NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

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

ANNUAL UPDATE NUMBER 20

Submitted to:

State of Maryland
Department of the Environment
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Baltimore, Maryland 21230

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December 17, 2015

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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 January 2015 population of 304,066 according to the Howard County Department of Planning and Zoning (DPZ) 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 20

For annual update number 20 (AR20) MDE required breaking out two six-month permit periods of two different permits so that is how this report is organized. In some cases it is not possible or practical to break out whole year tasks. When this occurs the reporting period is specified. Information is presented in the following parts and sections:

Section I. Introduction

Part A: June 20, 2014 to December 17, 2014

Section III. Standard Permit Conditions

Section IV. Program Review and Annual Progress Reporting

Section V. Special Programmatic Conditions

Part B: December 18, 2014 to June 30, 2015

Section IV. Standard Permit Conditions

Section V. Program Review and Annual Progress Reporting

Section VI. 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 permit year. Annual data is compiled/reported on a fiscal year basis. In limited cases, where data is only available by calendar year this is noted.

Part A. Jun. 20, 2014 – Dec. 17, 2014

Section III. Standard Permit Conditions

Introduction
The municipal NPDES regulations require Howard County to provide contact information for all personnel responsible for compliance with this permit. The regulations also require the County to have and maintain adequate legal authority to address water quality issues associated with stormwater discharges, prohibit illicit connections, and control spills and illegal dumping.

A. Permit Administration

Howard County shall designate an individual to act as liaison with the Maryland Department of the Environment (MDE) and provide the coordinator's name, title, address, phone number, and email address. Additionally, the County shall submit to MDE an organizational chart detailing personnel and groups responsible for major National Pollutant Discharge Elimination System (NPDES) program tasks. MDE shall be notified promptly and in subsequent annual reports of any changes in personnel or organization relative to NPDES program tasks.

Annual Update Number 20 Status
The County has included the current organizational information on the CD included as Attachment A in Section IV of this annual update.

B. Legal Authority

Adequate legal authority shall be maintained in accordance with NPDES regulations 40 CFR 122.26(d)(2)(i) throughout the term of this permit. In the event that any provision of its legal authority is found to be invalid, the County shall make the necessary changes to maintain adequate legal authority.

Annual Update Number 20 Status
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 shall be identified and linked to specific water quality impacts on a watershed basis. This process shall be used to develop watershed

restoration plans that effectively improve water quality. The following information shall be submitted in geographic information system (GIS) format with associated tables as required in PART IV. of this permit:

1. ***Storm drain system: major outfalls, inlets, and associated drainage areas;***

2. ***Urban best management practices (BMP): stormwater management facility data including locations and delineated drainage areas;***

3. ***Impervious surfaces: delineated controlled and uncontrolled impervious areas;***

4. ***Monitoring locations: locations established for chemical, biological, and physical monitoring of watershed restoration efforts and the 2000 Maryland Stormwater Design Manual or other innovative stormwater management technologies approved by MDE; and***

5. ***Watershed restoration: restoration project descriptions and locations.***

Annual Update Number 20 Status

An updated version of the County's GIS is included on the CD included in Section IV of this Annual Update. The following specifically addresses the five items noted above:

Storm Drain System

Digitizing efforts continued for storm drain systems and drainage areas to BMPs and major storm drain outfalls. The County's priority is the digitization of all storm drain and drainage features. A secondary priority is the digitization of the remaining elements of the proposed County GIS. The County is continuously updating the GIS with newer plans. The drainage areas to each major outfall have been linked to their respective outfall pipes, which is a task that can facilitate the calculation of pollutant loads from major outfalls. The current GIS layer with major NPDES outfalls is provided on the enclosed CD as Database A.

As of June 30, 2015 there are now 393 major MS4 outfalls in the County's GIS, an increase of seven from last year's Annual Update. One additional major outfall was also found in the GIS database, but the stormdrain data orthophotography for the outfall and the associated new land development is not complete in this area, so a drainage area could not be delineated. This record will be added once the development is complete. There are two records that have an outfall dimension of zero because the pipe diameter for these outfalls is unknown. Finally, 27 records in the database have the TYPE_OUTFL field populated. The remaining records will be researched and populated for Annual Update Number 21.

Urban Best Management Practices (BMP)

The County maintains two databases for inventorying the SWM best management practices (BMPs). One has been developed on a GIS system. Parallel with the GIS system, a database of BMPs has been developed for use in implementing the County's comprehensive BMP

inspection program. This database provides more extensive information for each BMP and is the database reported on in this Annual Update. The County continued to update both databases and work towards synchronizing these two databases. The most updated inspection-based BMP database is included as Database B on the CD in Section VI of this Annual Update. A total of 5,207 BMPs are included in the submitted database. This is an increase from the 4,354 submitted in last year's Annual Update. Most of these newly added records were identified through an exhaustive cleanup effort which uncovered existing BMPs that were not currently being tracked in the County's records.

The increase represents previously existing BMPs that were inspected and had latitude/longitude coordinates added to the database for the first time. It also includes new BMPs that were "dedicated" in the past year. Dedication is the step in the land development process in Howard County where the County accepts new developments as complete and the construction inspection process is essentially ended. Developments are dedicated in whole – including roads, water and sewer lines, sidewalks, etc., as well as stormwater BMPs. Before dedication, a BMP may be anywhere from a just approved construction plan to currently functioning facility. Hence, some of the BMPs not reported in the attached BMP database include BMPs that may be performing a water quality function, but are not yet dedicated.

The increase is also attributed to the thorough review performed by the County of all approved development plans dated 2009 to the present. This review was performed in order to verify the accuracy of the County's BMP inventory and to provide the MDE and the USEPA Chesapeake Bay Program with a "Historical BMP Cleanup" for their use in developing a new watershed model for the Chesapeake Bay TMDL. A draft database of cleanup information was submitted to MDE on June 30, 2014. A finalized version of the cleanup information was submitted in May 2015 and updated in June 2015.

The permit requires that drainage areas be delineated to all BMPs in the County. A total of 2,218 delineated drainage areas are now in the County's GIS, which is being submitted as Database B. 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 4,867 drainage areas (2,218 delineated and 2,649 assumed) are in the pollutant loading model. 340 BMPs in Table B do not have a corresponding drainage area polygon, which are attributable to 317 tree plantings, 18 stream restoration projects, and 5 structural BMPs. The stream restorations and structural BMPs with missing drainage areas are pending delineation, however modeling was conducted using the restoration length or impervious treated as specified on a final design plan.

The County understands that the TOT_DRAIN and RCN fields are being phased out by MDE in its future geodatabase, so they are unpopulated. The optional ADC_MAP field is also left unpopulated since coordinates are provided for each BMP record. The DRAIN_AREA and

IMP_ACRES fields are set to 0 for STRU_TYPE "FPU" (Tree Plantings) and "STRE" (Stream Restorations) since treatment credit for these BMP types is calculated without using a drainage area. For all other BMP types, the DRAIN_AREA and IMP_ACRE fields are populated based on either an assumed or delineated drainage area, except for two EDSW records which will be incorporated into Annual Report Number 21. At the end of the permit term, 1542 records had not been inspected and have null values in the INSP_DATE field. 1320 of these records have been inspected as of AR20 submittal date but after the December 17, 2014 end date of the previous MS4 Permit. While not considered a requirement of the previous permit the County has now included ESD features in its triennial BMP inspection Program. For cost and time efficiency the ESD's have been put on the same geographical three year inspection cycle as its other BMP's so it is to be expected that some of the ESD's will not have inspection dates until the first full round of triennial inspections has been completed. All other fields in Table B are fully populated for all records.

Impervious Surfaces

Database C. Impervious Surfaces is included as a table only with no associated GIS. The County does not have a historical impervious layer that adequately represents the condition of the previous permit terms. Database C represents progress to the 10% restoration target of previous permit terms. IMP_CONTROLLED is the cumulative total of the impervious acreage treated including baseline and restoration BMPs up through December 17, 2014. IMP_BASELINE is the untreated baseline as of 6/15/2000, the issuance/effective date of the County's earlier permit. This value (11,309.6 acres) represents the untreated impervious surface in 2000, the year the 10% restoration target was first introduced in the County's NPDES permit. Howard County determined that to finalize progress on the old permit that it was important to recalculate the restoration goal using current data and methods, and current understanding of the requirements and treatment credit given to the various BMP types. To that end, a 2000 impervious untreated value was calculated by using the same 2013 GIS polygon impervious layer with jurisdictional delineation as was used in setting the new 20% baseline for the County's new permit. This GIS layer is the County's most up to date layer with the most accurate delineation of ownership and is topologically correct. To estimate the 2000 condition, the impervious surface associated with all BMPs installed since 6/15/2000 (8,099.4 acres) was subtracted from the total. Next, any treatment or partial treatment implemented pre-6/15/2000 was accounted for. This value (3,082.3 acres) was also subtracted from the total. The result is a baseline of 11,309.6 acres and a 10% restoration target of 1,130.96 acres. The County's restoration progress up through the end of the permit term from 6/15/2000 to 12/17/2014 is 778.7 acres which represents 6.9% of the baseline.

Monitoring Locations

From 2006 to 2009 the County conducted watershed based monitoring relative to assessing watershed restoration initiatives in the Centennial Lake and Wilde Lake watersheds using chemical, biological and physical techniques. In 2010 the County continued monitoring restoration progress in the Wilde Lake watershed; however monitoring efforts related to the Centennial Lake watershed were transitioned to the Red Hill Branch subwatershed. During the previous permit period and with the approval of MDE the County discontinued its biological and

physical monitoring relative to the *2000 Maryland Stormwater Manual* on a tributary to the Hammond Branch and shifted that monitoring effort to Rumsey Run, a tributary to Red Hill Branch. The locations of the chemical, biological, and physical monitoring sites are included in the GIS submitted on the CD provided in Section IV under Databases E, E.1. and E.2.

Watershed Restoration

The County continues to perform watershed restoration projects. Locations and descriptions on the projects are included in Section V of this Annual Update and the GIS database submitted on the CD provided in Section IV under Database D. Some watershed restoration projects are specifically located in targeted watersheds and others are in response to immediate needs and public safety. All projects provide improvements to water quality. The columns POUNDS_TN, POUNDS_TP, and POUNDS_TSS are left unpopulated because these fields are only used for street sweeping and inlet cleaning, activities which the County does not perform at a frequency that would generate restoration credit. LINEAR_FT is populated for stream restoration projects only. The DRAIN_AREA and IMP_ACRES fields are set to 0 for STRU_TYPE "FPU" (Tree Plantings) and "STRE" (Stream Restorations) since treatment credit for these BMP types is calculated without using a drainage area. For all other BMP types, the DRAIN_AREA and IMP_ACRE fields are populated based on either an assumed or delineated drainage area. Unpopulated records in the INSP_DATE field are for either those BMPs that are more recently built and were not due for inspection by the end of the reporting period or those that will be reported in Annual Update 21. All other columns are fully populated. The County has 450 records in Table D.

Additional Issues Relative to Source Identification

The County's Department of Technology and Communication Services (DTCS) continues to oversee and coordinate all Geospatial related operations within Howard County. Howard County acquired new orthophotography in the fall of 2014. This imagery was captured in spring 2014 by the State of Maryland. The County contracted out the capture of major buildings and driveways from the new imagery. The County has updated the remaining planimetric features in-house using the 2014 imagery:

- Parking Lots Paved
- Parking Lots Unpaved
- Road Edge
- Road Edge Unpaved
- Major Sidewalks
- Minor Sidewalks (Lines)
- Swimming Pools
- Sports Fields
- Trails/Pathways
- Curb Lines

The County also acquired Pictometry (oblique) Imagery in the Spring of 2015. The County created a Common Place data set and it is available to county staff to use. The County plans to acquire imagery in the spring of 2016.

DTCS has also been working with the Storm Water Management Division (SWMD) on improving several housekeeping items for the County's MS4 data management. The first item is an improved BMP inspection database, which went live October 28, 2013. The second item is in progress, and is a geodatabase that will link our BMP inspection database to a spatial database that will include all other relevant NPDES data, including the Attachment A data. The third item is an improved database that will be used to store and manage data associated with the County's Illicit Discharge Detection and Elimination (IDDE) program. The work on the IDDE database is currently in the early development stage.

D. Discharge Characterization

The following management programs shall be implemented in all areas served by Howard County's municipal separate storm sewer system. These jurisdiction-wide programs are designed to control stormwater discharges to the maximum extent practicable and shall be maintained for the term of this permit. Additionally, these programs are to be integrated with other permit requirements to promote a comprehensive approach toward solving water quality problems. The County shall address any needed program improvements identified as a result of periodic evaluation by MDE and annual self-assessment.

Introduction

In previous permits Discharge Characterization covered Howard County's efforts to help MDE characterize the quality and quantity of stormwater discharges to its Municipal Separate Storm Sewer System (MS4) as required by the USEPA NPDES regulations and MDE permit requirements, through long-term (chemical, physical and biological) monitoring; the effectiveness of a SWM system constructed with the *2000 Maryland Stormwater Design Manual* (the Manual); and pollutant loading estimates (annual and seasonal) for major outfalls. The County's long-term sites were in the Font Hill neighborhood within the Little Patuxent River watershed and the evaluation of the effectiveness of the new SWM techniques was done on a tributary (Hammond Branch Tributary) within the Emerson Development.

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The third generation permit essentially shifts the chemical, biological, and physical monitoring requirements and discussions to Assessment of Controls (Section VIII of the Annual Update). With concurrence by MDE, the County discontinued its monitoring program at the Font Hill sites during the eleventh permit year. Since the inception of the monitoring at the three individual Font Hill sites in 1998, little change had been observed in the sampling results and little change to the watershed characteristics had occurred or was expected to occur. Since the third generation permit stresses the need to monitor relative to watershed restoration project implementation, the County felt it appropriate to shift its monitoring sites to the Centennial,

Wilde Lake, and/or Red Hill Branch watersheds since the three previous sites had served their purpose, but would provide no further insight into the Font Hill Tributary watershed. Further discussion of the new sites and protocols are provided in Section H. Assessment of Controls.

E. Management Programs

The following management programs shall be implemented in all areas served by Howard County's municipal separate storm sewer system. These jurisdiction-wide programs are designed to control stormwater discharges to the maximum extent practicable and shall be maintained for the term of this permit. Additionally, these programs are to be integrated with other permit requirements to promote a comprehensive approach toward solving water quality problems. The County shall address any needed program improvements identified as a result of periodic evaluation by MDE and annual self-assessment.

1. Stormwater Management

An acceptable stormwater management program shall be maintained in accordance with the Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland. At a minimum, the County shall:

a. Conduct preventative maintenance inspections of all stormwater management facilities at least on a triennial basis. Documentation identifying the facilities inspected, the number of maintenance inspections, follow-up inspections, the enforcement action(s) used to ensure compliance, the maintenance inspection schedules, and any other relevant information shall be submitted in the County's annual reports;

b. Implement the stormwater management design policies, principles, methods, and practices found in the 2000 Maryland Stormwater Design Manual or other innovative stormwater management technologies approved by MDE;

c. Track the progress toward implementing the 2000 Maryland Stormwater Design Manual or other innovative stormwater management technologies approved by MDE and report annually the modifications needed to address any programmatic problems; and

d. Maintain programmatic and implementation information according to the requirements established as part of MDE's triennial stormwater program review.

Introduction

A major component of the County's NPDES permit is the management programs. The main goal of the management programs is to provide a framework for achieving long-term NPDES permit conditions through the reduced discharge of pollutants to the municipal storm sewer system to

the maximum extent practicable. The management programs build on many of the programs that are currently in place in Howard County.

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While implementing the 2000 Maryland Stormwater Design Manual and providing applicable feedback to MDE on programmatic problems is a condition of the current NPDES permit, MDE has updated the Design Manual per the requirements set forth by the Stormwater Management Act of 2007. Therefore, the County is now implementing the current version of the Design Manual, including the 2009 revision for Environmental Site Design (ESD), and providing feedback on that version as necessary. The County has had no modifications to the guidelines and no programmatic problems to address at this time.

Preventative Maintenance Inspections

Preventative maintenance inspections of County, Board of Education, and private SWM facilities were conducted from June 20, 2014 through December 17, 2014. All facilities are to be inspected on a triennial basis. A summary of the inspections during this time period is listed in Table 1. The SWMD is responsible for SWM BMP inspections.

Table 1: Preventative Maintenance Inspections

Inspection Detail	Inspections Jun. 2014 through Dec. 2014
County Maintained BMPs	176
Board of Education Maintained BMPs	36
Privately Maintained BMPs	306
Residential ESD BMPs	40
Total	558

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

There are currently 1,134 County maintained BMPs, 135 Board of Education BMPs, and 2,055 privately owned and maintained BMPs, for a total of 3,324 BMPs, which are inspected on a three-year cycle. In addition, there are approximately 919 individual residential lot environmental site design BMPs (e.g. rain gardens, drywells, rain barrels, etc.). Documented inspection of the residential ESD BMPs began in 2014 using the same geographic triennial inspection cycle as the structural BMPs.

The general procedure for the inspection of privately maintained facilities is to use the owner information in the BMP database developed by the County to give prior notification to the BMP owners of the County's intent to inspect their facility; perform the inspection; provide the owner a complete record of the results of the inspection, including deficiencies that need to be repaired; then follow up with the owner to ensure the necessary repairs are made within a reasonable time frame. The County has developed an extensive component to the BMP database to allow tracking of the inspection and maintenance process in detail for each BMP

inspected. The County has found that considerable follow-up is needed for owners that do not readily respond to initial inspection notifications and the results of the inspections with repairs. Further, several site visits may be required of County inspection staff to meet with BMP owners and their maintenance contractors to better explain the repairs needed and to follow up until the repairs are completed.

Where pipes or other in ground structures are of concern, but cannot be safely entered by an inspector, videos obtained from remote video cameras are used to identify problems with the facilities and create a video database of the County's SWM facilities. GPS locations are collected for all facilities and are used to supplement current GIS mapping.

2. Erosion and Sediment Control

An acceptable erosion and sediment control program shall be maintained in accordance with the Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland. At a minimum, the County shall:

a. Address any needed program improvements identified during MDE's evaluation of the County's application for the delegation of erosion and sediment control enforcement authority;

b. At least three times per year, conduct "responsible personnel certification" classes to educate construction site operators regarding erosion and sediment control compliance. Program activity shall be recorded on MDE's "green card" database and submitted as required in PART IV. of this permit; and

c. Report 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 shall be specific to the permitting activity for the preceding three months.

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MDE completed their evaluation of the County's application for delegation of erosion and sediment control enforcement authority and sent the County a re-authorization letter on November 7, 2012. The delegation authority is effective through June 30, 2015.

Responsible Personnel Certification

Howard County offered two Responsible Personnel training classes from January, 2014 through December, 2014. The first class was held on March 20, 2014 with 16 attendees and the second class was held on May 22, 2014 with 10 attendees.

The Erosion and Sediment Control (E&SC) Responsible Personnel Training Certification Databases for each class were submitted to MDE within two weeks after each class; however, a summary of this information is also included as Database J in Section IV Attachment A of this

Annual Update. John Seefried, who is certified by MDE as an instructor, taught the courses. Roni Landis served as Program Coordinator. There are online classes offered by MDE however, Howard County may offer tutorial classes in response to the high demand for in-person classes. Typical attendees are those responsible for installation and maintenance of E&SC practices including builders, developers, contractors, and County personnel.

Quarterly report on earth disturbances > 1 acre

Quarterly reports are based on calendar years. From January, 2014 through December, 2014, 260 sites were reported to the Construction Inspection Division as having more than one acre disturbed. The site disturbances ranged from one to 708 acres. The County submits the quarterly reports on earth disturbances of greater than one acre, directly to MDE. This information is also included as Database K in Section IV Attachment A of this Annual Update.

3. Illicit Discharge Detection and Elimination

Howard County shall maintain an inspection and enforcement program, or other alternative methods approved by MDE, to ensure that all discharges to and from the municipal separate storm sewer system that are not composed entirely of stormwater are either permitted by MDE or eliminated. At a minimum, activities shall include:

a. Field screening at least 100 outfalls annually. Each outfall having a discharge shall be sampled using a chemical test kit;

b. Conducting routine surveys of commercial and industrial watersheds for discovering and eliminating pollutant sources;

c. Maintaining a program to address illegal 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 IV. of this permit. Annual reports shall include any requests and accompanying justifications for proposed modifications to the illicit discharge detection and elimination program.

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

- 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 Festival. 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 http://www.howardcountymd.gov/DisplayPrimary.aspx?ekfrm=530. The County also is proactively surveying all commercial and industrial sites in the County to identify the potential for illicit discharges before they occur.

Detection Program

The County's IDDE program has procedures in place to detect illicit discharges and connections to the County storm sewer system and to look at areas within the County where illicit discharges are most likely to occur. These proactive inspections are followed up by chemical testing of outfalls that are flowing; when a chemical test shows a violation, the flow is tracked to the source. The owner/tenant of the property where the illicit discharge originates is identified and a follow-up investigation of the violation includes a Notice of Violation for the first offense and citations for recurring violations. Major spills are reported to the Howard County Fire Department and MDE.

For the current permit reporting period the County's contractor performing 110 IDDE outfall inspections even though MDE only requires that 100 inspections be performed. The County also performed an additional three industrial/commercial routine site surveys from June 20, 2014 to December 17, 2014. This year the County performed inspections primarily in areas such as the Little Patuxent Watershed, the Route 1 corridor, and I-95 corridor. The majority of the outfalls inspected were industrial or commercial land use.

Removal and Compliance Program

The following ten sites were discovered to have an illicit discharge during the current reporting period:

- **Site Number 218662, 7920 Tar Bay Dr.** The field team visited outfall 218662 and immediately noted that the water in the plunge pool was grey and the area smelled of sewage. Water was flowing from the outfall and it was clear. A chemical test was performed and yielded an above action level for detergents (> 3.0 mg/l) and chlorine (0.80 mg/l). The field team traced the chlorine and detergent levels half-way up Rappahannock Ave. toward Assateague.

  Remediation: No specific source was identified. Field staff revisited the site later in the day and retested the effluent. The chlorine level had dropped but the detergent concentration

was still > 3.0 mg/l. Follow-up by the County included a check of the sewer lines in the area by the Bureau of Utilities. No break in the sewer line was found. Further investigation showed that a nearby business was washing vehicles. The business was ordered to keep their wash water out of the storm drain system.

- **Site Number 218830, 9070 Junction Dr.** The outfall was found to be flowing at a very low flow rate with clear water. The water tested above the action level for detergents at 1.5 mg/L. The pH was also out of the acceptable range at 8.63.
  Remediation: The flow appeared to originate in seams of a catch basin and was not the result of illicit activity on the parking lot. The warehouse appeared to be not in use.

- **Site Number 218909, Native Floral**. Field crew discovered red-colored water flowing across a parking lot toward a storm drain inlet while traveling to an outfall. Field crew then proceeded to the outfall **218909.** Staff noted no visual indicators of the illicit discharge at the outfall but the field test was positive for phenols (> 2.00 mg/l) and detergents (> 3.00 mg/l). **Remediation:** The discharging flow was traced back to rinse water from a florist company loading dock. The crew also tested the flowing water across the parking lot and obtained similar results. The County issued a Notice of Violation to the company responsible for the discharge, and they were ordered to keep their floral rinse water out of the storm drain system. A follow-up inspection of the site and a discussion with owner about the discharge was performed. No discharge was present at that time.

- **Site Number 218944, Maryland Seafood Market.** Outfall screening results were positive for pH (6.28). Staff traced the flow to three sources: 1) possible leaking water line near a fire hydrant along Tar Bay Drive, 2) possible leaking water line just inside the fence of Maryland Seafood Market and running into the gutter pan of Oceano Ave., and 3) unknown source underneath Oceano Ave. that is presumed to be groundwater.
  Remediation: The Howard County Bureau of Utilities was notified and one of the businesses in the Seafood Market was informed they had a break in their water line. The line was repaired.

- **Site Number 220107, O'Donnell Honda service.** Field crew visited O'Donnell Honda and downstream storm water infrastructure. The outfall was found to be flowing with non-illicit water from an underground source. We tracked the flow up the network to the O'Donnell dealership and found that water was flowing across the parking lot in a similar fashion as last year. Water was dripping off cars that were leaving the car wash and the accumulated water was flowing east toward an inlet. Staff also noted water ponding and flowing along a stretch of parking lot along the south side of the building near a detailing operation. Field staff tested both surface collections of water and found above action levels of detergents at both locations. The concentrations of both areas were greater than 3 mg/l.

Remediation: O'Donnell Honda met with the County and will reduce the concentration of chemical in their car wash. In addition, they have bermed the car wash area to prevent the car wash water residue from leaving the car wash area.

- **Site Number 220323, Maryland Produce Market.** Staff screened the major outfall draining the Maryland Produce Market and found acceptable pH; however, a white flocculant material was deposited on the outfall apron. Flow was tracked to a 4-way junction just inside the front gate. At this point the flow split between a stream originating from the northeast-most inlet grate and the small, corrugated plastic pipe that has been a problem in the past. The pH of this stream was 11.27 and the detergent concentration was 0.50. Flow coming from another line originating from the southeast had pH of 5.42; contributing infrastructure to the southeast line was dry.

  Remediation: Howard County, MDE and the Food Center Authority have met to discuss the high pH, and the Food Center Authority conducted water sampling and testing per MDE and County requests. Based on review of sampling results and discussions, MDE and the County have concluded the high pH is due to concrete rubble used as fill and buried on site and no further remediation is required for this particular issue.

- **Site Number 221163, Panda Cabinet and Granite.** The plunge pool at the outfall opening had a gray cast in the water and an oil sheen was present on top. The water that was flowing into the plunge pool from the outfall was clear and did not exceed any illicit discharge parameter limits. Staff tracked the flow to two areas: a) an east wing feeder line which originated on the east side of the building, however the pipes in this portion were just wet, and b) the west wing feeder line, which originates on the north side of the building in the vicinity of the rear of Panda Cabinet and Concrete. At the rear of Panda Cabinet and Concrete, water was flowing from a tub constructed of concrete block. The overflow from the tub was followed to a point beyond railroad tracks where the flow had etched a small channel measuring 4" to 6" wide. The channel had flowing water and led to a storm drain inlet that was covered by plywood. Staff captured a water sample from the PVC pipe, but it likewise did not test positive for any illicit discharge parameters except for opaque light gray color.

  Remediation: The County visited the site and ordered the owner to prevent the discharge flow from entering the environment even though no stream was found nearby.

- **Site Number 221183, Taylor Farms.** Field crew found the outfall flowing with slightly discolored water. At the time of our visit, the chemical tests were negative for illicit discharge. All flow to the outfall appeared to originate in water that was found flowing across the paved area in front of the loading dock. The source of this flow appeared to be water that had accumulated around and behind some stacked pallets in shrink wrap to the right of loading dock #5. We found a 4-inch PVC pipe in the wall, approximately 2 feet

above the asphalt, which was discharging a dribble of water. We captured a sample from this flowing which tested positive for illicit discharge (phenols 0.6 mg/l and pH 6.46).

Remediation: The County revisited the site and met with the facility manager, who explained that the flow was coming from roof drainage. Taylor Farms is a facility that processes produce and has large refrigeration units on their roof. No other source of flow or discharge was found. Since air conditioning condensate is exempt from the IDDE program, no further follow up was necessary.

- **Site Number 221193, Junction Drive Food Trucks**. The field team visited the outfall and found it to be very rancid smelling with faintly flowing greyish water. They also observed whitish flecks around the plunge pool that appeared to be food material and some oil sheen on the standing water. Testing the water yielded illicit discharge hits for pH (5.40), phenols (0.30 mg/l), and detergents (> 3.00 mg/l). The team tracked the flow to curb inlets along Junction Drive near mobile food vans. The curb inlets contained accumulated food matter. Gray wash water was also found running along the gutter pan and appeared to originate from an overflowing wash water waste bucket placed underneath a food van. Testing of the curb grey water yielded similar results as the outfall. During the revisit, staff observed one of the food van workers dumping the overflowing wash water bucket down the storm drain.

  Remediation: The County visited the food vans and issued a Notice of Violation to the owner. The employee was reprimanded and educated on the proper disposal of food.

- **Site Number 221289, Lancaster Foods.** Field staff visited the outfall draining the rear lot of Lancaster Foods. We found the outfall discharging clear water, but it tested out of bounds for pH (6.34) during the first visit and within the acceptable range on the 2nd visit. No other chemical tests were above action criteria. All of the sources of flowing water were low flow rate or trickles and could not be sampled without entering the manholes. All flow entering the trunk line originated from pipes joining the system that originated from the direction of the building.

  Remediation: Howard County followed up on this inspection on July 13, 2015 and performed a pH test. The test showed the pH was 7.1. There was no pH violation. Lancaster Foods' flow is coming from their outfall due to large refrigeration units used to refrigerate the produce that they process. The County will re-inspect the facility within the year.

Program Management and Reporting

Howard County has a staff of five, one manager and four inspectors who carry out the duties of the IDDE Program, which includes 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 an Access and .pdf files. All sites are reported to MDE at the end of the reporting period.

4. County Property Management

Howard County shall identify all County-owned and municipal facilities requiring NPDES stormwater general permit coverage and submit Notices of Intent (NOI) to MDE for each. The status of pollution prevention plan development and implementation shall be submitted annually.

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The County has identified and listed County owned and municipal sites needing a permit below.

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.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. The County has begun the design phase and approximately $2.5 million has been approved in the County's FY13 capital budget, and an additional $1.1 million has been approved for the FY14 capital budget, to cover the cost of design and construction to retrofit the existing facilities with the needed outdoor washing systems. 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. An additional $900,000 was approved for the FY15 capital budget and $1 million for the FY16 capital budget to cover additional design and construction costs.

County Waste Water Treatment Plant (LPWRP)

There were no spills reported to Maryland Department of the Environment (MDE) from June 20, 2014 to December 17, 2014.

In partnership with the National Security Agency (NSA) and Howard County LPWRP, highly treated wastewater will be 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. From June 20, 2014 through December 17, 2014 there was no flow to the National Security Agency.

Annual Inspections

Plant inspections 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.

