Plan for Bacteria, February 2017.* Percent reductions required for the Patapsco and Upper Patuxent are for the Anne Arundel County portion only.

MDE identified four bacteria source categories in each of the 19 TMDLs: pet waste, wildlife, humans, and livestock. During the development of the TMDLs MDE quantified the contribution for each of these source categories to the impaired waterbody. Among all 19 TMDL watersheds, the average percent contribution for each category was determined (Table 25).

Table 25. Bacteria Source Categories and Contribution

Bacteria Source Category	Average % Contribution
Pet Waste	46.0
Wildlife	34.5
Human	6.9
Livestock	12.6
TOTAL	**100**

Due to the number of bacteria TMDLs and because the four source categories were represented in all of the impaired waterbodies, Anne Arundel County chose to develop a single consolidated implementation plan to address all 19 bacteria TMDLs. Anne Arundel County's Bacteria TMDL Restoration Plan is posted on the County's WPRP Bay TMDL webpage, under TMDL Restoration Plans, at www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/index.html .

FY18 Progress:

On May 11, 2018 Anne Arundel County received formal approval from the Water and Science Administration of MDE of its Bacteria TMDL Restoration Plan. In the May 11, 2018 letter MDE determined that "Anne Arundel County's SW-WLA implementation plans are responsive to local water quality impairments and EPA approved TMDLs, meet permit condition Part1.IV.E.2.b, and are formally approved".

During this reporting year Anne Arundel County staff participated in a work group, convened by the EPA Chesapeake Bay Program's Urban Stormwater Workgroup (USWG), with representatives from the Center for Watershed Protection, DC Dept. of Energy and Environment and several environmental consultants to review and summarize the recent science and existing data on bacteria source tracking (BST), and removal techniques and BMP efficiencies for achieving bacteria load reductions. This effort resulted in the publication of the document "Fecal Indicator Bacteria Management: Reviewing the Latest Science on Bacteria Control for Watershed Managers, September 2018". The document is posted on the Chesapeake Stormwater Network website at https://chesapeakestormwater.net/category/publications/. In addition to exploring BST, the County researched new bacteria filtering technologies for installation in storm drain inlets as a tool for reducing bacteria loads. One specific technology, AbTech, was explored and efforts to identify an application site were pursued. The County continues to investigate methods to retire or upgrade septic systems -- an implementation of Tier A strategies to reduce human sources of bacteria in County waterways.

The County continued implementing Tier B (non-human source) recommendations during FY18 by initiating the development of a robust pet waste outreach program. A pilot program will be launched in the Rhode River/Cadle Creek and the Magothy River Mainstem watersheds in spring 2019. The results of the pilot program will inform the County on the most effective outreach strategy (or strategies) to use for a County-wide outreach effort. A methodology for evaluating the effectiveness and quantifying the bacteria load reductions for the adopted pet waste program is

still needed. The County continues to promote pump-out services associated with marinas through its social media.

An evaluation of the Plan's implementation progress was completed in FY18. This evaluation, the *TMDL Restoration Plan for Bacteria - 2018 Annual TMDL Assessment Report*, is included in Appendix I of the FY18 NDPES MS4 Annual Report. The bacteria load reductions achieved from current implementation of the proposed Tier A and two Tier B restoration strategies were quantified using the Center for Watershed Protection's Watershed Treatment Model (WTM). Existing literature was used to evaluate load reduction progress associated with remaining Tier B strategies. Table 26 presents a summary of the County's progress toward achieving the SW-WLAs for Bacteria TMDLs.

Table 26. Progress Toward Achieving Bacteria TMDL SW-WLAs

Watershed	SW-WLA		Percent Reduction	
	Baseline	Target	Required	Reduction through FY18
Magothy River Mainstem	$4.97x10^{12}$	$4.33x10^{12}$	12.8%	14.13%
Forked Creek	$1.83x10^{11}$	$1.35x10^{11}$	26.3%	16.53%
Tar Cove	$9.82x10^{11}$	$2.07x10^{12}$	0.0%	0.00%
Furnace Creek	$3.66x10^{12}$	$8.14x10^{11}$	77.7%	13.49%
Marley Creek	$6.19x10^{12}$	$1.50x10^{12}$	75.7%	17.26%
Patapsco Lower North Branch	$2.37x10^{15}$	$1.99x10^{15}$	20.7%	20.89%
Upper Patuxent River	$1.20x10^{16}$	$6.01x10^{15}$	22.3%	1.74%
Bear Neck Creek	$3.55x10^{11}$	$2.01x10^{11}$	43.3%	5.88%
Cadle Creek	$3.54x10^{11}$	$9.85x10^{10}$	72.2%	17.35%
Severn River Mainstem	$6.07x10^{12}$	$4.92x10^{12}$	19.0%	24.27%
Mill Creek (Severn River)	$1.78x10^{12}$	$2.49x10^{11}$	86.0%	2.44%
Whitehall & Meredith Creeks	$4.92x10^{11}$	$4.92x10^{10}$	90.0%	2.70%
South River Mainstem	$1.32x10^{13}$	$9.31x10^{12}$	29.5%	15.14%
Duvall Creek	$1.52x10^{11}$	$8.27x10^{10}$	45.6%	9.54%
Ramsey Lake	$5.57x10^{11}$	$2.27x10^{11}$	59.3%	0.14%
Selby Bay	$3.27x10^{11}$	$3.57x10^{11}$	0.0%	0.19%
Tracy & Rockhold Creeks	$1.67x10^{12}$	$3.06x10^{11}$	81.6%	0.52%
West River Mainstem	$1.77x10^{12}$	$1.15x10^{12}$	35.3%	3.76%
Parish Creek	$2.56x10^{11}$	$1.20x10^{11}$	53.1%	13.13%

Comparison of FY18 and FY17 Modeling Results

The percentage of bacteria load reductions estimated from implementation of Tier A and Tier B strategies for FY18 were compared with the percent bacteria load reductions estimated for FY17. Observations regarding the modeling results are provided below:

- There were no changes or updates to the data related to the retirement of County septic systems for the bacteria TMDL watersheds; therefore the percent bacteria load reductions from this Tier A strategy remained unchanged from FY17 data.

- An increase in the IDDE rate of implementation resulted in a slight increase in percent bacteria load reductions across all watersheds. The Patapsco River/Furnace Creek watershed showed the greatest change with a 0.76 percent increase in bacteria load reduction. The Ramsey Lake, Selby Bay, and Parish Creek watersheds showed the smallest change with a 0.01 percent increase in bacteria load reductions.

- Implementation of urban stormwater management retrofits slightly reduced the percent bacteria load reductions in Mill Creek and the West River Mainstem watersheds because the impervious cover treated, and the designed rainfall treatment depth for the stormwater projects, was updated in the FY18 dataset compared to the FY17 data. Additionally, in the Mill Creek watershed, the reduction in percent bacteria load reductions was also due to proposed stormwater projects included converting infiltration basins with high bacteria removal efficiencies to wet ponds with lower bacteria removal efficiencies. No stormwater management projects were proposed in the Tar Cove, Upper Patuxent River, Cadle Creek, South and Parish Creek watersheds. The percent bacteria load reductions increased for all the remaining watersheds as the result of updated impervious cover treated and designed rainfall treatment depth and addition of new stormwater projects in FY18.

The Patapsco River Lower North Branch and Furnace Creek watersheds showed a slight reduction in the percentage of bacteria load reductions compared to the FY17 modeling results because the number of pump stations being upgraded in these watersheds was revised in the FY18 data. An increase in percent bacteria load reductions or no change was observed for the remaining watersheds when compared to the FY17 modeling results. Overall, the 2018 annual evaluation concluded that the County continues to make progress toward meeting the bacteria TMDL goals through a combination of stormwater management retrofits, elimination of illicit connections to the storm drain system, and abatement of sanitary sewer overflows. The County's IDDE program continues to make gains towards decreasing bacteria loads. An increase in percent bacteria load reductions was observed in all watersheds compared to the FY17 annual progress modeling results except for the Mill Creek and Furnace Creek watersheds. The overall percent bacteria load reductions reduced by 0.06 in the Mill Creek watershed and 0.19 in the Furnace Creek watershed.

Detailed information on the WTM modeling, and the County's FY18 implementation progress, is documented in the previously referenced 2018 Annual Assessment Report found in Appendix I.

Individual Nutrient TMDLs

The *"Total Maximum Daily Loads of Nitrogen and Phosphorus for the Baltimore Harbor in Anne Arundel, Baltimore, Carroll and Howard Counties and Baltimore City, Maryland"* approved by EPA in 2007 and revised by MDE in August 2015 is currently the only individual nutrient TMDL applicable to Anne Arundel County. All other waterbodies listed as impaired for nitrogen and phosphorus are included in the 2010 Chesapeake Bay TMDL. Reductions in nitrogen and phosphorus loads for those waterbodies are addressed by Anne Arundel County's Phase II WIP, July 2012.

The Baltimore Harbor Nutrient TMDL covers 46,223 acres of the Patapsco tidal and Patapsco non-tidal watersheds within Anne Arundel County. To assure that critical conditions are addressed, the

TMDL establishes a growing season allocation (May 1 through October 31) as well as an average annual allocation. The water quality goal of these TMDLs is to reduce excessive algal blooms that result in high chlorophyll *a* concentrations, and maintain the dissolved oxygen concentrations at levels above the water quality criteria for the specific designated uses of the Baltimore Harbor.

FY18 Progress:

On May 11, 2018 Anne Arundel County received formal approval from the Water and Science Administration of MDE of its Baltimore Harbor Nutrient TMDL Restoration Plan (2016). In the May 11, 2018 letter MDE determined that Anne Arundel County's SW-WLA implementation plans are responsive to local water quality impairments and EPA approved TMDLs, meet permit condition Part.IV.E.2.b, and are formally approved. The plan is posted on the County's webpage at: www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/index.html

During FY18 the County continued to implement restoration projects to reduce nutrient loads to the Baltimore Harbor. A summary of nutrient baseline loads, TMDL allocations, required load reductions, and progress toward meeting the required load reductions through FY18 for Anne Arundel County's portion of the Baltimore Harbor is presented in Table 27.

Table 27. Progress Toward Achieving the SW-WLA for Anne Arundel County's Portion of the Baltimore Harbor Nutrient TMDL

Watershed	SW-WLA (lbs/yr)			% Reduction Required	
	Baseline[1] (1995)	Target	Current	Required	Reduction Through FY18
Baltimore Harbor	**Nitrogen**				
	161,514	137,287	158,068	15%	2.1%
	Phosphorus				
	13,941	11,850	13,236	15%	5.1%

[1] The derivation of baseline and target loads is described in detail in Section1.3 of the FY18 Baltimore Harbor Watershed Nutrient TMDL Annual Assessment Report in Appendix I.

Although FY18 progress compared to the FY17 milestone is slightly behind schedule, the program is on track to meet both the phosphorus and nitrogen end dates ahead of schedule with completion of planned restoration projects and continued street sweeping and inlet cleaning as prescribed. The County currently has 40 restoration projects in planning and design phases that are scheduled to be complete by FY22. These projects include stream restoration, SPSCs, bioretention, wet ponds and wetlands, and infiltration basins and trenches.

Individual PCB TMDLs

There are currently six (6) approved PCB TMDLs for Anne Arundel County. Of the six approved PCB TMDLs, only the Baltimore Harbor and Curtis Creek/Bay and the Patuxent Mesohaline, Oligohaline and Tidal Fresh TMDLs have stormwater wasteload allocations that must be met. Table 28 provides information on the six TMDLs, their approval dates, and the required percent load reductions.

