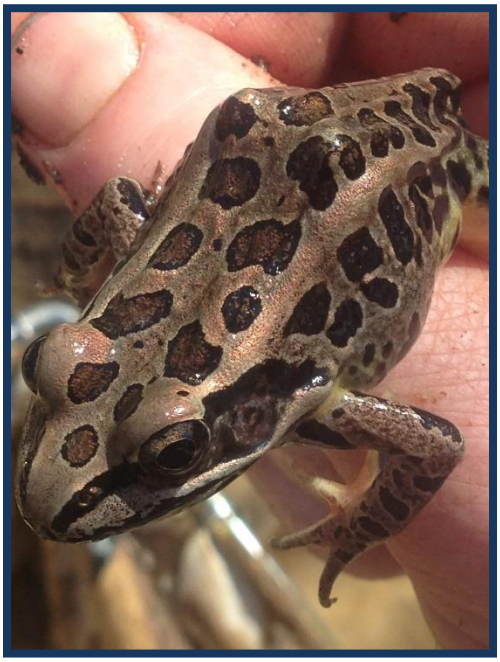
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

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

FISCAL YEAR 2017 ANNUAL REPORT



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

February 12, 2018

Fiscal Year 2017 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 2018

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

Prepared by:

VERSAR

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I. PURPOSE AND SCOPE

This Annual Report was assembled to detail the activities in Anne Arundel County for the County and State Fiscal Year (FY) beginning July 1, 2016 and ending June 30, 2017. These activities demonstrate compliance with the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit terms provided by 40 CFR 122.42(c). It describes the components of the stormwater management program and the associated implementation status. The County proposes no revision to the program at this time.

This report also 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).

On February 12, 2014, the County was issued a new, Fourth-Generation, NPDES MS4 Permit. This report is the fourth Annual Report prepared under that permit. Per the permit requirements, submitted with this annual report is the County's Permit Re-application.

II. IMPLEMENTATION STATUS – 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:

- Storm Drain Infrastructure and Impervious Area Inventory;
- Erosion and Sediment Control Program;
- Stormwater Management Program;
- Illicit Connection 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 concerns within County watersheds. Monitoring efforts have shown that the 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 addressed under the appropriate permit conditions 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 FY2017 (1 July 2016 – 30 June 2017). 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 FY 2017. Information on specific positions and personnel responsible for permit compliance and stormwater program tasks follows.

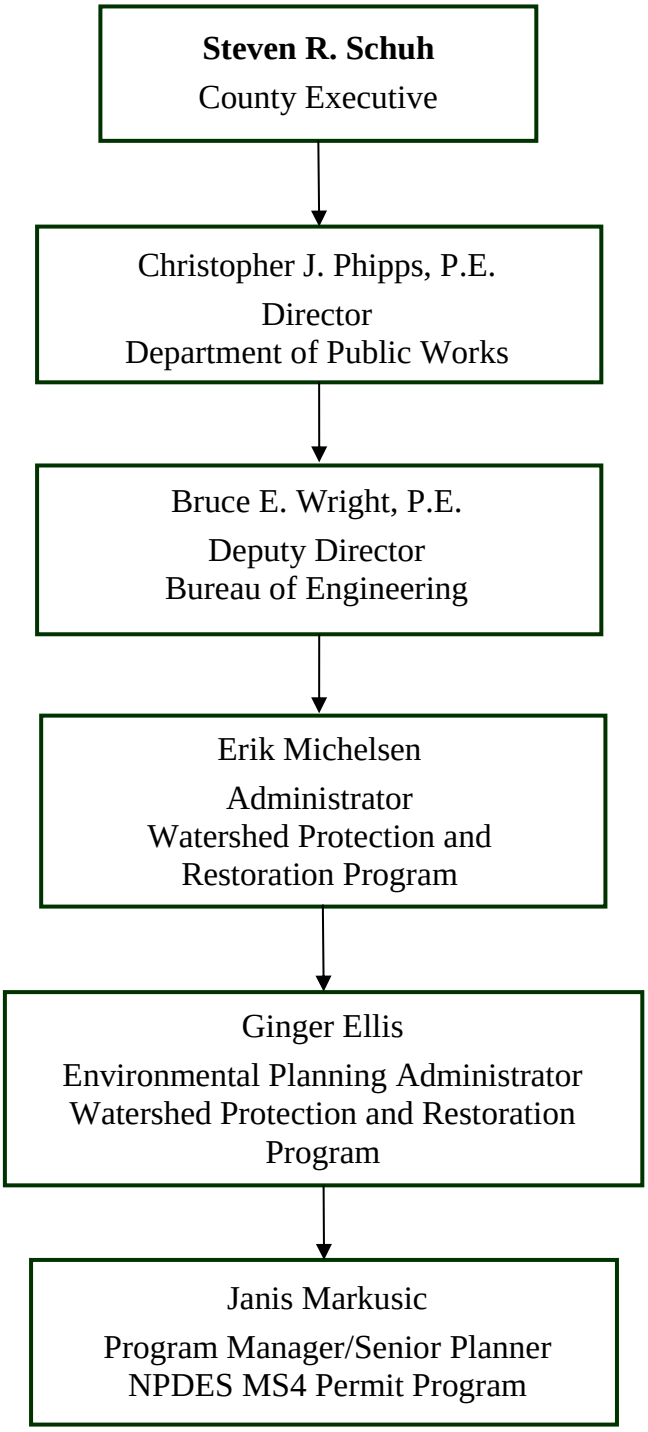


Figure 1. Organization Chart for NPDES Permit Administration (7/1/2016 through 6/30/2017)

Additional County staff members responsible for components of the NPDES MS4 Permit requirements during FY2017 are listed below.

Department of Public Works

- 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.

- 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.

- Darryl Hockstra, Engineer Manager

Bureau of Highways, Infrastructure Management Division
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.

- 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 publicly owned storm drain/culvert system as well as the inspection, repair and maintenance of IMD maintained (public) stormwater management practices.

- Vacant, Engineer III

Bureau of Highways, Infrastructure Management Division
Inspects publicly owned storm drain infrastructure and oversees public stormwater management inspection staff.

- Rick Davis, Engineer IV

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

- Clark Rosendale, 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

- 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

- 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.

- 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 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; conducts roadside litter clean-up activities; and provides support for volunteer watershed and stream clean-up activities.

- 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
  Bureau of Engineering, Watershed Protection and Restoration Program
  Administers the Watershed Assessment 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 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 Modeling and Analysis Stormwater Remediation Fee Unit with researching and tracking fee assessment, appeals and credits.

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

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

- Erica Jackson, Engineer III
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

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

- Diron Baker, Engineer III
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Gerry Ingelsby, Engineer III
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Dennis McMonigle, Engineer III (held position from July 1, 2016 through Oct 1, 2016)

- Larry Mathena (started in this position June 1, 2017)
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

- Vacant, Engineer III
  Bureau of Engineering, Watershed Protection and Restoration Program
  Manages design and construction of watershed restoration projects.

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

- Vacant, Engineer III
  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.

- 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 F of this permit. Assists Program Manager with implementation of the Illicit Discharge Detection and Elimination (IDDE) Program as identified in Part 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.

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

- Robb Fish, Program Specialist II
  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 to the public regarding the development of its watershed assessments and restoration plans is achieved and public input is solicited and incorporated.

- Joe Ports, Program Specialist I
  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.

- Kim Cluney, Management Assistant II (held position from July 2016 - February 2017)

- Mike Hrubiak, Management Assistant II (started in this position February 2017)
  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 Clerk II
  Bureau of Engineering, Watershed Protection and Restoration Program
  Supports the Financial Management Assistants in tracking revenues and expenditures associated with the WPRF, processing procurements for restoration work, and maintaining established reports to ensure Fund integrity.

- 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.

- 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.

- Chandra Chithaluru, 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>Office of Planning & Zoning</u>

- Chris Soldano, Assistant Planning & Zoning Officer
  Development Division
  Oversees components of the County's Stormwater Management Program to ensure consistency with State requirements, including the updating of County stormwater legislation and of the County's Stormwater Practices and Procedures Manual.

Department of Inspections & Permits

- 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, Engineering Manager
  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, Site Inspections
  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
  Manages stormwater inspection staff responsible for inspecting private stormwater BMPs.

- Stormwater Inspection Staff
  Seven (7) inspectors are dedicated to the stormwater management program. In FY17, those inspectors are:

Tyler Smith	Bradlee Burnham	Mary Ford
Joseph Maxwell	Mike Schindler	Dennis Gills
Robert Branch		

Anne Arundel Soil Conservation District

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

Anne Arundel Department of Health

- 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. The County Code has been revised to incorporate these stormwater management requirements, and subsequently renumbered, over the past 10 years. As of November 2010, Article 16 of the County Code contains the stormwater management program and erosion and sediment control regulations. Article 17 contains the subdivision and development requirements. Article 18 contains the zoning regulations. A copy of the final approved implementing legislation and other associated documentation was provided in a prior year's Annual Report.

The County Stormwater Management Practices and Procedures 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 of the revised manual) which is required for all new grading permits submitted on or after March 1, 2017.

On November 1 and 3, 2016 MDE, County personnel, and the Anne Arundel County Soil Conservation District conducted field inspections and a review of erosion and sediment control enforcement procedures as part of Anne Arundel County's application for continued delegation of erosion and sediment control enforcement authority. Based on the findings of this evaluation, 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 accompanies the County's FY17 Annual Report in **Appendix C**.

As reported in a prior year's Annual Report, 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 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 FY17, no changes were made to this enabling legislation.

The entire County Code, including Articles 13, 16, and 17, can be found online through the County website at http://www.aacounty.org/our-county/county-code/, under the link for the County Code.

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 system**: **all infrastructure, major outfalls, inlets, and associated drainage areas delineated;

Status:

In 2008, Anne Arundel County completed a Countywide inventory of storm drain inlets, manholes, outfalls, culverts, and pipes for all County watersheds. In FY17, the County continued to capture updates for incorporation into the County storm drain maps and the County GIS. Furthermore, the County continues to populate the drainage area information for the County outfalls, following the watershed study schedule as presented in **Part IV.E** of this permit. The storm drain inlet and outfall database was prepared in the format required by MDE and is included in the *Outfalls* Feature Class of the MDE reporting Geodatabase.

The County is able to identify outfalls by querying the GIS for structures with no hydraulic connection to any other structure downstream. The County then focuses on these discharge points for delineation of contributing drainage areas. As of June 30, 2017, there are a total of 6,028 storm drain outfalls in the County. As of June 30, 2017, there are 2,226 major outfalls in the County. According to 40 CFR 122.26, a major municipal separate storm drain outfall is defined as an outfall pipe with an internal diameter of 36 inches or greater or an outfall pipe with an internal diameter of 12 inches or greater that receives storm water from industrially zoned lands. In addition, as of June 2017, there are 37,075 storm drain inlets.

During the last permit year, the County identified 89 new major outfalls and one new IDDE outfall for a total of 90 outfalls added to the geodatabase. The drainage areas for these new outfalls have been delineated and added to the inventory of major outfall drainage areas submitted in *Outfalls* Feature Class of the MDE reporting Geodatabase. It should be noted that modifications were made to ten of the previously submitted major outfall records over the course of the past year. Table 1 below describes the changes made to these outfalls.

Table 1. Changes to Outfalls Database in FY17

MDE_OUTFALL_ID	LOCAL_OUTFALL_ID	COMMENT
AA16OUT000064	R06O046	Change local ID from R06O008 to R06O046.
AA16OUT000630	N08O037	Delete record. Pipe extended.
AA16OUT001286	W16O024	Delete record. Pipe extended.
AA16OUT001153	O12O012	Replace existing MDE DA 85.54 TO 67.93 ACRES
AA16OUT001622	K02O009	Pt moved, replace existing MDE DA 0.839 TO 0.232 ACRES
AA16OUT001889	O030	Change local ID from O30 to Q23O035
AA16OUT001890	O029	Change local ID from O29 to Q23O034
AA16OUT002131	C10O004	Change local ID from C10O004 to C10O023.
AA16OUT001135	L09O031	Delete, Inlet not an Outfall.
AA16OUT001265	R19O012	Delete, Inlet not an Outfall.

The County will continue to develop and report drainage areas for outfalls as the watershed assessments are completed.

2. <u>Industrial and commercial sources</u>: 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 is described below. The data and GIS coverage are found in the *Outfalls* Feature Class of the MDE reporting Geodatabase.

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
- County closed storm drain system inlets, pipes, and outfalls

Specifically, inlets in designated Industrial and Commercial land cover polygons were identified and the closed storm drain pipes intersecting these inlets were selected. Closed storm drain pipes connecting to the already selected pipes were also selected to provide the closed storm drain system network connected to the chosen inlets. Once this network was identified, the outfalls intersecting the closed storm drain pipes were selected. All outfalls not meeting the definition of a "major outfall" were removed from the selected set of outfalls. In 2017 Anne Arundel County updated this list to include 46 new major outfalls draining Commercial and Industrial lands, bringing the total to 1,037 commercial and industrial outfalls. These outfalls

are a subset of the major outfalls GIS layer found in the *Outfalls* Feature Class of the MDE reporting Geodatabase of this report.

The GIS files required for this section of the permit are submitted as a separate ESRI File Geodatabase and are not a component of the required MS4 Geodatabase. Please see the geodatabases titled "IV.C.2 – Industrial & Commercial Sources" and "StormwaterInfrastructure" in **Appendix A** for these records.

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 FY17 NPDES MS4 Annual Report submittal (**Appendix A**).

Nearly all of the BMPs in the County's dataset prior to FY16 are represented by a BMP Point of Investigation (POI) that is associated with a single BMP structure or practice (i.e., one record in the *BMPPOI* feature class is associated with one record in the *BMP* table of the MS4 Geodatabase). For new BMP records added to the dataset in FY17, where appropriate, the County has adopted the strategy recommended by MDE of designating a BMP POI to represent multiple structures and/or practices that work in concert as a system or are part of a treatment train (i.e., one record in the *BMPPOI* feature class corresponds to multiple records in the *BMP* table of the MS4 Geodatabase).

This year, the County is submitting 10,369 BMP POIs, representing 18,011 BMP records that we can confirm as active or completed per the Urban BMP Database Historic Records Review and Update project, further described below. Included in the MS4 Geodatabase are an additional 5,731 BMP POIs and 5,752 BMP records (included with the FY16 MS4 Geodatabase) which will be confirmed in the coming year. The County has updated the structure type to comply with the latest MDE guidance (Version 1.2, May 2017) on urban BMP data reporting (MDE 2017). The updated guidance also required that the County add an additional 125 BMP POIs representing restoration BMPs.

During the FY16 reporting year, the County initiated the comprehensive Urban BMP Database Historic Records Review and Update project. This project supports ongoing Urban BMP Database improvements and the required database enhancements associated with the MS4 Geodatabase design. 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. During FY16 the County engaged a consultant to assist with the Historic Records Review and Update. During FY17, the County and consultant worked to comprehensively review and update the Urban BMP data fields for the Phase I BMP

records (those dating from 2002 through the end of FY2015) as well as the FY16/17 BMP records, and to delineate drainage areas for each BMP record. To the extent possible, efficiencies in permit and record review were achieved by identifying permits that are applicable to the same geographic area and reviewing these permits as a group regardless of their date of construction. Thus, some Phase II BMP records (pre-2002 construction) were also updated in this process.

All record review and updating efforts adhere to the Quality Assurance Project Plan (QAPP) and Standard Operating Procedures (SOPs) developed to ensure consistency in data review and update. The completed Phase I and FY16/17 BMPs work effort were submitted to the County for QC and acceptance in October – November 2017. Concurrent with the beginning of County FY18, the consultant also began work efforts to review and update all of the pre-2002 constructed stormwater BMP records regardless of geographic co-location with Phase I records. As of the end of Calendar Year 2017 (first six months of FY18), the consultant successfully reviewed over 6,100 permits and over 21,500 individual stormwater BMP practices associated with those permits. Part of the reason for a marked increase in the number of BMPs is the County's decision to inventory and track practices at the lowest possible level; for example, each disconnected roof leader that leads to a drywell would be marked as a BMP, in addition to the drywell itself. This will allow the County to adapt as reporting or analyses evolve in the future, and allow inspectors in the field to detect changes (e.g., redirection of a downspout to a driveway) that might undermine required functioning of stormwater BMPs.

The FY17 *BMP* table and associated *BMPPOI* feature class components of the MS4 Geodatabase include the updated records from this work effort. It should also be noted that those BMP records that have not yet been updated (primarily pre-2002 construction) are also included in the FY17 MS4 Geodatabase. The reviewer will note that there are fields associated with these yet-to-be-reviewed records that include error codes. The County is aware that all mandatory data fields must be completed and, through the Urban BMP Database Historic Records Review and Update project we anticipate providing complete datasets in the FY18 MS4 Annual Report submittal.

For this FY17 Annual Report data submittal, the reader is referred to the ReadMe document that accompanies the MS4 Geodatabase (**Appendix A**) for explanations of null and/or blank values and for explanation of error codes. For example, a "77777" error code is used where a numeric value is required but not currently available (e.g., BMPs with a type of 'Other' may not have a delineated treatment area and the BMP_DRAIN_AREA field would contain this error code). A "99999" error code represents a 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 do not have the mandatory built-date as of yet. Again, the data to complete these fields are being researched during the Urban BMP Database Historic Records Review and Update project.

Table 2. 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%
Total	**265,268**					**42,312**						**16%**			

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 the 2017 reporting year, the County continued efforts to maintain an accurate impervious surface dataset. In the spring of 2017 the County initiated a contract with Axis Geospatial to update its impervious surface and land cover datasets utilizing imagery captured for the state of Maryland's High-Resolution Aerial Ortho-photography. This project is anticipated to be completed in the summer of 2018. Impervious surface calculations for this reporting year (FY2017) are based on the 2014 impervious surface dataset. In this dataset, impervious surfaces include unpaved driveways and unpaved parking lots (e.g., compacted gravel driveways).

<u>Impervious Cover</u>

The impervious surface layer is a critical component of the County's Watershed Management Tool (WMT). The WMT consists of many watershed analysis models for characterizing the existing conditions of the watershed. The WMT also provides predictive modeling for future conditions, restoration approaches, and preservation scenarios. These models are fully integrated with GIS and currently use the 2014 impervious layer for many different watershed and planning analyses, including hydrologic analysis, Rosgen Level 1 stream classification, pollutant loading estimates, and stream sediment loading estimates.

<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. The City of Annapolis, the 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 are examples of land areas that are outside the stormwater authority of Anne Arundel County. Using the County's parcel layer along with the Consolidated Property File (CPF), a GIS layer of Data analyses indicate that approximately seven percent of the land within the County boundary is owned by the State Government, seven percent is owned by the Federal Government, twelve percent is owned by the County local government, two percent is under the jurisdiction of the City of Annapolis, and seventy-two percent is privately owned. A breakdown of impervious surfaces within Anne Arundel County is listed in Table 2.

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 2017 permit year monitoring efforts at these sites is found in **Part IV.F**, and the complete monitoring reports for the reporting year are included in **Appendix D** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017*) and **Appendix E** (*Biological and Geomorphological Conditions in the Picture Spring Branch Subwatershed: 2016-2017*).

The *MonitoringSite* feature class contained in the MS4 Geodatabase gives the location of the Parole Plaza, Church Creek, and Picture Spring Branch monitoring sites. The *ChemicalMonitoring* table contains results from FY17 and is included in the MS4 Geodatabase provided in **Appendix A**.

