NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

NPDES Permit No. MD0068322
State Discharge Permit No. 11-DP-3318

ANNUAL UPDATE NUMBER 22

Submitted to:

State of Maryland
Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

Submitted by:

Department of Public Works
Howard County Government
Stormwater Management Division
6751 Gateway Drive, Suite 514
Columbia, Maryland 21046

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Section I. Introduction

A. Background

Since passage of the Federal Water Pollution Control Act Amendments of 1972, subsequent amendments have increasingly emphasized the quality control of stormwater runoff. The most recent revision, the Water Quality Act of 1987, establishes permit requirements for both Municipal Separate Storm Sewer Systems (MS4s) and stormwater discharges associated with industrial discharges. Section 402(p) of the Act requires phased permit applications, compliance requirements, and deadlines for application submission and approval.

On November 16, 1990, the final National Pollutant Discharge Elimination System (NPDES) Permit Application Regulations for Storm Water Discharges were published in the *Federal Register*. The Regulations establish permit conditions for large (serving populations greater than 250,000) and medium (serving populations greater than 100,000 but less than 250,000) MS4s. Included are requirements to effectively prohibit non-stormwater discharges into storm sewers and controls to reduce the discharge of pollutants to the maximum extent practicable. The Regulations also require NPDES permits for stormwater discharges associated with certain industrial activities.

The U.S. Environmental Protection Agency (USEPA) has delegated review and permitting authority for Maryland's large and medium municipalities to the Maryland Department of the Environment (MDE). Within the MDE, the Water Management Administration (WMA) is responsible for issuing permits to designated municipalities.

B. Howard County, Maryland

Howard County referred to as "the County", with population of 313,414 according to the Howard County Department of Planning and Zoning (DPZ) September 2017 population data, is one of five medium and five large jurisdictions in Maryland that is regulated by a MS4 Permit. Additionally, the Maryland State Highway Administration also is under permit. Howard County's first permit, (MS-HO-95-008, which was subsequently renumbered to MD0068322, 99-DP-3318), went into effect on April 17, 1995 and expired on April 17, 2000. During this period, Howard County undertook an extensive effort to improve Maryland's water quality and became a state and national leader in the control of stormwater. Howard County's second permit, (Number MD0068322, 00-DP-3318), went into effect on June 15, 2000 and expired on June 15, 2005. This permit included conditions that reflected Howard County's progress toward stormwater management (SWM) program implementation under its NPDES MS4 permit. The County's third permit (Number MD0068322, 00-DP-3318), which went into effect on June 20, 2005 was to expire on June 20, 2010, but due to a delay in the issuance of the County's fourth permit, the County continued to operate under its third permit per MDE until December 18, 2014 when the fourth permit was issued. The conditions of the fourth permit (Number MD0068322, 11-DP-3318), are similar to previous permits. As required by the conditions of the permit, the County must prepare Annual Updates to report on the progress made during the preceding permit year.

C. Annual Update Number 22

For Annual Update Number 20 (AR20), MDE required breaking out two six-month permit periods to report on permit compliance under the County's third and fourth permits. Therefore, Annual Update Number 21 (AR21) was the first to report on a full year under the County's fourth NPDES MS4 Permit. Annual Update Number 22 (AR22) is the second full-year report under the County's current NPDES MS4 Permit. Information is presented in the following parts and sections:

Section I. Introduction

Section II. Standard Permit Conditions

Section III. Program Review and Annual Progress Reporting

Section IV. Special Programmatic Conditions

Each section generally begins with the permit conditions, which are denoted in bold italics. Following each permit condition, as applicable, is a description of the progress made towards meeting the permit conditions within the annual update reporting year. Annual data are compiled/reported on a fiscal year basis.

Section II. Standard Permit Conditions

A. Permit Administration

Howard 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, in its annual reports, submit 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.

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The County has included the current organizational information as a narrative file included in the geodatabase. Mr. Mark S. Richmond, Chief of the SWMD, is the liaison with MDE and can be reached at (410) 313-6413 or msrichmond@howardcountymd.gov.

B. Legal Authority

Howard 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.

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The County previously submitted a certification from the County Attorney to MDE, which stated that the County possesses the authority to directly perform the activities described in 40 CFR 122.26(d)(2)(i) and the NPDES permit. Specifically, the County Office of Law has certified that the laws of Howard County, Maryland provide adequate legal authority to carry out Howard County's NPDES Permit for Operators of MS4 programs. The legal authority is adequate to implement programs that control the quality as well as the quantity of water that is discharged through its storm sewer system.

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;***

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

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

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

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

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

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Updated versions of the County's Source Identification GIS data (items 1. – 6. above) are provided on the DVD included in Section IV of this Annual Update. Several items related to Source Identification are noted below:

Storm Drain System

As of June 30, 2017 there are 581 outfall records included in the Outfall feature class of the MDE NPDES Geodatabase. Of these there are currently 409 are outfalls that meet the requirements of being major MS4 outfalls. Each of the 393 major MS4 outfalls has a corresponding drainage area in the OutfallDrainageArea feature class. Non-major outfalls are being added to the Outfall feature class as a result of the IDDE inspections. In order to fully document the inspection in the database the outfall where the inspection occurred needs to be included in the database regardless of its major/non-major NPDES outfall status. The County is currently developing a method for prioritizing the delineation of drainage areas for non-major outfalls. Other County GIS storm drain system layers are also included with the data submittal including outlets, inlets, stormdrains and manholes.

The permit requires that drainage areas be delineated to all BMPs in the County. A total of 2,496 delineated drainage areas are now in the County's GIS, which is being submitted as the BMPDrainageAreas feature class in MDE's NPDES Geodatabase. The difference between the total number of BMPs and the number of BMP drainage areas is attributable to BMPs such as dry wells, and other small single lot LID practices, where it is impractical to delineate a drainage area to such a localized BMP. At present the County has no plans for delineating drainage areas to each of these individual lot BMPs, but these BMPs are factored into the pollutant removal computations discussed later in this Annual Update. A total of 7899 drainage areas (2,496 delineated and 5,403 assumed) are in the pollutant loading model and they correspond to records in the RestBMP and BMPPOI feature classes. Per MDE's database requirements, records stored in the AltBMPLine, AltBMPPoint, and AltBMPPolygon feature classes do not have a corresponding drainage area.

Industrial and Commercial Sources

Howard County obtained SDAT data which identified approximately 2500 commercial and industrial parcels in the county. All commercial and industrial parcels were then entered into the Commercial/Industrial CRM database. The County set a goal of conducting a visual survey of 500 sites each year in order to perform a visual survey on each site within the five year permit term. In FY17, 328 sites were surveyed. The surveys are conducted by the four inspectors in the Stormwater Management Division who also inspect stormwater management facilities and perform illicit discharge field investigations. During the survey, the inspectors photograph each site, and if they find a suspected discharge they try to determine the source. Back in the office they complete a Field Data Sheet and enter the site information, photos, and scanned Field Data Sheet into the Commercial/Industrial CRM database. Any suspected discharges are referred to the County's IDDE Team Leader and the corresponding Field Data Sheet and photos are saved into the SWMD's shared drive. The IDDE Team Leader then follows up on and resolves the suspected discharge. GIS data representing the potential industrial and commercial sources and the FY17 assessed sites is included as a separate GIS layer.

Urban Best Management Practices (BMPs)

Urban BMP data are included in multiple feature classes and tables in the geodatabase including BMPPOI, BMP, AltBMPLine, AltBMPPoly, BMPInspections, AltBMPLineInspections, AltBMPPolyInspections, RestBMP, and RestBMPInspections. These feature classes and tables encompass development BMPs, restoration projects, and alternative BMPs. For the purposes of annual reporting this urban BMP summary will include the BMPPOI, BMP and BMPInspection tables and the other data are described below under Water Quality Improvement Projects; however in reality there is much overlap between the two sections.

The BMP and BMPInspections tables each contain 6,762 records, which is an increase of 1,050 records from AR21. The inspection information provided in the BMPInspections table is current as of December 2017. As a result, 1,118 records have a LAST_INSP_DATE after the June 30, 2017 end date of the reporting period. Inspections for 144 facilities have not been performed within three years of the June 30, 2017 end date of the reporting period. Most of these facilities are individual residential lot BMPs for which the County has started performing systems inspections. In FY16, the County developed and piloted an approach to inspecting these BMPs and began actively implementing the process. Notes were added to the GEN_COMMENTS field indicating the reason for the lack of inspection and the time frame for when the inspection will be complete. All inspections for the individual residential lot BMPs will be complete by December 2019. The REINSP_DATE field of the BMPInspections table does not allow for null values, so a default value of 12:00AM was assigned when no re-inspection was performed.

Howard County is currently transitioning its stormwater BMP management and accounting system to the point of investigation or POI framework. The method accounts for smaller dispersed BMPs built under MDE's Environmental Site Design (ESD) guidance as required by the Stormwater Management Act of 2007. The POI method accounts for nested BMPs and provides an accounting framework for impervious area treatment that avoids double counting but accounts for volumes treated by upstream BMPs. BMPs within a POI system are linked by their drainage patterns and volumes and impervious surfaces are computed as a system. Full implementation of the POI method will impact many County processes including delineation of BMP drainage areas, BMP inspections, impervious treatment and credit accounting, and even selection of future restoration sites. Once the POI system is in place, changes to drainage areas and impervious areas treated for BMPs existing pre-2002 in the baseline period will impact the County's baseline accounting and restoration target.

The County has begun implementation of the BMP POI protocol to transition away from the assumed BMP drainage approach previously in use. A pilot implementation of this BMP POI protocol was implemented on six subwatersheds within the County. Engineers are also checking, updating and correcting BMP drainage areas in the process. The subwatershed layer is being used for organizational purposes to define work areas. The GIS layer is County specific and has been included in the annual report submittal to aid reviewers identifying areas which have been updated. The six subwatersheds represent approximately 10% of the County. Additional implementation is scheduled for early 2018 on an additional six areas to bring the total transitioned to 20%. Further implementation will follow in 2018 in time for year four baseline re-calculation.

Of the 570 BMPs in the pilot watersheds, 329 were of a smaller BMP type that the County has typically assumed a drainage area for (e.g dry wells, rain gardens, etc.). Depending in the setting, connectivity with upstream/downstream BMPs the individual BMP drainage areas have been either delineated specifically or aggregated into 259 corresponding POI systems for the pilot effort without individually delineated drainage areas. Drainage area sizes and impervious acre treatment for these facilities now more accurately reflect the true drainage to these facilities instead of the previously assumed values. The BMP POI feature class contains 7,905 records, 1,493 of which correspond to records in the RestBMP feature class and 6,445 correspond to records in the BMP feature class. A total of 390 RestBMP and BMP records are now nested within these larger POIs and have no unique drainage area shape of their own.

Impervious Surfaces

The County has updated its impervious accounting as part of the baseline impervious surface area assessment to provide the final baseline untreated value and the associated 20% restoration target. The assessment was first detailed in the County's Countywide Implementation Strategy submitted to MDE with AR20 in December of 2015. Updates to the accounting were completed per MDE recommended changes in the cutoff date between baseline and restoration to be coincident with the end of the County's last permit, June 20, 2010. Howard County submitted the revisions in a report (*Howard County Impervious Accounting: Methods and Results*) to MDE with the FY2016 annual report in December of 2016 to detail the process and baseline results. MDE reviewed the document and provided their comment and an approved baseline in a letter dated April 13, 2017. Appendix 2 of the County's December 2017 revised Countywide Implementation Strategy (CIS) includes the revisions to the document, details the County's original methods, the items approved by MDE and the final results. It is noted that due to minor discrepancies and likely rounding issues, MDE's baseline untreated value of 12,299.2 is slightly different from the County's calculated value of 12,281.7. The County is using the MDE value for developing the 20% restoration target (2,459.8).

The assessment procedure and results are summarized in this Annual Update in under permit condition IV.E.2 and detailed in an attached narrative file (Howard County CIS Appendix 2).

In preparation of the base GIS layer used in the analysis, the County's jurisdictional impervious areas were delineated via an extraction of areas under other ownership including State Owned Properties such as State Highway Administration and the Department of Natural Resources. Properties under separate Industrial NPDES permits were also excluded. A list of properties with associated impervious acreage deducted from the County's baseline is included in the narrative files of the geodatabase (Howard County CIS Appendix 2).

The County's impervious GIS layers were submitted to MDE in December 2016 and are therefore not submitted again with this annual report. In 2016 the layers were submitted separately along with the NPDES Geodatabase since it is not specifically required of the database schema. The County submitted the 2002 GIS layer delineated by ownership and by 8-digit watershed to demonstrate the 2002 baseline condition used in the impervious accounting analysis. The County also submitted the 2016 impervious layer to demonstrate current conditions. This is still the most up to date GIS impervious layer.

Monitoring Locations

The County's NPDES monitoring locations and associated drainage areas are included in the database in the MonitoringSite feature class. Monitoring locations include both the biological and chemical monitoring sites for the Wilde Lake subwatershed monitoring and the Red Hill Branch subwatershed monitoring conducted in fulfillment of Part IV.F.1 Watershed Restoration Assessment.

Part IV.F.2 Stormwater Management Assessment is being conducted at the Rumsey Run project site. Locations of the geomorphic monitoring locations are included with the data submittal as a separate GIS layer.

Howard County conducts monitoring several other sites beyond what the NPDES permit requires. These sites include the Turf Valley and Dorsey Hall monitoring studies which are further described under permit condition IV.F.1 of the annual report. Monitoring site locations for these sites are included in the MonitoringSite feature class of the geodatabase.

Water Quality Improvement Projects

Water quality improvement projects are stored in several features and tables including RestBMP, AltBMPLine, AltBMPPoly, AltBMPPoint and their associated Inspection tables of the new MDE NPDES Geodatabase. For this database, the County is using the expiration of our 3rd generation permit date of June 20, 2010 as the cutoff between projects associated with the old, versus the current permit; however all improvement projects are included in the dataset.

The RestBMP feature class contains 1,527 records, with 1,523 completed, two records in planning, and two records in construction. Each RestBMP record has a corresponding inspection record in the RestBMPInspections table. 788 of the inspections were not performed within three years of the June 30, 2017 end date of the reporting period. 706 of these 788 inspections relate to County rain barrels. The County is currently exploring a self certification approach for verifying these rain barrels are installed and functioning appropriately. The remaining 82 inspections will be completed in FY18 and included in AR23. The REINSP_DATE field of the RestBMPInspections table does not allow for null values, so a default value of 12:00AM was assigned when no re-inspection was performed. 1,466 of the RestBMP records have a corresponding drainage area in the BMPDrainageArea feature class. For the 34 records without a corresponding drainage area, impervious treatment information was provided by the designer. Drainage areas will be delineated in FY18 and included in AR23.

The AltBMPLine feature class contains 111 records with 66 stream restorations and 45 outfall stabilizations, which is an increase from the 54 stream restoration records included in FY16. In addition to several newly completed outfall projects there were additions to the number of outfall stabilization records resulting from a cleanup effort the County implemented to identify outfall stabilizations completed as part of stream restoration or other restoration projects. The IMPL_STATUS field is populated with the current status as of June 30, 2017 with 91 of these records being complete, 15 in planning, and 5 in construction. An inspection record for each of the completed projects is included in the AltBMPLineInspections table. All inspections have been performed within three years of the June 30, 2017 end date of the reporting period. The REINSP_DATE field of the AltBMPLineInspections table does not allow for null values, so a default value of 12:00AM was assigned when no re-inspection was performed.

The AltBMPPoly feature class contains 2,693 records with 2,602 tree plantings, 86 stormdrain vacuuming, and five street sweeping records. The County is reporting the last five years of street sweeping records and using the average of the tonnage collected each year to estimate impervious reduction credits and loads reduced. The County is now tracking stormwater inlet and pipe cleaning efforts conducted by the Bureau of Highways for impervious and stormwater credits therefore the 86 pipes cleaned in 2017 are new entries to the database. Each AltBMPPoly record has a corresponding inspection record in the AltBMPPolyInspections table. These inspections will be completed in FY17 and included in AR22. The REINSP_DATE field of the AltBMPPolyInspections table does not allow for null values, so a default value of 12:00AM was assigned when no re-inspection was performed.

The AltBMPPoint feature class includes 7,241 total records including 11 septic connections to public wastewater systems and 231 septic system upgrades to denitrification systems dating back to 2011. New this year are 6,999 septic pumping entries dating back to 2013 and up through 2017. Howard County compiled septage hauling and manifest data to develop a comprehensive list of unique records over the last 5-yr period which will be used for impervious crediting. Septic load reductions for some of the records calculated and reported, however it is the County's current understanding that reductions achieved from septic practices may not be credited towards the urban MS4 sector and only impervious credits associated with septics are used.

D. Management Programs

The following management programs shall be implemented in areas served by Howard 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 made 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.

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.

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 Howard County.

d. Conducting preventative maintenance inspections, according to COMAR 26.17.02, of all ESD treatment systems and structural stormwater management facilities at least on a triennial basis. Documentation identifying the ESD systems and structural stormwater management facilities inspected, the number of maintenance inspections, follow-up 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.

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Stormwater Management Act Compliance

The County continues to comply with the Act and implement ESD to the MEP for new and redevelopment projects under the current version of the Design Manual, including the 2009 revision for ESD, as well as provide feedback on that version, as necessary. The County has had no modifications to the design manual requirements and there are no programmatic problems to address at this time.

Stormwater Management Programmatic and Implementation Information

Stormwater management is reviewed for compliance with the Howard County Design Manual, Volume I – Storm Drainage, throughout the development process by Planning and Zoning – Development Engineering Division. The programmatic and implementation information identified as i. – iv. above has been included in this Annual Update in the database under Stormwater Management as required by Part V of the County's MS4 Permit.

In 2017, Council Resolution CR94-2017 revised Volume I (Storm Drainage) of the Design Manual to mandate a specified amount of rainfall for 100-year storms; to clarify provisions related to open channels; to amend provisions related to stormwater management facilities in Howard County; and to make technical changes related to Volume I, Storm Drainage, of the Design Manual.

Construction Inspection

Stormwater construction inspections are the responsibility of Public Works – Construction Inspection Division. A summary of the stormwater construction inspections and violation notices issued is listed in Table 1 and is listed in the SWM Associated Table in the geodatabase.

Table 1: Construction Inspections

Summary of Inspections and Violations	Total July 1, 2016 – June 30, 2017
Number of Construction Inspections	22,880
Number of Construction Violations	594

Preventative Maintenance Inspections

The SWMD is responsible for SWM BMP inspections, which continue to be performed for County, Board of Education, and private SWM facilities on a triennial basis. A summary of the inspections from July 1, 2016 through June 30, 2017 is listed in Table 2.

There are currently 1,248 County maintained BMPs, 152 Board of Education BMPs, and 2,431 privately owned and maintained BMPs, and 2,424 privately owned and maintained residential ESD BMPs for a total of 6,255 BMPs, which are inspected on a three-year cycle.

Table 2: Preventative Maintenance Inspections

Inspection Detail	Inspections July 1, 2016 - June 30, 2017
Maintenance Inspections	2,475
County Maintained BMPs	382
Board of Education Maintained BMPs	62
Privately Maintained BMPs	766
Residential ESD BMPs	1,265
Follow-up Inspections	425
Enforcement Actions (Extra Follow Up)	0 Citation / 17 NOVs
Total	2,917

** The inspection cycle for Board of Education Maintained BMPs begins in August of each year.*

The County sends a letter to the owner of any BMP needing corrective action (structural or non-structural) giving them a deadline for addressing the items. The County performs follow up inspections to verify that compliance is achieved. If the owner does not comply, a citation or Notice of Violation (NOV) is issued. An NOV is a warning letter providing owner 14 days from the date of the letter to either correct the deficiencies or request an extension in writing. A citation is the legal action taken to initiate an actual fine or civil penalty against the owner. This action takes place if after 14 days, there has been no contact with the owner.

Inspections for tree planting sites are performed by the Department of Recreation and Parks. Inspections are performed according to the Policies and Procedures: Reforestation Tree Planting on Public and Private Lands, Inspecting Forest Conservation Easements, and Inspecting Forest Conservation Easements with GIS Tools. Inspections for voluntary BMPs on private property and those installed by Howard EcoWorks, formerly READY, are performed by the Office of Community Sustainability. Long-term verification Inspections for stream restoration projects are performed by the SWMD.

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;

b. Ensure that construction site operators have received training regarding erosion and sediment control compliance and hold a valid Responsible Personnel Certification as required by MDE;

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

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.

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Howard County submitted its renewal application for delegation of erosion and sediment control enforcement authority on October 6, 2016. MDE conducted a field review on October 18 and 20, 2016 and completed its review on November 4, 2016 and provided a verbal recommendation of MDE's extension delegation for the maximum 2-year period. MDE's written review and re-authorization letter was received on January 24, 2017. The delegation authority is effective through June 30, 2019.

Program Improvements

Construction Inspection Division (CID) supervisors conducted training sessions to share the MDE field review and findings with all the staff. During the training sessions staff discussed their experience and lesson learned from the MDE review. The Erosion and Sediment Inspection Manual was updated to highlight MDE observations during the review.