Table 28. PCB TMDLs for Anne Arundel County

Location	Approval Date	% Reduction Required
Subsegment of 8 Digit WS 0230903 Baltimore Harbor Curtis Creek/Bay	October 1, 2012	 91.1% 93.5%
Magothy River	March 16, 2015	0
Severn River	July 19, 2016	0
South River	April 27, 2015	0
West and Rhode Rivers	January 8, 2016	0
Patuxent Mesohaline, Oligohaline, Tidal Fresh CB Segments	September 19, 2017	99.9%

Anne Arundel County's Baltimore Harbor and Curtis Creek/Bay PCB TMDL Restoration Plan is posted on the County's webpage, under TMDL Restoration Plans, at www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/index.html.

Sub Segment of 8 Digit WS 0230903/Baltimore Harbor and Curtis Creek/Bay

The Maryland Department of Environment identified the Baltimore Harbor portion of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment that includes Curtis Creek/Bay as individually impaired by PCBs in fish tissue. In addition, the Curtis Creek/Bay portion of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment has been identified as individually impaired by PCBs in sediment as well as fish tissue. Both of these individual PCB impairments are addressed in the *Total Maximum Daily Loads of Polychlorinated Biphenyls in Baltimore Harbor, Curtis Creek/Bay, and Bear Creek Portions of Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Maryland* which was approved by EPA on October 1, 2012. The Baltimore Harbor portion of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment encompasses Curtis Creek/Bay. Because the Curtis Creek/Bay segment was individually identified as impaired for PCBs due to sediment data, in addition to the impairment listing for the entire Baltimore Harbor portion of the Bay Segment based on PCB fish tissue concentrations, there is spatial overlap between the PCB listings for this Bay Segment. As a result, the baseline and TMDL loads for the Baltimore Harbor portion of the Bay Segment include the baseline and TMDL loads for the Curtis Creek/Bay segment (Table 29).

The PCB load to the Baltimore Harbor Embayment and Curtis Creek/Bay is primarily due to point and nonpoint source loads. Resuspension/diffusion from within the embayment and loading from the Chesapeake Bay mainstem may occur but is not considered to be a major source of PCBs to these TMDL watersheds. Moreover, modeling results indicate a likely net transport of PCBs out of the embayment and Curtis Creek. This PCB TMDL SW-WLA addresses only controllable sources (e.g., point and nonpoint sources) for load reduction implementation, and does not include resuspension or tidal influx from the Chesapeake Bay mainstem.

FY18 Progress:

On May 11, 2018 Anne Arundel County received formal approval from the Water and Science Administration of MDE of its PCB TMDL Restoration Plan. In the May 11, 2018 letter MDE

determined that Anne Arundel County's SW-WLA implementation plans are responsive to local water quality impairments and EPA approved TMDLs, meet permit condition Part1.IV.E.2.b, and are formally approved. Consistent with the Baltimore Harbor and Curtis Creek/Bay PCB TMDL Restoration Plan, PCB load updates were modeled based on the Center for Watershed Protection Watershed Treatment Model (WMT) adapted for PCBs. The model was updated to compute the 2018 progress in PCB load reduction. Progress was tracked independently for each subwatershed. The *Baltimore Harbor and Curtis Creek/Bay PCB TMDL Restoration Plan – 2018 Annual TMDL Assessment Report* is found in Appendix I.

A summary of the tPCB baseline loads, TMDL allocations, required load reductions, and progress toward meeting the required load reductions through FY18 for the Baltimore Harbor and Curtis Creek/Bay is presented in Table 29.

Table 29. Progress Toward Achieving tPCB SW-WLA for Anne Arundel County's portion of the Baltimore Harbor Embayment and Curtis Creek/Bay

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2011)	Target	Current	Required	Reduction Through FY18
Baltimore Harbor Embayment	454.55	40.45	449.34	91.1%	1.74%
Curtis Creek/Bay	262.89	17.09	258.58	93.5%	1.10%

In addition to BMP retrofits, Anne Arundel County initiated a contract in FY18 to develop a targeted PCB action strategy, one of the recommendations in the 2016 Restoration Plan. The County worked in collaboration with MDE's Water and Science Services staff to refine a scope of work for the development of a strategy to further investigate watershed sources of PCB through monitoring. The County met with MDE personnel in March 2018 to discuss possible approaches for the strategy, reaching consensus to focus on continued discovery through monitoring in selected pilot catchments in addition to sampling select stormwater ponds. The strategy will focus on the logistics of PCB monitoring and recommend a monitoring plan for implementation. Development of the strategy is currently in process and is scheduled to be completed May 2019.

Patuxent River Mesohaline, Oligohaline, and Tidal Fresh Chesapeake Bay Segments

The Maryland Department of the Environment identified the waters of the Patuxent River mesohaline, oligohaline, and tidal fresh segments on the State's 2014 Integrated Report of surface water quality as impaired by Polychlorinated Biphenyls (PCBs) in fish tissue. This impairment is addressed through the *Total Maximum Daily Loads of Polychlorinated Biphenyls in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments, Maryland* which was approved by EPA on September 19, 2017.

Although the transport of PCBs from bottom sediments to the water column through re-suspension and diffusion can be a major source of PCBs in estuarine systems they were not considered a source within the framework of this TMDL. The model used to determine baseline loads considers the exchange between the sediment and water column as an internal load. Only external sources

to the system are assigned a baseline load. The transport of PCBs into the Patuxent mesohaline tidal segment due to tidal influences from the Chesapeake Bay mainstem is a source of PCBs to the system; however, this load contribution results from other point and nonpoint source inputs and is not considered to be a directly controllable source.

FY18 Progress:

A summary of the tPCB baseline loads, TMDL allocations, required load reductions, and progress toward meeting the required load reductions through FY18 for the Patuxent Watershed Oligohaline, Mesohaline and Tidal Fresh Chesapeake Bay segments is presented in Table 30.

Table 30. Progress Toward Achieving PCB SW-WLA for Anne Arundel County's portion of the Patuxent Watershed Oligohaline, Mesohaline and Tidal Fresh Chesapeake Bay segments

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2014)	Target	Current	Required	Reduction Through FY18
Mesohaline	0.0	0.0	N/A	0.0%	N/A
Oligohaline	0.3	0.3	N/A	0.0%	N/A
Tidal Fresh	25.41[1]	25.39	24.7	99.9%	97.1%

[1] The baseline load from 2014 was calculated using the MDE 2014 Progress BMPs in CAST. Details of the baseline modeling can be found in Section 1.2 of the Patuxent River Watershed PCB TMDL Restoration Plan in Appendix I.

The County developed a restoration plan for the Patuxent River Oligohaline, Mesohaline and Tidal Fresh PCB TMDL (approved by EPA on September 18, 2017). An annotated outline of the plan was submitted to MDE on September 14, 2018 and approved on September 17, 2018. A final draft restoration plan (*Patuxent River Watershed PCB TMDL Restoration Plan*) is submitted with the County's FY18 Annual NPDES MS4 Report as Appendix I.

With respect to PCB remediation in the County, during the FY17 reporting period an opportunity for the County to explore the remediation of PCBs in-situ in a stormwater detention pond located in the Severn River watershed. This remediation included amending soils with activated carbon and PCB de-chlorinators and aerobic degraders. During FY18 Anne Arundel County initiated a pilot study to apply this remediation technology and assess its effectiveness. Although the proposed site is not located within a watershed that has a stormwater WLA for PCBs it is anticipated that the findings will be applicable to watersheds that do, including the Baltimore Harbor, Curtis Creek/Bay and the Patuxent River watersheds.

Magothy River

The Total Maximum Daily Load of Polychlorinated Biphenyls in the Magothy River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland was approved by EPA on March 16, 2015. Because the Magothy River is identified as impaired for PCBs in fish tissue, the overall objective of the PCB TMDL for the Magothy River is to ensure that the "fishing" designated use, which is protective of human health related to the consumption of fish from the river, is supported. This TMDL, however, also ensures the protection of all other applicable designated uses within the river. More specifically, the objective of this TMDL is to reduce the current total PCB (tPCB)

loads to the Magothy River so that the water column and sediment TMDL endpoint tPCB concentrations are achieved.

The TMDL states that "no reductions to these (watershed) loads are necessary in order to achieve the TMDL." When the TMDL endpoints are met, the tPCB load from the Chesapeake Bay mainstem will be reduced by about 92.3% including an explicit 5% Margin of Safety. At that time, the total load to the waterbody will be reduced by 90.6% from its baseline. (*Total Maximum Daily Load of Polychlorinated Biphenyls in the Magothy River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland. MDE. Document version: February 12, 2015. EPA Approval Date: March 16, 2015. Pg. 28*).

A summary of the NPDES MS4 regulated tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the Magothy is presented in Table 31.

Table 31. SW-WLA tPCB Baseline Loads and Load Reductions for Magothy River

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2011)	Target	Current	Required	Reduction Through FY18
Magothy	7.9	7.9	N/A	0.0	N/A

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the Magothy River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland, Document Version: February 12, 2015. EPA Approval Date: March 16, 2015

FY18 Progress:

Per MDE, the PCB TMDL for the Magothy River is achieved through the decline in PCB concentrations in the Bay and natural attenuation in sediments. Therefore, no reduction in PCB loads is required to achieve the TMDL. The County understands the need to ensure that PCB loads from stormwater runoff will not increase over the baseline load. Although an increase in the baseline load is unlikely because the manufacture of PCBs has been banned since 1979, Anne Arundel County is prepared to investigate and identify remediation actions for any new sources of PCBs that may be identified in the future.

Severn River

The Total Maximum Daily Load of Polychlorinated Biphenyls in the Severn River, Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland was approved by EPA on July 19, 2016. Because the Severn River is identified as impaired for PCBs in fish tissue, the overall objective of the tPCB TMDL for the Severn River Mesohaline is to ensure that the "fishing" designated use, which is protective of human health related to the consumption of fish, in the river is supported. This TMDL, however, ensures the protection of all other applicable designated uses within the river. More specifically, the objective of this TMDL is to reduce current tPCB loads to the Severn River so that the water column and sediment TMDL endpoint tPCB concentrations are achieved.

The TMDL states "because the watershed's load was estimated as being only 1.08% of the total PCB baseline load, the Anne Arundel County Phase I MS4 permit was not assigned a reduction and therefore no PCB implementation plan will be required." (*Total Maximum Daily Load of*

Polychlorinated Biphenyls in the Severn River, Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland. MDE. Document version: July 2016. EPA Approval Date: July 19, 2016. Pg.27).

A summary of the NPDES MS4 regulated tPCB loads, TMDL allocations, load reductions, and maximum daily loads for the Severn is presented in Table 32.

Table 32. SW-WLA tPCB Baseline Loads and Load Reductions for Severn River

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2011)	Target	Current	Required	Reduction Through FY18
Severn	21.5	21.5	N/A	0.0	N/A

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the Severn River, Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland. Document Version: July 2016. EPA Approval Date: July 19, 2016.

FY18 Progress:

Per MDE, the tPCB TMDL for the Severn River is achieved through the decline in PCB concentrations in the Chesapeake Bay mainstem. Therefore, no reduction in PCB loads is required to achieve the TMDL. The County understands the need to ensure that PCB loads from stormwater runoff will not increase over the baseline load. Although an increase in the baseline load is unlikely because the manufacture of PCBs has been banned since 1979, Anne Arundel County is prepared to investigate and identify remediation actions for any new sources of PCBs that may be identified in the future.