5. Road Maintenance

Howard County shall maintain its plan to reduce pollutants associated with road maintenance activities. At a minimum, an annual progress report shall be submitted that documents the following activities:

a. Street sweeping;

b. Inlet cleaning;

c. Reducing the use of pesticides, herbicides, fertilizers, and other pollutants associated with roadside vegetation management through the use of integrated pest management (IPM); and

d. Controlling the overuse of winter weather deicing materials through continual testing and improvement of materials, equipment calibration, employee training, and effective decision-making.

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Bureau of Highways (BOH)

The Bureau of Highways (BOH) is responsible for the maintenance and repair of 1071 miles of County-owned roadways, 164 bridges, as well as all of the street trees in the County. Some of the areas of operation that the BOH has focused on during the current permit year include:

Street Sweeping
The County has continued performing street cleaning with the assistance of a private contractor. Street sweeping continued along approximately 1,376 curb miles on County roadways. Between June 20, 2014 – December 17, 2014, the BOH collected approximately 418 tons of street debris via street sweeping.

Inlet Cleaning
The BOH cleans and repairs storm drain inlets as needed. In the fall, the County removes leaf litter from storm drain inlets as needed. The amount of debris collected FY15 is approximately 10 tons.

Pesticides, Herbicides and Fertilizer
The County continues to minimize the amount of pesticides, herbicides and fertilizer used. No pesticides, herbicides or fertilizer was applied by the BOH during this time period.

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 de-icing chemicals. The table below identifies the highway zone and the deicer usage.

Table 2: BOH Snow & Ice Removal Material

Highway Zone	Salt (tons)	Liquid Magnesium (gal)	Salt Brine (gal)
East	600	0	0
West	385	30	0
Central	420	0	0
Total:	1,405	30	0

Adopt-A-Road Program/Trash Collection

The County "Adopt-A-Road" program continues to be very successful. Table 3 Adopt-A-Road Summary below, provides a breakdown of the different zones for the Adopt-A-Road program from February 1, 2014 to March 4, 2015 that details the amount of trash collected, the mileage of road adopted, and the number of roads adopted by zones. A flyer about the Adopt-A-Road program can be found on the County's website.

Table 3: Adopt-A-Road Summary

Zone	Trash Bags Collected	Number of Roads Adopted	Estimated Miles
Central	637	42	35
East	613	40	50
West	228	26	35
Total	**1478**	**108**	**120**

6. Public Education

A public education and outreach program shall be maintained to reduce stormwater pollutants. Outreach efforts are to be integrated with all aspects of the County's activities. These efforts are to be documented and summarized in each annual report. At a minimum, the County shall:

a. Continue to publicize a compliance hotline for the public reporting of suspected illicit discharges, illegal dumping, and spills.

b. Provide information regarding the following water quality issues to the general public:

- ***i. Water conservation;***
- ***ii. Stormwater management facility maintenance;***
- ***iii. Erosion and sediment control;***
- ***iv. Household hazardous waste;***
- ***v. 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. Litter control, recycling, and composting;***
- ***vii. Car care, mass transit, and alternative transportation;***
- ***viii. Private well and septic system management; and***
- ***ix. 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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Public education and outreach occurs throughout the County and is conducted by various agencies. The following is a summary of educational activities and outreach, which occurred throughout the current permit year:

Stormwater Management Division (SWMD) Education Programs

Compliance Hotline

The Howard County website posts a Hotline number, (410) 313-6444, 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 which is sent to MDE on an annual basis. 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 See Click Fix, a smart phone application that allows anyone in Howard County to report an illicit discharge directly to the IDDE Manager.

School Outreach

The SWMD continues to provide workshops to the schools and businesses in Howard County. Schools participate in County-sponsored programs and workshops designed to increase their awareness of water quality issues.

During this permit period the County met with one elementary school to discuss stormwater management and water quality as it applied to their particular school sites as well as the County. The County hopes to do more water quality projects at school sites, which will provide more opportunities for student outreach and involvement.

Howard Environmental Education Resource Organization (HEERO)

A resource group has been formed and is currently being led by the Howard County Public School elementary school environmental education coordinator. The group's goals are to promote and coordinate the various opportunities throughout the County for environmental education and awareness. HEERO members include County staff as well as local environmental interests and environmental non-profit organizations. The SWMD and DRP both have representatives in this group. While no meetings were held during the current permit term, the group still exists.

Other Educational Outreach Initiatives

The SWMD as well as DRP speak at the Howard County Legacy Leadership Institute for the Environment (HoLLIE), speak at Master Gardener training events, and are part of the Howard County Watershed Forum. The result of the forum was the first Howard County Watershed Steward Academy class in 2012. SWMD personnel were speakers and led a field walk as part of the Watershed Stewards Academy class during the current permit term.

The SWMD also has a booth at the annual GreenFest to help promote water quality and stormwater management. The result of all of these efforts is to create a more educated county citizen who will contribute to the improvement of water quality in Howard County and in the Chesapeake Bay.

Recycling and Waste Reduction Division Public Outreach

Recycling Division Programs: Jul. 1, 2014 – Dec. 31, 2014

Howard County Recycling Division continues to provide a variety of recycling opportunities and information to County residents and businesses, as well as County government operations. From July 1, 2014 through December 31, 2014, a total of 38,467.82 tons of recyclables were collected curbside and through drop-off programs at Alpha Ridge Landfill.

Weekly residential single stream recycling collection is provided to over 86,000 single family homes, townhouses, mobile home parks and condominiums. Three collection routes also have foodscrap 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, woodwaste, yard trim, foodscraps, roofing shingles, compressed gas tanks, electronics, rigid plastics, cardboard, carpet and padding, mattresses and box springs, reusable building materials, Styrofoam™, cooking oil, motor oil & filters, anti-freeze, wet cell batteries, clothing & textiles, tires, scrap metal and appliances, and single stream recycling. All County residents may use the convenience center with proof of residency; businesses must apply for a permit. On-going 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 woodwaste and yard trim.

The Recycling Division distributes recycling and waste reduction literature to Howard County households and businesses. 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.

From Jun. 20, 2014 through December 17, 2014 the County provided various recycling and waste reduction education and outreach through:

- Print ads in the Baltimore Sun, Epoch Times, The Howard County Black Book, Pennysaver Trends Magazine, A timely recycling message printed on the back of the County's tax envelopes.
- Promotional items that included jar openers made out of recycled tires, pencils made out recycled newspaper, magnetic memo clips made out of recycled plastic and reusable bags made out of recycled water bottles.
- Direct mailings through Comcast and Verizon about recycling program holiday schedule during Thanksgiving to include the holiday slide schedule for curbside collection.
- Free-standing vertical signs at the Columbia Mall.
- Windowed recycling carts displayed at libraries and County buildings to highlight the many items that can be recycled.
- Distribution of recycling and waste reduction literature at library branches, schools, County buildings, village centers, senior centers and private residences.
- Provide a Home Composting Guide which is distributed with free back yard compost bins available to County residents.
- Participate in community events with a recycling exhibit and educational materials, such as GreenFest, Wine in the Woods, Triathlons and school festivals.
- Performing outreach activities at camps, schools, community organizations, scout groups, senior centers, professional organizations and new employee orientation.
- Outreach through social media such as Twitter, using the twitter name, @HoCoRecycles
- A postcard providing positive feedback was sent to participants in the food scrap recycling program.

Outreach to Business Communities

The Business Recycling Program has been providing technical support to the Howard County Chamber of Commerce business collection co-op. A new section on specialty recycling along with business recycling options has been posted on the website.

Outreach to Students and Schools

The County's Recycling Coordinators continued distribution of school recycling information through school programs, brochures and visually appealing lunchroom recycling posters. Programs ranging from individual classroom talks and short lunchroom presentations to school-wide assemblies were conducted for students as young as 2 years old. The County maintains its presence in schools and educated approximately 6,211 students about recycling from June 20, 2014 through December 17, 2014.

Outreach and education was also provided outside of the school. Presentations and tours of the Alpha Ridge Landfill were provided to multiple Boy Scout and Girl Scout troops to enable them to earn merit badges. Active presentations, which included a hands-on relay game, were available for summer camps. The County educated approximately 529 citizens about recycling from June 20, 2014 through December 17, 2014.

In addition to outreach, the School Board and the County continued to collaborate on a contract for front-end trash and recycling collection service. This new contract provides all County buildings, school and participating Condominium properties with consistent weekly service at a cost-competitive price.

Curbside Food Scrap Collection

The County has expanded its food scrap collection pilot to the Clarksville area with an additional 1,100 homes participating along with the 2,200 homes in the eastern Ellicott City and Elkridge. Collection is once weekly with a choice of two sizes of collection containers. The County has also opened a pilot scale aerobic composting facility at the Alpha Ridge Landfill that can accommodate food scraps as well as yard trim. This is the first facility of its kind being operated by a County government in the State of Maryland.

Department of Recreation and Parks (DRP)

Stream and Pond Cleanup Program

Since 1996, DRP has actively recruited volunteers and tracked their efforts removing trash and other debris from Howard County's waterways. In FY15 (plus the event in April 2014), we had 127 volunteers spend 332 hours in this program. Volunteers collected 1,217 pounds of trash and an additional 4,785 pounds of bottles, cans, tires and scrap metal were recycled. Since 1996, we have had 2,503 people spend 5,493 hours cleaning our waterways. These figures reflect DRP's participation in the Baltimore regional stream and watershed clean-up effort, "Project Clean Stream". This was the sixth year DRP participated in the International Coastal Clean-up providing one location. Since 2000, 40.09 miles of streams/rivers and 102.2 acres of lakes and ponds areas have been cleaned. Trash collected since 2000 totals 30,149 pounds with an additional 17,111 pounds of trash recycled!

The Bark Ranger Program

In the summer of 2013, the DRP Park Rangers 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. Between June 20, 2014 to December 17, 2014 the program has 561 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 bandanna and a plastic bone which contains baggies to remove pet excrement. Through this initiative, visitors of DRP 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.

Forest Conservation/Reforestation Program

This is an exciting example of the private and public sectors working together. The program started in 1996 and provides developers, who do not have the room to do their forest conservation "on-site", the option to pay a fee-in-lieu to the County. A portion of this fee is passed down to DRP Natural Resources Division to perform the mitigation. DRP, which manages over 8,000 acres, determines where the trees are most needed. Our first priority is planting and enhancing riparian forest buffers. In FY15, DRP planted and enhanced a total of 16.27 acres of new forests. To date (1996-June 30, 2015), a total of 394.42 acres have been planted through this program. This translates to 15.55 miles of stream buffer plantings and 125,501 plants**.**

Forest Conservation Easement Inspections

DRP Natural Resources Division is responsible for the inspection of any forest conservation easement established under a forest conservation agreement between a developer and the County pursuant to the Forest Conservation Act of Howard County. The inspection process forces developer compliance with County forest conservation requirements and includes the verification of easement boundaries, location of protective signage, identification of encroachments or deficiencies and the assessment of reforestation survival and overall forest health. Through June 2015, a total of 1,060 projects creating or modifying more than 5,638 acres of forest conservation easements have been digitized into the County's forest conservation GIS layer, which is essential in identifying easement boundaries in the field in the absence of required signage. From July 2010 through June 2015, a total of 594 forest conservation inspections were performed and only 334 inspections (56.2%) found projects to be in compliance with their project-specific "Forest Conservation Plan".

	FY11	FY12	FY13	FY14	FY15	Total
Inspections	143	114	120	110	107	594
Passing	79	66	69	66	54	334
Percentage	55.2%	57.9%	57.5%	60.0%	50.5%	56.2%

The combination of forest conservation easement inspections and post-development enforcement allows the County to protect the forest conservation easements that currently exist within Howard County, Maryland. The inspection program insures that developers follow requirements and best management practices. Regular inspections guarantee viable forests for the future that will continue to provide habitat, air and water quality and other environmental benefits. Between fiscal years 2011 and 2015 a total of 94 post-development enforcement actions have been undertaken by the County against violators of the Forest Conservation Act of Howard County. Post-development enforcement actions insure that those who inherit or

occupy property encumbered by or adjacent to easements comply with applicable forest conservation regulations following developer compliance. Non-compliance fees collected during the past five fiscal years have funded the replanting of 19 forest conservation projects.

Post-Development Landscaping Inspections

DRP Natural Resources Division is responsible for the inspection of any perimeter, parking lot, private street, internal residential and storm water management landscaping resulting from the subdivision or redevelopment of land in accordance with the requirements of Section 16.124 of the Howard County Code and the Landscape Manual. The Department of Planning & Zoning awarded full responsibility for such inspections to the Department of Recreation & Parks in December 2008. The inspection process forces developer compliance with a project-specific "Landscape Plan". From July 2010 through June 2015, a total of 991 landscaping inspections were performed and only 360 inspections (36.3%) found projects to be in compliance with their project-specific "Landscape Plan".

	FY11	FY12	FY13	FY14	FY15	Total
Inspections	239	182	203	186	199	1,009
Passing	92	72	69	49	78	360
Percentage	38.5%	39.6%	34.0%	26.3%	39.2%	35.7%

Plant It Green Programs

DRP was awarded funding through the Governors Stream Challenge Grant for the years 2013 through 2016. $434,890 will be provided by the Chesapeake Bay Foundation to be used for education and buffering streams throughout the County. Recreation and Parks will be utilizing the Tree Canopy and Stream ReLeaf Programs, part of "Plant It Green" to achieve the goals of this grant. Students will participate in recruitment for these programs as well as attend field trips with educational lectures and demonstrations to be held at key planting sites within Howard County parks.

Tree Canopy

A 2009 Tree Canopy Study, initiated by DRP and the Baltimore Ecosystem Study and performed by the Spatial Analysis Laboratory of the University of Vermont, revealed that many areas throughout Howard County were found to have less than adequate canopy cover. A healthy tree canopy provides water filtration and retention, clean air, climate cooling, energy conservation, water quality benefits, stream bank stabilization and wildlife habitat.

Tree Canopy is a program designed to establish and increase urban tree canopy throughout Howard County by providing free native trees to homeowners. Homeowners may have Tree Canopy trees planted anywhere on their property as long as they are not in a utility right-of-way or within existing heavy canopy coverage.

Year	Number of Participants	Number of Trees Planted
2011	1	30
2012	8	17
2013	234	1,272
2014	77	548
Total	**320**	**1,867**

Stream ReLeaf

The Stream ReLeaf Program was initiated by the SWMD 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 DRP Natural Resources Division.

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 (rights of ways are not eligible); and the homeowner must commit to planting at least 12 trees.

Year	Number of Participants	Number of Trees Planted
2003	8	103
2004	15	468
2005[1]	1	150
2006	37	1,374
2007	31	1,208
2008[2]	28	709
2009	25	1,908
2010[3]	11	367
2011	81	1,780
2012	32	1,166
2013	69	2,353
2014	55	2,281
Total	**393**	**13,870**

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

Students Branching Out (SBO)

In the spring of 2013, DRP 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 to improve 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.

The existing Stream ReLeaf and Tree Canopy programs provided a foundation for the creation and improvement of stream buffers and tree canopy throughout the County. The Alliance for the Chesapeake Bay was brought on board to aid in the partnership between DRP and schools throughout the County. Students were asked to create marketing materials to promote the Stream ReLeaf and Tree Canopy Programs and to help garner applicants. In addition, students took field trips to reforestation sites. Students learned about the importance of riparian forest buffers, the negative effects of storm water runoff, the Emerald Ash Borer, how to properly plant trees and participated in in a forest conservation stream buffer planting.

Year	Students/Volunteers Engaged	Service Hours	Trees/Shrubs Planted	Acres Planted
2013	443	734	3,911	20.5
2014	264	645	3,496	24.97
Total	**663**	**1,379**	**7,407**	**45.47**

Students Branching Out Two (SBOII)

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

Planting on school grounds will total 20 acres over two years to be planted at 200 trees per acre. Students will learn about stream buffers throughout the year, culminating in a spring planting. Parkland plantings will total another 20 acres to be planted at 200 trees per acre to be completed by June 30th, 2015. Students from various groups such as 4-H, Scouts, Environmental clubs, National Honors Societies and Youth Groups will be recruited to aid in volunteer plantings each Spring and Fall.

Year	Students/Volunteers Engaged	Service Hours	Trees/Shrubs Planted	Acres Planted
2013	60	60	2,250	14.5
2014	687	767	5,754	32.365
Total	**747**	**827**	**8,004**	**46.865**

Emerald Ash Borer Project

The Emerald Ash Borer Project is part of the Students Branching Out Grant. This effort consists of a plan to save the biodiversity of forested areas located within the boundaries of Howard County Park property. The process involves four steps which include surveying park property for the presence of ash forests, site preparation, under planting, and long term forest management. Since starting the project, we have identified 191 acres of ash located on parkland. In FY15, a total of 645 native trees were planted on 7.91acres of ash stands.

Private Forest Conservation Establishment (PFCE)
The PFCE program is designed to create forest conservation easements on private properties.

The Department of Recreation and Parks is responsible for site selection, development of forest conservation plans, preparation and recordation of forest conservation easement plats and agreements, site preparation, installation of forest plantings and management of plantings for a two year period. To be considered for the PFCE program, properties must be ten acres or larger and forest conservation planting sites on these properties must be one acre or larger. Sites are chosen to maximize water quality and habitat benefits.

Easement	Acreage	Trees Planted	Feet of Stream Buffered	Year Planted
Conlon	7.591	2,600	3,820	2008
Horner	1.483	352	440	2009
Meissner	2.99	1,050	1,430	2009
Ziegler 1	4.642	1,430	3,010	2010
Zielger 2	2.156	700	1,107	2010
Litt	3.001	850	1,140	2010
Warfield	4.2603	1,250	1,180	2010
Earle	6.826	1,365	1,610	2010
Zoller	2.235	700	1,640	2011
Eyler	3.212	960	100	2012
Sharp-Waterford	8.2	2,600	1,530	2012
Sharp-Chase	6.9389	2,200	4,380	2012
Mariani	5.1095	1600	2,270	2012
Sharp-Chase 2	6	1800	2,160	2013
Sharp-Waterford 2	3.3	660	1,340	2013
Totals:	**67.9447**	**20,117**	**27,157**	

No additional easements are being planned for the future and there are no changes in the current reporting period to what has already been reported in Annual Update No. 19.

Volunteer Tree Plantings
The Forestry section conducted two volunteer tree plantings during FY15. The fall 2014 planting took place at Alpha Ridge Park and was part of the *Students Branching Out II Grant*. Volunteers from Winchester Homes planted 150 trees between the sports fields and parking lots. These trees will provide shade and intercept storm water run- off from the sports fields.

Promotion of Natural Resources Programs

This year, the Natural Resources Division redesigned and created marketing materials for its Tree Canopy, Stream ReLeaf and Bark Ranger programs. Materials include brochures, websites, social media, post cards and mailers, handouts, as well as large informative banners. These materials were used at GreenFest and the Howard County Fair to promote the programs and garner applicants.

Parkland, Open Space and Natural Resources Regulation Enforcement

In 1992, parkland regulations were revised to place stronger emphasis on natural resources protection. This gave Howard County its first "post-development" environmental regulations. To date, we have issued over 1,944 warnings and have achieved nearly 100% compliance.

	FY11	FY12	FY13	FY14	FY15	Total
Warnings	38	31	189	92	82	432

Parkland Acquisition

During FY15, the following properties were added to our landownership holdings. We also verified our land holding acreage with the Real Estate Services Division. Total acreage can vary from year to year due to the reallocation of properties for other uses.

New Parkland Added in FY15 (included in Total)

Open Space in FY15	87.1650 acres
Open Space Approved for Transfer	118.9480 acres

Total Recreation and Parks Land Holdings

Regional Parks	2,609.2300 acres
Community Parks (with Alpha Ridge Park)	710.8720 acres
Neighborhood Parks (including Playgrounds)	279.1450 acres
Natural Resource Areas	1,887.2800 acres
Historic Places	108.5920 acres
Open Space Total (including above)	3,564.5400 acres
Total:	**9,159.6590 acres**

FrogWatch USA

FrogWatch USA was implemented in 2000. With amphibian populations declining worldwide, researchers at the federal level have a need to gather information on frog and toad population trends across the United States. In FY15, we had 24 volunteers that contributed 160 hours. Since 2000, we have had 1,107 volunteers gather information for researchers at 30 sites in Howard County by conducting frog-calling surveys. They have contributed 5,740 hours of volunteer service.

Weed Warriors

The Purple Loosestrife Pluckers, an off shoot of DRP's Weed Warrior program, was initiated in 2006 to assist the Maryland Department of Natural Resources in identifying populations of

purple loosestrife in the County and to assist DRP in the removal of this invasive wetland plant from Font Hill Park, Western Regional Park and Burleigh Manor open space. Volunteers were utilized this year to target purple loosestrife and garlic mustard removal at Cedar Lane Park. In FY15, 21 volunteers reported 42 hours of removing invasive plant species. To date, 171 volunteers have worked together for a total of 703 volunteer hours removing invasive plants.

Annual Butterfly Count

Since 2000, DRP has partnered with the Howard County Bird Club to assist with an annual census of North American butterflies found in the County. Each year in July, teams assemble to survey County parklands. It is important to survey butterfly species as the disappearance of a species may indicate a watershed problem. In FY15, 11 volunteers reported 22 hours for this annual survey. Since 2007, DRP has used 100 volunteers in this effort contributing 266 hours of service.

Annual Dragonfly Count

Since 2006, DRP has partnered with the Howard County Bird Club to conduct the annual census of dragonflies and damselflies (odonates) in the County. It is important to survey odonates as the disappearance of a species can indicate a watershed problem as well as certain species can indicate poor water quality. In FY15, 23 volunteers contributed 107 hours to this survey. Since 2009, DRP has had 120 volunteers contribute 1045 hours of service.

Maryland Amphibian & Reptile Atlas

This was the fifth and final year of a five-year statewide effort to document reptile and amphibian species. Howard County had 424 volunteers contributing 402 volunteer hours. Since 2010, we have had 916 volunteers contribute 2,724 volunteer hours to this survey. After completion, the Maryland Department of Natural Resources will use the data to produce range maps for reptile and amphibian species and over time will serve as an indicator of watershed health around the state. This survey will be repeated every 20 years.

Howard County Fair (Live Green Day)

In FY15, the Howard County Fair hosted a "Live Green Day" featuring community groups focused on environmental awareness. The Natural Resources Division set up a display featuring information about the Maryland Amphibian & Reptile Atlas. One volunteer helped with manning the table during this event with a total of six volunteers assisting since 2012.

Howard County GreenFest

FY15 was the eighth year for the County to host its' annual GreenFest. The theme this year was "Living with Wildlife" and featured many exhibits and vendors dealing with tree plantings, energy efficient home improvements, rain barrels, gardening and composting, electronics recycling, Goodwill donations, Nike Reuse-a-Shoe collection, Bikes for the World collection, as well as live bird and reptile displays. Other features included the County's recycling program and community tree planting programs as well as many community groups focused on environmental awareness. Festival attendance this year was over 1,500 individuals. Since the beginning, attendance has reached over 17,200 people.

Agricultural Leased Lands
All lands leased to farmers have conservation plans developed by the Natural Resources Conservation Service and are being farmed accordingly. In FY15, DRP had 254.2978 acres leased to five farmers.

Resident Canada Goose Management Program
DRP continued its Canada Goose Population Control Program since the birds continue to cause degradation of the lake, pond waters and shoreline at Centennial and Font Hill Wetland Park. They continue to graze and trample shore line vegetation which causes erosion. In addition, this concentrated population of geese defecates excessively on areas in which the public uses for outdoor concerts and picnics which in turn elevate nutrient and bacteria levels in the lake water. Flocks of 300+ geese and ducks use Centennial Lake throughout the year. Font Hill's population fluctuates between 10 - 40 birds. Migratory geese overwinter in the region as well. In April 2015, a total of 56 Canada goose nests were treated on DRP lands under our federal permit that allows us to coat the eggs with vegetable oil to prevent hatching. A total of 285 eggs were treated over a period of four weeks.

Dealing with the high population levels of resident Canada geese, mallards and illegally released domestic waterfowl will be an ongoing problem on DRP lands. DRP will continue to address this issue through an integrated approach that will include public education, habitat modification, behavior modification and population reduction.

Trout Stocking on the Middle Patuxent and Little Patuxent Rivers & Centennial Lake
During FY15, 6,000 brown and rainbow trout were stocked in the Little Patuxent and Middle Patuxent Rivers. State Fishery officials have determined that the water quality in these rivers are sufficient to support a recreational, three season fishery. In addition, Centennial Lake had 2,500 trout stocked in the spring.

Deer Population Management in Howard County Parks
During the 2015 Fiscal Year, managed deer hunts were conducted in: West Friendship Park and the MPEA, along the Middle Patuxent River, Alpha Ridge, Blandair and David Force Parks, all in the Little Patuxent River watershed, and High Ridge and Schooley Mill Parks on the main stem of the Patuxent. The Wincopin Trail area of Savage Park, which is at the confluence of the Little and Middle Patuxent Rivers, were hunted for the first time during this season. All parks were found to be over-populated with deer based on observed vegetative damage, complaints from nearby residents, incidence of deer-vehicle collisions on area roads and population estimates performed using helicopter-mounted infrared video cameras. In addition to the Managed Hunt Program, additional population management was carried out at Savage Park, where the Little and Middle Patuxent Rivers meet, the Alpha Ridge Landfill (adjacent to the park of the same name), Centennial Park, Gray Rock subdivision and the Meadowbrook Athletic Center in the Little Patuxent watershed, The Robinson Nature Center and River's Edge subdivision in the Middle Patuxent watershed, Belmont Park, Daniels Mill Overlook subdivision, Governor's Run Subdivision, Rockburn Branch Park and Worthington Park in the Patapsco watershed, by

sharpshooting at night with noise-suppressed rifles. Benson's Branch Park, in the Middle Patuxent watershed, is under agricultural lease and has deer management through a crop damage permit.

The hunts, which take place on prescheduled dates from October through February, are a response to continuing damage to trees, shrubs and groundcover in the Parks from deer browsing. Without management, the current trends will continue, causing degradation of forest shrub and ground cover layers. Long-term forest health will also be impacted since replacement of mature canopy trees would be reduced or eliminated through destruction of seedling stock. These impacts have been documented in our Parks, and are well confirmed in the scientific literature.

During FY15, 341 deer were removed through these management efforts. Population estimates and vegetative surveys indicate that the understory in MPEA is recovering, although overall, harvests there continue much higher than the goal. At David Force and Alpha Ridge Parks, statistical analysis indicates that the hunt is continuing to reduce the population of deer. Observation of the vegetative response also indicates recovery in many areas. Continued hunting is deemed necessary both to bring down the herd sizes and to maintain the lower densities, once acceptable population levels have been achieved.

Every year, the Deer Management Section receives increasing numbers of complaints from the most developed areas in the eastern third of the County, where active management is most difficult. This is mostly in the Little Patuxent and Patapsco River watersheds. Additional management effort is implemented as resources and feasibility allow in this and other areas. Increasingly, educational outreach is done to assist residents in adjusting to high deer densities in areas which cannot be managed. New means of managing deer in such densely suburban areas are needed, and being investigated as time and resources allow.

The table below shows the total deer harvest by our management program since its inception with the crop damage permit at Benson's Branch Park. What cannot be seen by these numbers alone is the growth of the program, both in sites managed and in methods of management. It is clear, though, that stabilization of deer populations within our park system is not yet a reality, and that natural resources, including water quality, are still being negatively impacted by the overabundance of deer. Deer Management Program Harvests:

SEASON	SEASON TOTAL
1997-2000	238
2000 - 2005	1,192
2005 - 2010	1,616
2010-2011	304
2011-2012	348
2012 - 2013	256

2013-2014	341
2014-2015	341
TOTAL	**4,636**

The 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 December 2014. The plan outlines strategies, techniques and protocols for environmental education, research, recreation, natural resources management and administration.

The implementation of the plan's projects and programs in FY15 has included the following accomplishments:

- 2,275 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 FY15. In spring 2015, an additional acre (mostly multiflora rose and autumn olive) was restored to early native successional habitat to benefit woodcock and other meadow/shrub-scrub species.
- In FY15, MPEA staff completed an assessment of the entire 5 ½ miles of natural surface trails in MPEA and updated the MPEA Trail Management Plan with mapping and descriptions of trail improvement and maintenance projects. The six remaining perpetually wet spots from the FY14 trail drainage repair project were completed using turnpike construction and/or by addressing the trail tread's side slope, and the running slope, to improve drainage.
- The MPEA Independent Trail Maintenance Team volunteer program contributed 227 hours in FY15, 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 1,613 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 grant from CBT awarded to the MPE Foundation in the amount of $13,898 helped to fund the MPEA Weed Warriors program, and also funded bringing EcoGoats to the MPEA as a new management tool for invasive species control.
- A donation from the Howard County Forestry Board, and some additional community donations, funded the planting of 220 trees and shrubs in the MPEA during FY15.
- 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 1,460 native trees and shrubs previously planted in MPEA stream buffers and upland habitats.

- A multi-year floristic survey in cooperation with Towson University is now in phase two in the MPEA. Two primary functions of the survey are to evaluate the spread of invasive plant species since the time of the previous survey (2001) and also to identify any rare, threatened or endangered plant species within the boundary. Following analysis of the data, recommendations on management practices will be made. Preliminary recommendations support the need to control invasive plant species within the forested areas to maintain habitat quality and biodiversity.
- 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 storm water 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 FY15, 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 FY15, MPEA volunteers continued to build on previous work with ongoing stream monitoring and stream habitat assessments.
- 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.
- In FY15, a graduate student intern from Slippery Rock University conducted an inventory of all the vernal pools within the MPEA. The intern mapped and collected data on 56 vernal pools, and completed a summary report on her findings, including management recommendations.

- MPEA staff completed a clean-up at Silent Sun Pond in MPEA that resulted in the removal of five bags of floatable litter.
- In October 2014, 384 resident letters were mailed or presented as door-hangers to all the residents with property bordering on the MPEA. The letters and accompanying information were part of an ongoing public education and outreach program to encourage residents to adopt environmentally responsible habits. The main purpose of the letter was to share resources for proper yard waste disposal, recycling, composting, and environmental landscape management practices such as managing storm water and reducing pesticide use. Each letter was accompanied by either a hard copy (door-hangers) or a link to the "From My Backyard to Our Bay" booklet.