CID developed a new "Sediment Control Fence Reconfiguration" construction detail, to supplement MDE's standards until the MDE publishes a similar detail. This detail describes where and when to adjust sediment control fence installed at the end of Rock Outlet Protection. CID also developed training material and conducted classes for the County's project manager in charge of the capital projects to refresh their knowledge about Erosion and Sediment Control. This is similar to the former Responsible Personnel Certification Class, but now it is only instructional; certifications are only available through MDE's website.

Responsible Personnel Certification

In accordance with the re-authorization letter issued by MDE on May 1, 2015 the following process is in place relative to the Responsible Personnel certification:

"This training may now be taken on MDE's website and all inquiries should be referred to this on-line application that will now satisfy the County's MS4 permit obligations."

MDE issues the certification online. Therefore, Howard County had no information to submit regarding the Responsible Personnel Certificate Information Associated Table. Additionally, MDE has concluded that the Responsible Personnel Certificate Information Associated Table is optional. Therefore, Howard County will not be submitting the Responsible Personnel Certificate Information Associated Table in the geodatabase for this Annual Update.

Program Activity

The electronic program activity information has been included in this Annual Update, in the database under Erosion Sediment Control Associated Table as required by Part V of the County's MS4 Permit.

Earth Disturbances > 1 acre

Construction Inspection Division submits quarterly reports for earth disturbances greater than one acre directly to MDE. This information is also included in the Annual Report database under Quarterly Grading Permit Feature Class and Quarterly Grading Permit Information Associated Table as required by Part V of the County's MS4 Permit.

3. Illicit Discharge Detection and Elimination

Howard 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. Activities shall include, but not be limited to:

a. ***Field screening at least 100 outfalls annually. Each outfall having a discharge shall be sampled 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;***

b. ***Conducting annual visual surveys of commercial and industrial areas as identified in PART IV.C.2 above for discovering, documenting, and eliminating pollutant sources. Areas surveyed shall be reported annually;***

c. ***Maintaining a program to address and, if necessary, respond to illegal discharges, dumping, and spills;***

d. ***Using appropriate enforcement procedures for investigating and eliminating illicit discharges, illegal dumping, and spills. Significant discharges shall be reported to MDE for enforcement and/or permitting; and***

e. ***Reporting illicit discharge detection and elimination activities as specified in PART V of this permit.***

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Howard County's Illicit Discharge Detection and Elimination (IDDE) program incorporates four components to meet the permit requirements:

- Prevention Program
- Detection Program
- Removal and Compliance Program
- Program Management and Reporting

Prevention Program

The County's IDDE Program uses public outreach and in-house employee training to prevent illicit discharges. Outreach is also done at community events such as the annual GreenFest event. In-house training is performed for County departments involved in the handling of chemicals and in the maintenance of facilities. The County developed a brochure for general distribution to the public to provide education about the role that the County's IDDE Program and they play in eliminating pollution entering our waterways. The brochure is available in County offices and is mailed out to targeted audiences as part of the County's outreach program. The County also utilizes an illicit discharge reporting form on its SWMD website with a hotline number for public reporting of an illicit discharge. The web address is:
https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Environmental-Services/Stormwater-Management/Illicit-Discharges

Illicit discharge complaints can also be reported through the TellHoCo smart phone app. In addition, the County is proactively surveying all commercial and industrial sites in the County to identify the potential for illicit discharges before they occur.

Detection Program

Howard County investigated 72 cases in FY17, which were identified through the three programs in place to detect illicit discharges.

A. The first program is the inspection of 100 outfalls per year. The inspections this year were in the Deep Run watershed and the Route 1 corridor. The County provides maps to the contractor showing the areas where the inspections must be conducted. The contractor then identifies 100 outfalls to inspect. They visit the outfalls at least 72 hours after a precipitation event and look for flow. If they see any flow, they collect a sample and analyze it for the required analytes. They then trace the discharge up the storm drain system to identify the source. The contractor then calls the County IDDE Team Leader to report the discharge, so the County can follow up with the property owner to stop the discharge. Of the 102 outfalls inspected in this reporting period, five suspected discharges were identified and are described below.

1. Taylor Farms, 7920 Tar Bay Drive, Jessup. On October 20, 2016, Howard County's contractor discovered non-stormwater flow in outfall 218662, which services Taylor Farms. The inspector conducted a chemical test and did not find any violations. Discharge source was assumed to be groundwater. Case resolved.
2. 6333 Macaw Court, Elkridge. On October 19, 2016, Howard County's contractor discovered non-stormwater flow in outfall 219115. The inspector conducted a chemical test and did not find any violations. Case resolved.
3. 6360 South Hanover Road, Elkridge. On October 21, 2016, Howard County's contractor discovered milky fluid in outfall 219534 and contacted Howard County. County inspectors met with the contractor and they discovered a white powdery residue in the parking lot of Harwood Business Center, which drains to the outfall. Further inspections did not reveal the source of the discharge.
4. Manheim Baltimore Washington, 7120 Dorsey Road, Jessup. On November 17, 2016, Howard County's contractor discovered sudsy flow at outfall 220406. They conducted a chemical test which showed detergents at >1.3 mg/L. Howard County met with the business owners to determine whether an illicit connection existed. Howard County issued an NOV on November 23, 2016 which required Manheim Baltimore-Washington to stop the discharge and eliminate the connection, if it existed. The company has since cleaned the sanitary drains and TVed the storm sewer. No illicit connection was discovered. Case resolved.
5. 6725 Santa Barbara Court, Elkridge. On October 26, 2016, Howard County's contractor noted trash on embankment upstream of outfall 220625. Howard County will periodically re-inspect the site.

B. The second program is a visual survey of commercial/industrial parcels, conducted by County inspectors. If the inspectors see any suspected discharges, they try to identify the source and notify the IDDE Team Leader. In this reporting period the County conducted 328 visual surveys and identified three suspected discharges, which are described below.

1. Forest Green Shopping Center, 10035 Baltimore National Pike, Ellicott City. On December 22, 2016, Howard County inspectors discovered an open grease container with a grease stain on the pavement next to it. Howard County's IDDE manager contacted Valley Protein, the owner of the

grease container, on January 5, 2017. Valley Protein emptied the container that day and removed it the next day. Valley Protein did not know which business had leased the container from them. Case resolved.

2. Sonesta ES Suites, 8844 Columbia 100 Parkway, Columbia. On February 23, 2017, Howard County inspectors discovered an open 5-gallon bucket of oil/asphalt. Howard County's IDDE manager contacted Sonesta ES Suites which promptly removed the buckets. Case resolved.
3. Chaney Concrete, 7296 Old Jessup Road, Jessup. On March 2, 2017, Howard County inspectors discovered cloudy water discharging from Chaney Concrete. On March 10, 2017 Howard County's IDDE manager contacted Chaney Concrete. A company representative told her that the facility was covered under General Permit 10MM: Discharges from Mineral Mines, Quarries, Borrow Pits, and Concrete and Asphalt Plants, Registration No. 10MM8046. He sent a copy of the permit, the SWPPP, and verified that Chaney Concrete is conducting and submitting the required tests to MDE. Case resolved.

C. The third program is a response to complaints received from the public, other Howard County departments, MDE, or EPA. Howard County responded to 54 complaints

- 13 reports were from Howard County employees
- 4 reports were referred by MDE
- 37 reports were received from the public

Howard County issued 18 Notices of Violation during FY17, described below:

1. Unity Disposal, 6221 Slender Sky Court, Columbia: On October 17, 2016 a trash truck leaked hydraulic oil into the street and a storm drain. Howard County issued a NOV requiring the company to clean out the storm drain, report the spill to MDE, and train drivers in correct spill response.
2. Tucker Construction, 10730 Little Patuxent Parkway, Columbia: On October 14, 2016, a Howard County Construction Inspection Division inspector saw a contractor dispose of drill water into a stream. Howard County issued a NOV requiring the company to vacuum up the sediment and take steps to prevent future discharges.
3. Manheim Baltimore Washington, 7120 Dorsey Road, Jessup: On November 17, 2016, Howard County's contractor discovered sudsy flow at outfall 220406. They conducted a chemical test which showed detergents at >1.3 mg/L. Howard County met with the business owners to determine whether an illicit connection existed. Howard County issued an NOV on November 23, 2016 which required Manheim Baltimore-Washington to stop the discharge and eliminate the connection, if it existed. The company has since cleaned the sanitary drains and TVed the storm sewer. No illicit connection was discovered. Case resolved.
4. 6427 Amherst Avenue, Columbia: On November 11, 2016, a member of the public notified Howard County of an oil spill onto a driveway which then entered the street. Howard County issued an NOV requiring the property owner to stop and clean up the discharge.
5. 4796 Carman Drive, Ellicott City: On December 6, 2016, a member of the public notified Howard County of a large pile of leaves which had been dumped into a swale on a neighboring property. Howard County issued a NOV to the property owner of the of the leaf pile requiring them to remove the leaves from the swale.

6. Gateway Pizza and Subs, 6520 Old Waterloo Road, Columbia: On January 20, 2017, a Howard County Pretreatment inspector saw an open and overflowing grease container. Howard County issued a NOV requiring the company to clean the container, have it emptied, and train its employees on proper grease disposal.
7. Dorsey Search Village Center, Ellicott City: On February 6, 2017, Howard County was notified by the Columbia Association Watershed Manager of an uncovered salt pile. Howard County issued an NOV to the property owner requiring that the salt pile be covered.
8. Iron World Fencing, 9390 Davis Avenue, Laurel: On February 7, 2017, Howard County was notified by a state inspector of an oily discharge. Further investigation revealed that Iron World Fencing was the source of the discharge. Howard County issued an NOV requiring the discharge to be stopped and prevented from reoccurring.
9. 7060 Oakland Mills Road, Columbia: On February 10, 2017, a Howard County Pretreatment inspector saw an overflowing grease container. Howard County issued an NOV requiring the property owner to clean up the container and surrounding area and kept from overflowing again.
10. 8975 Henkels Lane, Annapolis Junction: On February 7, 2017, a Howard County employee noticed an uncovered salt pile at this location. Howard County issued an NOV requiring that the salt pile be covered.
11. JT Seafood, 401 Woodbine Road, Woodbine: On February 22, 2017, Howard County received a public complaint of a discharge of soapy water from vehicle washing into a storm drain. Howard County issued an NOV requiring that vehicle wash water be properly contained and disposed of.
12. 9030 Shinleaf Court, Columbia: On February 22, 2017, Howard County received a public complaint of concrete blocks dumped into a stream. The Stormwater Management Division worked with Howard County Dept. of Planning and Zoning to investigate. It was determined that the blocks had been placed on the streambank and was not considered an illicit discharge.
13. Deep Run Park, 6551 Old Waterloo Road, Elkridge: On March 15, 2017, Howard County received a complaint of an oil discharge leaking from a car into the street at a mobile home park. Howard County issued a NOV to the property owner requiring that the spill be cleaned up and that any further discharges be prevented.
14. J and D Auto Services, 8820 Washington Boulevard, Jessup. On April 19, 2017, Howard County stormwater inspectors found a corrugated metal chute leading from the parking lot at an auto services business into a stormwater management facility. Conversations with the owner of J and D Auto Services revealed that employees of a food truck parked on the site used the chute to dispose of dish wash water. Howard County issued an NOV requiring that the wash water be contained and properly disposed of, and that the chute be removed.
15. 7467 Broken Staff, Columbia. On April 4, 2017, Howard County received a public complaint that a contractor working at this address was dumping something into the storm drain. Howard County contacted the property owner and learned that the contractor was pouring grout wash water into the drain. Howard County issued a NOV requiring that the discharge be stopped.
16. 7444 Broken Staff, Columbia. On April 6, 2017, Howard County received a public complaint that the owner of this property was washing rugs in the parking lot and allowing the wash water to

enter the storm drain. Howard County issued a NOV explaining that such a discharge, if it had occurred, would be a violation of county code.

17. Children of America, 8020 Village Crest Drive, Ellicott City. On May 15, 2017, Howard County received a public complaint via EPA and MDE that a contractor for this business had cleaned out a grease trap and dumped the contents into a storm drain. Howard County issued a NOV requiring that the storm drain be cleaned out and further discharges of this type prevented.
18. Tate Access Floors, 7510 Montevideo Drive, Jessup. On May 25, 2017, a Howard County Dept. of Planning and Zoning employee reported that Tate Access Floors had built two large aggregate storage in the floodplain without a county building permit, and that sediment was washing into a stream. The Stormwater Management Division issued a NOV requiring that the aggregate be cleaned up and the stockpiles covered, and that the trench drain in front of the aggregate storage area be cleaned out on a regular basis.

Three types of cases were referred to other Howard County departments:

- water main breaks
- spills by county contractors
- trash in floodplain

Two cases were referred to MDE:

- Maryland Recycling, 5618 Furnace Avenue, Elkridge, should be covered by General Permit 12-SW
- Excel Tree Experts, 7549 Montevideo Road, Jessup, referred to MDE

Thirty-four cases were not illicit discharges, generally including:

- Sources could not be identified
- Iron floc
- Abandoned car
- Spills cleaned up before reaching a storm drain
- Minor trash not in floodplain
- Allowable pool discharges

Five cases are still under investigation:

1. God Speed Auto, 6360 South Hanover Road, Elkridge. Howard County is conducting follow-up inspections.
2. Taylor Farms, 7920 Tar Bay Drive, Jessup. Howard County is conducting follow-up inspections on potential discharge of food-processing wastes.
3. 6333 Macaw Street, Elkridge. Howard County is conducting follow-up inspections on potential vehicle wash water discharge.
4. 6725 Santa Barbara Court, Elkridge. Howard County is conducting follow-up inspection on potential trash disposal.
5. Alister Town Center, 5331 Columbia Road, Columbia. Howard County is discussing trash clean-up practices with the apartment management company.

Ten additional cases consisted of proactive outreach to restaurants located in Historic Ellicott City, to confirm that businesses re-opening after the 2016 flood knew how to properly dispose of used grease and where to put grease containers.

Removal and Compliance Program
The County uses the procedure described below to address illicit discharges.

Initial Response: Phone call, email, or inspection. The SMD inspector will complete a Field Inspection Report and leave one copy with the owner. The report will identify any problems identified and actions required. This method is used with both industrial/commercial discharges and residential (individual or Homeowners Association) discharges.

First Notification: The County issues a Notice of Violation (NOV) for more serious or repeat discharges. The NOV will require the owner to respond within two weeks with a plan of action, and to perform corrective action within a specified time frame (typically 60 days).

Second Notification: In the case of very serious or repeat discharges, the County will issue a citation. Under Howard County Code, prohibited discharges and illicit connections are a Class A offense, subject to a minimum fine of $500 and a maximum fine of $1000 per day. The County will request that all illicit discharge violators submit proof (photos, contractor's inspection notes, e-mail or notarized letter) that compliance was completed within the specified time frame. If necessary, the County will follow up at violation sites to ensure that compliance occurs in a timely and effective manner. Visual observation and, if necessary, monitoring will be performed to verify that the illicit discharge was stopped and/or necessary permit obtained.

Program Management and Reporting
Howard County's IDDE Program has a staff of five which includes one manager and four inspectors who carry out the duties of the IDDE Program. This involves following up on reported illicit discharges and proactively doing industrial and commercial site surveys. The inspectors immediately report any illicit discharges found and the manager follows up with the owner to eliminate and remediate the issue. The IDDE program field data sheets, pictures, and support documents such as e-mails and letters are saved to the Commercial/Industrial CRM database, the IDDE CRM database, and as PDF files in the SWMD shared drive. The two IDDE CRM databases were created during this reporting period to enhance the County's IDDE program. All sites are reported to MDE at the end of the reporting period in the IDDE Associated Table.

4. Litter and Floatables

This section of the permit requires Howard 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. Howard 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 Howard County's watershed assessments under PART IV.E.1 of this permit, Howard County shall document all litter control programs and identify potential sources, ways of elimination, and opportunities for overall improvement.

b. Within one year of permit issuance, as part of the public education program described in PART IV.D.6., Howard 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.

Annual Update Number 22 Status

Recycling Division Programs
Howard County Recycling Division continues to provide many recycling opportunities and information to County residents and businesses, as well as County government operations. In 2016, a total of 235,631.70 tons of recyclables were recycled by businesses and residents. Of that, 39,889.72 tons of recyclables were collected curbside and 66,543.16 tons through drop-off programs at Alpha Ridge Landfill.

Weekly residential single stream recycling collection is provided to over 85,000 single family homes, townhouses, mobile home parks and condominiums. Three collection routes also have food scrap collection available to them. The Alpha Ridge Landfill Resident's Convenience Center accepts a wide variety of recyclable materials including: paint, manure, topsoil, reusable household items, wood waste, yard trim, food scraps, compressed gas tanks, electronics, rigid plastics, cardboard, foam padding, mattresses and box springs, reusable building materials, Styrofoam™, cooking oil, motor oil & filters, antifreeze, wet cell batteries, clothing & textiles, tires, scrap metal and appliances, reusable bicycles, oyster shells and single stream recycling. All County residents may use the convenience center with proof of residency; businesses may also use the center for recycling if the materials originated in the County. Ongoing recycling events include electronics collection, paper shredding, Christmas tree recycling, backyard composting, trash and recycling route surveys, and a variety of education and outreach programs to audiences of all ages. Single stream recyclables are collected from County buildings and facilities on a weekly schedule; County agencies also bring items to Alpha Ridge for recycling such as wood waste and yard trim.

The County provides education and outreach to the public on the importance of reducing, reusing, recycling and waste reduction through disseminating information in the following manners:

- During FY17, the Recycling Division distributed a significant amount of recycling and waste reduction literature to households and businesses that emphasize reducing, reusing and recycling. In addition, material was available through local libraries, public buildings and events. Outreach to businesses and residents were also achieved through the County's website, www.HowardCountyRecycles.org.
- A monthly e-newsletter is sent to 14,711 residents. Residents opt-in to receive this newsletter which highlights holiday schedule changes, shredding events, tips and updates on the recycling program. Newsletters can be found at www.howardcountymd.gov/NewsAndUpcomingEvents.
- Print ads relevant to the importance of reducing, reusing, and recycling promoted to the public in the following:

  - Baltimore Sun
  - The Pennysaver
  - The Parent's Guide to Howard County
  - Welcome to the Neighborhood
  - Senior Resource Guide
  - Armed Forces Directory
  - Epoch Newspaper
  - Howard County Visitors Guide
  - Howard County Chamber of Commerce Directory
  - The Business Monthly
- A promotional message on the property tax bill envelopes to promote a new reusable bike collection program.
- Advertising sign at the Columbia Mall promoting recycling.
- Promotional items that encourage recycling and include recycled content.
- Custom made windowed recycling carts are available for display at libraries and County buildings to highlight the many items that can be recycled.
- Distribution of recycling and waste reduction literature at libraries, schools, County buildings, community associations, senior centers, and businesses and directly to individuals. Brochures can also be found on the County's Recycling website at www.HowardCountyRecycles.org
- Outreach through social media such as Twitter, using the twitter account @HoCoRecycles and tweet regularly to promote recycling, composting and waste reduction.
- A postcard providing positive feedback was sent to participants in the food scrap recycling program.

In addition, relevant education material was available through local libraries, public buildings and events. Outreach to businesses and residents were also achieved through the County's website, www.HowardCountyRecycles.org

The County's Recycling Coordinators provide educational programs in schools, businesses, community associations, etc. These efforts include:

- Participating in community, school and corporate events with a recycling exhibit and educational materials.
- Continued distribution of school recycling information through school programs, brochures and visually appealing lunchroom recycling posters in public and private schools at all age ranges.
- Presentations and tours at the Alpha Ridge Landfill.
- The School Board and the County continue to collaborate on a collection contract for trash and recycling. Collection is provided weekly for trash and recycling from lidded dumpsters as well as recycling collection from wheeled, lidded carts for single stream recycling as well for food scraps at 6 schools.
- Technical support provided as requested to businesses throughout Howard County. A section on specialty recycling along with business recycling options has been posted on the website at www.howardcountymd.gov/Business-Recycling.

Adopt-A-Road Program/Trash Collection

The County "Adopt-A-Road" volunteer program continues to be very successful. The Adopt-A-Road Summary in Table 3 below, provides a breakdown of the different zones for the Adopt-A-Road program from February 1, 2016 to May 16, 2017, that details the amount of trash collected, the mileage of road adopted, and the number of roads adopted by zones. More information about the Adopt-A-Road program can be found on the County's website: https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Highways/Adopt-A-Road-Program

Table 3: FY17 Adopt-A-Road Summary

Zone	Trash Bags Collected	Number of Roads Adopted	Estimated Miles Cleaned
Central	607	40	32
East	590	40	50
West	220	26	35
Total	***1417***	***106***	***117***

Howard EcoWorks Channel Maintenance Program

Howard EcoWorks removed 6,000 lbs of litter from the Tiber-Hudson channels after the town's flash flood event (not including 27,000 lbs of large woody debris).

Howard EcoWorks regularly collects trash when doing tree maintenance work on County Forest Conservation Areas and stream restoration projects. There are currently 44 sites where Howard EcoWorks has done or continues to do this work. Volume and weight of litter collected are not tracked during these projects.