Countywide Biological Monitoring Program

Since 2004, the County has implemented a Countywide 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 Countywide 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 http://www.aacounty.org/departments/public-works/wprp/ecological-assessment-and-evaluation/biological-monitoring/. To summarize, fish and water quality sampling have been added to the benthic macroinvertebrate sampling already performed by the Program. Additionally, 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	
Copper	NH3	Hardness
Lead	TP	Alkalinity
Zinc	TSS	Total Phenols
Magnesium	PO4	Oil and Grease
Iron	COD	*E. coli*
BOD5	Turbidity	VOC (EPA 624)
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. It is anticipated that sampling will likely resume during the next reporting period (FY18).

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 plans to restore the concrete channel to a more natural stream/wetland system, with the final configuration currently under design. The County has established a monitoring station to characterize pre- and post-restoration water quality, geo-morphic, and biological conditions. During the reporting period, benthic macroin-vertebrate samples were collected at two locations and a total of ten storm samples and 11 baseflow samples were collected.

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/retrofit activities in the design or construction phase or activities completed during the reporting year. In 2017, the County continued to initiate new restoration projects and is working towards the completion of previously reported projects.

During FY 2017, the County reported 84 completed Restoration BMP and Alternative Restoration BMP projects with a total impervious treatment area of 498 acres (Figure 2) and load reductions of 3,741 lbs. per year of total nitrogen (TN), 897 lbs. per year of total phosphorus (TP), and 1,254,109 lbs. per year of suspended solids (TSS). In addition to the restoration BMPs, the County reported a series of alternative impervious equivalent credits to be counted toward the 20% reduction goal. The total equivalent credits from approved alternative BMPs reported are 563 acres and these included: 4 outfall stabilizations (2.5 acres); 32individual septic connections to the waste water treatment plant (12.48 acres); 156 individual nitrogen reduction septic conversions (40.6 acres); septic pump outs[1] (171 acres); 1 impervious surface elimination (0.057 acres); 2,447 inlets cleaned (96.5 acres); and 297 curb miles of street sweeping (239.8 acres). There were six (6) Restoration BMP projects built from 2012 through 2016 which were not included in previous reports. These projects were added to the 2017 Geodatabase. Also, there were 38 Alternate Restoration projects built from 2012 through June 30, 2016 which were not previously reported; and have been added to the 2017 Geodatabase.

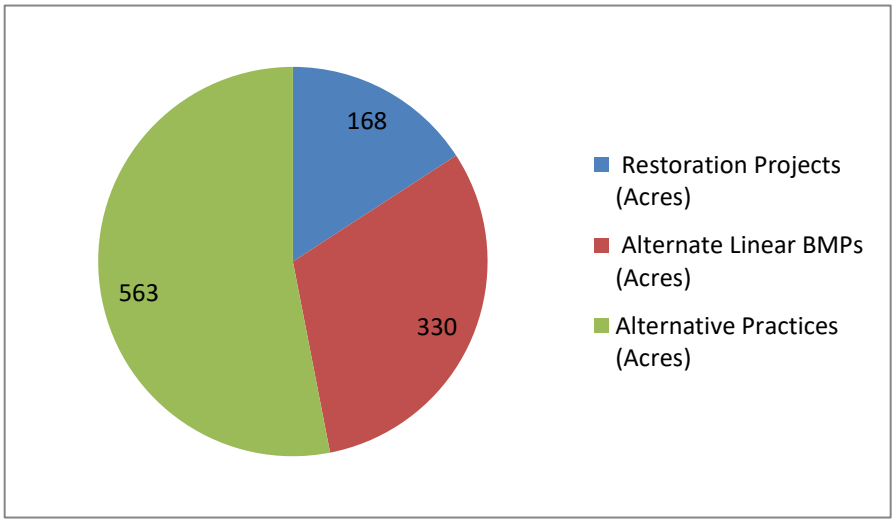


Figure 2. Impervious Restoration Acreage - FY17

Included in this FY17 Report are changes to previously reported credits from FY2016. These included projects which were updated based on as-built data and SPSC projects that were reclassified as Restoration BMPs (previously reported as Alternative BMPs) because they were ephemeral or intermittent channels. It was determined that Protocol 4 from the Expert Panel Report, *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* by the Center for Watershed Protection (Berg et al. 2014) should be used. Table 3 provides information on the project changes.

[1] Individual pump out data not available. The credit is based on septage data from the WRF from various vendors. Credit is calculated based on 1,000 gallons as average pump out.

Table 3. Changes to Restoration Project Credits in 2017

Restoration ID	BMP Type	Original Impervious Surface Credit	Updated Impervious Surface Credit	Reason for Change
AA16RST000011	IBAS	1.79	1.79	Treatment Practice Type changed from ST to RR
AA16RST000020	IBAS	2.52	2.52	Treatment Practice Type changed from ST to RR
AA16RST000037	IBAS	5.79	5.67	Treatment Practice Type changed from ST to RR
AA16RST000045	IBAS	4.54	4.54	Treatment Practice Type changed from ST to RR
AA15RST000094	PWET	1.97	1.10	Updated based on as-built
AA15RST000091	PWET	0.71	1.19	Updated based on as-built
AA15RST000095	PWET	2.48	3.51	Updated based on as-built
AA15RST000093	PWET	1.38	2.29	Updated based on as-built
AA16RST000030	PWET	2.98	0.38	Updated based on as-built
AA16RST000028	PWET	1.82	2.58	Updated based on as-built
AA15RST000098	SPSC	3.50	19.12	Moved from Alternate Restoration
AA15RST000099	SPSC	3.34	1.60	Moved from Alternate Restoration
AA15RST000100	SPSC	2.25	2.45	Moved from Alternate Restoration
AA15RST000101	SPSC	2.20	10.03	Moved from Alternate Restoration
AA15RST000102	SPSC	3.00	7.93	Moved from Alternate Restoration
AA15RST000092	SPSC	2.39	2.65	Updated based on as-built
AA16RST000088	SPSC	2.50	1.66	Moved from Alternate Restoration
AA16RST000089	SPSC	4.55	0.50	Moved from Alternate Restoration
AA16RST000090	SPSC	6.42	1.39	Moved from Alternate Restoration
AA16RST000091	SPSC	5.22	-	Moved from Alternate Restoration; upstream pond treating water quality
AA16RST000092	SPSC	10.00	2.38	Moved from Alternate Restoration
AA16RST000093	SPSC	2.76	1.13	Moved from Alternate Restoration
AA16RST000094	SPSC	2.90	2.83	Moved from Alternate Restoration
TOTAL		**79.24**	**77.01**	

After implementing these changes, the reported credits for FY2017 incorporate the updated data. This brings the impervious credit from the completed restoration projects during the current reporting period to 1,061 acres; equivalent load reductions of 4,673.2 lbs. per year total nitrogen (TN), 1,258 lbs. per year total phosphorus, and 1,383,289 lbs. per year total suspended solids.

In addition to the completed projects, the County has 51 projects in construction or design phases. It is anticipated that these projects will provide an additional 698 equivalent impervious acres of treatment as well as 12,403.9 lbs. per year of total nitrogen, 1,923.6 lbs. per year of total phosphorus, and 1,297,085 lbs. per year of suspended solids to be reported in the upcoming year(s). The inventory of these project locations have been submitted in the MDE Geodatabase.

The County will continue to update its inventory of restoration projects as they are designed, implemented, and completed.

D. <u>Management Programs</u>

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 FY17, the Department of Inspections & Permits continued the requirement for all proposed new stormwater management plans to 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.

The Office of Planning and Zoning (OPZ), as a component of permit application review for County CIP projects, desired to execute a formal Memorandum of Understanding (MOU) between DPW and OPZ that would establish the process by which County CIP Projects would receive stormwater management approval. That process would include the submission, by DPW, of an affidavit with each CIP project permit application that confirms the project design meets the State stormwater management requirements as per the Maryland Stormwater Design Manual (most recent version).

The MOU was not completed in FY17 due to reorganization of permit review staff but should be revisited in FY18.

In addition, a comprehensive review and update to the County's Practices & Procedures Manual was completed in FY17. 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 preliminary approval was received from MDE on October 3, 2017.

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. Recommendations for improving the program were identified and the County has begun, and will continue, to take appropriate action. The County review engineers have received additional training to ensure that all plan review requirements are addressed consistently. In addition, the physical work location of the review engineers was relocated to accommodate the FY17 budget transfer of the review engineers from OPZ to I&P effective 7/1/2016. This relocation is designed to improve the communication between the review engineers and the field inspectors. The next stormwater management program triennial inspection is scheduled for September 2016 (FY17). At that time, the transfer of stormwater management plan review responsibility, from the Office of Planning and Zoning to the Department of Inspections & Permits, will be fully implemented.

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 FY17, County records indicate the following information regarding stormwater management program data (Table 4).

Table 4. Concept, Site Development, Final Development, and Redevelopment Plans Received During FY17

Type	Number of Projects Received
Concept Plan[(a)]	101
Site Development Plan[(a)]	150
Final Development Plan[(b)]	89
Final Redevelopment Plan[(c)]	35
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
(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 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:

- 851 Stormwater Construction Inspections
- 66 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:

- 6,206 Three Year Maintenance Inspections
- 504 Three Year Maintenance Correction Notices
- 27 Three Year Maintenance Violation Notices

Review of the *BMPInspections* table of the MS4 Geodatabase (**Appendix A**) indicates that 6,206 three-year inspections of 5,878 stormwater facilities (includes 328 re-inspections) were conducted during the reporting year, equating to roughly 13% 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 7,814 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.

During the reporting period, and as documented in **Part IV.C.3**, the County continued review and update of historic BMP records. The majority of BMPs constructed between January 2002 and July 2017 were reviewed and records updated in FY17. Using the information and data resulting from this work effort, the County was able to identify 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 data fields as required by the MS4

Geodatabase. The FY17 maintenance inspection information was extrapolated from the stacked BMP records to the resulting individual BMP record. It should be noted that the "unstacking" of BMP records and assignment of a unique identifier within the County's database system is still a fluid process. As such, certain records within the *BMPInspections* table contain error codes with annotation found in the General Comments field.

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 FY17 reporting period, all correction notices were successfully enforced at the Phase 1 level and, subsequently, there were no Phase 2 or Phase3 violation notices required. Additional information relating to inspection and enforcement activities in FY17 is provided in the *SWM* table of the MS4 Geodatabase submittal (**Appendix A**).

Alternative stormwater facility inspections are also documented in the MS4 Geodatabase. The *AltBMPPointInspections* table contains 119 records associated with alternative BMPs such as septic system upgrades, connections to WWTP, and pumpouts. These 119 records are associated with 118 inspections (there is 1 record that notes MDE inspection data is missing). The *AltBMPPolyInspections* table contains 793 inspection records associated with street sweeping, inlet and catch basin cleaning and other associated alternative BMPs. The *AltBMPLineInspections* table contains 4 records for which inspection is slated in FY2018.

Lastly, restoration stormwater BMPs are also subject to maintenance inspection to ensure their efficacy within the landscape. The *RestBMPInspections* table contains 18 restoration BMP records for which there are 12 associated inspections and 6 records that are set for inspection in FY18.

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 Fiscal Year 2017, the Maryland Department of the Environment completed their review of the County's application for continued delegation of erosion and sediment control enforcement authority. As documented in prior NPDES MS4

Annual Reports, during FY15 and subsequent to the State's review, County Code relevant to Erosion and Sediment Control was updated to comply with the most recent changes to the State Erosion and Sediment Control Code. A copy of County Council Bill 83-15 reflecting the required code updates was included with the County's FY15 Annual Report, and this legislation was adopted in FY16. During FY16, the County submitted an erosion and sediment delegation application for continued delegation of erosion and sediment control. Upon receipt of the signed and approved legislation, MDE continued the County's delegation of authority. A copy of the delegation review is included in **Appendix C**. 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 card-holders' 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 web site. The optional MS4 Geodatabase table *RespPersonnelCertInfo* is not submitted with the FY17 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 web site. Therefore, no certification information is submitted in this narrative or with the MS4 Geodatabase. Other 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, quarterly reports were not required provided the Construction General Permit Activity Database continued 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 Coordinator, 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. Once per permit term, 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 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.

During the 2017 reporting period, illicit discharge screening targeted the north portion of Route 2, north of Arnold up to Route 100/Mountain Road (including Glen Burnie and part of Severna Park); Veterans Highway in the Millersville area; the County portion of Parole and Annapolis Town Center; and Bestgate Road. Field crews successfully inspected 150 outfalls draining commercial, industrial, and residential land uses. Two complaint-driven outfall inspections were performed during this reporting period. For the 2018 effort, the County will concentrate in areas north and east of BWI Airport, areas along Routes 3 and Route 100, focusing on the Crofton residential area, and rescreen outfalls having prior illicit discharges. In FY 2019, the County plans to screen areas north and northeast of Annapolis (e.g., Severna Park, Lake Shore, 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, and ammonia), an Extech single analyte tester (for fluoride), and an 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 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 the County Department of Inspections and Permits (I&P), the County's Infrastructure Management Division, or the Anne Arundel Health Department for further investigation and enforcement.

Of the screened outfalls containing dry-weather flow during the 2017 reporting period, 12 yielded a result above the action-criteria limit for one or more of the tested contaminants. Field crews re-screened all of these outfalls and, of those, 10 had concentrations that were above at least one action level when re-tested. Discharges from five of the 10 retested outfalls were outside of the acceptable range for pH only, and it was determined that the results were due to natural site conditions. 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 – 2017 Annual Report* (**Appendix F**). The report also includes details regarding the resolution of previously unresolved cases described in the 2016 reporting year.

The County consultant's field teams identified five locations where physical issues significantly affected stormwater infrastructure within the targeted areas of Anne Arundel County during the 2017 reporting period. Staff reported these conditions to the County MS4 Program Manager. These site-specific reports were then forwarded to the County's Infrastructure Management Division (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 – 2017 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 19 upland pollutant sources within the target areas during the 2017 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 – 2017 Annual Report* (**Appendix F**); relevant digital data are included in the *IDDE* table of the MS4 Geodatabase provided in **Appendix A**. The complete report (**Appendix F**) contains details of the findings from the 2017 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 reporting year.

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 forty illicit discharge, dumping, or storm drainage complaints were reported to I&P during the 2017 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 2017 reporting year are documented in Appendix F of the *Illicit Discharge Detection and Elimination – 2017 Annual Report* (**Appendix F**). 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. If the civil citation is not paid and the violating activity is not abated, the civil citation will move to litigation processes 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 2017 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 2017 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 addressed thirteen issues reported to the Department by County consultants during the reporting period, two reported by citizens through U.S. EPA, and one directly reported by a citizen. Please refer to the *Illicit Discharge Detection and Elimination – 2017 Annual Report* (**Appendix F**) for details.

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

Status:

For the 2017 reporting period, illicit discharge complaints and referrals received were successfully enforced by I&P, although I&P did coordinate with MDE on several cases. These cases are more fully described in Table 5-1 of the *Illicit Discharge Detection and Elimination – 2017 Annual Report* (**Appendix F)**.

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 – 2017 Annual Report* (**Appendix F)** provides descriptions of all activities completed as part of the County's 2017 IDDE program. Additionally, 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 FY17. Additional information related to IDDE activities of FY2017 can be found in the *Illicit Discharge Detection and Elimination – 2017 Annual Report* included in **Appendix F** 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:

As watershed assessments continue per the schedule found in **Part IV.E.1**, information on litter control programs in those watershed areas, potential litter sources, and opportunities for eliminating litter and floatables will be examined. During FY17, watershed assessment projects were underway for the Herring Bay and Middle Patuxent watersheds. These assessments include documentation of potential sources and opportunities for control and elimination of litter and floatables. The watershed assessment provides valuable information which can be used to better identify litter sources and opportunities for effective litter control outreach programs.

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 FY17, the County prepared a Litter and Floatables Comprehensive Plan document which 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 G**.

Documented below are the annual results of the County's education and outreach programs.

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, 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 26 fairs and festivals in FY17 were attended, and recycling assistance was provided to 16 of those events. Anne Arundel County promotes its recycling program to the public through several methods such as:

- Providing technical assistances, and services when possible, to small business and multifamily units;
- Improving communication with customers by maximizing the use of various media including direct mail, broadcast media, social media, 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 MAEOE program. In FY17, Recycling Program

Specialists provided information to 31 elementary school programs, 14 middle school programs, and two high school programs, and also provided 13 tours of our 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, flyers and other handouts focusing on recycling, 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:

- http://www.recyclemoreoften.com/
- http://www.aacounty.org/DPW/WasteManagement/householdWaste.cfm
- https://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 Countywide recycling rate has increased from 31% to 44%. 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 FY17, 201 customers 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/ 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 FY17.

In FY17, there were six household hazardous waste events (two at each of the three Recycling Centers). These events attracted 3,063 customers and successfully kept 211,463 pounds (106 tons) of household hazardous waste out of the landfill and potentially our 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 Watershed Protection & Restoration Program of the County to aid in community and watershed cleanup activities. WMS also assists in hauling the trash and recyclable material collected from these activities. In FY17, roll-off bins were provided for approximately 170 communities, programs and citizen groups to assist in trash removals.

In an effort to bring specific 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 school students to participate in the Anne Arundel County Litterati Challenge utilizing the Litterati© (Litterati, LLC., 2017) application ("app") for smartphone or tablets (www.litterati.org). 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). Initially, there will be two rounds of the Litterati Challenge. It is anticipated that the program will launch in spring 2018, with the first round taking place from March through April. Round two will take place in the fall from September through October. Awards will be given at the end of each round to the school with the most total items of litter collected attributed to it and to the individual participant with the most total items of litter collected. It is hoped that the program may be incorporated into the classroom curriculum by 2020. The Litterati app is used by over 19,000 people worldwide and as of September 2017 has resulted in over 855,000 pieces of litter being picked up around the globe. The Litterati Challenge will mesh technology, school pride, and social and environmental awareness in order 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. Additionally, 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. In addition to typical weekend roadside litter cleanup, in late FY17 BOH began litter and debris pickup in alleys in select communities in the northern region of the County (Brooklyn Park, portions of Glen Burnie) as part of a rodent control initiative in cooperation with the County Health Department. Over the course of two weekends in June 2017, 129 thirty-gallon bags of litter/debris were collected from 51 alleyways.

A total of 9,751 thirty-gallon bags of litter were removed from roadsides from July 1, 2016 to June 30, 2017, with 6,755 bags collected during the routine work week and 2,996 bags collected by the weekend litter removal program (including the aforementioned alley cleanup activity). This represents a 22% decrease from the last reporting period in which 12,549 bags of litter were removed. The decrease in litter removal is attributed primarily to the availability of inmate support for this program.

Stream Cleanups

BOH and WMS supported several watershed cleanup initiatives during the reporting period. Significant support was provided to The Friends of the Patapsco Valley & Heritage Greenway, who sponsored several watershed clean-ups in Patapsco State Park off Race Road in Hanover, Maryland. Support was also given by BOH to community cleanup events in the Marley Creek floodplain. In partnership with these efforts, BOH supported 10 events and hauled away more than 13,700 reported lbs. of material for proper disposal (note that the amount of trash removed was only recorded for five events). Four additional cleanup events were supported by WMS. In total, County-supported cleanup events accounted for the removal and disposal of a reported 26,880 lbs (13.4 tons) of trash and tires. Specific examples of trash, debris, and litter clean-up events supported by the County are listed in Table 5.