Pesticide Usage

DRP utilizes Integrated Pest Management (IPM) greatly reducing the pesticide usage in the park system. Pesticide use is shown in the table below by ounces per watershed.

Watershed	2011	2012	2013	2014	2015
1 - Patuxent River	479.67	509.75	789.05	0.00	0.00
2 - Cattail Creek	1,620.00	177.50	740.00	390.70	0.00
3 - Middle Patuxent River	2,577.26	4,805.50	198.45	6,688.00	180.50
4 - Little Patuxent River	4,728.12	8,849.89	10,481.20	132.00	4,824.50
5 - Dorsey Run	16.00	94.00	54.00	0.00	0.00
6 - Deep Run	15.60	2.00	160.60	132.00	48.00
7 - Patapsco River	869.80	710.25	774.50	405.75	12.00
8 - Hammond Branch	48.00	70.00	64.00	275.00	6.00
Totals:	**10,354.45**	**15,218.89**	**13,261.80**	**8,023.45**	**7,086.00**

Canada Thistle Control Program

This program manages Canada thistle, a noxious weed regulated by the Maryland Department of Agriculture. DRP is required through state mandates to eradicate or control thistle infestations throughout the park system. To meet the State requirements, thistle control will be carried out with existing staff and through a contracted pesticide applicator.

Contracted Thistle Control

Year	2010	2011	2012	2013	2014
Total (oz.)	0.00	0.00	988.00	2,469.00	2,522.00

- **Note:** Due to the economic downturn, funds for this effort were cut for FY10 and FY11 and reinstated in FY12.

Trail Maintenance Projects on Parkland

DRP manages over 9,000 acres of public land for a wide range of purposes. One very important component of DRP's mission is to provide opportunities for outdoor recreation. DRP lands provide a variety of recreational activities including, but not limited to fishing, bird watching, hiking, trail running, cross country skiing, mountain biking, dog walking and horseback riding.

Most of the lands managed by the DRP have a trail network, planned or unplanned. In many cases, the network is substantial and has been in place for some period of time. The task faced by the Department is to upgrade and improve the management of the existing trail system and to determine where construction of new trails will be necessary to meet user demands or to protect resources.

DRP has developed a trail management policy for consistency of trail and pathway planning, design, installation and management. The purpose of the Howard County trail and pathway system is:

- To provide opportunities for all people to recreate in a natural setting without causing damage to the resource.
- To provide opportunities to stimulate and accommodate public interest in wildlife conservation and habitat restoration through controlled access.
- To provide alternative transportation corridors.
- To accommodate and balance conflicting trail uses.

Trail Construction & Maintenance Workshop

- **Rockburn Branch Park** – Conducted an in-house staff training in July 2014 to restore a severely eroded culvert area in preparation for mountain bike Epic Event.
- **Rockburn Branch Park** – Utilizing volunteers, the power line trail re-route – re-routed 600 linear feet of trail approaching the eroded culvert area in September 2014. New trail is located on a sustainable alignment.
- **MRPA Summit** – Gave power point presentation on Sustainable Trails November 2014. The presentation focused on sustainable trail principles and practices that minimize trail erosion.
- **Winter Staff Training** – Gave a power point presentation on Sustainable Trails and the State of Trails in Howard County in December 2014.
- **Haviland Mill Trail** – Progress continued in site planning for the Haviland Mill Recreational Access Route in 2014. Phase I construction is due to begin in FY16.

Trail Assessments

Detailed trail assessments were conducted along the entire natural surface trail systems occurring at the Wincopin, Savage Park and Savage Mill Trails in September 2014. In addition, Phase I potential corridor alignments were identified within the Benson Branch Park site. The assessment documents will help the Department identify current trail tread conditions and make recommendations to repair, re-align or close degraded trail segments. It will be up to DRP

managers to prioritize trail maintenance projects needed to upgrade the trail system to a more sustainable standard. The Department is looking to reduce trail user impacts, simplify future trail maintenance and save time and money over both the short term and long term.

Conservation Stewardship at Robinson Nature Center

Property and trail enhancements have continued since the initial construction of the building and the following projects and programs are highlighted accomplishments for FY15:

- 789 volunteers contributed 3,939 hours towards conservation stewardship and environmental education programs at the Nature Center. Volunteers greatly improved the grounds assisting with native tree, shrub and wildflower plantings, invasive plant removals, trail maintenance and effectively assisted naturalists/educators with educational opportunities at nature camps, scout programs, school field trips and other special events.
- Planted 340 new native trees and shrubs as part of a Maryland Department of Natural Resources grant through the Natural Resources Division. Plantings occurred throughout the 18 acres of property that included forest edge, understory and riparian locales.
- Invasive plant species were continually removed throughout the year with assistance from volunteers and staff. Targeted species among understory and riparian sites included Wineberry, Japanese Barberry, Autumn Olive and Multi-flora Rose. Continued monitoring and removal efforts will provide effective measures combating these nuisance species.
- More than 200 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.
- 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 95 new native trees and shrubs along hillsides and surrounding portions of the trail to further enhance soil stabilization in these areas.
- The Howard County Forestry Board funded a riparian buffer planting alongside Skunk Cabbage Creek. Volunteers assisted with planting 125 native trees and shrubs that improved the forest understory and stabilized soil conditions along the floodplain.
- 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 FY15, 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.
- Participated as a test site for the woodland bee survey, sponsored by the University of Delaware and the U.S. Geological Society. The study focused on what species of bees

rely on woodland plantings for nectar and pollen consumption. Native woodland flowers and soil conditions are crucial to some species survival.

- Researcher Dr. Sonja Scheffer, from the USDA Systematic Entomology Lab, continued conducting insect sampling in upland habitats at the Robinson Nature Center 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 will be created from this project.
- Professor Kevin Omland, from UMBC (University of Maryland, Baltimore County), continued his field research which focusing on migration routes preferred by Orchard and Baltimore Orioles in upland and riparian habitats. The birds were captured via mist nets, color banded, fixed with geolocators and then released. Subsequent years will focus on recapturing and then downloading data and reconstructing migrating routes from Central and South America. The research will increase the understanding of where and how orioles are throughout the year.

Robinson Nature Center Awards for the Environment:

- 2014 Trip Advisor – Certificate of Excellence
- 2014 National Award for Wooden Design, awarded by Woodworks, an initiative of the Wood Products Council in 2014

Educational Initiatives at Robinson Nature Center

The Robinson Nature Center facility educates the public about green technologies, sustainability, environmental stewardship and techniques that can help reduce storm water run-off, as well as reducing water and energy consumption:

- *Storm water mitigation* is achieved on the property through a pervious concrete parking lot and four separate bioretention/rain gardens. Both of 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. These features are also highlighted for visitors with interpretive signs.
- *Interpretive signage* in the building and on the grounds describes to visitors how different features reduce the environmental impact of the building by mitigating storm water run-off and minimizing water and electricity use.
- *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 run-off 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. It is our hope that through face to face interactions with creatures, visitors will develop a greater appreciation for our waterways and their inhabitants.

- *A display case* is utilized for rotating interpretive mini-exhibits. Topics covered during the past year have included promotion of Howard County's Stream ReLeaf program and the importance of forest buffers, as well as the benefits of planting native plants.

LEED Tours and Educational Programming

In addition to using the building's features to educate the public, Robinson Nature Center offers informal and formal educational opportunities that help educate the public about Howard County's connection to the Chesapeake Bay and about the LEED certification program:

- In FY15, Robinson staff led 426 programs (including 114 field trips, 237 public programs and camps, as well as 75 birthday parties). These programs engaged over 16,850 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
    - Bay Day Event
    - 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 Weblos Boy scouts; LEED building tours and volunteer service opportunities for scout troops)

- In FY15, Robinson staff members led numerous LEED tours. These tours provide in-depth information on what it means to be LEED certified and detail the green technologies incorporated into Robinson. These tours give groups a further understanding of how building design can play a key role in the management of natural resources. 32 LEED-focused tours have been given since the building opened, educating over 652 visitors. Additionally, Robinson staff has the "Green Building for Green Education" brochure for visitors who are unable to schedule a tour.

- **Bay Day** – Robinson Nature Center created an annual event, Bay Day, to celebrate Howard County's connection to the Chesapeake Bay and educate the public on issues related to storm water management and on the important wildlife that inhabit the Bay. The event focused on the oyster as a resource, and Robinson partnered with Maryland DNR to conduct oyster dissections. Robinson also partners with the Oyster Recovery Partnership to encourage recycling of oyster shells as substrate for new oysters that will

be planted in the Bay to improve water quality and installed a new oyster shell recycling bin for public use.

- **Streams to Seas festival -** Robinson Nature Center worked in partnership with the National Aquarium to develop and host a "Streams to Seas" festival in October of 2014 that highlighted our water's journey from the Middle Patuxent River in Howard County to the Chesapeake Bay and, eventually, to the Atlantic ocean. The event included activities using watershed models, hikes to the stream to search for macroinvertebrates and assess water quality, introduction of the County's StreamMAPPer app that lets Howard County residents report the conditions of streams near their houses and screening of the film, the Last Reef. We also held a rain barrel workshop during the event to educate residents about capturing and saving runoff from their roof. We sent 17 families home 50-gallon rain barrels. The overall event drew hundreds of residents and non-residents of diverse ages.

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 storm water 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. In the first year of this program, Robinson Nature Center has recycled 23.22 bushels of shell. That shell will provide homes for 116,100 baby oysters to be planted back into the Chesapeake Bay watershed.

Professional Development and Training for Teachers

Robinson offers professional development opportunities to teachers that allow them to bring water conservation and stewardship issues back to the classroom.

- In FY15, Robinson Nature Center continued to serve as a Green School Center. This status was given in 2013 by the Maryland Association of Environmental and Outdoor Educators (MAEOE) in recognition of Robinson's commitment to providing professional

development opportunities, community support and innovative lessons to schools certifying or recertifying as Maryland Green Schools. Water conservation/stewardship is among one of many categories that schools must report on to achieve this status and are issues that both students and teachers can learn about at the Center.

- In FY15, Robinson Nature Center offered a series of environmental education workshops including Projects WET, WILD, Learning Tree and WOW. Each of these curriculums touches on water quality/conservation issues and gives teachers the tools they need to educate about these issues at their own schools.

Robinson Nature Center Community Engagement and Public Outreach

Robinson Nature Center exhibited and educated attendees on environmentally responsible and sustainable practices which would positively impact local waterways and Chesapeake Bay water quality at the following events in 2014/2015:

Partnership Events:

- Fox 45 TV "Hometown Hotspots" Live broadcast interview at Port Discovery.
- Planned event "Celebrating our Collaborative Community Dinner" Beverly White Seals from the Community Foundation of Howard County presented information about the philanthropic efforts of Howard County residents.
- Secured the Aldo Leopold film "The Lost Bird Project" from the Robinson Foundation for staff and volunteers to view.
- Assisted the Audubon Society of Central Maryland in disseminating grant application materials to RNC educators and contacts at Howard County Public Schools. The Society sponsors $500 grants for schools and nature centers planning to create wildlife habitat and native plant gardens.
- Hosted Friends "Second Sunday" Meeting. Friends partnered with the Audubon Society to present the film "Billions to None".
- Hosted Friends "Second Sunday Meeting", and book signing; author Ned Tillman, presented "Saving the Places We Love: Paths to Environmental Stewardship".
- Power point presentation to The Legacy Leadership Environmental Institute at the Howard County Conservancy Belmont location to inform members of HoLLIE about local service and volunteer opportunities. Betsy Singer, coordinator of event wrote about Robinson: "*The wealth of programs that you offer for children and adults contributes to making Howard County a wonderful place to live and work."*
- "Children in Nature" meeting at Key School in Annapolis and tour of 'Tiny House'.
- Organized and gave a presentation for a Leadership Howard County meeting at RNC.

DRP Participation in Festivals, Fairs and Open Houses:

- Howard County Fair
- Port Discovery's FALL-O-WEEN Festival
- Montgomery County Parks annual Educators' Open House promoting outreach/fieldtrip programs to teachers from public and private schools
- 50+ Expo at Wilde Lake HS

- Howard County University of Maryland Extension Open House
- Art exhibit opening at the Howard County Arts Council
- "Open Streets" community event sponsored by the Horizon Foundation, to promote healthy neighborhoods and families
- ARTreach 2015
- The Community Foundation of Howard County's Spring Party at HCC's Horowitz Visual and Performing Arts Center
- Exhibited at Mom's Organic Market Earth Day event "Save the Dandelions", handing out seed packets and native plant literature
- Participated in Whole Foods Columbia quarterly Community Donation Day; 5% of the sales dollars are donated to support local causes. They chose May 15th, "Ride Your Bike to Work Day/Endangered Species Day" to focus support on our environmental missions resulting in over $5000.00 being donated to the Robinson Foundation/Friends
- Exhibited at the I-95 North Welcome Center for Tourism Day
- Dinner and orientation at the Conference Center at the Maritime Institute, a public outreach event to advertise new "green" features, amenities and upgrades following over $500,000.00 worth of renovations at CCMIT
- Annual Sheep and Wool Festival at the Howard County Fair Grounds
- Green Fest, exhibited and interviewed for a live broadcast of "Dragon" HCC's in-house radio station
- Women Fest
- Exhibited on behalf of the Department of Rec & Parks at Baltimore Air Coil Company's Health Fair
- Provided marketing materials and literature for the Howard County Office of Children's Services Preschool/Child Care Information Fair about RNC's children's camps and programs
- MAEOE, Maryland Association of Environmental and Outdoor Education, Green School Summit at Sandy Point State Park, speaking to over 2300 students, teachers and chaperones about carpenter bees and pollinators. Staff began the process of assembling RNC's next Green Center Application
- Howard County Tourism "pARTners in ART party"

DRP Environmental, Educational Events at Schools/Institutions of Learning:

- Presenter for "Saving the Bay" at the Black Student Achievement Program (BSAP) at Mount Hebron.
- HCC's Service Learning Fairs, (2)
- Sustainability Fair at Howard Community College.
- Teen Opportunities Fair at Long Reach HS.
- The "Science in Society Conference" event at River Hill HS; Mr. Steven Sasson, creator of digital photography at KODAK was Keynote.
- Distributed Nature Program Guides to fifteen Howard County Elementary Schools.

- Phone interview with Scott Jesnick at Frostburg State University about Robinson's LEED Platinum Certification. His project was to visit a LEED facility, examine the pros and cons associated with building, using and maintaining a LEED structure.
- RNC volunteers attended Hammond High School Second Annual Green Fest.
- HCC Career Day

STEM/STEAM Events:

- Three day STEAM Professional Development Institute at multiple locations; UMBC, University of Maryland Baltimore County, Robinson Nature Center, Thunder Hill Elementary School featuring Wendy Wang from the University of Taipei presenting "Building an Environmental Education Program" to address Environmental Literacy requirements throughout Howard County schools and Taiwan schools.
- STEAM event at the Sheraton in Columbia.
- Clemens Crossing Elementary School "Family Math, Reading and STEM Night" Presentation to "Reduce, Reuse, Repurpose and Recycle" providing directions for making homemade pollinator seed balls.
- Science, Technology, Engineering, & Math (STEM) Internship Fair at Howard Community College.
- STEM Math event at Centennial HS.
- Exhibited at "STEM-ulating Minds" a county-wide event at HCC.
- Port Discovery "STEM in Spring".
- Attended three STEAM Meetings at Thunder Hill ES.

Green Tourism/RNC Tours:

- Hosted Brazilian students tour at RNC providing speakers and presentations revolving around environmental issues and tourism.
- Hosted Howard County Tourism's "Meet It", a monthly networking meeting between vendors, restaurants, hoteliers and various attractions in the metro region supporting "Green" and "Eco-tourism".
- Provided a tour of the Nature Center for Janice Keene, President of the Evergreen Heritage Center Foundation in Allegany County and her husband Richard. The couple was seeking advice and support to assist them in meeting their vision for the Center's, growth and sustainability.
- Conducted a FAM tour for Brianna Netzgel from "Mending the Piggy Bank", writer and "Frugal Living Blogger" with a following of over three thousand families with young children, she wrote: "*The 23,000 square foot center has interactive exhibits on local habitats, wildlife, and the Chesapeake Bay, a children's discovery room complete with a Touch Tank, and a digital, domed nature theater. I really feel like the boys learned a lot…"*
- Spoke at the Chesapeake and Potomac Regional Chapter of the Society of Environmental Toxicology and Chemistry (CPRC) SETAC 2015 Annual Spring Meeting here at the Center about RNC's environmental missions and history.

Networking Events:

- The Maryland Environmental Health Network's workshop in Baltimore on Health Impact Assessment as a tool for policy-making and environmental health advocacy.

RNC Programs and Professional Development*:

- Valentine's Day Program, Wine Tasting and Truffle Making; Misty Demory of Knob Hill Winery in Clear Spring, MD spoke about local practices concerning farming and harvesting sustainably for wine making.
- Arranged a recycling presentation for staff and RNC volunteers with Alicia Moore, Recycling Coordinator from Howard County Environmental Services.
- Anne Robinson's Centennial Birthday celebrating her example and legacy of environmental stewardship.
- Performed a Holiday Centerpiece Workshop using sustainably harvested botanicals and recycled/repurposed decorative accessories.

*Total populace reached, (excluding RNC's public programs, Departmental meetings and staff training sessions): 33,000+ people.

DRP Horticulture and Land Management Division

Soil Percolation

Staff has scheduled turf areas in heavy traffic areas in front of government buildings to be aerated twice a year to allow more water penetration and less sheet erosion. This aids in water filtering for the bay. These areas include North Laurel and Gary Arthur Community Centers, Miller and Glenwood Library and Belmont Historic Manor. Top dressing with compost was done to Miller Library. 400,000 square feet has been aerated this year.

Debris Removal

DRP cleaned up five new sites acquired by the County this year totaling 303,908 square feet. At the Granite Manor, this involved removal of exposed bags of fertilizer, taking a truck load of plant pots to a nursery for reuse, removal of hazardous material, trash and debris, removal of fallen dead trees decaying stone walls, etc. Bare areas were then seeded for vegetation coverage. During the year, 100 bags of loose trash, even an engine, were removed from the grounds.

Turf Repair

Turf repair was completed by seeding 133,884 square feet to damaged turf over nine different sites. This was caused by construction, snow removal damage, tire ruts, etc. We use a recommended three-way blend of Turf-Type Fescue. Additionally, sodding was completed on 1,800 square feet because of construction damage.

Stump Removal and Seeding

Staff is proactive on stump removal for safety and reestablishing vegetation. Over 100 stumps were removed for the year and repaired with grass covering of 2,900 square feet.

Sink Holes
DRP repaired three sink holes covering 3,520 square feet, involving three different locations. They were located at the Howard County Detention Center, Howard County Center of the Arts and open space on Helmart Drive in Laurel.

Control of Invasive Species
DRP was assigned the task of removing invasive pear from over 2,000 square feet of meadow at Gateway and Thomas Dorsey Building. In the Font Hill Drive area, the Division has continued to mechanically remove and treat a 5,000 square foot area of Japanese Knotweed. DRP cleared a 2,000 square foot area covered by bittersweet at Elkhorn Garden Plots and converted it to turf.

Water Pipe Leaks
There were six water pipe leaks that were repaired, and then the ground was reestablished with vegetation. These were in the Columbia Gardener's garden plots.

Stream Cleanups
Staff handled several stream obstructing conditions. Two stream cleanups along the Little Patuxent River and Red Hill Branch and removing logs and debris blocking water flow in the stream along the Little Patuxent River.

Rain Gardens
The County assisted the Restoring the Environment and Developing Youth organization (READY) with the maintenance of rain gardens in various locations throughout the County. This program uses high school and college students to create rain gardens and other storm water enhancements at churches, schools and open space areas. This year, READY branched out and started handling maintenance of these areas. Staff taught the group the difference between weeds and the existing plants. HLMD also worked alongside the group at Savage Library, Thomas Dorsey Building, Howard Building Complex and the green roof at the Savage Volunteer Fire Station. As a group, they are maintaining 15,000 square feet of bio-retention areas and 22,000 square feet of green roof.

Regional Parks Division / Zone 1

Athletic Field/Grass area Aeration and Maintenance

- DRP Zone 1 has a very rigorous aeration schedule that it adheres to in order to help with water run-off. The Zone aerates a total of 15 ball diamonds, 15 multipurpose fields, and a number of plateau areas. The total acreage combined is roughly 26 acres.

Fertilization

- Zone 1 fertilizes its athletic fields with a bio-organic engineered fertilizer called Three Tier. The benefit of using Three Tier is that its fertility, microbial, and supplement protocols provide a healthier ecosystem that makes nutrients and minerals more available to plants. Their bioactive materials increase water absorption and retention,

holding vital nutrients in soil solution and preventing loss for leaching or runoff. The balanced microbial environment provided by 3Tier increases nutrient conversion and makes more nutrients available to the roots, increasing plant uptake. Chemical and synthetic fertility can be reduced or eliminated entirely by this natural process. The two products that we use from 3 Tier are 14-0-7, and Huma boost. Both are in a liquid form and are mixed with water at a rate of 2 ounces per gallon for the 14-0-7, and 1 ounce per gallon for the Huma Boost. The benefit of switching to the 14-0-7 product is that it contains no phosphorous. With that being said, Zone 1 did not use any phosphorous in its fertilization program this past year. Huma-Boost is a companion product for use with the 14-0-7. Huma-Boost fulfills two critical roles in turf and plant management. First, it serves as a catalyst for chelating valuable nutrients, improving water retention, and reducing soil-salt and pesticide residue. Second, the addition of Huma-Boost to chemical applications multiplies the effectiveness of the chemical activity while decreasing the amount of chemicals and the associated costs. Zone 1 fertilizes its athletic fields 7 times a year, from April to November.

Pesticide Use

- Zone 1 has cut down its use of pesticides this past year. The Zone used only 128oz. of pesticide, compared to 210oz. the year prior; almost a 40% 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 1 is also experimenting with a more natural way of spraying weeds by using a vinegar/water solution to control the weeds, so that the process may be pesticide free in the future. Further testing is needed to go this route.

Litter Control

- 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 has 40 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 195 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 675 tons worth of trash and recycling each year.

Bio Retention Ponds

- Zone 1 maintains 4 Bio Retention Ponds within its Zone. The purpose of the Bio-retention is the process in which contaminants and sedimentation are removed from storm water runoff. The maintenance includes the grass buffer zone, removing invasive materials, monthly inspections, and making sure it's not holding water after the specified time period after a rain event. Zone 1 staff roughly spends 50 man hours per year for pond maintenance.

Inlets, Storm Drains, and Swales

- 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 are 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.

Trainings

- 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.

Regional Parks Division / Zone 2

Soil Stabilization Projects

- 35 acres of common area were top dressed and aerated including, Sports fields and overflow parking field at Centennial Park to stabilize soil. 70 Hrs. of work was performed by park staff.
- Meadowbrook Park sports fields were top dressed, aerated and over seeded an area totaling 5 acres which took 24 hours and 700 lbs. to complete.
- Cypress Meade Park's natural surface trails were renovated through replacing rotten timbers directing water flow off of the trail into vegetative areas helping to prevent sediment deposits into stream. This effort took 16 hours to complete.
- Created and incorporated an Event Parking Contingency Plan for all event agreements at Centennial Park. The purpose is to reduce damage to turf, helping to eliminate soil erosion and sedimentation into storm water drains and Lake. The overflow parking area has also been closed off to daily parking in order to establish and maintain turf.

Watersheds

Centennial North ponds sediment grate was regularly cleaned to allow for proper water flow during rain events. This effort took 120 hours from July 1- June 30th.

- Staff conducted 16 water quality tests to determine bacteria levels before swim events at Centennial Park. This effort took 64 hours to complete.

Recycling

- To promote recycling, the Zone added a dozen 55 gallon recyclable containers and collected approximately 32,500 lbs. of recyclables.

Meadowland Management

- DRP staff partnered to renovate a 4 acres meadow establishing habitat for a variety of wildlife. Cost for seed was obtained through a donation of $1,300.00 from the Howard County Bird Club. This effort took 220 hours to complete. Additional areas have been identified for Meadow establishment in the future.

Nutrient Management

- Three Tier Fertilizer Program - A liquid organic fertilizer that is quickly absorbed by plants to establish healthy stands of turf grass. Zone 2 is now phosphorus free as related to turf fertilization as required in the guidelines as required by law. 35 acres of athletic fields and common areas have been treated. This effort took 320 hours to complete from June - July. 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.

Litter

- Zone 2 maintains 113 50-gallon trash cans throughout the parks, resulting in 42,000 bags of trash collected. Staff is also responsible for 47 55-gallon recycle cans throughout the parks, resulting in 11,300 bags collected.

Pollution reduction

- 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. 1,540 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 causing less pollution to our parks and Maintenance Shop.

Storm Water Inlet Inspection

- Zone 2 has 15 inlet receiving drains which are inspected by staff and cleared of debris monthly. Large inlets/Storm water Pipe Outflows are cleared by Department of Public

works, where the scope of work is beyond the capabilities of our current staff.

Regional Parks Division / Zone 3

Pesticide Free Parks:

DRP is researching the merits of pesticide free parks and has started a pilot study.

- Consultant was hired in 2013
- Pilot site has been selected: Dayton Oaks Park
- Site evaluation is in progress
- Methodology:
  - 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. We will continue our effort by testing the steaming method.

Trail Soil Erosion Repair

- Trail grading at Western Regional and Schooley Mill Parks tread surfacing to reduce water channeling on sloped trail inclines, turns and switch backs. Objective: Prevent soil surface erosion into streams and wetland areas. Also to provide stability and safe tread way for Equestrian riders and hikers.
- Install drainage Pipe at Trail/ stream interface crossings. Back fill with bank run stone mixture and clay. Objective: Eliminate water ponding barrier to provide stabile Trail surface. This was performed by Scout volunteers: Troop 737; 15 volunteers.
- Remove woody plant growth at Warfield Pond Park on dam spillways to provide unobstructed water flow at spillways. This was performed by park staff.

Soil Analysis

- Annual soil analysis was completed on all athletic fields in Zone 3. The result determined that application of organic liquid fertilizer was needed to sustain a healthy stand of turf. Testing done determined phosphorous levels to be compliant to the 2014 Maryland regulations. Treatment and testing of 57 acres consisted of 300 staff hours.

Athletic Field Aeration

- Aeration topdressing and over seeding of 22 athletic fields completed to enhance turf stands at viable capacities to withstand athletic sport activities, reduce compaction, erosion and soil runoff. 6,500 pounds of seed, 180 yards of top soil and 23,000 square feet of sod were needed.

Waterway/ Stream Cleanup

- 16.5 miles of stream waterways within Schooley Mill Park, Warfield Pond Park, Western

Regional Park and Benson Branch Park were cleaned through removal of debris and log jams that prevented natural stream water flow producing log jams and bank erosion. September and November Scout troops 007 and 737 committed 320 hours to this project.

Volunteer Day

- Western Regional Park and Schooley Mill Park installed sediment fencing on Baseball infields to contain soil in place.
- Schooley Mill Park- Installed 160 yards of crushed stone milling grade and Compact in place to Equestrian Ring surfaces to reduce Soil runoff and provide safe tread for Equestrian Riders. 21 Volunteers worked 84 hours.

Storm Water Pollution Prevention Plan

- (SWPPP) is for the Schooley Mill Park and Western Regional Parks Maintenance Facility. 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.

Regional Parks Division / Zone 4

Plantings

- Rockburn Park planted about 30 trees around sports fields and maintenance shop with the help of 20 volunteers from the Elkridge Youth Organization
- Rockburn staff planted five trees at the Pfeiffer Corner School House.

Trails

- MORE (Mid-Atlantic Off Road Enthusiasts) performed 124 hours of volunteer work on "problem" areas within our trail system, fixing drainage and erosion issues. At each given time, there were 11 volunteers that covered various areas within the 7.4 miles of trails.

Storm Drain

- Re-painted 10 storm drains in Rockburn Park: "Chesapeake Bay Drainage, Do not Dump".

Ground Stabilization

- Installed 319 linear feet of guard rail around the skills park course to prevent bikers from exiting and entering the course which causes new trails where there is not intended to be a trail.

Bio-Retention

- Maintains 15 Bio-Retention areas in the newly developed Troy Park.
- Full-time staff attended Bio-Retention maintenance workshop

Waste

- Approximately three tons of waste was removed at Worthington Dog Park, Hillsboro Road and Landing Road. There were 3 tires, 2 bags of recyclables and 3 bags of trash recovered.

SWPP

- SWPP 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.

Litter

- Rockburn staff spends approximately 986 hours per year on litter removal. This averages out to approximately 490 yards of recyclables and 585 yards of trash.

Pollution Reduction

- 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. In January, staff built a lean-to to house our disposables for which are picked up by Clean Harbors. This lean-to is kept outside secured in our shop yard. Our staff fuels all equipment inside as well.

Storm Water Inlet Inspection

- The pond crew comes out annually to mow and remove the woody growth from the storm water pond area. Our staff conducts quarterly inspections to check for holes created by burrowing animals, and to ensure there is no evidence of run off from sediments. The pond crew spends approximately 10-20 hours a year on this task. Our staff spends approximately four hours a year on quarterly inspections and three hours per year on a group inspection conducted by Environmental Services.

Pesticides

- Zone 4 has reduced use of pesticides. We use a three tier fertilizer that is environmentally friendly.

De-Icing

- Rockburn Maintenance staff's de-icing 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.

Capital Projects Park Planning Division

The following work efforts during the reporting period reduced erosion and promoted good environmental stewardship on County sites:

Timbers at Troy Golf Course Parking Lots
Contractor crack filled the clubhouse and maintenance center parking lots. Both lots were also overlaid with new asphalt.

Centennial Park Lake Loop Pathway Paving
Flanagan Paving overlaid the following portions of the lake loop. Once paving was completed, all path edges were back filled with topsoil, seeded and curflexed. This project should help to eliminate shoulder run off into the lake.

Cedar Villa Park Pathway
HTI Contractors widen and overlaid the deteriorated pathways in Cedar Villa Park.

