Carroll County Maryland

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
MUNICIPAL SEPARATE STORM SEWER SYSTEM
DISCHARGE PERMIT

ANNUAL REPORT
December 29, 2015

2015 NPDES MS4 Permit Annual Report

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NPDES ANNUAL REPORT

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CARROLL COUNTY, MARYLAND
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)
PERMIT

Preface

This document summarizes Carroll County, Maryland's compliance efforts taken in response to conditions attached to the National Pollutant Discharge Elimination System Permit No. 99-DP-3319 (MD0068331) issued for the County's municipal storm sewer systems. Permit No. 99-DP-3319 is required under Section 1342 (p) of the Clean Water Act (ref.: USC, Title 33, Ch. 26, Sub. Ch. IV). It is in response to the specific requirements in 40 CRF122.42(c). This report provides final documentation under Carroll County's third generation permit (July 1, 2014 through December 28, 2014). It also includes the first 6 months of the County's fourth generation permit from December 29, 2014, through June 30, 2015.

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MDE 2013/2014 Annual Report Assessment Response

This section of the annual report addresses documentation received from the state regarding MDE's Assessment and Recommendations related to previously submitted annual reports (2013/2014); therefore, the response to comments from the assessment is focused on the reporting period from July 1, 2012 to June 30, 2014. The assessment documentation included in *Attachment 1* provided comments related to the reporting period as provided in the submitted annual report. The following is a discussion, presented by permit condition, related to issues which were identified within the assessment.

Source Identification

MDE Comment: *A review of the 2013 County's electronic BMP database found: 1035 records, 1035 records missing as built dates, 33 records missing drainage area, and 200 records missing last inspection dates.*

MDE Comment: *The review of the same BMP database submitted in 2014 found: 884 records, 884 records missing as built dates, and 2 records missing drainage area.*

Response: The 2013 Annual Report Stormwater Management (SWM) Best Management Practices (BMP) database showed all the records relating to structural SWM BMPs, as-built approved facilities, SWM approved but not constructed facilities, and facilities which could have been under construction at the time the annual report was written. The only facilities listed in the 2014 Annual Report were those facilities which had an associated approved as-built; therefore, the record number was higher in 2013 compared to 2014. In both annual reports the database information clearly indicates the as-built approval dates. In 2013, the column was entitled "As-Built App," and in 2014 it was under column "R," "As Bui App". In 2013, the report showed 33 projects with missing drainage areas; however, this report as noted above showed all the SWM facilities (approved with no as-built and facilities with as-builts). The report for 2014 had only two (2) facilities which did not include the drainage areas (DA), and these two (2) facilities have been updated to include the DA. Approximately 200 facilities in the 2013 report could not have a last inspection date as the construction had not been completed at the time of the report.

Discharge Characterization (Assessment of Controls)

MDE Comment: *For reporting year 2014, the County submitted data for only 7 sampling events (out of 8 required). The County noted this in its report, but did not explain why it fell short of the requirement in this year. If circumstances out of the County's control prevent the required sampling of 8 storms, the County needs to provide an explanation as to why this occurred.*

Response: The final storm event that was targeted for the 2014 reporting year did not produce the amount of rainfall needed to capture the three limbs of the storm which resulted in inadequate data for the sample event.

MDE Comment: *The County is missing a "station name" column in its Table F submission (but mentions in its annual report the name of the site, the Air Business Park). In future submissions please include this column.*

Response: The associated "station names" column (outfall, instream) was included in Table F. An additional column labeled "station name" was added to minimize any confusion.

MDE Comment: *For Reporting year 2014, the County labels each event by the month and year of the sample; however, the day and time of sampling are missing. In 2013, the County does report the day of the sampling, but is missing the time of sampling. If these parameters were also captured, please submit this information.*

Response: This data was collected and should have been part of the submission. The required information will be submitted in the future. The 2013/2014 reporting years have been updated.

Stormwater Management

MDE Comment: *There are minor discrepancies between the numbers reported as part of the narrative and the urban BMP database. These need to be resolved.*

Response: The numbers listed in the narrative and the numbers in the database could appear different because a facility may be inspected numerous times in order to gain compliance; however, the last inspection date should be in the database. In future annual reports, we will make sure that the numbers are consistent; however, if there are discrepancies, we will indicate the reason for the differences in the narrative.

MDE Comment: *Additional information is needed regarding on-going corrective action, for example the FY-14 annual report should clearly indicate how the 18 sites pending enforcement action from the FY 13 annual report were resolved.*

Response: Each of the annual reports has a "Comment" column which indicates the reason that the facility was disapproved. Once these violations have been addressed, the site no longer appears as being disapproved and is considered in compliance.

Illicit Discharge Detection and Elimination (IDDE)

MDE Comment: *"Per permit requirements, the County should begin including these parameters in its outfall screening and submit a complete Attachment A in subsequent reports".*

Response: Parameters as noted will be consistently included in future outfall screening and reported.

MDE Comment: ***"****Out of 43 flows that were observed and reported in Attachment A for 2014, chemical tests were only conducted on 14. In 2013, 51 flows were recorded, but only 4 were chemically tested. Per Part III.E.3.a of the permit, the County shall begin chemically testing*

every dry weather flow discovered during its outfall screening, and report these data in Attachment A".

Response: The source of flows not chemically tested were from either natural groundwater seeps or normal wet stormwater pond storage facility discharges lacking physical indicators of potential pollutants under dry weather conditions. The majority of these, if not all, flow year round. As a check, in-flow pipes to stormwater management facilities are observed for illicit discharges. The flow source should have been provided in the "Comments" section of Attachment A for clarification and will be provided in future reporting.

MDE Comment: *"The County has not reported conducting routine surveys of commercial and industrial watersheds for discovering and eliminating pollutant sources as required per PART III.E.3.b of the permit. In future annual reports, the County shall provide information on its activities to meet this condition."*

Response: Routine commercial/industrial survey information will be provided in future annual reports.

MDE Comment: *"Although a total of 94 instances of dry weather flow were recorded in Attachment A in 2013 and 2014, the County indicated that only six flows required investigation and two were described as potentially illicit. The reason the other dry weather flows were not investigated is unclear, particularly since chemical tests were not conducted on the majority of detected discharges. In future annual reports, the County should include details on investigations, discharge sources, corrective actions taken, and enforcement in order to demonstrate that the County is actively eliminating illicit discharges and dumping."*

Response: Every dry weather flow source is investigated and is the foremost concern of each inspection for Carroll County. Flows not tested were due to groundwater or wet stormwater pond storage discharge sources as explained above and not from an illicit discharging source. These normal discharge sources will be noted in future reports. Standard dry weather outfall screening and investigative procedures are in place and conducted for all suspect flows and elimination of confirmed illicit discharges. Details of these activities will be included in future annual reports.

Property Management and Maintenance

MDE Comment: *"Additional information should be provided on the use of SWPPPs at these facilities to prevent stormwater pollution, and whether quarterly and annual inspections of SWPPPs were performed as required by MDE."*

Response: We believe the information provided under this section was sufficient. The MS4 permit number 99-DP-3319 (MD0068331) for which the 2013/2014 annual reports were prepared simply states, "*The status of pollution prevention plan development and implementation shall be submitted annually."* At the time of reporting the facilities were under the "02SW" version of the General Permit for Stormwater Associated with Industrial Activities. In both 2013 and 2014 annual reports, a table indicates the SWPPP status for the facilities as "Current." We interpret this to refer to the status of implementation of the SWPPP documents themselves and

an update regarding their status. The report indicates status, includes if the SWPPP was up-to-date, including inspections and comprehensive evaluations, etc., which also is an 02SW permit requirement. The 2013 report narrative states, *"Throughout the permit year, a comprehensive evaluation of each Stormwater Pollution Prevention Plan occurred for each facility resulting in updates and/or revisions for implementation and greater effectiveness for which they were designed."* The 2014 report states that *"a comprehensive update of each Stormwater Pollution Prevention Plan occurred for the 4 facilities for submittal to MDE with respective Notice of Intent applications."*

The County continues to make every effort possible related to compliance with permit conditions. We appreciate MDE's review and comment on annual report submittals as improvements to program methods and techniques are based largely on such feedback. Carroll County is fully committed to improving our NPDES program as well as our local waterways. Working cooperatively via the annual report assessment and recommendations provides an excellent partnership between our agencies.

Part I. Identification

A. Permit Number

99-DP-3319 (MD0068331)

B. Permit Area

This permit covers all stormwater discharges from the municipal separate storm sewer system (MS4) owned or operated by Carroll County, Maryland. This permit covers all stormwater discharges from the municipal separate storm sewer system (MS4) owned or operated by Carroll County, Maryland (permittee), and the following incorporated municipalities: the Towns of Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Union Bridge and the Cities of Taneytown and Westminster (co-permittees).

C. Effective Date

December 29, 2014

D. Expiration Date

December 28, 2019

Part II. Definitions

Terms used in the Carroll County permit are defined in relevant chapters of the Code of Federal Regulations (CFR) or the Code of Maryland Regulations (COMAR). Terms not defined in CFR or COMAR shall have the meanings attributed by common use, unless the context in which they are used clearly requires a different meaning.

Part III. Water Quality

The permit requires the co-permittees to manage, implement, and enforce a stormwater management program (SWMP) in accordance with the Clean Water Act (CWA) and corresponding stormwater NPDES regulations. According to Maryland Department of the Environment's (MDE) "Basis for Final Determination to Issue Carroll County's NPDES MS4 Permit," the goals of Carroll County's MS4 permit are to control stormwater pollutant discharges and unauthorized discharges into the MS4, to improve water quality within the county's urban watersheds, and to work toward meeting water quality standards (WQS).

In alignment with these goals, 402(p)(3)(B)(iii) of the CWA requires the County to implement "…controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and systems, design and engineering methods, and

such other provisions as the administrator or state determine appropriate for the control of such pollutants." Carroll County has aggressively and consistently pursued measures to improve water quality and work towards compliance with its NPDES MS4 permit, effectively prohibiting pollutants in stormwater discharges or other unauthorized discharges into the MS4 through these measures.

The County fully supports its stormwater program through strong fiscal commitments, staffing resources to implement the program, and coordination between co-permittees. The County's fiscal expenditures and capital budgeting – historically, currently, and planned – demonstrate the implementation of this commitment. Achieving the impervious mitigation goal of the third generation permit and continued impervious area restoration show the County's aggressive implementation toward meeting these goals. Extensive public outreach efforts and interjurisdictional coordination between co-permittees to address mitigation, stormwater pollution prevention, illicit discharge detection and elimination, restoration plan development, and other permit requirements are evidence of the continued commitment and strengthening of the collective stormwater programs of the co-permittees. The co-permittees further demonstrate the commitment to achieve the impervious restoration requirement and other provisions and requirements contained in the permit through the Memorandum of Agreement (MOA) signed by all co-permittees. This MOA obligates funding for the capital costs to meet the permit's impervious restoration requirements associated with the municipalities, as well as overall administrative support by the County.

EPA and MDE have determined that the 20 percent restoration requirement is an approved effluent limit consistent with, and satisfactory for, addressing both the Chesapeake Bay and other applicable TMDL wasteload allocations (WLAs). The County achieved its impervious mitigation goal of the third generation permit, and the co-permittees continue to actively and aggressively implement an adaptive program of restoration to achieve the fourth generation permit's impervious requirements. As shown in the Program Funding section of this report, the funding needed to support the operating expenses of this program and permit administration, as well as the funding necessary to address the impervious restoration requirement, are programmed and budgeted for the permit term. Additionally, the Management Program and Program Funding sections demonstrate that the programmatic structure is in place to develop restoration plans to address WLAs and approved TMDLs for all of the county's watersheds.

Recognition should be given to conflict between the requirement for specific projects, costs, and deadlines in the restoration plans to meet WLAs and the allowance for an iterative process of continuous, adaptive implementation within the regulatory framework of this permit. Application of the scientific method to the TMDL implementation process should allow for the error and uncertainty in the modeling process by establishing a margin of error, or subsequently a margin of safety, that does not assume the modeling results and WLA are underestimating the effort needed to achieve water quality standards. Rather, a more appropriate adaptive implementation approach for TMDL compliance might be to apply the same approach used with impervious surface area restoration, which sets a percentage to be achieved in each permit term. The current approach solicits a very specific and substantial commitment of funds and projects that may or may not be needed to achieve the goal.

Part IV. Standard Permit Conditions

A. Permit Administration

The legal responsibility for maintaining the conditions included in this permit lies with the Carroll County Board of Commissioners. The Commissioners have delegated responsibility to the Carroll County Department of Land and Resource Management (LRM) to provide administrative and technical implementation of the NPDES MS4 permit. The LRM Director provides direct administration of the permit. An organizational chart for LRM can be found in Appendix A.

LRM has one dedicated position, the NPDES Compliance Specialist, assigned to the NPDES MS4 program. The NPDES Compliance Specialist position is jointly funded by Carroll County and the eight incorporated municipalities. This arrangement was coordinated through the Water Resource Coordination Council (WRCC). Under the direction of the Director, the NPDES Compliance Specialist implements certain aspects of NPDES MS4 program requirements. Key responsibilities for this position include:

- Liaison to MDE;
- Coordinates, manages, and implements certain permit requirements in accordance with federal, state, and local laws;
- Coordinates with County/municipal personnel, other government officials, and citizens regarding NPDES compliance issues;
- Coordinate illicit discharge inspections and routine surveys with County/municipal personnel to discover and eliminate pollutant sources;
- Designs, coordinates, and maintains Geographic Information System (GIS) and Global Positioning System (GPS) applications for NPDES MS4 compliance; and
- Coordinate development of compliance education, training, and outreach programs.

The Bureau of Resource Management (BRM) provides vital NPDES MS4 operational and technical support, including fieldwork, GIS mapping, monitoring, inspections, compliance, watershed management, and various other responsibilities. The BRM holds the primary responsibility for external environmental compliance through the administration of Carroll County Government's environmental and land development codes, ordinances, and standards. These include stormwater management, floodplain management, forest conservation, landscape enhancement, water resource management, grading, erosion and sediment control, and storm sewer systems management.

The County/municipal joint permit eliminates political boundaries as a watershed planning consideration. This working relationship has made compliance with the NPDES MS4 requirements more purposeful and effective. The NPDES Compliance Specialist supports each municipality in storm sewer system mapping, illicit discharge detection and elimination inspections, routine surveys, public education and outreach efforts, and more.

Annual written agreements between the County and each municipality further delineate services the County will provide to support implementation and compliance with the permit and the environmental and land development codes, ordinances, and standards to support the County's program. **Table 1** shows the assignment of responsibilities for review, inspection, and bonding for each municipality.

Compliance by each individual co-permittee jurisdiction with various permits lies with County agencies or municipalities that oversee the facilities. Coordination between these agencies and LRM regarding NPDES compliance remains a priority. In addition, the County continues to work jointly with the municipalities to ensure ongoing implementation of compliance responsibilities. Any future changes in the administration of this permit will be reported to MDE.