Table 5. Watershed Cleanup Activities Supported by BOH and WMS in FY17

Date	Organization/Location	Location	Amount of Trash Removed
October 26, 2016	Patapsco Heritage Greenway	Hammonds Ferry Rd N	not recorded
October 31, 2016	Patapsco Heritage Greenway	Hammonds Ferry Rd N	5,500 lbs trash
December 9, 2016	Patapsco Heritage Greenway	Hammonds Ferry Rd N	not recorded
January 18, 2017	Marley Creek (floodplain)	Manning Rd @ Norfolk Rd	15 Bags trash
January 25, 2017	Marley Creek (floodplain)	Saunders Way @ Norfolk Rd	not recorded

Table 5. Watershed Cleanup Activities Supported by BOH and WMS in FY17

Date	Organization/Location	Location	Amount of Trash Removed
March 24, 2017	Patapsco Heritage Greenway	River Rd @ W. Nursery	not recorded
March 27, 2017	Patapsco Heritage Greenway	821 Oregon Ave @ Fairview Ave	4,760 lbs trash/56 tires
March 29, 2017	Patapsco Heritage Greenway	River Rd @ W. Nursery	860 lbs
April 1, 2017	Project Clean Stream	Annapolis Harbour Center	2,240 lbs trash
April 3, 2017	Patapsco Heritage Greenway	Hammonds Ferry Rd N	2,620 lbs
April 7-8, 2017	Forks of Patuxent	Patuxent Pond	4,960 lbs trash
May 1, 2017	Patapsco Heritage Greenway	Hammonds Ferry Rd N	not recorded
May 7-8, 2017	World War II Memorial	1920 Ritchie Hwy, Glen Burnie	4420 lbs trash
n/a	Ches Bay Radio Control Club	680 Evergreen Rd, Crownsville	2,380 lbs tires

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:

Annapolis WRF, permit number 12DP0838, effective October 1, 2015 to September 30, 2020.

Broadneck WRF, permit number 14DP0677, effective November 1, 2017 to October 31, 2022.

Broadwater WRF, permit number 14DP0813, effective November 1, 2017 to October 31, 2022

Cox Creek WRF, permit number 07DP0698, effective January 1, 2010 to December 31, 2014. A renewal package was submitted as per the permit requirement.

Maryland City WRF, permit number 11DP2393, effective April 1, 2015 to March 31, 2020. A renewal package was submitted as per the permit requirement.

Mayo Large Communal WRF, permit number 02DP2291, effective October 1, 2013 to September 30, 2018.

Patuxent WRF, permit number 11DP0132, effective April 1, 2015 to March 31, 2020. A renewal package was submitted as per the permit requirement.

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 SWPPPs, and the permit coverage period is listed in Table 6 below.

Table 6. County 12-SW Covered Facilities

Facility	Permit	NOI & SWPPP Received by MDE	Permit Coverage Period
Bureau of Highways			
Northern District Roads 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
Central District Roads 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
Southern District Roads Yards			
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			
Millersville Landfill & Resource Recovery Facility	12-SW-1304	July 3, 2014	Aug. 15, 2014 – Dec. 31,2018
Northern Recycling Center	12-SW-0298	July 3, 2014	Aug.15, 2014 – Dec. 31, 2018
Southern Recycling Center	12-SW-0297	July 3, 2014	Aug. 18, 2014 – Dec. 31, 2018
Bureau of Utility Operations			
Annapolis Water Reclamation Facility (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, 208
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 Maryland 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.

Bureau of Highways Stormwater Pollution Prevention Plan Development and Implementation

During the period July 1, 2016, through June 30, 2017, the following items related to implementation of 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 2017.
  - 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:
  - Annual testing of spill buckets (catchment basins) at all facilities in March 2017.
  - Third Party Inspections at two facilities in calendar year 2017 based upon MDE notification.
  - Five-year tank tightness testing completed at all facilities during August 2013.
  - Five-year containment sump testing completed at select facilities during August 2013.
- Completed capital improvements to underground storage tank infrastructure at the following facilities:
  - 200 Dover Rd, waste oil tank removed 9/8/2017
  - 415 Broadneck Rd., waste oil tank removed 4/5/2017
  - 6651 Old Solomons Island Rd., waste oil tank removed 4/5/2017

- Completed capital improvements to Road Salt storage infrastructure at the following facilities:
  - Central District, 415 Broadneck Rd, New Salt Barn, Spring 2017

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 6. During the reporting period annual comprehensive SWPPP compliance inspections were performed at these facilities in November 2016 and again in November 2017; visual inspections occur on a quarterly basis. Additionally, the stormwater management facilities at these sites are routinely inspected and all identified repairs are immediately undertaken. WMS employs two technicians who are tasked with the responsibility of inspecting and managing the stormwater facilities to ensure proper function.

Bureau of Utility Operations Stormwater Pollution Prevention Plan Development and Implementation

During this reporting period, Anne Arundel County's Bureau of Utility Operations continued implementation of the SWPPPs specific to the 6 WRF facilities and the Utilities Operations Center site listed in Table 6 (above). In support of the NOI and in compliance with the SWPPP, WRF staff perform monthly inspections, quarterly dry weather inspections, quarterly wet weather inspections, annual comprehensive site inspections, annual record review, and annual training **(Appendix H)**. These records are maintained at each facility. It should be noted that the Cox Creek WRF is in the final stages of 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. Likewise, the Maryland City WRF is undergoing expansion and, as such, that SWPPP will need to be updated following construction completion. Staff at these facilities are aware of the need to maintain a current and accurate SWPPP and will strive to 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.

FY17 Sweeping Schedule

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. 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 transition from in-house to contracted street sweeping has significantly increased the number of miles swept. The County tracks street sweeping data by curb miles and debris tons. During the reporting period, the County swept 7,128 curb miles equating to 594 curb miles per month, a 45% increase from the last reporting period. This street sweeping program collected approximately 600 tons of material from County maintained streets in FY17, representing a 100% increase from FY16.

ii. Inlet inspection and cleaning;

Status:

Anne Arundel County BOH conducts manual and mechanical storm drain inlet cleaning throughout the county. Inlets are cleaned on a rotating basis, with each inlet being serviced about once every three years. For FY 2017, the County manually cleaned and removed debris from catch basins, inlets and outlets of pipes to maintain proper drainage for 6,879 structures, a 44% decrease from the previous reporting period that was associated with the increased focus on structures requiring sewer vacuum or power rodder cleaning.

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 2,447 structures required cleaning with a sewer vacuum, an increase of 148% from the last reporting period in which 987 were cleaned with a sewer vacuum. A total of 49,710 feet of pipe were cleaned, an increase of 167% from the last reporting period in which 18,623 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 172,460 feet during the reporting period. This is a 22% increase from the last reporting period in which the County cleaned 141,265 feet. Year to year variability in linear feet of ditch and curbline 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). Some of this work occurs along County-maintained roadways. No data regarding the quantity of materials applied along roadways is recorded by the County.

Herbicide use associated with road maintenance performed by the Bureau of Highways 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 27.5 gallons of Glyphosate were used during the reporting period. This is a 66% decrease over the previous reporting period in which 80 gallons were 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 following compounds* at certain AACRP fields during FY17 (Table 7)

Table 7. FY17 Pesticide/Herbicides used at AACRP Turf Fields

Turf Field	Ronstar (lbs)	Round-up (gal)	Tribute (ml)	Sevin (ounces)
Andover	150	60	5.6	N/A
Annapolis HS	375	N/A	N/A	N/A
Bachman	150	60	5.6	N/A
Bay Head	300	N/A	N/A	N/A
Bodkin	375	150	28	N/A
Davidsonville	300	120	N/A	N/A
Lakeshore	150	60	N/A	N/A
Loopers	300	N/A	5.6	160
Mac Church	300	60	11.2	N/A
PAL	300	120	22.4	N/A
Severn Danza	150	60	5.6	N/A
South River	400	N/A	N/A	N/A
TOTALS	**3250**	**690**	**84**	**160**

***Compounds Used**
Ronstar: Oxadiazon 3-(2,4-dichloro-5-(1 methylethoxylphenyl)-5-(1,1-dimethylethyl)-1,3,4-oxadiazol-2(3H)-one
Round-Up: Glyphosate
Tribute Total: Thiencarbazone-methyl; Foramsulfuron; Halosulfuron-methyl
Sevin: - Carbaryl (1-naphthyl N-methylcarbamate)

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 FY17, the following compounds and quantities were reported by the FMD Horticulture Unit:

- 4 gallons of liquid Round-up (Glyphosate)
- 95.2 pounds of granular Round-up (Glyphosate)
- 60 ounces of Wasp & Bee Spray (Propoxur, Piperonyl butoxide & Pyrethrins)
- 2.5 pounds of Merit (Imidacloprid)
- 20 ounces of Sevin Bug Killer (Carbaryl)

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 Facilities Maintenance Division (FMD) properties and right-of ways include Integrated Pest Management (IPM). Key elements include:

- 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 R&P public facilities. Key elements of the IPM program at AACRP facilities include:

- 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 Bureau of Highways from July 1, 2016 to June 30, 2017 are found in Table 8. De-icing chemical data for the 2013-2014, 2014-2015, and 2015-2016 reporting period are provided as a comparison. The quantity of deicing 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 8. Deicing Material Applied

Material	2013-2014	2014- 2015	2015 – 2016	2016-2017
Salt (tons)	50,996	32,250	11,318	5,361
Liquid Salt Brine (gal)	0	0	71,500	139,000
Total Salt (tons)	50,996	32,250	11,390 [(c)]	5,500 [(c)]
Liquid Calcium Chloride (gal)	13,355 [(a)]	11,925 [(a)]	6,578 [(a)]	1,046 [(a)]
NWS Snow Totals – BWI (in)	39 [(b)]	28.7 [(b)]	35.1 [(b)]	3 [(b)]
NWS Avg. Winter Temp (F)	33.3	32.0	39.4	40.5

[(a)] Average long-term 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. Use is likely when average temperature is near or below freezing or in cases of heavy snowfall.
[(b)] Average long-term annual snowfall total at BWI Thurgood Marshall Airport is 20.1 inches according to the National Weather Service (NWS). Winter 2016-2017 snowfall total was 3 inches, although that total underestimates the actual accumulation total for the southern half of the County. Low overall snowfall, moderate temperatures, expanded use of anti-icing, and sensible salting practices resulted in less overall salt use.
[(c)] Two pounds of rock salt yields one gallon of salt brine. One ton of rock salt produces 1,000 gallons.

In 2014, subsequent to the promulgation of a Statewide Salt Management Plan, the Bureau of Highways 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 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 web page.
- *GPS Upgrade:* It is recommended that the Snow Operations fleet be upgraded by installing an automated vehicle location system (GPS). Strategic and tactical decision making during a storm response informed by an automated vehicle location system improves effectiveness, resource allocation, and potentially reduces storm response duration. GPS data 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 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.

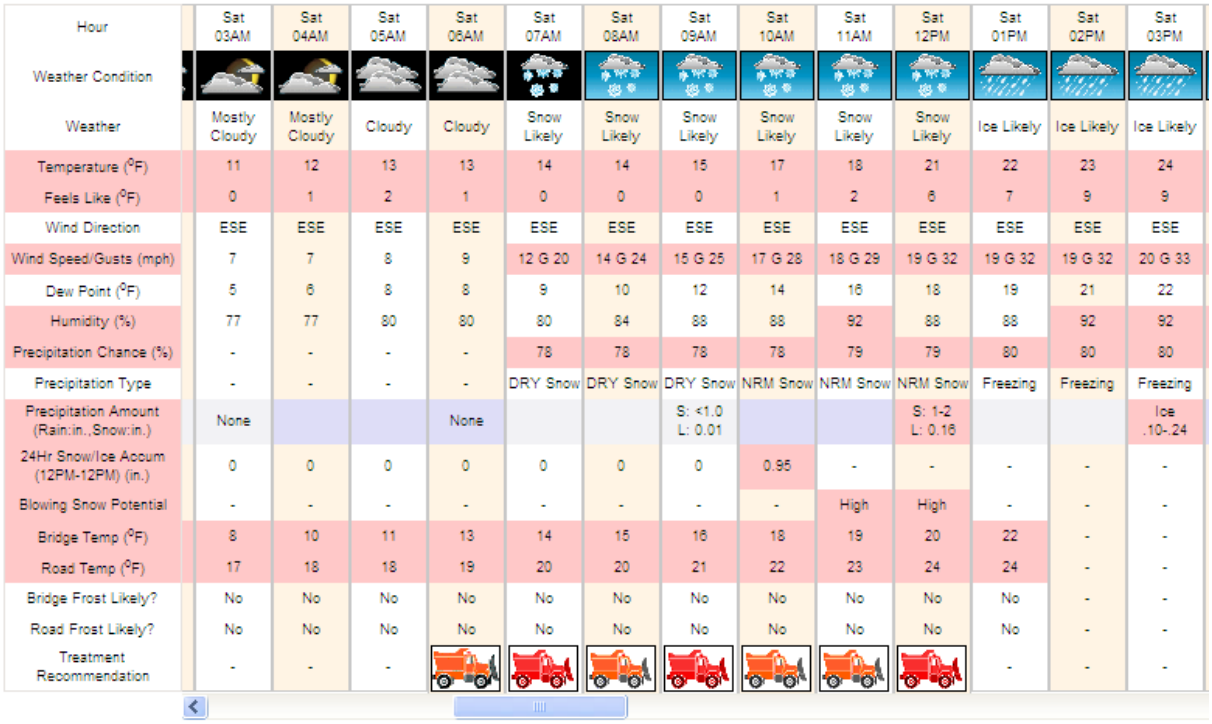
- *Environmentally Sensitive Areas:* Concentrations of chloride in the environment can have negative environmental impacts and the Statewide Salt Management Plan suggests a program to assess the levels of impact due to winter maintenance. Initially, the environmentally sensitive areas can be identified 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 2016-2017, the Bureau continued its efforts to reduce the use of winter weather deicing 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 2017-2018 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 a 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 deicing chemicals. Screen shots from the MDSS shown below (Figures 3 and 4) are from our subscription weather service, MxVision WeatherSentry Online http://weather.dtn.com/dtnweather/.

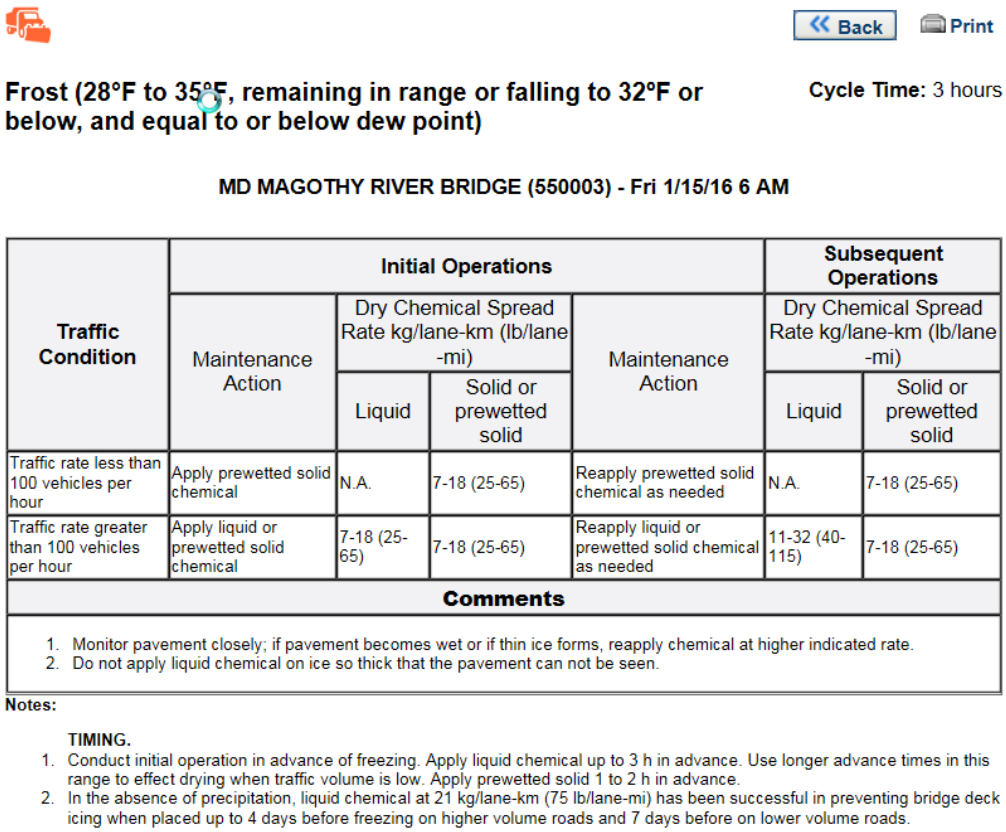
Annual training on proper snow plowing techniques is also offered to both County and contractor personnel responsible for maintaining the County's roadways during inclement winter weather. The training also includes information on the application of deicing products and proper application rates. Training sessions are held in October and November each year. Approximately 150 County personnel and 125 contractors attended the training sessions in FY17 and again in FY18.

Training sessions present the concept of "Sensible Salting" to all winter operations personnel. "Sensible Salting" is another way of saying: "Enough and no more." Sufficient salt is required to produce the desired safety and mobility, the level-of-service goal. "Excess" applications add cost but no further benefit, and harm the environment.



Hour	Sat 03AM	Sat 04AM	Sat 05AM	Sat 06AM	Sat 07AM	Sat 08AM	Sat 09AM	Sat 10AM	Sat 11AM	Sat 12PM	Sat 01PM	Sat 02PM	Sat 03PM
Weather Condition													
Weather	Mostly Cloudy	Mostly Cloudy	Cloudy	Cloudy	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Snow Likely	Ice Likely	Ice Likely	Ice Likely
Temperature (°F)	11	12	13	13	14	14	15	17	18	21	22	23	24
Feels Like (°F)	0	1	2	1	0	0	0	1	2	6	7	9	9
Wind Direction	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE
Wind Speed/Gusts (mph)	7	7	8	9	12 G 20	14 G 24	15 G 25	17 G 28	18 G 29	19 G 32	19 G 32	19 G 32	20 G 33
Dew Point (°F)	5	6	8	8	9	10	12	14	16	18	19	21	22
Humidity (%)	77	77	80	80	80	84	88	88	92	88	88	92	92
Precipitation Chance (%)	-	-	-	-	78	78	78	78	79	79	80	80	80
Precipitation Type	-	-	-	-	DRY Snow	DRY Snow	DRY Snow	NRM Snow	NRM Snow	NRM Snow	Freezing	Freezing	Freezing
Precipitation Amount (Rain:in.,Snow:in.)	None			None			S: <1.0 L: 0.01			S: 1-2 L: 0.16			Ice .10-.24
24Hr Snow/Ice Accum (12PM-12PM) (in.)	0	0	0	0	0	0	0	0.95	-	-	-	-	-
Blowing Snow Potential	-	-	-	-	-	-	-	-	High	High	-	-	-
Bridge Temp (°F)	8	10	11	13	14	15	16	18	19	20	22	-	-
Road Temp (°F)	17	18	18	19	20	20	21	22	23	24	24	-	-
Bridge Frost Likely?	No	No	No	No	No	No	No	No	No	No	No	-	-
Road Frost Likely?	No	No	No	No	No	No	No	No	No	No	No	-	-
Treatment Recommendation	-	-	-								-	-	-

Figure 3. MDSS Hourly Weather Forecast With Treatment Recommendations



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Frost (28°F to 35°F, remaining in range or falling to 32°F or below, and equal to or below dew point)

Cycle Time: 3 hours

MD MAGOTHY RIVER BRIDGE (550003) - Fri 1/15/16 6 AM

Traffic Condition	Initial Operations			Subsequent Operations		
	Maintenance Action	Dry Chemical Spread Rate kg/lane-km (lb/lane-mi)		Maintenance Action	Dry Chemical Spread Rate kg/lane-km (lb/lane-mi)	
		Liquid	Solid or prewetted solid		Liquid	Solid or prewetted solid
Traffic rate less than 100 vehicles per hour	Apply prewetted solid chemical	N.A.	7-18 (25-65)	Reapply prewetted solid chemical as needed	N.A.	7-18 (25-65)
Traffic rate greater than 100 vehicles per hour	Apply liquid or prewetted solid chemical	7-18 (25-65)	7-18 (25-65)	Reapply liquid or prewetted solid chemical as needed	11-32 (40-115)	7-18 (25-65)

Comments

1. Monitor pavement closely; if pavement becomes wet or if thin ice forms, reapply chemical at higher indicated rate.
2. Do not apply liquid chemical on ice so thick that the pavement can not be seen.