Skaggs House & Houchen's Barn Demolition
The Skaggs house located in Fulton and the Barn located in Woodbine was razed this year, voiding the area of any contaminates from the house and barn interior/exterior components. All debris surrounding the house and barn were also removed from the site.

Dunloggin Bridge Deck Renovations
The Division contracted the re-decking of three Steadfast bridges bordering Dunloggin Middle School.

Salas Driveway Paving
General Paving added to the driveway stone sub base and installed four inches of new asphalt to the Salas driveway from the road to the house then up the back hill to side yard parking. The existing stone driveway was severally washed out and the upper hill was eroding. This project eliminated the drainage issues.

Belmont Manor & Pool House Restoration
Oak Grove Contractors was awarded the restoration contract. They removed all rotted and peeling exterior materials such as loose stucco/paint from the Manor & Pool House. The entire exterior siding surfaces were washed and restored to excellent condition. All trim, windows, doors and shutters were also restored. This restoration project eliminates lead contaminates from entering the grounds and watershed.

Belmont Driveway & Parking Lot Renovation
Flanagan Paving overlaid all existing roadways and parking lots with two inches of new asphalt. All edges were backfilled, seeded and curlexed to prevent erosion.

Centennial Park Boat Ramp Intersection Re-grading
HTI contractors corrected the soil grade in the boat ramp pathway intersection area. All areas were sodded along with 7-8 new trees installed.

High School Turf Fields Renovated to Artificial Turf
Reservoir, Marriott Ridge and Wilde Lake High School turf multipurpose fields were renovated into artificial turf fields. These projects eliminated the need for annual applications of Nitrogen, Phosphorus and Potassium, along with the elimination of field erosion.

Bonded Rubber Playground Surfaces
New bonded rubber playground surfaces were installed at Troy Park, Holiday Hills Park, Centennial Park South area and South Branch Park playgrounds. The rubber safety surface will ensure that no erosion occurs even in the highest volume of public use.

Holiday Hills Volleyball Court Removal and Pathway Overlay
HTI Contractors removed the existing sand volleyball court and installed topsoil, seed and straw to return the area to turf, thus eliminating sand erosion during storm events. The pathway from the playground to the Vista Road entrance to the park was overlaid with new asphalt.

Troy Park Development Phase 1
The first phase of Troy Park has been completed. Storm water management controls have been installed for the entire phase. Amenities include two artificial turf fields, a playground and parking lots.

South Branch Park Development
The first phase of South Branch Park was completed this year. Amenities include a pavilion, playground and ADA parking lot.

Blandair Park Phase 2 Development
The second phase of Blandair Park has started. The contractor is grading the site.

Soil Conservation Programs

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) 3050 feet Fencing
(5) 1520.2 acres Nutrient Management
(1) 830 feet Pipeline
(1) 2.8 acres Access Control
(1) 1 each Seasonal High Tunnel
(1) 0.1 acre Critical Area Planting

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.

(17) 2417.5 acres Cover Crop
(5) 2.7 acres Grassed Waterway
(1) 7.5 acres Access Control
(2) 2 each Stream Crossing
(2) 2 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. Existing preservation parcels have conservation plans that may be updated. June 20, 2014 through December 17, 2014 there were 11 new conservation plans on 1229 acres and 4 revised conservation plans on 553.1 acres written by the HSCD office.

Stormwater Management Division

Floodplain Management Program

The SWMD manages the County's Floodplain Management Programs. The SWMD responds to property owner inquiries pertaining to floodplain locations and assists residents in dealing with flood insurance issues. Howard County will continue to apply for FEMA and MEMA Federal grants under the Hazard mitigation grant program to help resolve property owners' flood insurance issues.

The County coordinated with MDE, FEMA, and the Corps of Engineers to update and create digital Flood Insurance Rate Maps (DFIRMs) for Howard County. On May 6, 2013 FEMA issued a Letter of Final Determination, which approved the new model and report as final. The new maps and models became effective for flood insurance purposes on November 6, 2013.

The County Code was recently amended and Bill 41-2103 updated the Floodplain ordinances and was approved by the County Council on July 30, 2013.

Countywide Biomonitoring Program

The SWMD initiated the Howard County Biological Monitoring and Assessment Program in the spring of 2001 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 will be sampled once within a five year period. The monitoring involves sampling instream water quality, collection, and analysis of the biological community (benthic macroinvertebrates) using Maryland Biological Stream Survey (MBSS) methodologies.

For 2014, the watersheds assessed were the Upper, Middle, and Lower Middle Patuxent watersheds. The Upper Middle Patuxent watersheds average received a "fair" rating for biology and a rating of "Partially Supporting" for habitat. The average biological results for the Middle Patuxent watershed were "Fair" and the average habitat assessment was "Partially Supporting". Lastly, the average biological rating result for the Lower Middle Patuxent was "Fair" and the average habitat assessment was "Partially Supporting". In conclusion, the entire Middle Patuxent watershed, was rated "Fair" for biology and "Partially Supporting" for habitat in 2014.

Urban Nutrient Management Group

The SWMD continues to attend the Urban Nutrient Management Group meetings held at the Department of Agriculture in Annapolis, MD. The County also participated in the Chesapeake Bay Landscape Professional (CBLP) program whose goal is to develop a core set of standards, on-line manuals, and exams for design, installation, and maintenance of landscape features.

Rain Barrel Program

The SWMD continues to provide residents with free barrels through the County's Rain Barrel Program. Predrilled 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 2014, Howard County gave away 128 rain barrels to residents resulting in a total of 924 rain barrels given away since the program's inception.

Planning and Zoning

Rain Garden Program

During the summer of 2014 Howard County provided the funding for the second year of the READY (Restoring the Environment and Developing Youth) Rain Garden Program. Led by the Alliance for the Chesapeake Bay, People Acting Together in Howard (PATH), Parks and People Foundation, and the University of Maryland Extension Service, the READY Program teaches young adults about environmental issues, trains them to build water quality projects, asks them to give presentations throughout the community, and has them install local projects. Several groups including the Cove Condominiums, North St. John's Swim and Tennis Club and the Stonebrook Community Association participated in the READY program. Some statistics from this season include:

- 44 young adults employed as READY workers (range: 16-26 years old, average age 19)
- Interactions with 37 customers, thereof 16 new installation locations
- Installation of 42 rain gardens, conservation landscapes, and erosion control measures
- Maintenance and redesign of 11 rain gardens and conservation landscapes
- Total drainage area of more than 375,000 sq. ft. addressed
- Man-made impervious surfaces of 100,000 sq. ft. addressed

In contrast to 2012 during which it was possible to treat large parking lots, the opportunities available this year mainly involved treating rooftops. However, many of the watershed protection measures this year also encompassed terrain such as eroded slopes within the

drainage areas. Maintenance and redesign was a component of the activity this year. While maintenance does not increase impervious surfaces treated, the adjustments help to ensure proper ongoing performance of the watershed protection measures. By revisiting prior sites the students could also see how well certain practices performed.

Agricultural Land Preservation Program

The Howard County Agricultural Land Preservation Program (ALPP) uses County funds to purchase preservation easements on farmland. The County also obtains agricultural easements through the dedication of preservation parcels to the ALPP as part of the density sending and clustering provisions of the subdivision regulations. As of December 30, 2014, the County had purchased easements on 15,040 acres, the State had purchased easements on 4,041 acres (MALPF and Rural Legacy) and the County had acquired easements through dedication on 2,972 acres. In the June 30, 2014 – December 30, 2014 reporting period, the County purchased agricultural easements on 1 property totaling 81 acres. There were no easements purchased by MALPF or dedicated to the ALPP in the reporting period.

Fee-In-Lieu-Of SWM Fund

The County has a fee-in-lieu-of SWM fund that allows developers of minor subdivisions to pay a fee instead of building quantity SWM, when it would present a hardship. "Fee-in-lieu-of" funds result from quantity management releases only; water quality treatment is still required. No additional fee-in-lieu-of SWM funds were collected during the current permit year. The County is using the collected funds to address stormwater impacts in a variety of ways including pond retrofit and stream restoration projects. With the current stormwater regulations in place, "fee-in-lieu-of" quantity management is rarely an option; therefore, funds are rarely collected.

Other County Agencies

Fire Department Hazardous Spills Response

From June 20, 2014 through December 17, 2014 the Fire Department responded to 19 spills that required mitigation by the hazardous materials team. Materials involved in these spills included diesel fuel, hydraulic fluid, home heating oil, motor oil, hydrochloric acid and various other petroleum products. Not all spills were large enough to generate a spill report.

Environmental Sustainability Board

On the recommendation of the Commission on Environment and Sustainability (February-August 2007) Howard County created an Office of Environmental Sustainability and a permanent Environmental Sustainability Advisory Board. The board consists of 13 citizens with a broad range of expertise. Meeting agendas and notes can be found at http://www.howardcountymd.gov/ESB.htm.

Since the Commission's final report, the Office and Board have systematically worked to achieve the goals put forth by the Commission report as well as continuing to develop new goals and initiatives. The Board also advises the County Council and County Executive on environmental concerns, including stormwater management.

In 2015 the Office was changed to the Office of Community Sustainability, not to diminish the County's environmental work, but to be more holistic and inclusive of other areas of sustainability such as agriculture and economics.

Office of Community Sustainability

The Office of Community Sustainability (OCS) continues to lead the County's Stormwater Cabinet that includes the directors and key senior staff from DPW, DPZ, DRP, OCS, and the County Executive's Office. Policy issues as well as project initiatives are shared in order to bring greater efficiency to stormwater operations and maintenance initiatives.

From a community outreach perspective, OCS has developed a stormwater management awareness campaign that includes a website, informational brochures, workshops and a variety of multi-media programs to raise awareness and offer a variety of stormwater management solutions suitable for residential and small commercial properties. The website Cleanwaterhoward.com receives regular updates and is a frequented tool for residents, businesses, and nonprofits in the county.

OCS began training the public to use a new stream monitoring smart phone app, The Stream Mapper and piloting storm drain stencils with local messaging.

Health Department

Since 2012, the Howard County Health Department has maintained 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. Based upon available funding, some BRF money may also be available for new installations of units utilizing best available technology (BAT). State legislation (effective January 2014), now requires that all new construction utilizing on-site sewage disposal, must be outfitted with BAT units which may create an across the board reduction in the nitrogen levels potentially impacting overall TMDL limits. The current grant award for FY 2016 is $198,000, which has already been fully allocated. Additionally, the Health Department, through an M.O.U. with MDE, will receive level 1 grant funding to help administer various aspects and reporting requirements of the BRF program. Final funding for FY 2016, 2017 and 2018 is contingent upon approval from the State Board of Public Works. Future BRF renewals and/or supplemental funding will be based upon established criteria and available funding distributed by MDE.

Howard County Public School System

The following environmental projects were completed on Howard County School Property during the 2014-2015 school year:

- Worked with the Alliance for the Chesapeake Bay and Restoring the Environmental and Developing Youth (READY) to design Rain Gardens at the Manor Woods ES, Dayton Oaks ES, Forest Ridge ES, and Atholton ES.
- Relining of outfall pipe at Elkridge ES.
- Repairs to inlet leading to SWM at Oakland Mills HS.
- Repair to the outflow area at Wilde Lake HS.
- Repair to outfall area behind Northfield ES.
- Stabilized embankment erosion leading to SWM at Murray Hill MS.
- Repair yard inlet and made improvements to surrounding yard drain at Long Reach HS.
- Installed bioretention ponds at our schools during Renovation projects. Stevens Forrest ES, Deep Run ES, Ducketts Lane ES, Gormans Crossing ES, Laurel Woods ES, Longfellow ES and Running Brook ES.
- Heavily involved in the Howard County recycling program.
- Elementary Schools involved in grounds survey to identify environmental problems on school grounds.
- The following Schools installed small gardens as part of the school curriculum: Folly Quarter MS, Waverly ES, Talbott Springs ES, Harpers Choice MS, Veterans ES, Hammond HS, Worthington ES.

F. <u>Watershed Assessment and Planning</u>

Howard County shall continue the systematic assessment of water quality within all of its watersheds. These watershed assessments shall include detailed water quality analyses, the identification of water quality improvement opportunities, and the development and implementation of plans to control stormwater discharges to the maximum extent practicable. The overall goal is to ensure that each County watershed has been thoroughly evaluated and has an action plan to maximize water quality improvements.

At a minimum, the County shall:

1. ***Continue to develop watershed management plans for all watersheds in Howard County. These assessments shall be performed according to priorities established previously by the County. At a minimum, watershed management plans shall:***

    a. ***Determine current water quality conditions;***

    b. ***Identify and rank water quality problems;***

    c. ***Identify all structural and non-structural water quality improvement opportunities;***

    d. ***Include the results of a visual watershed inspection;***

    e. ***Specify how the restoration efforts will be monitored; and***

f. Provide an estimated cost and a detailed implementation schedule for those improvement opportunities identified above.

Introduction

The entire County must be assessed on an individual watershed basis to evaluate existing water quality conditions and then recommend structural and non-structural projects, which when implemented will improve water quality within that watershed and in turn improve water quality in the County as a whole.

Annual Update Number 20 Status

Howard County continues the systematic assessment of water quality in all its watersheds. The process began during the second-generation permit period with a task to divide the County into manageable size sub-watersheds and then prioritize the watersheds for doing detailed assessments. The first two detailed studies were for the Centennial Lake and Wilde Lake watersheds. The County previously completed detailed watershed assessments for the Sucker Branch and Rockburn Branch sub-watersheds as part of the larger-scale Lower Patapsco WRAS. The portions of the Lower Patapsco WRAS study area not in Sucker or Rockburn Branches had been field assessed as part of the overall WRAS work. The County revisited all potential water quality improvement sites in the Lower Patapsco WRAS area and added these sites to its master list of countywide restoration projects.

All of the watershed plans noted herein identified current water quality conditions and ranked the problems according to their severity. The detailed studies listed structural as well as non-structural improvement projects along with cost estimates to implement the projects. A list of potential projects has been generated from each detailed study, from previous stream assessments not mentioned above, and from citizen complaints. A master list of all potential projects is extensive, but it provides the County with a priority list, which continues to be used for adding new water quality improvement projects to the capital budget subject to available funding.

Monitoring for the specific projects noted above will be handled through various monitoring efforts. The County is performing watershed level biological, physical, and chemical monitoring for the Wilde Lake and Red Hill Branch watersheds. Specific projects in these watersheds and within other watersheds may also include monitoring on a case-by-case basis per specific project permit requirements.

2. Develop watershed management plans until all land area in Howard County is covered by a specific action plan to address the water quality problems identified. At a minimum, the County shall perform a detailed watershed management plan for one County watershed during this permit term.

Annual Update Number 20 Status

As noted above, the County is systematically developing watershed management plans for all of its watersheds. The County completed the Upper Little Patuxent River (ULPR) Watershed Study during the 15th permit year, which met the requirement for the one watershed study during the third permit term. The ULPR study area begins at the headwaters of the Little Patuxent River and includes all tributaries down to where the Little Patuxent River crosses Old Annapolis Road. The final ULPR report, which includes the methods and results of the study, and an implementation plan, was completed in 2009 and is available on the County's SWMD's webpage.

In 2014, the County completed two countywide assessments, which identified water quality enhancement projects to help the County meet its TMDL requirements. The first study reviewed all County owned properties (including properties owned by the Howard County Public School System) to identify LID projects to treat currently untreated impervious areas. The second study reviewed all dry ponds and extended detention ponds in the County to identify opportunities for water quality upgrades.

Design and construction of projects from these studies began in 2013 as soon as the studies were completed.

The County is also working on a Countywide Implementation Strategy (CIS) for addressing its TMDL requirements. The CIS will include a large scale assessment that will provide the framework for moving forward with more detailed studies and watershed restoration plans. In 2015, the County initiated detailed assessments in the Little Patuxent Watershed and the Middle Patuxent Watershed to identify additional projects and to develop restoration plans for these watersheds. These studies, which are requirements of the new MS4 permit issued December 17, 2014, will be reported on in the next section of Annual Update No. 20, which addresses the new permit.

Columbia Association

The Columbia Association (CA) has developed a Columbia Watershed Management Plan (CWMP) that outlines a long-term, far-reaching strategy to protect and restore the Little and Middle Patuxent Rivers and adjacent waters within Columbia. The CWMP will support ongoing efforts and provide a sustainable pathway to effectively manage these Columbia watersheds going forward consistent with the CWMP's vision statement: Protecting and Restoring the Waters of Columbia.

Additionally, CA developed a watershed web site at www.columbiawatershed.org, where stakeholders can find information on numerous activities to help protect and restore the watershed. The web site includes links to other resources that provide more in-depth information. There are also sections with activities for kids and an interactive map for pinpointing which stream is nearest to your home. There are links to this website on all other CA websites.

CA also sponsors or participates in a number of community engagement activities, including the Columbia-wide stream cleanup, CA's Watershed Advisory Committee and Watershed Sub-Committee sub-committees in the Villages of River Hill, Hickory Ridge, and Kings Contrivance. Through these events and groups over 300 volunteers were engaged.

3. Provide, in the first annual report for this permit, complete watershed management plans for Wilde Lake and Centennial Lake. Subsequent annual reports shall continue progress reporting and the detailed watershed management plan required in PART III. F.2. above shall be submitted no later than the fourth annual report.

Annual Update Number 20 Status

The final Centennial Lake and Wilde Lake Watershed Restoration Plan has previously been provided to MDE. Implementation of the Centennial Lake and Wilde Lake Watershed Restoration Plan continues and will be reported on in Section VII. Watershed Restoration below.

G. Watershed Restoration

Howard County shall implement those practices identified in PART III. F. above to control stormwater discharges to the maximum extent practicable. The overall goal is to maximize the water quality in a single watershed, or combination of watersheds, using efforts that are definable and the effects of which are measurable. At a minimum, the County shall:

1. Continue the implementation of those restoration efforts that were identified and initiated during the previous permit term to restore ten percent of the County's impervious surface area. The watershed, or combination of watersheds where the restoration efforts are implemented shall be monitored according to PART III. H. below to determine effectiveness toward improving water quality.

Introduction

The goal of the Watershed Assessment and Planning section of the County's NPDES permit is to identify projects, which when implemented will improve water quality in the County. Section VII. Watershed Restoration includes a description of the projects selected by the County for implementing its watershed restoration approach.

Annual Update Number 20 Status

The County continues looking to implement water quality improvement projects identified in the Centennial Lake and Wilde Lake Watershed Restoration Plan. Several restoration projects were ongoing in the Wilde Lake watershed during the current permit year. The first project is a large underground storage facility at Wilde Lake High School. Construction was completed during this reporting period. The facility will capture runoff from the Wilde Lake watershed. The second project is a bioretention facility enhancement at Harpers Choice Middle School. This project is currently on hold. The Centennial Park North Pond Retrofit project will be done in conjunction with the dredging project planned for Centennial Lake.

2. ***Begin to implement restoration efforts in a watershed, or combination of watersheds, to restore an additional ten percent of the County's impervious surface area. These efforts shall be separate from those specified in PART III. G.1. above and shall be monitored according to PART III. H. below to determine effectiveness toward improving water quality.***

Annual Update Number 20 Status

As noted in Section VI. Watershed Assessment and Planning, the County has developed a single prioritized list of water quality improvement projects. The list includes potential projects from watershed studies as well as from responding to citizen complaints. The County selects projects from that list for implementation. The nature of the list allows the County to implement restoration efforts in additional watersheds or combinations of watersheds as required by the County's NPDES permit conditions. During the current permit year, the County continues the design/construction of restoration projects identified in the Upper Little Patuxent River Watershed Study as well as other high priority projects in other watersheds.

Included within the Wilde Lake Watershed as a restoration project in the fall of 2014, Environmental Services partnered with the Office of Community Sustainability. At the Board of Education and Harpers Choice Middle School had fall planting events funded through a grant from the Chesapeake Bay Trust. Students learned about the importance of reforestation, stormwater quality, the negative impacts of pollutants to stormwater and how to plant trees. After the session the students went to a designated location on the school site and planted trees.

3. ***Report annually:***

   a. ***The progress toward meeting the goals established in PART III. G.1. and 2. above;***

   b. ***The estimated cost and the actual expenditures for all watershed restoration activity; and***

   c. ***The progress toward meeting the overall watershed restoration goals established in PART III.F. above.***

Annual Update Number 20 Status

As noted previously in Section VII Watershed Restoration, the County continues to work towards meeting the goals in the specific detailed watershed studies as well performing watershed restoration on a countywide basis. The County has completed or is currently working on many projects to meet its watershed restoration goals. In addition to the new projects noted above, the list below notes other current restoration projects. For projects completed during previous permit years refer to previous permit annual updates.. All other projects have a brief description. "CA" is used to designate projects performed by Columbia Association.

- Stevens Forest Elementary School Retrofit (2014)

- Turf Valley Overlook Pond 2 Retrofit (2014)

Centennial Park North Pond Retrofit Project – A design was initially done to convert an in-stream sediment forebay dam to a natural stream reach. The scope of the project has since changed to a rehabilitation of the existing dam. The design is complete. The proposed work area drains directly to Centennial Lake and is located within the Centennial Lake Watershed area. Construction is expected to be done as part of the lake dredging project planned for the near future.

Rainwater Harvesting and Washpads – As mentioned previously in this Annual Report, the County is currently designing the addition of outdoor washpads and rainwater harvesting from the roofs of most of the County's fire stations and several park maintenance shops. These projects will collect and treat the washwater as well as utilize the harvested rainwater for the washing activities. The County has completed a feasibility study of all fourteen locations and is currently in the design phase.

Whitworth Way Pond Retrofit – Design has begun on a water quality retrofit to an existing dry stormwater management pond. The drainage area to the pond is approximately 85 acres. Construction is anticipated in Fall 2015.

Turf Valley Pond 3 Retrofit – Design has begun on a water quality retrofit to an existing wet stormwater management pond. The drainage area to the pond is approximately 58 acres. Construction is anticipated in winter FY16.

Warfields Range Pond Retrofit – This project will retrofit a dry stormwater management pond to provide water quality treatment. Construction is anticipated in Spring 2016.

Gerwig Lane Pond Retrofit–This project will retrofit a wet stormwater management pond with the addition of water quality treatment. WQv and channel protection treatment will be provided for the entire drainage area. Construction is anticipated in Spring 2016.

Pinehurst Court Stream Rehabilitation Project – Design of this stream restoration project is nearing completion. Construction is anticipated to begin in Fall 2014. The project involves stabilization of approximately 450 linear feet of a tributary to the Little Patuxent River and the installation of a shallow marsh BMP that will provide water quality treatment for over 2 acres of imperviousness.

Southview Road Stream Restoration Project – Design of this stream restoration project is nearing completion. Construction is anticipated to begin in Fall 2014. The project involves the stabilization of over 2,700 linear feet of a tributary to Plumtree Branch in the Little Patuxent Watershed.

Wilde Lake High School Retrofit Project – The Wilde Lake High School Retrofit Project treats a drainage area of 23.09 acres with an impervious area of 12.88 acres. Channel protection volume is managed by 600 linear feet of 96-inch pipe. Water quality treatment is provided by four devices (two storm filters and two Voortechs. The entire system is located underground, beneath the athletic fields of Wilde Lake High School. The system is designed to intercept runoff from the parking areas at the Interfaith Center and the High School as well as the roof areas. Construction is ongoing and anticipated to be completed Fall 2015.

Dorsey Hall Village Center Stream Restoration and Outfall Stabilization – This project consists of approximately 1,300 linear feet of stream restoration and four (4) outfall stabilizations with Regenerative Stormwater Conveyance (RSC) providing 67% water quality for over 13 acres of impervious surface area in the Dorsey Hall Village Center area. Construction on the outfalls and RSC's has been completed and stream restoration will be completed by the end of the summer with plantings anticipated in the Fall of 2015.

Rusty Rim Pond Retrofit – This project consists of replacing the principle spillway and installing a new bio-retention pond and the design is ongoing. Construction is anticipated winter FY15.

Willow Bend Stream Restoration – Preliminary design of this stream restoration project is has begun and is ongoing. Final design will begin winter during FY15. The project involves the stabilization of approximately 2,000 linear feet of a tributary to the Little Patuxent River in the Little Patuxent Watershed.

Velvet Path Pond Retrofit and Stream Restoration - This project will retrofit an existing stormwater management pond with a sand filter and provide the addition of water quality treatment. WQv, plunge pool outfall stabilization and channel protection treatment will be provided. Design is on-going and construction is anticipated fall of FY16.

Kings Meade Pond 2 – Design is underway for a water quality retrofit to an existing wet stormwater management pond. Construction is anticipated Summer FY15.

Ellicott City Parking Lot E – The County performed a major project to re-construct Parking Lot E, which included a staircase to allow pedestrian access from the courthouse to downtown Ellicott City, resurfacing of the parking lot, revised ingress/egress, re-landscaping, reconstructing of failed or failing retaining walls, and several stormwater/water quality improvements. Stormwater components included a new bioretention area, a cascading step-pool system next to and through the staircase, and a Filterra tree box. These features serve to provide water quality for previously untreated impervious areas. Construction began in Winter 2014.

The County has identified the estimated and actual costs for implementing the watershed restoration projects noted above in Section IV of this Annual Report. As of the date of this annual report, the estimated cost is approximately $19 million and the actual cost is approximately $31 million for a total expenditure of approximately $50 million. The "actual" costs reflect designs and/or construction phases that have been completed. The "estimated"

costs reflect design and/or construction phases that are currently in process where a purchase order has not been issued yet, therefore, these tasks do not yet have an "actual" cost associated with them.

Starting with Permit Year 14, there were a large number of projects begun, which was primarily due to the influx of funding from a Chesapeake Bay 2010 Trust Fund Local Implementation Grant and other State and Federal grants. The County continues to receive Trust Fund grant money, which has allowed the County to accelerate the number of projects that can get done annually.

H. Assessment of Controls

Assessment of controls is critical for determining the effectiveness of the NPDES stormwater management program and progress toward improving water quality. Therefore, the County shall use chemical, biological, and physical monitoring to document work toward meeting the watershed restoration goals identified in PART III. G. above. Additionally, the County shall continue physical stream monitoring in the Hammond Branch watershed to assess the implementation of the 2000 Maryland Stormwater Design Manual or other innovative stormwater management technologies approved by MDE. Specific monitoring requirements are described below.

1. Watershed Restoration Assessment

The County shall continue monitoring in the Font Hill watershed, or, select and submit for MDE's approval a new watershed restoration project for monitoring. Ample time shall be provided so that pre-restoration monitoring, or characterization monitoring can take place. Monitoring activities shall occur where the cumulative effects of watershed restoration activities can be assessed. An outfall and 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:

Introduction

Howard County's municipal NPDES management program effectiveness is evaluated through a combination of chemical, biological, and physical assessments to document the water quality impacts of the County's water quality improvement and watershed restoration efforts.

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As noted in Section D. Discharge Characterization, the County, with MDE approval, previously replaced the Font Hill watershed monitoring with monitoring efforts in the Centennial Lake and Wilde Lake watersheds. The monitoring program included geomorphic, chemical, physical habitat, and biological assessments conducted throughout the watersheds to determine if the restoration efforts outlined in the Centennial and Wilde Lake Watershed Restoration Plan (CWP, 2005) were 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.

In 2009-2010, monitoring at the Centennial Lake watershed was discontinued (see discussion in Annual Report Number No. 14 for details) and Red Hill Branch subwatershed was initiated. The Red Hill Branch subwatershed was identified as a priority subwatershed in the County's Upper Little Patuxent Watershed Management Plan. The County has therefore focusing restoration and restoration monitoring efforts in this area. As described in more detail below, Red Hill Branch monitoring was initiated in late 2009 with geomorphic assessments, and in early spring of 2010 with biological assessment, continuous discharge, baseflow and stormflow water quality, and sediment sampling. Monitoring focuses on determining the pollutant loading/removal rates at three sites; Salterforth Pond Retrofit, Bramhope Lane Stream Restoration, and Meadowbrook Park at the downstream end of the subwatershed.

Since full Year 1 monitoring was not complete until late 2010, summary results of the Red Hill Branch Monitoring from 2010 were not included in Annual Update No. 15, and were, instead, included in Annual Update No. 16. Similarly, since full Year 2 and Year 3 monitoring was not completed until late 2011 and 2012, respectively, summary results from these years were included in Annual Update No. 17, and in Annual Update No. 18, respectively. Last year's report (Annual Update No. 19) included summary results of the Red Hill Branch Monitoring from Year 4 (2013). This year's report includes summary results of the Red Hill Branch Monitoring from Year 5 (2014). A full report of Red Hill Branch monitoring methods, data analysis, and results from Year 5 is provided in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, which is included as a stand-alone document with the Annual Update.

Under Howard County's previous permit, physical stream monitoring in the Hammond Branch watershed was undertaken to determine the effectiveness of stormwater management practices for stream channel protection. In 2010, monitoring of Hammond Branch was discontinued, and in 2011 Howard County (in conjunction with MDE) replaced monitoring at the Hammond Branch site with another site in order to meet the conditions of the County's NPDES MS4 permit. To evaluate the effectiveness of recent stormwater controls from developed sites, Howard County and MDE chose an unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill Branch subwatershed for this 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 4 – 2014 and Year 5 – (Through June 30, 2015)* report, produced as a stand-alone document and submitted as part of the Annual Update.

The specific monitoring strategies in place for Wilde Lake are discussed further in sub-sections a, b and c below. The full methods and data analysis for chemical, biological and geomorphic

monitoring conducted during 2014 were reported in the *Wilde Lake Watershed Stream Monitoring; Years Nine and Ten – 2014 and 2015* report, produced as a stand-alone document included as part of this year's Annual Update. The following subsections will provide a more detailed explanation of the chemical, biological, and physical components of the monitoring work.

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 (BOD5)
Total Kjeldahl Nitrogen (TKN)
Nitrate plus Nitrite
Total Suspended Solids
Hydrocarbons (TPH)
Fecal Coliform or E. coli
Total Lead
Total Copper
Total Zinc
Total Phosphorus Total Petroleum
Oil and Grease*
(*Optional).

iv. Continuous flow measurements shall be recorded at the in-stream monitoring station or other practical locations based on an approved study design. Data collected shall be used to estimate annual and seasonal pollutant loads and for the calibration of watershed assessment models.