South River

The *Total Maximum Daily Load of Polychlorinated Biphenyls in the South River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland* was approved by EPA on April 27, 2015. Because the South River is identified as impaired for PCBs in fish tissue, the overall objective of the PCB TMDL for the South River is to ensure that the "fishing" designated use, which is protective of human health related to the consumption of fish in the river, is supported. This TMDL, however, also ensures the protection of all other applicable designated uses within the river.

The TMDL states that "no reductions to these loads are necessary in order to achieve the TMDL." When the targets are met, the PCB load from the Chesapeake Bay mainstem will be reduced by approximately 50% including an explicit 5% Margin of Safety. At that time, the total load to the waterbody will be reduced by 46% from its baseline. (*Total Maximum Daily Load of Polychlorinated Biphenyls in the South River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland. MDE. Document Version December, 2014. EPA Approval Date: April 27, 2015. Pg. 24*).

A summary of NPDES MS4 regulated tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the South River is presented in Table 33.

Table 33. SW-WLA tPCB Baseline Loads and Load Reductions for South River

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2011)	Target	Current	Required	Reduction Through FY18
South	3.9	3.9	N/A	0.0	N/A

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the South River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland, Document Version December 2014, EPA Approval Date: April 27, 2015

FY18 Progress:

Per MDE, the PCB TMDL for the South River is achieved through the decline in PCB concentrations in the Bay and natural attenuation in sediments. Therefore, no reduction in PCB loads is required to achieve the TMDL. The County understands the need to ensure that PCB loads from stormwater runoff will not increase over the baseline load. Although an increase in the baseline load is unlikely because the manufacture of PCBs has been banned since 1979, Anne Arundel County is prepared to investigate and identify remediation actions for any new sources of PCBs that may be identified in the future.

West and Rhode Rivers

The *Total Maximum Daily Load of Polychlorinated Biphenyls in the West and Rhode River, Mesohaline Segments, Anne Arundel County, Maryland* was approved by EPA on January 8, 2016. Because the West and Rhode Rivers are identified as impaired for PCBs in fish tissue, the overall objective of the tPCB TMDL is to ensure that the "fishing" designated use, which is protective of human health related to the consumption of fish in the rivers is supported. The TMDL also ensures the protection of all other applicable designated uses within the rivers.

The states that no reduction to these (watershed) loads is necessary in order to achieve the TMDL When the targets are met, the TPCB load from the Chesapeake Bay mainstem will be reduced by approximately 57.8% from its baseline load including an explicit 5% Margin of Safety. (*Total Maximum Daily Load of Polychlorinated Biphenyls in the West River and Rhode River, Mesohaline Segments, Anne Arundel County, Maryland. MDE. Document Version December, 2015. EPA Approval Date: January 8, 2016. Pg.23*).

A summary of the NPDES MS4 regulated tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the West and Rhode Rivers is presented in Table 34.

Table 34. SW-WLA tPCB Loads and Load Reductions for West and Rhode Rivers

Watershed	SW-WLA (g/year)			% Reduction Required	
	Baseline (2011)	Target	Current	Required	Reduction Through FY18
West/Rhode	1.6	1.6	N/A	0.0	N/A

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the West and Rhode River Mesohaline Chesapeake Bay Tidal Segment, Anne Arundel County, Maryland, Document Version December, 2015 EPA Approval Date: January 8, 2016.

FY18 Progress:

Per MDE, the PCB TMDL for the West and Rhode Rivers is achieved through the decline in PCB concentrations in the Bay and natural attenuation in sediments. Therefore, no reduction in PCB loads is required to achieve the TMDL. The County understands the need to ensure that PCB loads from stormwater runoff will not increase over the baseline load. Although an increase in the baseline load is unlikely because the manufacture of PCBs has been banned since 1979, Anne Arundel County is prepared to investigate and identify remediation actions for any new sources of PCBs that may be identified in the future.

Sediment TMDLs

Prior to this reporting period, three (3) individual sediment TMDLs had been approved in Anne Arundel County. During this reporting period an individual sediment TMDL was approved by EPA for the South River and the Other West Chesapeake watershed, and on July 2, 2018 (FY19) sediment TMDLs were approved for the Middle and Lower Patuxent River watersheds. The seven (7) approved sediment TMDLs for Anne Arundel County are listed in Table 35 along with their approval dates.

Table 35. Sediment TMDLs in Anne Arundel County

Location	Approval Date
Little Patuxent River, 8 Digit WS 02131105	September 30, 2011
Upper Patuxent River, 8 Digit WS 02131104	September 30, 2011
Patapsco River Lower North Branch, 8 Digit WS 02130906	September 30, 2011
South River, 8 Digit WS 02131003	September 28, 2017
Other West Chesapeake, 8 Digit WS 02131005	February 9, 2018
Middle Patuxent River, 8 Digit WS 02131102	July 2 , 2018
Lower Patuxent River, 8 Digit WS 02131101	July 2, 2018

Little Patuxent River

The *Total Maximum Daily Load of Sediment in the Little Patuxent River Watershed, Howard, and Anne Arundel Counties, Maryland, September 30, 2011* presents the TMDL for sediment in the Little Patuxent watershed as an average annual load to ensure the support of aquatic life. WLAs were calculated for NPDES regulated individual industrial, individual municipal, individual municipal separate storm sewer systems, general mineral mining, general industrial stormwater, and general MS4 permits in the Little Patuxent River watershed. To attain the TMDL loading cap, reductions were only applied to the urban sediment sources, because urban land was identified as the only predominant controllable sediment source in the watershed. The overall Little Patuxent WLA and the Anne Arundel County stormwater WLA, and the required percent reduction are presented in Table 36.

Table 36. Little Patuxent River SW-WLA Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW Point Source	Baseline Load (tons/year)	SW WLA (tons/year)	% Reduction Required
Anne Arundel County	3,310.8	2,632.3	20.5%
Total Little Patuxent	17,092.5	11,225.8	34.3%

FY18 Progress:

Anne Arundel County received formal MDE approval of the *Little Patuxent River Sediment TMDL Restoration Plan* (2016) on May 11, 2018. The plan is posted on the County's webpage at: www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/. The *Little Patuxent River 2018 Sediment TMDL Annual Assessment Report* is found in **Appendix I**. Progress toward meeting the SW WLA is documented in this report and summarized in Table 37 below.

Table 37. Progress Toward Achieving the Sediment TMDL NPDES MS4 Regulated SW WLA for Anne Arundel County's Portion of the Little Patuxent River Watershed

Watershed	SW-WLA (lbs/year)			% Reduction Required	
	Baseline (2005)	Target	Current	Required	Reduction Through FY18
Little Patuxent	1,207,534	959,989	977,517	20.5%	19.0%

Overall the modeling results indicate that on a TMDL allocated goal of 20.5%, the County has achieved a 19.0% reduction, which translates to 92.7% progress towards the reduction goal. The 2016 plan (Anne Arundel County, 2016) anticipated 18.1% reduction by 2017. The additional reduction needed between the planned 2017 reduction and the final 2025 reduction of 20.5% was converted to a reduction per year (3,574 pounds or 1.44%). When compared to the 2018 reduction of 19.0% the current progress is ahead by 7,492 pounds.

The load reduction achieved in 2017 was 19.4%, larger than the reduction for 2018 of 19.0%. This is due to less material being removed through both inlet cleanings and street sweeping during FY18. If the current three-year rate of progress (5.5% from 2016-2018) is maintained, it is expected that the TMDL allocation load and load reduction would be met by 2021. The County's initial estimate and plan were based on a 2025 end date for meeting the TMDL; therefore the program is currently on track to meet the end date ahead of schedule.

Upper Patuxent River

The *Total Maximum Daily Load of Sediment in the Upper Patuxent River Watershed, Anne Arundel, Howard and Prince George's Counties, Maryland, September 30, 2011* presents the TMDL for sediment in the Upper Patuxent River Watershed as an average annual load to ensure the support of aquatic life. To attain the TMDL loading cap calculated for the watershed, reductions were applied equally to the predominant controllable sediment sources, which were identified as urban land, high till crops, low till crops, and hay. Since all urban land use in the

Upper Patuxent watershed is considered to be representative of all regulated stormwater sources, the NPDES stormwater WLA is equivalent to the urban land use loads resulting from applying reductions to all of the predominant land uses. The overall Upper Patuxent WLA and the Anne Arundel County stormwater WLA, and the required percent reduction are presented in Table 38.

Table 38. Upper Patuxent River Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW Point Source	Baseline Load (tons/year)	SW WLA (tons/year)	% Reduction Required
Anne Arundel County	1,029.7	912.4	11.4%
Total Upper Patuxent	9,102.0	8,064.6	11.4%

FY18 Progress:

Anne Arundel County received formal MDE approval of the *Upper Patuxent River Sediment TMDL Restoration Plan* (2016) on May 11, 2018. The plan is posted on the County's website at: www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/. The *Upper Patuxent River 2018 Sediment TMDL Annual Assessment Report* is found in **Appendix I**. Progress toward meeting Anne Arundel County's portion of the SW- WLA is documented in this report and presented in Table 39.

Table 39. Progress Toward Achieving the Sediment TMDL NPDES MS4 Regulated SW-WLA for Anne Arundel County's Portion of the Upper Patuxent River Watershed

Watershed	SW-WLA (lbs/yr)			% Reduction Required	
	Baseline (2005)	Target	Current	Required	Reduction Through FY18
Upper Patuxent	485,565	430,211	450,451	11.4%	7.2%

Modeling results indicate that on a TMDL allocated goal of 11.4%, the County has achieved a 7.2% reduction, which translates to 63% progress towards the reduction goal. The 2016 plan (Anne Arundel County, 2016) anticipated 10.6% reduction by 2017. The additional reduction needed between the actual 2017 reduction and the final 2025 reduction of 11.4% was converted to a reduction per year (2,213 pounds or 0.45%) assuming an even distribution of restoration projects over time. When compared to the 2018 reduction of 7.2% the current progress is behind by 4,746 pounds.

The County's initial estimate and plan were based on a 2025 end date for meeting the TMDL. Although the progress as of FY18 is slightly behind schedule, the overall program is on track to meet the end date ahead of schedule with completion of a small number of restoration projects and continued street sweeping and inlet cleaning as prescribed.

The Maryland City Outfall and Stream Restoration project, based on early calculations at the 30% design phase, is estimated to reduce over 400 tons of sediment. Once the project is finalized, the

load reductions will be updated and compared to the target goals. The project is expected to make substantial progress towards the final goal.

Patapsco River Lower North Branch

The *Total Maximum Daily Load of Sediment in the Patapsco River Lower North Branch Watershed, Baltimore City and Baltimore County, Howard, Carroll and Anne Arundel Counties, Technical Memorandum: Significant Sediment Point Sources in the Patapsco River Lower North Branch, September 30, 2011* presents the TMDL for the Lower North Branch as an average annual load to ensure that there will be no sediment impacts affecting aquatic health. The overall Patapsco Lower North Branch and the Anne Arundel County stormwater WLAs, and the required percent reduction are presented in Table 40.