Table 1
Review, Inspection, and Bonding: Assignment of Responsibilities

Carroll County Code & Activity	Hampstead	Manchester	Mount Airy	New Windsor	Sykesville	Taneytown	Union Bridge	Westminster
Floodplain								
Review*	C/C	C/C	C/C	C/C	C/C	C/C	C/M	C/M
Bond	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Inspection	C	C	C	C	C	N/A	C	M
Easement	C	C	C	C	C	C	M	M
Grading								
Review*	C/C	C/C	C/C	C/C	C/C	C/C	C/C	C/C
Bond	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Inspection	C	C	C	C	C	C	C	C
Sediment Control								
Review*	SCD/S	SCD/S	SCD/S	SCD/S	SCD/S	SCD/S	SCD/S	SCD/S
Bond	C	C	M	C	M	M	C	C
Inspection	C	C	C	C	M/C	C	C	C
Stormwater Management								
Review*	C/C	C/C	C/C	C/C	C/C	M	M	C/M
Bond	C	C	M	M/C	M	M	M	M
Inspection	C	C	C	M/C	M/C	M	M	C
Easement	C	M	M	M	M	M	M	M
Landscape								
Review*	C	C/C	C/M	C	C/M	C/C	M	M
Bond	C	C	M	C	M	C	M	M
Inspection	C	C	M	C	M	C	M	M
Forest Conservation								
Review*	C/C	C/C	C/C	C/C	C/C	C/C	C/C	C/C
Bond	C	C	C	C	C	C	C	C
Inspection	C	C	C	C	C	C	C	C
Easement	C	C	C	C	C	C	C	C
Water Resources								
Review*	C/No Code	C/C	C/C	C/C	C/C	C/ No Code	M	CO/ No Code
Bond	N/A	N/A	N/A	N/A	N/A	N/A	M	N/A
Inspection	N/A	C	N/A	C	C	N/A	M	N/A
Easement	N/A	C	M	C	C	N/A	M	N/A

Key: **C = County** **M = Municipality** **S = State** **SCD = Carroll Soil Conservation District**

** Review performed by / whose code*

Source: Carroll County Bureau of Resource Management

B. Legal Authority

Continuation of Established Authority – The legal authority established under this permit remains within the Carroll County Code of Public Local Laws and Ordinances. In addition, a Memorandum of Agreement (MOA) between the County and incorporated municipalities dated October 2014 establishes cost-sharing and co-permittee responsibilities in complying with this permit.

Chapter 53 of the County Code, Environmental Management of Storm Sewer Systems, was adopted by all permit jurisdictions. The chapter gives Carroll County and the municipalities a practical, effective regulatory tool that provides standards to protect the MS4.

C. Source Identification

The permit requires identification of the sources of pollutants in stormwater and the systems which convey the runoff. Carroll County maintains staffing dedicated to NPDES MS4 compliance, concentrating on those efforts that relate to storm drain system delineation and facility compliance. GIS and GPS are employed to assist in mapping and data analysis. These tools are used to help identify drainage systems exhibiting stormwater quality deficiencies. GIS and GPS also provide detailed locations for issues identified during the watershed assessments, which aids in developing effective restoration plans when needed.

1. Storm Drain System GIS Mapping & Database (County and Municipalities)

Initial or baseline storm drain system infrastructure mapping for the entire County MS4 including new co-permittee municipalities was completed in 2013. NPDES Phase I MS4 geodatabase files are maintained using the County's GIS software ArcMap 10.3. Recent periodic updates included removal of overlapping Maryland State Highway Administration (SHA) storm drain infrastructure from the MS4 as shown in **Table 2**. Updates utilize detailed as-built survey plans of newly constructed storm sewer systems in digital format provided through the development process. Other source data for revisions may include various archive sources, SHA sources, infrastructure engineering surveys, aerial photography, and various field inspections.

Table 2
Storm Drain System Mapping Status: NPDES MS4 Jurisdictions

Municipality	2014 Periodic Update (Including SHA Overlap Removal)
Hampstead	6/30/15
Manchester	6/30/15
Mt. Airy	6/30/15
New Windsor	6/30/15
Sykesville	6/30/15
Taneytown	6/30/15
Union Bridge	6/30/15
Westminster	6/30/15
Carroll County	6/30/15

The Carroll County NPDES Phase 1 MS4 geodatabase includes stormwater facilities, storm drain pipes, storm structures, and drainage area layers. The storm structures sub-layer includes inlets, manholes, risers, end sections, and outfalls. NPDES outfalls maintained in the storm structures layer currently contain 288 major outfalls. Storm drain system GIS files for the MS4 are included with this report on the enclosed CD under Appendix B.

In the next permit year, the County MS4 GIS storm drain system data will be restructured and refined using ArcMap 10.3. This refinement will improve infrastructure data attribute standards, data management, accuracy, and digital export compatibility in anticipation of MDE's MS4 Geodatabase System. A review of owner/operator classification of the mapped storm drain system will be performed to more clearly define the County MS4 and other storm drain systems including SHA, municipal and private entities, etc.

2. Industrial and Commercial Sources

Industrial and commercial pollutant source identification is a component of watershed assessments, regular stormwater management BMP maintenance inspections, and the Illicit Discharge Detection Elimination (IDDE) program. Specific industrial and commercial land uses with the potential to contribute significant pollutants were reviewed to identify potential sources as described in the method below.

ArcGIS 10.3 was used to determine which properties fit certain characteristics.

1) Initial properties were selected that were greater than 1 acre, within 300 feet of a stream, and for which the existing use of land was industrial, commercial, extractive, or mixed use.

    a) A definition query was used to narrow down the Carroll County properties to those greater than 1 acre with the land uses listed above.

    b) The BMP drainage area and active permit shapefile database was spatially joined to the property shapefile to give the property shapefile important attributes such as the presence of General Industrial Stormwater Permits, General Discharge Permit from Mineral Quarries, Borrow Pits, Concrete and Asphalt Plants, Individual Permit for Discharges to Surface Water and/or Groundwater, and presence of BMPs.

    c) A 300-foot buffer was created from the streams within the county and a spatial selection and export were used to create a final property shapefile which included 232 total properties of interest.

2) The Carroll County impervious surface shapefile was clipped to the 232 properties of interest. The determination within each watershed of the number of properties, property acres, number of properties with BMPs, percent of properties containing a BMP, impervious acres, and average percent impervious were calculated through multiple iterations using the "tabulate intersection" tool and the 8-digit watersheds as zones.

3) The tabulate intersection tool was also used to calculate the percent and number of impervious acres for each property, using the properties as zones, followed by a subsequent join to the property shapefile.

It should be noted that acreage calculations for properties within more than one watershed were not split but rather wholly included in both watersheds. One will simply locate those few properties and observe the watershed that is encompassed for each proportion of the property.

The complete industrial and commercial property process and map can be found in Appendix C. Those properties identified via this analysis are to be field screened for the potential to contribute significant pollutants to the MS4.

3. Urban Best Management Practices (Stormwater Management Facility Data)

The BRM manages stormwater management facility data for the County and municipalities, with the exception of Taneytown, in a centralized stormwater management database. The database contains information related to facility location, ownership, review and approvals, drainage area, inspections, and other potential information. This is the basis for mapping of stormwater management Best Management Practices (BMPs) using the GIS application.

Mapping of stormwater facilities and associated data within all municipalities has been completed. There are 906 as-built certified and approved stormwater facilities throughout the County and municipalities. The City of Taneytown reported 38 approved stormwater facilities, with 37 as-built surveys and one in progress. All facilities, drainage areas, and outfalls have been mapped with associated data in various watersheds.

As development projects are constructed, the stormwater facilities and their drainage areas are mapped and linked to data entered into the County's database. In addition, as stormwater facilities are retrofitted as a BMP, the database is updated.

Appendix B includes the County stormwater management database map of newly added stormwater facilities in the county.

4. Impervious Surfaces

Carroll County continued implementing an aggressive program related to watershed restoration projects through the end of its third generation permit (December 2014). A specific list of impervious surface restoration projects can be found in Part IV C.6 of this report. **Figure 1** represents the final results of the third generation permit impervious surface assessment. The County was required under the third generation permit to restore 672 acres (10% of untreated County MS4 impervious area). In addition, the permit required, per Part III, to begin implementation of restoration efforts on an additional 10 percent of the county's untreated impervious surface area. This would equate to a total of 1,344 acres to be completed and underway through the permit cycle. As seen on the "Carroll County Impervious Acres Treatment Breakdown" graph in **Figure 1,** the County's actual completed restoration as of

December 2014 was 1,767 acres. This final accounting provides an actual final restoration level for the third generation permit of 26 percent.

The fourth generation permit (December 29, 2014) allowed for the reassessment of impervious surfaces and the development of a baseline per MDE's *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for National Pollutant Discharge Elimination System Stormwater Permits*, August 2014. The new analysis and updated assessment of impervious surfaces utilized when implementing the fourth generation permit can be found in Part IV.E.2. of this report.

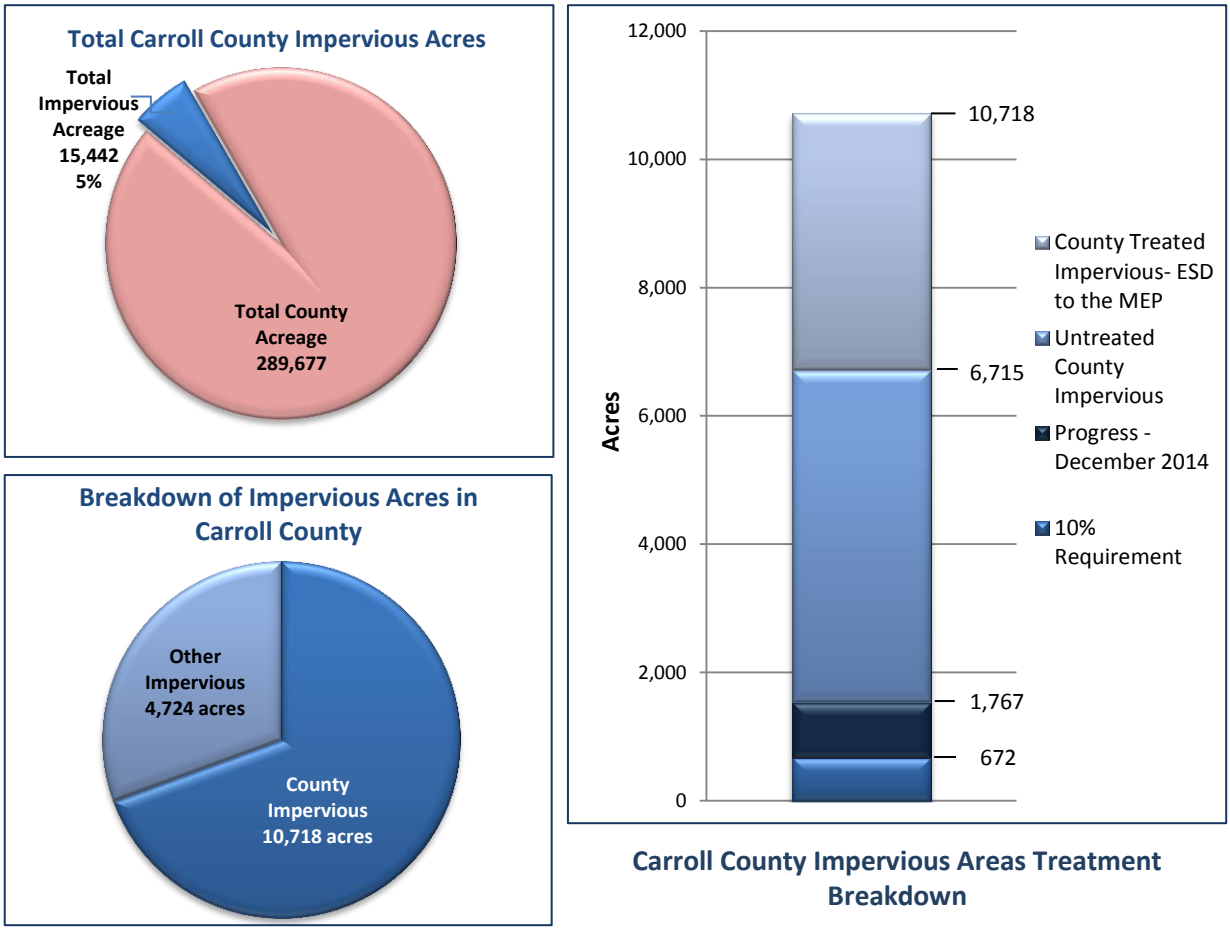


Figure 1: Third Generation Permit Impervious Surface Assessment

5. Monitoring Locations and Watershed Restoration

The BRM is responsible for monitoring and watershed assessment efforts required under the NPDES MS4 permit. These efforts include the survey and verification of existing conditions as well as the performance of site and natural resource assessments and potential water quality issues. These efforts are integral to the NPDES MS4 program since the results provide a means

for measuring program implementation. The BRM's watershed assessments support the development of restoration plans required in the permit. Staff identifies watershed restoration opportunities and implements watershed improvement projects. Efforts related to these items are provided in Part IV.E. of this report.

6. Water Quality Improvement Projects

Carroll County continues to vigorously apply its watershed restoration efforts, i.e., impervious surface mitigation and water quality improvements. Projects are designed, managed, and implemented by LRM and BRM through a capital improvement program, which is titled Watershed Assessment and Improvement (NPDES) in the Carroll County Community Investment Plan (CIP). Funding for operating (administrative/technical) and capital (engineering and construction functions) is discussed in detail in Part IV.G. of this report.

The County continues to plan, design, and implement restoration projects including the following:

- rehabilitating and upgrading older stormwater management facilities to current standards;
- managing existing untreated impervious areas; and
- planting stream buffers.

During the final six-month period of the third generation permit (July to December 2014), the County completed one stormwater retrofit project, equaling 0.55 acres of treated impervious surface and 1.33 acres of treated drainage area. In addition, two tree plantings associated with stream buffer enhancement were implemented which resulted in 14.11 acres of impervious acres treated. During the initial six-month period of the fourth generation permit (January to July 2015), the County completed two stormwater retrofit projects, equaling 15.81 acres of treated impervious surface and 84.2 acres of treated drainage area. In addition, three tree plantings associated with stream buffer enhancement were implemented which resulted in 6.36 acres of impervious area treated. Specific projects completed (green), in design (yellow), and planned (orange) can be found in **Table 3**.

The BRM maintains GIS data layers of all environmental easements established during the development process. These easements have specific conditions which provide protection measurements to the delineated resources. The easements are perpetual and dedicated to the Board of County Commissioners and/or relevant municipality in certain cases. Those easements include forest conservation, floodplain, and water resource protection. Certain water resource easements are associated with stream systems on developed property and are based on variable-width criteria. As of June 30, 2015, the County holds easements on approximately 3,911.60 acres for forest conservation, 595.95 acres for floodplain, and 1,827.03 acres for water resource protection. All easements are subject to inspection and monitoring for compliance.