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In 2014, the County performed seven storm sampling events and one baseflow sampling event at the Wilde Lake site, and eight storm sampling events at the Red Hill Branch site located in Meadowbrook Park. Baseflow sampling was conducted at Wild Lake in lieu of storm sampling due to lack of appropriate sampling opportunities in the early part of the year. The results of the sampling at all sites are submitted on the CD provided as outlined in Attachment A as part of the accompanying geodatabase. The water quality database contains blank fields for data that were unavailable, not collected, or not applicable during 2014-2015. Blank cells in the chemical results data fields are for parameters that are not required to be tested by Howard County. Since the February 10, 2014 event at Wilde Lake is a baseflow collection, a total storm discharge value is not required. At Meadowbrook, some total storm discharge data are missing due to a malfunction of flow logger during June-December 2014. Temperature data are missing

during 2014-2015 at both stations because the temperature logger had malfunctioned. Both units are undergoing repair.

Stormflow data were collected at Wilde Lake on seven occasions during the 2014 monitoring period (March 29, May 15, June 12, October 9, November 5, November 16, and December 16, 2014). Baseflow data were collected on one occasion during the 2014 monitoring period (February 10, 2014). Average (2007-2014) concentrations of metals in stormflows (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. Fecal coliform concentrations, however, have been consistently high during the years that storm samples have been collected, especially during the 2012-2014 monitoring period.

Stormflow data were collected at the permanent water quality monitoring station at Meadowbrook Park on eight occasions in 2014 (March 12, April 7, May 16, June 25, September 25, October 7, November 5, and December 6, 2014). Median concentrations of storm runoff total nitrogen, TSS, and total phosphorus were 1.98 mg/L, 56 mg/L, and 0.13 mg/L, respectively. Average metal concentrations at Meadowbrook Park were below their respective acute MDE criteria. Fecal coliform levels remained elevated during 2014.

A total of eight wet weather events were sampled at the Red Hill Branch retrofit site in 2014 (March 12, April 7, May 16, June 25, August 12, September 25, November 5, and December 6, 2014).

During 2014, Salterforth Pond total nitrogen concentrations ranged from 0.30 to 9.94 mg/L for the influent and 0.30 to 3.20 mg/L for the effluent. Concentrations of total phosphorus ranged from 0.043 to 1.50 mg/L for the influent and 0.076 to 0.39 mg/L for the effluent. TSS concentrations ranged from 2 to 872 mg/L for the influent and 1 to 74 mg/L for the effluent.

A total of eight wet weather events were sampled at the Red Hill Branch restoration site in 2014 (March 12, April 7, May 16, July 3, August 12, September 25, November 5, December 6, 2014). Five baseflow samples were collected during the reporting period (March 24, June 25, July 3, September 30, and November 12, 2014).

Bramhope Lane restoration site baseflow data showed that baseflow total nitrogen and total phosphorus concentrations were elevated in comparison to EPA guidelines while TSS concentrations were within acceptable ranges. The maximum stormflow concentration of total phosphorus ranged from 0.74 mg/L at the upstream station to 0.36 mg/L at the downstream station. The maximum stormflow TSS concentration ranged from 220 mg/L at the upstream station to 73 mg/L at the downstream station. The maximum stormflow concentration of total nitrogen ranged from 5.10 mg/L at the upstream station to 4.62 mg/L at the downstream station. The median suspended solids concentrations in samples collected from the siphon samplers at the upstream Bramhope, downstream Bramhope, and Meadowbrook stations were 49, 196, and 425 mg/L, respectively. The median dry-weight mass of sediment transported at

the upstream Bramhope, downstream Bramhope, and Meadowbrook stations were 0.48, 6.16, and 194.74 pounds, respectively.

b. Biological Monitoring:

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

ii. The County shall use the U.S. Environmental Protection Agency's (EPA) Rapid Bioassessment Protocol III, Maryland Biological Stream Survey (MBSS), or other similar method approved by MDE.

Annual Update Number 20 Status

Biological monitoring was conducted in Spring 2014 at five sites in the Wilde Lake watershed. This was the 9th consecutive year of monitoring at Wilde Lake, which began in the spring of 2006. In 2006, sites were selected using a randomized census approach to assess the condition and reaction of the stream's biological integrity to the implementation of the stream and watershed restoration plans. To enable an assessment of changes at the sites over time, sites first sampled during 2006 to 2010 will be re-visited during a second round of sampling. In 2011, sites that were first sampled in 2006 were re-sampled. In 2012, sites that were originally monitored in 2007 were re-visited. In 2013, sites that were originally monitored in 2008 were re-assessed. Similarly, in 2014, sites sampled in 2009 were re-sampled. The monitoring included the collection and analysis of the benthic macroinvertebrate community, assessment of the physical habitat, and instream water quality sampling. The full methods and data analysis are in the *Wilde Lake Watershed, Stream Monitoring; Years Nine and Ten 2014 and 2015* report, produced as a stand-alone document included as part of this year's Annual Update.

A biological monitoring program was initiated in Red Hill Branch during the spring of 2010, which included the collection and analysis of the macroinvertebrate community, physical habitat assessments, and measurements of *in situ* water chemistry. Biological assessments involved 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. During the spring of 2014, benthic monitoring continued at these sites. The full methods and data analyses for assessments conducted in 2014 are presented in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, produced as a stand-alone document and included as part of the Annual Update.

Biological assessment methods within Howard County are designed to be consistent and comparable with the methods used by Maryland Department of Natural Resources (DNR) in their Maryland Biological Stream Survey (MBSS). The County has adopted the MBSS methodology to be consistent with statewide monitoring programs and programs adopted by other Maryland counties.

Results of the Year 9 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. Two of the five sampling sites had habitat that rated Not Supporting and two rated Partially Supporting; the remaining one rated Supporting in 2014. Using MBSS's Physical Habitat Index (PHI), the majority of reaches in 2014 rated Degraded. One reach was Partially Degraded and another was Severely Degraded in 2014. Benthic macroinvertebrate sampling results were between Very Poor and Poor ratings where five sites were in the Very Poor range, including the QC benthic macroinvertebrate site, and one site rated Poor. 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 nine years of monitoring.

In Red Hill Branch, post-restoration monitoring results indicate a subwatershed in an overall degraded ecological condition, with little change from the first three years of pre-restoration monitoring. During 2014, one study reach and the control reach were classified as 'Very Poor' for biological condition, with an overall BIBI score of 1.67 and 1.00, respectively. The remaining study reaches were each classified as 'Poor' with scores of 2.00 and 2.33. The restoration reach received a "Degraded" habitat condition rating and its habitat was evaluated as 'Partially Supporting' aquatic life which was slightly improved from 2013 ('Severely Degraded' and 'Not Supporting'). Habitat at the remaining study reaches rated "Degraded" and "Partially Degraded" and was classified as 'Non Supporting' and 'Partially Supporting' of aquatic life. The control reach received a habitat rating of 'Degraded' due to a low abundance of woody habitat and because of its close proximity to a road, but was rated 'Partially Supporting' of aquatic life based on frequency of riffles and epifaunal substrate.

c. Physical Monitoring:

- ***i. A geomorphologic stream assessment shall be conducted between the outfall and in stream monitoring locations or in a reasonable area based on 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 "Rapid Bioassessment Protocol for use in Streams and Rivers," or other similar method; and***
- ***iii. A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-2, HSPF, SWMM, etc.) to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.***

Annual Update Number 20 Status

Wilde Lake Watershed

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. Assessment techniques include the survey of channel cross-sections, particle size analysis, longitudinal profile, and Rosgen Level II analysis. Geomorphic monitoring was conducted in Spring 2014 in the Wilde Lake watershed. The full methods and data analysis are in the *Wilde Lake Watershed, Stream Monitoring; Years Nine and Ten – 2014 and 2015* report, produced as a stand-alone document included as part of this year's Annual Update.

Cross-sections have been surveyed annually in the spring since 2006 to assess changes in channel geometry. A total of four cross-sections are surveyed in the Wilde Lake watershed. The cross-sections are located generally at the downstream ends of subwatersheds to identify the cumulative effects of the proposed upstream stormwater retrofits and stream restoration activities. Particle size analysis was completed at each cross-section. Three longitudinal profile surveys were conducted across the watershed, totaling approximately 2960 feet.

Based on 2006 – 2014 geomorphic assessments, the Wilde Lake main stem 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 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 complete riparian buffer is lacking along most of the channel.

Stream physical habitat assessments were conducted in the Wilde Lake watershed in 2014 in conjunction with the 5 biological sites described under Biological Monitoring above. Physical habitat for the Wilde Lake watershed was assessed using the EPA's Rapid Bioassessment Protocol (RBP) (Barbour, *et al*, 1999) habitat assessment for high-gradient streams. The Wilde Lake sites showed low overall habitat availability, with two sites rated 'Partially Supporting' of aquatic life, two rated 'Not Supporting' and one rated 'Supporting' in 2014. By design, these sites sampled in 2014 were the same locations first sampled in 2009, when similar habitat scores were attained. In 2009, two sites rated 'Partially Supporting' and three sites rated as 'Not Supporting'. For the most part, habitat degradation has been observed at these Wilde Lake sites over time. During the initial year of monitoring (2006), three sites rated 'Supporting' and two sites rated as 'Not Supporting.' Between 2007 and 2013, there were three sites rated as 'Supporting,' 19 sites rated as 'Partially Supporting' and 12 sites 'Not Supporting.

In 2007 a hydrologic and hydraulic (H&H) model analysis was performed to assess the stability of the main stem channels in the Centennial and Wilde Lake watersheds with results indicating erosion as the dominant channel process in both watersheds. The hydraulic model was updated in 2009 with similar results. Erosion remains the dominant channel process, but results indicated a move toward a more stable channel. The H&H analysis is generally consistent with the Wilde Lake geomorphic assessment results. Based on field data, many reaches are eroding, which is resulting in localized areas of point bar formation.

Red Hill Branch Subwatershed

Geomorphic assessments in the Red Hill Branch subwatershed were conducted in the spring of 2014, three 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. The full methods and data analyses for assessments conducted in 2014 are in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, produced as a stand-alone document included as part of this Annual Update.

Geomorphic data collected in 2014 serve as a comprehensive assessment of the third year of post-restoration conditions within the Red Hill Branch subwatershed. These data can be compared to results of two years of surveys of pre-restoration conditions conducted during 2009 and 2011 and the previous two year's post-restoration data collected within the watershed. Comparisons between pre-restoration and post-restoration surveys will quantitatively evaluate changes in conditions as a result of restoration efforts throughout the subwatershed.

From the longitudinal profiles, Year 5 slopes were compared to those from two years of pre-restoration monitoring. The slope at the restoration reach did not change between the pre-restoration assessment conducted in 2011 and the first post-restoration assessment conducted in 2012. In the year following restoration (between 2012 and 2013), the slope at the restoration reach increased slightly, while the slopes at the other reaches slightly decreased. The restoration reach, which is located in the middle to upper portion of the watershed, had the steepest slope of the reaches surveyed while the downstream reach had the lowest in 2014. The surveyed profiles from 2014 were plotted, overlain, and compared to the baseline condition profiles to assess changes occurring in the bed structure. At the restoration reach, little change was observed between the 2013 and 2014 post-restoration surveying with the exception of slight deposition in the series of step pools. At the downstream reach, a logjam that formed between the 2011 and 2012 survey was still in place during the 2014 survey, but it has broken up slightly which has allowed for more sediment to pass through. Between Years 4 and 5, the bed elevation of the upstream portion has increased. At the control reach, a picnic table and resultant debris jam was present within the channel during all four years of monitoring, but slowly migrated downstream between each assessment year. Downstream of this jam, several smaller debris jams also formed, and have resulted in the continued shifting of features along the bed surface particularly in the middle to downstream portions of this reach. Future annual profiles will be plotted, superimposed, and compared to the baseline condition and yearly surveyed profiles to assess changes occurring in the bed structure.

At the downstream reach, there was noticeable deepening in 2014 along the right bank and through mid-channel at the riffle cross-section. At the meander bend cross-section, the thalweg

elevation remained relatively stable during all study years, but the remainder of the cross-section has widened considerably as both banks have experienced erosion. Bank erosion between post-restoration years has been comparatively unchanging. At the control reach, the riffle cross-section remained relatively stable during five years of assessments, while the meander bend cross-section continues to downcut and deepen, most notably along the left bank. Prior to restoration, the restoration reach was highly incised and the stream did not have access to its floodplain. Restoration of the channel at this location (including raising the bed elevation and grading back the streambanks) resulted in the stream no longer being incised and enabled the stream to have good access to its flood plain. Post-restoration surveying has shown moderate deepening along the left bank at the riffle cross-section. At the meander bend cross-section, the bed has marginally deepened and widened along the banks between Years 4 and 5, but has overall remained stable. Future surveyed cross-sections will be plotted, superimposed, and compared to the baseline condition and yearly surveyed profiles to assess changes occurring in channel dimensions.

Bank pin erosion rates in the restoration reach ranged from 0.00 to 0.12 feet/year during 2014 with the most erosion occurring on the lower portion of the outer meander bend at the upper end of the reach. Deposition rates ranged from -0.01 to -0.15 feet/year during 2014 with the most deposition located on the lower portion of the inner meander bend at the middle of the reach. Erosion rates at the downstream reach ranged from 0.02 to 0.59 feet/year during 2014 with the most erosion occurring at the lower portion of the outer mender bend at profile station 0+51. Deposition rates ranged from -0.02 to -1.61 feet/year during 2014 with the most deposition occurring at the lower portion of the outer meander bend. Erosion rates in the control reach ranged from 0.01 to 0.80 feet/year during 2014. Deposition rates at the control reach ranged from -0.01 to -0.16 feet/year during 2014. Scour chains were studied at all three reaches throughout 2014. Scour rates in the Bramhope restoration reach ranged from 0.00 feet/year to 0.14 feet/year (scour) during 2014. In the downstream reach, scour rates ranging from 0.60 feet/year (scour) to -1.44 feet/year (deposition) during 2014. At the control reach, scour rates ranged from 0.47 feet/year to -0.11 feet/year during 2014.

Particle size analyses continued within Red Hill Branch during the fifth year of monitoring. The results indicate that the restoration reach has similar riffle surface median (D50) particle size, but larger D50 particle sizes for the entire reach as compared to the downstream and control reaches. However, the D84 at the restoration reach for both the riffle surface and reachwide counts exceeded that of the other sites. Results from all five assessment years of bar sample analyses indicate that both downstream and restoration reaches transported more fine particles (i.e., medium gravel and sand) than the control reach. The control reach transported larger particles, ranging from coarse gravel to medium cobble. The size of particles transported at all three reaches increased or remained the same during the two years of pre-restoration monitoring, and then decreased in the 2012 post-restoration assessment. In 2014, the size of particles transported decreased or stayed the same from those during the first and second year of post-restoration monitoring.

The results of the facies mapping data collected during five years of monitoring within Red Hill Branch illustrate changing substrate conditions among all three reaches. Between pre-restoration Years 1 and 2, the proportion of sand-dominated facies increased at all three reaches.
During 2012, the proportion of sand-dominated facies increased at both the downstream and control reaches. The restoration reach, however, experienced the most noticeable change in its facies distribution following restoration. The restoration reach was still dominated by sand-dominated facies, but the addition of boulders, large rocks, and cobble used in the construction of the newly-restored channel resulted in increased percentages of larger facies. During 2014, the substrate of the restoration reach was a majority of cobble and secondarily gravel-dominated facies, for the second year.

Stream physical habitat assessments were conducted in conjunction with monitoring of the four biological sites described under Biological Monitoring above. Physical habitat for the Red Hill Branch subwatershed was assessed using the Maryland Biological Stream Survey (MBSS) Physical Habitat Index (PHI) (Paul et al., 2002), and EPA's Rapid Bioassessment Protocol (RBP) (Barbour et al., 1999) habitat assessment for high-gradient streams. The Red Hill Branch sites show low overall habitat availability, with habitat at three study reaches rated 'Degraded' and "Partially Degraded" at a 3rd study site under the PHI. Three study sites rated "Partially-Supporting" of aquatic life using the RBP assessment. The control reach received a PHI rating of 'Degraded', but was rated 'Partially Supporting' using the RBP assessment due to slightly higher scores for frequency of riffles, channel alteration, and channel flow. It also received the second highest score of all sites for in-stream cover, meaning good habitat for fish.

Rumsey Run Watershed
In 2010, geomorphic monitoring of Hammond Branch was discontinued, and in 2011 Howard County (in conjunction with MDE) replaced monitoring at the Hammond Branch site with geomorphic monitoring of an unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill subwatershed. To evaluate the effectiveness of recent stormwater controls from developed sites, Howard 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.

Geomorphic surveys were conducted throughout Rumsey Run to enable comparisons between upstream areas with little to no stormwater controls, mid-reach areas affected by a subdivision designed and constructed using Environmental Site Design (ESD) practices for stormwater management, and downstream areas constructed with traditional stormwater practices. Five permanently monumented cross-sections established in 2011 along almost 4,000 linear feet of stream were re-surveyed during Fall 2012, Fall 2013 and Fall 2014, along with the complete longitudinal profile, reach-wide and representative pebble count surveys.

In addition, to improve model accuracy, an additional 11 cross-sections were installed and surveyed during Fall 2013 to provide more comprehensive data. These cross-sections were re-

surveyed in Fall 2014. Analysis of the graphical overlays shows cross-sections throughout Rumsey Run remained more stable between the 2012 to 2014 monitoring efforts than between the baseline assessment in 2011 to 2012. Cross-sectional areas decreased at the two most upstream sites and the site furthest downstream, whereas the two middle sites slightly increasing in cross-sectional area. Width/depth ratios decreased at all sites except the furthest upstream site which increased somewhat. Future surveyed cross-sections will be plotted, superimposed, and compared to the baseline condition and yearly surveys to assess changes occurring in channel dimensions.

Year 4 longitudinal profile data were compared with baseline and Years 2 and 3 data to evaluate changes in the overall channel slope. Changes in slope varied throughout the reach, as slope decreased at two most downstream cross-sections and increased at the three most upstream cross-sections. Sandy substrate dominates the upper and middle portions of the stream reach, and the continual shifting of features in these sections is evident in analyses of the longitudinal profile overlays. The surveyed longitudinal profiles in future years will be plotted, overlain, and compared to the baseline condition and yearly surveyed profiles to assess changes occurring in the channel slope and bed structure.

Pebble count data indicate finer particles dominate the reach in the upstream portion, and increase in roughness moving downstream. The dominant particle size class remained the same at three cross-sections (X2, X3 and X5). The lower most cross-section (X1) median partical size slightly increased and moved from silt/clay class to sand class. In contrast, X4 decreased in particle size placing it in the sand category and changing the channel type from C4 in 2013 to C5 in 2014. A full report of Rumsey Run Year 4 monitoring methods, data analysis, and results is included in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 – 2014 and Year 5 (Through June 30, 2015)* report, produced as a stand-alone document and submitted as part of the Annual Update.

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 IV. A.2.d. below;

ii. Chemical, biological, and physical monitoring results and a combined analysis for Font Hill or other approved monitoring locations; and

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

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EMC information is included later in the Annual Update under Section C. Additional Information Relative to Assessment of Controls. EMC values have been updated to reflect the addition of 2014 chemical data.

Summary descriptions of all chemical, biological, and physical monitoring activities performed during the past year are included in the Assessment of Control section herein and in more detail in the stand alone documents provided as part of this Annual Update: *Wilde Lake Watershed Stream Monitoring, Years Nine and Ten – 2014 and 2015; Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring;* and *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 –2014 and Year 5 (Through June 30, 2015).*

The problems associated with installing the chemical sampling unit in the Centennial Lake watershed have been described previously in this report. In lieu of continuing to look for locations to place the sampling unit in the Centennial Lake watershed, the County felt a more appropriate course of action was to install the sampling site in the Upper Little Patuxent River (ULPR) Watershed study area (Red Hill Branch) in conjunction with proposed restoration projects. Additionally, the County received a Chesapeake and Atlantic Coastal Bays 2010 Trust Fund Local Implementation Grant for work in the Little Patuxent River Watershed. The County selected Red Hill Branch as the first subwatershed (which is in both the ULPR study area and the 2010 Grant study area) where numerous restoration projects were planned, and many have been undertaken.

The County developed a monitoring approach for the 2010 Grant acceptable to DNR (who administers the 2010 Grant), which includes the placement of the chemical sampling unit within Meadowbrook Park at the lower end of the Red Hill Branch subwatershed. Monitoring within Red Hill Branch also includes extensive biological and physical monitoring. Installation of the Meadowbrook unit was completed in early 2010 and sampling began shortly thereafter. Results of the Meadowbrook monitoring are provided in this Annual Update. The County has terminated the biological, physical, and chemical sampling in the Centennial Lake watershed as previous noted and replaced it with the more detailed Red Hill Branch monitoring efforts.

2. Stormwater Management Assessment

The County shall continue monitoring in the Hammond Branch watershed to determine 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 the Hammond Branch to evaluate channel stability;

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

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

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After 10 years of monitoring at the Hammond Branch Tributary Watershed, the County requested and was given permission by MDE to discontinue monitoring at this location. The County and MDE worked together to select another site for the County to perform monitoring in lieu of the Hammond Branch Tributary site. An unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill Branch subwatershed was chosen and monitoring began during permit year 17. To evaluate the effectiveness of recent stormwater controls from developed sites, Howard County plans to monitor the effectiveness of the *2000 Maryland Stormwater Design Manual* and other innovative stormwater management technologies through annual geomorphic assessments, limited runoff investigations, and modeling in Rumsey Run. A full report of Rumsey Run monitoring methods, data analysis, and results is provided in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 –2014 and Year 5 (Through June 30, 2015)* report, produced as a stand-alone document and provided as part of the Annual Update.

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

During the Fall of 2011, five permanently monumented cross-sections were established along the almost 4,000 linear feet of stream in Rumsey Run. The five cross-sections, along with the complete longitudinal profile, were re-surveyed in Fall of 2012, Fall of 2013 and Fall of 2014 to evaluate channel stability throughout the reach. The distribution of cross sections throughout the entire reach was intended to enable comparisons between (1) upstream areas with little to no stormwater controls, (2) mid-reach areas affected by a subdivision designed and constructed using Environmental Site Design (ESD) practices for stormwater management, and (3) downstream areas constructed with traditional stormwater practices. Analysis of the cross-section overlays shows cross-sections throughout Rumsey Run remained more stable between the 2012 to 2014 monitoring efforts than between the baseline assessment in 2011 to 2012.

During the 2011 - 2014 surveys, the upstream portion of the reach was characterized by a low-gradient channel with access to a wide, forested floodplain, with flow that disappears underground in some areas. Channel substrate in the upstream portion of the reach was dominated by fine particles, which are frequently moved. As the channel becomes more defined and incised in the middle portion of the reach, several headcuts are present, the riparian area is diminished, and bed and bank erosion is prevalent. Channel substrate in the middle portion was still dominated by sand, but some larger particles were present. Channel incision and bank erosion remains present in the downstream portion of the reach, where floodplain access diminishes and substrate coarsens.

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

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The 2014 survey of five permanently monumented cross-sections and nearly 4,000 linear feet of stream profile serve as a comprehensive annual assessment of conditions of Rumsey Run. Results of the 2014 monitoring and annual monitoring from additional years can be compared to the baseline conditions found in 2011 to assess areas of aggradation and degradation. Compared to the baseline surveys from Fall 2011, cross-sections in the upper and middle portions of Rumsey Run exhibited deposition and aggradation within the thalweg channel during 2012, while cross-sections in the lower portion of the reach experienced some bank erosion and deposition. Cross-sections throughout Rumsey Run remained more stable between the 2012 to 2014 monitoring efforts than between the baseline assessment in 2011 to 2012. Cross-sectional areas decreased at the two most upstream sites and the site furthest downstream, whereas the two middle sites slightly increasing in cross-sectional area. Width/depth ratios decreased at all sites except the furthest upstream site which increased somewhat. Year 4 longitudinal profile data were compared with previous longitudinal profile data to evaluate changes in the overall channel slope. Slope decreased at two most downstream cross-sections and increased at the three most upstream cross-sections. Sandy substrate dominates the upper and middle portions of the stream reach, and the continual shifting of features in these sections is evident in analyses of the longitudinal profile overlays.

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

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A hydrologic and hydraulic analysis was updated for Rumsey Run using WinTR-55 to model drainage characteristics for the watershed with 15 contributing drainage areas. Subareas were defined to assess the combined benefit of the three existing stormwater management ponds and several LID projects within the watershed on discharges within the main channel. Using the stage-storage-discharge curves and WinTR-55 data for existing hydrologic conditions, pre-development and existing conditions WinTR-20 models were used. These models were previously run for the 0.5-, 1-, 2-, 10-, 25-, 50- and 100-year events. The existing conditions model was compared with measured storms in 2012 and again in 2015, with daily rainfall totals ranging from 1 to 7 inches. Model runs included existing conditions and pre-development (forested) land use conditions.

A HEC-RAS model was revised in 2013 using five original field-surveyed cross sections that were re-surveyed and 11 new field-surveyed sections to add additional detail to the model; these cross-sections were resurveyed in 2014 and the model updated with data from that survey. The cross-sections extend from the top of the Rumsey Run watershed through the project limits just above the confluence with Red Hill Branch. The WinTR-20 routing of existing conditions,

including the modeling of the stormwater management ponds, were used for the analysis of design rainfall events in comparison with peak stage measurements at three of the cross-section stations where peak stage records are available. The models should continue to be updated and calibrated in the coming years, as measurements of SWM pond inflows and outflows become available, along with peak stage records within the main stream channel for various storm events. Additional details are provided in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 – 2014 and Year 5 (Through June 30, 2015)* report, produced as a stand-alone document and provided as part of the Annual Update.

5. Additional Issues Relative to Assessment of Controls

The County uses a pollutant loading model to assess the pollutant reductions achieved from structural improvements throughout the County. The results of the model are included in Table G of the Attachment A database. The following describes the model and its results in more detail.

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The County has traditionally used a GIS-based analysis tool to compute pollutant load values. The model used was based on loading using land use data with associated event mean concentrations (EMCs) with reductions based on efficiency rates for each BMP type using the County's full BMP dataset. Because watershed planning, and specifically, TMDL planning and load reduction calculation methodologies are becoming more consolidated and consistent with use of the Maryland Assessment Scenario Tool (MAST) and because the County's planning efforts are now based on MAST modeling, the County has transitioned the calculations in Table G to a MAST modeling effort.

Load computations are completed at the State's 8-digit watershed scale. Howard County falls within seven of the state's 8-digit watersheds as follows:

- Little Patuxent River (02131105)
- Middle Patuxent River (02131106)
- Patapsco River - North Branch (02130906)
- Patapsco River - South Branch (02130908)
- Patuxent River - Brighton Dam (02131108)
- Patuxent River - Rocky Gorge Dam (02131107)
- Patuxent River - Upper (02131104)

Load reduction calculations were made for both of the permit terms being presented in this current Annual Update.

To summarize conditions up to the end of the County's previous permit ending on 12/17/2014, runoff loads were calculated in MAST using a 2014 no BMP scenario. The scenario uses Howard County geography with the 2014 revised initial condition (land use) and 2014 progress processed water base data without any BMPs input into the model. This model output gives

pollutant loads using 2014 conditions before considering any BMPs. Controlled loads were then modeled in MAST using the same 2014 revised initial condition and 2014 progress processed water base data, but with County BMPs constructed before 12/18/2014 included. The difference in pollutant loads between the two model runs represents the controlled load. BMP data came from Howard County's database of BMPs included as Table B in the Attachment A database.

Results of the loading analysis are included in the tables below.

Table 4: Total Nitrogen (TN) Load Reduction Summary to 12/17/14

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	89,876	80,541	9,335	10.4%
Little Patuxent River	290,804	233,808	56,997	19.6%
Middle Patuxent River	142,387	123,606	18,782	13.2%
Patapsco River L N Br	109,084	93,394	15,690	14.4%
Patuxent River Upper	13,047	11,294	1,753	13.4%
Rocky Gorge Dam	24,497	22,684	1,813	7.4%
S Branch Patapsco	31,382	28,782	2,600	8.3%
Countywide	701,077	594,107	106,970	15.3%

Table 5: Total Phosphorus (TP) Load Reduction Summary to 12/17/14

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	4,108	3,597	511	12.4%
Little Patuxent River	17,035	10,310	6,725	39.5%
Middle Patuxent River	6,862	5,303	1,559	22.7%
Patapsco River L N Br	8,014	6,014	2,000	25.0%
Patuxent River Upper	696	512	184	26.4%
Rocky Gorge Dam	1,176	964	212	18.0%
S Branch Patapsco	1,201	1,098	103	8.5%
Countywide	39,092	27,799	11,293	28.9%

Table 6: Total Suspended Solids (TSS) Load Reduction Summary to 12/17/14

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	2,847,944	2,407,937	440,007	15.4%
Little Patuxent River	16,835,976	8,986,654	7,849,323	46.6%
Middle Patuxent River	8,544,162	6,021,644	2,522,518	29.5%
Patapsco River L N Br	9,592,851	6,465,898	3,126,953	32.6%
Patuxent River Upper	299,803	176,851	122,952	41.0%
Rocky Gorge Dam	1,798,221	1,438,642	359,580	20.0%
S Branch Patapsco	1,504,518	1,339,507	165,011	11.0%
Countywide	41,423,475	26,837,132	14,586,343	35.2%

Bacteria Loading

Because Patapsco River Lower North Branch is the only County watershed with a bacteria SW-WLA, bacteria modeling was only performed for this watershed. Loads and reductions were calculated to represent the conditions at the end of the County's previous permit ending 12/17/2014, and also at the end of the current permit year 6/30/2015.

Bacteria loads were calculated by deriving a watershed loading rate (in billion MPN/100mL/yr/acre) for urban land from the baseline year load and the County Phase I area (MAST 2005 land use including MS4 pervious and impervious surfaces). The loading rate was then applied to the 2015 urban land area to derive a 2015 load. The annual % change calculated between the 2005 and 2015 years was used to back-calculate a 2014 load. Reductions were then calculated using the County's BMP database and applying the percent reductions associated with each BMP dataset, one with all BMPs installed through 12/17/2014, and another with all BMPs installed through 6/30/2015.