Notes:

TIMING.

1. Conduct initial operation in advance of freezing. Apply liquid chemical up to 3 h in advance. Use longer advance times in this range to effect drying when traffic volume is low. Apply prewetted solid 1 to 2 h in advance.
2. In the absence of precipitation, liquid chemical at 21 kg/lane-km (75 lb/lane-mi) has been successful in preventing bridge deck icing when placed up to 4 days before freezing on higher volume roads and 7 days before on lower volume roads.

Figure 4. MDSS Treatment Recommendation

The Department's Sensible Salting Practices include:

- Limited Salting During the Late Evening/Early Morning Hours: From 11:00 p.m. – 4:00 a.m. very limited salting will take place, as salting is not as effective due to low traffic volumes. The goal of the Department during this time 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 salt usage at each facility, in FY17, is as follows:

- Millersville Landfill and Resource Recovery Facility & Central Recycling Center – 45 tons
- Northern Recycling Center – 7.5 tons
- Southern Recycling Center – 3.75 tons

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

Status:

The County's WMS staff continue their training on stormwater pollution prevention with formal SWPPP training sessions held in November 2016 and June 2017. Sixteen County WMS staff assigned to the three 12-SW permitted facilities (Northern Recycling Center, Millersville Landfill & Resource Recovery Center, and Southern Recycling Center) attended the training in FY17. Additional staff training (e.g., Hazwopper Refresher, Preventing Landfill Fires) was also offered to all staff throughout the fiscal year.

The Bureau of Utilities conducted SWPPP staff training sessions at the WRFs and Utility Operations Center facilities, as listed in **Part IV.D.5.a**. During this reporting period, stormwater pollution prevention training sessions occurred on July 12, 2016, September 7, 2016, October 13, 2016, November 2, 2016, December 15, 2016, and June 29, 2017.

The Bureau of Highways staff training sessions were administered to Road District personnel during the reporting period to support SWPPP implementation, as summarized in Table 9.

Table 9. SWPPP Training Summary for Bureau of Highways Facilities

Training Number	Training Location	Training Date	# Attendees	Training Session Topic
16222495	1310ND	08/25/2016	17	SESSION #2 - Our SWPPP - Part I
16222496	1310ND	11/17/2016	17	SESSION #1/3 - WHEN IT RAINS, IT DRAINS & IMPORTANCE OF HOUSEKEEPING
16222497	1310ND	03/22/2017	18	SESSION #1 - WHEN IT RAINS IT DRAINS & WHAT IS A SWPPP?
16222498	1310ND	05/15/2017	19	SESSION #1 - WHEN IT RAINS, IT DRAINS
16222501	1310NM	07/29/2016	24	SESSION #1/3 - WHEN IT RAINS, IT DRAINS & IMPORTANCE OF HOUSEKEEPING
16222503	1310NM	11/22/2016	18	SESSION #1 - WHAT IS A SWPPP
16222507	1310NM	02/24/2017	18	SESSION #1 WHEN IT RAINS, IT DRAINS
16222508	1310NM	05/10/2017	19	SESSION #1 WHEN IT RAINS, IT DRAINS
16222511	1311CO	08/26/2016	12	SESSION #4 - SECONDARY CONTAINMENT & HOUSEKEEPING
16222820	1311CO	12/01/2016	13	SESSION #1 - WHEN IT RAINS, IT DRAINS
16222822	1311CO	02/17/2017	9	SESSION #4 POLLUTION PREVENTION TEAM
16222824	1311CO	05/26/2017	11	SESSION #3 - OUR SWPPP - PART II
16222826	1311CC	08/25/2016	9	SESSION #1 WHEN IT RAINS, IT DRAINS
16222827	1311CC	11/16/2016	10	SESSION #2 - OUR SWPPP - PART I
16222829	1311CC	02/21/2017	12	SESSION #4 - SECONDARY CONTAINMENT
16222830	1311CC	05/12/2017	12	SESSION #1 WHEN IT RAINS, IT DRAINS
16222832	1311CS	09/06/2016	5	SESSION # 2/3 - OUR SWPPP - PART I & II
16222834	1311CS	02/17/2017	6	SESSION #3 - OUR SWPPP - PART II
16222835	1311CS	05/30/2017	8	SESSION # E&S CONTROL - PROPER USE AND INSTALLATION OF JUTE/CURLEX
16222836	1312SD	08/16/2016	17	SESSION #1 - WHAT IS A SWPPP?
16222837	1312SD	11/17/2016	15	SESSION #4 - SECONDARY CONTAINMENT & POLLUTION PREVENTION TEAM
16222839	1312SD	02/22/2017	16	SESSION # 4 - POLLUTION PREVENTION TEAM
16222840	1312SD	05/23/2017	18	SESSION #4 - SECONDARY CONTAINMENT & POLLUTION PREVENTION TEAM
16228880	1310NM	08/19/2016	11	SESSION #1 WHEN IT RAINS, IT DRAINS & WHAT IS A SWPPP?
17271102	1312SD	04/25/2017	18	SESSION #3 - OUR SWPPP - PART II

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 webpage: www.aacounty.org/departments/ inspections-and-permits/site-inspections. In August of 2017, the 24-Hour 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: 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) and/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.

For the reporting period, 675 environmentally related complaints were investigated by the Department, including 540 complaints related to Erosion and Sediment Control. The complaints received often involve potential Critical Area violations, sediment control issues, tree removal without appropriate approvals, or illegal grading activities. All complaints, including their compliance status, inspection results, enforcement and completion dates are viewable on the Department's Code Compliance Database which is also available through the web site (www.aacounty.org/departments/inspections-and-permits/code-compliance/) and is found under the "Popular Services & Programs" banner on the right side of the page. The Department acknowledges that this database is not easily filtered, therefore making it difficult to summarize for reporting purposes. The County has advertised for bids to implement a new permitting system that would allow for improved reporting processes and anticipates a launch of this system toward the end of Calendar Year 2019.

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.

Anne Arundel County DPW webpage provides water quality-related information associated with County-provided services (www.aacounty.org/departments/public-works). In FY17, information available through this website included the County's Annual Drinking Water Quality Report (www.aacounty.org/departments/public-works/utilities/forms-and-publications/water-quality-reports/).

In addition, relevant information to help residents reduce stormwater pollution is provided on the County's Watershed Protection and Restoration Program (WPRP) website (www.aacounty.org/departments/public-works/wprp) and its "Think Bay" webpage (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 deicing.

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 10).

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 www.aacounty.org/departments/inspections-and-permits/environmental-programs/frequently-asked-questions/.

Table 10. Bureau of Utilities Community Events and Tours

7/5/2016	Annapolis City Nature Camp	Outreach Event
7/18/2016	Chesapeake Bay Foundation Staff	Tour of Water Reclamation Facility
8/1/2016	AACPS Middle School Educators	Tour of Water Reclamation Facility
9/10/2016	AA County Emergency Preparedness Fair	Outreach Event
9/13/2016	Anne Arundel County Fair (5day event)	Outreach Event
9/23/2016	Severna Park Middle School	Outreach Event
10/6/2016	CAT-N Open House	Outreach Event
10/15/2016	STEM Day	Outreach Event
10/11/2016	Magothy River Middle School	Outreach Event
11/2/2016	AA County Government Expo	Outreach Event
11/3/2016	Glen Burnie High School	Outreach Event
11/7/2016	AACC Science Expo	Outreach Event
12/7/2016	Monarch Academy – 7th Graders	Tour of Water Treatment Facility
1/21/2017	Destination Imagination	Tour of Water Reclamation Facility
1/27/2017	Arundel Christian School	Outreach Event
2/9/2017	Old Mill Middle School	Tour of Water Reclamation Facility
2/9/2017	Old Mill Middle School	Tour of Water Treatment Facility
3/2/2017	CAT-S	Outreach Event
3/4/2017	North County High School	Outreach Event
3/22/2017	Solley Elementary School	Outreach Event
3/23/2017	Science Night – Solley Elementary School	Outreach Event
6/1/2017	Hilltop Elementary School	Outreach Event

The Anne Arundel Watershed Stewards Academy 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, Waste Management Services (WMS) administers an extensive outreach campaign geared toward residential recycling as well as outreach for proper disposal of household hazardous waste materials. Outreach pertinent to household hazardous waste disposal has been reported in prior annual reports and is also documented in the County's Litter and Floatables Comprehensive Plan **(Appendix G); a summary of events related to HHW is located in Part IV.D.4.** 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 here: 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 Watershed Stewards Academy website (aawsa.org/choose-non-toxic-products).

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 Countywide 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. As such, in addition to the information provided on the WPRP website, the Watershed Stewards Academy 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 available here: http://www.aacounty.org/departments/public-works/wprp/think-bay/Lawn%20Maint.pdf.

The County's winter deicing 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 include:

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 11,650 tons of salt at the following locations: Dover Road (Glen Burnie), Mountain Road (Pasadena), Crownsville Road (Annapolis), Broadneck Road (St. Margarets), Duckins 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 to present information on 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 web page (www.aarivers.org) and through the County's Watershed Stewards Academy (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 available here: http://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. In addition, 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. Additionally, education regarding pet waste management is included on the "Think Bay" section of the WPRP webpage (www.aarivers.org) as well as 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 (http://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 Watershed Stewards Academy[2] (WSA), which was established in 2008 as an organized framework to educate community leaders to become "Master Watershed Stewards."

[2] WSA reports successes on a calendar year basis. Calendar year 2016 data shown.

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+ volunteer instructors logging over 120 hours of volunteer time spent on instruction.

During this reporting period, WSA recruited 24 Stewards as part of the 9th Certification Course. Of the 24, 30% were from under-represented and priority communities, particularly in Northern Anne Arundel County. Four participants represented houses of worship and three signed on to work with schools. The WSA Certification Course was held from October 2016-June 2017, encompassing 20 sessions for a total of 70 hours of training for each participant. A special track was developed to connect Stewards with environmental literacy in Anne Arundel Public Schools, which was attended by certified Stewards, professionals and Steward Candidates.

WSA also offered 15 continuing education/networking opportunities for both environmental professionals and Watershed Stewards. These sessions encompassed 1,416 total training hours.

The RiverWise Congregations Program — a partnership of WSA, Alliance for the Chesapeake Bay and Interfaith Partners for the Chesapeake — continued to attract strong interest from the faith-based community. The second phase of RiverWise Congregations involved four congregants from two congregations completing the Watershed Stewards Academy Certification Course this past spring (2017). Stormwater BMPs were designed and installed at two congregational properties with a third one in the pipeline and to be in the ground the fall 2017. RiverWise Congregations also included a residential BMP component in which twenty-seven residential projects were designed and installed on the homes of congregants who completed a "Steward Lite" training in spring 2016. These projects consisted of 5,140 square feet of conservation landscapes (1,593 native plants and shrubs total), 10 tree planting projects (42 trees total), and 62 rain barrels. Additionally, four Congregational Stewards went through the Watershed Stewards Academy training and will graduate as Master Watershed Stewards in December 2017.

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

- 75 rain barrels
- 6,888 native plants and trees
- 55,826 square feet of new residential projects
- 6,765 citizens of Anne Arundel County received technical assistance or environmental education
- Stewards donated 4,017 hours towards restoration and education in their communities
- 58,958 square feet of invasive species removed
- 1,297 bags of trash collected
- 7,160 square feet of impervious surface removed

The WSA continued to support and engage Certified Master Watershed Stewards through the following activities:

- Conducted networking meetings designed to allow Stewards to share their successes and learn new techniques for engaging communities
- Offered continuing education classes for Certified Stewards
- Held the annual "Spring into Action" conference; a day-long conference that offered additional training and networking opportunities to foster collaboration and action
- Coordinated the use of training and outreach materials
- Coordinated plant orders to give Stewards wholesale rates for additional RainScaping projects in their communities
- Connected interested communities with their closest Master Watershed Steward for consultation and presentations
- Coordinated the Backyard Buffer program, in collaboration with Maryland Department of Natural Resources (DNR), in which 2,500 tree seedlings were planted in areas adjacent to stormwater flow. An educational workshop for participants was held to instruct homeowners on how to plan, install and care for trees
- Promoted several web-based tools to assist Stewards and communities in the installation of RainScaping projects including the Runoff Calculator, designed to simulate the runoff reduced of projects; the Conservation Landscape Design Tool; and WSA Rainscaping Guidebook for residents and contractors.

As noted in prior 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.

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
- Onsite septic tank maintenance tips
- Green boating tips
- Bay-friendly de-icing tips
- Effects of various types of pollutants on water quality
- Real-time tracking of restoration project goals and impervious surface treatment goals.

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.

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 as well as 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. Below is a listing of those opportunities that occurred during the reporting period:

- Laurel Highlands Pond Retrofit – 320 6th grade students from MacArthur Middle School and 310 6th grade students from Old Mill Middle South
- Golden Oaks Drive Pond Retrofit – 295 6th grade students from Marley Middle School
- Tulip Oak Court Pond Retrofit – 170 6th grade students from Corkran Middle School
- Sharpsburg Drive Pond Retrofit – 420 6th grade students from Central Middle School and 15 10th grade students from Broadneck High School
- St. Andrews Pond Retrofit – 20 students from Phoenix Academy and 50 students from St. Andrews Day School
- Waugh Chapel Pond Retrofit – 200 6th grade students from Magothy River Middle School
- Four Season Outfall Repair – 300 6th grade students from Old Mill Middle School North and 350 6th grade students from Crofton Middle School and 420 6th grade students from Severna Park Middle School

Successful conservation and preservation of Anne Arundel County's watersheds takes teamwork. To that end, in FY17 the Anne Arundel County Department of Public Works, in partnership with the Chesapeake Bay Trust, continued the Anne Arundel County Watershed Restoration Grant Program, a community grant program to support watershed restoration activities throughout the County in order 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. A total of $917,215 was awarded to our partner organization for implementation of eight stormwater management projects. Table 11, below lists organizations that were awarded grant funding from Anne Arundel County for water quality restoration projects in FY17.

Table 11. Projects Awarded WPRP Grant Funding in FY17

Organization	Project Description	Watershed	Funding Amount	Match Amount	Anticipated Impervious Acres Treated
South River Federation	Bacon Ridge Groundwater Recharge Micro-BMP and Outfall Restoration	South River	$67,901	$197,000	0.55
Anne Arundel Watershed Stewards Academy	Berrywood Community - Cattail Creek Restoration	Magothy River	$355,549	$514,890	14.29
South River Federation	Turnbull Estates Innovative Bioretention, Oyster Restoration, & Living Shoreline Project	South River	$86,665	$23,050	28.39
South River Federation	Twin Harbors Shoreline & BMP Project	Magothy River	$377,100	$30,400	16.69
South River Federation	United Church of Christ Bioretention Swale and Pond Retrofit	South River	$30,000	$59,020	0.39
	TOTAL		**$917,215**	**$824,360**	**60.31**

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 select articles about the WPRP that were published during the reporting period:

- "More than $1 million in watershed grants awarded in Anne Arundel" – June 12, 2017 Capital Gazette, http://bit.ly/2AdcStw
- "Guest column: County pushes ahead on stormwater" – September 5, 2016 Capital Gazette, http://bit.ly/2Acy8zx
- "First water quality partnership signed under new Schuh initiative" – May 5, 2017 Capital Gazette, http://bit.ly/2AfJJy0

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

Date	Organization/Event
7/15/2016	Israeli Port Delegation
7/16/2016	Virginia Tech Executive Master's Program
7/19/2016	Admirals Walk HOA
8/17/2016	Walnut Ridge HOA
8/24/2016	West Arundel Swim Club
8/31/2016	Chesapeake Tri-Association Conference
9/8/2016	Russett Green Committee
9/14/16-9/18/16	Anne Arundel County Fair

Date	Organization/Event
9/15/2016	Maryland City Civic Association Board
9/19/2016	Crofton Civic Association
9/20/2016	IECA Contractors Meeting
9/21/2016	IECA
9/27/2016	Herring Bay-Middle Patuxent Watershed Meeting
10/11/2016	Greater Severna Park Council
10/13/2016	Four Seasons Community Association
10/14/2016	Jabez Run Stakeholders Meeting
10/15/2016	STEM Day
10/19/2016	STEM @ AACPL - Odenton
10/20/2016	WSA
10/27/2016	Broadneck Council
11/22/2016	CEPA
12/1/2016	Stormwater Advisory Committee
12/2/2016	MWMC
12/2/2016	MWMC
12/8/2016	Rock Creek Community Meeting
1/4/2017	WNAV
1/11/2017	American Council of Engineering Companies/Maryland
2/10/2017	University of MD - PALS Program
2/25/2017	WSA Spring Conference
3/10/2017	Davidsonville Green Expo
3/17/2017	Chesapeake Stormwater Partners
3/27/2017	Herald Harbor Community Association
4/10/2017	Elizabeth's Landing HOA
4/24/2017	WSA and others
4/25/2017	STAC Legacy Sediment Conference
5/11/2017	Leadership Anne Arundel
5/11/2017	Mago Vista Community Association
5/18/2017	Anne Arundel Chamber of Commerce
5/18/2017	CWEA Conference
5/18/2017	CWEA Conference
6/13/2017	Severn River Association
6/14/2017	Montgomery County
6/28/2017	Cornell University Staff

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.

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 include:

- 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 campaigns major focus 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 web site.

The Department of Health promotes the Bay Restoration Fund Program. This program is a grant that plans to use grant funds to help qualified applicants connect to existing public sewer and continues to pay for nitrogen reducing pretreatment units that must be installed 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. The Department of Health administers this grant, awarded by MDE.

In FY17, the Department of Health used the Fund to subsidize the installation of 248 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. In addition, the Bay Restoration Fund Program has been expanded to include public sewer connections of existing dwellings currently served by a septic system where public sewer is available and immediately abuts a property. During the reporting period 9 new connections were made 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.

The Bureau of Highways has developed a comprehensive pollution prevention training document consisting of a series of four modules intended to educate staff on pollutant sources, the importance of storm water pollution prevention, what components constitute a storm water pollution prevention plan, implementation of a storm water pollution prevention plan, secondary containment concepts, and an effective pollution prevention team. These modules are presented to staff on an annual, rotating basis.

SWPPP Evaluation Reports for the County's Waste Management Services facilities are completed on a regular basis, including training outlines for each. Pollution prevention plans and spill prevention, control, and countermeasure plans are kept at these facilities and updated regularly. Similarly, pollution prevention training for the County's Bureau of Utilities occurs on an annual basis.