Table 3
Listing of Watershed Restoration Efforts, July 2015
NPDES

Year	Project Name	Project Type	Drainage Area	Project Status	Reported Impervious Area	MDE8NAME
			Projects Completed			
1996	Winter Street Shallow Marsh	Wetland Planting	0.00	Completed	0.00	Liberty Reservoir
1997	Longwell County Park Channel Restoration	Restoration	211.20	Completed	142.80	Liberty Reservoir
1997	Longwell County Park Wetland	Shallow Marsh	76.80	Completed	53.76	Liberty Reservoir
1998	Carroll County Times Channel Reconstruction	Restoration	6.60	Completed	0.50	Liberty Reservoir
1998	Carroll County Times SWM Retrofit	Dry Detention Pond	10.26	Completed	3.02	Liberty Reservoir
1998	East Middle School Water Quality Facility	Shallow Marsh	10.18	Completed	0.80	Liberty Reservoir
1999	Carroll County District Court	Retrofit	1.96	Completed	0.00	Liberty Reservoir
1999	Piney Run Channel Reconstruction	Restoration	397.04	Completed	258.07	Loch Raven Reservoir
2000	Carroll County MPC Parking Mgmt.	Retrofit	0.60	Completed	0.60	Liberty Reservoir
2000	Carroll County Times	Retrofit	0.30	Completed	0.30	Liberty Reservoir
2000	Carroll County Times Addition	Retrofit	6.80	Completed	0.00	Liberty Reservoir
2000	Piney Run Buffer Project	Riparian Buffer	0.00	Completed	0.40	Loch Raven Reservoir
2000	Ralph Street Facility	Water Quality Marsh	29.50	Completed	16.50	Liberty Reservoir
2001	Hampstead Valley 3 Dry Retention	Riser Structure Construction	79.19	Completed	32.27	Loch Raven Reservoir
2001	North Woods Trail Dry Retention Facility	Outfall Modification	236.80	Completed	0.00	Loch Raven Reservoir
2001	Roberts Field Wet Retention Pond Retrofit	Riser Structure Modification	47.20	Completed	0.00	Loch Raven Reservoir
2005	Eldersburg Elementary School	Retrofit	1.45	Completed	1.00	Liberty Reservoir
2006	Chung Project	Channel Stabilization	92.00	Completed	10.00	S Branch Patapsco
2007	Winfield Fire Department Addition	New Construction	3.13	Completed	0.22	S Branch Patapsco
2007	Englar Business Park	Retrofit	95.00	Completed	80.00	Liberty Reservoir
2007	Marriott Wood I Facility #1	Replace	3.00	Completed	0.56	Liberty Reservoir
2008	Neale Court Storm Drain	Retrofit	3.23	Completed	0.64	S Branch Patapsco
2008	Hickory Ridge	Retrofit	23.75	Completed	8.16	Liberty Reservoir

Year	Project Name	Project Type	Drainage Area	Project Status	Reported Impervious Area	MDE8NAME
2008	Bateman SWM Pond	New Construction	47.25	Completed	17.76	Liberty Reservoir
2008	Marriott Wood I Facility #2	Retrofit	7.12	Completed	3.88	Liberty Reservoir
2008	Marriott Wood II	Retrofit	11.62	Completed	2.30	Liberty Reservoir
2008	Westminster Airport Pond	Retrofit	204.84	Completed	110.50	Liberty Reservoir
2008	Piney Run Planting (Filbey)	Buffer Planting	47.20	Completed	1.14	S Branch Patapsco
2008	Elderwood Village	Retrofit	15.28	Completed	6.42	Liberty Reservoir
2008	Collins Estate	Retrofit	32.68	Completed	8.90	Liberty Reservoir
2008	Arthur Ridge	Retrofit	51.17	Completed	5.14	S Branch Patapsco
2009	Oklahoma II Foothills	Retrofit	23.72	Completed	7.88	Liberty Reservoir
2009	Oklahoma Phase I	Retrofit	24.44	Completed	12.36	Liberty Reservoir
2009	Deer Park Tree Planting	Buffer Planting	16.28	Completed	0.57	Liberty Reservoir
2009	Edgewood	Retrofit	38.00	Completed	16.97	Liberty Reservoir
2009	South Carroll High School - Fine Arts Addition	New Construction	28.19	Completed	14.32	S Branch Patapsco
2009	Naganna Pond	New Construction	24.50	Completed	14.00	Liberty Reservoir
2009	High Point	Retrofit	9.40	Completed	2.37	Liberty Reservoir
2010	Brimfield	Retrofit	34.69	Completed	29.30	S Branch Patapsco
2010	Hoff Pond	New Construction	77.30	Completed	42.61	Liberty Reservoir
2010	Heritage Heights	Retrofit	21.40	Completed	10.25	Liberty Reservoir
2010	Quail Meadows	Retrofit	55.40	Completed	14.50	Liberty Reservoir
2010	Harvest Farms 1A	Retrofit	43.80	Completed	23.62	S Branch Patapsco
2010	Parrish Park	Retrofit	94.23	Completed	18.20	S Branch Patapsco
2010	Clipper Hills - Gardenia	Retrofit	33.19	Completed	16.62	S Branch Patapsco
2010	Clipper Hills - Hilltop	Retrofit	43.82	Completed	21.44	S Branch Patapsco
2010	Sun Valley	Retrofit	12.80	Completed	3.27	Liberty Reservoir
2012	Chrisman Property	New Construction	6.75	Completed	1.60	Liberty Reservoir
2013	Prettyboy Tree Plantings	Buffer Planting	15.69	Completed	1.06	Prettyboy Reservoir
2013	Lower Monocacy Tree Plantings	Buffer Planting	11.85	Completed	4.09	Lower Monocacy
2013	Bennett Cerf Tree Planting	Buffer Planting		Completed	0.25	Liberty Reservoir
2009	Westminster High School	New Construction	115.00	Completed	63.18	Liberty Reservoir
2013	Benjamin's Claim	Retrofit	47.10	Completed	20.51	S Branch Patapsco
2013	Friendship Overlook/Diamond Hills Section 2	Retrofit	82.01	Completed	19.92	Double Pipe Creek

Year	Project Name	Project Type	Drainage Area	Project Status	Reported Impervious Area	MDE8NAME
2013	Diamond Hills Section 5	Retrofit	51.80	Completed	19.51	Liberty Reservoir
2013	Carrolltowne 2B	Retrofit	34.61	Completed	10.38	S Branch Patapsco
2013	Carrolltowne Gemini Drive	Retrofit	87.73	Completed	44.75	S Branch Patapsco
2013	Westminster Community Pond	New Construction	250.22	Completed	43.92	Liberty Reservoir
2013	Cherry Branch Tree Planting Phase I	Buffer Planting	–	Completed	1.52	Double Pipe Creek
2013	Sunnyside	New Construction	30.20	Completed	9.36	Double Pipe Creek
2014	Wakefield Valley Tree Planting	Buffer Planting	–	Completed	3.35	Double Pipe Creek
2014	Liberty Tree Plantings	Buffer Planting	–	Completed	2.07	Liberty Reservoir
2014	Eldersburg Estates 3-5	Retrofit	34.90	Completed	8.16	S Branch Patapsco
2014	Cherry Branch Tree Planting Phase II	Buffer Planting	–	Completed	1.14	Double Pipe Creek
2014	Cherry Branch Tree Planting Phase III	Buffer Planting	–	Completed	0.57	Double Pipe Creek
2015	Water Resource Easement Buffers	Grass Buffer	–	Completed	224.26	Multiple
2015	Floodplain Easement Buffers	Grass Buffer	–	Completed	43.21	Multiple
2015	Septic Pumping (updated yearly)	–	–	Completed	222.30	Multiple
2015	Mechanical Street Sweeping	–	–	Completed	0.74	Liberty Reservoir
2015	Mechanical Street Sweeping	–	–	Completed	1.06	Double Pipe Creek
2015	Braddock Manor West	Retrofit	49.30	Completed	7.65	S Branch Patapsco
2015	Benjamin's Claim Basin B	Retrofit	1.33	Completed	0.55	S Branch Patapsco
2015	Double Pipe Creek Planting #1	Buffer Planting	–	Completed	3.97	Double Pipe Creek
2015	Double Pipe Creek Planting #2	Buffer Planting	–	Completed	1.82	Double Pipe Creek
2015	South Branch Plantings	Buffer Planting	–	Completed	4.16	S Branch Patapsco
2015	Municipal Plantings	Buffer Planting	–	Completed	9.95	
	Totals		***3,152.80***		***1,788.93***	
			Projects In Design			
2013	Finksburg Industrial Park	Retrofit	61.40	Design	22.12	Liberty Reservoir
2014	Miller/Watts	Retrofit	39.65	Design	24.93	Liberty Reservoir
2017	Carroll County Maintenance Center	Retrofit	48.50	Design	13.03	Double Pipe Creek
2014	Elderwood Village Parcel B/Oklahoma 4 Ph. IV	Retrofit	206.88	Design	87.28	Liberty Reservoir
2015	Langdon (Jantz)	New Construction	198.00	Design	92.10	Double Pipe Creek
2013	Windemere	Retrofit	107.00	Concept	33.00	Liberty Reservoir
2015	Carroll County Farm Museum	New Construction	20.00	Design	4.00	Double Pipe Creek
2016	Manchester Skate Park	New Construction	98.30	Design	24.00	Double Pipe Creek

Year	Project Name	Project Type	Drainage Area	Project Status	Reported Impervious Area	MDE8NAME
2015	Shannon Run/Hawk Ridge	Retrofit	208.00	Concept	29.11	S Branch Patapsco
2017	Smalls Crossing/Versa Property	Retrofit	35.50	Concept	9.15	Prettyboy Reservoir
	Totals		***1,023.23***		***338.72***	
			Planned Projects			
2016	Eden Farms La Triomphe	Retrofit	168.00	Planning	85.40	Liberty Reservoir
2016	Whispering Valley Phase 4	Retrofit	95.00	Planning	21.80	Prettyboy Reservoir
2017	Squires	Retrofit	38.00	Planning	10.00	Liberty Reservoir
2017	Taneytown Elementary	Retrofit	190.00	Planning	48.00	Double Pipe Creek
2017	Greens of Westminster	Retrofit	141.00	Planning	76.00	Double Pipe Creek
2017	Piney Ridge Village As-Built 57	Retrofit	23.50	Planning	8.00	S Branch Patapsco
2017	Hampstead Regional	Retrofit	–	Planning	90.00	Liberty Reservoir
2017	Merridale Gardens	Retrofit	–	Planning	25.00	S Branch Patapsco
2017	IDA Property (Mount Airy)	New Construction	–	Planning	10.50	S Branch Patapsco
2017	Town of New Windsor Project	–	–	Planning	10.00	Double Pipe Creek
2017	Town of Union Bridge Project	–	–	Planning	10.00	Double Pipe Creek
2018	Central Maryland (Dry Facility)	Retrofit	62.90	Planning	45.00	Liberty Reservoir
2018	Central Maryland (Wet Facility)	Retrofit	87.50	Planning	38.30	Liberty Reservoir
2018	Candice Estates	New Construction	39.00	Design	13.00	Lower Monocacy
2018	Springmount Estates	New Construction	60.00	Concept	20.00	Liberty Reservoir
	Totals		***904.90***		***511.00***	
	TOTALS		***5,080.93***		***2,638.65***	

D. Management Programs

The Environmental Inspections Services Division (EISD) of the BRM remains responsible for all inspections and enforcement actions necessary to ensure that the conditions established in the review, approval, and permitting phases are met. The EISD also contributes to compliance with the County NPDES responsibilities by providing stormwater management facility maintenance inspections and assistance with illicit discharge inspections and visual surveys. During the permit year, EISD performed a total of 9,043 environmental inspections.

1. Stormwater Management

The County stormwater management program is the responsibility of the BRM within LRM as indicated in Chapter 151 of the Carroll County Code of Public Local Laws and Ordinances. The implementation of Chapter 151 is also applied to the municipalities of Hampstead, Manchester, Mount Airy, New Windsor and Sykesville. The City of Westminster has its own approved stormwater management code, which is implemented by the County. The City of Taneytown and the Town of Union Bridge implement approved stormwater management codes independent of the County (see **Table 1**). Reviews performed by the County are the responsibility of the Program Engineer and the Stormwater Management Review Assistant. Carroll County consists of 289,677 acres of land of which 11,772 acres of drainage area are treated with stormwater management practices. This equates to 4.1 percent of the county's land area. Review and approval of stormwater management during the period of July 1, 2014, through June 30, 2015, consisted of 416 plans reviewed, 25 structural as-builts, and 140 non-structural as-builts approved. There were no programmatic changes undertaken during the reporting period.

Residential stormwater management facilities and storm sewer systems in unincorporated areas are owned by the County. Commercial and industrial facilities are maintained by the property owners. Database information on facilities located in Carroll County and an updated map are contained in Appendix B of this report.

Inspections of facilities in the county and 6 of the 8 municipalities are handled by EISD. Maintenance inspections are performed each calendar year. The following is a breakdown of the 907 as-built facilities currently being inspected: 298 will be inspected during calendar year 2016, 258 will be inspected in 2017, and 351 will be inspected in 2018. Each facility is inspected every three years, with letters sent to the owner indicating the condition of the facility and the amount of time allowed for compliance to be achieved. In the case of County-owned structures, the notice is sent to the Bureau of Facilities, Bureau of Road Operations, and BRM. The EISD performed 310 inspections this year, resulting in 125 corrective actions, 281 individual facilities, and 29 re-inspections. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. As of June 30, 2015, 74 of those facilities have been brought into compliance. In cases where violations still exist, Notices of Violation are sent, allowing an additional amount of time to resolve issues. During the period of July 1, 2014, to June 30, 2015, 14 Notices of Violation were issued. The remaining 37 have been notified, and EISD is awaiting corrective action. According to COMAR 26.17.02, preventative maintenance inspections of all ESD treatment systems and structural stormwater management facilities must

be conducted at least on a triennial basis. This function is performed by the County for all municipalities except Union Bridge and Taneytown. Union Bridge and Taneytown perform their own inspections. Maintenance inspection information of all ESD treatment practices and structural stormwater management facilities is maintained according to COMAR 26.17.02.

City of Taneytown and Town of Union Bridge

The City of Taneytown and the Town of Union Bridge have independent consultants which perform plan review. Union Bridge received no development plans or re-development plans for review and issued no stormwater exemptions or waivers. Taneytown received one development plan but no re-development plans, and issued no stormwater exemptions or waivers. Union Bridge and Taneytown performed their own construction inspections. This information is maintained according to COMAR 26.17.02 for all Environmental Site Design (ESD) treatment practices and structural stormwater management facilities. Union Bridge had no facilities requiring construction inspections during this permit period. Taneytown conducted inspections on three facilities; no violations or waivers were issued.

Stormwater management structures and infrastructure intended for ownership by the City of Taneytown are inspected as constructed, typically by an independent inspector hired by the City. Frequency of inspections and reports of such inspections are determined by project specific factors. Reports including narratives and photographs are submitted to the City's Department of Public Works (DPW) for maintenance per the department's State-approved records retention schedule. Facilities intended to be deeded to the City are typically the product of residential development projects which may include storm sewer system improvements, ESD features, stormwater management structures, and may include transfer of real property or deeds of easement. Projects involving stormwater management on City-owned properties or involving City-owned facilities are also subject to construction inspections by the City or its contractor. Park development projects and construction of existing water, sewer, or stormwater infrastructure are typical of these projects. Construction inspection, reporting, and retention of reports for such projects follow the same process as the aforementioned projects by others intended for City ownership.

Stormwater management facilities, structural BMPs, or other features intended to remain under private ownership are inspected during construction by the developer's engineer in accordance with an approved construction drawing and inspection schedule incorporated into the stormwater management plan. The City's consultant engineer reviews and approves stormwater management plans prior to construction and, upon completion of a project, completes a review of the stormwater 'as-built' drawings, which are certified by the developer's engineer prior to release of construction surety. The City's DPW also provides inspection of completed stormwater facilities and coordinates with city consultant engineer on approvals. As-built plans are maintained by the City's Planning and Zoning Department in accordance with the department's State-approved retention schedule.

The City of Taneytown is required to inspect all public and private stormwater management facilities every three years under the City of Taneytown's stormwater management ordinance. Per the City's "Stormwater Management Facilities Inspection Report" prepared by the City's

consulting engineer, reports of all maintenance facilities within the City of Taneytown are inspected on a triennial basis. The consulting engineer inspected 33 SWM maintenance facilities for the City on February 20 and 21, 2013.