These results are included in Table G.1 of the Attachment A database and are presented here.

Table 7: Patapsco River Lower North Branch Bacteria Loading Summary

Watershed	Runoff Load (MPN/100 mL/yr)	Controlled Load (MPN/100 mL/yr)	Load Reduction (MPN/100 mL/yr)	% Reduction
December 17, 2014 Conditions	69,071	44,049	25,022	36.2%
June 30, 2015 Conditions	70,457	45,257	25,201	35.8%

I. Program Funding

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

Introduction

Howard County must analyze the resources needed to implement the proposed NPDES plan for the permit period and describe the resources available to implement the plan.

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The Howard County budget shows that approximately $80.1 million was appropriated to implement various aspects of NPDES activities and associated work during permit years FY06 through FY15 and an additional $21.3 million has been proposed for FY16. Since AR20 is reporting on two different permits lasting six months, the amounts shown for FY16 each six month period is half of the total, $21.3 million, with the exception of several costs that will start being tracked in the new permit. Tables 8 through 10 present the fiscal analysis separated into three general categories, i.e. capital, operation and maintenance expenditures, respectively. Table 11 provides a summary of the three funding areas.

The County notes that the funding tables provided below account for programs specifically required by the NPDES permit conditions and not necessarily all programs within the County that promote water quality. For example the tables do not include the costs associated with the County erosion and sediment control inspection program. While this program has definite benefits to maintaining good water quality, the program is not mandated by the County's NPDES permit; rather the NPDES permit requires the County to maintain and report on the status of its erosion and sediment control program. Therefore, the status of the program is reported on within the Annual Update but the funding for the erosion and sediment control program is not included in the funding tables.

Capital Expenditures

Table 8 below summarizes the capital expenditures appropriated in support of the County's NPDES program for FY06 – FY15 and proposed for FY16. Capital expenditures primarily include stream restoration and SWM construction projects, but also include the cost for monitoring of these specific projects and the purchase of monitoring equipment.

Table 8: NPDES Funding – Capital Expenditures

Permit Condition	Year 1-10 (FY06-15)	FY16 *
B. Legal Authority		
C. Source Identification 1. GIS/Database maintenance		
E. Management Programs 1. Stormwater Management 2. Pollution Prevention 3. Erosion and Sediment 4. Public Education 5. Road Maintenance Street Sweeping Inlet Cleaning	2,262	
F. Watershed Assessment and Planning 1. Assessment/evaluation 2. Restoration Projects	2,650	500
G. Watershed Restoration 1. 10% restoration 2. Water quality improvement monitoring.	53,775 1,013	5,242 209
H. Assessment of Controls 1. Chemical Monitoring 2. Biological Monitoring 3. Physical Monitoring 4. Design Manual Monitoring		
TOTAL	$59,700	$5,950

* FY16 amounts are based on 6 months only.

**All values are in thousands of dollars.

Operation Expenditures

Table 9 below summarizes the operation expenditures appropriated in support of the County's NPDES program for FY06 – FY15 and proposed for FY16. Operation expenditures primarily include SWM division staff, supplies, and annually repeated expenses such as monitoring, illicit discharge inspections, SWM facility inspections, and public outreach efforts.

Table 9: NPDES Funding – Operation Expenditures

Permit Condition	Year 1-10 (FY06-15)	FY16*
B. Legal Authority		
C. Source Identification		
1. GIS/Database maintenance	387	48
E. Management Programs		
1. Stormwater Management	4,895	808
2. Pollution Prevention	287	40
3. Erosion and Sediment		
4. Public Education	1,950	551
5. Road Maintenance		
Street Sweeping		
Inlet Cleaning		
F. Watershed Assessment and Planning		
1. Assessment/evaluation	822	85
2. Restoration Projects		
G. Watershed Restoration		
1. 10% restoration	4,775	573
2. Water quality improvement monitoring.		
H. Assessment of Controls		
1. Chemical Monitoring	200	19
2. Biological Monitoring	487	63
3. Physical Monitoring	145	19
4. Design Manual Monitoring	231	32
TOTAL	$14,177	$2,238

* FY16 amounts are based on 6 months only.

** All values are in thousands of dollars.

Maintenance Expenditures

Table 10 below summarizes the maintenance expenditures appropriated in support of the County's NPDES program for FY06 – FY15 and proposed for FY16. Maintenance expenditures primarily include the operational budget for the Bureau of Highways Storm Water Maintenance Program and also include street sweeping, which is run from the Bureau of Environmental Services.

Table 10: NPDES Funding – Maintenance Expenditures

Permit Condition	Year 1-10 (FY06-15)	FY16*
B. Legal Authority		
C. Source Identification		
1. GIS/Database maintenance		
E. Management Programs		
1. Stormwater Management	5,014	
2. Pollution Prevention		
3. Erosion and Sediment		
4. Public Education		
5. Road Maintenance		
Street Sweeping	2,000	200
Inlet Cleaning	50	5
F. Watershed Assessment and Planning		
1. Assessment/evaluation		
2. Restoration Projects		
G. Watershed Restoration		
1. 10% restoration		
2. Water quality improvement monitoring		
H. Assessment of Controls		
1. Chemical Monitoring		
2. Biological Monitoring		
3. Physical Monitoring		
4. Design Manual Monitoring		
TOTAL	$7,064	$205

* FY16 amounts are based on 6 months only.

** All values are in thousands of dollars.

NPDES Funding

Table 11, which is located on the following page, provides the total funding appropriated in FY06 – FY15 and proposed for FY16 in support of the County's NPDES program initiatives.

The FY16 budget in Table 11 includes the third year of the County's Watershed Protection and Restoration Fund (WPRF), which was first collected in FY14. As alluded to in Annual Update No. 18 the County Council modified the WRPF legislation after Annual Update No. 18 was submitted to the State. The revised legislation reduced the fee collected in FY15, which has been reflected in Tables 8 through 11.

The County has reapplied for and was selected to receive additional Chesapeake and Atlantic Coastal Bays Trust Fund Local Implementation Grant for FY16. $375,000 was granted for capital projects and is accounted for in Tables 8 through 11. Receipt of this grant continues to help the County leverage its available capital funds to be able to complete even more NPDES related projects.

Table 11: NPDES Funding - Summary

Permit Condition	Year 1-10 (FY06-FY15)	FY16*
B. Legal Authority		
C. Source Identification		
1. GIS/Database maintenance	387	48
E. Management Programs		
1. Stormwater Management	9,909	808
2. Pollution Prevention	2,586	40
3. Erosion and Sediment		
4. Public Education	1,596	551
5. Road Maintenance		
Street Sweeping	2,000	200
Inlet Cleaning	50	5
F. Watershed Assessment and Planning		
1. Assessment/evaluation	3,056	585
2. Restoration Projects		
G. Watershed Restoration		
1. 10% restoration	58,550	5,814
2. Water quality improvement monitoring	1,029	209
H. Assessment of Controls		
1. Chemical Monitoring	184	19
2. Biological Monitoring	470	63
3. Physical Monitoring	145	19
4. Design Manual Monitoring	231	32
TOTAL	$80,191	$8,393

* FY16 amounts are based on 6 months only.

** All values are in thousands of dollars.

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

Annual Update Number 20 Status

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, respectfully. 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.

The WPRF was billed on the December property tax bill. Approximately $11.1 M was collected for FY15. These funds were budgeted among the various County agencies to fund the following programs:

- 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

The distribution of funds is presented in a pie chart on www.cleanwaterhoward.com in compliance with the state legislation.

The County is working with the SeaGrant Extension and the Chesapeake Bay Program Office to pilot a residential BMP tracking tool to certify BMPs as to type and pollutant removal efficiency. Each installed BMP pursuing a reimbursement or credit is entered into this tool and subsequent field verified to ensure the design and function of the BMP meet defined standards. Once certified the practice is eligible for both reimbursement of a portion of construction costs as well as a 20% reduction from the WPRF. In period 2of the 28 applications received, 22 reimbursements were granted at a total cost of $11,240. The cumulative cost of these practices at the end of period 2 was $42,845.These practices in total treated 0.343 acres for a per acre equivalent cost of $33,058.82. At the end of period 2, these practices had treaded 1.28 acres of impervious surface. We expect the program to grow over the next few years as more outreach is underway, as well as many improvements to the program. Information about

the programs is available to the public on the dedicated stormwater webpage www.cleanwaterhoward.com.

J. Total Maximum Daily Loads

Stormwater BMPs and programs implemented as a result of this permit must be consistent with available waste load allocations (WLA's) [see 40 CFR 122.44(d)(1)(vii)(B)] developed under a Total Maximum Daily Load (TMDL). MDE has determined that owners of storm drain systems that implement the requirements of this permit will be controlling stormwater pollution to the maximum extent practicable. Therefore, satisfying the conditions of this permit will meet WLA's specified in TMDL's developed for impaired water bodies. If assessment of the stormwater management program indicates TMDL WLAs are not being met, additional or alternative stormwater controls must be implemented to achieve WLAs.

Introduction

MDE had identified the need for NPDES municipalities to meet waste load allocations through the implementation of the NPDES permit conditions. By meeting the conditions of the NPDES permit, the municipality will be deemed to have controlled stormwater pollution to the maximum extent practicable.

Annual Update Number 20 Status

Howard County understands that if it continues to implement the requirements of municipal NPDES permit # MD0068322 and continues to satisfy the conditions of that permit, it will be considered to have controlled stormwater pollution to the maximum extent practicable. The County further understands that additional or alternative stormwater controls may be requested by MDE if MDE determines that TMDL WLAs are not being met by meeting the County's current permit conditions.

While not part of the current NPDES permit, the County is actively working towards meeting the requirements of the Chesapeake Bay TMDL as well as the milestones set out by MDE for meeting the Bay TMDL. The County is performing MAST modeling and coordinating the results with MDE. The County is also in the process of developing a Countywide Implementation Strategy (CIS) designed to define the general types and locations of restoration efforts and stormwater management improvements that will be needed to meet both the County's local TMDLs as well as the Bay TMDL. The CIS will be submitted to MDE in December 2015 with the first Annual Update under the permit renewal issued in December 2014. The County also continues to provide updated 2-Year Programmatic Milestones to MDE in order to maintain progress toward achieving the County's Watershed Implementation Plan (WIP) commitments for meeting the Bay TMDL.

Section IV. Program Review and Annual Progress Reporting

A. Annual Reporting

As required by the NPDES permit, the County is submitting all Annual Update Databases on the attached DVD in an Access Database geodatabase file, *HowardNPDESAttachmentA2015_PartA.mdb*. The databases include those listed below:

	Database	Comment
A	Storm Drain System Mapping	Spatial data included
B	Urban Best Management Practices (BMPs)	Spatial data included
C	Impervious Surfaces	
D	Water Quality Improvement Project Locations	Spatial data included
E	Monitoring Site Locations	Spatial data included
E.1	Monitoring Site Locations – Use for Multiple Land Use Values in the Drainage Area	Spatial data included
E.2	Monitoring Site Locations – Use for Multiple Stormwater BMPs in the Drainage Area	Spatial data included
F	Chemical Monitoring	Spatial data included
G	Pollutant Load Reductions	Spatial data included
H	Biological and Habitat Monitoring	Spatial data included
I	Illicit Discharge Detection and Elimination	
J	Responsible Personnel Certification Information	Spatial data not Included
K	Quarterly Grading Permit Information	Spatial data included
L	Fiscal Analyses	
M	NPDES Contacts	

Currently, the format of the geodatabase is based on the Attachment A format provided by MDE and dated January 16, 2013. As MDE updates the Attachment A database format and develops its own Geodatabase, Howard County will make efforts to modify the databases and populate the data fields accordingly.

Section V. Special Programmatic Conditions

A. Chesapeake Bay Restoration by 2025

Since the signing of the Chesapeake Bay Agreement in 1983, Maryland has been working toward reducing the discharge of nutrients and sediments to Chesapeake Bay. Howard County lies within two of the Bay's ten major tributaries. These include the Patuxent and the Patapsco/Back tributaries. This NPDES permit encourages Howard County to assist with the implementation of the Tributary Strategy designed to meet the nutrient and sediment reduction goals of each of its two tributaries.

Introduction

MDE recognizes that working to improve water quality does not follow strict governmental boundaries, i.e. County lines. It is important that municipalities work with neighboring jurisdictions within shared watersheds in order to address stormwater and water quality issues. It is also important in some cases to go beyond locally shared tributaries and to coordinate on a statewide or regional basis.

Annual Update Number 20 Status

The County recognizes the importance of the Tributary Strategy objectives and has been working with MDE and other municipalities to help achieve the goals of the new 2000 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: agricultural BMP implementation, reservoir monitoring, and public outreach. The TAC is currently in the process of engaging consultant services to evaluate progress toward TMDL implementation for the Patuxent reservoirs. 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 the now completed Cherry Creek watershed restoration projects, as well as ongoing biomonitoring and public outreach activities. 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 round of biomonitoring was conducted in 2012 and performed at the Upper and Lower Brighton Dam and Cattail Creek watersheds. A report can be found at http://www.howardcountymd.gov/DisplayPrimary.aspx?id=359. Howard County public outreach activities include support for the TAC's annual Earth Month and Reservoir Watershed Day events and the fall Campfire Program, when possible.

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 2013, the Commission began developing an update to the Policy Plan to reflect the new Bay TMDLs, and is moving forward with local and State adoption of the updated Policy Plan in 2014. 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 .

Lower Patapsco Watershed Restoration Action Strategy

The Lower Patapsco Watershed Restoration Action Strategy (WRAS) was issued in 2006. The WRAS is a watershed restoration plan and implementation strategy that serves as a work plan for restoring and protecting water quality and aquatic and terrestrial habitats, and for addressing community needs for environmental outreach and education in the Lower North Branch Patapsco River watershed. The WRAS included a more detailed assessment of restoration opportunities in the Rockburn Branch and Sucker Branch subwatersheds. Recommended projects in the WRAS include stormwater retrofits, stream and buffer restorations, and public outreach and education. The County has added priority restoration projects identified through the WRAS to the County capital budget for implementation.

Patapsco/Back River Tributary Team

Howard County is a member of the Patapsco/Back River Tributary Team. The Team no longer receives official staff support from DNR, however, a team member remains active and helps organize communications and meetings voluntarily. The Team focuses on serving as a forum for information exchange and brings together jurisdictions and groups within the watershed as

needed. The Team works to inform and increase stakeholder participation in the Chesapeake Bay TMDL and the Watershed Implementation Plan (WIP) process.

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 Department of Planning and Zoning web page at http://www.howardcountymd.gov/DisplayPrimary.aspx?id=4294967721.

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 November 13, 2014 and the theme of the conference was "Protecting the Source - Sustaining Maryland's Waters"

Part B. Dec. 18, 2014 – Jun. 30, 2015

Section IV. 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.

Annual Update Number 20 Status

The County has included the current organizational information on the CD included as Attachment A in Section V of this Annual Update. Mr. Mark S. Richmond, Chief of the SWMD is the liaison with MDE.

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.

Annual Update Number 20 Status

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 association drainage areas delineated.***

Annual Update Number 20 Status

An updated version of the County's GIS storm drain systems and associated components (items 1. – 6. above) that is within the MS4 permitted area as required, is provided on the CD included in Section V of this Annual Update.

Several items related to Source Identification are noted below:

Storm Drain System

As of June 30, 2015 there are now 393 major MS4 outfalls in the County's GIS, an increase of seven from last year's Annual Update. One additional major outfall was also found in the GIS database, but the storm drain data orthophotography for the outfall and the associated development is not complete in this area, so a drainage area could not be delineated. This record will be added once the development is complete. There are two records that have an outfall dimension of zero because the pipe diameter for these outfalls is unknown. Finally, 27 records in the database have the TYPE_OUTFL field populated. The remaining records will be researched and populated for Annual Update Number 21. The current GIS layer with major NPDES outfalls is provided on the enclosed CD as Database A. Other County GIS storm drain system layers are also included on the enclosed CD with the exception of drainage areas for any infrastructure other than major outfalls.

The permit requires that drainage areas be delineated to all BMPs in the County. A total of 2,225 delineated drainage areas are now in the County's GIS, which is being submitted as Database B. 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 4993 drainage areas (2,225 delineated and 2,768 assumed) are in the pollutant loading model. 363 BMPs in Table B do not have a corresponding drainage area polygon, which are attributable to 340 tree plantings, 18 stream restoration projects, and 5 structural BMPs. The stream restorations and structural BMPs with missing drainage areas are pending delineation, however modeling was conducted using the restoration length or impervious treated as specified on a final design plan.

Urban Best Management Practices (BMPs)

The County understands that the TOT_DRAIN and RCN fields are being phased out by MDE in its future geodatabase, so they are unpopulated. The optional ADC_MAP field is also left unpopulated since coordinates are provided for each BMP record. The DRAIN_AREA and IMP_ACRES fields are set to 0 for STRU_TYPE "FPU" (Tree Plantings) and "STRE" (Stream Restorations) since treatment credit for these BMP types is calculated without using a drainage area. For all other BMP types, the DRAIN_AREA and IMP_ACRE fields are populated based on either an assumed or delineated drainage area, except for two EDSW records which will be incorporated into Annual Report Number 21. At the end of the permit term, 772 records had not been inspected and have null values in the INSP_DATE field. 593 of these records have been inspected as of AR20 submittal date but after the June 30, 2015 end date of the reporting period. While not considered a requirement of the previous permit the County has now included ESD features in its triennial BMP inspection Program. For cost and time efficiency the ESD's have been put on the same geographical three year inspection cycle as its other BMP's so it is to be expected that some of the ESD's will not have inspection dates until the first full round of triennial inspections has been completed. All other fields in Table B are fully populated for all records.

Impervious Surfaces

The County has updated its impervious accounting in the past year as part of the baseline impervious surface area assessment to provide the baseline untreated value and the associated 20% restoration target. The assessment procedure and results are described in the Countywide Implementation Strategy (CIS) and in this Annual Update in under permit condition IV.E.2.

The database includes the most up to date GIS impervious information and includes the County MS4 imperviousness area with state, federal, and SHA lands removed. The GIS file also includes several regulated industrial areas; however the impervious values per watershed provided under IMP_ACREAGE have those industrial areas removed. In that sense the GIS does not match exactly the IMP_ACREAGE record which reports the current total impervious area under County jurisdiction as 18,208.2 (IMP_ACREAGE). IMP_CONTROLLED is the cumulative total of the impervious acreage treated including baseline and restoration BMPs as of 6/30/2015. IMP_BASELINE is the untreated baseline as of 6/30/2013. The baseline calculation is described more in permit condition IV.E.2 of this Annual Update and in the CIS. RESTORATION_P is the planned treatment from the CIS. RESTORATION_UC are the current projects under construction and RESTORATION_C includes only the restoration since 7/1/2013 to document progress on the current 20% impervious restoration requirement.

Water Quality Improvement Projects

For this database, the County is using the Watershed Protection Fee date of July 1, 2013 as the cutoff between projects associated with the old, versus the current permit. The columns POUNDS_TN, POUNDS_TP, and POUNDS_TSS are left unpopulated because these fields are only used for street sweeping and inlet cleaning, activities which the County does not perform at a frequency that would generate restoration credit. LINEAR_FT is populated for stream restoration projects only. The DRAIN_AREA and IMP_ACRES fields are set to 0 for STRU_TYPE "FPU" (Tree Plantings) and "STRE" (Stream Restorations) since treatment credit for these BMP types is calculated without using a drainage area. For all other BMP types, the DRAIN_AREA and IMP_ACRE fields are populated based on either an assumed or delineated drainage area. Unpopulated records in the INSP_DATE field are either for those BMPs that are more recently built and were not due for inspection by the end of the reporting period or those that will be reported in Annual Update 21. All other columns are fully populated. The County has 245 records in Table D which account for water quality improvement projects completed after July 1, 2013.

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.

Annual Update Number 20 Status

Environmental Site Design

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 Quality – Development

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. Please refer to the Attachment A as listed in Section V of this Annual Update.

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. Stormwater construction inspections are the responsibility of Public Works – Construction Inspection Division. A summary of the plans received, exemptions and waivers issued is listed in Table 1; a summary of the stormwater construction inspections and violation notices issued is listed in Table 12.

Table 12: Development Submittal Review

Types of Plans, Exemptions, and Waivers Received/Reviewed	Total July 1, 2014 – June 30, 2015
Concept Plans Received	79
Site Development Plans Received	39
Final Plans Received	51
Redevelopment Projects Received	13
Stormwater Exemptions Issued	0
Stormwater Waivers Issued	0

Table 13: Construction Inspections

Types of Plans, Exemptions, and Waivers Received/Reviewed	Total Jan 1, 2014 – Dec 31, 2014
Stormwater Construction Inspectors	17
Stormwater Construction Inspections	7,340
Notice of Violations Issued	258
Fines or securities collected	1 @ $1,000
Court Cases	1
Sediment Control Complaints Received	86

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 December 18, 2014 through June 30, 2015 is listed in Table 14.

There are currently 1,134 County maintained BMPs, 135 Board of Education BMPs, and 2,055 privately owned and maintained BMPs, for a total of 3,324 BMPs, which are inspected on a three-year cycle. In addition, there are approximately 919 individual residential lot environmental site design BMPs such as rain gardens, drywells and rain barrels.

Table 14: Preventative Maintenance Inspections

Inspection Detail	Inspections Dec 1 2014 - June 30, 2015
Maintenance Inspections	
County Maintained BMPs	176
Board of Education Maintained BMPs	36
Privately Maintained BMPs	306
Residential ESD BMPs	40
Follow-up Inspections	195
Enforcement Actions	(1) Citation / 0 NOVs
Total	754

** 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 NOV is issued.

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.

Annual Update Number 20 Status

MDE completed their evaluation of the County's application for delegation of erosion and sediment control enforcement authority and sent the County a re-authorization letter on May 1, 2015. The delegation authority is effective through June 30, 2017.

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." and, "This delegation of authority is effective through June 30, 2017."

Therefore, Database J:

Program Activity
The electronic program activity information has been included in this Annual Update, in the database under Erosion and Sediment Control as required by Part V of the County's MS4 Permit. Construction Inspection Division submits the quarterly reports for earth disturbances greater than one acre directly to MDE. This information is also included in the database under Erosion and Sediment Control as required by Part V of the County's MS4 Permit.

Earth Disturbances > 1 acre
In the 2014 calendar year January through December, 241 sites were reported to the Construction Inspection Division as having more than one acre disturbed. The site disturbed area for issued permits is 708 acres and the total disturbed area for active permits is equal to 696 acres disturbed in Howard County.

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.

Annual Update Number 20 Status

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

- 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 Festival. 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 http://www.howardcountymd.gov/DisplayPrimary.aspx?ekfrm=530. The County also is proactively surveying all commercial and industrial sites in the County to identify the potential for illicit discharges before they occur.

Detection Program

The County's IDDE program has procedures in place to detect illicit discharges and connections to the County storm sewer system and to look at areas within the County where illicit discharges are most likely to occur. These proactive inspections are followed up by chemical testing of outfalls that are flowing; when a chemical test shows a violation, the flow is tracked to the source. The owner/tenant of the property where the illicit discharge originates is identified and a follow-up investigation of the violation includes a Notice of Violation for the first offense and citations for recurring violations. Major spills are reported to the Howard County Fire Department and MDE.

For the current permit reporting period the County's contractor is performing 110 IDDE outfall inspections even though MDE only requires that 100 inspections be performed. The County also performed an additional 200 industrial/commercial routine site surveys from Dec. 18, 2014 to Jun. 30, 2015. This year the County performed inspections primarily in areas such as the Little Patuxent Watershed, the Route 1 corridor and the I-95 corridor. The majority of the outfalls inspected were industrial or commercial land use.

Removal and Compliance Program

Due to the timing of MDE issuing the County's new permit in December 2014, i.e. six months into the old permit year, IDDE requirements that were performed for the old permit (in the Fall/Winter of 2014) were reported in Part A, Section III.E.3of this Annual Update. The 110 IDDE inspections being performed in Fall/Winter 2015 will be reported in the next Annual Update.

Program Management and Reporting

Howard County has a staff of five, one manager and four inspectors who carry out the duties of the IDDE Program, which includes 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 an Access and .pdf files. All sites are reported to MDE at the end of the reporting period.

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.

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Recycling Division Programs:
Howard County Recycling Division continues to provide many recycling opportunities and a variety of information to County residents and businesses, as well as County government operations. From January 1, 2015 through June 30, 2015, a total of 29,991.52 tons of recyclables were collected curbside and through drop-off programs at Alpha Ridge Landfill.

Weekly residential single stream recycling collection is provided to over 86,000 single family homes, townhouses, mobile home parks and condominiums. Three collection routes also have foodscrap 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, woodwaste, yard trim, foodscraps, roofing shingles, compressed gas tanks, electronics, rigid plastics, cardboard, carpet and padding, mattresses and box springs, reusable building materials, Styrofoam™, cooking oil, motor oil & filters, anti-freeze, wet cell batteries, clothing & textiles, tires, scrap metal and appliances, and single stream recycling. All County residents may use the convenience center with proof of residency; businesses must apply for a permit. On-going 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 woodwaste and yard trim.

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

- During FY15, 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 many residents. 000. Residents opt-in to receive this newsletter which highlights holiday schedule changes, shredding events, tips and updates on the recycling program. The 2015 newsletters can be found on http://www.howardcountymd.gov/newsandupcomingevents.htm.

- Print ads relevant to the importance of reducing, reusing, and recycling promoted to the general public in the following:
  - Baltimore Sun
    - Recycling…Easier than wrapping gifts!
    - Recycling…Easier than baking a pie!
    - Howard County Recycles – Get rid of stuff
    - www.HowardCountyRecycles.org
    - HoCo Recycles Thank you!!
  - The Parent's Guide to Howard County

- A timely recycling message printed on the back of the County's tax envelopes:
  - Recycling – Easier than Sorting Laundry!
  - Recycling – Easier than Opening the Mail!

- Free-standing vertical sign at the Columbia Mall backlit directory:
  - Recycling is Fashionable!

- Promotional items that included jar openers made out of recycled tires, pencils made out recycled newspaper, magnetic memo clips made out of recycled plastic and reusable bags made out of recycled water bottles.

- Windowed recycling carts displayed at libraries and County buildings to highlight the many items that can be recycled.

- Distribution of recycling and waste reduction literature is available at library branches, schools, County buildings, village centers, senior centers, private residences and businesses. All of the brochures we have available can be found on the County's Recycling website at www.HowardCountyRecycles.org

- Direct mailings through Comcast and Verizon about recycling program holiday schedule during Christmas and New Year's to include the holiday slide schedule for curbside collection.

- 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 promote educational programs in schools, businesses, community associations, etc. These programs include:

- Participate in community events with a recycling exhibit and educational materials, such as GreenFest, Wine in the Woods, Triathlons and school festivals.

- Continued distribution of school recycling information through school programs, brochures and visually appealing lunchroom recycling posters. Programs ranging from individual classroom talks and short lunchroom presentations to school-wide assemblies were conducted for students as young as 2 years old. The County is maintaining its presence in schools that has been established over the past six years.

- Presentations and tours of the Alpha Ridge Landfill were provided to multiple Boy Scout and Girl Scout troops to enable them to earn merit badges. Active presentations, which included a hands-on relay game, were available for summer camps.

- In addition to outreach, the School Board and the County continued to collaborate on a collection contract for front-end trash and recycling collection service. This contract provides all County buildings, public school and participating Condominium properties with consistent weekly service at a cost-competitive price. Collection is provided primarily from lidded dumpsters that have plugs/drains in them. Some locations receive recycling collection from wheeled, lidded carts similar to those used in the residential program.

- Technical support about setting up recycling collection, and education for businesses & their employees is provided as requested to businesses throughout Howard County. A section on specialty recycling along with business recycling options has been posted on the website. http://www.howardcountymd.gov/businessrecycling.htm

Adopt-A-Road Program/Trash Collection

The County "Adopt-A-Road" volunteer program continues to be very successful. Table 15 Adopt-A-Road Summary below, provides a breakdown of the different zones for the Adopt-A-Road program from February 1, 2014 to March 4, 2015, that details the amount of trash collected, the mileage of road adopted, and the number of roads adopted by zones. A flyer about the Adopt-A-Road program can be found on the County's website.

Table 15: FY15Adopt-A-Road Summary

Zone	Trash Bags Collected	Number of Roads Adopted	Estimated Miles Cleaned
Central	637	42	35
East	613	40	50
West	228	26	35
Total	1478	108	120

Middle Patuxent Environmental Area (MPEA)

- MPEA staff completed a clean-up at Silent Sun Pond in MPEA that resulted in the removal of five bags of floatable litter.

- In October 2014, 384 resident letters were mailed or presented as door-hangers to all the residents with property bordering on the MPEA. The letters and accompanying information were part of an ongoing public education and outreach program to encourage residents to adopt environmentally responsible habits. The main purpose of the letter was to share resources for proper yard waste disposal, recycling, composting, and environmental landscape management practices such as managing storm water and reducing pesticide use. Each letter was accompanied by either a hard copy (door-hangers) or a link to the "From My Backyard to Our Bay" booklet.

- For additional projects from the Department of Recreation and Park related to Litter and Floatables refer to Attachment B.

The information included within this Annual Update and in applicable attachments will serve as the County's Annual Update to detail public education and outreach programs. The detailed description provided herein demonstrates a strong, pro-active public education and outreach program to reduce litter in the County.

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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Environmental Services Division

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.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. The County has begun the design phase and approximately $2.5 million has been approved in the County's FY13 capital budget, and an additional $1.1 million has been approved for the FY14 capital budget, to cover the cost of design and construction to retrofit the existing facilities with the needed outdoor washing systems. 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.

During December 18, 2014 – June 30, 2015 design was completed for four of the locations and the construction contract was put out to bid.

County Waste Water Treatment Plant (LPWRP)

There were no spills reported to Maryland Department of the Environment (MDE) from December 18, 2014 – June 30, 2015.