Department of Recreation and Parks Programs

Natural Resources Division

Stream and Pond Cleanup Program

- Since 1996, the Department has actively recruited volunteers and tracked their efforts removing trash and other debris from Howard County's waterways. In FY2017, we had 28 volunteers spend 77 hours in this program. Volunteers collected 625 pounds of trash and an additional 1,164 pounds of bottles, cans, tires and scrap metal were recycled. Since 1996, we have had 2,581 people spend 5,679 hours cleaning our waterways. These figures reflect the Department's participation in the Baltimore regional stream and watershed clean-up effort, "Project Clean Stream". This was the eighth year the Department participated in the International Coastal Clean-up providing one location. Since 2000, 41.94 miles of streams/rivers and 102.2 acres of lakes and ponds areas have been cleaned. Trash collected since 2000 totals 31,967 pounds with an additional 19,234 pounds of trash recycled!

Park Operations

- Zone 1 has a variety of ways it uses to control the litter in their area. The main source of litter within the Zone is from the general public, as well as its athletic field users. The control means for battling the refuse is by installing trash/recycle cans and by picking up all loose trash within the Zone. Staff spends roughly 7,000 hours picking up loose trash within their Zone and another 560 hours for emptying trash/recycle cans, for a total of 7,560 hours per year on litter control. Zone 1 has 100 trash cans within its area. Each can is pulled at least once a day, weigh approximately 40lbs. Therefore, Zone 1 empties roughly 480 tons worth of trash every year. All trash is put into dumpsters and picked up twice a week. The trash is taken to a transfer station for proper disposal. In addition to trash cans, Zone 1 also has 100 recycle dumpsters within their Zone which is pulled at least once per day. The average weight for recycle cans is roughly 40lbs. Therefore, Zone 1 empties roughly 480 tons worth of recycling each year. The recycling is taken to recycling dumpsters that are emptied twice per week and taken to a recycling center for sorting. In total, Zone 1 removes roughly 960 tons worth of trash and recycling each year.
- Zone 2 maintains one hundred and thirteen 50-gallon trash cans throughout the parks, resulting in 48,000 lbs. of trash collected.
- Rockburn staff spends approximately 986 hours per year on litter removal. This average out to approximately 35,000 lbs of trash and 38,000 lbs of recycling.

- Zone 1 also has 100 recycle dumpsters within their Zone which is pulled at least once per day. The average weight for recycle cans is roughly 40lbs. Therefore, Zone 1 empties roughly 480 tons worth of recycling each year. The recycling is taken to recycling dumpsters that are emptied twice per week and taken to a recycling center for sorting. In total, Zone 1 removes roughly 960 tons worth of trash and recycling each year
- To promote recycling, the Zone 2 has added thirty-five 55 gallon recyclable containers and collected approximately 43,600 lbs. of recyclables.

Natural and Historic Resources Division

Park Ranger Walks

- In 2014, the Park Rangers of Howard County Recreation and Parks implemented "Ranger Walks." These walks are an outreach initiative committed to educating the park patrons on natural resource topics and encourage stewardship of the environment. The four "Walk" topics related to current efforts include: (1) The Native Tree Hike, which teaches the basics of tree identification, the importance of forest buffers and the benefits of trees; (2) The Watershed Walk provides various topics within water conservation and the effects of pollution on local tributaries that lead to the Chesapeake Bay watershed; (3) The Reptiles and Amphibians walk takes patrons through the parks while exploring the wonderful world of turtles, snakes and frogs;

Howard County GreenFest

- FY2017 was the tenth year for the County to host its' annual GreenFest. The theme this year was "Earth Day Every Day" and featured many exhibits and vendors dealing with tree plantings, energy efficient home improvements, rain barrels, gardening and composting, Goodwill donations, CD/DVD collections, as well as live bird and reptile displays. Other features included the County's recycling program, SWM Division talking about illicit discharge prevention, and community tree planting programs as well as many community groups focused on environmental awareness. Festival attendance this year was over 2,000 individuals. Since the beginning, attendance has reached over 201,300 people.

Innovative Recycling Programs and Demonstrations

- Robinson Nature Center partners with local and regional groups to promote programs that recycle organic materials for uses consistent with mitigating stormwater runoff and sediment discharge.
- Since 2013, Howard County Master Gardeners have held free compost demonstrations at the Center during which residents of the County are provided with instructions on how to create and manage their own backyard compost piles. Howard County's Office of Recycling provides free compost bins to residents at these demonstrations. The residential composting operations allow families to use organic, natural fertilizer in place of commercial and chemical fertilizer. In addition to providing the composting demonstration area, the staff at Robinson Nature Center actively composts organic food waste at the center.
- Since 2013, Robinson Nature Center has maintained a partnership with the Oyster Recovery Partnership. The Center has been working as an official drop-site for oyster shell recycling. Members of the public can drop their oyster shells at the Center's shell recycling caddie and staff from the ORP retrieves the shells for use in oyster reef recovery programs in the Chesapeake. The recycled shells provide substrate upon which new oysters can grow, thus helping revitalize the oyster population and its valuable ecosystem service of filtering the waters of the Chesapeake Bay. Robinson Nature Center has recycled over 50 bushels of shell. That shell will provide homes for nearly 250,000 baby oysters to be planted back into the Chesapeake Bay watershed.

Disseminating information by using signs, articles, and other media outlets

- The Robinson Nature Center facility educates the public about green technologies, sustainability, environmental stewardship and techniques that can help reduce stormwater runoff, as well as reducing water and energy consumption:
- Stormwater mitigation is achieved on the property through a pervious concrete parking lot, four separate bioretention/rain gardens and a green roof. These items are highlighted on our LEED tours which we offer by group reservation as well as during special events throughout the year. The parking lot is vacuumed as needed during the year to maintain its pervious nature. Our maintenance staff monitors and maintains the plantings within the four bioretention areas. In FY17 we received support from Howard EcoWorks to complete significant maintenance of these rain gardens. The pervious concrete parking lot, green roof and rain gardens are also highlighted for visitors with interpretive signs.
- Interpretive signage in the building and on the center's grounds describe to visitors how different features reduce the environmental impact of the building by mitigating stormwater run-off and minimizing water and electricity use.
- A backyard demonstration area shows the public what they can do on their own properties to improve the management of water. Rain barrels demonstrate catchment of water for use in the garden and native plants demonstrate low-maintenance landscaping.
- The Chesapeake Bay exhibit (one of three permanent exhibits in the building) educates the public about water quality issues. A scaled reproduction of the Bay covering the floor of the exhibit allows visitors to walk the connections between Howard County and the Bay. Through interactive displays, visitors learn about the plight of oysters, how products they use can contribute to storm water runoff issues and how they can help save the Bay.
- A touch tank filled with sea creatures has been added to our Children's Discovery room. This tank serves as an extension to our Chesapeake Bay exhibit and further demonstrates how bodies of water are connected. Our educators and volunteers interpret the dependence of aquatic animals on our land use decisions that affect the quality of their habitat. Extensions of these concepts are also shared through docent carts through which volunteers discuss oysters and horseshoe crabs, two prominent species, in the Chesapeake Bay.
- In FY2017, Robinson Nature Center hosted 29,791 visitors through the building

Promoting educational programs in schools, businesses, community associations
Natural and Historic Resources Division

Students Branching Out

- In the spring of 2013 the Howard County Recreation and Parks partnered with the Office of Sustainability to apply for a grant from the Chesapeake Bay Trust. The purpose of the grant was to combine efforts at improving water quality and stream health with student education. $373,100 was awarded to be used by June 30th, 2015 for the involvement of students in planting 6,300 trees on a total of 47.5 acres.

- In the fall of 2013 further funding was requested to expand the Students Branching Out project. An additional $448,000 was granted to plant 8,000 more trees on 40 acres of school property and parkland by 2015. The Department of Public Works and the Howard County School System joined Recreation and Parks and Office of Sustainability to strengthen the outcome of the project by bringing together various areas of expertise.

- While the grant ended in 2015 The Department of Recreation and Parks and the Department of Community Sustainability want to continue planting efforts on school properties, partnering with teachers and students, as funding allows. Funding will come from Turf to Trees and Stream ReLeaf programs, so tree totals will be reported through those programs.

Year	Students Engaged
CY2017	265
Total	265

Trout in the Classroom at Robinson Nature Center

- Robinson Nature Center has continued to successfully raise Rainbow Trout in partnership with the Trout in the Classroom program. From January – June when the trout are growing at the Center, they serve as an educational tool and are utilized during school field trips, public programs and summer camps. Nature Center educators are able to demonstrate the value of clean water and healthy habitat using the trout as an example of an animal that has been impacted by human disturbance to the watershed. In FY2017, the Nature Center gave their fish to many Howard County schools prior to the end of the school year. Ultimately, students released over 200 trout into the Middle Patuxent River

- In FY2017, Robinson staff led 483 programs (including 80 field trips, 263 public programs, 31 camps, 15 scout programs, as well as 94 birthday parties). These programs engaged over 17,465 participants. Mission-driven programming connecting participants to their natural resources is a key component of the Nature Center's goals and promotes environmental stewardship to all generations. Key programs of note contributing to education on issues such as storm water runoff, recycling, pollution management and integrated pest management include:
    - World to A River Dweller Field Trip
    - Water Works Field Trip
    - It's Easy Being Green Field Trip
    - Battlefield Earth Field Trip
    - Native Plant Sale
    - River Explorers and Epic Water Ventures Summer Camps
    - Scout programs ("Use Resources Wisely" and "Make the World a Better Place" for Daisy Girl scouts; "Water" badge for Ambassador Girl Scouts; "Into the Wild" for Webelos Boy scouts; LEED building tours and volunteer service opportunities for scout troops)

Environmental, Educational Events at Schools/Institutions of Learning

- Exhibited at Howard County Community College's "Sustainability Day". Spoke with approximately **400** students. Thirty environmental and HC governmental organizations/agencies attended and gave presentations.
- Attended HCC's "Career Day", emphasized environmental education, internship opportunities and the Center's sustainability projects to **200** attendees.
- Exhibited at the Howard County Office of Children and Families Early Care in Education Conference at the Sheraton Inn in Columbia. Approximately **300** child care professionals attended the conference. Provided flyers and literature about professional development opportunities facilitated by Robinson staff for educators and child care providers; Project Wet and Project Wild-Aquatic Wild, (Environmental curriculum that's water based).
- Participated in a "Service Learning Fair" at Howard Community College. Approximately **200** students engaged in the event and four students signed up to volunteer for trail maintenance projects at Robinson. Jessica Klug, Service Learning Operations and
- Exhibited at MAEOE's Annual Conference entitled "Investigate & Create" the Science and Art of Environmental Education. Approximately **600** environmental industry professionals attended the various classes, workshops, exhibits and networking events throughout the four-day conference. Participants included Non-Formal Educators, Classroom Teachers, School and Organization

Administration, Government, School Facility Staff and the Private Sector.

- Attended the Master Naturalist Graduation Ceremony at Robinson, coordinated and facilitated by Kelly Vogelpohl and received my Master Naturalist Certificate. Approximately 45 people attended the ceremony.

STEM/STEAM Events:

- Participated in Port Discovery's "STEM in Spring" an outreach science event. I took flashlights, colored film sheets, magnifiers and spectroscopes for the children to use to view colors and refracted light. This educational activity was designed to assist in identifying differences in vision between species, specifically differences between humans, bees and snakes. There was great foot traffic and attendance this year, about **1,500** people from the region traversed through the museum.
- STEAM event at the Sheraton in Columbia. STEAM is an acronym for **S**cience, **T**echnology, **E**ngineering, **A**rt and **M**ath. Provided attendees information about Bay pollution and Robinson's efforts to assist with the Oyster Recovery Partnership program to help clean up the bay by providing a collection site for oyster shells which will be cleaned, reseeded with spat and returned to the Bay to replenish oyster population. I encouraged and invited approximately **250** attendees to visit RNC to drop off their used oyster shells at our collection bins.
- Science, Technology, Engineering, & Math (STEM) Internship Fair at Howard Community College. Handed out flyers on viability of Stream Insects and Crustaceans to approximately **150** students.
- Facilitated staff engagement and activities for "STEMulating Minds" at HCC. The event was for students of all ages. There were **3000+** attendees happy to tour the new Science Building where the event was held.

5. Property Management and Maintenance

a. Howard 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.

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;
ii. Inlet inspection and cleaning;
iii. Reducing the use of pesticides, herbicides, fertilizers, and other pollutants associated with vegetation management through increased use of integrated pest management;
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
v. Ensuring that all County staff receives adequate training in pollution prevention and good housekeeping practices.

The County shall report annually on the changes in any maintenance practices and the overall pollutant reductions resulting from the maintenance program. Within one year of permit issuance, an

alternative maintenance program may be submitted for MDE approval indicating the activities to be undertaken and associated pollutant reductions.

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Bureau of Environmental Services (BES)

County Facilities – Notice of Intent (NOI)
The County has identified and listed County owned and municipal sites needing a permit below. Stormwater Pollution Prevention Plans (SWPPPs) are reviewed annually, updated as necessary and placed in the associated SWPPP binder.

County Landfills
As required by the industrial NPDES discharge permits, Howard County DPW monitors surface discharge from groundwater treatment systems. The County maintains General Industrial NPDES Discharge permits from MDE for New Cut and Carrs Mill landfills and an Individual Industrial NPDES Discharge permit with Stormwater for Alpha Ridge Landfill. Alpha Ridge Landfill is the only site under the NPDES permit that has stormwater requirements. The other two sites do not have stormwater requirements associated with their NPDES permits.

Alpha Ridge – The current State Discharge Permit #13-DP-3224, NPDES Permit #MD0067865 is effective as of 2/21/15 and will expire on 1/31/20. This permit required Howard County to apply for coverage under General Permit 12-SW. Howard County submitted the NOI and SWPPP for General Permit 12-SW on 8/5/15. MDE then assigned Registration of Application No. 12SW3054 and NPDES No. MDR003054 to this site. The landfill is still active, but the majority of Howard County's solid waste is transferred out of state to Virginia. Alpha Ridge Landfill still buries a small amount of the overall waste generated within the County. The transfer station has been operational since September 2005. The installation of the groundwater remediation system was completed in 2000 and has been operating since that time.

Park Equipment Maintenance Shops and Fueling Facilities
The MDE Wastewater Permits Program has agreed that the following park maintenance shops and fueling facilities are not required to apply for coverage under General Permit 12-SW. However, Howard County will continue to implement the BMPs identified in the previous SWPPPs at these sites.

- Cedar Lane Park Equipment Maintenance Shop
- Centennial Park Equipment Maintenance Shop
- Corridor Road Fueling Facility
- Rockburn Branch Park Equipment Maintenance Shop
- Savage Park Equipment Maintenance Shop
- Schooley Mill Equipment Maintenance Shop
- Western Regional Park Equipment Maintenance Shop

County Facility Wash Racks
In August 2011 a review of vehicle washing efforts at County fire stations, police stations, and several County parks identified the need for better treatment for vehicle wash water, in particular when vehicles are washed outside. As part of the design the County will harvest rainwater for use in vehicle washing operations. The County has completed a feasibility study and a preliminary design of all 14 locations. The entire budget for design and construction is approximately $4.8 million.

Construction is complete at five locations, ongoing at one location and started in August 2017 at one more location. See list below of the status of all the vehicle wash pad/rainwater harvesting systems.

Table 4: Howard County Vehicle Wash Pad/Rainwater Harvesting Sites

Facility	Address	Vehicle Washing	Industrial Activities
Alpha Ridge Landfill	2350 Marriottsville Rd Marriottsville, MD	Y - wash water is directed to sanitary sewer	Y - SWPPP
Banneker Fire Station (#7)	5815 Banneker Rd Columbia, MD	Y - indoors only	N
Bethany Fire Station (#8)	9601 Old Frederick Rd Ellicott City, MD	Y - wash water is directed to sanitary sewer	N
Cedar Lane Park Maintenance Shop	5081 Cedar Lane Columbia, MD	N	N
Centennial Park Maintenance Shop	10000 Route 108 Ellicott City, MD	Y – wash water is contained, pumped out, and delivered to the Recreation & Parks HQ wash bay	N
Central Maryland Transit Operations Facility	8800 Corridor Rd. Annapolis Junction, MD	Y - indoors only	Y - SWPPP
Clarksville Fire Station (#5)	5000 Signal Bell Lane Clarksville, MD	Y - indoors only	N
Cooksville Maintenance Shop	14212 Frederick Rd Cooksville, MD	Y - wash water is captured and trucked to WWTP	Y - SWPPP
Dayton Maintenance Shop	4301 Route 32 Dayton, MD	Y-wash water is captured and trucked to WWTP	Y - SWPPP
Elkridge Fire Station (#1)	6275 Old Washington Blvd Elkridge, MD	Y-indoors only	N
Ellicott City Fire Station (#2) Ellicott City, MD	4150 Montgomery Rd Ellicott City, MD	Y - wash water is directed to sanitary sewer	N
Glenwood Fire Station (#13)	14620 Carrs Mill Rd Woodbine, MD	Y - wash water is recycled	N
Lisbon Fire Station (#4)	1330 Woodbine Drive Lisbon, MD	Y - indoors only	N
Long Reach Fire Station (#9)	5950 Tamar Drive Columbia, MD	Y - wash water is directed to sanitary sewer	N
Little Patuxent Water Reclamation Plant	8900 Greenwood Place Savage, MD	Y - wash water is directed to sanitary sewer	Y - SWPPP
Mayfield Maintenance Shop	7751 Mayfield Ave. Elkridge, MD	Y - wash water is directed to sanitary sewer	Y - SWPPP
Public Safety Training Center	2200 Scott Wheeler Dr Marriottsville, MD	Y – wash water is directed to sanitary sewer	N

Facility	Address	Vehicle Washing	Industrial Activities
Recreation & Parks Headquarters	7120 Oakland Mills Rd Columbia, MD	Y - indoors only	Y - SWPPP
Ridge Rd. Maintenance Shop	8800 Ridge Rd. Ellicott City, MD	Y - indoors only	Y - SWPPP
Rivers Park Fire Station (#10)	10155 Old Columbia Rd Columbia, MD	Y - indoors only, outdoor washpad construction starting in 8/17	N
Rockburn Branch Park Maintenance Shop	6105 Rockburn Branch Park Rd. Elkridge, MD	N	N
Savage Fire Station (#6)	8521 Corridor Rd Savage, MD	Y - wash water is directed to sanitary sewer	N
Savage Park Maintenance Shop	8400 Fair St. Savage, MD	N	N
Scaggsville Public Safety Complex (#11)	11226 Scaggsville Rd Laurel, MD	Y - indoors only, outdoor washpad under construction	N
Schooley Mill Park Maintenance Shop	12975 Hall Shop Rd Highland, MD	N	N
Utilities Maintenance Shop	8250 Old Montgomery Rd Columbia, MD	Y - wash water is directed to sanitary sewer	Y - SWPPP
West Friendship Fire Station (#3)	12535 Old Frederick Rd Sykesville, MD	Y - wash water is directed to sanitary sewer	N
Western Regional Park Maintenance Shop	15040 Carrs Mill Rd Woodbine, MD	N	N

County Wastewater Treatment Plant (LPWRP)

There were no spills reported to Maryland Department of the Environment (MDE) from July 1, 2016 – June 30, 2017.

There were 248,352,000 gallons of Reclaimed Water sent to the National Security Agency from July 1, 2016 through June 30, 2017.

Annual Inspections

Plant inspections for the SPCC Plan are completed on a monthly schedule. Any significant findings are reported to the Bureau of Environmental Services with corrective actions and follow-up correspondence. Each inspection is scanned and saved at LPWRP.

Plant inspections for the SWPPP are completed on a quarterly basis. All findings are recorded and reports are sent to Environmental Services and saved at the LPWRP.

Pollution Prevention and Good Housekeeping Practices Training

For all industrial permits listed below, SWPPPs have been developed for each site and employees are trained annually, at minimum. Each year County staff is required to attend training which includes the SPCCs, the SWPPPs, IDDE and handling hazardous wastes. Training for FY17 was completed in January 2017.

The following inspections are conducted at the facilities covered by the industrial permits

- Alpha Ridge Landfill
    - Weekly inspections of drainages areas which include unstabilized landfill areas, active land application areas, material storage, and waste exposed to precipitation.
    - Monthly inspections of the rest of the drainage areas.
    - Quarterly facility inspections of the entire site.
    - Quarterly visual monitoring inspections of flow from each outfall. This was required to start in the first full quarter after the County was notified of coverage under 12-SW, which was the fourth quarter of calendar year 2015.
    - Quarterly Benchmark monitoring of the outfalls from drainage areas that call with Sector L: Landfill and Land Application Sites, and Sector C: Chemicals and Allied Products (the pilot composting facility). Benchmark monitoring was required to begin in the first full monitoring period six months after the County was notified of coverage under 12-SW, which was the second quarter of calendar year 2016.
    - Annual Comprehensive Site Compliance Evaluation (CSCE or Annual Inspection) of the entire site.
- All Other Sites
    - Quarterly facility inspections of the entire site.
    - Quarterly visual monitoring inspections of flow from each outfall.
    - Annual Comprehensive Site Compliance Evaluation (CSCE or Annual Inspection) of the entire site.