2. Erosion and Sediment Control

The EISD of the BRM is responsible for inspection and enforcement of all related codes. MDE has delegated sediment control enforcement authority to Carroll County through June 30, 2017. Inspection statistics relating to building permits, grading permits, and forest-harvest grading permits during the reporting timeframe are as follows: 135 grading permits issued and 4,075 sediment control inspections.

All inspections are recorded with notices sent for both violations and compliance. In 10 cases, Stop Work Orders were posted for severe violations, which in most instances required compliance within 36 hours. Currently, there are no outstanding violations.

Grading permits are issued on all projects with disturbance in excess of 5,000 square feet. Pre-construction meetings are held to discuss the project and meet with the site foreman who holds a valid "Responsible Personnel Certification" as required by MDE.

As part of the NPDES permit requirements, grading permits issued with earth disturbance in excess of one acre are reported to MDE quarterly.

3. Illicit Discharge Detection and Elimination (IDDE)

The permit requires that an inspection and enforcement program continue to be implemented to ensure that all discharges to and from the MS4 that are not composed entirely of stormwater are either permitted by MDE, exempt under the NPDES Phase 1 MS4 permit, or eliminated. Carroll County Government provides support for illicit discharge monitoring, detection, and elimination in cooperation with municipal co-permittee responsibilities. The MOA between the County and the municipalities wherein services are provided in support of the permit satisfies part of this requirement. No modifications to municipal ordinances and regulations related to the County Code Chapter 53, "Environmental Management of Storm Sewer Systems," were made or needed to be made in this permit year.

Field screening of at least 100 outfalls annually is performed by the County's Environmental EISD of the BRM and the NPDES Compliance Specialist. These staff participated in annual IDDE training prior to the inspection season. Current standard operating procedures (SOP) and parameters in the County's IDDE Guidance Manual were reviewed and are based on the U.S. Environmental Protection Agency (EPA) document *"Illicit Discharge Detection and Elimination A Guidance Manual"* prepared by the Center for Watershed Protection and Robert Pitt, University of Alabama.

The County screens all major outfalls on a triennial basis. Outfall selections emphasize screening areas that have greater illicit discharge potential such as commercial and industrial land uses, densely populated areas, and aging sewer infrastructure areas. Approximately one half of major

outfall screening inspections are located in the county outside of municipalities. Assignments are prepared by county election district groupings and performed by EISD staff most familiar with industrial, commercial, residential, and construction activities in these areas. The other half fall within the eight incorporated municipalities and are inspected by the NPDES Compliance Specialist in cooperation with municipal staff, who are most knowledgeable of their local environs.

There were 105 IDDE outfalls screened for the permit year. Outfall screenings were distributed among seven watersheds as follows: Prettyboy Reservoir (10), Loch Raven Reservoir (2), Liberty Reservoir (45), Patapsco River - South Branch (15), Lower Monocacy River (8), Double Pipe Creek (14), and the Upper Monocacy River (11) (see outfall map in Appendix D).

Dry weather screening results found 36 outfalls with flow. Six of these flows were initially unconfirmed sources and received a chemical field screening test with negative results. Inflow points to these outfalls were observed for flows or illicit discharge, but none were observed. The flow source for these was determined to be from groundwater. There were 30 flows observed from normal stormwater wet BMP discharges and/or known groundwater or stream sources. These normal flows receive a chemical test only if physical indicators are present or if the location of the outfall is in an area with a land use that may have a greater potential for an illicit discharge. Of these normal flows, 12 outfalls were chemically tested.

Of the 105 screenings, 3 outfalls were identified as having potential illicit discharges. Individual dry weather screening results are documented in an Excel spreadsheet file in Appendix B. Two illicit discharges were observed and eliminated, one flowing and one non-flowing with obvious physical indicators. A summary of these investigations can be found in Appendix D. One outfall investigation was inconclusive and will be periodically rescreened and monitored and rescreened during the next permit year.

Specific industrial and commercial land uses and sites that have a potential to contribute significant pollutants have been identified per PART IV.C.2. SOPs for conducting visual surveys of these commercial and industrial areas are in place for discovering, documenting, and eliminating pollutant sources in the MS4. Prior to conducting visual IDDE surveys, NPDES compliance enforcement staff receives training regarding permit regulations, general protocols, terms, form completion, reporting, and follow-up procedures should a significant potential pollutant source be observed. When potential sources are discovered, the property owner is to be contacted by the EISD or respective municipality. The SOP guidelines and County Code Chapter 53 relating to enforcement measures are followed until the potential source is eliminated. Sites identified are currently scheduled to be surveyed at least once during the permit cycle. Sites identified as not having activities with exposure may be taken off the inventory list. Visual surveys are currently in progress. All surveys are logged into the Accela database tracking system specifically designed for documenting, managing, enforcement, and reporting purposes. A summary of 2015/2016 visual surveys can be found in Appendix D.

The MS4 is required to maintain a program to address and, if necessary, respond to illegal discharges, dumping, and spills. The County maintains a Stormwater Pollution Hotline for all Carroll County residents as indicated on the County website. The site is also linked by all eight

municipal websites. "Illicit Discharge Incident Response" SOPs have been implemented and are documented in the County IDDE Guidance Manual to quickly respond to and eliminate potential illicit/pollutant discharges in the MS4. A Pollutant Discharge (PD) Accela database is in place and managed by the County EISD. Calls from the public are investigated and processed through this program and tracked through to abatement. Protocols are also in place for quick response to inter-agency and co-permittee reporting. EISD closely coordinates with the respective municipality for elimination if an incident proves to be an illicit discharge. Significant discharges are reported to MDE as required in the permit. Fifteen illicit discharge complaints were received during the permit reporting year. An investigation summary is located in Appendix D of this report.

County Code Chapter 53 establishes methods of controlling the introduction of illicit discharges or pollutants into the MS4 in order to comply with requirements of the permit. The adoption of the ordinance by each municipality provides enforcement authority, either solely or in conjunction with the County, necessary to comply with permit requirements. **Table 4** lists the municipalities that have adopted Carroll County Code Chapter 53 and the responsible enforcement authority.

Table 4
Municipal Adoption and Enforcement Of Carroll County Code Chapter 53, Environmental Management Of Storm Sewer System

Municipality	Enforcement Authority
Hampstead	County
Manchester	County
Mount Airy	Municipal
New Windsor	County
Sykesville	Municipal
Taneytown	Municipal
Union Bridge	County
Westminster	Municipal

An Annual NPDES Stormwater Pollution Prevention Training event is held each November for administrative and public works manager/supervisory-level personnel of pertinent County bureaus and the eight municipalities. An overview of the NPDES permitting program is provided along with MS4 and 12SW Industrial Permit requirements. The training strongly emphasizes good housekeeping BMPs, Stormwater Pollution Prevention Plan practices, IDDE, storm drain technology, public education and participation, employee training, and record keeping.

Many County and municipal public works staffs are trained to perform visual inspections of storm drain systems as they go about their workday. Illicit discharges may also be observed by trained County personnel while performing various inspections for grading and sediment control, stormwater facility maintenance inspections, or flooding issues.

The NPDES MS4 staff that are performing IDDE administrative enforcement and public works maintenance to detect, respond, and report illicit discharges, dumping, spills, etc., per the permit,

received training coordinated by the LRM NPDES MS4 staff. A total of 292 employees received training.

4. Litter and Floatables

The permit requires the co-permittees to address problems associated with litter and floatables in waterways that adversely affect water quality. MDE is concerned with litter discharges to receiving waters and has required Carroll County to evaluate its current litter control associated with discharges from its storm drain system. A public outreach and education program is to be developed and implemented as needed on a watershed by watershed basis. The County, via its watershed assessment efforts, has not identified any issue related to litter and floatables within those areas assessed. Therefore, a problem with litter and floatables is not an identified concern in Carroll County.

Carroll County implements several programs to reduce and control litter along roadways, which ultimately reduces litter to county waterways:

- Eight groups actively volunteer to pick up trash along a mile stretch of roadway once in the fall and once in the spring as part of the Carroll County Department of Public Works' (DPW) Adopt-A-Road program. The County provides roadside signs, safety vests, and trash bags. Each group picks up four to five bags of trash each outing. The County picks up the balance of the trash for disposal at the County's Resource Recovery Facility (formerly known as the Northern Landfill).
- Approximately 1,238 hours in 2014 (calendar year) and 841 hours in 2015 were spent by trustees from the Sheriff's Office to pick up trash.
- Trash nuisance remediation is primarily complaint driven and site or address specific. Contractors hired by the Carroll County DPW's Roads Operations abate the trash. In 2015 (calendar year), 46 complaints were received and 11 sites were abated by the contractors.
- Hampstead provides additional public education and outreach efforts at many town events regarding the impacts of litter and floatables.
- Manchester adopted Ordinance 111, "Littering," to address litter control. In addition, Ordinance 196 addresses littering of streets and sidewalks, installation of trash cans, and dog waste stations.
- Sykesville uses volunteers to remove trash from its parks and trails along with students who are earning their community service learning hours.
- Union Bridge provides trash receptacles, which are maintained by the Town, on Main Street and at each park. The Town also uses its newsletter to encourage recycling.
- Westminster implements a regular street-sweeping program. In addition, the City's DPW holds clean-up days in coordination with McDaniel College twice a year.

Carroll County has developed and implemented a public education and outreach program to reduce littering and increase recycling, actively seeking to divert waste from the landfill. As seen in **Figure 4**, recycling participation is on the rise in Carroll County. Options for both curbside and drop-off opportunities have increased, as has the type of materials that can be recycled. While pick-up of recyclables within municipalities is provided by each individual

municipality, the County's recycling public education and outreach efforts are implemented countywide, including within the municipalities.

Curbside, single-stream recycling was implemented in 2007 (and expanded in 2008), making it easy and convenient for residents to participate. Most standard household recycling can simply be placed at the curb. Carroll County has taken advantage of grant opportunities to purchase and distribute large recycling containers that added to the ease of handling curbside recycling.

Carroll County's Recycling Operations staff offers voluntary recycling opportunities for all Carroll County residents and businesses. Licensed haulers are required to offer all of their customers a curbside recycling service. For residents or businesses who wish to haul their own waste and recyclables to the landfill, the County provides a drop-off site for waste and a full-service Recycling Center at the Resource Recovery Park and a drop-off site at Hoods Mill Landfill. Carroll's Resource Recovery Park is conveniently located in the center of the county. There is no charge for recycling.

The Recycling Center accepts all materials recycled through the County's curbside program plus many items that are not eligible for curbside pickup such as textiles, Styrofoam, rigid plastics, grocery and empty clear food bags, electronics, CD/DVD cases and disks, car and truck batteries, used motor oil, antifreeze, waste oil, cooking oil, as well as aluminum can reimbursement. Aluminum can reimbursement fluctuates with the market value. The Resource Recovery Park also accepts white goods/scrap metal for recycling. A Goodwill Donation drop off and a loading area for reusable building materials are offered onsite.

Hampstead, Manchester, Mount Airy, Sykesville, and Westminster provide bulk trash pick-up to encourage proper disposal of trash and debris to help promote better water quality. In addition, multiple municipalities have an oil, antifreeze, and/or gasoline recycling program managed by either the municipality or Maryland Environmental Service (MES) at a municipal facility or MES facility.

Since 1994, the County has banned yard waste from being mixed with household waste for disposal or in plastic bags. Citizens countywide can dispose of grass, leaves, and branches in the yard waste area of the Resource Recovery Facility. These items are mulched by a third party. Citizens are encouraged to consider backyard composting. The County provides an opportunity to purchase compost bins and rain barrels at a discounted rate in the spring. Information and announcements related to these opportunities can be found at the Recycling website at recyclecarroll.org.

The Carroll County Recycling Office offers a semi-annual household hazardous waste collection to ensure household chemicals are properly discarded. The Carroll County Recycling office diligently works to inform citizens and instill the "Reduce, Reuse, Recycle!" theme.

In Fiscal Year (FY) 2015, the County hosted several "Reduce, Reuse, Recycle!" public outreach efforts as explained below.

1. Two residential household waste drop-off events took place on April 19, 2014, and June 6, 2015. An additional event was held on October 24, 2015. Events such as these provide county residents with a safe means for:
   - disposing of household chemicals;
   - shredding of unneeded documents; and
   - learning about measures to protect the environment.
2. County residents were encouraged to dispose of unused prescription and non-prescription drugs at designated law enforcement agencies in the county.
3. The County hosted a rain barrel and composting event on April 4, 2015, to provide rain barrels and composting bins to residents at a reduced cost.

Through all recycling efforts, the County has achieved a 43.96 percent recycling waste diversion rate that includes a 5 percent source reduction credit in 2013 (based on MDE's Recycling Report). The State-mandated recycling rate is 35 percent (as of December 31, 2015).

To proactively address changing and future solid waste needs, a Solid Waste Work Group evaluated options and prepared a report with recommendations. A Solid Waste Advisory Council (SWAC) was subsequently established in 2014 to help implement recommendations of the various solid waste plans and advise staff.

The Recycling Office hosts a webpage entitled Recycling which provides extensive public education materials and opportunities (http://ccgovernment.carr.org/ccg/recycle/). The homepage provides general information and materials on recycling, as well as information targeted to recycling in the home, at schools, and for businesses. All recycling events are posted on the website, and related educational materials and documents are posted and available for download. The Recycling Program also hosts a Facebook page for followers to receive regular information and updates.

In addition to the reduce, reuse, and recycle events, information is given out to residents about hard to recycle items such as CFL bulbs, pharmaceuticals, kitchen grease, and latex paint. Recycling program staff also attends many festivals and community events where an educational booth and materials are provided and staff is available to answer questions.

In addition to all the educational materials available on the Recycling website and at events, information is routinely disseminated to the public through mailers, advertisements in local print media, local cable channels, and local radio stations.

Carroll County DPW Recycling staff coordinates closely with Carroll County Public Schools (CCPS) and Carroll Community College to address the requirements of House Bill 1290 – Environment – Recycling – Public School Plans (2009) to implement a strategy for collecting, processing, marketing, and disposing of recyclable materials from public schools. Single-stream recycling was implemented at schools and in residential communities. Various types of collection containers, provided by CCPS, are available throughout the schools. The Carroll County Board of Education is responsible for the administration of the program in all public schools and contracts for trash and recycling services.

Additionally, County recycling staff partners with the Carroll County Public Schools STEM (Science, Technology, Engineering, & Math) programs each year to educate and engage students, usually in elementary school, on issues related to recycling that coincide with the curriculum. Information related to recycling in the schools can be found on the County's Recycling webpage (http://ccgovernment.carr.org/ccg/recycle/school.asp).

The Maryland Recycling Act (MRA) requires all counties and Baltimore City to recycle 15 percent (for populations under 150,000) or 20 percent (for populations over 150,000) of the waste generated. These rates includes to 20 percent or 35 percent for counties by December 31, 2015. In addition, Maryland established a voluntary waste diversion goal of 60 percent and a voluntary recycling rate of 55 percent by 2020. The waste diversion goal is comprised of the recycling rate plus source reduction credits (maximum 5%) that Maryland counties and Baltimore City earn through activities designed to reduce the amount of waste going to the waste stream.

Carroll County continues to exceed the State goal for recycling and receive the maximum credit for waste diversion. Despite the challenges of the recycling market, recycling rates are climbing in the county. In addition, the County continues to provide extensive public outreach efforts and events to promote "Reduce, Reuse, Recycle." These programs and events continue to provide opportunities to divert waste from the landfills as well as encourage continued recycling and litter control.