From June 20, 2014 through December 17, 2014 there was 1,599,837 gallons flow to National Security Agency.

Annual Inspections

Plant inspections 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.

Bureau of Highways (BOH)

The Bureau of Highways (BOH) is responsible for the maintenance and repair of 1071 miles of County-owned roadways, 164 bridges, as well as all of the street trees in the County. 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 continued along approximately 1,376 curb miles on County roadways. December 18, 2014 to June 30, 2015 the BOH collected approximately 578 tons of street debris via street sweeping.

Inlet Cleaning

- The BOH cleans and repairs storm drain inlets as needed. In the fall, the County removes leaf litter from storm drain inlets as needed. The amount of debris collected FY15 is approximately 10 tons.

Pesticides, Herbicides and Fertilizer

- The County continues to minimize the amount of pesticides, herbicides and fertilizer used. The following chemicals listed in Table 16 were used to control vegetation along the county's guard rails:

Table 16: Pesticides, Herbicides and Fertilizer

Herbicide Name	Amount
Oust	46 oz.
Cornerstone Plus	39 gal.
Pennant	14 gal.

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 de-icing chemicals. Table 17 below identifies the highway zone and the deicer usage.

Table 17: BOH Snow & Ice Removal Material

Highway Zone	Salt (tons)	Liquid Magnesium (gal)	Salt Brine (gal)
East	16,270	5,300	0
West	7,377	8,873	0
Central	12039	7,242	0
Total:	35,686	21,415	0

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.

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 for – SPCC, SWPPP and IDDE and Handling Hazardous Wastes. Training for FY15 was completed and reported in Part A of this Annual Update. The next training is schedule September and October 2015 (FY16).

For additional information relevant to Recreation and Parks property management and maintenance activities, please refer to Attachment B – Department of Recreation and Parks NPDES FY15 Report.

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) 313-6444, 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 which is sent to MDE on an annual basis. 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 See Click Fix, a smart phone application that allows anyone in Howard County to report an illicit discharge directly to the IDDE Manager.

- **Increasing Water Conservation**

  Robinson Nature Center

  Using the building as a teaching tool, Robinson Nature Center facility educates the public about green technologies, sustainability, environmental stewardship and techniques that can help reduce stormwater run-off, as well as reducing water and energy consumption:

  - *Storm water mitigation* is achieved on the property through a pervious concrete parking lot and four separate bioretention/rain gardens. Both of 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. These features are also highlighted for visitors with interpretive signs.

  - *Interpretive signage* in the building and on the grounds describes to visitors how different features reduce the environmental impact of the building by mitigating stormwater run-off and minimizing water and electricity use. http://www.co.ho.md.us/RobinsonNatureCenter.htm

  Staff at the Robinson Nature Center offer professional development opportunities to school teachers that allow them to bring water conservation and stewardship issues back to the classroom.

  In FY15, Robinson Nature Center was awarded Green School Center status by the Maryland Association of Environmental and Outdoor Educators (MAEOE) in recognition of Robinson's commitment to providing professional development opportunities, community support and innovative lessons to schools certifying or recertifying as Maryland Green Schools. Water

conservation/stewardship is among one of many categories that schools must report on to achieve this status and are issues that both students and teachers can learn about at the Center.

In 2013, Robinson Nature Center and the Howard County Conservancy teamed up to offer the public a series of environmental education workshops including Projects WET, WILD, Learning Tree and WOW. Each of these curriculums touches on water quality/conservation issues and gives teachers the tools they need to educate about these issues at their own schools.

Envirothon Program
The 2015 Howard County Envirothon was held in April with three teams (15 students) from River Hill High School and Wilde Lake High School participated.

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) 8.9 acres Prescribed Grazing
(2) 2 each Watering Facility
(1) 0.1 acre Heavy Use Area
(6) 14.5 Forage and Biomass Planting

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. The following practices were installed in the County through this program:

(1) 5.3 acres Riparian Forest Buffer
(1) 36.6 Conservation Cover

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.

(3) 1.65 acres Grassed Waterway
(1) 1 each Watering Facility
(1) 697 feet Fencing

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. December 18, 2014

through June 30, 2015, there were 13 new conservation plans on 1,422.1 acres and 3 revised conservation plans on 301.6 acres written by the HSCD office.

Environmental Stewardship
In partnership with the National Security Agency (NSA) and Howard County LPWRP, highly treated wastewater will be 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.

- **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. Predrilled 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 FY15, Howard County gave away 128 rain barrels to residents resulting in a total of 586 rain barrels given away within the past four years.

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 December 2014. The plan outlines strategies, techniques and protocols for environmental education, research, recreation, natural resources management and administration.

The implementation of the plan's projects and programs in FY15 has included the following accomplishments:

- The MPEA Independent Trail Maintenance Team volunteer program contributed 227 hours in FY15, 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.

- 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 storm water 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 FY15, 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.

- **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 become 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.

Rain Garden Program

In the springtime customers were sought out, designs created, and some maintenance performed. From June 1st until June 30th the READY crews are in training. During training the crewmembers learn principals of stormwater restoration, BMP installation, tool safety, and customer and public interaction. Actual BMP Implementation begins immediately following this reporting period.

Some statistics available for this period of relative downtime include:

- 45 young adults employed as READY workers (range: 16-26 years old from June 15th on)
- Interactions with approximately 15 customers to determine current and future needs
- Redesign of several rain gardens and conservation landscapes

- **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
At the Robinson Nature Center Facilities 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 a compost bin shows how fertilizer can be produced from organic food scraps and reducing the amount of chemical fertilizers that need to be used.

Master Gardner Program
Howard County Master Gardeners held free compost demonstrations at the Center during which residents of the County were provided with instructions on how to create and manage their own backyard compost piles. Howard County's Office of Recycling provided 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.

- **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 FY15, 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. From December 18, 2014 to June 30, 2015 the program has 101 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 bandanna 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.

Department of Recreation and Parks

For additional projects and activities from the Department of Recreation and Park related to Public Education to Attachment B.

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.

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 20 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. Employing GIS analyses and field investigations, the project team recommended a suite of opportunities including upgrades to existing stormwater BMPs, new BMPs, tree plantings, stream restoration, and stabilization of stormwater outfalls.

The Little and Middle Patuxent Watershed Assessments were tailored to address the latest MS4 requirements, with a focus on identifying and ranking opportunities based on the restoration of untreated impervious area and the reduction of urban stormwater loads of nitrogen, phosphorus, and sediment. These assessments were specifically designed to assess current water quality conditions and identify the most effective management measures to reduce stormwater pollutant loads to address both the Chesapeake Bay TMDL (in both watersheds) and the local sediment TMDL in Little Patuxent Watershed. The permit also requires treatment of 20% of the County's impervious area that has not been treated to the Maximum Extent Practicable (MEP). This target was considered in development of the watershed plans, such that the benefits of implementing individual projects were computed in terms of impervious acres treated, or equivalent acres treated, as per MDE guidance.

The watershed assessments evaluated current water quality conditions based on stream monitoring data collected by Howard County, MBSS, and Maryland Stream Waders, along with GIS analyses of treated and untreated impervious cover, land use, and other landscape factors.

Visual watershed inspections were carried out via extensive field surveys. Field data collection was customized for each of the five site types (existing BMPs with potential for upgrade, areas of uncontrolled impervious for new BMP implementation, pervious urban land for tree planting, degraded stream channels, and unstable stormwater outfall channels) focused on assessing current conditions and identifying and describing restoration opportunities. Some sites previously visited in earlier studies (72 in Little Patuxent, 14 in Middle Patuxent) were evaluated

via desktop assessment only. In Little Patuxent, a total of 600 sites and 50.2 stream miles were assessed. In Middle Patuxent, 120 sites and 29.2 stream miles were assessed.

A scoring system was used to select the highest-ranked projects in each watershed for concept plans to be developed at this time, out of a larger group of potential projects identified. In all, the Little Patuxent Watershed Assessment yielded 760 potential projects and produced concept plans for 109 of the top ranked opportunities identified. The assessment for Middle Patuxent yielded 193 potential projects and produced concept plans for 39 top-ranked opportunities.

A pollutant load model was created for each watershed to quantify nitrogen, phosphorus, and sediment loadings and loading rates to the watershed with the existing and planned BMPs, based on the County's BMP inventory geodatabase as of November 12, 2015. Further, the models were used to calculate the expected nutrient and sediment loading reductions that would result based on implementation of restoration opportunities identified as part of the watershed assessments. Pollutant load calculations and removals by BMPs were completed for the Chesapeake Bay TMDL for nitrogen, phosphorus, and sediment, in both watersheds, and the local TMDL for sediment in Little Patuxent.

Modeling results included a summary of estimated pollutant load reductions for the implementation of recommended projects, including how reductions were credited, pollutant removal efficiencies, potential load reductions, and units available for restoration. Results indicated that implementation of potential restoration BMPs would approach or exceed the required percent reduction for nitrogen, phosphorus, and sediment loads needed to meet water quality standards for these watersheds, as specified by the local and Chesapeake Bay TMDLs. Additional reductions may also be achieved through restoration actions not included in this analysis such as street sweeping, erosion and sediment control, and public education and outreach efforts (e.g., a watershed trash and recycling campaign, conservation landscaping, pet waste education). These may be added as progress toward TMDL goals is tracked over the next several years.

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.

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***

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 20 Status

To meet the requirements under section IV.E Restoration Plans and Total Maximum Daily Loads, Howard County developed two related projects in 2015. First are the Watershed Assessments conducted in the Little Patuxent and Middle Patuxent watersheds, which are described in previous sections. Second, a Countywide Implementation Strategy, or CIS was developed in 2015 as the County's overall Restoration Plan. 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 full CIS is submitted with Annual Update 20 for MDE review. The CIS includes more detailed methods and results on each of the following items, however summaries are provided here to provide some detail.

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. The total County MS4 Impervious Area, or the area under Howard County jurisdiction, is 18,202.8 acres. The difference between this value and the total impervious area

of 20,574.5 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 7,981.1 acres and the untreated area is 10,221.6 acres. Applying the 20% factor to the untreated area yields a 20% restoration target of 2,044.3 acres. A summary of the assessment per watershed is presented in Table 18.

Table 18: Impervious Area Assessment Summary

Watershed	Total Impervious Area	County MS4 Impervious Area	Impervious Baseline Treated	Impervious Baseline Untreated	Restoration Target (20%)
Triadelphia Reservoir (Brighton Dam)	1,830.1	1,691.1	515.0	1,176.1	235.2
Little Patuxent River	9,139.7	8,124.7	4,231.2	3,893.5	778.7
Middle Patuxent River	3,410.9	2,990.6	1,088.4	1,902.2	380.4
Patapsco River L N Br	4,424.8	3,854.5	1,676.1	2,178.3	435.7
Patuxent River Upper	439.7	381.0	153.1	227.9	45.6
Rocky Gorge Dam	584.8	530.9	156.0	374.9	75.0
South Branch Patapsco	744.3	629.9	161.3	468.6	93.7
Countywide	20,574.5	18,202.8	7,981.1	10,221.6	2,044.3

Impervious Area Restoration

Howard County implemented its stormwater utility fee, termed the 'Watershed Protection Fee' on July 1, 2013. As of this date, and using the fees collected, the County has been making concerted efforts to plan, design, implement and monitor restoration projects implemented specifically towards meeting the current NPDES permit's 20% restoration goal. Therefore restoration projects implemented following July 1, 2013 are considered restoration, and restoration projects implemented before July 1, 2013 are credited to the baseline. The results indicate that the County has completed 157.4 impervious acres of restoration to apply to its 20% goal, leaving 1,886.9 acres of impervious restoration to be completed by the end of the permit term in December, 2019.

The CIS, with a full accounting of current progress and the projects and programs recommended and planned would result in a total restoration of 2,116.4 acres, or 20.7% of the untreated baseline. These values are presented in Table 19 with a breakdown per watershed.

Table 19: Impervious Area Restoration Summary

Watershed	Impervious Baseline Untreated	Restoration Target (20%)	Restoration Progress to 2015	Restoration Planned (2016-2019)	Total Impervious Restoration	Impervious Treated %
Triadelphia Reservoir (Brighton Dam)	1,176.1	235.2	35.2	103.4	138.6	11.8%
Little Patuxent River	3,893.5	778.7	72.0	970.2	1,042.1	26.8%
Middle Patuxent River	1,902.2	380.4	28.2	374.0	402.2	21.1%
Patapsco River L N Br	2,178.3	435.7	11.8	291.0	302.9	13.9%
Patuxent River Upper	227.9	45.6	0.0	53.1	53.1	23.3%
Rocky Gorge Dam	374.9	75.0	3.6	72.1	75.7	20.2%
South Branch Patapsco	468.6	93.7	6.5	95.3	101.8	21.7%
Countywide	10,221.6	2,044.3	157.4	1,959.0	2,116.4	20.7%

TMDL Restoration Plan

Local TMDLs

As a requirement of section PART IV.E.2.b of the County's NPDES MS4 permit, the County must develop a restoration plan by December 2015 for each SW-WLA approved by EPA prior to the effective date of the permit. There are currently eight final approved TMDLs within Howard County with either an individual or aggregate SW-WLA (Table 20). 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 20: 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	13.4%
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. Based on MDE guidance, growth in the stormwater load since the TMDL baseline year was not accounted for in the analysis. Local TMDLs are considered met, from a planning perspective, when the load reductions associated with 2015 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; however the Bay TMDL nutrient reductions have been tabulated in the CIS for general comparison.

Management Measures

Management measures to reduce pollutant loads and restore impervious surfaces include structural stormwater (BMPs, alternate 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 Table21. These include projects currently identified in the County's FY2016 and FY2017 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 to be identified in 2016 with assessment of the County's remaining watersheds. They are listed here with the proposed level of implementation.

Table 21: CIS Planned Strategies

BMP	Number of Projects Planned Countywide	Accounting Unit	Countywide Total
Stormwater BMP Conversion	45	Drainage area acres	727.0
New Stormwater BMP	34	Drainage area acres	166.1
Outfall Stabilization	17	Linear feet	2,584.9
Outfall Enhancement (SPSC)	91	Linear feet	14,910.8
Stream Restoration	103	Linear feet	190,494.3
Urban Tree Planting	59	Acres planted	307.8
Rain Barrels	100 / year added	Per units implemented	300
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 FY16 and FY19 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 22. 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 22: 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 (2015 Progress + Planned)[1]
Patapsco River Lower North Branch	02130906	Sediment	10.0%	612,344	48%	2,941,339
		Bacteria	13.4%	8,078	18.0%	10,837
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	Nitrogen	15.0%	16,059	15.3%	16,344
	02130908					
	02130906	Phosphorus	15.0%	982	82.3%	5,389
	02130908					
Patuxent River Upper	02131104	Sediment	11.40%	16,633	34.1%	49,721
Little Patuxent River	02131105	Sediment	48.10%	4,976,821	48.5%	5,022,824
Rocky Gorge Reservoir	02131107	Phosphorus	15%	129	23.3%	201
Triadelphia Reservoir (Brighton Dam)	02131108	Phosphorus	15%	398	19.7%	522
		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 total projected cost to implement the County's CIP projects described in this plan is approximately $222,290,000. Estimates of the planned projects and associated cost per year are shown in Table 23. Additional costs associated with the rain barrel and septic programs have been formulated and will add another $915,000 to the total cost between FY17 and FY20.

Table 23: Fiscal Year Schedule of Project Implementation and Cost

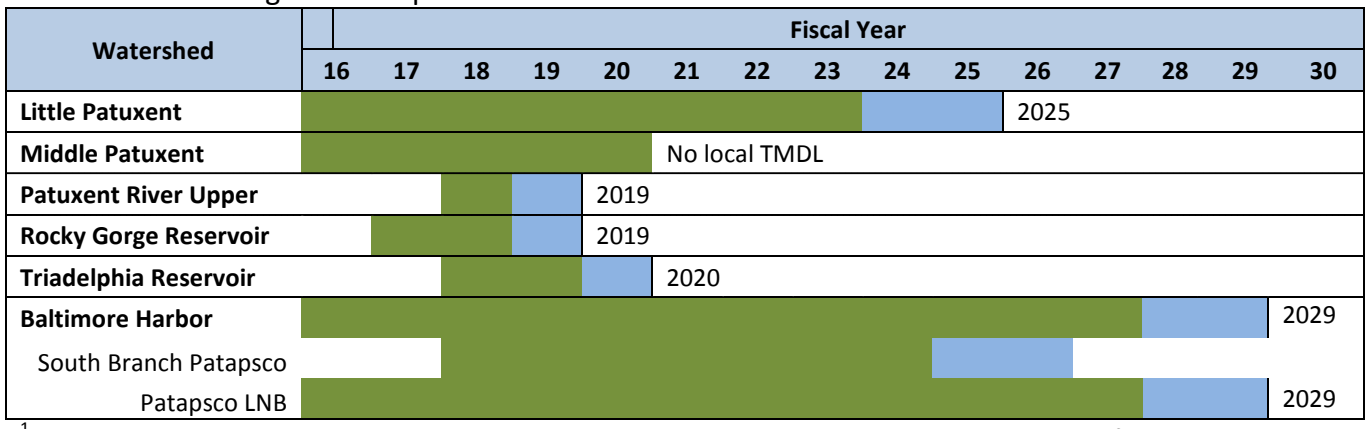
Fiscal Year	Number of Planned Projects to Meet the 20% Restoration Requirement[1]	Total Cost to Meet the 20% Restoration Requirement[1]	Number of Additional Planned Projects to Complete the TMDL Goals[2]	Total Additional Cost to Complete the TMDL Goals[2]
2016	20	$ 8,515,487		
2017	38	$ 27,555,179		
2018	40	$ 32,091,365		
2019	42	$ 32,328,247		
2020	43	$ 32,110,558		
2021			20	$ 13,894,277
2022			22	$ 13,706,835
2023			21	$ 12,879,189
2024			23	$ 12,467,750
2025			29	$ 12,287,148
2026			30	$ 12,287,148
2027			21	$ 12,166,869
Total	183	$ 132,600,836	166	$ 89,689,216

[1] Values for FY2016 through FY2020 meet the 20% restoration requirement and also provide a portion of the nutrient and sediment load reductions required toward meeting the local and Bay TMDL goals.

[2] Values for FY2021 through FY2027 provide the additional nutrient and sediment load reductions required toward meeting the local and Bay TMDL goals. The grand total cost of the complete project implementation plan is $ 222,290,052.

Implementation of the CIS at the required pace and with necessary funding is projected to meet the impervious surface restoration goal by December of 2019 and will meet the local TMDL-required reductions by the end dates indicated in the following figure, Figure 1.

Figure 1 – Implementation Schedule with End Dates Indicated



[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 first step; 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 20 Status

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 press release was also sent to the Howard County Times and a short article was put in the paper noting the meetings. 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:

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

We investigate any issues brought to our attention, and review any comments received. To date we have only received comments about specific problems on individual properties. We have followed up on all of them, either by meeting with the property owner and/or adding the site to our watershed assessment.

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 20 Status

Howard County has developed its CIS in December 2015 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 2015 progress evaluation presented in the CIS, and the planned management and restoration strategies. In subsequent years, the 'TMDL Compliance' section of the Annual Update will compare annual and cumulative implementation progress to the schedule in the CIS and will compare load reductions achieved to determine the rate of reduction. A detailed accounting of the stormwater BMPs, alternate practices and programs implemented through 2015 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. 20 submittal to MDE and sections are summarized here to address the permit condition.

Pollutant Load Reduction

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 permit year, which is 2015.

Howard County is making good progress towards meeting the reductions required by the local TMDL SW-WLAs. Table 24 includes the 2015 progress for each SW-WLA watershed.

Table 24: SW-WLA Progress Reductions as of 2015

Watershed Name	Watershed Number	Pollutant	Calibrated Target Reduction (EOS)[1]	MDE Published Reduction Percent	2015 Progress Reduction (EOS)[1]	2015 Progress Reduction Percent
Patapsco River Lower North Branch	02130906	Sediment	612,344	10.0%	99,887	1.6%
		Bacteria	8,078	13.4%	4,975	8.3%
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	Nitrogen	16,059	15.0%	2,324	2.2%
	02130908					
	02130906	Phosphorus	982	15.0%	205	3.1%
	02130908					
Patuxent River Upper	02131104	Sediment	16,633	11.40%		
Little Patuxent River	02131105	Sediment	4,976,821	48.10%	697,379	6.7%
Rocky Gorge Reservoir	02131107	Phosphorus	129	15%	64	7.4%
Triadelphia Reservoir (Brighton Dam)	02131108	Phosphorus	398	15%	112	4.2%
		Sediment	--	0%		

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

Cost of Completed Projects

To date the County has encumbered approximately $50 million for projects already constructed or are going to construction in FY16.

Cost of Planned Projects and Programs

The total projected cost to implement the County's CIP projects described in the CIS is approximately $222,290,000. Estimates of the planned projects and associated cost per year are shown in Table 25. Additional costs associated with the rain barrel and septic programs have been formulated and will add another $915,000 to the total cost between FY16 and FY19.

Table 25: Fiscal Year Schedule of Project Implementation Cost

Fiscal Year	Number of Planned Projects[1]	Total
2016	20	$ 8,515,487
2017	38	$ 27,555,179
2018	50	$ 40,357,805
2019	48	$ 38,026,169
2020	52	$ 36,292,393
2021	21	$ 11,293,285
2022	21	$ 11,293,285
2023	21	$ 11,293,285
2024	23	$ 11,406,114
2025	21	$ 9,320,252
2026	27	$ 11,023,958
2027	8	$ 5,912,839
Total	349	$ 222,290,052

[1] Projects are distributed as percentages of totals per year, rounding causes total number to not match 349 when added independently

The relative costs per watershed per fiscal year are presented here in Table 26. 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 42% of overall project costs are expected for this watershed. Most of the Little Patuxent projects are scheduled for the 2016-2019 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 $92,333,129, which represents 42% of the total CIP cost.

Table 26: Cost Estimate Summary Per Watershed

Watershed Name	Watershed Number	Cost Estimate
Baltimore Harbor (Patapsco R LN Br + S Br Patapsco)	02130906	$ 79,701,233
	02130908	$ 12,631,896
Patuxent River Upper	02131104	$ 777,212
Little Patuxent River	02131105	$ 92,504,931
Middle Patuxent River	02131106	$30,207,095
Rocky Gorge Reservoir	02131107	$ 1,804,424
Triadelphia Reservoir (Brighton Dam)	02131108	$ 4,663,272

Adaptive Management

As stated in the CIS, Howard County is taking an adaptive management approach to the implementation of the recommended projects and associated load reductions. 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 progress annually to determine if the pace of implementation is yielding the anticipated reduction benefits. The CIS will be reviewed and updated as needed base on the results of the analysis. Likewise projections of cost will be compared against actual expenditures to determine if additional funding is required on per project basis, and if load reductions yields are less than expected additional projects and programs may be needed. Because the CIS is being formalized in late 2015, with some minor revisions necessary in early 2016, a more thorough evaluation of progress will be possible following the first year of implementation.

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)	***Oil and Grease****
Fecal Coliform or E. coli	***(*Optional)***

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

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Watershed Restoration Assessment

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.

The Red Hill Branch subwatershed was identified as a priority subwatershed in the County's Upper Little Patuxent Watershed Management Plan. The County has therefore been focusing restoration and restoration monitoring efforts in this area. As described in more detail below, Red Hill Branch monitoring was initiated in late 2009 with geomorphic assessments, and in early spring of 2010 with biological assessment, continuous discharge, baseflow and stormflow water quality, and sediment sampling. Monitoring has continued annually since its inception. Monitoring focuses on determining the pollutant loading/removal rates at three sites; Salterforth Pond Retrofit, Bramhope Lane Stream Restoration, and Meadowbrook Park at the downstream end of the subwatershed.

This year's report includes summary results of the Red Hill Branch Monitoring from Year 6 (through June 30, 2015). A full report of Red Hill Branch monitoring methods, data analysis, and results from Year 6 is provided in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, which is included as a stand-alone document with the Annual Update.

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 4 – 2014 and Year 5 – (Through June 30, 2015)* report, produced as a stand-alone document and submitted as part of the Annual Update.

The specific monitoring strategies in place for Wilde Lake and Red Hill Branch are discussed further in sub-sections a, b and c below. The full methods and data analysis for chemical, biological and geomorphic monitoring conducted during the first half of 2015 (i.e., through June 30, 2015) are included in the *Wilde Lake Watershed Stream Monitoring; Years Nine and Ten – 2014 and 2015*, *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring*, the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 – 2014 and Year 5 – (Through June 30, 2015)* reports, produced as stand-alone documents included with this Annual Update. The following subsections will provide a more detailed explanation of the chemical, biological, and physical components of the monitoring work.

Chemical Monitoring

The automatic sampler and continuous flow monitoring equipment for the Wilde Lake site is located on the main channel draining to Wilde Lake and is located on Columbia Association property behind Green Mountain Circle. Due to channel conditions and access issues, the selected site is approximately 1700 feet upstream of Wilde Lake. The sampling station includes a probe for continuous instream water quality monitoring, continuous flow monitoring, and a refrigerated unit for collection of stormwater samples. No rain gage is installed; however the Wilde Lake site is located in close enough proximity to the Meadowbrook rain gauge along with other rain gauges in the County, whose data can be applied to the Wilde Lake site.

From December 18, 2014 through June 30, 2015, the County performed three storm sampling events at the Wilde Lake site, and three storm sampling events at the Red Hill Branch site located in Meadowbrook Park. The results of the sampling at all sites are included as part of the County's geodatabase submittal. The water quality database contains blank fields for data that were unavailable, not collected, or not applicable during 2014-2015. Blank cells in the chemical results data fields are for parameters that are not required to be tested by Howard County.

Temperature data are missing at both stations because the temperature logger had malfunctioned. Both units are undergoing repair.

Stormflow data were collected at Wilde Lake on three occasions during the 2015 monitoring period (March 10, April 19, and June 8, 2015). No baseflow data were collected during the 2015 monitoring period. Average (2007-2015) concentrations of metals in stormflows (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. Fecal coliform concentrations, however, have been consistently high during the years that storm samples have been collected, especially during the 2012-2014 monitoring period.

Stormflow data were collected at the permanent water quality monitoring station at the Red Hill Branch site at Meadowbrook Park on three occasions in 2015 (March 4, June 1, and June 8, 2015). Median concentrations of storm runoff total nitrogen, TSS, and total phosphorus were 1.74 mg/L, 52.5 mg/L, and 0.26 mg/L, respectively. Average metal concentrations at Meadowbrook Park were below their respective acute MDE criteria. Fecal coliform levels remained elevated during the first half of 2015.

A total of three wet weather events were sampled at the Red Hill Branch retrofit site in the first half of 2015 (March 4, June 1, and June 8, 2015).

During the first half of 2015, Salterforth Pond total nitrogen concentrations ranged from 1.04 to 3.60 mg/L for the influent and 0.62 to 4.30 mg/L for the effluent. Concentrations of total phosphorus ranged from 0.16 to 0.32 mg/L for the influent and 0.15 to 0.40 mg/L for the effluent. TSS concentrations ranged from 4 to 231 mg/L for the influent and 7 to 32 mg/L for the effluent.

A total of three wet weather events were sampled at the Red Hill Branch restoration site in the first half of 2015 (March 4, June 1, and June 8, 2015). One baseflow sample was collected during the reporting period (December 22, 2014). This baseflow sample was collected as a requirement under the trust fund.

Bramhope Lane restoration site baseflow data showed that baseflow total nitrogen and total phosphorus concentrations were elevated in comparison to EPA guidelines while TSS concentrations were within acceptable ranges. The maximum stormflow concentration of total phosphorus ranged from 0.46 mg/L at the upstream station to 3.00 mg/L at the downstream station. The maximum stormflow TSS concentration ranged from 70 mg/L at the upstream station to 97 mg/L at the downstream station. The maximum stormflow concentration of total nitrogen ranged from 9.0 mg/L at the upstream station to 5.10 mg/L at the downstream station. The median suspended solids concentrations in samples collected from the siphon samplers at the upstream Bramhope, downstream Bramhope, and Meadowbrook stations were 63.5, 201, and 527 mg/L, respectively. The median dry-weight mass of sediment transported at

the upstream Bramhope, downstream Bramhope, and Meadowbrook stations were 0.98, 0.82, and 437.00 pounds, respectively.

Biological Monitoring

Biological monitoring was conducted in Spring 2015 at five sites in the Wilde Lake watershed. This was the 10th consecutive year of monitoring at Wilde Lake, which began in the spring of 2006. In 2006, sites were selected using a randomized census approach to assess the condition and reaction of the stream's biological integrity to the implementation of the stream and watershed restoration plans. To enable an assessment of changes at the sites over time, sites first sampled during 2006 to 2010 will be re-visited during a second round of sampling. In 2011, sites that were first sampled in 2006 were re-sampled. In 2012, sites that were originally monitored in 2007 were re-visited. In 2013 and 2014, sites that were originally monitored in 2008 and 2009, respectively, were re-assessed. Similarly, in 2015, sites sampled in 2010 were re-sampled. The monitoring included the collection and analysis of the benthic macroinvertebrate community, assessment of the physical habitat, and instream water quality sampling. The full methods and data analysis are in the *Wilde Lake Watershed, Stream Monitoring; Years Nine and Ten 2014 and 2015* report, produced as a stand-alone document included as part of last year's Annual Update.

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. During the spring of 2015, benthic monitoring continued at these sites. The full methods and data analyses for assessments conducted in 2014 are presented in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, produced as a stand-alone document and included as part of the Annual Update.

Biological assessment methods within Howard County are designed to be consistent and comparable with the methods used by Maryland Department of Natural Resources (DNR) in their Maryland Biological Stream Survey (MBSS). The County has adopted the MBSS methodology to be consistent with statewide monitoring programs and programs adopted by other Maryland counties.

Results of the Year 10 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. Two of the five sampling sites had habitat that rated Supporting and three rated Partially Supporting in 2015. Using MBSS's Physical Habitat Index (PHI), the majority of reaches in 2015 rated Degraded. Two reaches were Partially Degraded and the remaining three were Degraded. Benthic macroinvertebrate sampling results were between Very Poor and Poor

ratings where two sites were in the Very Poor range, including the QC benthic macroinvertebrate site, and four site rated Poor. 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 ten years of monitoring.