Reports of the inspections described above are included as narrative files included in the geodatabase. Note that Annual CSCE inspections are conducted every calendar year, and have not yet been conducted in CY2017. Therefore no CSCE inspection reports are included with this report.

Bureau of Highways (BOH)

The County shall report annually on the changes in any maintenance practices and the overall pollutant reductions resulting from the maintenance program. Within one year of permit issuance, an alternative maintenance program may be submitted for MDE approval indicating the activities to be undertaken and associated pollutant reductions.

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Bureau of Highways (BOH)

The Bureau of Highways (BOH) is responsible for addressing a number of issues concerning pavement, sidewalks, storm drains, and trees along more than 1,000 miles of County roads for the convenience and safety of the public. This work includes preservation efforts such as road crack-sealing and tree trimming, and remedial efforts such as County road snow removal and filling potholes. Some of the areas of operation that the BOH has focused on during the current permit year include:

Street Sweeping

The BOH has continued performing street sweeping with the assistance of a private contractor. Street sweeping occurs on 806 miles of the County's approximately 1,376 miles of curbed roadways. During the period of July 1, 2016 through June 30, 2017, the BOH collected approximately 732.46 tons of street debris via street sweeping. Each street is swept three to four times a year. Each sweeping cycle takes from six to nine weeks to complete. Cycles generally begin in the months of January, April, July and September. In general, each cycle begins in the east part of Howard County and moves westward.

Inlet and Pipe Cleaning

The BOH cleans and repairs storm drain inlets and pipes as needed or as complaints are reported. This work is performed throughout the year through the use of a recently purchased Vactor truck. Additionally, in the fall, the County removes leaf litter from storm drain inlets as needed.

Table 5: FY17 Inlet and Pipe Cleaning

Work Performed	Amount and units
No. of Inlet Repairs	8 ea.
No. of Inlet Cleaned	35 ea.
Amount of Debris from Inlet	180 tons
No. of Pipe Replacements	9 ea.
No. of Pipe Cleaned	40 ea.
Amount of Debris from Pipe	270 tons

Pesticides, Herbicides and Fertilizer

The County continues to minimize the amount of pesticides, herbicides and fertilizer used. The chemicals listed in the Chemical Application Associated Table of the geodatabase were used to control vegetation along the county's guard rails.

Table 6: FY17 Pesticides, Herbicides and Fertilizer

Herbicide Name	Amount and units
Oust	34.4 oz.
Cornerstone Plus	22.8 gal.
Pennant	11.4 gal.
Surfactant	5.7 oz.

Snow and Ice Removal

The BOH continues to utilize and update AVL and GIS technology to record where and when de-icing chemicals were applied on county roads during winter storm events. This minimizes the possibility of inadvertent multiple applications of deicing chemicals. The chemicals listed in the Chemical Application Associated Table of the geodatabase were used to for deicing the County's roads in FY17. According to the Baltimore, MD Snowfall data available from the National Weather Service Forecast Office for the Baltimore/Washington area, Howard County received approximately 3.0 inches of snowfall during the 2016-2017 winter season. MD Snowfall data are available online at:
http://www.weather.gov/media/lwx/climate/bwisnow.pdf.

Table 7: FY18 BOH Snow & Ice Removal Material

Highway Zone	Salt (tons)	Liquid Magnesium (gal)	Salt Brine (gal)
East	4,510	2,000	0
West	1,809	0	0
Central	3,910	150	42,000
Total:	10,229	2,150	42,000

Snow and Ice Removal Training

The BOH holds a Snow Rodeo event every October which Highway staff are required to participate. At this event staff use their skills to navigate through a course for them to drive a full size snow plow through narrow pathways while missing all obstacles. In addition to missing obstacles the crews practice backing up without hitting a barrier, pushing a log into a designated slot. This event is a fun activity that also allows the County snow plow/salt truck drivers to hone their skills and make them more efficient during actual snow/ice events.

Department of Recreation and Parks (DRP)

Street Sweeping

The parking lot at Robinson Nature Center is vacuumed as needed during the year to maintain its pervious nature. Our maintenance staff monitors and maintains the plantings within the four bioretention areas. In FY17 we received support from Howard EcoWorks to complete significant maintenance of these rain gardens. The pervious concrete parking lot, green roof and rain gardens are also highlighted for visitors with interpretive signs.

Inlets Inspection and Cleaning

Zone 1 staff maintains a variety of inlets, storm drains, and swales within their respective sites. There are 40 storm drains that are located within Zone 1. The maintenance of the storm drains is painting, cleaning out, replacing hardware, and maintaining positive drainage. Staff spends roughly 50 hours per year on storm drain maintenance. Staff also maintains 10 inlets performing the following functions: removing invasive materials, maintaining a proper buffer zone, fixing any hardware issues, and litter/debris removal. This effort takes approximately 60 hours per year. Staff also maintains roughly 1,000 feet of swales through litter/debris removal, maintaining positive drainage, and routine trimming. This effort takes approximately 50 hours per year.

Zone 2 has spent 80 hours annually to inspect and clean twenty-one inlets receiving drains to maintain stormwater systems on park land. Large inlets/stormwater pipe outflows are cleared by Department of Public Works, where the scope of work is beyond our capabilities.

The pond crew comes out annually to mow and remove the woody growth from the storm water pond area. Our staff conducts quarterly inspections, approximately 10-20 hours a year, to check for holes created by burrowing animals, and to ensure there is no evidence of run off from sediments.

Pesticides, Herbicides and Fertilizer

Park Operations will be incorporating a new fertilizer application maintenance plan that is phosphorous free. This is an organic granular product that is less labor intensive than the 3-tier liquid formulation the Department was using to meet the recommendation requirements issued for fertilizer by the State of Maryland Department of Agriculture. The organic product will require two applications per year as opposed to nine applications previously

being applied with the 3-Tier solutions. This will reduce our footprint on fossil fuel usage, equipment care and maintenance, man hours and subsequently reduce compaction of our soil structures while increasing water and oxygen infiltration to plant roots. 35 acres of athletic fields and common areas will be treated. A focus on continued efforts to maintain turf stands and reduce stormwater erosion and runoff is being made. Howard County Parks has implemented and continues to use the latest technology and resources available to be a leader in conservation efforts to manage and protect our natural resources.

Zone 1 has cut down its use of pesticides this past year. The Zone used only 115 oz. of pesticide, compared to 128 oz. the year prior; almost a 12% reduction of pesticides used. The pesticide used is Prosecutor which is a non-selective herbicide that is used to kill any unwanted leafy growth. It is mainly used on sidewalks, curbs, warning tracks, fence lines and parking lot areas. The Zone was able to cut down on the amount of chemicals used by string trimming around fence lines instead of spraying, and hand pulling weeds in mulch beds/tree rings.

Zone 2 Pesticide usage has been reduced by 50% at Community parks to include the usage of Glyphosate. Alternative organic solutions being tested by the Department of Agriculture to include acetate, a derivative of vinegar, this material is being sold on the market but has not been assigned a regulatory number by the Department of Agriculture.

Zone 4 has reduced use of pesticides. The zone makes every effort to hand pull or trim weeds. When this is not feasible, we will spot spray.

The Department researched the merits of pesticide free parks and has started a pilot study.

- Consultant was hired in 2013
- Pilot site had been selected: Dayton Oaks Park
- Site evaluation is in progress
- Methodology to be tested:
    - Freeze
    - Burn
    - Vinegar
    - Horticulture oil
- The Department has tested the freezing method for weed control at Dayton Oaks Park but found it be too cost prohibitive. The steaming method was also not effective. All methods were either cost or time consuming. We have returned to manually removing and spot spraying invasive weeds.

Snow and Ice Removal

Zone 1 staff use motorized equipment, hand tools, and ice-melt materials to clear snow and ice from park roadways, pathways, ball courts, and school pathways. When possible, an organic corn-cob derivative product called “Dri-Zorb” is used in place of granular calcium chloride

Zone 2, 3 and 4 deicing efforts have been handed over to one crew. This crew has been trained in the proper calibration of the equipment used. The formation of this crew has reduced wasted materials as there is one sole group focused on all of the areas and they are able to monitor the walks more closely and effectively which maximizes efficiency.

Pollution Prevention and Good Housekeeping Practices

- Zone 1 adheres to all standards in regard to hazardous material handling and spill response. Regular inspections of material storage and spill remediation are conducted though Clean Harbors. This is intended

to identify and improve social, economic, and environmental impacts. Adherences to these standards help prevent the release of hazardous material into the environment.

- Staff has attended a variety of trainings this year to help them towards their goals of being more aware in pollution elimination and water runoff. Some of these trainings include: Trail maintenance workshops, Hazmat training, Annual Storm Water Pollution Prevention Training, and Proper Planting Techniques.
- Centennial Maintenance Shop has installed four spill clean-up stations to collect fluid spills from equipment leaks and fluid fill areas. Vehicles are equipped with small fluid spill kits for spills that could potentially occur during transport of small fluid containers. A monthly SWPPP report is filed with the Waste Management Division. 1,750 pounds of spill waste has been collected and removed from the Maintenance Shop since implementing the stations.
- Vehicles and equipment are cleaned off site at designated facilities equipped with wash bays reducing runoff from park operation maintenance sites.
- SWPPP are in place for the Schooley Mill Park and Western Regional Parks Maintenance Facilities. This is a monthly inspection/report to monitor water runoff from the maintenance yards. This also includes yearly inspection on the condition of the sediment ponds affiliated with these maintenance yards.
- SWPP (Storm Water Protection Plan) is in place to ensure that run-off around Rockburn's maintenance shop is eliminated. The plan was created by Environmental Services who conduct inspections 2 times a year and trains staff on proper protocols for maintenance and vehicle cleaning.
- The Zone cleans paint machines in proper locations, we use turf carts vs trucks whenever possible, we clean all spills properly and use pig mats when we are aware of machine leaks. Our staff fuels all equipment inside as well.

6. Public Education

Howard 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.

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.

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.

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Compliance Hotline

The Howard County website posts a Hotline number, (410) 313-6447, which visitors can call to reach the Bureau of Environmental Services. Managers and inspectors responsible for the County's IDDE program respond to these calls within 24 hours, Monday through Friday. Complaints that come in during the weekend are referred to 911 or the 24 hour MDE Spill Hotline at (866) 633-4686.

Complaints include but are not limited to illicit discharges, dumping and spills. All complaints are kept in a database. The County website also hosts an illicit discharge form that visitors can fill out and send directly to the manager of the IDDE Program. In addition, the County also is part of Tell HoCo, a SeeClickFix, smartphone application that allows anyone in Howard County to report an illicit discharge directly to the IDDE Manager.

Increasing Water Conservation

Robinson Nature Center

The Robinson Nature Center, in operation since September 2011, serves as a model of innovative water conservation methods and officially received its LEED Platinum certification by the USGBC in 2012. Innovative water conservation methods incorporated into the building and property include:

- Porous Paving in the parking lot
- Geothermal HVAC heating and cooling system that utilizes rain water collected in tanks underneath the Porous Paving in the parking lot
- Contracted for Green Power
- Green Roof technology
- Efficient Landscapes including four rain gardens that incorporate native plantings
- Water use reduction using waterless urinals and high efficiency toilets and faucets
- More than 100 native perennials and grasses were planted and mulched and will continue filtering runoff pollution, recharging local groundwater and improving water quality throughout the Middle Patuxent watershed.
- The vegetated Green Roof had an additional 115 sedums planted in efforts to reduce stormwater runoff and provide habitat for pollinators and other wildlife.
- Native plantings continue to be incorporated throughout the property, including in the center's backyard demonstration area that serves as an educational display for residents. Existing native plantings continue to be monitored, maintained through regular volunteer weeding events and replaced as needed when predation occurs. These plantings reduce the need for irrigation, pesticides, herbicides, etc., while providing a habitat for wildlife.
- Working with local nurseries and volunteers, the center planted almost 75 new native trees and shrubs along hillsides and surrounding portions of the trail to further enhance soil stabilization in these areas.
- Two trail reroutes were constructed along the Sycamore Stroll trail corridor. These re-routes improved the trail grade to allow easier access for visitors and reduced the amount of erosion

occurring. Additional sections of trail will be assessed and addressed for FY2018.

- Storm drains located along the Cedar Lane entrance of the Nature Center had "Chesapeake Bay Drainage" stenciled onto them, thus educating visitors about the importance of proper disposal of pollutants that could affect local waterways and wildlife.
- Since 2012, the Nature Center has participated as a host site for "Project Clean Stream", a Baltimore regional stream and watershed clean-up effort. In FY2017, invasive plant species including, Wineberry, Multi-flora Rose, and Japanese Honeysuckle were targeted. Volunteers cleared said species and allowed the opportunity for reforestation plantings to occur.
- Using the building as a teaching tool – the Robinson Nature Center facility educates the public about green technologies, sustainability, environmental stewardship and techniques that can help reduce stormwater runoff, as well as reducing water and energy consumption:
- Stormwater mitigation is achieved on the property through a pervious concrete parking lot, four separate bioretention/rain gardens and a green roof. These items are highlighted on our LEED tours which we offer by group reservation as well as during special events throughout the year. The parking lot is vacuumed as needed during the year to maintain its pervious nature. Our maintenance staff monitors and maintains the plantings within the four bioretention areas. In FY17 we received support from Howard EcoWorks to complete significant maintenance of these rain gardens. The pervious concrete parking lot, green roof and rain gardens are also highlighted for visitors with interpretive signs.
- Interpretive signage in the building and on the center's grounds describe to visitors how different features reduce the environmental impact of the building by mitigating stormwater run-off and minimizing water and electricity use.
- A backyard demonstration area shows the public what they can do on their own properties to improve the management of water. Rain barrels demonstrate catchment of water for use in the garden and native plants demonstrate low-maintenance landscaping.
- The Chesapeake Bay exhibit (one of three permanent exhibits in the building) educates the public about water quality issues. A scaled reproduction of the Bay covering the floor of the exhibit allows visitors to walk the connections between Howard County and the Bay. Through interactive displays, visitors learn about the plight of oysters, how products they use can contribute to storm water runoff issues and how they can help save the Bay.
- A touch tank filled with sea creatures has been added to our Children's Discovery room. This tank serves as an extension to our Chesapeake Bay exhibit and further demonstrates how bodies of water are connected. Our educators and volunteers interpret the dependence of aquatic animals on our land use decisions that affect the quality of their habitat. Extensions of these concepts are also shared through docent carts through which volunteers discuss oysters and horseshoe crabs, two prominent species, in the Chesapeake Bay.
- In FY2017, Robinson Nature Center hosted 29,791 visitors through the building.

Environmental Quality Incentives Program (EQIP)

The USDA, NRCS continued to work with the HSCD to administer EQIP, the main conservation cost-share program available to farmers and farm owners from the federal agriculture department. The following practices were installed in the County through this program:

(1) 2109 square feet High Tunnel
(2) 4 each Watering Facility
(2) 0.3 acre Heavy Use Area
(3) 0.5 acre Critical Area Planting
(1) 0.1 acre Grassed Waterway
(1) 5325 linear feet Fencing

Conservation Reserve Enhancement Program (CREP)
The USDA continued to work with HSCD to administer CREP, a streamside buffer cost-share program available to farmers and farm owners from the federal agriculture department.

(1) 2.8 acres Riparian Forested Buffer

Practices Completed with State or Local Cost Share or Without Cost Share Assistance
These practices were completed with technical assistance from the HSCD. Some projects received cost sharing from either Maryland Agriculture and Water Quality Cost Share (MACS) program or Patuxent Reservoirs Watershed Protection Group local cost-share program while other practices received no cost-share.

(6) 3.4 acres Grassed Waterway
(1) 1 each Watering Facility
(1) 250 feet Diversion
(3) 3 each Grade Stabilization Structure

Conservation Planning
In providing technical assistance, the HSCD writes conservation plans. Plans are also written for land that is proposed for the agricultural land preservation program. Also, existing preservation parcels have conservation plans that may be updated. There were 29 new conservation plans on 2,858.8 acres and 9 revised conservation plans on 1,284.4 acres written by the HSCD office.

Environmental Stewardship
In partnership with the National Security Agency (NSA) and Howard County LPWRP, highly treated wastewater is diverted and utilized as cooling water for national security technology. Much of the water will be evaporated during the cooling process.

A carbon-neutral power backup system was created at the Plant, which includes the combination of solar panels and diesel generators to ensure the Plant operates in all weather conditions and avoids potential overflows.

Plant personnel attend the Howard County Fair to hand out information on the treatment plant and on how to keep the sewers from getting clogged and causing overflows. This information includes proper disposal of grease.

Stormwater Management – A study was conducted to determine the cause of deterioration of 3 stormwater outfalls at the Plant along the Little Patuxent River. Out of the study a project was started to rehabilitate the three outfalls. The design was completed in December, 2016. The project was broken into two phases due to timing and stream closure. Phase 1 included the rehabilitation of Outfalls E and F and was completed in March 2017. Phase 2 is scheduled to begin in October 2017 and will include rehabilitation of Outfalls C and D.

Residential and Community Stormwater Management Implementation and Facility Maintenance

Rain Barrel Program
The SWMD continues to provide residents with free barrels through the County's Rain Barrel Program. Pre-drilled rain barrels are available free of charge to residents who attend seminars at the Alpha Ridge landfill. Residents purchase the hardware needed and the Master Gardeners provide free instruction on how to

assemble the rain barrels. In FY17, Howard County gave away 27 rain barrels to residents through workshops held at the Alpha Ridge Landfill. The County also provided 38 free rain barrels to residents at GreenFest.

Residential Pool Discharge

Howard County mailed out two letters to residential pool owners advising them of the requirements for draining pools (correct pH, drain slowly, and lower disinfection levels to less than 0.40 mg/L).

Middle Patuxent Environmental Area (MPEA)

- The MPEA Integrated Natural Resources Management Plan for the 1,021-acre environmental area was initially drafted in June 2000, and was last updated in January 2017. The plan outlines strategies, techniques and protocols for environmental education, research, recreation, natural resources management and administration. The plan is updated annually.
- The implementation of the plan's projects and programs in FY2017 has included the following accomplishments:

- 1,152 volunteer hours were spent maintaining 5 ½ miles of trails, conducting wildlife and stream surveys, controlling invasive exotic vegetation, planting native trees and shrubs and assisting with the managed deer hunts in the MPEA.
- Implementation of the MPEA Woodcock Habitat Management Plan to restore breeding habitat for American woodcock and other early-successional species within the Middle Patuxent River watershed continued as an ongoing project in FY2017. In spring 2016, an additional acre (mostly autumn olive and multiflora rose) was restored to native early successional habitat to benefit woodcock and other meadow/shrub-scrub species. A transitional edge shrub border was planted in this new meadow, and maintenance included invasive species control, reseeding of any bare patches, and winter meadow mowing.
- The MPEA Independent Trail Maintenance Team volunteer program contributed 257 hours in FY2017, with much of the time being spent on the installation and maintenance of drainage and erosion control structures. Check dams and water bars were installed and maintained along trails through riparian areas where trail erosion was evident.
- Between the Conservation Stewardship and the Weed Warriors programs, a total of 582 volunteer hours were contributed to the removal of non-native, invasive plant species and replanting of native trees and shrubs within the environmental area.
- A donation from the Howard County Forestry Board/MUCFC, and a donation from the Howard County Bird Club, funded the planting of 224 trees and shrubs in the MPEA during FY2017.
- MPEA staff and Conservation Stewardship Program volunteers worked to maintain native tree and shrub planting sites from previous seasons. Tree shelter maintenance, invasive removal and monitoring was conducted on 1,920 native trees and shrubs previously planted in MPEA stream buffers and upland habitats.
- MPEA staff completed a systematic evaluation of all 35 storm drain outfalls within the environmental area in 2010, and in 2011 an additional 38 storm drain outfalls outside but impacting the area were inspected. Outfalls were placed into severity rating categories as follows: 1 – fairly good (about 50%), 2 – slight to moderate erosion (17%), 3 – slight to moderate erosion with severe stream bank erosion downstream (14%), 4 – moderate to severe erosion; unstable; some impact to infrastructure (14%), 5 – infrastructure damaged/under repair (5%). During the evaluation, one storm drain outfall with severe erosion and infrastructure damage was referred to the Storm Water Management Division and was repaired in 2012 using a regenerative stormwater conveyance design. This project now serves as a demonstration site for innovation in SWM techniques. In 2013, MPEA staff trained volunteers from the Middle Patuxent Environmental Foundation to repeat the original storm drain outfall surveys. 2013 data was compared to the baseline data from 2010 in order to monitor whether the outfalls were stable or if the erosion was

progressing and to recommend actions to minimize future erosion. In FY2017, MPEA staff continued to monitor SDO's for erosion, as well as monitoring the two repaired SDO's at New Country Lane and Great Oak Way for function, tree planting success, and invasive species control.