Figure 2, "Carroll County MRA Recyclables," and **Figure 3,** "Carroll County Recycling & Waste Diversion Rates," demonstrate the trend in both the recycling weight and rates, respectively, in Carroll County from 2007 to 2013 (2014 data not yet published by MDE). Recycling of MRA recyclables in Carroll County rose steadily from the start and expansion of the program in 2007 and 2008; however, falling oil prices, a strong U.S. dollar, and a weakened economy in China have caused the national and global industry to take a significant downturn since 2011, which have impacted Carroll's recycling market as well. These market conditions, which are beyond the County's control, have subsequently impact Carroll's recycling rates for MRA recyclables. Although the County is currently paying to dispose of the recyclables, the County continues to encourage recycling to reduce the waste stream to the landfill, and the recycling rate since 2012 is on the rise.

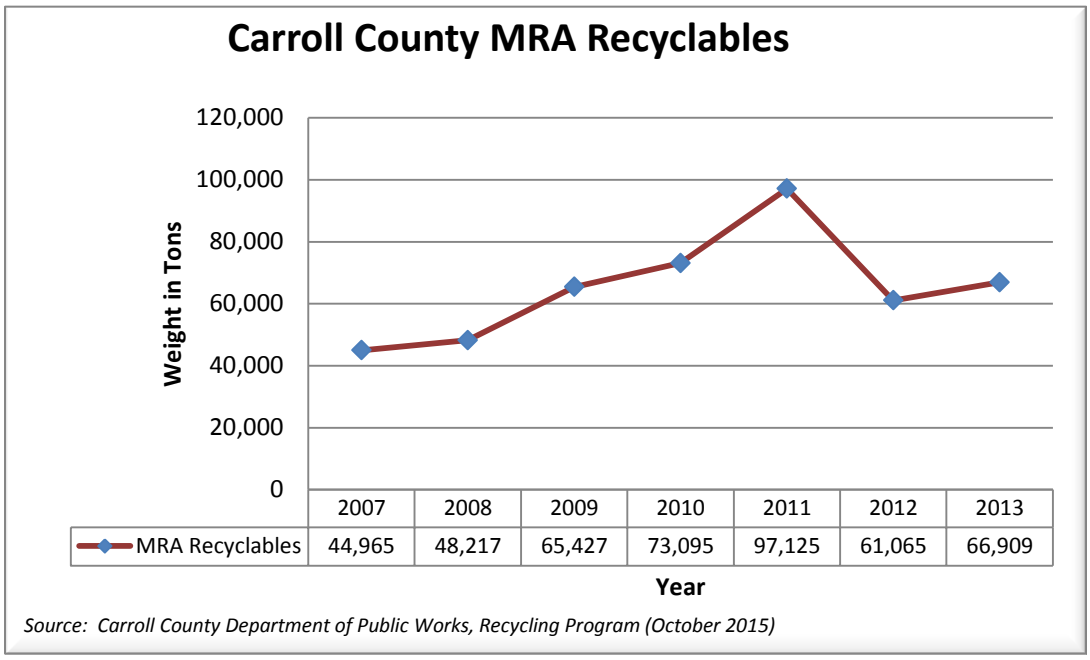


Figure 2: Carroll County MRA Recyclables

Figure 3, "Carroll County Recycling & Waste Diversion Rates," shows the rate of MRA recycling as well as the waste diversion rate. The source reduction credit is reflected in the waste diversion rate (added to the recycling rate).

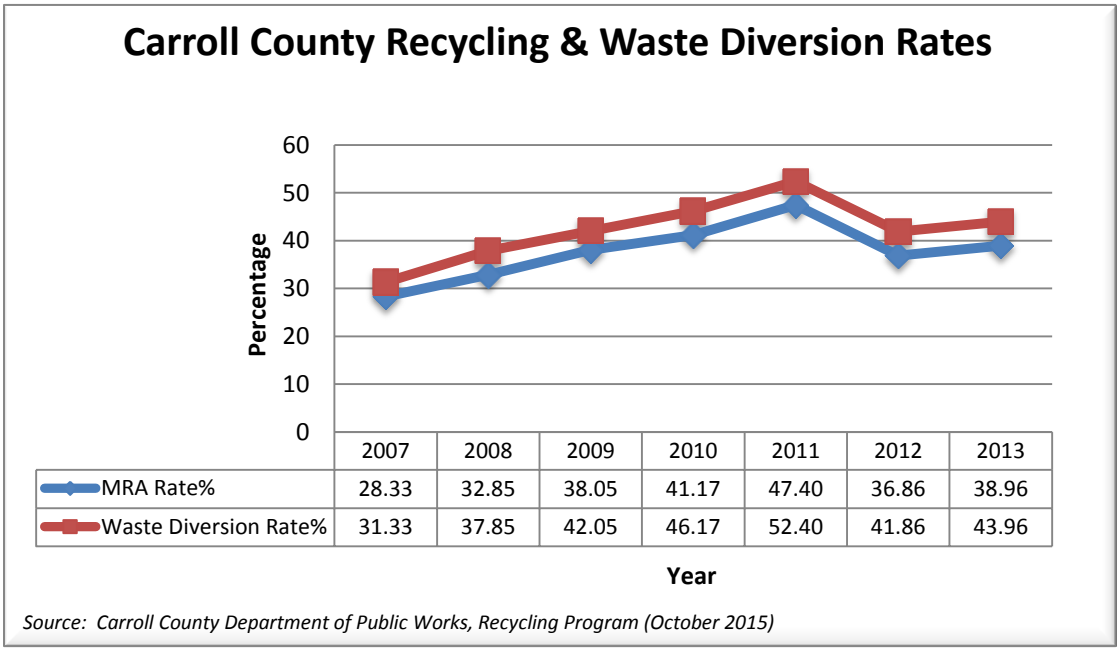


Figure 3: Recycling & Waste Diversion Rates

Non-MRA recyclables may include automobile components, construction/building materials, and other materials. Despite the decrease in the MRA recycling rate since 2011, the County's total recycling has risen sharply (see **Figure 4).** This success continues to divert waste from the landfills.

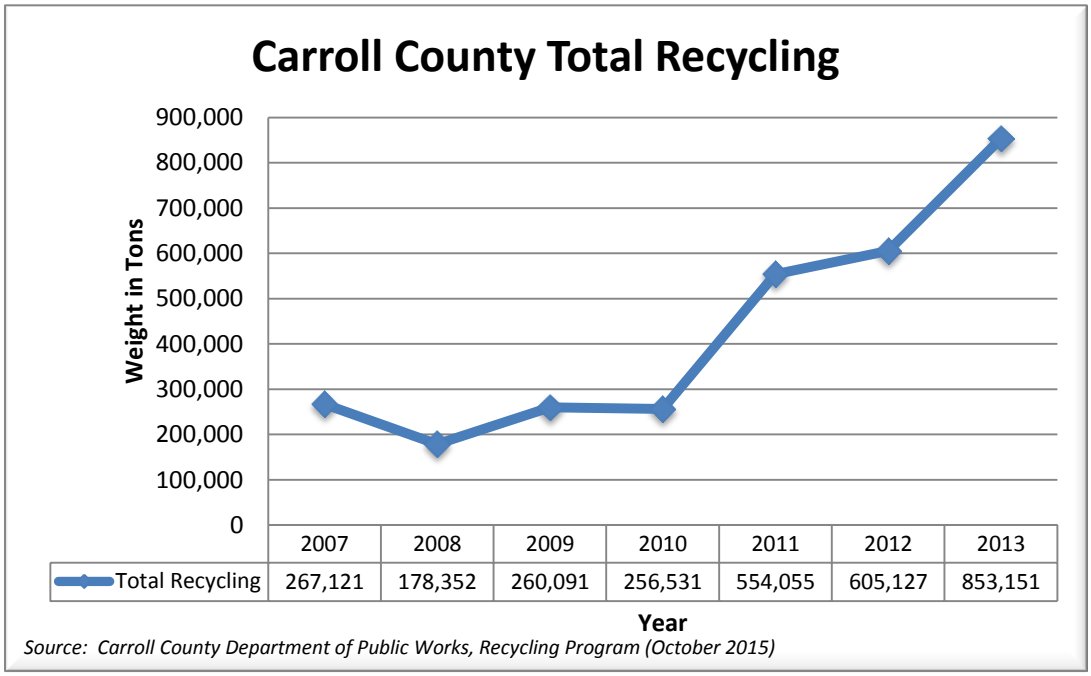


Figure 4: Total Recycling

5. Property Management and Maintenance

The permit requires a Notice of Intent (NOI) submitted to MDE for each County-owned municipal facility requiring NPDES stormwater general permit coverage. **Table 5** includes all facilities in the County and municipalities that possibly need coverage under the 12SW permit. Submittal status and MDE 12SW permit registration and information are provided.

Table 5
Carroll County Co-Permittees – 12SW General Stormwater Industrial Permit Status

County or Municipal Owned Facility	Review Applicability	SWPPP Submitted to MDE	Submittal (NE, NOI, NOT)	MDE RESPONSE
County Regional Airport	5/01/2014	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1755/MDR001755
County Maintenance Center	5/01/2014	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1861/MDR001861
Northern Municipal Landfill	5/01/2014	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660
Hoods Mill Landfill (Convenience Drop-off)	5/01/2014	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0661/MDR000661
Hampstead – Public Works Hentz Maintenance Yard	2/28/2014	N/A	NOT June 16, 2014	MDE Notice of Termination Received
Hampstead – Public Works Gill Maintenance Shop	2/18/2014	Yes	NOI June 16, 2014	MDE Registration: 07/30/14 12SW2213 / MDR002213
Manchester Public Works Maintenance Shop	12/19/2013	Yes	NOI May 5, 2014	MDE Registration: 06/04/14 12SW2201/MDR02201
Manchester – Public Works WTTP	12/19/2013	N/A Less than 1.0 MGD	N/A	N/A
Mount Airy Public Works Maintenance Shop	3/27/2014	Yes	NOI June 6, 2015	MDE Registration: 06/24/15 12SW2257/MDR002257
Mount Airy Public Works WWTP	3/27/2014	Yes	NOI 3/30/2015	MDE Registration: 04/10/15 12SW2258/MDR002258
New Windsor Public Works Maintenance / WWTP	6/04/2014	N/A No Fleet Maintenance	N/A	N/A
New Windsor Public Works WTTP	6/04/2014	N/A Less Than 1.0 MGD	N/A	N/A
Sykesville Public Works Maintenance Shop	3/06/2014	N/A	NOT 06/04/2014	MDE Notice of Termination Received
Taneytown Public Works Maintenance Facility	2/20/2014	Yes	NOI June 16, 2014	MDE Registration: 07/17/14 12SW2263 / MDR001743
Taneytown Public Works WWTP	2/20/2014	Yes	NOI June 16, 2014	MDE Registration: 06/26/14 12SW1743 / MDR001743
Union Bridge Public Works Maintenance / WWTP	3/10/2014	N/A Less than 1.0 MGD	N/A	N/A
Westminster Public Works Streets Maintenance Shop	3/04/2014	Yes	NOI March 31, 2014	MDE Registration:06/26/14 12SW2292/MDR002292
Westminster Public Works WTTP	3/05/2014	Yes	NOI	MDE Registration: 08/14/14 12SW2252 / MDR002252
Westminster Public Works Utilities	3/07/2014	Yes	NOI June 17, 2014	MDE Registration: 07/28/14 12SW2455 / MDR002455

Abbreviations: NOI – Notice of Intent NOT – Notice of Termination NE – No Exposure

The permit also requires that the status of stormwater pollution prevention plan (SWPPP) development and implementation for each permitted county and municipal facility be reviewed, documented, and submitted to MDE annually.

All permitted facilities owned by a co-permittee have developed and implemented SWPPPs. **Table 6** shows the status of the SWPPP plans during the permit year. Employees of all co-

permittees with permitted facilities have been trained. Annual NPDES training emphasized the development and implementation of the SWPPP. Routine SWPPP inspections and visual grab samples were performed for all permitted facilities. The annual comprehensive evaluation has either been completed or will be performed in the near future for all facilities. It should be noted that Mount Airy has up to one year in its 12SW permit, which was issued on March 20, 2015, and June 20, 2015, to complete the first comprehensive evaluation. In addition, as the Taneytown Wastewater Treatment Plant is currently undergoing an enhanced nutrient removal (ENR) upgrade, the SWPPPs will be updated accordingly during the coming permit year.

Table 6
MS4 Co-Permittee – 12SW General Stormwater Industrial Permit
SWPPP Status (During MS4 Permit Reporting Year)

Facility	SWPPP Plan Current *Y/N*	SWPPP Implemented *Y/N*	Facility Employees Trained *Y/N*	Training Date(s)	SWPPP Routine Inspections & Visual Grab Samples Performed *Y/N*	SWPPP Annual Comprehensive Evaluation Performed *Y/N*	Last Annual Comprehensive Evaluation Date(s)
County Regional Airport	Y	Y	Y	11/5/14	Y	Y	10/21/14
County Maintenance Center	Y	Y	Y	11/5/14	Y	Y	9/24/14
Northern Municipal Landfill	Y	Y	Y	11/5/14	Y	Y	9/23/14
Hoods Mill Landfill (Convenience Drop-Off)	Y	Y	Y	11/5/14	Y	Y	9/23/14
Hampstead – Public Works Gill Maintenance Shop	Y	Y	Y	12/4/14	Y	Y	6/02/15
Manchester Public Works Maintenance Shop	Y	Y	Y	7/7/14	Y	Y	5/14/15
Mount Airy Public Works Maintenance Shop	Y	Y	Y	4/25/14*	Y	N*	N/A
Mount Airy Public Works WWTP	Y	Y	Y	4/25/14*	Y	N*	N/A
Taneytown Public Works Maintenance Facility	Y	Y	Y	11/5/14	Y	Y	6/05/14
Taneytown Public Works WWTP	Y	Y	Y	11/5/14	Y	Y	6/05/14
Westminster Public Works Streets Maintenance Shop	Y	Y	Y	12/15/14, 12/19/14	Y	Y	12/1/14
Westminster Public Works WTTP	Y	Y	Y	12/10/14, 12/11/14	Y	Y	12/10/14
Westminster Public Works Utilities	Y	Y	Y	12/19/14	Y	Y	10/1/14

*Two Mount Airy DPW facilities had "No Exposure" status until NOI/12SW permit registration in May and June of 2015. Prior to permit issuance, DPW personnel received Municipal Stormwater Pollution Prevention Best Management Practice/Good Housekeeping and Illicit Discharge Detection and Elimination training. SWPPP Annual Evaluations will be performed prior to the end of the first year of 12SW permit coverage in the first half of 2016 (calendar year).

The permit requires the County to continue to implement a program to reduce pollutants associated with maintenance activities at County-owned facilities, including parks, roadways, and parking lots. NPDES Stormwater Pollution Prevention and Illicit Discharge Detection and Elimination training is provided annually to County and municipal DPW supervisory and crew-level staff. Training includes BMPs for non-hazardous spill or leak containment and clean-up and procedures for reporting to the appropriate authorities.