E. *Restoration Plans and Total Maximum Daily Loads*

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 group 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, 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 WERS mapping application found at the following website address: http://gis-world2.aacounty.org/silverlightviewer/?Viewer= WERS.

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.

To date the County has completed watershed assessments on ten of 12 of its eight-digit sub-basins (Bodkin Creek, Magothy River, Patapsco Non-Tidal, Patapsco Tidal, Severn River, South River, Little Patuxent, Upper Patuxent, West and Rhode). Completed watershed assessment documents can be found on the County's website: www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/watershed-studies/

Error! Reference source not found.2 shows the current schedule established t o complete these studies.

Table 12. 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	02131002	Complete	Complete	Complete
South	02131003	Complete	Complete	Complete
Upper Patuxent	02131104	Complete	Complete	Complete
Magothy	02131001	Complete	Complete	Complete
Patapsco Non-Tidal	02130906	Complete	Complete	Complete
Patapsco Tidal	02130903	Complete	Complete	Complete
Bodkin	02130902	Complete	Complete	Complete
Little Patuxent	02131105	Complete	Complete	Complete
Rhode	02131004	Complete	Complete	Complete
West	02131004	Complete	Complete	Complete
Herring Bay	02131005	Complete	Complete	2018
Middle Patuxent	02131102	Complete	Complete	2018

Assessment of the remaining watersheds (Herring Bay, Middle Patuxent) is in progress and is expected to be finalized in 2018. During FY2017, the County completed the following assessment activities for these watersheds: Project Initiation, Data Collection and Condition Assessment, Site Selection of Stream Crossings for Flooding Analysis, Rosgen Level I Assessments, and the first public meeting in September 2016.

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 WQ_v 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).

The Maryland Department of the Environment (MDE) previously approved[3] the County's impervious surface area assessment and the associated baseline for impervious area restoration. The impervious area assessment identified 1,639 acres as managed to the MEP[4] (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% restoration goal of 5,862 acres, to be achieved by the County on or before February 2019.

The County previously submitted an *Impervious Area Restoration Plan* (Appendix I of the FY2015 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 (i.e., 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. The County's progress toward meeting the impervious area restoration goal is illustrated below, with number of acres indicated for each type of project (Figure 5 and Table 13).

[3] MDE approval letter dated July 07, 2015.
[4] Only 238 out of the 10,500 existing BMPs were counted as managed, as only these met MDE's triennial inspection requirement.

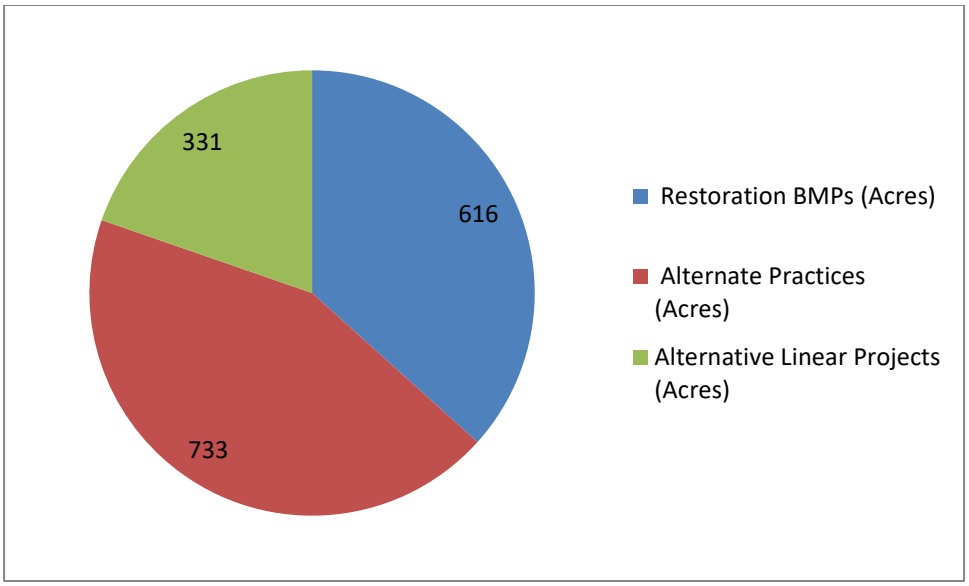

Figure 5. Anne Arundel County's cumulative progress towards meeting the impervious area restoration goal

Table 13. Impervious Area Restoration Progress (Cumulative) through FY17 (Permit Term)

Item	Description	Acres
Restoration BMPs	Restoration BMPs (Acres)	386
Alternative BMPs	Alternate Practices (Acres)[5]	733
Alternative Line BMPs	Alternative Linear Projects (Acres)	561
		1,680 acres

During FY17, the County reported 84 completed Restoration BMP and Alternative Restoration BMP projects with an impervious treatment area of 498 acres and with load reductions of 3,741 lbs. per year of total nitrogen (TN), 897 lbs. per year of total phosphorus (TP), and 1,254,109 lbs. per year of suspended solids (TSS). In addition to the restoration BMPs, the County reported a series of alternative impervious equivalent credits to be counted toward the 20% reduction goal. The total equivalent credits from approved alternative BMPs reported are 563 acres and these included: 4 outfall stabilizations (2.5 acres); 32 individual septic connections to the waste water treatment plant (12.48 acres); 156 individual nitrogen reduction septic conversions (40.6 acres); septic pump outs[6] (171 acres); 2,447 inlets cleaned (96.5 acres); and 297 curb miles of street sweeping (239.8 acres). This brings the

[5] Credits for annual BMP (e.g., street sweeping, inlet cleaning, and septic pumping) are updated yearly based on program implementation rates, and are not cumulative.
[6] Individual pump out data not available. The credit is based on septage data from the WRF from various vendors. Credit is calculated based on using 1,000 gallons as average pump out.

impervious credit from the completed restoration projects during the current reporting period to 1,061 acres and equivalent load reductions of 4,673.2 lbs. per year total nitrogen (TN), 1,258lbs. per year total phosphorus (TP), and 1,383,289 lbs. per year total suspended solids (TSS).

The County recognizes the need for adaptive management to meet the restoration goal by utilizing all available opportunities and enhancing alternative strategies, including, but not limited to the possibility of increasing County grants for project implementation, nutrient trading/offset mitigation, and additional CIP projects to close the "gap" (if any) as the restoration goal is tracked annually.

The County continues to make progress toward the impervious area restoration goal. The County's efforts to meet the goal are described below:

CIP Implementation: The majority of the FY16 and FY17 CIP programmed projects are already under contract, in-design, or completed. Due to the nature of the restoration projects in progress (e.g., stream restoration projects), permitting timelines, and County procurement processes, a number of FY17 projects are either in contract initiation or in the design submittal stage. The County has chosen 30% design, i.e., schematic submittal stage, to designate projects as "proposed" (called "Planning" in the geodatabase) to ensure that the project is actually feasible. Credits are tracked, verified, and reported based on the schematic design. The County currently has 32 BMP restoration projects and stream projects in the County procurement and/or in the design submittal stage (proposed projects). The stream restoration projects could realize up to 150,000 LF of restoration, and living shoreline projects could realize up to 6,000 LF of restoration. Credits from these projects will be refined as projects are developed and reported with future reports. In addition to the now completed CIP projects; the County has 51 projects in the construction or design phase. It is anticipated that these projects will provide an additional 698 equivalent impervious acres of treatment as well as 12,403.9 lbs. per year of total nitrogen, 1,923.6 lbs. per year of total phosphorus, and 1,297,085 lbs. per year of suspended solids to be reported in the upcoming year(s).

Alternative Urban BMPs: The County is working to improve existing maintenance procedures to meet MDE alternative BMP credit reporting requirements. The County has continued to use de-watering cans to deposit collected storm inlet/pipe debris, allow de-watering, and then hauling the debris to the landfill, obtaining net scale-house weights. The County began prioritizing inlet cleaning using GIS in July 2017 and anticipates increased material collection from this effort, which would be reported with FY18 MS4 Geodatabase submittal.

Existing BMPs Managed Impervious Area: As noted in the text above, MDE previously approved the County's baseline evaluation of impervious lands (*Establishing Baseline – Impervious Area Assessment; Anne Arundel County, May 2015*). As a part of the baseline impervious area analysis, 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.

To track and gain credit for the managed impervious acreage from existing BMP facilities, which were counted as unmanaged in the baseline analysis, the County is pursuing several activities. One such activity, as reported in **Part IV.D.1**, is the continued efforts to increase inspection of BMPs and meet MDEs triennial inspection requirements, and to ensure any needed BMP maintenance is completed. Another activity underway is the comprehensive review and update of historic BMP records as described in **Part IV.C.3**. It is expected that the County will achieve further progress towards documenting WQ_v and/or P_e for existing BMPs through the FY18 reporting year, and that such efforts will continue in-house into the future. This effort is tied to the ongoing Urban BMP Database improvements and the required database enhancements associated with the August 2014 guidance (MDE 2014).

Some of the BMPs reported in the *BMP* table of the MS4 Geodatabase are new BMPs (recently constructed) and are not yet ripe for triennial maintenance inspections. As the County further enhances its maintenance inspection program, ramps up field inspection efforts, and increases inspection and maintenance of additional BMPs, the impervious credit associated with these existing BMP practices will be documented toward impervious surface restoration or included in an adjusted baseline.

Design Build Projects: The County solicited proposals for full delivery water quality projects in FY17 and has selected a firm to complete (design-build) these projects. Impervious area credit ultimately expected from these completed projects is 188 acres with approximately 130 acres credit realized by the end of the permit term. These projects will be reported in the FY18 MS4 Geodatabase submittal. The County also anticipates a subsequent solicitation in FY18.

Alternative Strategies: The County anticipates meeting the impervious area restoration goal through a combination of the strategies discussed above, and recognizes the need for adaptive management to meet the restoration goal. Adaptive management includes utilizing all available restoration opportunities and enhancing alternate strategies including, but not limited to, the possibility of County restoration grant program expansion, nutrient trading/offset mitigation (Figure 6), accounting for storm drain and inlet cleaning equivalent impervious area managed, and identifying additional CIP projects with restoration potential or restoration components. These 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 and the strategies to meet the goal will be evaluated, and adjustments made if necessary.

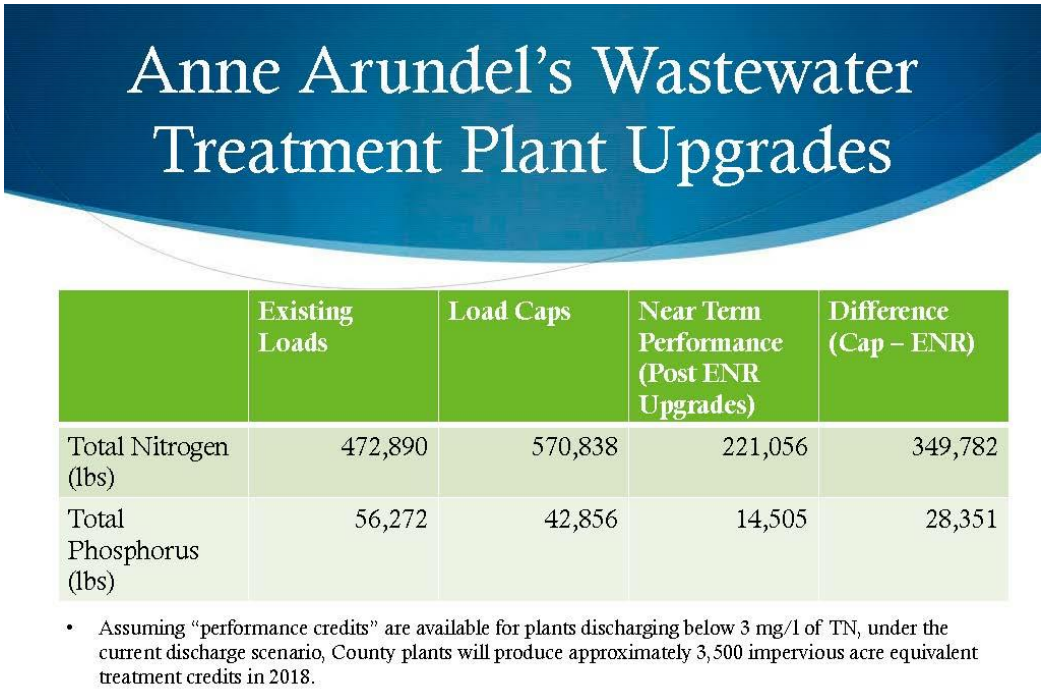

Figure 6. Alternative strategies, including nutrient trading/offset mitigation, could be utilized to meet the impervious area restoration goal

Shoreline Restoration Review – Desktop Analysis: Anne Arundel County has over 520 miles of shoreline and most of its boundaries are defined by water, principally by the Chesapeake Bay to the east. Many shoreline landowners in the County protect shoreline property and water quality using a suite of shoreline management practices. These shoreline management practices consist of structural or hard practices, vegetated practices, or a mix of hardened and vegetative practices often called a hybrid approach. Currently, the County claims minimal nutrient and sediment pollutant load reduction for shoreline projects, as there has been no systematic review to determine the appropriate "credit" for these practices.

The County has started a systematic desktop review, beginning with a pilot analysis to review the shoreline practices in the County. The purpose of this exercise is to identify and develop geospatial documentation of existing shoreline projects not currently in the County's inventory. This will allow the County to apply the Expert Panel's recommendations for estimating the impervious, sediment and nutrient pollutant load reduction associated with different shoreline management practices (Drescher 2014). The County is currently working to extend the pilot analysis to the entire county in an effort to collect and claim impervious area credit as appropriate.

Pilot Analysis. To develop a better understanding of the extent of shoreline restoration in Anne Arundel County, a pilot analysis was performed that attempted to identify existing shoreline restoration sites using aerial imagery.

The purpose of this pilot analysis was to see if aerial imagery was an effective means of locating existing shoreline restoration sites and to determine if there are a substantial number of shoreline restoration sites that are not documented in existing data sets.

Aerial imagery from 2016 was compared to aerial imagery from 2007, 2010, 2011 and 2014 to see if there were any visible changes to the shoreline that may indicate the implementation of shoreline restoration after 2007. Documented shoreline restoration sites were used as reference images to assist in identifying undocumented sites.

For each site identified in the aerial images, a line tracing the shoreline was added to an ArcGIS feature class and the following information was recorded: restored shoreline length, the year the restoration was first visible in the aerial imagery, the landowner type (i.e., public or private), and the type of shoreline restoration. If the shoreline restoration was visible in the 2007 aerial imagery and did not change type in subsequent years, the project was not recorded[7].

The four shoreline restoration types were[8]:

1. Living Shoreline (Figure 7)
2. Shoreline Stabilization (rock revetments or groins, not bulkheads; Figure 8)
3. Unknown Type (Unable to determine type from imagery)
4. Other (Unable to determine if shoreline restoration occurred from imagery)

[7] Examples of changes in shoreline restoration type include, but are not limited to, rock revetment added to an existing bulkhead, bulkhead replaced by a rock revetment, and rock revetment converted to a living shoreline. Changes due to maintenance, such as adding new rocks to an existing rock revetment site, were not considered a change in type.

[8] Bulkheads were added as a shoreline restoration category for the second pilot watershed (West River), but none were recorded during the review of the aerial imagery since all bulkheads were visible in the 2007 imagery. Bulkheads were not included as a category for the first pilot watershed (Severn River).

Figure 7. Living Shoreline Site Examples

Figure 8. Shoreline Stabilization Site Examples

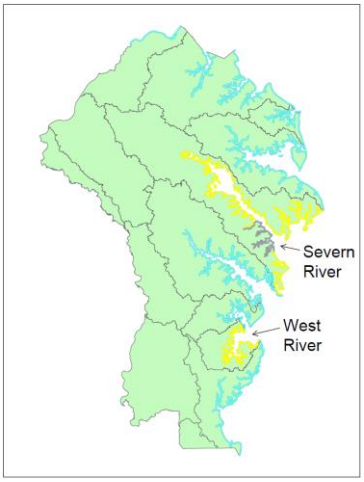

Figure 9. Shoreline reviewed in pilot project is yellow. Remaining shoreline in Anne Arundel County is blue

This analysis was performed for two pilot areas: the Severn River watershed (not including shoreline within the Annapolis City boundary)[9] and the West River watershed. The shoreline in these two watersheds totals 155.2 miles, which is approximately 30% of Anne Arundel County's total shoreline (see Figure 9). Aerial imagery of the full length of shoreline in these two watersheds was reviewed as described and all shoreline restoration projects visible in the aerial imagery were recorded. Tables 14-16 show the results by watershed, year first seen, and ownership type, respectively.

A majority of the identified sites were classifiable as either a living shoreline or shoreline stabilization based on the aerial imagery. Moving forward, the County will verify a subset of the classified sites through site visits or other means. Eight percent (8%) of recorded sites were categorized as "Unknown Type" and "Other" due to difficulty in identifying if vegetation was present from aerial imagery. Further investigation is needed before type can be determined for these sites.

One of the purposes of this pilot analysis was to determine if aerial imagery was an effective means of identifying existing shoreline restoration sites. All restoration sites visible in the aerial imagery were recorded and included in Tables 14-16 regardless of whether or not they were already documented in other datasets. Other sources that document existing shoreline restoration sites in Anne Arundel County include the *AltBMPLine* feature class in the County's MS4 geodatabase, the *annar_sstru* feature class for shoreline data from the Center for Coastal Resource Management, and Anne Arundel County Department of Inspections and Permits permit records.

The remaining shoreline in Anne Arundel County will be reviewed at a later date if it is determined that the information obtained from this pilot analysis was an accurate and efficient method for identifying undocumented shoreline restoration projects.

[9] 20.6 miles of shoreline in the Severn River watershed falls within the boundaries of Annapolis City and is not included within the Severn River results provided in Tables 14-16.

Table 14. Shoreline Restoration Visible in Aerial Imagery by Watershed and Type

Watershed	Total Shoreline	Living Shoreline		Shoreline Stabilization		Unknown Type		Other	
	Feet	Feet	# of sites	Feet	# of sites	Feet	# of sites	Feet	# of sites
Severn River (not City of Annapolis)	629,882	3,210	10	12,700	73	912	5	0	0
West River	189,364	1,809	12	3,793	36	1,933	6	194	1
TOTAL	**819,246**	**5,019**	**22**	**16,493**	**109**	**2,845**	**11**	**194**	**1**

Table 15. Shoreline Restoration in the Severn and West Rivers by Year First Seen in Aerial Imagery and Type

Year First Seen	Living Shoreline		Shoreline Stabilization		Unknown Type		Other	
	Feet	# of sites	Feet	# of sites	Feet	# of sites	Feet	# of sites
2010	1,396	6	7,795	49	580	4	0	0
2011	0	0	1,590	13	0	0	0	0
2014	2,479	8	4,067	27	1,522	4	194	1
2016	1,144	8	3,040	20	743	3	0	0
TOTAL	**5,019**	**22**	**16,492**	**109**	**2,845**	**11**	**194**	**1**

Table 16. Shoreline Restoration in the Severn and West Rivers by Ownership and Type

Ownership	Living Shoreline		Shoreline Stabilization		Unknown Type		Other	
	Feet	# of sites	Feet	# of sites	Feet	# of sites	Feet	# of sites
Private- Individual Homeowners	3,369	17	13,970	87	1,819	10	0	0
Private- Marina, HOA, etc.	1,166	3	1,309	10	0	0	0	0
Public- County	309	1	648	5	0	0	0	0
Public- Other	176	1	566	7	1,025	1	194	1
TOTAL	**5,020**	**22**	**16,493**	**109**	**2,844**	**11**	**194**	**1**

Rooftop Runoff Disconnection Analysis Methodology[10]: Stormwater management water quality criteria have been a regulatory requirement in Maryland since 2000. Based on the accounting guidance provided by Maryland Department of the Environment (MDE 2014), any existing features developed prior to 2000 that meet minimum Environmental Site Design (ESD)

[10] Reference - Howard County Rooftop Runoff Disconnection Methodology approved by MDE.

requirements as defined in *Maryland Stormwater Design Manual* are considered treated and can be claimed as baseline credit.