- A volunteer from the Howard County Legacy Leadership Institute for the Environment (HoLLIE) completed work on conducting macroinvertebrate stream surveys on all 17 tributaries and the main stem of the Middle Patuxent River within the MPEA in 2011. In 2012, a subsequent volunteer continued work on the project with data analysis and creation of a PowerPoint presentation on the results, plus a synopsis of the Middle Patuxent Watershed's scope, stakeholders and education and monitoring strategies. In 2013, a Watershed Stewards Academy graduate used this data in a public presentation, entitled "Slow the Flow", at the Robinson Nature Center. In FY2017, MPEA volunteers continued to build on previous work with ongoing stream monitoring and stream habitat assessments, and are building towards greater outreach to neighborhoods and HOAs.
- Researcher Dr. Sonja Scheffer, from the USDA Systematic Entomology Lab, conducted insect sampling in riparian and upland habitats in MPEA in order to identify and catalog insect fauna and also to provide volunteers with educational experiences relating to entomology, scientific identification methods, insect curation and natural history. A reference collection of curated insect specimens is being created from this project.

Howard EcoWorks (A green jobs training and environmental stewardship program)

Howard EcoWorks has continued to install stormwater BMPs and engage the public in fee for service maintenance. The maintenance program includes letters to past customers who have installed rain gardens, explaining the importance of maintaining them to preserve functionality. Howard EcoWorks maintained, for a fee, rain gardens and bioretention units on 23 different private properties. Howard EcoWorks installed 9 new rain gardens, including the HC Watershed Stewards capstone project. Howard EcoWorks also installed 1 bioretention and two conservation landscapes.

Howard EcoWorks provided Oakland Mills High School with technical assistance on one rain garden.

Howard EcoWorks Program Participants constitute 43 young persons who increased their understanding of stormwater principles through participation in the program.

Howard EcoWorks installed a bioretention treating roughly 0.4 acres of impervious surface in the Greenleaf neighborhood in Columbia, MD. This was after installing several rain gardens in the previous fiscal year and educating members of the community on maintenance and the purpose of rain gardens. Members of the community helped excavate and plant the bioretention.

Commercial/Non-residential

Commercial Credit and Reimbursement Program

During this time period, the Office of Community Sustainability continued the commercial credit and reimbursement program. Eligible property owners were awarded a credit against the Watershed Protection Fee for on-site stormwater management. Before the July 2017 Fee was issued, 67 commercial properties had been approved for credit. There have been no commercial reimbursements granted to date.

Commercial Task Force

In the spring of 2016 the Howard County Executive formed a task force of 11 business property owners with a request that over a series of meetings they review commercial stormwater issues and offer recommendations on ways to increase involvement of these private properties in initiatives to increase

impervious area stormwater management. This group which included commercial property owners, consulting engineers, commercial property managers, and the University of Maryland Environmental Financing Center met over 4 months, being educated on the MS4 program mandate challenge, and reviewing other programs including those in Washington DC and Philadelphia. The ability to find partnerships with these property owners is fundamental to the success of Howard County's MS4 mandate since over 70% of the impervious cover needing management is in private ownership. The group offered 7 recommendations with supporting justification.

1. Target the largest, owner-occupied, commercial and industrial properties with significant areas of land not in use. Recognize that the vast majority of properties will not meet these criteria and will have to be engaged as well.
2. Make outreach and education of the commercial sector as simple and relevant as possible, answering the questions of "why is it their problem?" and "how can participation benefit the owner?". Include messages that (1) there are consequences of the County not meeting its MS4 stormwater permit and (2) the burden of participation will be fairly distributed among all sectors of the county.
3. Develop standard and separate access and maintenance agreements for stormwater projects to meet the MS4 permit obligations. Provide owners with the option of self-performing maintenance or having the County or a third-party perform maintenance.
4. Streamline the permitting process for stormwater management projects needed to meet MS4 permit obligations and consider the options of (1) using standard stormwater designs, (2) hiring a dedicated stormwater permit reviewer, and/or (3) allowing "peer-review" of stormwater permits.
5. Reduction or elimination of the stormwater fee is an insufficient financial incentive for commercial property owners to construct stormwater projects. The county program should consider (1) funding up to 100% of projects, (2) reducing the stormwater fee for owner performed maintenance, (3) tax credits for stormwater projects, (4) relief from parking space requirements and (5) green certification.
6. Create a commercial stormwater program ideally modeled after the current County nonprofit program and similar to turnkey programs in other counties.
7. Ensure a balance of revenue and costs through cost effective implantation and adequate funding. Recognize that the County will need to increase its stormwater fee or property tax, or reduce expenditures from other programs if funds cannot be obtained from other sources.

The report was presented to the County Executive and Council and staff is working to accomplish and/or pilot some of these recommendations. Finding a way to involve the owners of these large impervious parcels is fundamental to the success of the County's MS4 restoration requirement.

Non-Profits

Watershed Protection Partnership

During this period, the Office of Community Sustainability continued the Non-Profit Watershed Protection Partnership (NPWPP). In this Partnership, the County grants a 100% credit to non-profits in exchange for the ability to assess for and implement stormwater management projects on their properties. This program not only accomplishes impervious surface management, but also involves key stakeholders in the stormwater remediation problem, thus increasing public buy-in. There are 231 parcels in the NPWPP, which totaled to approximately $463,000 of Watershed Protection Fee credits during fiscal year 2017.

Two contractors were hired to perform site assessments, designs, and installations of stormwater management practices on NPWPP property. These contractors were instructed to perform the maximum amount of impervious treatment possible for the total available funding of $2 million, $1 million of which was

furnished by an external grant. One contractor is finalizing design for a large stream restoration to be constructed in early FY18. The other contractor has installed a stormwater pond retrofit at Howard County General Hospital to achieve approximately 12 acres of impervious area credit in FY17 and plans to install 2 more stormwater pond retrofits in early FY18.

Residential

CleanScapes

Since an estimated 40% of impervious surface in Howard County is located on residential properties, a residential stormwater program is advisable. The CleanScapes program, administered by the Office of Community Sustainability, offers County residents reimbursement for installation of stormwater Best Management Practices (BMPs) and credit toward the Watershed Protection Fee. During FY17, $24,347 in reimbursements were granted to 41 residents. At the end of FY17, $2,120 was credit to 107 residents. The CleanScapes program also includes periodic public events and promotional materials to improve public education and buy-in. By the end of FY17, approximately 3.7 acres of impervious surface were treated by stormwater BMPs on residential lots.

CleanScapes Communities

The CleanScapes Communities pilot program was developed to increase the number and geographic diversity of residential stormwater BMPs in the County. The pilot program targeted a specific watershed outside of the Columbia Association since incentive programs for these residents were already established. The program was developed utilizing residential input in a Chesapeake Bay Trust-funded focus group and mimicking elements of successful residential stormwater programs.

Two contractors were hired to install rain gardens and rain barrels on residential property utilizing watershed protection funds and a grant from the National Fish and Wildlife Foundation (NFWF). Several elements were adopted to minimize barriers to homeowner BMP implementation including: high subsidy of Best Management Practices (75% covered up-front by Fee funds and NFWF grant), County provision of qualified contractors to install BMPs for homeowners, personal consultations and customized BMP designs for homeowners, provision of maintenance tips and packages to homeowners, plant and structural guarantees for BMPs through the contractors, and complete subsidy of BMPs for low-income homeowners. Contractors were also responsible for educating homeowners on the function and impact of the installed stormwater BMPs, increasing public education on stormwater management. Preliminary results indicate strong, positive changes in homeowner knowledge and attitude toward stormwater management after participation in this program, as well as a desire to engage in other stormwater-mitigating practices on their properties. One of the contractors hired for the CleanScapes Communities project had never performed work on residential properties, encouraging the growth of the residential BMP field.

Approximately 30 homeowners will participate in the pilot program which is finishing in FY18, managing about 0.8 acres of impervious surface. Because of the program's success, it was renamed Rain Gardens for Clean Water and expanded to the entire county (except Columbia Association properties since they already have a similar program available to their residents) for FY18 with $50,000 in funding. Advertising efforts, meetings, and events for this program have reached many more than the actual number of participants.

Septic Savers

The Office of Community Sustainability coordinated with the Health Department, Bureau of Utilities and the staff at the water treatment plant to develop a program that promotes proper septic maintenance. Residents

request a $100 reimbursement when they pump their septic tank every 3-5 years. During FY17, 270 residents applied for the reimbursement which equates to 8 acres of impervious credit treated.

Proper Erosion and Sediment Control Practices

Construction Inspection Division

The Construction Inspection Division (CID) responds to citizen complaints as they relate to development projects under construction. Often times when addressing citizen complaints, it becomes a public education opportunity describing the situation and BMP practices used to address their concerns as they relate to stormwater are explained.

Soil Conservation District

When county residents who reside on private property are having issues with erosion and/or drainage, the Soil Conservation District staff is contacted. A District staff member will meet with the resident to review the issues and consider options. The District will then put together a recommendation report for the resident with recommendations to repair and prevent additional erosion or drainage issues.

Howard EcoWorks

Howard EcoWorks gave away over 500 plants to residents of the Ellicott City watershed to educate citizens about the value of vegetation for stormwater management. The plants were accompanied by planting instructions, and in some cases the crew members assisted with plantings on private properties.

Howard EcoWorks gave two workshops, with combined attendance of 48 attendees, on the topic of using stormwater BMPs to promote habitat connectivity and the relationship between Stormwater Green Infrastructure and Green Infrastructure Networks that are focused on habitat connectivity.

Increasing Proper Disposal of Household Hazardous Waste

The County provides a multifaceted approach to proper management and diversion of household generated hazardous waste. These includes a brochure and web page highlighting what is accepted and not accepted though the County's permanent collection program, along with ways to minimize through safe alternative products other than the standard household chemicals. Promotional material like the brochures are placed at County buildings and libraries.

Improving Lawn Care and Landscape Management

Stream ReLeaf

The Stream ReLeaf Program was initiated by the Howard County Stormwater Management Division (Department of Public Works) in 2003 as part of the implementation of the Little Patuxent River Watershed Restoration Action Strategy. The Program has grown and expanded in scope significantly over the years, and is now managed by the Natural Resources Division of the Department of Recreation and Parks.

Stream ReLeaf is a program designed to enhance riparian (stream) buffers by providing free native trees and shrubs to homeowners. The homeowner commits to planting the trees and shrubs on their property and the County delivers the requested plants. Requirements for the program are as follows: the area that the homeowner is willing to plant must be within 75 feet of a stream (right of ways are not eligible); and the homeowner must commit to planting at least 12 trees. Past performance is presented in the table below.

Table 8: Stream ReLeaf Summary

Year	Number of Participants	Number of Trees Planted
CY 2003	8	103
CY 2004	15	468
CY 2005[1]	1	150
CY 2006	37	1,374
CY 2007	31	1,208
CY 2008[2]	28	709
CY 2009	25	1,908
CY 2010[3]	11	367
CY 2011	81	1,780
CY 2012	32	1,166
CY 2013	69	2,353
CY2014	55	2,281
CY2015-FY2016	32	1150
FY2017	13	700
Total	**438**	**15,717**

[1]Program not staffed.
[2]Some '08 plantings rescheduled for Spring '09.
[3]Some '10 plantings rescheduled for Spring '11.

Turf to Trees

The Turf to Trees program was created in 2016 and is a partnership between the Department of Recreation and Parks and the Office of Community Sustainability. The goal of the program is to aid property owners of lots sized 1.5 to 10 acres with little canopy coverage to convert lawn to forest. The Department of Recreation and Parks meets with interested homeowners to create a planting plan, species list and map out the boundaries of the planting. The County provides the trees and planting labor to qualifying homeowners free of cost. The homeowner must commit to the maintenance of the trees.

Table 9: Turf to Trees Summary

Year	Number of Participants	Number of Trees Planted
FY2017	16	2,062
Total	**16**	**2,062**

*FY2016- Fall only

Compost Demonstration Program & Compost bin give-away

Howard County Master Gardeners held free compost demonstrations and lessons throughout the County, attendees were instructed on how to create and manage their own backyard compost piles. Howard County's Recycling Division provides free compost bins to residents at these demonstrations, and additionally makes them available for pickup at the Alpha Ridge Landfill Resident's Convenience Center and the Bureau of Environmental Services office in Columbia. Approximately 450 compost bins were distributed in 2016. Additionally, staff at Robinson Nature Center and Miller Library actively compost food scraps generated by staff.

Residential Car Care and Washing

Public Education

Residential car care and car washing topics are included in presentations to the public and outreach activities to schools. The County has spoken to the Howard County Public Schools regarding the car wash fundraisers that were being done by many schools. An explanation of the IDDE program and what they can and cannot enter the storm drain system was provided and in general school car wash fundraisers have stopped.

Proper Pet Waste Management

The Bark Ranger Program

In the summer of 2013, the Park Rangers of Howard County Recreation and Parks implemented a new initiative program. "Bark Ranger" encourages patrons to clean up after their pets, more specifically dogs, and to use a leash while visiting a Howard County park. Dog feces not picked up is unsightly and negatively impacts our ground and surface water, and attracts rodents. It is important to keep your dog on a leash. Not only is it the law but it is being considerate to the other park patrons. We encourage you and your pooch to take the pledge and be committed to protecting our environment. Currently the program has 3,229 participants signed up that have taken the Bark Ranger pledge:

My Human and I care about our environment and the safety of others around us.
We pledge to do our "doodie" and clean up after ourselves.
I will remain on my leash by my Human's side at all times.

As part of the Bark Ranger pledge, participants receive a Bark Ranger cloth bandana and a plastic bone which contains baggies to remove pet excrement. Through this initiative, visitors of Howard County Recreation and Parks facilities are made aware of the negative environmental impact that pet feces have. Through this interpretation, those who participate, are appreciated for the "dirty jobs" of pet-ownership and rewarded with a small token.

Information Provided to the Regulated Community

The County provides various stormwater quality to the regulated community related to:

- NPDES Permitting Requirements
- Pollution Prevention Plan Development
- Proper Housekeeping
- Spill Prevention and Response

This information is provided when requested, through presentations, mailings, telephone conversation and one-on-one discussions in person.

Other Public Outreach and Education:

Stream Mapper -

The Office of Community Sustainability's contractors developed a stream monitoring app, the Stream Mapper, and a new user-friendly website, www.streammapper.org for data collected by app users. The website also provides education about watersheds and water quality. This app encourages County residents to visit local streams and collect basic information indicating stream health. This app not only encourages the public to become invested in local stream health, but has helped the County to detect and fix a sewer leak and a loose manhole.

One local group used the app to find a trash cleanup site, resulting in the removal of 3,700 pounds of trash. Several local groups and projects utilize the stream mapper including: the Howard County Watershed Report Card Project, the Howard County Watershed Stewards Academy, Patapsco Heritage Greenway, the Howard County Sierra Club, and Howard Community College. To date, the app has 459 users and 228 reports.

Storm Drain Stenciling

The Office of Community Sustainability developed a storm drain stencil with a local message, "Only Rain Down the Drain: Drains to Patuxent River/Patapsco River" to remind residents that materials dumped in storm drains will result in degradation of local water bodies. To date, over 324 drains have been stenciled by local groups including: Eagle Scouts, Boy Scouts, Girl Scouts, Howard Community College, Howard County Public Schools, Howard County Watershed Stewards Academy, Baltimore Aircoil Company, and Howard EcoWorks. The message itself will remind passersby not to pollute, but has also educated the volunteers stenciling the drains and the communities witnessing the projects.

Community Groups

The Office of Community Sustainability participates in several groups which educate the public about stormwater management, most prominently: the Howard County Watershed Stewards Academy (WSA), the Watershed Improvement Network (WIN), the Howard County Earth Forum, the Watershed Report Card Program, the Maryland Association of Floodplain and Stormwater Managers (MAFSM), the Sierra Club, and Transition Howard County.

Health Department

The Howard County Health Department continues to maintain information on its webpage noting that old prescriptions and medicines should not be poured down the drain or flushed since it may negatively affect the quality of streams, waterways, and the Bay. As part of the on-going Bay Restoration Fund (BRF) grant program, the Health Department is identifying and inspecting qualifying properties with failing septic systems, coordinating the connecting of qualifying homes currently on septic systems within the Metropolitan District, and also evaluating system upgrades for acceptance into the grant program. State legislation effective November 2016 enables non-critical area counties (including Howard) the ability to exercise flexibility in requiring BAT units for all new construction. This flexibility has helped enable a better targeted application of BRF funding, while leaving in place public health priorities. This has also corresponded to a reduction of BAT unit installations in the county since that time. The current grant award of $142,000 is through June 2018 with the potential for an additional supplement midway through the year. The completion of upgrades to most major Wastewater Treatment Plants is now complete, which means that additional funding beginning in FY 2018 will be available for stormwater, combined sewer systems remediation and potentially BRF funding for septic systems. Proposals to MDE will be prioritized upon readiness to proceed, benefit to the public and groundwater. MDE, through HB12 legislation, has established criteria for additional funding criteria to cover administrative costs of the BRF program for each county based upon county agreed to levels of support. Howard County has secured funding through FY 2018 for level 1 support ($30,000 each year). Future renewals and/or supplemental funding will be based upon established criteria and available funding distributed by MDE.

E. Restoration Plans and Total Maximum Daily Loads

In compliance with §402(p)(3)(B)(iii) of the CWA, MS4 permits must require stormwater controls to reduce the discharge of pollutants to the MEP. By regulation at 40 CFR §122.44, BMPs and programs implemented pursuant to this permit must be consistent with applicable WLAs developed under EPA approved TMDLs (see list of EPA approved TMDLs attached and incorporated as Attachment B).

Howard 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 Howard 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, Howard 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.

Annual Update Number 22 Status

Under Howard County's current MS4 permit (Part IV.E.1), the County is required to develop Watershed Assessments to assess current conditions and to identify restoration opportunities to address pollutant reductions in approved TMDLs. In accordance with this requirement, Howard County's SWMD sponsored assessments of the Little Patuxent and Middle Patuxent Watersheds in 2015 which were reported on in AR20. In 2016 the County completed assessments in the Patuxent watersheds (Brighton Dam, Patuxent River Upper, and Rocky Gorge Dam) and the Patapsco watersheds (Patapsco River Lower North Branch, Patapsco River South Branch) thereby completing assessments of all of the County's watersheds. The County scheduled public meetings in late January of 2017 to introduce the assessment results and provide the assessments for a 30-day comment period. No comments were received. The County continues to perform restoration projects from the Watershed Assessments as projects that will provide water quality improvement and impervious area surface restoration.

2. Restoration Plans

a. Within one year of permit issuance, Howard 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, Jun. 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, Howard 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.

b. Within one year of permit issuance, Howard 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, Howard County shall:

I. Include the final date for meeting applicable WLAs and a detailed schedule for implementing all structural and nonstructural water quality improvement 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 the 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.

Annual Update Number 22 Status

To meet the requirements under section IV.E Restoration Plans and Total Maximum Daily Loads, Howard County developed several related projects in 2015-2016. First are the watershed assessments conducted in the Little Patuxent and Middle Patuxent watersheds (2015) and the assessments for the Patuxent and Patapsco watersheds (2016) which were described in the previous annual reports. The Countywide Implementation Strategy, or CIS was developed in 2015 as the County's overall Restoration Plan. The County has updated the CIS based on MDE comments on the 2015 version, the approved impervious baseline, updates to the County's programs and strategies, and County progress made through FY17.

The CIS includes three major elements:

1. Impervious Area Assessment – to set the County's total jurisdictional impervious area, the total treated impervious area, the baseline untreated impervious area, and the 20% restoration target.
2. Impervious Area Restoration – the CIS establishes the current progress and the planned project and programs needed to meet the impervious restoration by the end of the permit in December 2019.
3. TMDL Restoration – the CIS establishes the current progress and the planned project and programs needed to meet the County's stormwater wasteload allocation (SW-WLAs) with cost, schedule, and final dates for meeting each required reduction.

The revised and updated CIS is submitted with this annual report.

Impervious Area Assessment

As a requirement of section PART IV.E.2.a of the County's NPDES MS4 permit the County must conduct an impervious area assessment to define the restoration efforts required under the permit and restore 20% of remaining countywide baseline untreated impervious acres by 2019, the end of the current permit term. The CIS includes the County's impervious accounting to determine the levels of treated, untreated and partially treated impervious surface under County MS4 jurisdiction and presents the County's impervious surface baseline and 20% restoration goal with MDE's approved values.

The County has updated its impervious accounting in the past year as part of the baseline impervious surface area assessment to provide the final baseline untreated value and the associated 20% restoration target. The assessment was first detailed in the County's Countywide Implementation Strategy submitted to MDE with AR20 in December of 2015. Updates to the accounting were completed per MDE recommended changes in the cutoff date between baseline and restoration to be coincident with the end of the County's last permit, June 20, 2010. Howard County submitted the revisions in a report (*Howard County Impervious Accounting: Methods and Results*) to MDE with the FY2016 annual report in December of 2016 to detail the process and baseline results. MDE reviewed the document and provided their comment and an approved baseline in a letter dated April 13, 2017. Appendix 2 of the County's December 2017 revised Countywide Implementation Strategy (CIS) includes the revisions to the document, details the County's original methods, the items approved by MDE and the final results.