County-owned facilities including parks, roadways, and parking lots are primarily maintained by numerous bureaus under the Carroll County DPW. The Bureau of Facilities provides general maintenance for over 40 County-owned properties ranging from administrative to park-related facilities having access roads and parking lots. The Bureau of Roads Operations provides routine maintenance of the roads including roadside mowing, patching, drainage work, pipe cleaning and replacement, tree trimming and removal, storm drain maintenance and repair, and surface sealing operations for approximately 973 miles of predominantly rural open section roadways (paved and gravel), 139 bridges, and salt dome facilities. The Carroll County Regional Airport, with a 5,100-foot runway and supporting tarmac and small parking lot, is maintained by the DPW. Access roads and parking lots for the treatment plants and maintenance facility are maintained under the Bureau of Utilities. The Bureau of Solid Waste maintains access roads to and from the County's active landfill and convenience drop-off location. The Department of Recreation and Park's Bureau of Parks maintain facilities for three natural resource-related parks, while the Department of Economic Development provides maintenance for the Carroll County Farm Museum tourism venue.

Street Sweeping

Street sweeping programs are implemented in numerous municipal areas covered by the permit. Approximately 933 linear miles of streets were swept countywide. These services are performed by a combination of municipal and contracted staff and equipment. Street sweeping also occurs in all co-permittee jurisdictions as a BMP when necessary for emergency management-related or construction-related activities.

Inlet Inspection and Cleaning

All co-permittees conduct regularly scheduled, complaint-driven, or clog-driven inlet inspections and clean-out programs. A total of 1,377 storm drain inlets were cleaned out countywide through manual, vacuum, or a combination of both cleaning methods during the permit reporting year.

Reducing the Use of Pesticides, Herbicides, Fertilizers, and Other Pollutants Associated with Vegetation Management through Increased Use of Integrated Pest Management

Carroll County, Hampstead, Manchester, Taneytown, and Westminster employ Integrated Pest Management (IPM) practices to increase the reduction of pesticide, herbicide, and fertilizer usage associated with vegetation management. The County's Bureau of Facilities, which manages over 40 properties, has a certified pesticide applicator utilizing an IPM program resulting in efficient, minimal, or no usage of chemical materials in maintenance practices. The

Bureau of Facilities does not regularly fertilize athletic fields under its supervision. Pollution reduction efforts at the natural resource park venues managed by the Bureau of Parks only use mechanical controls for vegetation management. The Carroll County Regional Airport facility also has a newly trained and certified pesticide applicator for vegetation management utilizing IPM practices. The overall management of noxious weed occurrences along County road rights-of-way and on private properties is implemented via an agreement with the Maryland Department of Agriculture (MDA). Employees from MDA perform spot spraying along County rights-of-way as well as private lands for a fee.

De-icing Materials

All co-permittees reduce the use of winter weather de-icing materials through research, continual testing and improvement of materials, equipment calibration, and/or employee training. Research and materials, salt management, and equipment calibration were included in the last supervisor training. In addition, all co-permittee DPW employees were provided with a copy of the SHA's salt management program/plan, which was made available for use by local governments. Carroll County staff attended a "Road Salt Alternatives Forum" on June 16, 2015, held by the Baltimore Metropolitan Council's Regional Purchasing Committee. The purpose of the meeting was to gain a broader perspective of industry best practices and identify ways to improve response to snow events including environmentally friendly and effective pre-treatment products.

The County Roads Operations Bureau responds to emergency situations such as snowstorms, flooding, downed trees, and vehicle accidents. The County is divided into 50 snowplow routes. Carroll County employs SOPs that include BMPs for salt management and that covers the use of salt from its delivery, storage, and handling at salt storage locations to its placement on roadways during winter storms and post-storm cleanup operations. These practices are reviewed at an annual snow season training event that includes calibration of salt truck equipment.

County salt storage facilities throughout the county have posted BMPs including sweeping up residual materials into the salt storage structures. On-site spill kits are available at each facility in case of equipment failure during loading operations. Increased usage of salt brine storage and applicator equipment occurred during the permit year allowing for increased pre-wetting of road surfaces in advance of winter storm events forecasted by national and local winter weather advisory sources, resulting in the reduction of salt in solid form when feasible. Snow plowing and salt application procedures are designed to limit the number of necessary passes to prevent overlapping usage of de-icer materials.

Every storm event is treated as a unique event with decisions made based on actual conditions. Pollution reduction measures include area supervisors performing real-time road inspections to determine if application rates are sufficient and efficient to deliver the best road conditions possible for public safety in a cost-effective manner in the most environmentally sound manner when practicable. Gravel roads do not receive de-icer applications. Stone applications are provided as needed to improve traction. Citizen information is provided on the Roads Operations' website entitled *"Clearing The Way Through Carroll County Efficiently,"* which provides instructions for the public that will help salt crews limit the number of return passes

necessary to clear roadways and reduce the amount of salt applications. Staff researches materials, methods, and technologies and attends national and regional seminars and local workshops when possible to stay current on winter road maintenance practices and affordable de-icer/chemical technologies with reduced environmental impact.

De-icers are used at pertinent facilities when winter weather conditions affect public and employee safety. Appropriate applications of chemicals are used at facilities having year round usage but not where facilities are inactive during the winter season, which is a pollution reduction practice.

Proper management of snow and ice at Carroll County Regional Airport (CCRA) is essential for safe winter operations. This includes aircraft and support equipment movements during servicing, taxiing, and takeoff. Ensuring safe conditions on the tarmac for outside boarding of passengers, flight crews, and maintenance ground personnel activities is crucial. No de-icing of aircraft is performed at the facility, thereby reducing potential pollutants at the facility. Additionally, keeping ahead of winter storm events through using proper mechanical practices minimizes chemical usage until conditions necessitate the use of de-icers in dry form. Effective decision making with regard to de-icer usage is facilitated through Federal Aviation Administration (FAA) regulations and guidelines, national and local winter weather warning and forecast information, regular surface winter condition inspections, and good communication between experienced Fixed Base Operator (FBO) and CCRA airport management personnel. Research for effective, economical de-icers that reduce pollutants includes keeping current with industry-related technical resource bulletins and information.

The County DPW's Roads Department has an *"Adopt A Road"* program to control and reduce litter on Carroll County's roads, which invites public, individual, and civic group volunteer participation. The program is promoted through an online video entitled *"A Cleaner Carroll"* found on the Roads Operations' website. Equipment is provided along with safety guidelines and tips on how to pick up trash along roadways. Signs recognizing individual or group efforts in helping keep Carroll clean are provided by the County. Additionally, the Bureau of Facilities provides trash and litter receptacles at facilities where they are considered practicable.

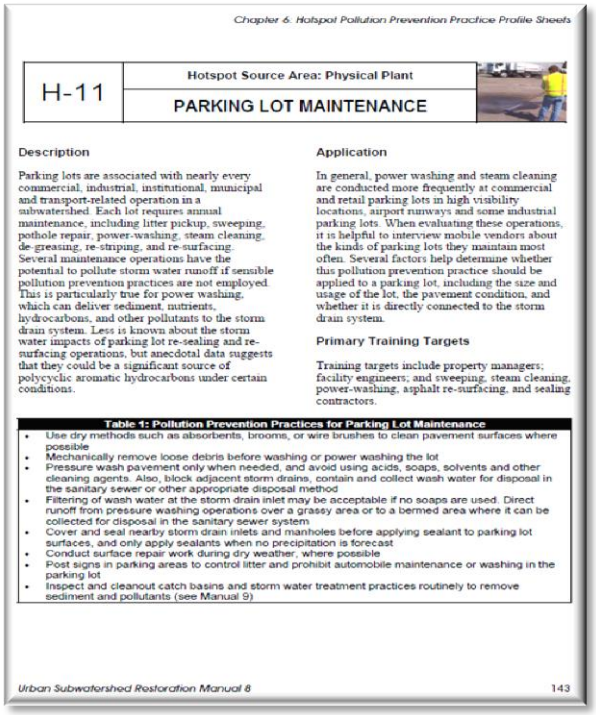
Facilities with 12SW permits, which are listed in **Table 6**, have developed and maintain the required SWPPPs, which include non-structural BMP/good housekeeping practices. These practices may include proper materials storage, fuel management practices, recycling, secondary containment, spill kits, and spill control measures. Quarterly visual inspections of the site include storm drain system infrastructure, visual grab samples, personnel training, and annual evaluations to make plan adjustments that continuously improve on-site pollution prevention effectiveness. CCRA also has a recently renewed Oil Operations permit issued by MDE requiring the facility to implement the Spill Prevention Control and Countermeasures Plan (SPCC) submitted to MDE as part of the renewal application and inspection process.

The County inventoried facilities with roads, parking lots, and parks to verify stormwater-related infrastructure and to ascertain whether pollution reduction activities were incorporated into current maintenance practices. This base information will be utilized to build a "Municipal Pollution Reduction Program" guidance document comprised of a menu or pallet of Structural

and Non-Structural BMPs from which the facility manager can select the appropriate practice in relationship to a certain land use or category of land uses. Research of reference documents, such as the Center for Watershed Protection's "Urban Sub-watershed Restoration" series and similar sources, will be utilized to develop the resource. Below is a potential list of BMPs followed by an example of a BMP option menu.

Non-Structural BMP List

- Inlet markers or stenciling
- Erosion control measures
- Integrated Pest Management (fertilizer and pesticide application & licensing)
- Trash/littering management
- Vegetation management to reduce runoff
- Maintenance of roadways and parking lots
- Park maintenance
- Vehicle/equipment washing
- Proper storage of chemicals
- Proper yard waste management
- Pressure washing management
- Hazardous waste and used motor oils
- Pet/animal waste management
- Street cleaning/sweeping
- Storm drain system inlet & outfall maintenance



Chapter 6. Hotspot Pollution Prevention Practice Profile Sheets

H-11

Hotspot Source Area: Physical Plant

PARKING LOT MAINTENANCE

Description

Parking lots are associated with nearly every commercial, industrial, institutional, municipal and transport-related operation in a subwatershed. Each lot requires annual maintenance, including litter pickup, sweeping, pothole repair, power-washing, steam cleaning, de-greasing, re-striping, and re-surfacing. Several maintenance operations have the potential to pollute storm water runoff if sensible pollution prevention practices are not employed. This is particularly true for power washing, which can deliver sediment, nutrients, hydrocarbons, and other pollutants to the storm drain system. Less is known about the storm water impacts of parking lot re-sealing and re-surfacing operations, but anecdotal data suggests that they could be a significant source of polycyclic aromatic hydrocarbons under certain conditions.

Application

In general, power washing and steam cleaning are conducted more frequently at commercial and retail parking lots in high visibility locations, airport runways and some industrial parking lots. When evaluating these operations, it is helpful to interview mobile vendors about the kinds of parking lots they maintain most often. Several factors help determine whether this pollution prevention practice should be applied to a parking lot, including the size and usage of the lot, the pavement condition, and whether it is directly connected to the storm drain system.

Primary Training Targets

Training targets include property managers; facility engineers; and sweeping, steam cleaning, power-washing, asphalt re-surfacing, and sealing contractors.

Table 1: Pollution Prevention Practices for Parking Lot Maintenance

- Use dry methods such as absorbents, brooms, or wire brushes to clean pavement surfaces where possible
- Mechanically remove loose debris before washing or power washing the lot
- Pressure wash pavement only when needed, and avoid using acids, soaps, solvents and other cleaning agents. Also, block adjacent storm drains, contain and collect wash water for disposal in the sanitary sewer or other appropriate disposal method
- Filtering of wash water at the storm drain inlet may be acceptable if no soaps are used. Direct runoff from pressure washing operations over a grassy area or to a bermed area where it can be collected for disposal in the sanitary sewer system
- Cover and seal nearby storm drain inlets and manholes before applying sealant to parking lot surfaces, and only apply sealants when no precipitation is forecast
- Conduct surface repair work during dry weather, where possible
- Post signs in parking areas to control litter and prohibit automobile maintenance or washing in the parking lot
- Inspect and cleanout catch basins and storm water treatment practices routinely to remove sediment and pollutants (see Manual 9)

Urban Subwatershed Restoration Manual 8 143

Structural BMP List
Treatment Measures/Elimination of Discharges

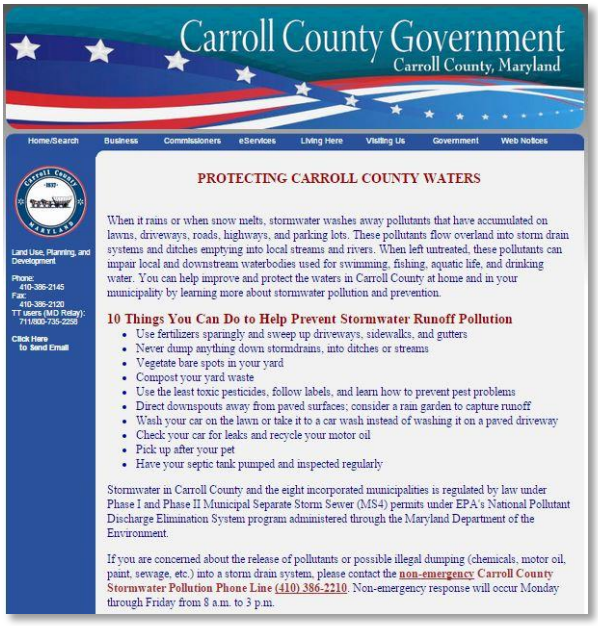
- Infiltration basins
- Pervious structures
- Diversion or off-line infiltration devices
- Stormwater treatment facilities

Staff Training: Co-permittees ensure that all DPW maintenance staff is trained in stormwater pollution prevention and good housekeeping practices. About 253 maintenance staff participated in the annual training during the permit year.

6. Public Education

The permit requires Carroll County to 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.

The permit requires maintenance of a compliance hotline or similar mechanism for public reporting of water quality complaints, including suspected illicit discharges, illegal dumping, and spills. Individuals are encouraged to report any evidence of illicit discharge or illegal dumping. Citizens throughout the county can call the non-emergency Stormwater Pollution Prevention Hotline at 410-386-2210.



Carroll County LRM hosts several webpages that provide materials and resources to local residents and businesses.

A dedicated NPDES webpage entitled *Protecting Carroll County Waters* (http://ccgovernment.carr.org/ccg/plan/npdes/) is the primary source of information related to the NPDES MS4 permit. The webpage describes basic information regarding actions the average property owner may take to help prevent stormwater runoff pollution. The page also features the Pollution Prevention Hotline, which is readily visible, to be used for non-emergency concerns. Municipal websites are linked to this webpage. This page also provides helpful links and documents available to download including, but not limited to, 2012 to 2014 annual reports, various U.S. Environmental Protection Agency (EPA) and MDE NPDES-related websites, and educational brochures and materials.

The NPDES webpage housed under the BRM website describes some of the basic permit requirements and terms, provides the same basic pollution prevention information found on the *Protecting Carroll County Waters* webpage, and provides another location at which the public can access the 2012 to 2014 annual reports (http://ccgovernment.carr.org/ccg/resmgmt/).

The BRM's website provides further information regarding the County's and municipalities' stormwater program and County and municipal contacts. Educational materials for both children and homeowners are available for viewing or download. The BMP webpage describes the various agricultural and urban BMPs. Copies of the Bureau's quarterly newsletter, *Down to Earth*, includes educational information and reporting on stormwater activities and program implementation. The Stormwater Pollution Prevention Hotline and emergency numbers are duplicated on this website.

In Carroll County, staff is continuously involved in environmental education efforts. LRM staff regularly volunteer to speak at schools, community organizations, club meetings, and other venues in an effort to ensure that effective and timely environmental information is available to the community.