Table 40. Patapsco River Lower North Branch Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW Point Source	Baseline Load (tons/year)	SW WLA (tons/year)	% Reduction Required
Anne Arundel County	1,915.1	1,490.0	22.2%
Total LNB	15,536.8	13,052.9	16.0%

FY18 Progress:

Anne Arundel County received formal approval of the *Patapsco River Lower North Branch Sediment TMDL Restoration Plan* (2016) on May 11, 2018. The plan is posted on the County's website at www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/. The *Patapsco Lower North Branch 2018 Sediment TMDL Annual Assessment* Report is found in **Appendix I**. Progress toward meeting Anne Arundel County's portion of the SW-WLA is documented in that report and presented in Table 41.

Table 41. Progress Toward Achieving the Sediment TMDL NPDES MS4 Regulated SW-WLA for Anne Arundel County's Portion of the Patapsco Lower North Branch Watershed

Watershed	SW-WLA (lbs/year)			% Reduction Required	
	Baseline (2005)	Target	Current	Required	Reduction Through FY18
Patapsco LN Branch	1,422,388	1,106,618	1,237,670	22.2%	13.0%

Modeling results indicate that on a TMDL allocated goal of 22.2%, the County has achieved a 13.0% reduction, which translates to 59% progress towards the reduction goal. The 2016 plan (Anne Arundel County, 2016) anticipated 18.1% reduction by 2017. The reduction needed between the actual 2017 reduction and the final 2025 reduction of 22.2% was converted to a reduction per year (14,895 pounds or 1.05%) assuming an even distribution of restoration projects over time. When compared to the 2018 reduction of 13.0% the current progress is behind by 26,788 pounds.

The actual reduction in 2017 was 13.8%, larger than the reduction for 2018 of 13.0%. This is due to less material being removed from both inlet cleanings and street sweeping. It is noted that the 46.2% reduction planned is based on the assumption that all of the recommended strategies would be completed, which is not often the case due to feasibility, site constraints etc.

The County currently has 16 projects in the planning and design stages that are set to be completed in 2018-2021; many of these projects were not included in the initial restoration plan completed in 2016. They include SPSCs, wet pond / wetlands, infiltration trenches, and stormwater retrofits. The estimated sediment load reductions for these projects is 254,238 lbs or 80.5% of the required sediment reduction. Completion of these projects in addition the progress made through FY18 would bring the total reduction to 30.8% by 2021, indicating that the County will meet the 22.2% reduction during 2021.

South River

A sediment TMDL for the Non-tidal South River Watershed was approved by EPA on September 28, 2017. The *Total Maximum Daily Load of Sediment in the Non-tidal South River Watershed, Anne Arundel County, Maryland, September 28, 2017* presents the TMDL for sediment in the South River watershed as an annual average load to ensure the support of aquatic life. The NPDES regulated stormwater loads within the South River watershed is expressed as an aggregate NPDES Stormwater WLA. The Stormwater WLA is based on reductions applied to the sediment load from the portion of the urban land-use in the watershed associated with the NPDES MS4 Permit. The Anne Arundel County regulated stormwater WLAs for the Nontidal South River watershed, and the required percent reduction are presented in Table 42.

Table 42. South River SW-WLA Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW Point Source	Baseline Load (lbs/year)	SW WLA (lbs/year)	% Reduction Required
Anne Arundel County	1,932,000	1,396,000	28%

FY18 Progress:

Pursuant to the County's NPDES MS4 Permit requirements, restoration plans for all TMDLs with SW-WLAs must be developed and submitted to MDE within one year of EPA approval. The *Total Maximum Daily Load of Sediment in the Non-tidal South River Watershed* was approved by EPA on September 28, 2017. In 2018 Anne Arundel County conducted a modeling analysis of sediment load reductions achieved through restoration project implementation to determine whether the SW-WLA for sediment in the South River watershed was achieved through recent implementation of restoration activities. This analysis showed that the SW-WLA had been achieved, and on September 28, 2018 the County provided documentation of that analysis to MDE for review and comment. Table 43 presents the result of the modeling analysis.

Table 43. Progress Toward Achieving the Sediment TMDL NPDES MS4 Regulated SW-WLA for the South River Watershed

Watershed	SW-WLA (lbs/year)			% Reduction Required	
	Baseline (2009)	Target	Current	Required	Reduction Through FY18
South River	3,964,651	1,110,102	1,669,519	28%	58%

Loads calculated by AACo. and submitted to MDE September 28, 2018.

A copy of the *South River Sediment TMDL: Documentation of Attainment, September 2018* is incorporated into the County's FY18 MS4 Annual Report in **Appendix I**.

Nontidal Other West Chesapeake Sediment

The *Total Maximum Daily Load of Sediment in the Other West Chesapeake Watershed, Anne Arundel County and Calvert Counties, Maryland,* approved by EPA on February 9, 2018 presents the sediment TMDL as an average annual load to ensure acceptable biological integrity in the watershed's streams. The Anne Arundel County regulated stormwater WLA, the required percent reduction and progress achieved through FY18 are presented in Table 44.

Table 44. Other West Chesapeake Watershed (Anne Arundel County) SW-WLA Sediment Baseline Load and Load Reduction Required

Watershed	SW-WLA (lbs/yr)			% Reduction Required	
	Baseline (2009)	Target	Current	Required	Reduction Through FY18
Other West Chesapeake	3,895,399	2,609,917	3,754,604	33%	3.6%

FY18 Progress:

Pursuant to the requirements of its NPDES MS4 permit, Anne Arundel County developed the *Other West Chesapeake Watershed Sediment TMDL Restoration Plan* to address this sediment TMDL. The restoration plan is submitted as a final draft with the County's FY18 MS4 Annual Report in **Appendix I**. Approximately 29 acres of County Phase I MS4 land has been treated by restoration BMPs through 2018 in addition to 1,216 linear feet of shoreline management and the implementation of other non-structural restoration BMPs. The County currently has one planned project in the Other West Chesapeake watershed: Jack Creek Park shoreline stabilization, which addresses 1,600 linear feet of shoreline stabilization.

Due to the limited number and extent of currently planned projects, a suite of possible BMPs types was developed as part of the restoration plan to achieve the required load reduction. The Herring Bay Watershed Assessment (Anne Arundel County, 2018) identified priority stream reaches for restoration, as well as prioritized parcels for potential impervious surface removal and tree planting

projects. The high priority sites identified in the watershed assessment were selected as potential projects for planning purposes. Planned tree planting sites were assumed to be located within riparian buffers and modeled as such. Riparian sites will be prioritized over upland sites, however all tree planting sites will be considered and credited accordingly. Inlet cleaning and street sweeping practices are recommended to continue at the current rate within the watershed.

Middle Patuxent River

The *Total Maximum Daily Load of Sediment in the Non-Tidal Patuxent River Middle Watershed, Anne Arundel, Calvert, and Prince George's Counties, Maryland, July 2, 2018* presents the TMDL for sediment in the Middle Nontidal Patuxent River Watershed as an average annual load to ensure acceptable biological integrity in the watershed's streams. The Anne Arundel County regulated stormwater WLAs for the Nontidal Middle Patuxent River watershed, and the required percent reduction are presented in Table 45.

Table 45. Nontidal Middle Patuxent River Watershed SW-WLA Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW	Baseline Load (lbs/year)	SW-WLA (lbs/year)	% Reduction Required
Nontidal Middle Patuxent River	324,000	142,000	56%

FY18 Progress

Pursuant to the County's NPDES MS4 Permit requirements, restoration plans for all TMDLs with SW-WLAs must be developed and submitted to MDE within one year of EPA approval. The *Total Maximum Daily Load of Sediment in the Nontidal Middle Patuxent River Watershed* was approved by EPA on July 2, 2018. In October 2018 the County initiated a contract for the development of a restoration plan for the Middle Patuxent sediment TMDL. Work on this contract is currently underway with a draft plan due to the County March 2019.

Lower Patuxent River

The *Total Maximum Daily Load of Sediment in the Non-Tidal Patuxent River Lower Watershed, Anne Arundel, Calvert, Charles, Prince George's and Saint Mary's Counties, Maryland, July 2, 2018* presents the TMDL for sediment in the Lower Nontidal Patuxent watershed as an average annual load to ensure acceptable biological integrity in the watershed's streams. The Anne Arundel County regulated stormwater WLAs for the Nontidal Lower Patuxent River watershed, and the required percent reduction are presented in Table 46.

Table 46. Nontidal Lower Patuxent River Watershed SW-WLA Sediment Baseline Load and Load Reduction Required

NPDES MS4 Regulated SW	Baseline Load (lbs/year)	SW-WLA (lbs/year)	% Reduction Required
Nontidal Lower Patuxent River	28,000	11,000	61%

FY18 Progress

Pursuant to the County's NPDES MS4 Permit requirements, restoration plans for all TMDLs with SW-WLAs must be developed and submitted to MDE within one year of EPA approval. The *Total Maximum Daily Load of Sediment in the Nontidal Lower Patuxent River Watershed* was approved by EPA on July 2, 2018. In October 2018 Anne Arundel initiated a contract for the development of a restoration plan for the Middle Patuxent sediment TMDL. Work on this contract is currently underway with a draft plan due to the County March 2019.

3. Nutrient Trading

Anne Arundel County may acquire total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) credits, in accordance with the requirements of the Maryland Water Quality Trading and Offset Program, COMAR 26.08.11, to meet its twenty percent impervious surface area restoration requirement in this permit. The basis for an equivalent impervious acre restored through trading is the difference in pollutant loads between urban and forest stormwater runoff according to MDE's "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits" (MDE, 2014, or the most recent version). On an annual basis, until reissuance of this permit, the permittee shall report to the Department:

a. The cumulative impervious acres restored achieved through installation of BMPs during the permit compliance period;
b. The equivalent impervious acres restored achieved through credit acquisition during the permit compliance period; and
c. Documentation required to verify credits acquired and to be used for impervious surface restoration during the permit compliance period.

Status:

In addition to the FY18 MS4 Geodatabase, required as part of the County's annual permit reporting, the County has included in Appendix A an additional MS4 Geodatabase. This additional geodatabase contains a summary of impervious restoration acreage; completed restoration and alternative BMP projects; and associated BMP records for the first half of FY19 (07/01/2018 – 12/31/2018). The purpose of this geodatabase is to provide an up-to-date and accurate accounting of the County's cumulative progress towards meeting its 20% impervious surface restoration (ISR) goal. Table 47 provides a summary of the impervious acres restored during the current permit term;

more detailed data is available in the FY19 MS4 Geodatabase feature classes: *RestBMP*, *AltBMPLine*, *AltBMPPoint*, *and AltBMPPoly*.

Table 47. Summary of cumulative impervious surface restoration through implementation of restoration and alternative BMPs as of December 31, 2018.

	# of Projects Completed	Impervious Acres Restored
Restoration BMPs		
- ESD	20	17
- structural	131	729
Alternative Restoration BMPs		
- street sweeping*	1,267 tons	169
- impervious surface elimination	3	0
- catch basin and storm drain cleaning*	349 tons	70
- stream restoration	20 (15,938 ft.)	306
- outfall stabilization	35 (2,515 ft.)	23
- shoreline management	64 (15,088 ft.)	604
- septic pumping*	18,644 units	186
- septic denitrification	913	237
- septic connections to WWTP	124	48
Totals	1,310	2,389
*For annual practices, Imperious Acres Restored is the average annual equivalent impervious treatment achieved, dating from the full implementation of the programs. Averages for street sweeping and septic pumping are based on FY16-FY18, and the average for catch basin cleaning is based on FY17-FY18.		