The total County MS4 Impervious Area, or the area under Howard County jurisdiction, is 15,226.4 acres. The difference between this value and the total impervious area of 17,728.0 is impervious surfaces under other ownership (state lands) and portions regulated by other NPDES permits (MSHA and industrial sites). The impervious baseline treated area is 2,944.7 acres and the untreated area is 12,281.7 acres. MDE approved a baseline value of 12,299.2. Applying the 20% factor to the untreated area yields a 20% restoration target of 2,459.8 acres. A summary of the assessment per watershed is presented in Table 10.

Table 10: Impervious Area Assessment Summary in Acres

Watershed	Total Impervious Area	County MS4 Impervious Area	Impervious Baseline Treated	Calculated Impervious Baseline Untreated	Approved Impervious Baseline	Restoration Target (20%)
Triadelphia Reservoir (Brighton Dam)	1,511.9	1,378.5	285.7	1,092.7		
Little Patuxent River	8,145.6	7,080.1	1,146.8	5,933.3		
Middle Patuxent River	2,953.9	2,506.9	563.7	1,943.2		
Patapsco River L N Br	3,611.2	2,971.4	638.8	2,332.6		
Patuxent River Upper	372.6	311.0	79.0	232.0		
Rocky Gorge Dam	471.0	426.2	86.0	340.2		
South Branch Patapsco	661.8	552.2	144.6	407.6		
Countywide	17,728.0	15,226.4	2,944.7	12,281.7	12,299.2	2,459.8

Impervious Area Restoration

A summary of the impervious restoration progress made by Howard County is included in Table 11 below. Additional details can be found in the attached CIS. Projects and programs completed after June 20, 2010 are considered to be restoration and are applied to meeting the 20% target. The results indicate that the County has completed 1,433.5 impervious acres of restoration (11.7%) to apply to its 20% goal, leaving 1,026.4 acres of impervious restoration to be completed by the end of the permit term.

Table 11: Impervious Area Restoration Progress Summary in Acres

Watershed	Restoration Progress through FY16
Triadelphia Reservoir (Brighton Dam)	71.1
Little Patuxent River	475.8
Middle Patuxent River	205.6
Patapsco River L N Br	134.6
Patuxent River Upper	1.0
Rocky Gorge Dam	4.1
South Branch Patapsco	6.2
Countywide	1,433.5

TMDL Restoration Plan

Local TMDLs

As a requirement of section PART IV.E.2.b of the County's NPDES MS4 permit, the County developed a restoration plan by December 2015 for each SW-WLA approved by EPA prior to the effective date of the permit. As noted previously the County developed the Countywide Implementation Strategy (CIS) in 2015 (submitted with AR20) to address this requirement. A revised CIS is included with this annual report submittal.

There are currently nine final approved TMDLs within Howard County with either an individual or aggregate SW-WLA. A PCB TMDL for the Patuxent was approved by the EPA in September of 2017. The County will be developing a separate plan to address PCBs in 2018 and those analyses and results are not included in the CIS Table 12 indicates the local TMDLs that the County is currently addressing. Although there are sediment and phosphorus TMDLs established for Centennial Lake (approved April 2002) and a bacteria TMDL established for the lower segment of the Patuxent River Upper (approved August 2011), they do not have SW-WLAs assigned to the Howard County MS4 source sector and are therefore not included in the CIS. The Triadelphia Reservoir has a sediment TMDL; however, the County MS4 Phase I urban sector requires a 0% reduction in baseline sediment loads and will not be addressed further in the CIS. South Branch Patapsco does not have a local TMDL, but it is included in the analysis since it, with the Patapsco River Lower North Branch, makes up the Baltimore Harbor watershed. The Middle Patuxent watershed does not have a local TMDL. Attachment B of the County's current permit also lists a mercury impairment in Cash Lake in the Patuxent River Upper Watershed on the list of Howard County TMDLs with applicable SW-WLAs. Cash Lake and its drainage area are located wholly within Prince George's County, therefore Howard County is not responsible for this TMDL and it is not included in the CIS.

Table 12: Howard County Local TMDL Summary

Watershed Name	Watershed Number	WLA Type	Pollutant	Baseline Year	MDE Published Reduction
Patapsco River Lower North Branch	02130906	Individual	Sediment	2005	10.0%
		Aggregate	Bacteria	2005	75%
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	Aggregate	Nitrogen	1995	15.0%
	02130908				
	02130906	Aggregate	Phosphorus	1995	15.0%
	02130908				
Patuxent River Upper	02131104	Individual	Sediment	2005	11.40%
Little Patuxent River	02131105	Individual	Sediment	2005	48.10%
Rocky Gorge Reservoir	02131107	Aggregate	Phosphorus	2000	15%
Triadelphia Reservoir (Brighton Dam)	02131108	Aggregate	Phosphorus	2000	15%
		Aggregate	Sediment	2000	0%

The CIS presents disaggregated and calibrated baseline loads for each SW-WLA to calculate the load reduction required from the baseline value. It is noted that the Patapsco River LNB bacteria TMDL is 75% reduction in a smaller subwatershed (PAT0148) and not across the entire watershed.

Based on MDE guidance, growth in the stormwater load since the TMDL baseline year is not accounted for in the analysis. Local TMDLs are considered met, from a planning perspective, when the load reductions associated with restoration progress coupled with the planned restoration load reductions included in the CIS exceed the load reduction required. Some TMDLs are estimated to be exceeded by a wide margin because removals per pollutant type are not achieved at the same rate. TN removal rates are relatively low compared to TP and TSS on a per project basis. This impacts watersheds with multiple TMDLs and also nested watersheds as in Baltimore Harbor.

Chesapeake Bay TMDL

The Chesapeake Bay TMDL, established by the EPA (EPA, 2010), sets pollution limits for nitrogen, phosphorus, and sediment in the Chesapeake Bay Watershed. While not a requirement in the County's NPDES MS4 permit, strategies provided in this plan to meet local TMDL reduction targets and impervious restoration treatment are also modeled against the Bay TMDL goals in order to calculate progress. The County's MS4 permit is requiring compliance with the Chesapeake Bay TMDL for the stormwater sector through the use of the 20% impervious surface restoration strategy.

Management Measures

Management measures to reduce pollutant loads and restore impervious surfaces include structural stormwater BMPs, alternative practices, and also non-structural County based and homeowner-implemented programs. The major project types accounted for in the CIS towards the reduction goals are presented in Table 13. These include projects currently identified in the County's Capital Improvement Plan (CIP) list, potential project sites identified with concept plans developed in the 2015 watershed assessments in the Little and Middle Patuxent, and potential project sites being finalized currently in the Patuxent and Patapsco assessment. They are listed here with the proposed level of implementation.

Table 13: CIS Planned Strategies

BMP	Number of Projects Planned Countywide	Accounting Unit	Countywide Total
Stormwater BMP Conversion	60	Drainage area acres	1,237.5
New Stormwater BMP	20	Drainage area acres	131.3
Outfall Stabilization	49	Linear feet	3,257.8
Stream Restoration	96	Linear feet	153,161.5
Urban Tree Planting	17	Acres planted	67.2
Rain Barrels	100 / year added	Per units implemented	300
Street Sweeping	806.3 miles per year	Miles swept	806.3
Septic System Pump-Outs	3,000 / year added	Per unit (annual practice)	9,000
Septic System Upgrades	30 / year added	Per unit	90

Note: rain barrel and septic totals are shown only for the three year period between FY18 to FY20 to coincide with the 2019 impervious restoration schedule end-date

Load Reductions

Load reductions to be achieved with implementation of the projects and programs detailed in the CIS are presented in Table 14. With this level of implementation, the local TMDLs in the Patuxent River Upper, Rocky Gorge Reservoir, and Brighton Dam (Triadelphia Reservoir), Baltimore Harbor, and Patapsco LNB will be met. Some TMDLs are projected to be far exceeded because removals per pollutant type are not achieved at the same rate. This occurs in watersheds with more than one pollutant type with a SW-WLA, and in nested watersheds. TN removal rates are relatively low compared to TP and TSS on a per project basis. For example, the number of projects needed to meet the Baltimore Harbor TN reduction goal resulted in overachieving on the TP reduction, and the TSS reduction in the Patapsco River LNB which is nested in the Baltimore Harbor watershed.

Table 14: SW-WLA Planned Reductions Summary

Watershed Name	Watershed Number	Pollutant	MDE Published Reduction Percent	Calibrated Target Reduction (EOS)[1]	CIS Planned Reduction Percent	Total Reduction (2017 Progress + Planned)[1]
Patapsco River Lower North Branch	02130906	Sediment	10.0%	612,344	91.0%	5,575,374
		Bacteria	75%	16,370	90.9%	19,849
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	Nitrogen	15.0%	16,059	17.5%	18,769
	02130908					
	02130906	Phosphorus	15.0%	982	138.3%	9,051
	02130908					
Patuxent River Upper	02131104	Sediment	11.40%	16,633	26.0%	37,965
Little Patuxent River	02131105	Sediment	48.10%	4,976,821	48.3%	4,993,034
Rocky Gorge Reservoir	02131107	Phosphorus	15%	129	22.3%	192
Triadelphia Reservoir (Brighton Dam)	02131108	Phosphorus	15%	398	22.4%	593
		Sediment	0%	--	--	--

[1] EOS is Edge of Stream, all values in lbs/yr except for bacteria which is MPN/100 mL/yr

Cost and Schedule

The cost of implementing the CIS to meet the stated goals has been estimated. It is important to note that the costs represent planning level estimates for use in high level forecast budgeting with many assumptions made. The cost estimates provided in the CIS will likely adjust as the County progresses with implementation of its program.

The total cost to implement all practices described in this plan is $167,885,317. This total cost includes all SWM Division CIP restoration BMPs ($158,095,317) along with costs from additional practices (i.e., rain barrels, septic pump-outs and upgrades, street sweeping, inlet cleaning and Howard EcoWorks) from FY17 – FY19 ($2,415,000) as well as costs from FY21 – FY29 ($7,425,000) needed to fulfill the local TMDL targets by FY29.

Table 15: Implementation Schedule with End Dates Indicated

Watershed	Fiscal Year														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Little Patuxent											2025				
Middle Patuxent					No local TMDL										
Patuxent River Upper					2019										
Rocky Gorge Reservoir					2019										
Triadelphia Reservoir						2020									
Baltimore Harbor															2029
South Branch Patapsco															
Patapsco LNB															2029

[1] Primary project completion period is shown in green, additional implementation contingent period for each TMDL are in blue.

[2] Baltimore Harbor TMDL includes the South Branch Patapsco and Patapsco Lower North Branch watersheds. There is no local TMDL specifically for the South Branch Patapsco.

Adaptive Management

The CIS is an important step in the restoration process; however, the MS4 permit calls for an iterative and adaptive plan for implementation. The County will monitor implementation progress on a regular basis and will report progress, load reductions achieved, and impervious surface reductions to MDE with the NPDES Annual Update and at required milestone intervals. The County will review the CIS annually and make plan adaptations based on the results. If new methods of stormwater treatment are identified, or better approaches to source control are found, the plans can be extended and updated to take these changes into account. Similarly, if some elements of the plans are not as successful as expected, adaptations and improvements will be incorporated in future updates. Plans may also change if pollutant removal crediting methods are modified in the future.

3. Public Participation

Howard 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. Howard County shall provide:

a. Notice in a local newspaper and the County's website 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.

Annual Update Number 22 Status

Little Patuxent and Middle Patuxent Watershed Assessments

For the Little Patuxent and Middle Patuxent Watershed Assessments the County provided public notice in the Howard County Times legal section on June 4, 2015 and November 19, 2015 as well as on the County public meeting webpage and the SWMD webpage. A general press release noting the meetings was also available to local media outlets. The press release and legal ad noted when the watershed assessment and restoration plans would be available to begin the 30-day review period. Public meetings were held on the following:

Table 16: Little Patuxent River and Middle Patuxent River Watershed Assessment Public Meeting Schedule

Date	Watershed	Time	Location
6/17/2015	Southern Middle Patuxent	7:00 pm – 8:30 pm	Robinson Nature Center
6/22/2015	Northern Little Patuxent	7:00 pm – 8:30 pm	Dunloggin Middle School
6/24/2015	Southern Little Patuxent	7:00 pm – 8:30 pm	Hammond High School
6/30/2015	Northern Middle Patuxent	7:30 pm – 9:00 pm	Folly Quarter Middle School
Date	**Watershed**	**Time**	**Location**
12/2/2015	Northern Middle Patuxent	6:30 pm – 8:00 pm	Gary J. Arthur Community Center
12/3/2015	Southern Little Patuxent	6:30 pm – 8:00 pm	North Laurel Community Center
12/9/2015	Southern Middle Patuxent	6:30 pm – 8:00 pm	Robinson Nature Center
12/10/2015	Northern Little Patuxent	6:30 pm – 8:00 pm	Howard Community College

In addition to the public notice provided in the Howard County Times, postcards were mailed with meeting invitation encouraging the residents within the watershed(s) to attend the public meeting(s). All public meeting attendees were given the opportunity to comment on issues and goals of the watershed assessment.

The County investigated any issues brought to our attention and reviewed any comments received on the watershed assessments. During the public meetings only comments about specific problems on individual properties were received. We have followed up on all of them, either by meeting with the property owner and/or by adding the site to the watershed assessment.

After the public meetings, both the watershed assessments and the Countywide Implementation Strategy (CIS) reports were made available for public review and comment for a minimum 30 days. The County received comments on both documents from the Chesapeake Bay Foundation (CBF) and also received comments from a citizen regarding the CIS only. These were the only comments received. The MS4 Permit requires a summary of how the County addressed or will address material comments received from the public, which we are providing as follows:

1. Commenters noted that the summary tables indicate that the nitrogen reductions required by the Bay TMDL will not be met.

Response: The computations and tables provided in these documents are based on a portion of the projects identified in the LP/MP Study and projecting a similar number of sites for the yet to be completed Patapsco and Main Patuxent watershed study (currently underway). While nearly 800 potential projects were identified in the LP/MP Study it was only practical to prepare concept plans for 148 of those sites. The loading computations in the reports are based on the 148 sites with concept plans but there are obviously well more sites available for future projects, which can supply added nutrient reductions. The CIS shows that the only local TMDL reduction target for nitrogen, which is in the South Branch Patapsco Watershed, will be exceeded. Also, MDE's Basis for Final Determination to Issue Howard County's NPDES MS4 Permit notes that the 20% restoration strategy will meet the necessary reductions for interim and long term Bay restoration milestones. The Permit itself states in Part VI Section A (Special Programmatic Conditions, Chesapeake Bay Restoration by 2025) that compliance with the Chesapeake Bay TMDL is required using the 20% restoration strategy within the five year permit term. No changes to either study have been made based on this comment.

2. CBF is concerned that stream restoration is the predominant type of project identified in the LP/MP Study. They contend that without doing upland infiltration and flow reduction stream projects often fail and they further state that stream projects are not cost effective.

Response: The County has been doing stream restoration projects for more than 10 years and our first hand experience over that time shows stream projects to be very cost-effective. Except for one or two times where we've needed to do localized repairs, which were done by manual labor or with a small piece of equipment, the projects have been successful. The upland infiltration and flow reduction would most likely be spread out on multiple private properties, which are typically more problematic and less cost-effective both short and long term. The County can only recommend that private property owners put in rain gardens, dry wells, rain barrels, or other techniques for upland controls, but we cannot mandate their installation and we have no long term control over these voluntary BMPs. Furthermore these facilities will require inspections and routine maintenance, which adds costs to the County and time/costs to the private property owners. Anecdotally we are finding that many property owners with these types of ESD devices that are required by development regulations are filling them in and/or requesting that they be removed from their property. The County certainly promotes the use of voluntary BMPs on private properties such as rain gardens, swales, dry wells, rain barrels, and tree planting, but it is not prudent nor within our control to use these BMPs as a predominant means for achieving our restoration and TMDL goals. For example, as shown in the CIS, 586 rain barrels were given away by the County in four years, and these rain barrels account for only 0.3 acres of impervious area treatment. While rain barrels are good educational tools for teaching residents about water quality, they are clearly not the most cost-effective or efficient solution to meeting the short-term goals and requirements of the MS4 Permit. No changes to either study have been made based on this comment.

3. CBF notes that the restoration projects considered and recommended are unduly limited to publicly owned land.

Response: This statement is incorrect as close to 75% of the projects identified by the LP/MP Study are on private property. No changes to either study have been made based on this comment.

4. CBF recommends considering additional prioritization or performance factors when selecting projects for recommendation, such as permanence and maintenance costs.

Response: The County's prioritization approach in the LP/MP Study has already considered many factors including permanence and maintenance. While there might not have been specific line items with these two titles they have certainly been considered. We will try to make this more apparent in the current Patapsco/Main Patuxent watershed study. No changes to either study have been made based on this comment.

5. CBF suggests that timeframes for permit compliance and final wasteload allocation (WLA) targets appear to be inconsistent with the deadlines under the permit and Bay TMDL.
Response: The County has specifically used the aggressive MS4 permit and the Bay TMDL deadlines for providing a plan to meet both dates. Local TMDLs do not have a deadline yet, but the County feels that we have suggested an equally aggressive schedule for meeting the local TMDLs, which are known at this time. No changes to either study have been made based on this comment.

6. CBF questions taking restoration and nutrient reduction credit for the stabilization of storm drain outfalls.
Response: The County intends on using restoration techniques in the MDE accounting documents to address the storm drain outfalls so taking restoration and nutrient reduction credit is proper. No changes to either study have been made based on this comment.

7. CBF states that citizen programs noted on pages 44-50 of the CIS are not accounted for in future load reduction projections.
Response: It is the County's intent to continue citizen programs that are found to be productive and help us to ultimately meet our goals and we will continue to look for new citizen programs. Examples of these programs include many current incentive programs to promote localized BMPs such as rain gardens, rain barrels, and tree planting. We are currently looking at a new incentive program relative to septic system maintenance. It should also be noted that the County performs many citizen related efforts, foremost of which is public education, which are not officially creditable through MDE's accounting documents; however we continue to pursue these efforts that help improve the quality of the waterways in the County, which ultimately helps the Bay. No changes to either study have been made based on this comment.

Mainstem Patuxent and Patuxent River Watershed Assessments
Watershed assessments for the Mainstem Patuxent River and Patapsco River Watersheds were performed in 2016. The Mainstem Patuxent River is made up of the Brighton Dam/Triadelphia Reservoir Watershed, the Rocky Gorge Reservoir Watershed, and the Upper Patuxent River Watershed. The Mainstem Patapsco River Watershed is made up of the Lower North Branch and the South Branch Patapsco River Watersheds. For the Mainstem Patuxent River and Patapsco River Watershed Assessments the County provided public notice for round 1 of the public meetings in the Howard County Times legal section on June 9, 2016 and for round 2 on January 5, 2017 as well as on the County public meeting webpage and the SWMD webpage. A general press release noting the meetings was also available to local media outlets. The press release and legal ad noted when the watershed assessment and restoration plans would be available to begin the 30-day review period. Public meetings dates and times for the Mainstem Patuxent River and Patapsco River Watershed Assessments are following:

Table 17: Mainstem Patuxent River and Patapsco River Watershed Assessment Public Meeting Schedule

Date	Watershed	Time	Location
6/21/2016	Rocky Gorge Reservoir and Upper Patuxent River	7:00 pm – 8:30 pm	North Laurel Community Center
6/23/2016	Lower North Branch Patapsco	7:30 pm – 9:00 pm	Roger Carter Community Center
6/28/2016	South Branch Patapsco and Brighton Dam/Triadelphia Reservoir	7:00 pm – 8:30 pm	Gary J. Arthur Community Center

Date	Watershed	Time	Location
1/23/2017	Mainstem Patuxent River	7:00 pm – 8:30 pm	Gary J. Arthur Community Center
1/26/2017	Mainstem Patapsco River	7:00 pm – 8:30 pm	Roger Carter Community Center

No public comments were received on the Mainstem Patuxent River and Patapsco River Watershed Assessments themselves. The County investigated any issues brought to our attention at the public meetings, which were limited to comments about specific problems on individual properties. We have followed up on all of them, either by meeting with the property owner or performing site reviews and relaying the issues to the proper County agencies.

4. TMDL Compliance

Howard 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. Howard 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.

Annual Update Number 22 Status

Howard County developed a revised and updated CIS in December 2017 to document progress and to address restoration planning for its SW-WLA for the County's final approved TMDLs. As such, the reporting items requested under permit condition E.4.a-e are based on the 2017 progress evaluation presented in the CIS through the end of fiscal year 2017 (June 30), and the planned management and restoration strategies. A detailed accounting of the stormwater BMPs, alternate practices and programs implemented through 2017 is included in the County's CIS along with the analytical method used to calculate the reductions. The CIS is included with the County's Annual Update No. 22 submittal to MDE and sections are summarized here to address the permit condition.

Pollutant Load Reduction

Baseline, target, permit and current loads for nutrient, sediment, and bacteria local TMDLs are presented in the MDE_NPDES_MS4 geodatabase table LocalStormwaterWatershedAssessment. Countywide baseline, target, permit and current loads are presented in the MDE_NPDES_MS4 geodatabase table CountywideStormwaterWatershedAssessment.