Staff partners with the Carroll County Public Schools' elementary science programs each year to educate and engage fourth and fifth grade students on issues related to water quality that coincide

with the curriculum. Sessions are provided on topics such as biological/stream health, stormwater, and the importance and benefits of tree planting.

All co-permittees provide stormwater pollution prevention materials at their municipal offices, at the Carroll County Office Building, and at various events held throughout the year. The number of specific public education venues increased during FY 2015, which provided additional opportunities to distribute information related to stormwater management, water quality, and other various environmental issues. In addition, all co-permittees participated during the permit year in outreach efforts associated with a workshop for local businesses entitled "Carroll County Businesses for Clean Water" to be held in the FY 2015-2016 permit year. In addition, storm drain stenciling is implemented throughout the county and is often coordinated as a volunteer or outreach event. A complete listing of FY 2015 events can be found in **Table 7**.

Table 7
Carroll County NPDES Phase 1 MS4 Public Outreach Events

Event	Date	Watershed(s)	Description
Westminster Art in the Park	June 6, 2015	◆ Double Pipe Creek ◆ Liberty Reservoir	Booth – materials and direct discussion w/ attendees
Manchester Valley High School	June 4, 2015	◆ Prettyboy Reservoir ◆ Double Pipe Creek ◆ Liberty	Spoke to 10th and 11th grades classes about stormwater and provided handouts
Hampstead Day	May 23, 2015	◆ Liberty ◆ Loch Raven ◆ Prettyboy	Materials and direct discussion w/ attendees
Cherry Branch Tree Planting	May 14, 2015	◆ Double Pipe Creek	Tree planting – outreach to 80 Outdoor School Students
Westminster Spring Flower & Jazz Festival	May 9, 2015	◆ Double Pipe Creek ◆ Liberty Reservoir	Booth – materials and direct discussion w/ attendees
Charlotte's Quest Nature Center Spring Fest	May 3, 2015	◆ Prettyboy Reservoir ◆ Double Pipe Creek ◆ Liberty	Booth – materials and direct discussion w/ attendees
Earth Day Event at Ebb Valley Elementary School	April 23, 2015	◆ Prettyboy	Tree planting – outreach to 166 students and 8 teachers who assisted with this effort
Westminster Clean-Up Day	April 11, 2015	◆ Double Pipe Creek ◆ Liberty Reservoir	Outreach to 31 students from McDaniel College who stenciled the storm drains (81) with "Only Rain Down the Drain," collected trash and debris from stormwater ponds and streams (10 small bags), and collected trash and debris from alleyways (2.77 tons)
Rain Barrel & Composting Event	April 4, 2015	◆ Multiple	The County hosted a rain barrel and composting event to provide rain barrels and composting bins to residents at a reduced cost.
Rain Barrel Training Session	March 28, 2015	◆ Lower Monocacy	The Rain Barrel Program, funded by the Chesapeake Bay Trust's Outreach and Restoration Mini grant, allowed 50 homeowners to receive a free rain barrel in exchange for their attendance at a training session, their commitment to raise awareness about the program, and their willingness to provide program evaluation. A volunteer training session was held at the Watkins Park Pavilion on March 28, 2015. During the session, the volunteers learned how rain barrels enhance

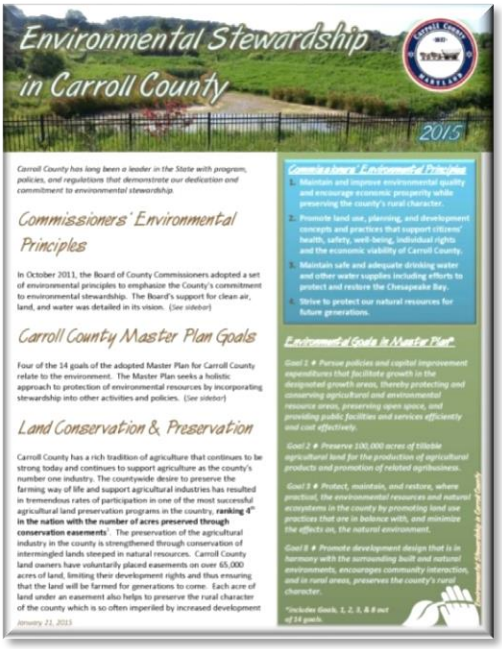
			water quality in the watershed by decreasing erosion, the ways rain barrels can be used on residential properties, how to install the barrels, and the associated seasonal maintenance procedures. The barrels were installed and inspected by June 2015.
Hampstead Business Expo	February 28, 2015	◆ Liberty ◆ Loch Raven ◆ Prettyboy	Materials and direct discussion w/ attendees
Environmental Advisory Council	January 21, 2015 & February 18, 2015	◆ Countywide	Informational presentation about NPDES Phase I MS4 permit and business community (meeting was open to public, streamed live, and video archived)
Westminster Mission Tree Planting	November 2014	◆ Double Pipe Creek	Tree planting – outreach to 80 Outdoor School students
Bollinger Park and Taneytown Memorial Tree Plantings	November 2014	◆ Upper Monocacy River	Tree planting – outreach to 250 Outdoor School students and Boy Scouts
Taneytown Harvest Festival	October 18, 2014	◆ Upper Monocacy River ◆ Double Pipe Creek	Booth – materials and direct discussion w/ attendees
Sykesville Fall Festival	October 11, 2014	◆ South Branch Patapsco River ◆ Liberty	Booth – materials and direct discussion w/ attendees
Mount Airy Fall Fest	October 4 and 5, 2014	◆ Lower Monocacy River ◆ South Branch Patapsco River	Booth – materials and direct discussion w/ attendees
Environmental Advisory Council	September 17, 2014	◆ Countywide	Informational presentation about NPDES Phase I MS4 permit (meeting open to public, streamed live, and video archived)
New Windsor Annual Clean-Up Event	September 6, 2014	◆ Double Pipe Creek	Annual clean-up event in spring to remove trash and debris from storm drains and along stream corridors
Union Bridge Clean-Up Day	September 6, 2014	◆ Double Pipe Creek	Volunteers stenciled 20 storm drains and participated in a stream clean-up funded by a grant from Chesapeake Bay Trust and donation from Lehigh Cement
National Night Out	August 5, 2014	◆ Multiple	Booth and materials and direct discussion w/ attendees

The County actively utilizes cable TV resources to convey public service information on the television. This may include upcoming events, presentations, good housekeeping BMPs, and other resources.

Carroll County continues to provide an open forum on environmental issues and concerns through its Environmental Advisory Council (EAC). This Commissioner-appointed citizen board holds monthly meetings which are open to the public. The EAC functions at the direction of the Carroll County Board of Commissioners; works cooperatively with County environmental staff to research environmental policy issues; advises the Board of County Commissioners on environmental issues; fosters environmental education; and generally acts in the best interest of county residents by promoting effective environmental protection and management principles.

In its role to promote environmental awareness and outreach, every other year the EAC accepts nominations for Environmental Awareness Awards. Winners are recognized in a joint ceremony with the Board of County Commissioners, in the press, and on the EAC's website.

In 2014, the EAC prepared a Carroll County Environmental Stewardship booklet, which was updated in 2015. The booklet is available on the website and is provided at various venues. The booklet describes various efforts and initiatives undertaken by the County to demonstrate environmental stewardship and protection, including stormwater mitigation and management projects and progress.


Environmental Stewardship in Carroll County

2015

Carroll County has long been a leader in the State with program, policies, and regulations that demonstrate our dedication and commitment to environmental stewardship.

Commissioners' Environmental Principles

In October 2011, the Board of County Commissioners adopted a set of environmental principles to emphasize the County's commitment to environmental stewardship. The Board's support for clean air, land, and water was detailed in its vision. (See sidebar)

Carroll County Master Plan Goals

Four of the 14 goals of the adopted Master Plan for Carroll County relate to the environment. The Master Plan seeks a holistic approach to protection of environmental resources by incorporating stewardship into other activities and policies. (See sidebar)

Land Conservation & Preservation

Carroll County has a rich tradition of agriculture that continues to be strong today and continues to support agriculture as the county's number one industry. The countywide desire to preserve the farming way of life and support agricultural industries has resulted in tremendous rates of participation in one of the most successful agricultural land preservation programs in the country, **ranking 4th in the nation with the number of acres preserved through conservation easements**. The preservation of the agricultural industry in the county is strengthened through conservation of intermingled lands steeped in natural resources. Carroll County land owners have voluntarily placed easements on over 65,000 acres of land, limiting their development rights and thus ensuring that the land will be farmed for generations to come. Each acre of land under an easement also helps to preserve the rural character of the county which is so often imperiled by increased development

January 21, 2015

Commissioners' Environmental Principles

1. Maintain and improve environmental quality and encourage economic prosperity while preserving the county's rural character.
2. Promote land use, planning, and development concepts and practices that support citizens' health, safety, well-being, individual rights and the economic viability of Carroll County.
3. Maintain safe and adequate drinking water and other water supplies including efforts to protect and restore the Chesapeake Bay.
4. Strive to protect our natural resources for future generations.

Environmental Goals in Master Plan*

Goal 1 ★ Pursue policies and capital improvement expenditures that facilitate growth in the designated growth areas, thereby protecting and conserving agricultural and environmental resource areas, preserving open space, and providing public facilities and services efficiently and cost effectively.

Goal 2 ★ Preserve 100,000 acres of tillable agricultural land for the production of agricultural products and promotion of related agribusiness.

Goal 3 ★ Protect, maintain, and restore, where practical, the environmental resources and natural ecosystems in the county by promoting land use practices that are in balance with, and minimize the effects on, the natural environment.

Goal 8 ★ Promote development design that is in harmony with the surrounding built and natural environments, encourages community interaction, and in rural areas, preserves the county's rural character.

*Includes Goals 1, 2, 3, & 8 out of 14 goals.

The WRCC was formed in 2007 through a cooperative partnership between the County, the eight municipalities, and the Carroll County Health Department by a formal joint resolution to discuss and address issues related to water resources. The WRCC discusses and collaborates on pertinent issues related to water, wastewater, and stormwater management. The monthly meetings, which are open to the public, provide an excellent venue for members to coordinate on various current issues. The WRCC discusses NPDES technical and administrative issues on a regular basis.

WRCC took the lead in coordinating and developing a joint Water Resources Element that was adopted by the County and seven municipalities. The WRCC serves as the local Watershed Implementation Plan (WIP) team for the development and implementation of Maryland's Phase II WIP and continues in this role to address WIP issues and tasks as they arise.

In FY 2013 and 2014, they collaborated to develop, sign, and implement a Memorandum of Agreement (MOA) to cost-share the capital costs of meeting the municipalities' stormwater mitigation requirements, for the County to continue to provide administrative and operating support services for the stormwater mitigation program, and for the WRCC to act as the forum for setting project priorities. The MOA was signed on October 23, 2014.

Also during this time, members of the WRCC participated in the Stormwater Fee Advisory Group to review and make recommendations regarding how a fee could be implemented as a result of House Bill 987 – Watershed Protection and Restoration Program, which was passed by the Maryland General Assembly in 2012. The Board chose not to adopt a fee.

The town/city councils and the municipal planning commissions meet regularly (**Table 8**). Discussions related to expenditure of funds and approval for stormwater projects may be discussed at these meetings, which are open to the public. The following table ("Co-Permittee Elected Officials and Planning Commissions Regular Meeting Schedule") provides the regular meeting time for each of these public bodies.

Table 8
Co-Permittee Elected Officials and Planning Commissions
Regular Meeting Schedule

	Elected Body	Planning Commission
Board of County Commissioners	Every Thursday	3rd Tuesday & 1st Wednesday of month
Hampstead	2nd Tuesday of month	4th Wednesday of month
Manchester	2nd Tuesday of month	3rd Tuesday of month
Mount Airy	1st Monday of month	Last Monday of month
New Windsor	1st Wednesday and 3rd Monday of month	4th Monday of month
Sykesville	2md & 4th Monday of month	1st Monday of month
Taneytown	2nd Monday of month, w/ workshops Wednesday before	Last Monday of month
Union Bridge	4th Monday of month	3rd Thursday of month
Westminster	2nd & 4th Monday of month	2nd Thursday of month

The primary goal of the *Carroll County and Municipalities NPDES MS4 Public Outreach Plan* is compliance with the permit. This plan provides a review of the public outreach opportunities currently available to residents and businesses in Carroll County and the municipalities regarding specific requirements of the permit and related stormwater program activities. As a result of this review, activities were suggested to round out those opportunities and improve outreach. The intent is to raise public awareness and encourage residents and businesses to take measures to reduce and prevent stormwater pollution. This is a dynamic, iterative plan, which will be revised on a regular basis as projects are completed and other needs arise. The public outreach plan can be found in Appendix E of this report.

The *Protecting Carroll County Waters* website (http://ccgovernment.carr.org/ccg/plan/npdes/) includes resources related to the regulated community. Each municipality provides a link from its website to this webpage. In addition to the information and materials described above under Public Education for the General Public, brochures are available that describe good housekeeping practices applicable to specific types of businesses that tend to be more vulnerable to having illicit discharges.

During 2015, the County's EAC partnered with the WRCC to develop a free workshop designed to help businesses understand stormwater regulations that affect them and good housekeeping practices they can employ. Development and outreach activities began in January 2015 and continued into the FY 2015-2016 permit year, including news releases, newsletters, flyers, phone calls, etc. The workshop is scheduled for January 5, 2016. The EAC will partner with the WRCC again in 2016 and 2017 to develop and conduct another free workshop, which will be geared to the general public.

E. Restoration Plans and Total Maximum Daily Loads

1. Watershed Assessments

The County has been conducting watershed assessments that are in accordance with the Stream Corridor Assessment (SCA) Survey Protocols, developed in 2001 by the Maryland Department of Natural Resources (DNR), Watershed Restoration Division. Assessments are performed between January and March by the BRM staff through the cooperation of private landowners and municipalities within the specific 8-digit watershed being assessed. Landowner permission for the assessments are obtained through a mailing and return postcard detailing the purpose and timing of the assessment.

Since 2011, the County has received permission through public participation to assess 588 miles out of the potential 948 miles (62%) within 7 of 9 major watershed basins within the county (**Table 9)**. The County is currently preparing for the final watershed assessment, Double Pipe Creek, which will take place during the winter of 2016. The current status of watershed assessments and the development of watershed restoration plans can be found in **Table 10**.