The County describes below a GIS analysis methodology to identify impervious areas that meet the criteria for Rooftop Runoff Disconnection Credit and can be claimed as treated. These treated areas can be claimed against the County's impervious surface baseline and are not considered restoration credit. By reducing the County's impervious surface baseline, this will also reduce their overall impervious surface treatment requirement.

Rooftop Runoff Disconnection Description. Rooftop disconnection involves directing flow from downspouts onto vegetated areas where it can soak into or filter over the ground. The Disconnection Flow Path Length (ft.) should be a minimum of 75 ft per the *2000 Maryland Stormwater Design Manual* (MDE 2009). This disconnects the rooftop from the storm drain system and reduces both runoff volume and pollutants delivered to receiving waters.

Rooftop Runoff Disconnection Credit Criteria. According to Chapter 5 of the above referenced Manual, to receive credit for Rooftop Runoff Disconnection, the follow criteria must be met:

- In residential development applications, disconnections will only be credited for lot sizes greater than 6,000 square feet.
- The length of the "disconnection" shall be 75 feet or greater.
- Dry wells, french drains, rain gardens, or other similar storage devices may be utilized to compensate for areas with disconnection lengths less than 75 feet.
- The entire vegetative "disconnection" shall be on an average slope of 5% or less.
- Rooftop cannot be within a designated hotspot.
- Disconnection shall cause no basement seepage.
- The contributing area of rooftop to each disconnected discharge shall be 500 square feet or less.
- The disconnection must drain continuously through a vegetated channel, swale, or through a filter strip to the property line or BMP.
- For those rooftops draining directly to a buffer, only the rooftop disconnection credit or the buffer credit may be used, not both.

GIS was used to create a point, representing downspouts, at the corners of all buildings that fell within residential land use areas with lot sizes greater than 6,000 square feet. A digital elevation model (DEM) was used to determine slopes of the individual parcels for these buildings. ArcHydro tools were then used to predict the lengths of all possible flow paths from the downspouts to the edges of pervious areas. **Appendix I** outlines the steps the County used for this analysis.

Impervious Area Restoration Summary: The County is committed to improving water quality and meeting its MS4 permit requirements by using all available resources. Based on the strategies outlined above, adaptive management across all restoration project types and a strong commitment to BMP database clean up, the County is confident it will be able to ultimately meet its impervious area restoration goal.

Table 17, below, summarizes the County's work towards meeting the impervious area restoration goal and includes anticipated impervious area credits to be realized through the end of the permit term utilizing the methods described in this section and earlier in the report.

Table 17. Cumulative Managed Impervious Acreage Anticipated by End of Permit Term

Item	Impervious Acres	Notes
County Jurisdictional MS4 area	30,950	From 2014 Baseline analysis
Non-MS4/12-SW area	533	Deduct from County Jurisdictional area
County Jurisdictional MS4 area	30,417	
Managed Impervious Area	1,639	From approved 2014 Baseline analysis
Historic BMP Review/Update	5,000	Estimate of managed acreage to be realized
Impervious Disconnection	500	Rooftop Runoff Disconnection Analysis Methodology
Shoreline Restoration	500	Estimated acreage credit
Total Managed Acres by End of Permit Term	7,639	Managed to MEP (estimated)
Unmanaged Acreage Remaining	22,778	Untreated areas (estimated)
Potential Future Restoration Requirement (estimated)	**4,555**	20% of the unmanaged acres; (original requirement in 2014 was 5,862 acres)

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 J** to this annual report.

Described below are EPA-approved TMDLs for Anne Arundel County that have a stormwater WLA, and the status of the restoration plans associated with them. **Appendix J** contains the completed individual TMDL Restoration Plans.

EPA has set 2025 as the final date for meeting the applicable WLA 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 all other impairments, with the exception of PCBs, for which TMDLs were approved prior to the issuance of the County's current NPDES MS4 Permit

(February 12, 2014). Further, Anne Arundel County has aligned its interim individual TMDL benchmarks with the Chesapeake Bay TMDL 2-Year Milestones.

Nitrogen, Phosphorus, and Sediment TMDLs

The Chesapeake Bay TMDL, as noted in Table 18, was approved on December 29, 2010 and applies to all of Anne Arundel County.

Table 18. Chesapeake Bay Nitrogen, Phosphorus, and Sediment TMDL

Location	Approval Date
Countywide	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 can be found at: http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Documents/FINAL_PhaseII_Report_Docs/Final_County_WIP_Narratives/Anne_Arundel_WIPII_2012.pdf

On September 15, 2011 MDE finalized its Phase II Load Allocations. Anne Arundel County's Phase I MS4 load allocations are set forth in Table 19.

Table 19. Anne Arundel County (Non-Federal) Stormwater Wasteload Allocation*

	Nitrogen (TN)	Phosphorus (TP)
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.

Status of Restoration Plan:

Anne Arundel County submitted final progress reports to MDE on January 26, 2018 for its 2016-2017 Implementation and Programmatic 2-Year Milestones. On January 26, 2018, Anne Arundel County also submitted new 2018-2019 Two-Year Programmatic Milestones.

The County's progress toward meeting its goals under the Bay TMDL is summarized below (Table 20, Figure 10). 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[11] for BMPs, to calculate pollutant loads and reductions.

Table 20. Summary of Bay TMDL Pollutant Load Reductions for TN and TP in Anne Arundel County, MD[1, 2]

TMDL	2009 Baseline (lbs)	2025 Target (lbs)	Required Reduction (lbs)	Current Load (lbs)	Current Reduction (lbs)	Current % Achieved
TN	657,383	449,641	207,742	640,822	16,561	8%
TP	56,531	30,147	26,384	51,673	4,858	18%

Note:
1. All loads are in lbs.
2. Maryland's Phase II WIP assumes that if TP reduction is met TSS reduction is met

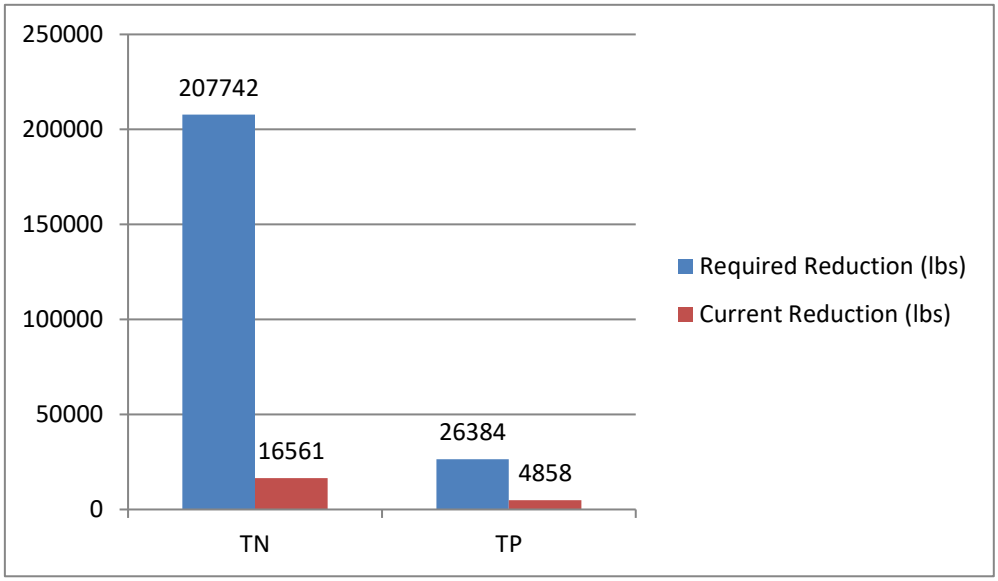

Figure 10. Summary of Bay TMDL pollutant load reductions for TN and TP in Anne Arundel County, MD

[11] For BMPs designed, under construction or completed prior to the final report, guidance from draft expert panel report or guidance from MDE 2014 has been used.

Individual Bacteria TMDLs

Table 21 characterizes the individual bacteria TMDLs in the County.

Table 21. Bacteria TMDLs

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 "*Draft Total Maximum Daily Load Restoration Plan for Bacteria, February 2015"* as originally submitted to MDE for review and comment with the FY14 MS4 Annual Report. Percent reductions required for the Patapsco and Upper Patuxent are for the Anne Arundel County portion only.

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 and 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 above table.

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 22).

Table 22. Contributions to Bacteria Sources

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 all of the four source categories were representative of the impaired waterbodies, Anne Arundel County chose to develop a single consolidated implementation plan to address all 19 bacteria TMDLs.

Status of Restoration Plan:

In FY17 the County posted its Final Bacteria TMDL Restoration Plan to the County's website. The plan can be found at www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/

The County received general comments from MDE on the restoration plan and FY16 Annual Progress Report on April 19, 2017 and more detailed comments from the Science Services Administration on July 14, 2017. The County addressed MDE's comments in its *2017 Annual TMDL Assessment Report* which is incorporated into the County's 2017 Annual MS4 NPDES Report in **Appendix J**.

During this reporting year Anne Arundel County participated in MACO led meetings with MDE staff and the staff of other Phase I jurisdictions to discuss challenges associated with individual TMDL implementation including bacteria TMDLs. Further conversations were held with MDE staff to discuss MDE's request that progress be assessed based on monitoring data rather than modeling results. Those conversations resulted in concurrence by MDE that modeling bacteria load reduction is acceptable as a compliment to using monitoring data to assess progress. And further, that MDE will work on developing a common set of BMP reduction efficiencies specific to bacteria (December 1, 2017 email from Jeff White).

In FY17, the County also evaluated the Plan's implementation progress. This evaluation, the *2017 Annual TMDL Assessment Report*, is included in **Appendix J** of the County's 2017 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.

Bacteria load reductions decreased slightly overall by 1.8 percent across all bacteria TMDL watersheds when compared to 2016 modelling results. As compared to 2016 results, bacteria load reductions increased in ten (10) bacteria TMDL watersheds (Magothy River/Forked Creek, Magothy River/Tar Cove, Patapsco River/Furnace Creek, Patapsco River/Marley Creek, Patuxent River Upper, Severn River Mainstem, Severn River/Whitehall and Meredith Creek, South River/Duvall Creek, South River/Ramsey Lake, and West River Mainstem). In these watersheds, bacteria load reductions total 3.7 percent. A total decrease in bacteria load reductions of 5.4 percent was observed in four watersheds (Magothy Mainstem, Patapsco River Lower North Branch, Severn River/Mill Creek, and South River Mainstem). A full comparison of these modeled load reductions is found in Table 4 of the *2017 Annual Bacteria Assessment Report*.

Overall, the 2017 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. No SSO abatement project occurred in the Bacteria TMDL watersheds since the last reporting period, thus load reductions resulting from SSO abatement projects have not changed. However, the total number of SSOs in Bacteria TMDL watersheds decreased from seventeen (17) to eight (8) during this reporting period.

The County continued implementing Tier B (non-human source) recommendations during FY 17 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 2018. 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 also promoted pump-out services associated with marinas through its social media. The County will continue to investigate methods to retire or upgrade septic systems and implementation of Tier A strategies to reduce human sources of bacteria in County waterways.

Individual PCB TMDLs

On September 19, 2017 EPA approved a PCB TMDL for the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segment. This brings the number of PCB TMDLs approved for Anne Arundel County to six

(6). Of the six PCB TMDLs approved for Anne Arundel County watersheds, 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. The location of the TMDL and the approval dates are noted in Table 23.

Table 23. PCB TMDLs

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

Achieving Stormwater WLAs associated with PCBs is extremely challenging. During this 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 by amending soils with activated carbon and PCB de-chlorinators and aerobic degraders was identified. As a result, Anne Arundel County will be pursuing 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.

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

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 (Tables 24 and 25).

Both nonpoint sources and point sources of PCBs were identified throughout the Baltimore Harbor embayment's watershed. Nonpoint sources include loads from direct atmospheric deposition to the embayment, identified contaminated sites, re-suspension and diffusion from bottom sediments, tidal influence from the Chesapeake Bay mainstem, tributaries outside of the embayment's direct drainage, and runoff from non-regulated watershed areas within the embayment's direct drainage. Point sources include loads from municipal wastewater treatment plants, industrial process water facilities, dredge material containment facilities and National Pollutant Discharge Elimination System (NPDES) regulated stormwater runoff from watershed areas within the embayment's direct drainage.

Although the transport of PCBs to the embayment from bottom sediments via re-suspension and diffusion is estimated to be a major source of PCBs to the embayment this load contribution results from other point and nonpoint source inputs within the embayment's watershed and is not considered for reduction in the TMDL. Further, transport of PCBs into the embayment due to tidal influxes from the Chesapeake Bay mainstem could be a major source to the system; however due to the high water column concentration of PCBs within the embayment, modeling results indicate a net transport of PCBs out of the embayment into the Bay's mainstem. The baseline loads and TMDL allocations only consider current sources of PCBs to the embayment and Curtis Creek/Bay that are considered directly controllable, and therefore do not include re-suspension and diffusion from bottom sediments or tidal influence of the Chesapeake Bay mainstem.

The modeling scenario used to develop the load reductions, wasteload allocations and load allocations for the tributary, non-regulated watershed runoff, NPDES regulated stormwater, and atmospheric deposition results in a required reduction of 91.5% for all watershed sources (e.g. tributaries, non-regulated watershed runoff, and NPDES regulated stormwater), with slight variations in the regulated stormwater sector due to the locations of contaminated sites, and a 57.6% reduction for atmospheric deposition in order to achieve the sediment and water column TMDL endpoint tPCB concentrations (*Total Maximum Daily Load of Polychlorinated Biphenyls in the BALTIMORE Harbor, Curtis Creek/Bay, and Bear Creek Portions of Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Maryland. MDE. Document version: September 28, 2011. EPA Approval Date: October 12, 2012. Pg. xv).* Further, based on the modeling used in this TMDL a 92.1% reduction in regulated stormwater PCB loads is required for Anne Arundel County's portion of the Baltimore Harbor embayment and a 93.5% reduction in regulated stormwater PCB loads is required for Curtis Creek/Bay. Therefore, a TMDL

Restoration Plan must be developed for Anne Arundel County's portion of these waterbodies and associated watersheds.

A summary of the tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the Baltimore Harbor and Curtis Creek/Bay is presented in Tables 24 and 25.

Table 24. tPCB Baseline Loads and Load Reductions for the Baltimore Harbor Embayment

Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
Direct Atm. Deposition (to surface of embayment)	1,360.88	22.0	576.47	57.6	5.30
Tributaries[a]					
Jones Falls	299.34	4.8	25.59	91.5	0.24
Gwynns Falls	541.42	8.7	46.29	91.5	0.43
Patapsco LN Branch	688.85	11.1	58.90	91.5	0.54
Non-regulated Watershed Runoff[b]	362.49	5.9	30.99	91.5	0.29
Contaminated Sites	14.51	0.2	14.51	0.0	0.13
Nonpoint Sources	**3,267.49**	**52.7**	**752.75**	**77.0**	**6.93**
Industrial Process Water[c]	859.38	13.9	498.60	42.0	4.24
WWTPs (Patapsco and Cox Creek)	366.81	5.9	32.83	91.1	0.28
DMCFs (Dredge Material Sites)	77.6	1.3	77.60	0.0	0.66
NPDES Regulated Stormwater[b,d]					
Anne Arundel County	850.74	13.7	66.97	92.1	0.62
Baltimore County	338.50	5.5	28.94	91.5	0.27
Baltimore City	435.27	7.0	30.44	93.0	0.28
Point Sources/WLAs	**2,928.31**	**47.3**	**735.22**	**74.9**	**6.34**
MOS (5%)	**-**	**-**	**78.31**	**-**	**0.70**
Total	**6,195.79**	**100.0**	**1,566.29**	**74.7**	**13.96**

Notes:

[a] Although the tributary loads are reported here as a single nonpoint source value, they could include both point and nonpoint source loads.

[b] Load applies to the direct drainage portion of the applicable watershed only.

[c] 18.66 g/year of the 498.6 g/year allocated to industrial process water point sources is assigned to the Back River WWTP Outfall 002, since the effluent from the outfall is routed to RG Steel for use in their industrial processes. The allocation to the Back River WWTP Outfall 002 is calculated as the part of the WWTP design flow allocated to the outfall, which is 50 Million Gallons per Day (MGD), multiplied by the water column TMDL endpoint, which is 0.27 ng/L.

[d] Load per jurisdiction applies to all NPDES stormwater dischargers within the direct drainage area of the jurisdiction to the Baltimore Harbor embayment.

Table 25. tPCB Baseline Loads and Load Reductions for Curtis Creek/Bay

Source[a]	Baseline Load (g/year)	Baseline Load (%)	TMDL	Load Reduction (%)	Maximum Daily Load (g/day)
Direct Atm. Deposition (to surface of embayment)	121.26	20.5	51.37	57.6	0.47
Non-regulated Watershed Runoff[b]	771.19	13.1	6.60	91.5	0.06
Contaminated Sites	7.84	1.3	7.84	0.0	0.07
Nonpoint Sources	**206.29**	**35.0**	**65.81**	**68.1**	**0.61**
Industrial Process Water[c]	-	-	-	-	-
WWTPs[c]	-	-	-	-	-
DMCFs[c] (Dredge Material Sites)	-	-	-	-	-
NPDES Regulated Stormwater[b,d]					
Anne Arundel County	357.68	60.6	23.13	93.5	0.21
Baltimore City	26.22	4.4	2.91	88.9	0.03
Point Sources (WLAs	***383.89***	***65.0***	***26.05***	***93.2***	***0.24***
MOS (5%)	**-**	**-**	***4.83***	**-**	***0.04***
Total	**590.18**	**100.0**	**96.68**	**83.6**	**0.89**

Notes:

[a] None of the Baltimore Harbor upstream tributaries (i.e., Jones Falls, Gwynns Falls, and the Patapsco River Lower North Branch) drain directly into the Curtis Creek/Bay portion of the embayment.

[b] Load applies to the direct drainage portion of the applicable watershed only.

[c] No industrial process water facilities, WWTPs, or DMCFs have been identified in the applicable watershed.

[d] Load per jurisdiction applies to all NPDES stormwater dischargers within the direct drainage area of the jurisdiction to Curtis Creek/Bay.

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the Baltimore Harbor, Curtis Creek/Bay, and Bear Creek Portions of Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Maryland, Document Version: September 28, 2011, EPA Approval Date: October 1, 2012.

Status of Restoration Plan

Anne Arundel submitted its final *PCB Restoration Plan for the Baltimore Harbor and Curtis Creek/Bay* to MDE in February 2017 as an appendix (Appendix F) to its 2016 Annual MS4 Report. MDE provided comments on the plan to the County in letters dated April 19, 2017 and July 14, 2017. The County's response to MDE's comments is incorporated into the *Annual Progress Report for the Baltimore Harbor and Curtis Creek/Bay PCB TMDL Restoration Plan* which is submitted as **Appendix J** to the County's 2017 Annual NPDES MS4 Report.