Anne Arundel County currently owns and operates six water reclamation facilities (WRFs). Over the past five years the County has invested over $250 million dollars in upgrading these facilities with enhanced nutrient removal (ENR) technology. Due to the "over-performance" of these facilities (*i.e.*, achievement of nutrient reductions greater than those required for the facility to comply with the Chesapeake Bay TMDL), excess nutrient reductions are available for conversion to equivalent impervious restoration acreage, which may then be traded with other MS4 permittees. The County will acquire nutrient trading credits from the following facilities:

- Annapolis WRF (ENR upgrades completed 1/1/2015)
- Broadneck WRF (ENR upgrades completed 4/1/2014)
- Broadwater WRF (ENR upgrades completed 9/1/2015)
- Cox Creek WRF (ENR upgrades completed 1/1/2018)
- Maryland City WRF (ENR upgrades completed 5/1/2014)
- Patuxent WRF (ENR upgrades completed 3/31/2015)

The nutrient trading credits available from this group of WRFs is detailed in Table 48.

Table 48. Summary of equivalent impervious acre credits generated by Anne Arundel WRFs upgraded with ENR technology.

	Equivalent Impervious Acre Credit	Notes
Credit Generation in 2018		
July	882	
August	861	
September	943	
October	901	
November	904	
December	798	
Subtotal	5,289	
Credit Reduction		
July 1 – July 15, 2018	(441)	Credit generation began on July 16, 2018 (date of formal adoption of COMAR 26.08.11).
Annapolis WRF	(496)	City of Annapolis entitled to 50% of the credits generated by this facility (total of 992 acres available from July 16 –December 31, 2018).
Subtotal	4,352	
Reserve	(217)	Retirement of 5% of each credit required by required by trading regulations.
Total Available Credit	4,134	

Verification of available credits for trading, and notification of the County's intent to use nutrient trading to satisfy a portion of the restoration requirement, is found in **Appendix J**. Effective December 31, 2018, MDE modified the discharge permits for the six County WRFs to allow nutrient trading. Currently, the County has submitted Discharge Monitoring Reports (DMRs) to MDE to confirm the nutrient credits generated and available for trading via the registry. The ultimate credit generation and posting on the registry is being finalized administratively within MDE.

The County has proposed a revision of its 2014 impervious area baseline assessment (**Part IV.E.2a** and **Appendix H**) to account for new BMP data gathered and updated during the historic BMP review and data cleanup completed in July 2018 (**Part IV.C.3**). Table 49 lays out the County's current accounting of impervious surface restoration credits, in relation to the required 20% ISR goal.

Table 49. Impervious restoration credit accounting, including acquired nutrient trading credits, demonstrating attainment of the 20% ISR goal.

Category	Acres	Restoration Progress	Source
Total unmanaged impervious area	24,981		2018 Revised Baseline (see summary in Table 18, Part IV.E.2.a)
20% impervious surface restoration (ISR) goal	4,996		2018 Revised Baseline (see summary in Table 18, Part IV.E.2.a)
Impervious area restored through implementation of restoration and alternative BMPs as of 12/31/2018	2,389	9.6%	FY19 MS4 Geodatabase (see summary in Table 47)
Available Equivalent Impervious Restoration Credits	4,134		Nutrient Trading
Acquired Equivalent Impervious Restoration Credits	2,607	10.4%	Nutrient Trading (only a portion of the available credits are required for MS4 permit compliance)
Total		**20.0%**	**20% ISR Attainment**

When the 20% ISR goal was introduced into the County's MS4 permit, the County recognized it would need a robust program to fully meet its permit obligations. Anne Arundel County has spent the past five years building up its Watershed Protection & Restoration Program. The early part of this current permit term was spent fully staffing the program and creating a pipeline of projects to restore impervious surface throughout Anne Arundel. The lead-time necessary to procure contracts for design, and to build a large number of complex BMPs meant that the County only recently was able to begin installing BMPs at the rate necessary to comply with the impervious surface restoration mandate in its MS4 permit. The credits available through the nutrient trading mechanism will allow the County to comply with the 20% ISR requirement included in its MS4 permit, as it continues to install BMPs to replace those borrowed credits. The County has a set of BMP projects both under design and under construction, as documented in the MS4 Geodatabases, and a slate of proposed projects that are not yet under design (see the FY2018 Financial Assurance Plan), which will allow the County to meet the permit-mandated 20% ISR goal by the end of the next MS4 permit term without the use of nutrient trading credits.

4. Public Participation

Anne Arundel County shall provide continual outreach to the public regarding the development of its watershed assessments and restoration plans. Additionally, the County shall allow for public participation in the TMDL process, solicit input, and incorporate any relevant ideas and program improvements that can aid in achieving TMDLs and water quality standards. Anne Arundel County shall provide:

a. Notice in a local newspaper and the County's web site outlining how the public may obtain information on the development of watershed assessments and stormwater watershed restoration plans and opportunities for comment;

b. Procedures for providing copies of watershed assessments and stormwater watershed restoration plans to interested parties upon request;

c. A minimum 30 day comment period before finalizing watershed assessments and stormwater watershed restoration plans; and

d. A summary in each annual report of how the County addressed or will address any material comment received from the public.

Status:

The County provides information on watershed assessment and restoration via the County website (www.aarivers.org) as well as through our interactive online mapping application. As watershed assessments are completed, the associated study reports are published on the WPRP webpage as noted in Part IV.E.1. Additionally, environmental restoration projects are highlighted on the WPRP webpage.

As originally reported in the 2010 Annual Report, the County developed an interactive online mapping application to track restoration projects undertaken by non-County organizations such as the Watershed Stewards Academy, grassroots environmental preservation groups, and local Riverkeepers. The mapping application also allows these organizations, and anyone with internet access and interest, to open the mapping application and view the many data layers that have resulted from the County's watershed assessments. Since 2010, the County has provided additional functionality by making changes to the overall look and feel of the application, and by moving it to the more robust Geocortex viewer. The mapping application can be accessed at: http://gis-world3.aacounty.org/HTML5Viewer/index.html?viewer=WPRP

During FY18, the County finalized the *Herring Bay, Middle Patuxent and Lower Patuxent Watershed Assessments*. On April 24, 2018, the County held a public information meeting to review and discuss the draft findings. Approximately 25 persons were in attendance. Following the public information meeting, the watershed assessments were posted for a 30-day public comment period from May 26 to June 26, 2018. Notification of the comment period was advertised in The Capital and Maryland Gazette Newspapers. The draft report and public comment notification were also posted on the County website. The County received comments from Advocates for Herring Bay during this period. The comments and the comment/response document are found in Appendix D of the watershed assessment report (http://www.aacounty.org/AACoOIT/WPRP/Herring%20Bay%20Middle%20Patuxent%20Final%20Report%20and%20Appendices%206.29.18.pdf). The *Herring Bay, Middle Patuxent and Lower Patuxent Watershed Assessment Report* was finalized on June 29, 2018 and the final report posted to the County website.

EPA approved three new individual TMDLs (one PCB and two Sediment TMDLs) in FY18 and two new individual Sediment TMDLs in early FY19 (see Part IV.E.2.b). No new individual TMDL restoration plans were advertised for public comment during FY18. Two draft TMDL Restoration Plans and one TMDL Documentation of Attainment, pertaining to these three new individual TMDLs, were developed and are submitted to MDE with this report. Upon receipt and

incorporation of MDE review comments, the County will advertise these three documents for a 30-day public comment period. The draft TMDL documents submitted for MDE review, and found in **Appendix I** of this report, are:

- *Patuxent River Watershed PCB TMDL Restoration Plan*
- *Other West Chesapeake Sediment TMDL Restoration Plan*
- *South River Sediment TMDL Documentation of Attainment*

The County recognizes the importance of public input into both watershed assessments and restoration plans and will provide a minimum of 30 days for public comment on draft plans and reports. Draft documents will be made available for review and/or download through the County webpage, and a minimum number of hard copy reports will also be made available on request. Prior to final acceptance, a summary of the comments received and County response will be incorporated into each document.

5. TMDL Compliance

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

a. Estimated net change in pollutant load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives;

b. A comparison of the net change in pollutant load reductions detailed above with the established benchmarks, deadlines, and applicable stormwater WLAs;

c. Itemized costs for completed projects, programs, and initiatives to meet established pollutant reduction benchmarks and deadlines;

d. Cost estimates for completing all projects, programs, and alternatives necessary for meeting applicable stormwater WLAs; and

e. A description of a plan for implementing additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate.

Status:

During FY18, the County continued implementing the individual TMDL restoration plans submitted to and reviewed by MDE in 2017. MDE formally approved those restoration plans on May 11, 2018. Attachment 2 to MDE's May 11, 2018 letter, documenting restoration plan

approval, is included **Appendix I** of this Annual Report. Restoration plans approved by MDE in 2018 include:

- Total Maximum Daily Load Restoration Plan for Bacteria,
- Baltimore Harbor Watershed Nutrient TMDL Restoration Plan,
- Baltimore Harbor and Curtis Creek/Bay PCB TMDL Restoration Plan,
- Little Patuxent River Sediment TMDL Restoration Plan,
- Upper Patuxent Sediment TMDL Restoration Plan and,
- Patapsco River Lower North Branch Sediment TMDL Restoration Plan.

Progress made during 2018 on these restoration plans is documented in the Annual Assessment Reports found in **Appendix I**. A summary of progress is presented in **Part IV.E.2b.** FY18 progress is also reported in the *LocalStormwaterWatershedAssessment* table of the MS4 Geodatabase **(Appendix A).** These restoration plans provide information on load reductions and implementation costs associated with achieving the individual TMDL SW-WLAs.

During FY18 two Sediment TMDLs and one PCB TMDL were approved by EPA:

- Patuxent River Mesohaline, Oligohaline, Tidal Fresh PCB TMDL
- Nontidal Other West Chesapeake Sediment TMDL
- Nontidal South River Sediment TMDL

In early FY19 (July 2, 2018), two additional sediment TMDLs were approved by EPA:

- Nontidal Middle Patuxent Sediment TMDL
- Nontidal Lower Patuxent Sediment TMDL

Draft restoration plans for the Patuxent River Mesohaline, Oligohaline, Tidal Fresh PCB TMDL, and the Nontidal West Chesapeake Sediment TMDL are submitted for MDE review in **Appendix I**. A "Documentation of Attainment of the Nontidal South River Sediment TMDL" was submitted to MDE in September 2018 and is currently under review by MDE's WSA. Restoration plans for the Middle Patuxent and Lower Patuxent Sediment TMDL are under development and will be submitted to MDE on or before July 2, 2019 as required by the County's MS4 permit.

As noted earlier, Anne Arundel County continues working collaboratively with MDE and various stakeholders within the County to implement the County's Phase II WIP, in support of the Chesapeake Bay TMDL Watershed Implementation Plan (WIP), to reduce the nutrient and sediment load within Anne Arundel County's portion of three major tributary basins (Lower Western Shore, Patuxent River, and Patapsco River). The County's progress for this TMDL is reported in Part IV.E.2.b. and in the *CountywideStormwaterWatershedAssessment* table of the MS4 Geodatabase (**Appendix A**).

Implementation of activities associated with the Chesapeake Bay TMDL stormwater WLA for Anne Arundel County has been ongoing since FY13. Detailed information pertaining to the County's progress toward achieving programmatic milestones associated with the County's Phase II WIP was reported to MDE on January 16, 2019.