Baseline and target loads including modeling approach and projects included in each of the models are described, in detail, in the CIS. All County completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives through 7/18/2014 were modeled in MAST to calculate 2014 permit loads, while all treatment through 6/30/2017 were modeled to calculate 2017 current loads.

Item E.4.a requests the net change in pollutant loads reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives. Additionally, item E.4.b requires a comparison to the County's SW-WLAs. Taken together these requests are focused on the progress made in addressing local TMDL SW-WLAs. Therefore the County considers this request to include restoration projects and programs completed from the baseline SW-WLA year (which differs between watersheds) to the current year.

Table 18: SW-WLA Progress Reductions as of 2017

Watershed Name	Watershed Number	Pollutant	Calibrated Target Reduction (EOS)[1]	Reduction Percent Required	2017 Progress Reduction (EOS)[1]	2015 Progress Reduction Percent
Patapsco River Lower North Branch	02130906	Sediment	612,344	10.0%	671,611	11.0%
		Bacteria	16,370	75%	304	1.4%
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	Nitrogen	16,059	15.0%	5,912	5.5%
	02130908					
	02130906	Phosphorus	982	15.0%	929	14.2%
	02130908					
Patuxent River Upper	02131104	Sediment	16,633	11.40%	10,965	7.5%
Little Patuxent River	02131105	Sediment	4,976,821	48.10%	3,398,711	32.8%
Rocky Gorge Reservoir	02131107	Phosphorus	129	15%	78	9.0%
Triadelphia Reservoir (Brighton Dam)	02131108	Phosphorus	398	15%	158	6.0%
		Sediment	--	0%		

[1] EOS is Edge of Stream, all values in lbs/yr except for bacteria which is MPN/100 mL/yr

Progress as of 2017 is good across the watersheds. Baltimore Harbor, which encompasses Patapsco River Lower North Branch, and South Branch Patapsco, has achieved 5.5% TN reduction or approximately 37% of the goal and

14.2% reduction for TP, very close to the 15.0% goal. The Patuxent River is showing a 32.8% TSS reduction on a goal of 48.1%. The Patapsco River Lower North Branch appears to have achieved the TSS goal as of FY2017 progress, exceeding the 10% goal by 1%; however work still remains on the bacteria loading with only 1.4% treated. Sediment reduction in the Patuxent River Upper is at 66% of the goal with only 3.9% reduction remaining. Rocky Gorge and Triadelphia Reservoir are at 60% and 40% of their 15% TP reductions respectively.

Cost of Completed Projects

The County's FY17 capital budget for restoration projects (pond retrofits, stream restoration) was $12 million. Annual costs for street sweeping are $400,000 and for inlet cleaning are $120,000. To date the County has encumbered approximately $62 million for projects completed through FY17. The County is submitting its Watershed Protection and Restoration Program (WPRP) report with Annual Report 22. The WPRP report details the cost of programs and projects to meet the impervious surface treamtment.

Cost of Planned Projects and Programs

The cost of implementing the CIS to meet the stated goals has been estimated. It is important to note that the costs represent planning level estimates for use in high level forecast budgeting with many assumptions made. The cost estimates provided in the CIS will likely adjust as the County progresses with implementation of its program.

The total cost to implement all practices described in this plan is $167,885,317. This total cost includes all SWM Division CIP restoration BMPs ($158,095,317) along with costs from additional practices (i.e., rain barrels, septic pump-outs and upgrades, street sweeping, inlet cleaning and Howard EcoWorks) from FY17 – FY19 ($2,415,000) as well as costs from FY21 – FY29 ($7,425,000) needed to fulfill the local TMDL targets by FY29.

Table 19: Fiscal Year Schedule of Project Implementation Cost

Fiscal Year	Number of Planned Projects	Total (in millions)
2018	24	$16.1
2019	21	$10.5
2020	12	$9.9
2021	17	$15.4
2022	20	$15.4
2023	19	$14.6
2024	21	$16.1
2025	21	$15.8
2026	20	$15.0
2027	20	$15.0
2028	19	$14.3
Total	209	$158.1

The costs per watershed per are presented here in Table 20. The largest expenditures are expected in the Little Patuxent and Baltimore Harbor watersheds. The Little Patuxent is one of the most developed portions of the County and makes up a large portion (30%) of the County's untreated impervious surface baseline, therefore 22% of overall project costs are expected for this watershed. Most of the Little Patuxent projects are scheduled for the

FY18-FY20 period to address the impervious restoration goal. The Baltimore Harbor watershed, which includes the Patapsco Lower North Branch and the South Branch Patapsco includes several SW-WLAs including Baltimore Harbor nutrients (nitrogen and phosphorus) and Patapsco River Lower North Branch sediment and bacteria. The nitrogen and bacteria SW-WLA are particularly costly to meet; therefore total estimate for the Baltimore Harbor is $115.7 million, which represents 73% of the total CIP cost.

Table 20: Cost Estimate Summary Per Watershed

Watershed Name	Watershed Number	Cost Estimate (in millions)
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	$ 100.7
	02130908	$ 15.0
Patuxent River Upper	02131104	$ 1.6
Little Patuxent River	02131105	$ 34.9
Middle Patuxent River	02131106	$ 2.8
Rocky Gorge Reservoir	02131107	$ 0.6
Triadelphia Reservoir (Brighton Dam)	02131108	$ 2.5

F. Assessment of Controls

Howard County and ten other municipalities in Maryland have been conducting discharge characterization monitoring since the early 1990s. From this expansive monitoring, a statewide database has been developed that includes hundreds of storms across numerous land uses. Analyses of this dataset and other research performed nationally effectively characterize stormwater runoff in Maryland for NPDES municipal stormwater purposes. To build on the existing information and to better track progress toward meeting TMDLs, better data are needed on ESD performance and BMP efficiencies and effectiveness.

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

a. Chemical Monitoring

i. ***Eight (8) 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 (3) samples determined to be representative of each storm event shall be submitted to a laboratory for analysis according to methods listed under 40 CFR Part 136 and event mean concentrations (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 both in-stream monitoring stations 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 TMDLs with a stormwater WLAs.***

*b. **Biological Monitoring***

*i. **Benthic macroinvertebrate samples shall be gathered each Spring between the outfall and instream monitoring locations or other practical locations based on an 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.***

*c. **Physical Monitoring***

*i. **A geomorphologic stream assessment shall be conducted in the Red Hill Branch watershed monitoring location or in a reasonable area based on an 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.***

*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 approved monitoring locations; and***

*iii. **Any requests and accompanying justifications for proposed modifications to the monitoring program.***

Annual Update Number 22 Status

Watershed Restoration Assessment

Wilde Lake Monitoring

In 2006, the County began monitoring in the Wilde Lake watershed, which has continued annually since its inception. The Wilde Lake monitoring program includes geomorphic, chemical, physical habitat, and biological assessments conducted throughout the watershed to determine if the restoration efforts outlined in the *Centennial and Wilde Lake Watershed Restoration Plan* (CWP, 2005) are succeeding in reducing pollutant loading and increasing the health of the lakes and streams. The goal of the monitoring strategy is to assess the overall condition rather than focusing on specific sites. Additional detail on monitoring in Wilde Lake and results can be found in *Wilde Lake Watershed Discharge Characterization, Stream Monitoring and Watershed Assessment, Year Twelve – 2017.*

Stormflow data were collected at Wilde Lake on December 16, 2016, and February 9, March 31, April 3, April 6, May 5, May 13, and May 22, 2017. Baseflow data were collected on December 21, 2016 and February 8, May 1, and June 13, 2017. Average (2007-2017) concentrations of metals in storm flows (Cadmium, Lead, Copper and Zinc) at the Wilde Lake sampling site have been consistently below their associated acute criteria set by MDE. TSS levels in stormflow samples are elevated, but not excessive, as would be expected during storm events in urban streams. *E. coli* counts were well above the published water quality criteria during 2015-2017 whereas previously (2006-2015) fecal coliform counts have been consistently high during the years that storm samples have been collected.

Biological monitoring was conducted in Spring 2017 at five sites in the Wilde Lake watershed. This was the 12th consecutive year of monitoring at Wilde Lake, which began in the spring of 2006. Sites sampled in 2017 were repeat visits of sites sampled in 2007 and again in 2012. Results of the Year 12 biological and physical habitat assessments in Wilde Lake indicated that the streams varied in habitat quality, but were only marginally capable of supporting aquatic life. Benthic macroinvertebrate sampling results were between 'Very Poor' and 'Poor' ratings where three sites were in the 'Very Poor' range and two sites rated 'Poor'. Two of the five sampling sites had RBP habitat that rated 'Partially Supporting' and three rated 'Not Supporting'. MBSS's Physical Habitat Index (PHI) rated four sites 'Degraded' and one site 'Partially Degraded'. Overall, the stream system in the Wilde Lake watershed exhibits evidence of the urban stressors affecting it and has not demonstrated marked improvement over the twelve years of monitoring.

Since 2006, a yearly geomorphic assessment has been conducted during the spring at sites throughout the Wilde Lake watershed. Assessment occurs at the same locations each year. The main goal of the monitoring is to assess the temporal variability of the geomorphic stability of the stream channels upstream of the lakes as they react to restoration activities. Overall, upstream improvements in the watershed do not appear to have significantly improved the habitat in the tributary streams. Based on 2006 – 2017 geomorphic assessments, the Wilde Lake mainstem continues to degrade with localized major changes in channel section and profile. Changes in bed features include bank erosion, bar formation, and high sediment supply. Sediment deposition and transport are

common with significant point bar and mid-channel accumulations in some areas. Bed and bank erosion is most evident along the downstream profile. Upstream reaches are not experiencing the same level of erosion as the downstream reach. A riparian buffer is lacking along most of the channel.

Red Hill Branch Monitoring

In 2009, the County began monitoring in the Red Hill Branch watershed, which has continued annually since its inception. The Red Hill Branch monitoring program includes geomorphic, chemical, physical habitat, and biological assessments conducted within and downstream of restoration projects to determine if the restoration are succeeding in reducing pollutant loading and increasing the health of the stream system. What follows is a brief summary of monitoring activities and results for 2017. More detail and results can be found in the annual report, *Red Hill Branch Restoration Monitoring Year 8–2017.*

Stormflow data were collected at the permanent water quality monitoring station at the Red Hill Branch site at Meadowbrook Park on September 28, November 29, 2016, January 2, February 9, March 31, April 3, April 6, and May 5, 2017. Baseflow samples were also collected on December 21, 2016, and February 8, May 1, and June 13, 2017. Event mean concentrations of storm runoff total nitrogen, TSS, and total phosphorus ranged from 1.42 – 2.42 mg/mL for total nitrogen, 10 – 245 mg/mL for TSS, and 0.05 – 0.40 mg/mL for total phosphorus. Average metal concentrations at Meadowbrook Park were below their respective acute MDE criteria. *E. coli* levels for all samples were well above the published water quality criteria.

A total of eight storm events were sampled at the Red Hill Branch – Bramhope Lane retrofit site during 2016-2017. Storms were sampled on November 29, 2016, January 2, January 23, February 9, February 28, April 3, May 22, and June 19, 2017. Baseflow samples were also collected at these sites on December 21, 2016, February 8, May 1, and June 13, 2017. For the upstream site event mean concentrations ranged from 1.32 – 2.81 mg/mL for total nitrogen, 4 – 115 mg/mL for TSS, and 0.08 – 0.91 mg/mL for total phosphorus. At the downstream Bramhope site event mean concentrations ranged from 1.54 – 2.89 mg/mL for total nitrogen, 3 – 162 mg/mL for TSS, and 0.06 – 0.69 mg/mL for total phosphorus.

Eight storm events were also sampled at the Salterforth pond retrofit site during 2016-2017. Storms were sampled on December 6, 2016, and January 2, January 23, March 31, April 6, May 5, May 31, and June 19, 2017. For the inflow site event mean concentrations ranged from 1.23 – 1.88 mg/mL for total nitrogen, 16 – 106 mg/mL for TSS, and 0.09 – 0.39 mg/mL for total phosphorus. At the outfall site event mean concentrations ranged from 1.20 – 2.85 mg/mL for total nitrogen, 2 – 46 mg/mL for TSS, and 0.09 – 0.36 mg/mL for total phosphorus.

A biological monitoring program was initiated in Red Hill Branch during the spring of 2010 and has continued annually. The program includes the collection and analysis of the macroinvertebrate community, physical habitat assessments, and measurements of *in situ* water chemistry. Biological assessments involve macroinvertebrate sampling at three sites located at the downstream end of the major drainage areas within the Red Hill Branch subwatershed as well as a fourth control site located in an adjacent watershed. The monitoring stations are being used for the assessment of restoration activities in this watershed. In Red Hill Branch, post-restoration monitoring results indicate a subwatershed in an overall degraded ecological condition, with little change from the first two years of pre-restoration monitoring. During 2017, three sites were classified as 'Very Poor' and one site 'Poor' for biological condition, with an overall BIBI score of from 2.33 to 1.33. Habitat during 2017 assessment at all sites rated 'Degraded' and 'Severely Degraded' and was classified as 'Non Supporting' and 'Partially Supporting' of aquatic life. The biological community and habitat remain in a degraded condition and have not shown any significant improvement after restoration.

Geomorphic assessments in the Red Hill Branch subwatershed were conducted in the summer of 2017, six years after the completion of the Bramhope Lane stream restoration project, to evaluate the effectiveness of this and other restoration projects undertaken in this subwatershed. Assessments were conducted at three sites, one within the lower portion of the restoration site, one downstream of the restoration site, and one on a similar channel in an adjacent watershed intended to serve as a control. Assessment included longitudinal profiles, permanently monumented cross-section surveys, pebble counts, substrate facies mapping, bulk-bar sample sieve analysis, and measurement of bed/bank pins and scour chains. Geomorphic assessments indicate some changing conditions and differences in stability of the three monitoring reaches in the sixth year of post-restoration monitoring. In the years prior to restoration at all three reaches, bed features exhibited evidence of the continually shifting, dynamic nature of these systems, including deposition in some pools and bars, deepening of other pools, and shifting locations of riffle crests. These conditions persisted at the non-restored reaches over the six years of post-restoration monitoring. In contrast, there has been far less change in channel dimensions and profiles, and notably less erosion during post restoration monitoring at the restoration reach. On the other hand, cross-sections at the downstream reach and the control reach continue to see significant changes.

Dorsey Hall Monitoring

The County began monitoring sites in Dorsey Hall project area in 2014 to assess new restoration activities in the Red Hill Branch watershed located downstream of the sites at Meadowbrook Park, Bramhope Lane stream restoration, and the Salterforth pond retrofit. Two sites were added, one on Red Hill Branch at Columbia Rd downstream of all restoration activities, and one site near the downstream end of Plumtree Branch upstream of its confluence with Red Hill Branch to measure effects of stormwater coming from the untreated Plumtree Branch. At each site chemical, biological, and physical habitat monitoring have been conducted annually.

Chemical monitoring consists of baseflow and stormflow chemical sampling for nitrogen, phosphorus, and sediment. Eight storm events were sampled at the Columbia Road site and seven events were sampled at the Plumtree Run site during 2016-2017. Storms were sampled on November 11 (Columbia Road only), December 6, 2016 (Plumtree Run only), and January 23 (Plumtree Run only), February 9, March 1, March 31, April 3 (Plumtree Run only), April 6 (Columbia Road only), May 13 (Columbia Road only), May 22 (Columbia Road only), May 25 (Plumtree Run only), and June 19, 2017 (Columbia Road only). For the Columbia Rd site event mean concentrations ranged from 1.14 – 2.20 mg/mL for total nitrogen, 1.91 – 95.49 mg/mL for TSS, and 0.06 – 0.37 mg/mL for total phosphorus. At the Plumtree site event mean concentrations ranged from 1.10 – 2.57 mg/mL for total nitrogen, 5 – 150 mg/mL for TSS, and 0.07 – 0.22 mg/mL for total phosphorus.

Biological and physical habitat monitoring was conducted at these sites during summer of 2017. Both sites rated 'Poor' for biological condition, with the Columbia Rd scoring a 2.33 and Plumtree scoring 2.33. Maryland's PHI results for the Dorsey Hall sites show both sites falling into the lowest 'Severely Degraded' category with scores of 49.0 for Columbia Rd and 29.1 for Plumtree. The RBP habitat results were similar with both sites in the 'Not Supporting' category with scores of 52.5% and 49.5% of reference. The physical habitat results show that both sites are severely impacted, most likely from urban development.

Turf Valley Monitoring

To evaluate potential improvements in water quality that may occur as a result of planned restoration projects in the Turf Valley project area, Howard County began conducting pre-restoration monitoring in 2014 with plans to continue monitoring annually. The Turf Valley projects are located on the headwaters of the Little Patuxent River between Turf Valley Road and Bethany Lane. The County is conducting biological monitoring at three sites, one each at the downstream end of two tributaries to the Little Patuxent River and also on the mainstem just below

all of the planned restoration. This reporting period includes the first round of pre-restoration monitoring conducted in 2014, a combination of pre- and post-restoration monitoring in 2015, and post-restoration monitoring starting in 2016.

Like Dorsey Hall, biological and physical habitat monitoring was conducted at these during summer of 2017. Results of the biological monitoring show that the two tributary sites are in poor condition, each falling in the 'Poor' category from 2014 – 2017 with scores varying between 2.00 and 2.33 each year. The mainstem Little Patuxent site is in better condition, scoring a 3.00 each year prior to 2017 and 3.33 in 2017 and falling in the 'Fair' category each year. The RBP physical habitat scores have varied year-to-year at the two tributary sites, decreasing in 2015 from the initial assessments in 2014, but returning to similar scores and ratings in 2016 and 2017. The RBP scores at the mainstem Little Patuxent have remained stable over the four years of data. All three sites scored in the 'Partially Supporting' category. Maryland PHI scores and ratings at the two tributary sites scored similar to 2016, with the pond retrofit site scoring 'Degraded' and the stream restoration site scoring 'Partially Degraded'. The PHI scores at the Little Patuxent site, similar to the RBP scores, have remained consistent across the four years of data. Biological scores have not changed after construction of the restoration and retrofit projects in the Turf Valley area.

Annual Data Submittal

Monitoring reports associated with Assessment of Controls monitoring including the programs summarized above, and the Rumsey Run Stormwater Management Assessment described below, can be found in the narrative files associated with the NPDES Geodatabase submittal. Also included are the monitoring site locations and drainage areas in the MonitoringSite and MonitoringDrainageArea feature classes.

The required chemical monitoring results and EMCs are found in the County's geodatabase submittal in the ChemicalMonitoring table for Wilde Lake and Meadowbrook (Red Hill). The County chose again this year to also report on other monitoring that is being conducted above the NPDES requirements at several sites. These sites are partially funded by Chesapeake and Atlantic Coastal Bays funding and are focused on assessing watershed restoration, therefore the County chose to include them. Because they are not NPDES compliance specific sites, they do not have all data as required by the NPDES permit. These sites are associated with the Dorsey Hall project (Plumtree - PT and Columbia Road - CR) and the Red Hill monitoring at Brampton Hills (aka Bramhope Lane, Upstream - BH01, Downstream, BH02). For these sites data from FY16 and FY17 are included.

The required biological monitoring data are included in the BiologicalMonitoring table for the Wilde Lake and Red Hill monitoring projects. As with the chemical data, there are additional biological data submitted for the Dorsey Hall and Turf Valley monitoring projects.

At this time, the County has no requests for modification to its monitoring program.

2. Stormwater Management Assessment

The County shall continue monitoring the Rumsey Run (tributary to Red Hill Branch) watershed, or select and submit for MDE's approval an alternative project for determining the effectiveness of stormwater management practices for stream channel protection. Physical stream monitoring protocols shall include:

a. An annual stream profile and survey of permanently monumented cross-sections in Rumsey Run to evaluate channel stability in conjunction with surrounding and on-going commercial development;

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

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

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Rumsey Run Monitoring

In 2011, to evaluate the effectiveness of recent stormwater controls from developed sites for stream channel protection, Howard County and MDE chose an unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill Branch subwatershed for analysis. The County is monitoring the effectiveness of the 2000 Maryland Stormwater Design Manual and other innovative stormwater management technologies through geomorphic assessments, limited runoff investigations, and modeling in Rumsey Run. A full report of Rumsey Run monitoring methods, data analysis, and results are provided in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 6 – 2017* report, produced as a stand-alone document and submitted as part of the Annual Update.