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, 2105. 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 in

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.

Both nonpoint sources and point sources of PCBs were identified in the watershed. Nonpoint sources identified include direct atmospheric deposition to the river, contaminated sites, runoff from non-regulated watershed areas and tidal influence from the Chesapeake Bay main stem. Point sources identified include only NPDES regulated stormwater runoff in the watershed. Although transport of PCBs from bottom sediments to the water column can be a source, under the framework of the approved TMDL it is not considered a source. The water quality model developed for this TMDL simulates conditions within the water column and sediment as a single system therefore exchanges between the sediment and water column are considered an internal loading. Only external sources to the system were assigned a baseline load or allocation.

The water quality model developed for simulating the ambient sediment and water column tPCB concentrations within the Magothy River was used to determine the specific load reductions that would result in simulated tPCB concentrations in the sediment and water column that meet the TMDL endpoints. The model assumes that the tPCB concentrations in the Chesapeake Bay main stem are decreasing at a rate of 5% per year. Given this rate of decline, the tPCB TMDL endpoints in both the water column and sediments in the Magothy River embayment will be met in approximately 43.4 years with the natural attenuation of tPCB concentration in the Chesapeake Bay main stem. Loads from the watershed, including non-point and point sources, and atmospheric deposition only account for 1.3% of the total tPCB baseline load. If these loads were reduced by 100% it would only reduce the time necessary to achieve the water column and sediment tPCB TMDL endpoints by 579 days (1.6 years). Therefore, the TMDL states that "no reductions to these loads are necessary in order to achieve the TMDL" (*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).* When the TMDL endpoints are met, the tPCB load from the Chesapeake Bay main stem 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.

A summary of the tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the Magothy is presented in Table 26.

Table 26. tPCB Baseline Loads and Load Reductions for Magothy River

Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
Ches. Bay Mainstem Tidal Influence	3,759.0	98.7	289.4	92.3	1.139
Direct Atmospheric Deposition	35.9	0.9	35.9	0.0	0.141
Maryland Non-regulated Watershed Runoff	3.3	0.1	3.3	0.0	0.013
Contaminated Sites	1.8	0.05	1.8	0.0	0.007
Nonpoint Sources	3,800.0	99.8	330.4	91.3	1.300
NPDES MS4 Regulated Stormwater	7.9	0.2	7.9	0.0	0.031
Point Sources	7.9	0.2	7.9	0.0	0.031
Margin of Safety	-	-	17.8	-	0.070
TOTAL	3,807.9	100.0	356.1	90.6	1.402

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

Status of Restoration Plan:

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.

PCB sources in the Severn River, resulting primarily from historical uses of PCBs and potential releases, include point sources and nonpoint sources.

Nonpoint sources identified include: direct atmospheric deposition to the river, runoff from non-regulated watershed areas and tidal influence from the Chesapeake Bay main stem. Point sources include NPDES regulated storm-water and two WWTPs (Annapolis Water Reclamation Facility and the Naval Support Activity Annapolis WWTP). 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; however, under the framework of this TMDL it is not considered a source.

The water quality model developed for simulating ambient sediment and water column tPCB concentrations with in the Severn River were used to determine the specific load reductions that would result in simulated tPCB concentration in the sediment and water column that meet the TMDL endpoints. The model assumes that the tPCB concentrations in the Chesapeake Bay mainstem are decreasing at a rate of 5% per year. Given this rate of decline, the tPCB targets in both the water column and sediments of the Severn River embayment will be met in approximately 46.2 years with the natural attenuation of tPCB concentration in the Chesapeake Bay mainstem. Loads from the watershed, including non-point and point sources, and atmospheric deposition only account for 1.83% of the total tPCB baseline load. 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).*

Status of Restoration Plan:

A summary of the tPCB loads, TMDL allocations, load reductions, and maximum daily loads for the Severn is presented in Table 27.

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.

Table 27. tPCB Baseline Loads and Load Reductions for Severn River

Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
Ches.Bay Mainstem Tidal Influence	6,155	98.17	574.4	90.7	3.389
Direct Atmospheric Deposition	47.0	0.75	47.0	0	0.277
Maryland Non-regulated Watershed Runoff	29.0	0.46	29.0	0	0.171
Nonpoint Sources	6,231.7	99.38	650.4	89.6	3.838
WWTP	17.1	0.273	17.1	0	0.145
NPDES MS4 Regulated Stormwater	21.5	0.343	21.5	0	0.127
Point Sources	38.6	0.62	38.6	0	0.272
Margin of Safety	-	-	36.3	-	0.216
TOTAL	6,270.3	100.00	725.3	88.4	4.326

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.

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.

Both nonpoint sources and point sources of PCBs were identified in the watershed. Nonpoint sources identified include direct atmospheric deposition to the river, runoff from non-regulated watershed areas, re-suspension and diffusion from bottom sediments, and tidal influence from the Chesapeake Bay main stem. Point sources identified include National Pollutant Discharge Elimination System (NPDES) permitted wastewater treatment plants (WWTPs) and NPDES regulated stormwater runoff within the watershed. Model estimated tPCB loads from these point and nonpoint sources represent the baseline conditions for the South River. The transport of PCBs to the river from the Chesapeake Bay main stem and from bottom sediment via re-suspension and diffusion are not considered to be directly controllable sources. Within the modeling framework of the TMDL, these loads are considered as internal loads and not included in the tPCB baseline load and TMDL allocation.

The water quality model developed for simulating the ambient sediment and water column tPCB concentrations within the South River was used to determine the specific load reductions that would result in simulated tPCB concentrations in the sediment and water column that meet the TMDL endpoints. The model assumes that the tPCB concentrations in the Chesapeake Bay main stem are decreasing at a rate of 5% per year. Given this rate of decline, the tPCB TMDL endpoints in both the water column and sediments in the South River embayment will be met in approximately 12.3 years with the natural attenuation of tPCB concentration in the Chesapeake Bay main stem. Therefore, the TMDL states that "no reductions to these loads are necessary in order to achieve the TMDL" (*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).* 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.

A summary of the tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the South River is presented in Table 28.

Table 28. tPCB Baseline Loads and Load Reductions for South River

Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
Ches. Bay Mainstem Tidal Influence	2,227.0	98.7	1,124.0	49.5	4.62
Direct Atmospheric Deposition	38.4	1.7	38.4	0.0	0.16
Maryland Non-regulated Watershed Runoff	8.2	0.4	8.2	0.0	0.03
Nonpoint Sources	2,273.6	99.8	1,171	48.5	4.81
WWTP	0.024	0.001	0.024	0.0	0.0
NPDES MS4 Regulated Stormwater	3.9	0.2	3.9	0.0	0.02
Point Sources	3.92	0.2	3.92	0.0	0.02
Margin of Safety	-	-	62	-	0.25
TOTAL	2,278	100.0	1,237	45.7	5.08

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

Status of Restoration Plan:

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.

Both nonpoint sources and point sources of PCBs were identified in the watershed. Nonpoint sources identified include: Chesapeake Bay mainstem influence, direct atmospheric deposition to the river and runoff from non-regulated watershed areas within the West and Rhode Rivers' drainage areas. No contaminated sites with the potential to contribute PCBs were identified in the West and Rhode Rivers watershed. Although 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 it was not considered a source in this TMDL. Point sources of PCBs identified include: one wastewater treatment plant, the Mayo Water Reclamation Facility, and NPDES regulated stormwater runoff within the watersheds. Estimated tPCB loads from these point and nonpoint sources represent the baseline conditions for the watersheds.

The water quality model developed for simulating ambient sediment and water column tPCB concentration within the West and Rhode Rivers were used to determine the specific load reductions that would result in simulated tPCB concentrations in the sediment and water column that meet the TMDL endpoints. The model assumes that the tPCB concentrations in the Chesapeake Bay mainstem are decreasing at a rate of 5% per year. Given this rate of decline, the tPCB targets in both the water column and sediment of the West and Rhode Rivers embayment will be met in about 16.8 years with the natural attenuation of tPCB concentration in the Chesapeake Bay mainstem. Loads from the watershed, including non-point sources, and point sources, and atmospheric deposition only account for 3.2% of the total tPCB baseline load. Therefore, "no reduction to these loads is necessary in order to achieve the TMDL" (*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).* 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.

A summary of the tPCB baseline loads, TMDL allocations, load reductions, and maximum daily loads for the West and Rhode Rivers is presented in Table 29.

Table 29. tPCB Loads and Load Reductions for West and Rhode Rivers

Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
Chesa.Bay Mainstem Tidal Influence	1081.5	96.83	456.5	57.8	2.009
Direct Atmospheric Deposition	22.6	2.03	22.6	0	0.099
Maryland Non-regulated Watershed Runoff	11.0	0.99	11.0	0	0.048
Nonpoint Sources	***1115.2***	***99.85***	***490.1***	***56.1***	***2.156***
WWTP	**0.2**	**0.01**	**0.2**	**0**	**0.001**
NPDES MS4 Regulated Stormwater	**1.6**	**0.14**	**1.6**	**0**	**0.007**
Point Sources	***1.7***	***0.15***	***1.7***	***0***	***0.008***
Margin of Safety	**-**	**-**	**25.9**	**-**	**0.114**
TOTAL	**1116.9**	**100.0**	**517.7**	**53.6**	**2.279**

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.

Status of Restoration Plan:

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.

Patuxent, Mesohaline, Oligohaline and Tidal Fresh

The Maryland Department of Environment identified the tidal portion of the Patuxent River Lower 8-digit basin (basin code 02131101) which includes the waters of the Patuxent Mesohaline (PAXMH), Patuxent Oligohaline (PAXOH) and the Patuxent Tidal Fresh PAXTF) as impaired for PCBs in fish tissue. These individual impairments are addressed in the *Total Maximum Daily Load of Polychlorinated Biphenyls in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments* which was approved by EPA on September 19, 2017.

Both nonpoint sources and point sources of PCBs were identified throughout the PAXMH, PZXOH, and PAXTF watersheds. Nonpoint sources include direct atmospheric deposition to the river, runoff from non-regulated watershed areas, one contaminated site, and tidal influences from the Chesapeake Bay mainstem. Point sources include NPDES regulated stormwater runoff within the watershed, 21 NPDES permitted municipal wastewater treatment plants and one NPDES permitted industrial process water facility. 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; however, under the framework of this TMDL it is not considered a source. Transport of PCBs into the PAXMH 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 (both historic and current) and is not considered to be a directly controllable source. Therefore, this load was not assigned a baseline load or allocation within the TMDL. It is important to note that Anne Arundel County has responsibility for loads only from the Oligohaline and Tidal Fresh portions of the watershed. A summary of baseline loads, TMDL allocations, and maximum daily loads for the PAXMH, PAXOH and PAXTF are presented in Table 30.

Table 30. tPCB Baseline Loads, TMDL Allocations, Load Reductions and Maximum Daily Loads for the PAXMH, PAXOH, and PAXTF Segments

Tidal Segment	Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
PAXMH	Non-regulated Watershed Runoff	119.2	40.62%	119.2	0.0%	2.453
	Atmospheric Deposition	172.1	58.64%	172.1	0.0%	3.541
	Nonpoint Sources	**291.4**	**99.26%**	**291.4**	**0.0%**	**5,993**
	NPDES Regulated Stormwater[(a)]					
	Prince Georges	0.6	0.20%	0.6	0.0%	0.012
	Calvert	0.0	0.01%	0.0	0.0%	0.000
	St. Mary's	0.1	0.02%	0.1	0.0%	0.001
	Charles	1.5	0.52%	1.5	0.0%	0.031
	Point Sources	**2.2**	**0.74%**	**2.2**	**0.0%**	**0.045**
	MOS (5%)	**-**	**-**	**-**	**-**	**-**
	Total PAXMH	**293.6**	**100.00%**	**293.6**	**0.0%**	**6.038**

Table 30. tPCB Baseline Loads, TMDL Allocations, Load Reductions and Maximum Daily Loads for the PAXMH, PAXOH, and PAXTF Segments

Tidal Segment	Source	Baseline Load (g/year)	Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	Maximum Daily Load (g/day)
PAXOH	Non-regulated Watershed Runoff	73.5	74.93%	73.5	0.0%	0.952
	Atmospheric Deposition	22.9	23.30%	22.9	0.0%	0.296
	Nonpoint Sources	***96.4***	***98.23%***	***96.4***	***0.0%***	***1.248***
	NPDES Regulated Stormwater[a]					
	Anne Arundel	0.3	0.31%	0.3	0.0%	0.004
	Calvert	0.0	0.00%	0.0	0.0%	0.000
	Prince Georges	1.4	1.44%	1.4	0.0%	0.018
	Point Sources	1.7	1.77%	1.7	0.0%	0.022
	MOS (5%)	-	-	-	-	-
	Total PAXOH	***98.1***	***100.00%***	***98.1***	***0.0***	***1.271***
PAXTF	Non-regulated Watershed Runoff[b]	1,118.9	65.32%	1.0	99.9%	0.011
	Atmospheric Deposition	7.1	0.41%	0.0	99.9%	0.000
	Contaminated Sites	0.0	0.00%	0.0	0.0%	0.000
	Nonpoint Sources	***1,126.0***	***65.74%***	***1.0***	***99.9%***	***0.011***
	NPDES Regulated Stormwater[a,b]					
	Anne Arundel	100.4	5.86%	0.1	99.9%	0.001
	Frederick	0.2	0.01%	0.2	0.0%	0.002
	Howard	228.6	13.35%	0.1	99.9%	0.001
	Montgomery	32.2	1.88%	0.0	99.9%	0.000
	Prince Georges	154.6	9.03%	0.1	99.9%	0.001
	WWTPs	70.8	4.13%	75.2	-6.3%	0.39
	Point Sources	***586.9***	***34.26%***	***75.7***	***87.1%***	***0.645***
	MOS (5%)	-	-	***4.0***	-	***0.035***
	Total PAXTF	***1,712.9***	***100.00%***	***80.7***	***95.3%***	***0.690***

Source: Total Maximum Daily Load of Polychlorinated Biphenyls in the Patuxent River, Mesohaline, Oligohaline, and Tidal Fresh Chesapeake Bay Segments. Document Version: August 2017. EPA Approval Date: September 19, 2017.

Notes:

[a] NPDES regulated stormwater baseline loads and WLAs are an aggregate of loadings from areas covered under the following permits: (i) Phase I and II jurisdictional MS4 permits, (ii) the State Highway Administration's Phase I MS4 permit, (iii) industrial facilities permitted for stormwater discharges, and (iv) MDE general permit to construction sites.

[b] Baseline loads from WWTPs which discharge to the PAXTF watershed have been subtracted proportionally from the non-regulated watershed runoff and NPDES regulated stormwater baseline load to avoid double counting.

In the PAXMH, PAXOH, and PAXTF segments the TMDL modeling scenario was developed using the water quality model to assign load reductions and to establish WLAs, and Las for all the source categories. The model assumes that water column tPCB concentrations decreases at a rate of 5% per year at the tidal boundary between the PAXMH and the Chesapeake Bay mainstem. The TMDL requires a 95.3% reduction of the total baseline load from the point and non-point sources in the PAXTF tidal watershed segment in order to achieve the

sediment and water column TMDL endpoint concentrations in the PAXMH, OAXOH, and PAXTF tidal segments. No reductions are necessary in the PAXMH and PAXOH watersheds to achieve the TMDL endpoints as the loading from the PAXTF watershed is orders of magnitude greater than the PCB loadings from the other watersheds.

Status of Restoration Plan

Pursuant to Part IV.E.2.b. of Anne Arundel County's NPDES MS4 Permit No. 11-DP-3316 MD0068306 the County is required to submit restoration plans for all TMDLs with WLAs approved by EPA within one year of EPA approval. The *Total Maximum Daily Load of Polychlorinated Biphenyls in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments* was approved by EPA on September 19, 2017. A draft Scope of Work has been drafted and is currently under internal review for the development of a restoration plan for submittal to MDE by September 19, 2018.

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. The sediment TMDLs are listed in Table 31 along with their approval dates.

Table 31. 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

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. In order to attain the TMDL loading cap, reductions were only applied to the urban sediment sources, since 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 32.

Table 32. Sediment Baseline Loads and Load Reductions, Little Patuxent River

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

Status of Restoration Plan:

Anne Arundel County submitted its final *Little Patuxent River Sediment TMDL Restoration Plan* to MDE with its 2016 Annual Report and posted on the County's website following submittal. The plan can be found at: http://www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/.

The County received general comments from MDE on the restoration plan and FY16 Annual Progress Report on April 19, 2017 and more detailed comments from the Science Services Administration on July 14, 2017. The County addressed MDE's comments in its *2017 Annual TMDL Assessment Report* which is incorporated into the County's 2017 Annual MS4 NPDES Report in **Appendix J**.

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. In order 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 33.

Table 33. Sediment Baseline Loads and Load Reductions, Upper Patuxent River

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

Status of Restoration Plan:

Anne Arundel County submitted its final *Upper Patuxent River Sediment TMDL Restoration Plan* to MDE with its 2016 Annual Report and posted on the County's website following submittal. The plan can be found at: http://www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/ chesapeake-bay-tmdl/.

The County received general comments from MDE on the restoration plan and FY16 Annual Progress Report on April 19, 2017 and more detailed comments from the Science Services Administration on July 14, 2017. The County addressed MDE's comments in its *2017 Annual TMDL Assessment Report* which is incorporated into the County's 2017 Annual MS4 NPDES Report in **Appendix J**.

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 p*resents 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 storm-water WLAs, and the required percent reduction are presented in Table 34.

Table 34. Sediment Baseline Loads and Load Reductions, Patapsco River Lower North Branch

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

Status of Restoration Plan:

Anne Arundel County submitted its final *Patapsco River Lower North Branch Sediment TMDL Restoration Plan* to MDE with its 2016 Annual Report and posted it on its webpage following submittal. The plan can be found at http://www.aacounty.org/departments/public-works/wprp/watershed-assessment-and-planning/chesapeake-bay-tmdl/

The County received general comments from MDE on the restoration plan and FY16 Annual Progress Report on April 19, 2017 and more detailed comments from the Science Services Administration on July 14, 2017. The County addressed MDE's comments in its *2017 Annual TMDL Assessment Report*

which is incorporated into the County's 2017 Annual MS4 NPDES Report in **Appendix J**.

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 29, 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 overall South River and the Anne Arundel County stormwater WLAs, and the required percent reduction are presented in Table 35.

Table 35. Sediment Baseline Loads and Load Reductions, South River

NPDES MS4 Regulated SW Point Source	Baseline Load (tons/year)	SW WLA (tons/year)	% Reduction
Anne Arundel County	966	698	28%
Total South River	1,444	1,050	27%

Status of Restoration Plan:

Pursuant to Part IV.E.2.b. of Anne Arundel County's NPDES MS4 Permit No. 11-DP-3316 MD0068306 the County is required to submit restoration plans for all TMDLs with WLAs approved by EPA 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 the spring of 2018 Anne Arundel County will be conducting 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 has been achieved through restoration activities. If this analysis verifies that the SW WLA has been achieved, the County will provide documentation of that analysis to MDE. If the analysis does not confirm achievement of the SW WLA the County will initiate the development of a formal restoration plan.