With respect to the net change in pollutant load reductions necessary to meet TMDL requirements, *CountywideStormwaterWatershedAssessment* and *LocalStormwaterWatershedAssessment* tables of the FY18 MS4 Geodatabase (**Appendix A**) list the load reduction summary for completed water quality improvement projects applicable to both the Chesapeake Bay TMDL and to the local TMDLs. For the current FY18 reporting year only, the County pollutant load reduction realized through restoration project implementation is 4,777 lbs/year of Total Nitrogen, 605 lbs/year of Total Phosphorus, and 298,256 lbs. /year (149.13 tons/year) of Total Suspended Solids. Specific itemized costs for the projects completed in FY18 are found in the FY18 MS4 Geodatabase in the *RestBMP*, *AltBMPPoint*, *AltBMPLine*, and *AltBMPPoly* feature classes. Costs associated with the restoration projects implemented by NGOs or other private entities are not provided.

The net pollutant load reductions associated with the County's cumulative stormwater management and restoration efforts, and the County's Chesapeake Bay TMDL stormwater WLA are presented in **Part IV.E.2**. Any remaining reductions required to meet the SW WLAs will be achieved through a blending of sector WLAs under the purview of Anne Arundel County. The cumulative cost of these restoration efforts is detailed in the County's FY2018 Financial Assurance Plan submitted concurrent with this Annual Report. Thus far the associated cumulative cost has been $42,262,858 (see FY2018 Financial Assurance Plan, Spec Actions tab). The FY18 project specific costs are documented in the County's 2018 WPRP Annual Report that is submitted with the FY2018 Financial Assurance Plan concurrent with this MS4 Annual Report. Additional information on FY18 expenditures associated with restoration efforts is also found in the Fiscal Analysis table of the MS4 Geodatabase (**Appendix A**).

The County continues to work toward meeting the targeted goals. Currently there are 91 projects planned (design contract issued) or under construction that are expected to be completed in upcoming reporting cycles (e.g., FY19, FY20) as previously mentioned in **Part IV.C.6** of this report. Additional projects are proposed for restoration and will be included in the planned projects once a design contract is initiated.

Part IV.E.4.e. of Anne Arundel County's NPDES MS4 permit requires the development of a plan for implementing additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate. During the 2012 development of Maryland's Phase II Watershed Implementation Plan (WIP) for the Chesapeake Bay, Anne Arundel County with the concurrence of the State of Maryland and EPA recognized the need for adaptive management in the WIP development and implementation process. As discussed in Maryland's Phase II Watershed Implementation Plan for The Chesapeake Bay, March 20, 2012, as implementation moves forward the achievement of stormwater wasteload allocation goals needs to be evaluated and watershed restoration plans modified in response to the rate of progress, additional modeling results, and resource availability. The adoption in 2018 of nutrient trading regulations by the State, and the subsequent modification of the County's permit on December 7, 2018 now allowing cross sector trading as an adaptive management tool for achieving load reductions, will be an integral component of adaptive management to ensure future progress.

Anne Arundel County took a conservative approach when developing the urban stormwater component of its Phase II WIP. The County's strategy was structured to achieve the Edge of

Stream (EOS) final target load derived from the County's Watershed Management Tool (WMT) baseline estimate which was higher than the MAST baseline estimates. In addition, the strategy included only restoration and preservation recommendations for the seven watersheds that were assessed when the County's Phase II WIP was developed in July 2012. Restoration opportunities for load reduction from the Little Patuxent, West and Rhode Rivers, Herring Bay and Middle Patuxent River watersheds were not identified nor taken into account. With these watershed assessments now completed opportunities for load reduction will be formulated into restoration projects and incorporated into the County's Capital Improvement Program (CIP) budget.

Further, Anne Arundel County adopted legislation in June 2013 to create a Watershed Protection and Restoration Program (WPRP) including a Stormwater Remediation Fee (Fee). The Fee is structured to provide sufficient funding for projects to meet the requirements of the County's MS4 Permit which also assists in meeting pollutant load reduction required by the Chesapeake Bay TMDL, EPA approved individual TMDLs with a stormwater WLA, and to meet the impervious surface management requirements and other stormwater obligations set forth in the County's NPDES MS4 Permit.

Adaptive management is a critical component of achieving the WLAs required by the County's NPDES MS4 Permit. The Chesapeake Bay TMDL and individual approved TMDLs clearly established load reduction targets. Two-Year Implementation Milestones were established by the County to provide interim planning targets and to serve as a vehicle for assessing progress toward the Bay TMDL reduction targets. Likewise, the progress toward meeting local TMDLs is evaluated annually. Progress is measured through three approaches: tracking implementation of management measures, estimating load reductions through modeling, and tracking overall program success through long term monitoring. Planning targets are re-evaluated against progress and revised to ensure that Anne Arundel County is on track to meet its goals.

Following the adoption of its Stormwater Remediation Fee in 2013 Anne Arundel County developed a 6-year Capital Improvement Program (CIP) in FY14 that created a Watershed Protection and Restoration Program (WPRP) Class of projects to implement those restoration projects identified in the County's Phase II WIP for achieving stormwater WLAs. Projects in the WPRP Class were identified and prioritized through a planning level assessment and consist of restoration of ephemeral and perennial streams with a MBSS Maryland Physical Habitat Index (MPHI) rating of severely degraded or degraded; implementation of stormwater/water quality treatment at currently untreated stormwater pipe outfalls (greater than 24 inches), and retrofit of stormwater management ponds built prior to 2002 (with drainage areas in excess of 10 acres) to optimize pollutant reduction and ecosystem functions for the facilities. As WPRP projects are funded, a determination is made whether more detailed constructability assessments are needed. These assessments may result in identifying projects previously thought to be implementable but are not due to a variety of reasons, or identifying additional and new opportunities for load reduction. As these assessments are completed the County will incorporate these findings into its modeling, reassess anticipated load reductions, and adapt its implementation program to delete or add projects.

At this time multiple lines of evidence, including results of several model runs, monitoring data, and the most recent science on BMP effectiveness and water quality response, are evaluated as

part of TMDL compliance assessment. The milestones and progress assessments contribute to continual reassessment of management plans, and adapting responses accordingly as technologies and efficiencies change, programs mature, credit trading is implemented, and regulations are put in place.

F. Assessment of Controls

Assessment of controls is critical for determining the effectiveness of the NPDES stormwater management program and progress toward improving water quality. The County shall use chemical, biological, and physical monitoring to assess watershed restoration efforts, document BMP effectiveness, or calibrate water quality models for showing progress toward meeting any applicable WLAs developed under EPA approved TMDLs identified above. Additionally, the County shall conduct physical stream monitoring to assess the implementation of the latest version of the 2000 Maryland Stormwater Design Manual. Specific monitoring requirements are described below.

1. Watershed Restoration Assessment

The County shall continue monitoring the Parole Plaza outfall and Church Creek in-stream station in the South River watershed, or select and submit for MDE's approval a new watershed restoration project for monitoring. Monitoring activities shall occur where the cumulative effects of watershed restoration activities can be assessed. One outfall and an associated in-stream station, or other locations based on a study design approved by MDE, shall be monitored. The minimum criteria for chemical, biological, and physical monitoring are as follows:

a. Chemical Monitoring

i. Twelve storm events shall be monitored per year at each monitoring location with at least two occurring per quarter. Quarters shall be based on the calendar year. If extended dry weather periods occur, baseflow samples shall be taken at least once per month at the monitoring stations if flow is observed;

ii. Discrete samples of stormwater flow shall be collected at the monitoring stations using automated or manual sampling methods. Measurements of pH and water temperature shall be taken;

iii. At least three samples determined to be representative of each storm event shall be submitted to a laboratory for analysis according to methods listed in 40 CFR Part 136 and EMC shall be calculated for:

Biochemical Oxygen Demand (BOD_5)	***Total Lead***
Total Kjeldahl Nitrogen (TKN)	***Total Copper***
Nitrate plus Nitrite	***Total Zinc***
Total Suspended Solids	***Total Phosphorus***
Total Petroleum Hydrocarbons (TPH)	***Hardness***
E. coli or enterococcus	

iv. Continuous flow measurements shall be recorded at the in-stream monitoring station or other practical locations based on an approved study design. Data collected shall be used to estimate annual and seasonal pollutant loads and reductions, and for the calibration of watershed assessment models. Pollutant load estimates shall be reported according to any EPA approved TMDL with a stormwater WLA.

Status:

Anne Arundel County continues to conduct a long-term monitoring program to satisfy the above permit conditions. This monitoring program includes chemical, biological, and physical monitoring in the Church Creek subwatershed located in the South River Watershed. Monitoring for this permit reporting period extended from July 2017 through June 2018. The full Church Creek monitoring report can be found in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018*) and the data required to support this section are also provided in the *MonitoringSite* and *MonitoringDrainageArea* feature classes and the *ChemicalMonitoring, and BiologicalMonitoring* tables of the MS4 Geodatabase included in **Appendix A** in the prescribed format.

Chemical monitoring activities take place at two stations in the Church Creek subwatershed:

- Parole Plaza Station: Outfall representing highly impervious (87 percent) commercial land use which was redeveloped in 2007 as the Annapolis Towne Centre; the construction incorporated stormwater management into the redevelopment (i.e., a restoration station); and
- Church Creek Station: An instream station approximately 2,000 feet downstream of the Parole Plaza monitoring station (69 percent impervious).

Located within the Church Creek subwatershed and upstream of the Church Creek Station, restoration of the Annapolis Harbor Center pond occurred during the reporting period (July through September 2017). This restoration involved draining the pond and excavating the bottom to provide additional storage; and construction of two forebays, a wetland berm, and aquatic benches all within the existing pond footprint. Prior to this pond retrofit work, the South River Federation (SRF) completed 1,500 linear feet of stream restoration in the Church Creek reach upstream of the Harbor Center pond and the Church Creek sampling station. During this reporting period, SRF and the Smithsonian Environmental Research Center (SERC) continued collaboratively monitoring the restored stream reach to document changes in habitat as well as post-restoration in-stream nutrient processing. The County is sharing the continuous flow data and storm event water quality data from both MS4 monitoring stations with the researchers.

During the 2018 reporting period, eight storm events were sampled and four baseflow samples were collected and analyzed. Two storm events were collected each quarter. The storm event samples were collected from both stations for the rising, peak, and falling limbs of the hydrograph. Samples were analyzed for the required parameters. The FY18 dates for successful storm event and baseflow sampling are provided in Table 50.

Table 50. Storm and baseflow sample collection dates for the Church Creek monitoring stations in FY18

Quarter	Date of Sampling	Sample Type
Summer Quarter 2017	7/28/17	Storm
	8/7/17	Storm
	9/25/17	Baseflow
Fall Quarter 2017	10/9/17	Storm
	12/5/17	Storm
	12/27/17	Baseflow
Winter Quarter 2018	1/23/18	Storm
	3/15/18	Baseflow
	3/20/18	Storm
Spring Quarter 2018	4/24/18	Storm
	5/31/18	Storm
	6/28/18	Baseflow

Four baseflow samples were collected in place of storm samples due to a low number of opportunities to sample qualifying events in each quarter of the monitoring period.

- Summer Quarter 2017: The rainfall that took place on September 2 was during a holiday weekend and the sampling team did not capture that event. The next storm occurred on September 6 and did not appear to be a storm that would produce 0.1 inches of rain, so it was not attempted. These two storms were the only storms that occurred during this month. Subsequently, a baseflow sample was collected on September 25.