Overall results suggest that the stormwater management practices in the drainage areas of the middle and lower reaches are having a positive effect on the maintaining the stability of the stream. The middle reach receives drainage from the newest development which was constructed with ESD practices for stormwater management and with MDE 2000 channel protection criteria. This reach was overall very stable and contained the cross sections with the least amount of measured change in terms of cross- sectional area and downcutting observed across all years of monitoring. The upstream end of the middle reach also has a large portion of intact riparian buffer on the left bank, which also likely contributes to the overall stability of the reach. Additionally, since the development in this middle reach is the most recent, the stream has had the least amount of time to show the potential effects of the development, when compared to the other reaches, which have much older development within their drainage areas. Therefore it is possible that over time this area may show similar signs of degradation. The lower reach receives drainage from an older development with pre-2000 stormwater management. The longitudinal profile in this reach was also quite stable, however the banks have experienced some widening over time. Particle size over time has varied the most within this reach. Finally, the upper reach receives drainage from an industrial park with little to no stormwater management and high levels of impervious surfaces. This reach is by far the least stable, with three major headcuts, and cross sections that show the most amount of change over time with significant widening and downcutting. This reach also has the highest overall slope, at 2.1% (compared to 1.6% in the lower reach and 1.3% in the middle reach). It is likely that the lack of stormwater controls, coupled with higher valley and channel slopes in this section have resulted in the observed degradation. Higher slopes will drive higher velocities and shear stress for the same level of discharge as compared with a lower slope segment, like those present in the middle and lower reaches. The lower slopes in those segments are likely buffering the channel from channel bed and bank erosion.

As per the County's new permit, hydrologic and/or hydraulic modeling will be conducted during the fourth year of the current permit and therefore there are no updates to include at this time.

Additional Assessment of Controls:

Countywide Biomonitoring Program

Howard County performs annual Countywide biological stream monitoring to characterize stream and watershed health. There is currently no specific NPDES MS4 requirement to complete this type of monitoring, however the County recognizes the importance in understanding the conditions of its stream systems. Data are used for general characterization, to support watershed assessment and management efforts, and to track conditions over time. Because there is no specific requirement, Howard County is presenting a summary of the program here and current reports are submitted for MDE's use; however specific site locations and site data are not include in the NPDES geodatabase.

Program Overview

The Howard County Department of Public Works Stormwater Management Division initiated the Howard County Biological Monitoring and Assessment Program in the spring of 2001. The County initiated the monitoring program to establish a baseline ecological stream condition for all of the County's watersheds. The program involves monitoring the biological health and physical condition of the County's water resources and is designed on a five year rotating basis such that each of the County's 15 watersheds, or primary sampling units (PSU) will be sampled once every five years.

Round 1 was completed from 2001 to 2003, Round 2 from 2005-2009, and Round 3 from 2012-2016, with 10 randomly selected sites sampled in each PSU. The current year of sampling (2017) is the first year of Round 4. To allow for paired site comparisons with previous Rounds, a total of four sites from Round One (2001), Round Two (2005), and Round Three (2012) were selected for resampling in each PSU for the Round 4 sampling. The remaining six sites in each PSU were randomly selected.

The monitoring in each round involved sampling instream water quality, collection and analysis of the biological community (benthic macroinvertebrates) using Maryland Biological Stream Survey (MBSS) protocols, cross section analysis, particle size distribution, and assessment of the physical habitat using the United States Environmental Protection Agency's (EPA) Rapid Bioassessment Protocols (RBP). The sampling methods used are compatible with those used in the third round (2012-2016) with updates where applicable.
All field data collection occurred between March 1st and April 30th of 2017, as required by the MBSS protocols. Sampling sites were marked in the field using survey flagging at the upstream and downstream limits of the reach. The positions of the site midpoints were collected using a GPS unit accurate to within 1-meter.

2017 Results

Biological and physical habitat assessment results for 2017 in Upper Brighton Dam, Cattail Creek, and Lower Brighton Dam indicate watersheds that are minimally impaired. Only one out of thirty benthic macroinvertebrate samples received a rating of 'Very Poor' and four received a 'Poor' rating. The remaining sites (83%) were rated as either 'Good' or 'Fair'.

Overall, the average watershed physical habitat conditions were 'Partially Supporting' (Upper Brighton Dam and Cattail Creek) and 'Non-supporting' (Lower Brighton Dam). The geomorphic assessment reveals a variable system. Using the Rosgen classification system for natural rivers (Rosgen, 1996), more than half (53%) of the channels sampled throughout the subwatersheds were classified as incised F or G channels and the remaining 47% were

classified as stable type B or C channels. Gravel, sand, and silt/clay were the dominant substrate types in the majority of sampling reaches.

The average percentage of impervious area in the Upper Brighton Dam, Cattail Creek, and Lower Brighton Dam subwatersheds is 3.6%, 6.9%, and 6.3%, respectively. Imperviousness for the areas draining to each sampling site range from 2.0% in Upper Brighton Dam to 8.3% in Lower Brighton Dam (see Appendix A for impervious values). Pearson correlations between the BIBI scores and all parameters (percent imperviousness, specific conductivity, PHI habitat, and RBP habitat) showed significant relationships. The percentage of imperviousness to each sampling site indicates a negative relationship (correlation coeff.= -0.428, p 0.018) to BIBI scores, suggesting biological condition decreases with increased watershed imperviousness. Specific conductivity and BIBI scores also showed a strong negative correlation (correlation coeff.= -0.613, p = 0.0003). These results support the notion that overall water quality and biological health are likely being affected by the amount of development, and hence imperviousness, in the watershed. A strong correlation was also observed between impervious percent and specific conductivity (correlation coeff.= 0.702, p <0.0001), suggesting that increased conductivity is due in large part to urban runoff.

Results of the 2017 assessment indicate minimally impaired biological conditions in all three watersheds, and no statistically significant changes in mean BIBI scores were observed in any of the subwatersheds over time. Average habitat assessment scores were found to be significantly higher in 2012 when compared to all other years. This may be a result of the subjectivity of habitat assessment scoring and the fact that different teams conducted the assessments each year.

Round 3 Summary Analysis

The County completed an analysis of the Round 3 sampling (2012-2016), to characterize the current condition of the County's watershed stream health and to draw comparisons to previous Rounds. The results are summarized here.

Based on the Benthic Index of Biotic Integrity (BIBI) for piedmont streams, Howard County streams during the Round Three assessment period were evenly mixed with 49% of sites having "Fair" or "Good" biological condition, while 51% of sites were rated "Poor" or "Very Poor". Countywide BIBI results indicate that 34% of the streams in the County were in "Good" condition, 15% were rated "Fair", 30% were rated "Poor", and 21% were classified as "Very Poor." Physical habitat conditions in County streams were generally rated "Degraded" using the MBSS Physical Habitat Index (PHI) method, and "Partially Supporting" using the U.S. EPA's Rapid Bioassessment Protocol (RBP).

Biological conditions at the PSU scale resulted in one PSU rated "Good", six PSUs rated as "Fair," five rated "Poor" and three rated "Very Poor." Physical habitat results using the PHI resulted in one PSE rated as "Minimally Degraded," five PSUs rated as "Partially Degraded," and nine rated as "Degraded." RBP physical habitat rated two PSUs as "Supporting," 11 PSUs as "Partially Supporting," and two were rated "Non Supporting." Geomorphic assessment data indicate that the majority of streams assessed were classified as Rosgen "F" type (50%) channels followed by "C" type (19%), "B" (14%), "G" (11%), and "E" (5%). Water quality data suggest that the more developed PSUs had highly elevated conductivity levels, one PSU had mean values of less than 171 µS/cm, three PSU's were between 171 µS/cm and 247 µS/cm suggesting a fish impairment, while 11 PSUs were above 247 µS/cm indicating both macroinvertebrate and fish impairments. Analysis of land use and imperviousness show 12 PSUs having predominantly developed land use and the remaining 3 PSUs dominated by agricultural land use. Impervious surface percentages at the PSU scale ranged from 3.1% to 39.5%.

Nonparametric Kendall rank correlations found significant correlations between a number of biotic and abiotic variables. Both the RBP and PHI physical habitat indices were significantly positively correlated with BIBI scores ($p < 0.001$). BIBI scores were strongly correlated (negatively) to percent imperviousness ($p < 0.001$) and percent developed ($p < 0.001$) land use variables, and correlated (positively) with percent forested ($p < 0.001$) and percent agriculture ($p < 0.001$) variables. Specific conductivity was strongly associated ($p < 0.001$) with the BIBI (negative), and all but one individual metric, percent clingers, which was correlated at the 0.05 level. Several geomorphic variables were significantly correlated with biotic variables, but the findings may be an artifact of intercorrelation with drainage area. This evaluation is useful for understanding factors that affect stream quality, for improving water-quality management programs, for predicting stream response, and for documenting changing conditions over time in Howard County.

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 V. below.***

2. ***Adequate program funding to comply with all conditions of this permit maintained. Lack of funding does not constitute a justification for noncompliance with the terms of this permit.***

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Howard County appropriated more than $90 million to implement various aspects of NPDES activities and associated work during permit years FY06 through the first half of FY16 (the first half of FY16 is used since the County's new permit was issued halfway through FY16). The County continues to appropriate significant funding for its current permit, which was issued midway through FY16. The fiscal database has been completed to report on the funding for the current permit term.

The database breaks out the funding into capital costs, operational costs, and information on the Watershed Protection and Restoration Fund (WPRF), as well as allowing the County to provide optional breakdowns for more specific task funding including maintenance. Capital costs include but are not limited to stream restoration and SWM construction projects, site-specific post-construction monitoring, and the purchase of monitoring equipment. Operational costs include but are not limited to County staff salaries, supplies, annually repeated expenses such as biological, physical, and chemical monitoring at NPDES program sites, illicit discharge inspections, SWM facility inspections, and public outreach efforts.

Unfortunately, the County was not selected in FY18 to receive funding from the Chesapeake and Atlantic Coastal Bays Trust Fund grant. The County plans to pursue grant funds for FY19 and future years to supplement its capital and operational funds. These grant funds help the County leverage its available capital funds to be able to complete even more NPDES related water quality projects.

The County intends to maintain an adequate level of funding throughout the current permit term. As noted in previous Annual Updates, all funding shown herein and proposed is subject to yearly approval by the County Council and the County Executive.

Watershed Protection and Restoration Fund (WPRF)

In March of 2013, the County adopted legislation to enact the WPRF to be charged based on the number of 500 square-foot impervious units for all properties. In July of 2013 the legislation was amended to modify the manner in which residential properties were charged based on the size of the parcel. Three tiers were established, and the rates for townhomes, properties less than ¼ acre and properties greater than ¼ acre are charged $15, $45,

and $90 per year, respectively. In addition, programs were established to provide reduced fees for agriculturally assessed properties and non-profit properties if they met certain criteria identified that reduced the potential for impact. Further, residential and commercial project reimbursement and fee credit programs were established for property owners that chose to add additional stormwater BMPs to their parcel.

In 2016, Council Resolution CR 37-2016 amended the WPRF Assistance Program for nonresidential properties. The Fee is deemed a hardship for nonresidential properties that do not qualify as not for profits if the Fee exceeds a percentage of the total property tax bill. The property owner then pays a Fee equal to that percentage of the total property tax due for the property. In 2017 the percentage was 15%, which was a 5% decrease from the previous hardship percentage cap.

The WPRF funds are budgeted among various County agencies to fund programs such as:

- BMP controls to manage stormwater flow and reduce pollutants
- Storm drain infrastructure, operation, repairs and upgrades
- MS4 permit compliance including monitoring and enforcement
- Stormwater education, outreach, and incentive programs

Section III. Program Review and Annual Progress Reporting

A. Annual Reporting

As required by the NPDES permit, the County is submitting all Annual Update Databases electronically using a large file sharing system and on the attached DVD. In addition to the required databases, the SWPPP reports, monitoring reports, and the NPDES Contact List are included as narrative files, and additional Source Identification GIS files are included.

Section IV. Special Programmatic Conditions

A. Chesapeake Bay Restoration by 2025

A Chesapeake Bay TMDL has been developed by the EPA for the six Bay States (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) and the District of Columbia.

The TMDL describes the level of effort that will be necessary for meeting water quality criteria and restoring Chesapeake Bay. This permit is requiring compliance with the Chesapeake Bay TMDL through the use of a strategy that calls for the restoration of twenty percent of previously developed impervious land with little or no controls within this five year permit term as described in Maryland's Watershed Implementation Plan. The TMDL is an aggregate of nonpoint sources or the load allocation (LA), and point sources or WLA, and a margin of safety. The State is required to issue NPDES permits to point source discharges that are consistent with the assumptions of any applicable TMDL, including those approved subsequent to permit issuance.

Urban stormwater is defined in the CWA as a point source discharge and will subsequently be a part of Maryland's WLA. The NPDES stormwater permits can play a significant role in regulating pollutants from Maryland's urban sector and in the development of Chesapeake Bay Watershed Implementation Plans. Therefore, Maryland's NPDES stormwater permits issued to Howard County and other municipalities will require coordination with MDE's Watershed Implementation Plan and be used as the regulatory backbone for controlling urban pollutants toward meeting the Chesapeake Bay TMDL by 2025.

B. Comprehensive Planning

Howard County shall cooperate with other agencies during the completion of the Water Resources Element (WRE) as required by the Maryland Economic Growth, Resources Protection and Planning Act of 1992 (Article 66B, Annotated Code of Maryland). Such cooperation shall entail all reasonable actions authorized by law and shall not be restricted by the responsibilities attributed to other entities by separate State statute, including but not limited to reviewing and approving plans and appropriating funds.

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The County recognizes the importance of the Chesapeake Bay restoration effort and has been working with MDE and other municipalities to help achieve the goals of the new 2014 Bay Agreement. The following paragraphs describe Howard County's recent and ongoing participation in programs that address the Chesapeake Bay water quality goals.

Patuxent Reservoirs Technical Advisory Committee

In 1996, Howard County joined Montgomery County, Prince George's County, WSSC, Maryland National Capital Park and Planning Commission (MNCPPC), HSCD, and Montgomery Soil Conservation District (MSCD) in signing the Patuxent Reservoirs Watershed Protection Agreement. The Agreement recognized the importance of protecting the long-term biological, physical and chemical integrity of the watershed. The Agreement established

a Policy Board and a Technical Advisory Committee (TAC) to oversee implementation of a protection strategy for the watershed.

TAC member activities have included water quality monitoring and modeling, implementing agricultural best management practices, stormwater retrofits and stream channel restoration, and public outreach and education. The TAC has developed a list of priority resources in the watershed: the reservoirs and drinking water supply; terrestrial habitat; stream systems; aquatic biota; rural character and landscape; and public awareness and stewardship. TAC member agencies continued progress in the following areas: evaluating progress toward TMDL implementation for the Patuxent Reservoirs, agricultural BMP implementation, reservoir monitoring, and public outreach. The TAC also revised the Patuxent Reservoirs Protection Strategy Memorandum of Understanding, which established an Agricultural BMP Cost Share Program, to make more properties eligible for the program and increase the types of BMPs the program would fund. WSSC and Howard County renewed program funding for HSCD; MSCD still has funds remaining. The TAC produces an Annual Update that documents the TAC's accomplishments for the past year and priorities for the upcoming year.

Howard County's major initiatives in the Patuxent Reservoirs watershed include several capital projects as well as ongoing biomonitoring and public outreach activities. One stream restoration known as the Cherry Creek project is complete, and one pond repair/retrofit and a stream restoration project are currently under design in the Cherrytree Farm neighborhood in the Rocky Gorge reservoir watershed. The first round of biomonitoring was conducted in the reservoirs watershed in 2001 and 2003, and a second round of monitoring was done in the Cattail Creek and Brighton Dam watersheds in 2005 and in the Rocky Gorge watershed in 2009. The third and fourth rounds of biomonitoring were conducted in 2012 and 2017 in the Upper and Lower Brighton Dam and Cattail Creek watersheds.

Patuxent River Commission

Howard County is a member of the Patuxent River Commission. The Commission provides oversight for implementation of the Patuxent River Policy Plan and development of the Chesapeake Bay Watershed Implementation Plan (WIP). The Policy Plan is a land management strategy to reduce nonpoint source pollution, and protect and restore habitat in the Patuxent River watershed. The WIP specifies actions to achieve pollutant load reductions from wastewater treatment plants, septic systems, agriculture and urban stormwater, to meet the Chesapeake Bay Total Maximum Daily Loads for nitrogen, phosphorus and sediment. In 2014, the Commission adopted an update to the Policy Plan to reflect the new Bay TMDLs. This update was subsequently adopted by the local member jurisdictions, including Howard County, and approved by the Maryland General Assembly in 2016. For more information about the Patuxent River Commission, please see the Maryland Department of Planning web page at
http://www.mdp.state.md.us/OurWork/PatuxentRiverCommInfo.shtml .

Water Resources Element

The Howard County Water Resources Element (WRE), adopted in April 2010, is an amendment to PlanHoward 2030 that adds Policies and Actions intended to ensure that the County has adequate water resource capacities to meet future growth needs through 2030. In particular, the WRE seeks to ensure a safe and adequate supply of drinking water, and adequate land and water capacity for the treatment of wastewater and stormwater. The WRE reflects the opportunities and limitations presented by local and regional water resources. It is intended to improve protection of land and water resources and to address water resource goals within the context of local and State smart growth policies. For more information on the WRE, please see the County web page at
https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Utilities/Tech-Support-Division/Bureau-of-Utilities-Water-Resources-Element.

Cooperative Project with the U.S. Geological Survey

Howard County continues cost-sharing for the cost to operate a U.S. Geological Survey (USGS) flow gauging station on the Little Patuxent River near Savage, MD.

Maryland Water Monitoring Council

The County continues to participate in the MWMC's annual conferences, which are held at the Maritime Institute in Linthicum, MD. This year's conference was held on December 8, 2017 and the theme of the conference was "Managing Water Quality in a Changing World".

References

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington DC.

Federal Highway Administration Agency, 2003. Stormwater Best Management Practices in an Ultra-Urban Setting. Accessed in May 2003 at http://www.fhwa.dot.gov/environment/ultraurb/index.htm

Howard County. Draft - Howard County Fiscal 2013 Capital Budget. Ellicott City, Maryland. 2012.

Howard County DPW/SWMD. 2005. Centennial and Wilde Lake Watershed Restoration Plan. Prepared by the Center for Watershed Protection and Tetra Tech, Inc. for Howard County, MD. September.

Howard County DPW/SWMD. 2009. Upper Little Patuxent River Watershed Management Plan. Prepared by KCI Technologies, Inc. for Howard County, MD. September.

Howard County. National Pollutant Elimination System Permit Application for Operators of Municipal Separate Storm Sewer Systems. Part 1. Ellicott City, Maryland. July 1993.

Howard County. National Pollutant Elimination System Permit Application for Operators of Municipal Separate Storm Sewer Systems. Part 2. Ellicott City, Maryland. April 1995.

Howard County. *NPDES Permit No. MS-HO-95-008 Annual Update Number 1-5*. Ellicott City, Maryland. April 1996 – April 2000, respectively.

Howard County. *NPDES Permit No. 00-DP-3318 Annual Update Number 6-10*. Columbia, Maryland. June 2001 – June 2005, respectively.

Howard County. *NPDES Permit No. 00-DP-3318 Annual Update Number 11-18*. Columbia, Maryland. June 2006 – June 2013, respectively.

Howard County. 2017. Dorsey Hall Year 3 (2016-2017) – Post Restoration Conditions Monitoring. Prepared by KCI Technologies Inc. for Howard County, MD.

Howard County. 2017. Evaluation of Maryland Stormwater Management Methods in Rumsey Run – Year 6 (2017). Prepared by Straughan Environmental, Inc. for Howard County, MD.

Howard County. 2017. Turf Valley Restoration Year 4 (2016-2017) – Post Restoration Conditions Monitoring. Prepared by KCI Technologies Inc. for Howard County, MD.

Howard County. 2017. Red Hill Branch Watershed Restoration – Year 8 (2016-2017) – Post Restoration Conditions Monitoring. Prepared by KCI Technologies Inc. for Howard County, MD.

Howard County. 2017. *Wilde Lake Watershed Discharge Characterization, Stream Monitoring and Watershed Assessment, Year Twelve – 2017*. Prepared by KCI, Inc. for Howard County, MD.

Kellerhals, R. 1967. "Stable Channels with Gravel-Paved Beds," *Journal of Waterways and Harbors Division,* American Society of Civil Engineers, pp 63-84.

Maryland Department of the Environment. 2000 Maryland Stormwater Design Manual. Revised May 2009.

Maryland Department of the Environment. National Pollutant Elimination System Permit Application Guidance for Operators of Municipal Separate Storm Sewer Systems. Part 2. Final. Baltimore. July 1992.

Maryland Department of Planning Website: http://www.mdp.state.md.us

Northern Virginia Planning District Commission, 1979. Guidebook for Screening Urban Nonpoint Pollution Management Strategies. Prepared for the Metropolitan Washington Council of Governments

Parker G. 1979. Hydraulic geometry of active gravel rivers, Journal of Hydraulic Engineering, 105, 1185-1201.

Paul, M.J., J.B. Stribling, R.J. Klauda, P.F. Kazyak, M.T. Southerland, and N.E. Roth. 2002. A Physical Habitat Index for Freshwater Wadeable Streams in Maryland. Maryland Department of Natural Resources, Monitoring and Non-Tidal Assessment Division. Annapolis, MD. CBWP-MANTA-EA-03-4.

Schueler, T.R. 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments. Publication number 87703. p. A-4.

Waters, T. F. 1995. *Sediment in Streams: Sources, Biological Effects and Controls.* American Fisheries Society Monograph 7. American Fisheries Society, Bethesda, MD.

Attachment - Database DVD