3. 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, 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 to this mapping application by making changes to the overall look and feel of the application. Most recently, the viewer was changed to a more robust Geocortex viewer. This required a change in the URL of the mapping application, the new address is: http://gis-world3.aacounty.org/HTML5Viewer/ index.html?viewer=WPRP

During FY17, the County finalized the *West and Rhode River Watershed Assessment Report* and posted it for a 30-day public comment period from October 1, 2016 thru October 31, 2016. 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 did not receive any comments during this period. The *West and Rhode*

River Watershed Assessment Report was finalized on November 2016 and the final report posted to the County website in November 2016.

In addition, WPRP held a public meeting on September 26, 2016 to present the project goals and plans for the ongoing assessment of the Herring Bay and Middle Patuxent River watersheds. Over 50 members of the public attended the meeting.

No new individual TMDL restoration plans were developed or advertised by the County in FY17. EPA approved two new individual TMDLs in September 2017 – the *Total Maximum Daily Load of Sediment in the Non-Tidal South River Watershed September 28, 2017* and the *Total Maximum Daily Load for PCBs in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments*. Restoration plans for these TMDLs will be developed and advertised for public comment when completed in 2018.

The County recognizes the importance of public input into watershed assessments and restoration plans and will provide a minimum of 30 days for public comment on draft TMDL implementation plans as well as watershed assessment reports as they are developed. 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.

4. 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 FY17, the County worked on implementing the individual TMDL restoration plans submitted to and reviewed by MDE in 2017. Progress made during 2017 on the following restoration plans is documented in the Annual Assessment Reports in **Appendix J**.

- *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.*

A summary status of these plans is presented in **Part IV.E.2b.** These restoration plans provide information on load reductions and implementation costs associated with achieving the individual TMDL SW-WLAs. The Bacteria TMDL, Nutrient TMDL, PCB TMDL, and Sediment TMDL models have been updated to reflect implementation and progress achieved during FY2017. This progress is reported in the *LocalStormwaterWatershed* Assessment table of the MS4 Geodatabase (**Appendix A**).

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 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 FY2013. Detailed information pertaining to the County's progress toward achieving programmatic and implementation milestones associated with the County's

Phase II WIP were reported to MDE on 29 January 2016 as previously documented in this section.

With respect to the net change in pollutant load reductions necessary to meet TMDL requirements, *CountywideStormwaterWatershedAssessment* and *LocalStormwater WatershedAssessment* tables of the MS4 Geodatabase (**Appendix A**) of this report 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 FY2017 reporting year, the County pollutant load reduction realized through restoration project implementation is 4,673 lbs./year of Total Nitrogen, 1,258 lbs./year of Total Phosphorus, and 1,383,289 lbs./year. (691.64 tons/year) of Total Suspended Solids. Specific itemized costs for the projects completed in FY2017 are found in the 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 available.

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 Table 19 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 thus far has been $28,167,928. Project specific cost are documented in the County's 2017 WPRP Annual Report that is submitted as a narrative file in the MS4 Geodatabase (**Appendix A**) and also included in the Fiscal Analysis table of the MS4 Geodatabase (**Appendix A**).

The County continues to work toward meeting the targeted goals. Currently there are 51 projects in the construction or schematic design phase. The County also initiated 135 projects during this reporting year that are expected to be in schematic design phase in the coming reporting cycle (FY18) as previously mentioned in **Part IV.C.6** of this report.

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 of nutrient trading regulations by the State, allowing cross sector trading as an adaptive management tool for achieving load reductions, will be an integral component of 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 at the time 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. As these watershed assessments are completed opportunities for load reduction are now being 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 have clearly established load reduction targets. Two-Year Implementation Milestones have been established by the County to provide interim planning targets and to serve as a vehicle for assessing progress toward the load reduction targets. Progress will be 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 will then be 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. Funding for this class

of projects averages $45 million annually over 6 years. 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 feasibility and constructability assessments are needed. These assessments may result in identifying projects previously thought to be implementable but due to a variety of reasons are not; or identifying additional and new opportunities for load reduction. As these feasibility 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, will be evaluated as part of TMDL compliance assessment. The milestones and progress assessments will contribute to continual reassessment of management plans, and adapting responses accordingly as technologies and efficiencies change, programs mature, credit trading is enacted, 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. <u>Chemical Monitoring</u>

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 2016 through June 2017. The full Church Creek monitoring report can be found in **Appendix D** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017*) 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.

During the 2017 reporting period, twelve storm events were sampled. Three 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 FY17 dates for successful storm event sampling are provided in Table 36.

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. Event Mean Concentrations (EMCs) for each parameter were calculated for each storm 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.

Table 36. Dates of Storm Event Sampling During FY17

Quarter	Date of Sampling
Summer Quarter 2016	7/28/16
	9/19/16
	9/27/16
Fall Quarter 2016	11/9/16
	11/29/16
	12/6/16
Winter Quarter 2017	1/23/17
	2/28/17
	3/31/17
Spring Quarter 2017	4/25/17
	5/12/17
	6/19/17

A stream restoration project was completed in 2016 on Church Creek upstream of the Church Creek water chemistry monitoring station. This project was a collaboration between the County and the South River Federation (SRF), as an effort to improve habitat and floodplain connectivity within the stream reach. Determinations on the efficacy of the stream restoration should be made after the County, SRF, and SERC share and compile data collected from the area.

As in prior years, comparisons to water quality criteria continue to 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.

Water quality criteria for the pollutants listed above were more frequently exceeded at the Parole Plaza station than at the Church Creek station for all contaminants except lead. *E. coli* concentrations also remained high at both stations throughout the 2017 monitoring period, exceeding water quality criteria 72 percent of the time at Church Creek and 81 percent of the time at Parole Plaza. Note that prior to redevelopment site stabilization in 2008, total suspended solids (TSS) concentrations had been particularly high due to construction activity at Annapolis Towne Centre. Following stabilization of the site (Fall 2008), the EMCs for total suspended solids dropped significantly. For this reporting period the June 19 storm event resulted in total suspended solids concentrations exceeding the water quality criterion during the rising limb at Parole Plaza; however, the event mean concentration for that storm remained low. Site conditions were dry from May 28 to the June 19 storm event, allowing for material to accumulate on impervious surfaces within the drainage area. This, coupled with a storm intensity of 0.6 inch per hour rainfall in the first 15 minutes of the storm event, may have flushed extra surface materials, as well as deposits within the stormwater system, into the stream during the rising limb. After the initial flow of water had passed, TSS levels stabilized for the remainder of the storm. At Church Creek TSS did not exceed the criterion during that June 19 storm event.

When compared to the 2016 reporting year, 2017 loading rates increased for all sampled parameters at the Parole Plaza Station with the exception of BOD_5, copper, and *E. coli*. At the Church Creek Station, 2017 reporting year loading rates decreased for all sampled parameters when compared to 2016. The reduction in loads at the Church Creek Station may indicate that the stream restoration provided immediate benefit. The change in loading may also be due to natural variability in stream pollutant concentrations coupled with a 17% decline in annual discharge because of lower total rainfall in 2017 compared to 2016.

During the reporting period, the highest pollutant loads at Church Creek were recorded in the summer, except for copper and zinc which were highest in the winter. At Parole Plaza, hardness was much higher in the winter, likely due to

the use of salt to deice local roads and sidewalks associated with the residential and commercial nature of the Annapolis Towne Center. TSS was also distinctly higher at the Parole Plaza site during the winter. High TSS loads are likely a product of the scraping action of plows on driving surfaces and the breakup of asphalt after several freeze-thaw cycles caused by the swings in temperature observed during the 2017 winter.

The highest seasonal loading rates at Parole Plaza were recorded in the winter, with the exception of *E. coli* (spring). Pollutant loads and were likely associated with the greater volumes of water from snowmelt passing through the watershed and carrying more organic matter and suspended solids concentrations.

Further discussion of the monitoring activities at these stations and the resulting data can be found in **Appendix D** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017*) 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:

A total of four 75-meter biological monitoring reaches are positioned along Church Creek between the Annapolis Towne Centre outfall and the Church Creek in-stream water quality monitoring station. Benthic macroinvertebrate samples were collected from these stations in April 2017, following the MBSS spring index period protocols. One station is located on the Parole Plaza Tributary just below Forest Drive, two stations are located along the Church Creek mainstem, on either side of Solomons Island Road (Maryland State Highway 2), and a fourth site, located just upstream of the confluence with the Parole Plaza Tributary, was added in 2007 to monitor the effects of runoff from the adjacent Annapolis Harbour Center and Festival at Riva shopping centers.

The biological condition at each station was evaluated using the BIBI developed for use in Maryland's Coastal Plain streams. Results of the 2017 sampling period indicate that biological conditions within the Church Creek study area continue to be impaired by urbanization within the surrounding watershed. The CC04 BIBI rating decreased from 'Poor' in 2016 to 'Very Poor' in 2017, while CC01 and CC02 BIBI ratings increased from 'Very Poor' in 2016 to 'Poor' in

2017; though the BIBI rating remained in the 'Poor' category for CC03 from 2016 to 2017, a slight increase in BIBI score was noted, from 2.14 to 2.43. Since 2006, all stations have consistently been rated as either 'Poor' or 'Very Poor.' The number of EPT taxa, the number and percent of Ephemeroptera and the percent intolerant urban were low for all stations.

Physical habitat quality was evaluated using the MBSS Physical Habitat Index (PHI) and EPA's Rapid Bioassessment Protocol (RBP). PHI scores increased at all sites from 2016 to 2017. These increased scores resulted in CC01 and CC04 improving from 'Degraded' to 'Partially Degraded' ratings, while CC02 and CC03 remained in their current categories, 'Degraded' and 'Partially Degraded', respectively. 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. Elevated conductivity levels 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 D** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017*) 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. <u>Physical Monitoring</u>

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 were often difficult to locate in the field, thus leading to a fair amount of professional judgment used to interpret the data and categorize the stream segments. This means that categorization of some of the stream segments may change somewhat from year to year. Table 37 is a summary of each reach and its classification for the past 5 years.

Table 37. Physical Characterization Summary

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

While geomorphic data collected in the Church Creek study area were generally consistent with previous measurements, significant departure from expected values, as derived from Maryland Coastal Plain regional relationships of bankfull channel geometry, were observed for cross sectional area, bankfull width, and bankfull depth dimensions. All dimensions were generally larger in the Church Creek study area and were more similar to relationships of bankfull channel geometry derived from urban watersheds. This reflects the higher level of imperviousness in the study area, as compared to those levels in the drainage areas used to develop the regional relationship data.

Additional information and data pertinent to the water quality, biological, physical and habitat assessments of Church Creek are included in the full report included in **Appendix D** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017*).

Using HEC-RAS and SWMM, a hydrologic and hydraulic model was used to determine the effect of 1-, 2-, 10-, and 100-year storms on the stream bed. Fourteen BMPs were included in the model and were shown to reduce volume and peak flow for smaller storms (less than 1 inch). Although 2-year storms did not overwhelm the BMPs, the Church Creek culvert does restrict channel flow. The BMPs provide little mitigation against 10- and 100-year storms. Modeled results indicate that given certain conditions, velocity and shear stress thresholds may be exceeded and field observations provide evidence of bank erosion and channel instability. Steep slopes, narrow floodplains, and large impervious areas create flashy and immediate runoff during storm events that lead to channel erosion and instability. Despite restoration and attempts at channel stabilization, the Parole Tributary to Church Creek segments of stream remain degraded, largely because stormwater energy cannot be mitigated due to natural floodplain constrictions. The H&H report is included in **Appendix D** (*Parole Tributary to Church Creek Hydrologic and Hydraulic Analysis Report*).

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 Picture Spring Branch stations. The required chemical monitoring results are found in the *Chemical Monitoring* table, and the required biological monitoring results are found in the *Biological* Monitoring 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 E** (*Chemical, Biological, and Physical Characterization of the Church Creek and Parole Plaza NPDES Monitoring Stations: 2016-2017),* which also provides greater detail on the work performed in this watershed.

During 2016 the County worked with the South River Federation (SRF) to implement the Annapolis Harbor Center stream restoration project on Church Creek, upstream of the existing Church Creek water chemistry monitoring station. This work, completed in 2016, consisted of 1,500 linear feet of stream restoration and implementation of step-pool storm conveyance, riffle weirs, and

grade control structures to improve habitat and increase floodplain connectivity. Following completion of this restoration project, the SRF and the Smithsonian Environmental Research Center (SERC) began a targeted water quality monitoring program to evaluate the restoration project efficacy. To assist with this program, the County and SERC share data to allow for better restoration project evaluation.

Additionally, in July 2017 (FY2018), the County began a restoration project at the Annapolis Harbour Center stormwater pond. It is anticipated that this pond retrofit, located downstream of the SRF stream restoration but upstream of the Church Creek monitoring station, may have an influence on downstream water quality at the Church Creek station. If such an influence could be identified in the FY18 data set currently being collected, it will be noted in the FY18 Annual Report.

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

2. <u>Stormwater Management Assessment</u>

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:

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

Physical condition and habitat monitoring for Picture Spring Branch, in the vicinity of the West County Library site, 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: 2016-2017* in **Appendix E** for a location map). Three cross-sections are located on the North

Tributary, as well as one downstream of Maryland State Highway 170, and one on the South Tributary. It should be noted that the South Tributary does not receive significant stormwater runoff from the West County Library site. Most of the runoff from this site drains to the North Tributary.

In 2017, 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). Channel dimensions along the North Tributary have not changed substantially from baseline conditions, although some aggradation has occurred in the past four years. Channel dimensions appear relatively constant for three (XS-2, XS-3, and XS-5) out of the five cross-sections in 2017, compared to baseline conditions. Cross-sections XS-2, XS-3, and XS-5 decreased in cross-sectional areas between the baseline assessment and the 2017 survey by 1.8%, 7.0%, and 7.9%, respectively. While cross-sectional area at XS-4 decreased 3.9% between 2016 and 2017, and increased at XS-1 by 6.3% between 2016 and 2017, significant increases in overall cross-sectional area at XS-1 (increase of 59.4% from baseline) and XS-4 (increase of 22.4% from baseline) have been observed. These are the only two sections not located in an engineered or partially-armored channel. Although cross-section XS-4 has filled in slightly between 2013 and 2016, notable stream bed erosion is apparent.

Overall, it appears that the BMPs installed as part of the development of the West County 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 2017, 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' with each location exhibiting improvement in benthic biological condition from all previous years of monitoring. Overall, an increase in taxa diversity at all three sites, sampled in both 2016 and 2017, is likely driving these BIBI score increases. The full biological and geomorphological conditions report is included in **Appendix E** *(Biological and Geomorphological Conditions in the Picture Spring Branch Subwatershed: 2016-2017).*

Using HEC-RAS and SWMM, a hydrologic and hydraulic model was used to determine the effect of 1-, 2-, 10-, and 100-year storms on the northern tributary's stream bed. Five BMPs were included in the model and were shown to

reduce volume and peak flow for smaller storms. The BMPs provide little mitigation against 10- and 100-year storms. Modeled results indicate that given certain conditions, velocity and shear stress thresholds may be exceeded; however, field observations indicate that the channel is in equilibrium and shows little downcutting, erosion, or instability. Major erosion or scour was not observed in overbank areas. The H&H report is included in **Appendix E** (*Picture Spring Branch Hydrologic and Hydraulic Analysis Report*).

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.

Status:

The FY2017 Annual Report covers the reporting period of July 2016 through June 2017. The summary of the funding is shown in this section (Table 38**)**. The funding period reflects the fifth year of the revenue change from general obligation bonds and County pay-go funding to the dedicated special revenue from the WPRP Fund. The WPRP Fund was implemented July 1, 2013 in response to 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 permit-requirements not eligible for WPRP funding will continue to be supported by the County's annual budget process (general revenue funds).

During the reporting period, funding for NPDES MS4 Permit compliance was addressed through the County CIP and annual operating budgets. CIP funding for the FY2017 fiscal year and the next five fiscal years was allocated to the "Watershed Protection and Restoration", "Stormwater Runoff Controls," and "Water Quality Improvements" CIP project classes. Specific line items funded through the CIP include stream restoration projects, stormwater facility retrofits, outfall repairs, storm drain rehabilitation, closed storm drain repairs and replacement, and stormwater infrastructure inspection and maintenance. With the FY17 budget, the County continued the process of moving projects previously funded in the "Stormwater Runoff Controls" and "Water Quality Improvements" project classes into the "Watershed Protection and Restoration" project class and operating budget as appropriate. The Watershed Protection and Restoration CIP budgets for FY2017 through FY2022 total $61,806,500.

The Anne Arundel County operating budget for FY2017 provides permit compliance support through funding of personnel associated with permit compliance. Such support is derived primarily from the County's OPZ, 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.

Table 38. Fiscal Analysis for FY2017 (Operating and Capital Appropriations)

Permit Condition	Fiscal Year 2017
Legal Authority	$0
Source ID	$1,347,610
SW Management	$1,241,395
Erosion and Sediment Control	$51,821
Illicit Discharge Detection and Elimination	$118,247
Trash and Litter Control	$788,692
Property Management	$7,556,600
Inlet Cleaning	$616,197
Street Sweeping	$437,013
Other Road Maintenance	$ 0
Public Education	$446,689
Watershed Assessment	$198,013
Watershed Restoration	$19,136,389
Chemical Monitoring Assessment	$184,072
Biological Monitoring Assessment	$395,726
Physical Stream Assessment	$137,619
Stormwater Design Manual Monitoring	$0
TMDL Assessment	$440,648
Annual Report Preparation	$148,963
Total Annual Cost for NPDES MS4 Program	**$33,245,694**

Additional funding for permit compliance has been included in the operating budgets for the WPRP Fund. Some specific line items funded through the operating budget include contracted street sweeping, consultant support for chemical, biological, and physical stream assessments, local TMDL restoration plan and implementation, public education, grants, and restoration projects.

As noted in the FY2016 Annual Report, the projected CIP budget for FY2017 through FY2022 decreased from prior reports. To meet the terms of the impervious surface reduction plan required by the NPDES MS4 permit, the budgets for restoration projects were phased in over the term of the permit. As previously initiated CIP projects move to construction and completion, new restoration projects are funded for restoration initiation and design. The program costs were previously submitted to MDE in the County's first Financial Assurance Plan (FAP), which was approved by the County Executive on July 11, 2016, and approved by MDE on October 17, 2016. This approval

from MDE indicates that the County has sufficient funding to meet the terms of the impervious surface reduction plan required by the NPDES MS4 permit. The County will prepare the updated the FAP, and also will submit this next FAP as an MS4 Geodatabase narrative file with the FY 2018 Annual Report (due on or before February 12, 2019).

With the implementation of the WPRP Fund, a dedicated revenue source has been created. These revenues for FY2017 totaled $22,030,000. A total of 212,980 properties in Anne Arundel County were assessed the fee in FY2017, which was the second year of the full implementation of the fee after the phase-in periods. Estimated projections of revenue for FY2018 are $22,051,200. These revenues fund the operating budget directly, and the CIP budget indirectly through debt repayment.

The complete FY2017 County budget is available for review and download at the following url: www.aacounty.org/departments/budget-office/

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

Status:

Table 38 (above, **Part IV.G.1**) denotes the distribution of funding from the County's FY2017 Capital and Operating Budgets. Additional information is included in the *FiscalAnalyses* table of the MS4 Geodatabase (**Appendix A**). Additionally, the County is submitting required fiscal information in the WPRP Annual Report format (**Appendix K**).

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. At the end of FY2017, however, staffing levels were at 87%. Additional hiring will be completed in FY18, and we anticipate being fully staffed by the end of the fiscal year. These staffing levels will improve the commitment of the County in achieving MS4 permit compliance and maintaining adequate funding to meet permit obligations.

H. References

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