- Fall Quarter 2017: Toward the end of November, rain events were predicted but none were expected to produce 0.1 inches of rain so were not attempted; however, two of these events were subsequently determined to have been missed sampleable events. At the beginning of December, crews deployed for all predicted storm events regardless of the amount of rain anticipated and captured one storm event. During December 15 to December 31, prevailing weather was dry, with the only sampleable event occurring the Saturday (December 23) before the holiday. Baseflow sampling was therefore performed after the holiday (December 27).

- Winter Quarter 2018: The monitoring team decided to sample at baseflow conditions in the middle of March to complete a second sampling event (March 15) for the winter period. Staff had not collected a storm in February and forecasts did not predict a storm in the near future. Staff did not successfully capture a storm in February for the following reasons: precipitation falling as snow and or ice, minimum required rainfall amounts not met, and unavailability of staff to monitor a 24-hour duration storm event occurring on a weekend.

- Spring Quarter 2018: During June, field crews deployed to the stations for several predicted storms but the rain dissipated and no sampling took place. Also, unexpected, “pop-up” storms frequently occurred during the month which caused challenges in meeting the antecedent dry time requirement and challenges for assembling a field crew on short notice.

On June 27, field crews deployed for a storm, but the event delivered less than the required amount of 0.1 inches of rain. Staff collected baseflow samples the following day (June 28).

Continuous water level measurements were taken at the Church Creek instream station and within both the 60" corrugated metal pipe and the 54" reinforced concrete pipe at the Parole Monitoring Station. Discharge was then determined using the rating curves developed for each monitoring location. Event Mean Concentrations (EMCs) for each measured water quality parameter were calculated for each event and applied to total stormflow discharges to calculate stormflow pollutant loads for each site. An EMC is a statistical parameter used to represent the flow-weighted average concentration of a given parameter during a storm event (U.S. EPA 2002). Total seasonal loads were calculated by multiplying the average seasonal EMC by the total volume for the season. Annual loads were calculated by summing all seasonal loads.

As in prior years, comparisons to water quality criteria indicate elevated pollutant concentrations in the Church Creek watershed during wet weather conditions. In particular, copper, zinc, total phosphorous, BOD5, nitrate-nitrite, and *E. coli* frequently exceeded criteria at both sampling stations. High levels of pollutants observed in the watershed are indicative of commercial and retail land uses that are coupled with high levels of automobile traffic and impervious surface area (U.S. EPA 1983). As indicated earlier in this section, 87% of the Parole Plaza station watershed and 69% of the entire Church Creek station watershed is impervious.

E. coli concentrations remained high at both stations throughout the FY18 monitoring period, exceeding water quality criteria 100% of the time at Church Creek and 96% of the time at Parole Plaza. Zinc samples exceeded the acute criterion 25% and 70% of the time at Church Creek and Parole Plaza, respectively. Zinc is associated with building materials and automobiles, both present in highly urbanized watersheds. During many storm events, zinc concentrations were highest during the rising limb, suggesting that zinc deposition occurred throughout the watershed during dry weather and may also become available by leaching from corrugated metal piping in stormwater infrastructure. During the FY18 monitoring year, Total Suspended Solids (TSS) exceeded its corresponding criterion only once: during the rising limb of the October 9, 2017 storm event, at Church Creek. The EMC for the storm, however, remained low at 77 mg/L. The cause of this TSS concentration at the Church Creek station, during this moderate-intensity event, is unknown but may be due to mobilization of sediment associated with the Annapolis Harbour Center stormwater pond retrofit that was completed in the prior month.

When compared to the 2017 reporting year, 2018 loading rates increased for all sampled parameters at the Parole Plaza Station with the exception of TSS, TKN, copper, lead, and hardness. The *E. coli* loading in 2018 was more than double the loading estimated in 2017. The source of the *E. coli* load is currently under investigation. At the Church Creek Station, 2018 reporting year loading rates also increased for all sampled parameters when compared to 2017, except for BOD, TKN, and hardness. The loading for TSS increased approximately 55 percent.

During the reporting period, the highest pollutant loads at Church Creek varied throughout the year, with hardness, zinc, BOD, nitrate-nitrite, and copper higher in the winter quarter while TSS and total phosphorus were higher in the fall quarter. *E. coli* was the only parameter that was highest

during the spring. At Parole Plaza, most parameters were at their highest during the spring quarter except for lead and *E. coli* which were higher during the summer quarter.

A comparison of mean annual loading rates for the subwatershed's pre-redevelopment period (2002-2006) with the post-redevelopment period (2009 to 2018), indicates the mean loading rates for all parameters at the Parole Plaza station were lower during the post-redevelopment period. However, at the Church Creek station, all mean post-redevelopment parameters except for lead and *E. coli* exceeded the mean pre-redevelopment (2002-2006) annual loads. Because annual average EMCs for most parameters have gradually declined since 2004, the likely cause of the higher annual loadings during the post-redevelopment period is higher annual flow volume during the post-redevelopment period than the pre-redevelopment period (see **Appendix C** for further explanation and detail).

Further discussion of the monitoring activities at these stations and the resulting data can be found in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018*) and the *ChemicalMonitoring* table of the MS4 Geodatabase included in **Appendix A**.

b. Biological Monitoring

i. Benthic macroinvertebrate samples shall be gathered each Spring between the outfall and in-stream stations or other practical locations based on an MDE approved study design; and

ii. The County shall use the EPA Rapid Bioassessment Protocols (RBP), Maryland Biological Stream Survey (MBSS), or other similar method approved by MDE.

Status:

Four 75-meter biological monitoring reaches are positioned along Church Creek between the Annapolis Towne Centre (Parole Plaza) outfall station and the Church Creek in-stream water quality monitoring station. Benthic macroinvertebrate samples were collected from these stations in April 2018, following the MBSS spring index period protocols. Three sites were established and first monitored in 2006; one site is located on the Parole Plaza Tributary just below Forest Drive (CC01), and two sites are located along the Church Creek mainstem, on either side of Solomons Island Road (Maryland State Highway 2), CC02 is the downstream station and CC03 is the upstream station. A fourth site, CC04, is located just upstream of the confluence with the Parole Plaza Tributary and was added in 2007 to monitor the effects of runoff from the adjacent Annapolis Harbour Center and Festival at Riva shopping centers (see Figure 2-1, located in **Appendix C** for site locations).

The biological condition at each station was evaluated using the BIBI developed for use in Maryland's Coastal Plain streams. The 2018 BIBI score narrative ratings at the Church Creek sites ranged from 'Poor' at CC03 and CC04 to 'Very Poor' at CC01 and CC02, with scores between 1.29 and 2.14 indicating a highly impaired benthic macroinvertebrate community. The CC01 and CC02 BIBI ratings decreased from 'Poor' in 2017 to 'Very Poor' in 2018, while the CC04 rating increased from 'Very Poor' in 2017 to 'Poor' in 2018. Though the BIBI rating remained in the

'Poor' category for CC03 from 2017 to 2018, a slight decrease in the score was noted, from 2.43 to 2.14. Since 2006, all stations have consistently been rated as either 'Poor' or 'Very Poor.' The low BIBI scores were driven by low scores for EPT taxa, the number and percent of Ephemeroptera and the percent intolerant urban metrics at all biological monitoring reaches.

Physical habitat quality was evaluated using the MBSS Physical Habitat Index (PHI) and EPA's Rapid Bioassessment Protocol (RBP). In 2018, PHI scores decreased at CC01 and CC02 and increased at CC03 and CC04, although the narrative ratings did not change for any site. CC02 remained categorized as 'Degraded' and CC01, CC03, and CC04 remained 'Partially Degraded'. The stream physical habitat has remained characterized as 'Degraded' or 'Partially Degraded' throughout the entire study reach since monitoring began in 2006. Overall, PHI and RBP scores indicate that habitat conditions may limit the potential for healthy biological communities. The close proximity to roads and development, along with a scarcity of stable epifaunal substrate, may prohibit the stream from supporting a diverse and healthy macroinvertebrate community. Continued elevated conductivity levels, as measured in April 2018, indicate the presence of water quality stressors and may limit biological condition improvement within Church Creek. The results of the biological monitoring work are included in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018*) and the data required to support this section are also provided in the *MonitoringSite* and *MonitoringDrainageArea* feature classes and the *BiologicalMonitoring* table of the MS4 Geodatabase in the prescribed format (**Appendix A**).

c. Physical Monitoring

i. A geomorphologic stream assessment shall be conducted between the outfall and in-stream monitoring locations or in a reasonable area based on the approved study design. This assessment shall include an annual comparison of permanently monumented stream channel cross-sections and the stream profile;

ii. A stream habitat assessment shall be conducted using techniques defined by the EPA's RBP, MBSS, or other similar method approved by MDE; and

iii. A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-2, HEC-RAS, HSPF, SWMM, etc.) in the fourth year of the permit to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.

Status:

Due to the highly altered conditions of the drainage area and stream channel in the study area, reliable bankfull indicators can be difficult to locate in the field; thus, best professional judgment is often used to augment data interpretation and categorize the stream segments. Table 51 is a summary of each reach and its classification for the past 6 years (for site locations, refer to Figure 2-1 in **Appendix C**).

Table 51. Summary of the physical characterization assessments for cross-sections in the Church Creek subwatershed

Reach	Classification by Year						Notes
	2013	2014	2015	2016	2017	2018	
XS-1	F4	F5/4	F4	F4	F4	F4	Channel degradation, loss of floodplain connectivity, and widening indicate this channel is not stable.
XS-2	G5c	G4c	G4	G4c	G4c	G4c	Channel is widening, scouring, and is unstable, with increasing entrenchment ratio and low sinuosity.
XS-3	G4c	G4c	G4/3c	G4c	G4c	G4c	This section was stabilized, with modification to the channel dimensions.
XS-4	C5	C5	C5	E5/4	E4/5	E4/5	Channel affected by restoration just downstream. Entrenchment ratio increased, width-depth ratio decreased.
XS-5	F4/3	F3	F4/3	F4	F4	F4	Slight entrenchment, moderate width/depth ratio, and low sinuosity.

The Church Creek subwatershed has a high percentage of impervious surface and no reach was classified as a C channel, which are generally considered the most stable stream types due to floodplain connectivity. Four reaches were classified as either F or G channels, indicating a degree of entrenchment and instability. One reach, located at the most downstream extent of the Parole Plaza tributary, was classified as an E channel and maintains some limited floodplain connectivity.

Bankfull channel dimensions (cross-sectional area, width, depth) in the Church Creek subwatershed showed significant departure from expected values, as derived from Maryland Coastal Plain regional relationships of bankfull channel geometry (McCandless 2003). Almost all dimensions were generally larger in the Church Creek study area and were often more similar to relationships of bankfull channel geometry derived from gaged urban watersheds located in the Coastal Plain (AADPW 2002). Values measured in 2018 were slightly higher than prior assessment results. This reflects the higher level of imperviousness in the study area, as compared to the lower impervious levels in the drainage areas used to develop the regional relationship data, suggesting the stream has enlarged as a result of high imperviousness and is both wider and deeper than the more stable channel forms (C and E-type channels) found in rural/suburban watersheds of the Coastal Plain.