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 2015, one study reach was classified as 'Fair' and the control reach was classified as 'Very Poor' for biological condition, with an overall BIBI score of from 3.00 and 1.67, respectively. The remaining study reaches were each classified as 'Poor' with scores of 2.00 and 2.33. The restoration reach received a 'Degraded' habitat condition rating and its habitat was evaluated as 'Partially Supporting' aquatic life. Habitat at the remaining study reaches rated 'Degraded' and 'Severely Degraded' and was classified as 'Non Supporting' and 'Partially Supporting' of aquatic life. The control reach received a habitat rating of 'Degraded' due to a low abundance of woody habitat and because of its close proximity to a road, but was rated 'Partially Supporting' of aquatic life based on frequency of riffles and epifaunal substrate.

Physical Monitoring

Wilde Lake Watershed

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. Assessment techniques include the survey of channel cross-sections, particle size analysis, longitudinal profile, and Rosgen Level II analysis. Geomorphic monitoring was conducted in Spring 2015 in the Wilde Lake watershed. The full methods and data analysis are in the *Wilde Lake Watershed, Stream Monitoring; Years Nine and Ten – 2014 and 2015* report, produced as a stand-alone document included as part of last year's Annual Update.

Cross-sections have been surveyed annually in the spring since 2006 to assess changes in channel geometry. A total of four cross-sections are surveyed in the Wilde Lake watershed. The cross-sections are located generally at the downstream ends of subwatersheds to identify the cumulative effects of the proposed upstream stormwater retrofits and stream restoration activities. Particle size analysis was completed at each cross-section. Three longitudinal profile surveys were conducted across the watershed, totaling approximately 2960 feet.

Based on 2006 – 2015 geomorphic assessments, the Wilde Lake main stem 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 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 complete riparian buffer is lacking along most of the channel.

Stream physical habitat assessments were conducted in the Wilde Lake watershed in 2015 in conjunction with the 5 biological sites described under Biological Monitoring above. Physical habitat for the Wilde Lake watershed was assessed using the EPA's Rapid Bioassessment Protocol (RBP) (Barbour, *et al*, 1999) habitat assessment for high-gradient streams. The Wilde Lake sites showed marginal overall habitat availability, with three sites rated 'Partially Supporting' of aquatic life, and the other two rated 'Supporting' in 2015. Under the PHI the majority of reaches in 2015 rated Degraded.

Red Hill Branch Subwatershed

Geomorphic assessments in the Red Hill Branch subwatershed were conducted in the spring of 2015, four 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. The full methods and data analyses for assessments conducted in 2015 are in the *Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring* report, produced as a stand-alone document included as part of this Annual Update.

Geomorphic data collected in 2015 serve as a comprehensive assessment of the fourth year of post-restoration conditions within the Red Hill Branch subwatershed. These data can be compared to results of two years of surveys of pre-restoration conditions conducted during 2009 and 2011 and the previous two year's post-restoration data collected within the watershed. Comparisons between pre-restoration and post-restoration surveys will quantitatively evaluate changes in conditions as a result of restoration efforts throughout the subwatershed.

From the longitudinal profiles, Year 6 slopes were compared to those from two years of pre-restoration monitoring. The slope at the restoration reach did not change between the pre-restoration assessment conducted in 2011 and the first post-restoration assessment conducted in 2012. The restoration reach, which is located in the middle to upper portion of the watershed, had the steepest slope of the reaches surveyed while the downstream reach had the lowest in 2015. The downstream reach, which is located toward the lower portion of the watershed, had the flattest slope of the reaches surveyed in 2015. The surveyed profiles from 2015 were plotted, overlain, and compared to the baseline condition profiles to assess changes occurring in the bed structure. At the restoration reach, a lower bed elevation was observed in both the upper and middle portions of the reach between the 2014 and 2015 post-restoration surveying. At the downstream reach, an increase in bed elevation can be seen in the lower portion of the reach due to a buildup of fine sediment. At the control reach, a picnic table and resultant debris jam was present within the channel during all six years of monitoring, but slowly migrated downstream between each assessment year. Downstream of this jam, several

smaller debris jams also formed, and have resulted in the continued shifting of features along the bed surface particularly in the middle to downstream portions of this reach.

At the downstream reach, there was noticeable deepening in 2014 which has remained consistent in 2015. At the riffle cross-section at the downstream reach, the right bank has remained stable, while the left bank has widened over time and shows considerable bed scour 2015. At the meander bend cross-section, the thalweg elevation remained relatively stable during all study years, but the remainder of the cross-section has widened considerably as both banks have experienced erosion. At the control reach, the riffle cross-section remained relatively stable during six years of assessments, while the meander bend cross-section continues to downcut and deepen, most notably along the left bank in previous years and along the right bank in 2015. Prior to restoration, the restoration reach was highly incised and the stream did not have access to its floodplain. Restoration of the channel at this location (including raising the bed elevation and grading back the streambanks) resulted in the stream no longer being incised and enabled the stream to have good access to its flood plain. Post-restoration surveying has shown moderate deepening along the right bank and thalweg at the riffle cross-section. At the meander bend cross-section, the bed has slightly elevated between Years 5 and 6 as well as widened along the banks, but has overall remained stable. Future surveyed cross-sections will be plotted, superimposed, and compared to the baseline condition and yearly surveyed profiles to assess changes occurring in channel dimensions.

Bank pin erosion rates in the restoration reach ranged from 0.00 to 1.84 feet/year during 2015 with the most erosion occurring on the lower portion of the inner meander bend at the middle of the reach. Deposition rates ranged from -0.02 to -0.39 feet/year during 2015 with the most deposition located on the lower portion of the inner meander bend at the lower end of the reach. Erosion rates at the downstream reach ranged from 0.15 to 2.03 feet/year during 2015 with the most erosion occurring at the lower portion of the outer mender bend at profile station 1+65. Deposition rates ranged from -0.29to -2.81 feet/year during 2015 with the most deposition occurring at the lower portion of the outer meander bend at profile station 1+18. Erosion rates in the control reach ranged from 0.08 to 1.32 feet/year during 2015. Deposition rates at the control reach ranged from -0.06 to -0.97 feet/year during 2015. Scour chains were studied at all three reaches throughout 2015. Scour rates in the Bramhope restoration reach ranged from 0.23 feet/year (scour) to -1.78 feet/year (deposition) during 2015. In the downstream reach, net deposition was observed at each chain, with rates ranging from -0.15 feet/year to -1.70 feet/year during 2015. At the control reach, scour rates ranged from 0.39 feet/year to -1.70 feet/year during 2015.

Particle size analyses continued within Red Hill Branch during the sixth year of monitoring. The results indicate that the restoration reach has larger riffle surface median (D50) particle size and larger D50 particle sizes for the entire reach as compared to the downstream and control reaches. The D84 at the restoration reach for both the riffle surface and reachwide counts also exceeded that of the other sites. Results from all six assessment years of bar sample analyses indicate that the downstream reach transported more fine particles (i.e., sand) than the control reach, which also transported the largest particles. No bar sample was collected at the

restoration reach in 2015 due to the fact that there were no mid-channel or side bars present within the reach or just upstream or downstream of the reach.

The results of the facies mapping data collected during six years of monitoring within Red Hill Branch illustrate changing substrate conditions among all three reaches. Between pre-restoration Years 1 and 2, the proportion of sand-dominated facies increased at all three reaches. During 2012, the proportion of sand-dominated facies increased at both the downstream and control reaches. The restoration reach, however, experienced the most noticeable change in its facies distribution following restoration. The restoration reach was still dominated by sand-dominated facies, but the addition of boulders, large rocks, and cobble used in the construction of the newly-restored channel resulted in increased percentages of larger facies. During 2015, as well as Years 2 and 3 post-restoration the substrate of the restoration reach was a majority of cobble and secondarily gravel-dominated facies.

Stream physical habitat assessments were conducted in conjunction with monitoring of the four biological sites described under Biological Monitoring above. Physical habitat for the Red Hill Branch subwatershed was assessed using the Maryland Biological Stream Survey (MBSS) Physical Habitat Index (PHI) (Paul et al., 2002), and EPA's Rapid Bioassessment Protocol (RBP) (Barbour et al., 1999) habitat assessment for high-gradient streams. The Red Hill Branch sites show low overall habitat availability, with habitat at three study reaches rated 'Degraded' and "Severely Degraded" at a 3rd study site under the PHI. Three study sites rated "Partially-Supporting" of aquatic life using the RBP assessment while the fourth site (BIO-1) rated "Not Supporting" in 2015. The control reach received a PHI rating of 'Degraded', but was rated 'Partially Supporting' using the RBP assessment due to slightly higher scores for frequency of riffles, channel alteration, and channel flow. It also received the second highest score of all sites for in-stream cover, meaning good habitat for fish.

Rumsey Run Watershed

In 2011 Howard County (in conjunction with MDE) began geomorphic monitoring of an unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill subwatershed. To evaluate the effectiveness of recent stormwater controls from developed sites, Howard 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.

Geomorphic surveys were conducted throughout Rumsey Run to enable comparisons between upstream areas with little to no stormwater controls, mid-reach areas affected by a subdivision designed and constructed using Environmental Site Design (ESD) practices for stormwater management, and downstream areas constructed with traditional stormwater practices. Five permanently monumented cross-sections established in 2011 along almost 4,000 linear feet of stream were re-surveyed during Fall 2012, Fall 2013, and Fall 2014, along with the complete longitudinal profile, reach-wide and representative pebble count surveys. In addition, to improve model accuracy, an additional 11 cross-sections were installed and surveyed during Fall 2013 to provide more comprehensive data. These cross-sections were re-surveyed in Fall

2014. Since the annual survey is conducted in the Fall, results of the 2015 survey will be included in next year's Annual Update.

A full report describing Rumsey Run monitoring methods, data analysis, and results is included in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 – 2014 and Year 5 (Through June 30, 2015)* report, produced as a stand-alone document and submitted as part of the Annual Update.

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

Annual Data Submittal

The required chemical monitoring results and EMCs are found in the County's geodatabase submittal, in accordance with Part V.A.2 of the permit (Appendix A). This database has been revised to comply with the formatting requirements as per the fourth generation Permit issued in December 2014.

Summary descriptions of all chemical, biological, and physical monitoring activities performed during the past year are included in the Assessment of Control section herein and in more detail in the stand alone documents provided as part of this Annual Update: *Wilde Lake Watershed Stream Monitoring, Years Nine and Ten – 2014 and 2015; Red Hill Branch Watershed Restoration Years 5 and 6 –2014 and 2015 Post-Restoration Conditions Monitoring;* and *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Year 4 –2014 and Year 5 (Through June 30, 2015).*

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 ten years of monitoring. Results of the 2014 and 2015 bioassessments are similar to results reported in previous years. The streams continue to be only marginally capable of supporting aquatic life. Based on 2006 – 2015 geomorphic assessments, the Wilde Lake main stem 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 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 complete riparian buffer is lacking along most of the channel. EMC data collected from 2007-2015 for various metals, nutrients, sediment, hydrocarbons, and bacteria have not appreciably changed over time. Time series plots of the data show that the data continue to be variable within a historical range. Only combined nitrate and nitrite and TKN appear to be slightly decreasing over time. However, the lack of other downward-trending parameters suggests that the trend in nitrogen may be due to other causes and not from stream restoration measures. As more restoration projects are implemented, the proportion of restored areas to the entire watershed may reach a level where positive changes in chemical, geomorphic, and biological conditions will be readily discernable.

In Red Hill Branch, post-restoration monitoring results show that the watershed remains in a degraded ecological condition, with at most modest improvements from pre-restoration conditions. Physical habitat assessment, biological condition assessment, and fish bioassessment results at the Meadowbrook monitoring station have not markedly changed from pre-restoration to post-restoration conditions. Nitrogen, phosphorus, and TSS concentrations observed at the Meadowbrook Park restoration area during post-restoration monitoring showed slight improvement in overall watershed water quality, which indicates that the restoration and retrofit efforts undertaken within the watershed are beginning to have a measurable impact on key chemical concentrations. Sediment transport data from post-restoration monitoring at the Meadowbrook site shows a slight reduction in bedload transport, and a sharp increase in suspended sediment concentrations leaving the watershed. This suggests that the restoration efforts that have been implemented throughout the Red Hill Branch watershed have yet to have a positive impact on suspended sediment concentrations at the watershed scale. Continued post-restoration monitoring will provide a comprehensive assessment of conditions within the Red Hill Branch subwatershed and will allow comparisons to quantitatively evaluate improvements in biological, physical and water quality conditions as a result of restoration efforts throughout the watershed.

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

An unnamed tributary to Red Hill Branch (hereafter called Rumsey Run) within the Red Hill Branch subwatershed was chosen for monitoring beginning during permit year 17. To evaluate the effectiveness of recent stormwater controls from developed sites, Howard County monitors the effectiveness of the *2000 Maryland Stormwater Design Manual* and other innovative stormwater management technologies through annual geomorphic assessments, limited runoff investigations, and modeling in Rumsey Run. A full report of Rumsey Run monitoring methods, data analysis, and results is provided in the *Evaluation of Maryland Stormwater Management Methods in Rumsey Run Years 4 and 5 – 2014 and 2015* report, produced as a stand-alone document and provided as part of the Annual Update.

Stream Profile

The annual survey of five permanently monumented cross-sections and nearly 4,000 linear feet of stream profile serve as a comprehensive annual assessment of conditions of Rumsey Run. Each year the survey has been conducted in Fall. Results of the 2015 survey will be included in next years' Annual Update. Fall 2014 results were reported under the County's previous permit in the Annual Update No. 20.

Baseline Comparison

The annual survey of five permanently monumented cross-sections and nearly 4,000 linear feet of stream profile serve as a comprehensive annual assessment of conditions of Rumsey Run. Each year the survey has been conducted in Fall. Results of the 2015 survey will be included in next years' Annual Update. Fall 2014 results were reported under the County's previous permit in Part A of Annual Update No. 20.

Hydrologic and/or Hydraulic Model

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

3. Additional Issues Relative to Assessment of Controls

The County uses a pollutant loading model to assess the pollutant reductions achieved from structural improvements throughout the County. The results of the model are included in Table G of the Attachment A database. The following describes the model and its results in more detail.

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The County has traditionally used a GIS-based analysis tool to compute pollutant load values. The model used was based on loading using land use data with associated event mean concentrations (EMCs) with reductions based on efficiency rates for each BMP type using the County's full BMP dataset. Because watershed planning, and specifically, TMDL planning and load reduction calculation methodologies are becoming more consolidated and consistent with

use of the Maryland Assessment Scenario Tool (MAST) and because the County's planning efforts are now based on MAST modeling, the County has transitioned the calculations in Table G to a MAST modeling effort.

Load reduction calculations were made for both of the permit terms being presented in this current Annual Update.

For the County's current permit for the reporting year ending on June 30, 2015 runoff loads were calculated in MAST using a 2015 no BMP scenario. The 2015 no BMP scenario in MAST uses Howard County geography with 2015 revised initial condition (land use) and 2014 milestone processed water base data without any BMPs input into the model. This model output gives pollutant loads using 2015 conditions before considering any BMPs. Controlled loads were then modeled in MAST using the same 2015 revised initial condition and 2015 milestone processed water base data, but with BMPs included for those constructed before as of June 30, 2015. BMP data came from Howard County's database of BMPs included as Table B in the Attachment A database.

Results of the loading analysis are included in the tables below.

Table 28: Total Nitrogen (TN) Load Reduction Summary to 6/30/15

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	92,140	82,388	9,752	10.6%
Little Patuxent River	294,048	236,609	57,439	19.5%
Middle Patuxent River	145,060	125,778	19,282	13.3%
Patapsco River L N Br	110,658	94,738	15,920	14.4%
Patuxent River Upper	13,180	11,395	1,786	13.5%
Rocky Gorge Dam	25,123	23,308	1,815	7.2%
S Branch Patapsco	32,102	29,388	2,714	8.5%
Countywide	712,312	603,605	108,707	15.3%

Table 29: Total Phosphorus (TP) Load Reduction Summary to 6/30/15

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	4,205	3,681	524	12.5%
Little Patuxent River	17,231	10,398	6,833	39.7%
Middle Patuxent River	6,988	5,365	1,622	23.2%
Patapsco River L N Br	8,125	6,091	2,034	25.0%
Patuxent River Upper	704	516	188	26.7%
Rocky Gorge Dam	1,204	992	212	17.6%
S Branch Patapsco	1,226	1,121	106	8.6%
Countywide	39,682	28,164	11,519	29.0%

Table 30: Total Suspended Solids (TSS) Load Reduction Summary to 6/30/15

Watershed	Runoff Load (lbs/yr)	Controlled Load (lbs/yr)	Load Reduction (lbs/yr)	% Reduction
Brighton Dam	2,913,892	2,465,883	448,009	15.4%
Little Patuxent River	17,015,519	9,095,302	7,920,216	46.5%
Middle Patuxent River	8,699,753	6,070,803	2,628,949	30.2%
Patapsco River L N Br	9,728,170	6,554,464	3,173,706	32.6%
Patuxent River Upper	302,996	178,049	124,947	41.2%
Rocky Gorge Dam	1,841,741	1,481,828	359,912	19.5%
S Branch Patapsco	1,536,286	1,367,833	168,453	11.0%
Countywide	42,038,356	27,214,163	14,824,193	35.3%

Bacteria Loading

Because Patapsco River Lower North Branch is the only County watershed with a bacteria SW-WLA, bacteria modeling was only performed for this watershed. Loads and reductions were calculated to represent the conditions at the end of the County's previous permit ending December 17, 2015, and also at the end of the current permit year June 30, 2015.

Bacteria loads were calculated by deriving a watershed loading rate (in billion MPN/100mL/yr/acre) for urban land from the baseline year load and the County Phase I area (MAST 2005 land use including MS4 pervious and impervious surfaces). The loading rate was then applied to the 2015 urban land area to derive a 2015 load. The annual % change calculated between the 2005 and 2015 years was used to back-calculate a 2014 load. Reductions were then calculated using the County's BMP database and applying the percent reductions associated with each BMP dataset, one with all BMPs installed through December 17, 2015, and another with all BMPs installed through June 30, 2015.

These results are included in Table G.1 of the Attachment A database and are presented here.

Table 31: Patapsco River Lower North Branch Bacteria Loading Summary

Watershed	Runoff Load (MPN/100 mL/yr)	Controlled Load (MPN/100 mL/yr)	Load Reduction (MPN/100 mL/yr)	% Reduction
December 17, 2014 Conditions	69,071	44,049	25,022	36.2%
June 30, 2015 Conditions	70,457	45,257	25,201	35.8%

Pollutant Load Discussion

In previous years reporting, a comparison of the percent reduction from year to year was included for each watershed. Because of the change in modeling methods this comparison has not been included so as to not inadvertently indicate that load reductions were drastically different from year to year, when in fact the change in results may be largely a factor of the modeling method used. It is noted however, that in 2015 several BMP database clean-up efforts were completed that included drainage area delineations, corrections of BMP type, additions of data for restoration projects, and updates for reduction accounting methodologies.

With these improved datasets and considering the differing modeling methods, the results from the current analyses using MAST indicate that at the Countywide scale the runoff loads without BMPs are much lower than using the previous modeling methods. Additionally, the overall reductions achieved for each of the pollutants modeled is greater. A comparison from the 12/17/2014 model run to the 6/30/2015 model run indicates a small increase in the Countywide controlled load (TN=+1.6%; TP=+1.3%, TSS=+1.4%), and also a very small increase in the Countywide reduction achieved (<1% for each pollutant).

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.***

Annual Update Number 20 Status

The Howard County budget shows that approximately $80.1 million was appropriated to implement various aspects of NPDES activities and associated work during permit years FY06 through FY15 and an additional $10.6 million has been proposed for FY16. Since AR20 is reporting on two different permits lasting six months, the amounts shown for FY16 each six month period is half of the total, $21.3 million, with the exception of several costs that will start being tracked in the new permit. Tables 32 through 34 present the fiscal analysis separated into three general categories, i.e. capital, operation and maintenance expenditures, respectively. Table 35 provides a summary of the three funding areas.

Capital Expenditures

Table 32 below summarizes the proposed capital expenditures appropriated in support of the County's NPDES program for FY16. Capital expenditures primarily include stream restoration

and SWM construction projects, but also include the cost for monitoring of these specific projects and the purchase of monitoring equipment.

Table 32: NPDES Funding – Capital Expenditures

Permit Condition	FY16*
B. Legal Authority	
C. Source Identification 1. GIS/Database maintenance	
E. Management Programs 1. Stormwater Management 2. Pollution Prevention 3. Erosion and Sediment 4. Public Education 5. Road Maintenance Street Sweeping Inlet Cleaning Other (Road Maint) Property Management Trash Elimination	
F. Watershed Assessment and Planning 1. Assessment/evaluation 2. Restoration Projects	500
G. Watershed Restoration 1. 10% restoration 2. Water quality improvement monitoring.	5,242 209
H. Assessment of Controls 1. Chemical Monitoring 2. Biological Monitoring 3. Physical Monitoring 4. Design Manual Monitoring	
TOTAL	$5,950

* FY16 amounts are based on 6 months only.

** All values are in thousands of dollars.

Operation Expenditures

Table 33 below summarizes the proposed operation expenditures appropriated in support of the County's NPDES program for FY16. Operation expenditures primarily include SWM division staff, supplies, and annually repeated expenses such as monitoring, illicit discharge inspections, SWM facility inspections, and public outreach efforts.

Table 33: NPDES Funding – Operation Expenditures

Permit Condition	FY16*
B. Legal Authority	
C. Source Identification	
1. GIS/Database maintenance	48
E. Management Programs	
1. Stormwater Management	808
2. Pollution Prevention	40
3. Erosion and Sediment	2,890
4. Public Education	551
5. Road Maintenance	
Street Sweeping	
Inlet Cleaning	
Other (Road Maint)	
Property Management	110
Trash Elimination	200
F. Watershed Assessment and Planning	
1. Assessment/evaluation	85
2. Restoration Projects	
G. Watershed Restoration	
1. 10% restoration	573
2. Water quality improvement monitoring.	
H. Assessment of Controls	
1. Chemical Monitoring	19
2. Biological Monitoring	63
3. Physical Monitoring	19
4. Design Manual Monitoring	32
TOTAL	$4,935

* FY16 amounts are based on 6 months only.

**All values are in thousands of dollars.

Maintenance Expenditures

Table 34 below summarizes the maintenance expenditures appropriated in support of the County's NPDES program for FY16. Maintenance expenditures primarily include the operational budget for the Bureau of Highways Storm Water Maintenance Program and also include street sweeping, which is run from the Bureau of Environmental Services.

Table 34: NPDES Funding – Maintenance Expenditures

Permit Condition	FY16*
B. Legal Authority	
C. Source Identification 1. GIS/Database maintenance	
E. Management Programs 1. Stormwater Management 2. Pollution Prevention 3. Erosion and Sediment 4. Public Education 5. Road Maintenance Street Sweeping Inlet Cleaning Other (Road Maint) Property Management Trash Elimination	 200 5 1323
F. Watershed Assessment and Planning 1. Assessment/evaluation 2. Restoration Projects	
G. Watershed Restoration 1. 10% restoration 2. Water quality improvement monitoring	
H. Assessment of Controls 1. Chemical Monitoring 2. Biological Monitoring 3. Physical Monitoring 4. Design Manual Monitoring	
TOTAL	$1,528

* FY16 amounts are based on 6 months only.

**All values are in thousands of dollars.

NPDES Funding

Table 35, which is located on the following page, provides the total proposed funding appropriated for FY16 in support of the County's NPDES program initiatives.

The FY16 budget in Table 35 includes the third year of the County's Watershed Protection and Restoration Fund (WPRF), which was first collected in FY14. As noted to in Annual Update Update No 18 the County Council modified the WRPF legislation after Annual Update No. 18 was submitted to the State. The revised legislation reduced the fee collected in FY15, which has been reflected in Tables 32 through 35.

The County has reapplied for and was selected to receive additional Chesapeake and Atlantic Coastal Bays Trust Fund Local Implementation Grant for FY16. $375,000 was granted for capital projects and is accounted for in the tables above. Receipt of this grant continues to help the County leverage its available capital funds to be able to complete even more NPDES related projects.

Table 35: NPDES Funding - Summary

Permit Condition	FY16*
B. Legal Authority	
C. Source Identification	
1. GIS/Database maintenance	48
E. Management Programs	
1. Stormwater Management	808
2. Pollution Prevention	40
3. Erosion and Sediment	2,890
4. Public Education	551
5. Road Maintenance	
Street Sweeping	200
Inlet Cleaning	5
Other (Road Maint.)	1323
Property Management	110
Trash Elimination	200
F. Watershed Assessment and Planning	
1. Assessment/evaluation	585
2. Restoration Projects	
G. Watershed Restoration	
1. 10% restoration	5,814
2. Water quality improvement monitoring	209
H. Assessment of Controls	
1. Chemical Monitoring	19
2. Biological Monitoring	63
3. Physical Monitoring	19
4. Design Manual Monitoring	32
TOTAL	$12,916

* FY16 amounts are based on 6 months only.

**All values are in thousands of dollars

Annual Update Number 20 Status

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 Watershed Protection and Restoration Fee (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, respectfully. 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.

The WPRF was billed on the December property tax bill. Approximately $11.1 M was collected for FY15. These funds were budgeted among the various County agencies to fund the following programs:

- 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

The distribution of funds is presented in a pie chart on www.cleanwaterhoward.com in compliance with the state legislation.

The County is working with the SeaGrant Extension and the Chesapeake Bay Program Office to pilot a residential BMP tracking tool to certify BMPs as to type and pollutant removal efficiency. Each installed BMP pursuing a reimbursement or credit is entered into this tool and subsequent field verified to ensure the design and function of the BMP meet defined standards. Once certified the practice is eligible for both reimbursement of a portion of construction costs as well as a 20% reduction from the WPRF. In period 1, of the 29applications received, all 29 reimbursements were granted for a total cost of $17,906. The cumulative cost of reimbursements at the end of period 1 was $31,605. These practices in total treated 0.59 acres for a per acre equivalent cost of $30,349.15. After period 1, these practices cumulatively treated 0.94 acres of impervious surface. We expect the program to grow over the next few years as more outreach is underway. Information about the programs is available to the public on the dedicated stormwater webpage www.cleanwaterhoward.com.

Section V. Program Review and Annual Progress Reporting

A. Annual Reporting

As required by the NPDES permit, the County is submitting all Annual Update Databases on the attached DVD in an Access Database geodatabase file, *HowardNPDESAttachmentA2015_PartB.mdb*. The databases include those listed below:

	Database	Comment
A	Storm Drain System Mapping	Spatial data included
B	Urban Best Management Practices (BMPs)	Spatial data included
C	Impervious Surfaces	Spatial data included
D	Water Quality Improvement Project Locations	Spatial data included
E	Monitoring Site Locations	Spatial data included
E.1	Monitoring Site Locations – Use for Multiple Land Use Values in the Drainage Area	Spatial data included
E.2	Monitoring Site Locations – Use for Multiple Stormwater BMPs in the Drainage Area	Spatial data included
F	Chemical Monitoring	Spatial data included
G	Pollutant Load Reductions	Spatial data included
H	Biological and Habitat Monitoring	Spatial data included
I	Illicit Discharge Detection and Elimination	
J	Responsible Personnel Certification Information	Spatial data not Included
K	Quarterly Grading Permit Information	Spatial data included
L	Fiscal Analyses	
M	NPDES Contacts	

Currently, the format of the geodatabase is based on the Attachment A format provided by MDE and dated January 16, 2013. As MDE updates the Attachment A database format and develops its own Geodatabase, Howard County will make efforts to modify the databases and populate the data fields accordingly.

Section VI. 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.

Annual Update Number 20 Status

The County recognizes the importance of the Tributary Strategy objectives and has been working with MDE and other municipalities to help achieve the goals of the new 2000 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: agricultural BMP implementation, reservoir monitoring, and public outreach. The TAC is currently in the process of engaging consultant services to evaluate progress toward TMDL implementation for the Patuxent reservoirs. 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 the now completed Cherry Creek watershed restoration projects, as well as ongoing biomonitoring and public outreach activities. 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 round of biomonitoring was conducted in 2012 and performed at the Upper and Lower Brighton Dam and Cattail Creek watersheds. A report can be found at http://www.howardcountymd.gov/DisplayPrimary.aspx?id=359. Howard County public outreach activities include support for the TAC's annual Earth Month and Reservoir Watershed Day events and the fall Campfire Program, when possible.

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 2013, the Commission began developing an update to the Policy Plan to reflect the new Bay TMDLs, and is moving forward with local and State adoption of the updated Policy Plan in 2014. 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 .

Lower Patapsco Watershed Restoration Action Strategy

The Lower Patapsco Watershed Restoration Action Strategy (WRAS) was issued in 2006. The WRAS is a watershed restoration plan and implementation strategy that serves as a work plan for restoring and protecting water quality and aquatic and terrestrial habitats, and for addressing community needs for environmental outreach and education in the Lower North Branch Patapsco River watershed. The WRAS included a more detailed assessment of

restoration opportunities in the Rockburn Branch and Sucker Branch subwatersheds. Recommended projects in the WRAS include stormwater retrofits, stream and buffer restorations, and public outreach and education. The County has added priority restoration projects identified through the WRAS to the County capital budget for implementation.

Patapsco/Back River Tributary Team

Howard County is a member of the Patapsco/Back River Tributary Team. The Team no longer receives official staff support from DNR, however, a team member remains active and helps organize communications and meetings voluntarily. The Team focuses on serving as a forum for information exchange and brings together jurisdictions and groups within the watershed as needed. The Team works to inform and increase stakeholder participation in the Chesapeake Bay TMDL and the Watershed Implementation Plan (WIP) process.

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 Department of Planning and Zoning web page at http://www.howardcountymd.gov/DisplayPrimary.aspx?id=4294967721.

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 November 13, 2015 and the theme of the conference was "Protecting the Source - Sustaining Maryland's Waters".

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Attachment A – Database Table CD

Attachment B – Recreation and Parks NPDES FY2015 Report