Additional information and data pertinent to the water quality, biological, physical and habitat assessments of Church Creek are found in the full report in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018*).

d. Annual Data Submittal

The County shall describe in detail its monitoring activities for the previous year and include the following:

i. EMCs submitted on MDE's long-term monitoring database as specified in Part V below;
ii. Chemical, biological, and physical monitoring results and a combined analysis for the approved monitoring locations; and
iii. Any requests and accompanying justifications for proposed modifications to the monitoring program.

Status:

The County continues the monitoring program at the Church Creek and Parole Plaza monitoring stations. The required chemical monitoring results are found in the *ChemicalMonitoring* table, and the required biological monitoring results are found in the *BiologicalMonitoring* table, of the MS4 Geodatabase in the prescribed format (**Appendix A**). As there is no geodatabase table for the physical monitoring results, these data are presented in **Appendix C** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2017-2018),* which also provides greater detail on the work performed in this watershed.

The County's ongoing, long-term monitoring (chemical, biological, and physical) will continue at these same locations for the duration of this permit term.

2. Stormwater Management Assessment

The County shall continue monitoring the Picture Spring Branch in the Severn River watershed, or select and submit for MDE's approval a new watershed restoration project for determining the effectiveness of stormwater management practices for stream channel protection. Physical stream monitoring protocols shall include:

a. An annual stream profile and survey of permanently monumented cross-sections in Picture Spring Branch to evaluate channel stability;

b. A comparison of the annual stream profile and survey of the permanently monumented cross-sections with baseline conditions for assessing areas of aggradation and degradation; and

c. A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-2, HEC- RAS, HSPF, SWMM, etc.) in the fourth year of the permit to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.

Status:

Physical condition and habitat monitoring for Picture Spring Branch, located adjacent to the Odenton Regional Library (formerly called West County Library), began in 2003 and is conducted annually. Five permanent cross-sections were established throughout the study area to evaluate channel stability over time (see *Biological and Geomorphological Condition in the Picture Spring Branch Subwatershed, Severn River Watershed, Anne Arundel County, Maryland: 2017-2018* in **Appendix D** for a location map). Three of the five cross-sections are located on the North Tributary, one is downstream of Maryland State Highway 170, and one is on the South Tributary. In FY18, these cross-sections were re-measured and longitudinal profile surveys were conducted along both the North Tributary (totaling 1,968 linear feet) and South Tributary (totaling 356 linear feet). It should be noted that the South Tributary does not receive significant stormwater runoff from the Odenton Regional Library site. Most of the runoff from this site drains to the North Tributary, downstream of XS-1.

To compare changes over time, the cross-sectional area from 2011 through 2018 was calculated using the top of bank elevation from the baseline survey to standardize comparisons and reduce variability among more subjective bankfull elevation reference points, or even changes that can occur to top of bank elevations from year to year. As documented in the full report (**Appendix D**), calculations prior to 2011 did not use this baseline reference elevation; instead, the corresponding year's top of bank elevation was used to calculate cross-sectional area. Consequently, these values are not directly comparable to the cross-sectional areas reported in 2011 through 2018. Comparison of baseline cross-section area is, however, comparable from 2011 through 2018 as all calculations are made using the same top of bank elevation.

Channel dimensions along the North Tributary have not changed substantially from baseline conditions, although some aggradation has occurred in the past five years. Channel dimensions appear relatively constant for three (XS-2, XS-3, and XS-5) out of the five cross-sections in 2018, compared to baseline conditions. Cross-sections XS-2, XS-3, and XS-5 decreased in cross-sectional areas between the baseline assessment and the 2018 survey by 3.2%, 6.7%, and 3.7%, respectively. While increases in cross-sectional areas at XS-1 and XS-4 have stabilized over the last eight years, significant increases in overall cross-sectional areas at XS-1 and XS-4 have been observed from baseline conditions (56.3% and 21.1%, respectively). These are the only two sections not located in an engineered or partially armored reach of Picture Spring Branch. Additionally, XS-1 is located upstream of the library site; as such, it does not receive stormwater runoff from this site.

Overall, it appears that the BMPs installed as part of the development of the Odenton Regional Library site have been effective in reducing the geophysical impacts of stormwater runoff. As noted previously, the South Tributary (XS-4) does not receive significant amounts of drainage from the West County Library site.

In April 2018, a benthic macroinvertebrate biological assessment was conducted at three previously established 75-meter reaches within the study area. From 2006 to 2008, biological condition in these reaches appeared to remain steady with ratings of 'Fair' to 'Poor;' however, during 2009 scores declined at all three sites with two of the sites rating 'Poor' and one rating 'Very Poor.' Between 2010 and 2015, BIBI scores were somewhat variable, fluctuating between

the 'Poor' and 'Fair' categories. Each site sampled in both 2016 and 2017 received narrative BIBI ratings of 'Fair'. In 2018, the benthic macroinvertebrate community at one site within the study area was rated as "Poor", while the other two sites received a "Fair" rating. These ratings represent a slight decrease in BIBI scores since 2017. Taxa diversity decreased across all sites, halting a trend of increasing diversity that had begun in 2014, and no Ephemeroptera taxa were found at any site during the 2018 sampling period.

Physical habitat was assessed at the same three benthic macroinvertebrate sampling reaches using the Maryland Physical Habitat Index (PHI). The three Picture Spring Branch sites were given a narrative rating of "Partially Degraded" in 2018. Although the narrative rating declined only at PSB01, the PHI scores at all three sites showed a decrease from 2017 scores. The overall decrease in scores is primarily a result of declines in epifaunal substrate. Physical habitat quality was also evaluated using the EPA Rapid Bioassessment Protocols (RBP) and rated "Partially Supporting" for two sites (PSB02 and PSB03) and "Supporting" for one site (PSB-01). Generally, the Picture Spring Branch sites had optimal or sub-optimal scores for channel flow status and channel alteration and marginal or poor scores for bank stability, vegetative protection, and riparian zone width. The complete biological and geomorphological conditions report is found in **Appendix D** *(Biological and Geomorphological Conditions in the Picture Spring Branch Subwatershed: 2017-2018).*

G. Program Funding

1. ***Annually, a fiscal analysis of the capital, operation, and maintenance expenditures necessary to comply with all conditions of this permit shall be submitted as required in Part IV.***

2. ***Adequate program funding to comply with all conditions of this permit shall be maintained.***

Status:

This Annual Report covers the reporting period of July 2017 through June 2018, and corresponds to the County's 2018 Fiscal Year (FY18). The summary of funding and expenditures for FY18 is found in the *FiscalAnalyses* table of the MS4 Geodatabase (**Appendix A**). Table 52 provides the FY18 break down of expenditures by permit condition.

Table 52. FY18 Fiscal Analysis (Operating and Capital Appropriations)

Permit Condition	Fiscal Year 2018
Legal Authority	$0
Source ID	$209,863
SW Management	$1,171,700
Erosion and Sediment Control	$55,989
Illicit Discharge Detection and Elimination	$123,886
Trash and Litter Control	$699,037
Property Management	$9,044,685

Table 52. FY18 Fiscal Analysis (Operating and Capital Appropriations)

Permit Condition	Fiscal Year 2018
Inlet Cleaning	$687,829
Street Sweeping	$437,004
Other Road Maintenance	$ 0
Public Education	$493,569
Watershed Assessment	$182,007
Watershed Restoration	$15,021,924
Chemical Monitoring Assessment	$225,359
Biological Monitoring Assessment	$471,309
Physical Stream Assessment	$339,618
Stormwater Design Manual Monitoring	$0
TMDL Assessment	$488,943
Annual Report Preparation	$131,645
Total Annual Cost for NPDES MS4 Program	**$29,784,368**

Submitted concurrent with this FY18 MS4 Annual Report is the County's FY2018 WPRP Financial Assurance Plan (FAP) with Executive Summary, County Council Resolution 3-19 as introduced on January 22, 2019, Council meeting schedule, and the FY2018 WPRP Annual Report. These documents further demonstrate adequate program funding to comply with all conditions of this NPDES MS4 permit, and the County's approval of same. As of the February 12, 2019 MS4 Annual Report submission date, the FAP and associated resolution (Resolution 3-19) to approve the FAP have been submitted to the County Council for approval. The resolution was introduced on January 22, 2019 and the public hearing and Council vote are schedule for February 19, 2019, after the February 12 County Council work session. The County will submit, to MDE, the final County Council approved FY2018 WPRP FAP following Council vote on Resolution 3-19.

The WPRP Fund was implemented July 1, 2013 in response to State legislated requirements found in Maryland Environmental Code Ann §4202.1 (2013). This Fund provides the primary fiscal support for all eligible components of the NPDES MS4 Permit program. Those MS4 permit-requirements not eligible for WPRP funding continue to be supported by the County's annual budget process (general revenue funds).

With the implementation of the WPRP Fund, a dedicated revenue source was created. These revenues for FY18 totaled $21,665,866. A total of 212,980 properties in Anne Arundel County were assessed the fee in FY18, which was the third year of the full implementation of the fee after the phase-in periods. Estimated projections of revenue for FY19 are $22,048,101. These revenues fund the operating budget directly, and the CIP budget indirectly through debt repayment.

During the reporting period, funding for NPDES MS4 Permit compliance was addressed through the County CIP and operating budgets. CIP funding for the current County fiscal year and the next five fiscal years is allocated to the "Stormwater Runoff Controls," "Water Quality Improvements" and "Watershed Protection and Restoration" CIP project classes. Specific line items funded through the CIP include storm drain rehabilitation, closed storm drain repairs and replacement,

stormwater infrastructure inspection and maintenance, stormwater facility retrofits, outfall repairs, and stream and ecological restoration projects. The budgets for the "Stormwater Runoff Controls" and "Water Quality Improvements" project classes have been, for the most part, incorporated into the Watershed Protection and Restoration CIP and operating budget items as appropriate. The Watershed Protection and Restoration CIP budgets for FY18 through FY23 total $47,022,000.

The Anne Arundel County operating budget for FY18 also provides permit compliance support through funding of personnel associated with permit compliance actions. Such support is derived primarily from the County's I&P, SCD, and DPW. Each of these agencies has responsibility or provides support for certain permit requirements and all must work collaboratively to achieve County compliance with permit terms. Additional funding for permit compliance has been included in the operating budgets for the WPRP Fund. Specific line items funded through the operating budget include chemical, biological, and physical stream assessments, public education, grants, and contracted street sweeping.

The completed FY18 and current FY19 approved County budget is available for review and download at https://www.aacounty.org/departments/budget-office/index.html

The FY2018 FAP and FY2018 WPRP Annual Report, submitted concurrent to this report, provide updated information and continue to indicate the County has sufficient funding to meet these compliance requirements through FY23. The FY2018 FAP includes revenues and expenses as of the end of FY18. The FY2018 FAP outlines the goals accomplished by the end of FY18, as well as, projects that are programmed to be completed by the end of FY23. As of the end of FY18, 2,140 acres of impervious surface restoration has been completed at a cost of $42,262,858 to the County. The County has additional projects programmed through FY23 amounting to 6,056 acres of impervious surface restoration at a cost of $194 million, which exceeds the County's requirement of treating 20% or 4,996 acres of impervious surface.

Lastly, with the funding provided by the WPRP, increased staffing began in FY14. Delays due to proposed legislation changes slowed the implementation of the program initially; however, at the end of FY18 staffing levels were at 91% and additional hiring will be accomplished in FY19. These staffing levels will assist the County in achieving MS4 permit compliance and maintaining adequate funding to meet permit obligations.

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