Table 9
Watershed Assessment Status

8-Digit Watershed	Major Basin	Miles Assessed	Total Miles	% Assessed	Year Assessed
Watersheds Assessed					
Prettyboy	Gunpowder	80	97	82%	2011
Liberty	Patapsco	255	458	56%	2012
South Branch Patapsco	Patapsco	156	218	72%	2013
Lower N. Branch Patapsco	Patapsco	6	6	100%	2014
Lower Monocacy	Monocacy/ Potomac	10	23	43%	2014
Conewago Creek	Susquehanna	11	18	61%	2014
Upper Monocacy	Monocacy/ Potomac	70	128	55%	2015
	Total:	***588***	***948***	**62%**	
Watersheds To Be Assessed					
Double Pipe	Monocacy/ Potomac		529		2016
Loch Raven	Gundpowder	1.8	1.8		2016

Table 10
Carroll County Watershed Planning Status

Major Watershed	Watershed #	Watershed Name	SCA	Watershed Assessment	Restoration Plan
Conewago Creek	0289	Conewago Creek	2014	2014	
	0290	West Branch Codorus Creek	2014	2014	
Double Pipe Creek	0248	Double Pipe Creek	2016		
	0268	Sams Creek	2016		
	0269	Sams Creek	2016		
	0271	Dickenson Creek	2016		
	0272	Little Pipe Creek	2016		
	0273	Priestland Branch/Wolf Pit Creek	2016		
	0274	Little Pipe Creek	2016		
	0275	Turkeyfoot Run	2016		
	0276	Little Pipe Creek	2016		
	0277	Meadow Branch	2016		
	0278	Big Pipe Creek	2016		
	0279	Big Pipe Creek	2016		
	0280	Big Pipe Creek	2016		
	0281	Bear Branch	2016		
	0282	Bear Branch	2016		
	0283	Big Pipe Creek	2016		
	0284	Big Pipe Creek	2016		
	0285	Silver Run	2016		
	0286	Big Pipe Creek	2016		
	0287	Big Pipe Creek	2016		
	0288	Deep Run	2016		
Liberty Reservoir	1046	Snowden's Run	2009-2010	2013	2015
	1047	Liberty Reservoir	2012	2013	2015
	1048	Roaring Run/Board Run	2012	2013	2015
	1049	Little Morgan Run	2012	2013	2015
	1050	Morgan Run	2012	2013	2015
	1051	West Branch Patapsco River	2012	2013	2015
	1052	East Branch Patapsco River	2012	2013	2015
	1053	Morgan Run	2012	2013	2015
	1054	Morgan Run	2012	2013	2015
	1055	Little Morgan Run	2012	2013	2015
	1056	Middle Run	2012	2013	2015
	1057	Beaver Run	2012	2013	2015
	1058	Deep Run	2012	2013	2015
	1059	East Branch Patapsco River	2012	2013	2015
	1060	Aspen Run	2012	2013	2015
	1061	Cranberry Branch	2012	2013	2015
	1062	West Branch Patapsco River	2012	2013	2015
Lower Monocacy River	0235	South Fork	2014	2014	
	0238	North Fork	2014	2014	
North Branch Patapsco River	1019	North Branch Patapsco River	2014		
Prettyboy Reservoir	0313	Poplar Run	2011	2012	2015
	0314	Georges/Murphy Run	2011	2012	2015
	0315	Grave/Indian Run	2011	2012	2015
	0316	Gunpowder Falls	2011	2012	2015
	0317	South Branch Gunpowder Falls	2011	2012	2015

Major Watershed	Watershed #	Watershed Name	SCA	Watershed Assessment	Restoration Plan
South Branch Patapsco River	1020	South Branch Patapsco River	2013	2014	
	1021	Piney Run	2013	2010	
	1022	South Branch Patapsco River	2013	2014	
	1023	Piney Run	2013	2010	
	1024	Piney Run	2013	2010	
	1025	South Branch Patapsco River	2013	2014	
	1026	Tuckers Run	2013	2014	
	1028	South Branch Patapsco River	2013	2014	
	1029	Middle Run	2013	2014	
	1030	Gillis Falls	2013	2014	
	1031	Gillis Falls	2013	2014	
Upper Monocacy River	0247	Upper Monocacy River	2015	2015	
	0254	Piney Creek	2015	2015	
	0255	Piney Creek	2015	2015	
	0256	Upper Monocacy River	2015	2015	
	0257	Piney Creek	2015	2015	
	0264	Alloway Creek	2015	2015	
	0266	Piney Creek	2015	2015	
	0267	Piney Creek	2015	2015	

Green = Completed, Blue = Completed – DRAFT, Red = In Progress

The watershed assessments will be used by the County to identify and rank current impairments within each watershed that will assist in prioritizing locations for structural and non-structural water quality improvement projects. The implementation of identified restoration projects, as well as the associated pollutant load reductions, will be documented in the corresponding watershed restoration plans.

2. Restoration Plans

The County has continued its very aggressive impervious surface restoration program throughout the permit period in which the third generation permit expired and the fourth generation permit was issued. As previously reported in Part IV.C. Source Identification, the County completed either direct or indirect mitigation measures on 1,767 acres, or 26 percent, of the untreated impervious surfaces in the unincorporated areas of Carroll County. This tally represents final mitigation acres as of December 2014, which is the end of the County's third generation permit.

Carroll County submits this Impervious Surface Area Assessment in accordance with Part IV.E.2.a of our MS4 discharge permit. This assessment is based on the MS4 permit area identified in Part I.B of the permit. However, the County makes no representation by submittal of this assessment that full and complete accounting of the impervious surface area is provided. Rather, the County has applied a correction factor to account for minor feature adjustments and mapping limitations, which results in an increase to the impervious total area. This assessment is subject to future refinement by the County based on new or additional information.

The fourth generation permit requires an impervious surface area assessment to be completed within one year of the permit issuance. The methods followed those developed by the County

for its previous impervious assessment and are now described in MDE's *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* document (August 2014). The assessment, when approved by MDE, will serve as the baseline for restoration efforts required in the fourth generation permit, which is an additional 20 percent of untreated County MS4 impervious area beyond the 10 percent required in the third generation permit. **Figure 5** represents the results of the County's impervious surface area assessment per Part IV.E.2.a. A major adjustment to the overall assessment in regards to this analysis is the incorporation of the eight municipalities' impervious surface acres within total impervious acres in the county that are the co-permittees' jurisdiction (13,104 acres).

The delineated impervious acreage countywide is 16,144 acres, which includes SHA MS4 acres, railroad rights-of-way, acreage that falls under a permit, and non-MS4 acreage. This total impervious acreage also includes a correction factor to account for mapping deficiencies. The correction factor includes a 15 percent adjustment in the municipal impervious acreage and a 4 percent adjustment in the county. The current acreage has been verified by County Geographic Information System (GIS) personnel and is the total approved in our system. The percent impervious to total county acreage still remains at approximately 5.6 percent. This low volume compared to the overall area reflects directly on the County's Master Plan. Since the 1970s, the Master Plan's foundation has been based on focusing managed growth in eight designated growth areas while maintaining the rural character of the remaining areas. To reinforce the maintenance of the rural area, the County's Agricultural Land Preservation Program was developed, has been supported by Boards of County Commissioners, and has become a top five nationwide program with approximately 67,000 acres permanently preserved as of December 2015.

The breakdown of total county impervious acres is as follows:

• County/Municipal MS4 Impervious Acres		13,104 acres
• Other Impervious		
▪ SHA MS4	1,338 acres	
▪ Railroad Rights-of-Way	302 acres	
▪ Permitted Facilities	457 acres	
▪ Non-MS4 Connected Dischargers*	943 acres	3,040 acres
Total		***16,144 acres***

*These are impervious acres which do not discharge through the County/municipal MS4.

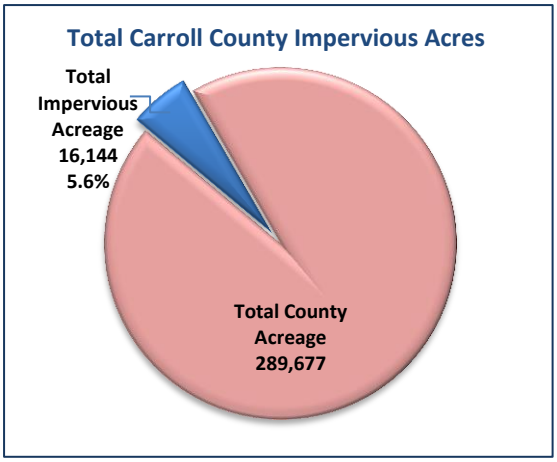
The 13,104 acres of Carroll County's MS4 impervious acres can then be divided between treated versus non-treated. The treated acres (6,012) include 2,125 acres of post-2002 Environmental Site Design to the Maximum Extent Practicable (ESD to the MEP) plus the remaining 3,887 acres of rural disconnect. The rural disconnect area includes 2,716 acres previously approved (2014 Annual Report) plus an additional 1,171 acres identified within the remaining southern portion of the county. The southern portion of the county was not included in the previous acres of rural disconnect identified as part of the 2014 Annual Report. These acres were delineated based on previous methods (2014 Annual Report, Appendix C, Historical Impervious Report) and those found in the *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*, August 2014. The remaining acres (7,092) are considered to be untreated. The fourth

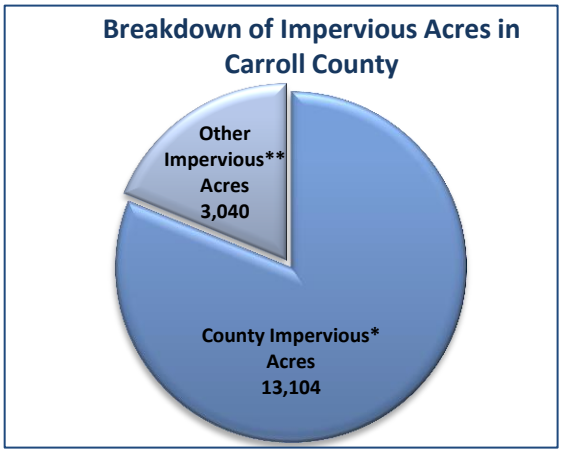
generation permit will require total restoration equal to 1,943 acres (**Figure 5**). The 1,943 acres includes the 30 percent total requirement (10% in third generation permit plus an additional 20% in the 4th generation permit) for 1,573 acres for the County and a 20 percent requirement for 370 acres within the municipalities. As seen in **Figure 5,** a total of 1,788 acres has been completed to date.

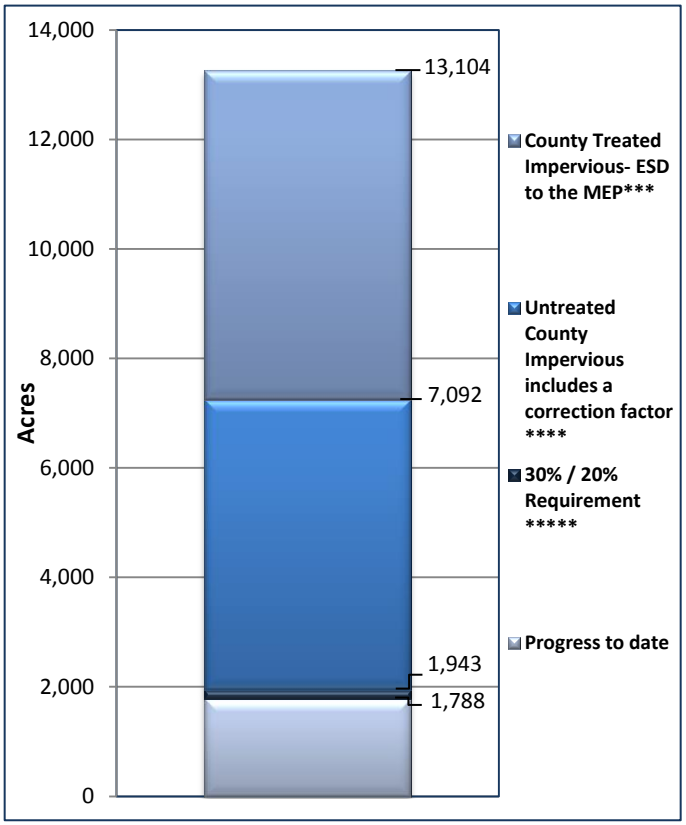
A total of 1,943 acres of untreated impervious surface are to be restored by the end of this permit. The list of restoration projects and other impervious areas treated and associated nutrient and sediment reductions are presented in **Table 11**.

The table provides a complete accounting of impervious areas as well as drainage area treated. A graph representation depicting acres restored, acres under construction, and acres in design for projects to restore impervious surfaces and drainage areas are shown in **Figures 6** and 7. These graphs provide an excellent representation related to the level of true watershed restoration accomplished via the County's retrofit program. Retrofit projects are designed to treat all of the contributing watershed acres, not just impervious surfaces.

The permit requires the County to submit to MDE for approval a restoration plan for each stormwater WLA approved by EPA within one year of issuance of the permit. The County has been in litigation with MDE regarding numerous issues related to this permit. On September 1, 2015, the Circuit Court for Carroll County, Case No. 06-C-15-068141, granted an Order to Extend Stay of Proceedings which provided "that the County's deadline under for submittal of restoration plans pursuant to Part IV.E.2.b of its MS4 Permit is stayed and extended until June 30, 2016." Therefore, the County will provide the requirements of the above-cited section of the permit as may be required by the court.







* This number includes a correction factor.

** Other Impervious includes SHA (1,338 acres), Permitted Facilities (457 acres), Railroad ROW (302 acres), and Non-MS4 (943 acres).

*** County Treated Impervious ESD to the MEP includes Rural Disconnect (3,887 acres) and Post-2002 SWM (2,125 acres).

**** Untreated Impervious Area: County (5,242 acres) + Municipal (1,850 acres). This number includes a correction factor.

***** Treatment Requirement: County 30% (1,573 acres) + Municipal 20% (370 acres)

Figure 5: Carroll County Initial Fourth Generation Permit Impervious Surface Assessment

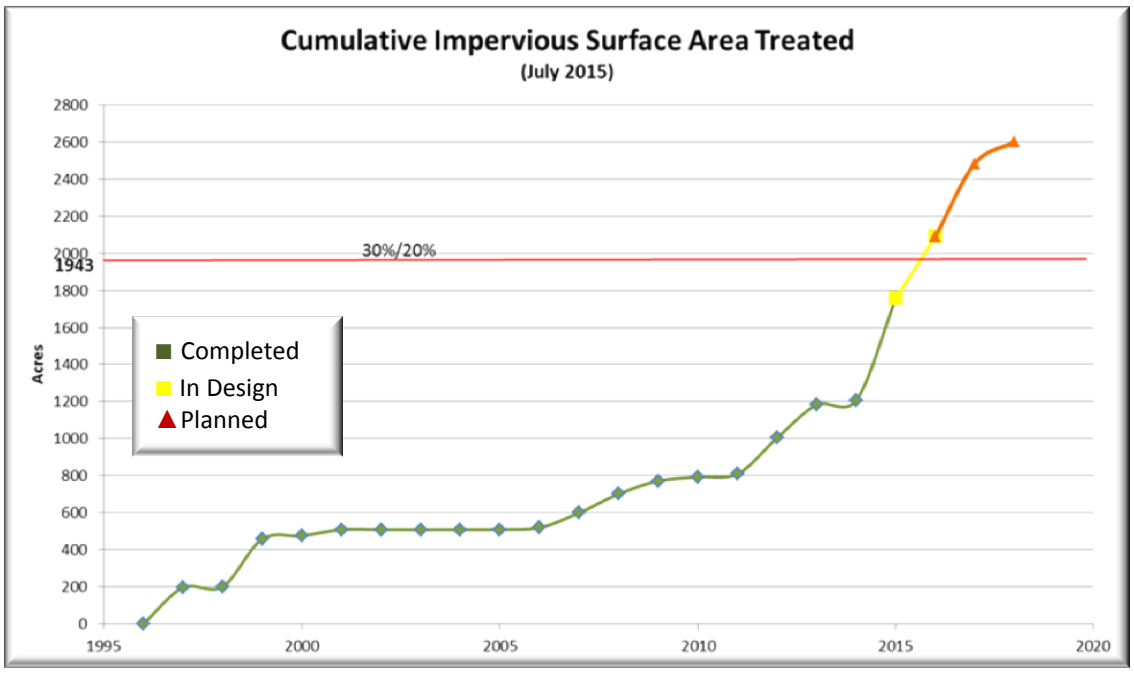


Figure 6: Impervious Surface Acres Treated for Constructed, Under Design, and Planned Projects

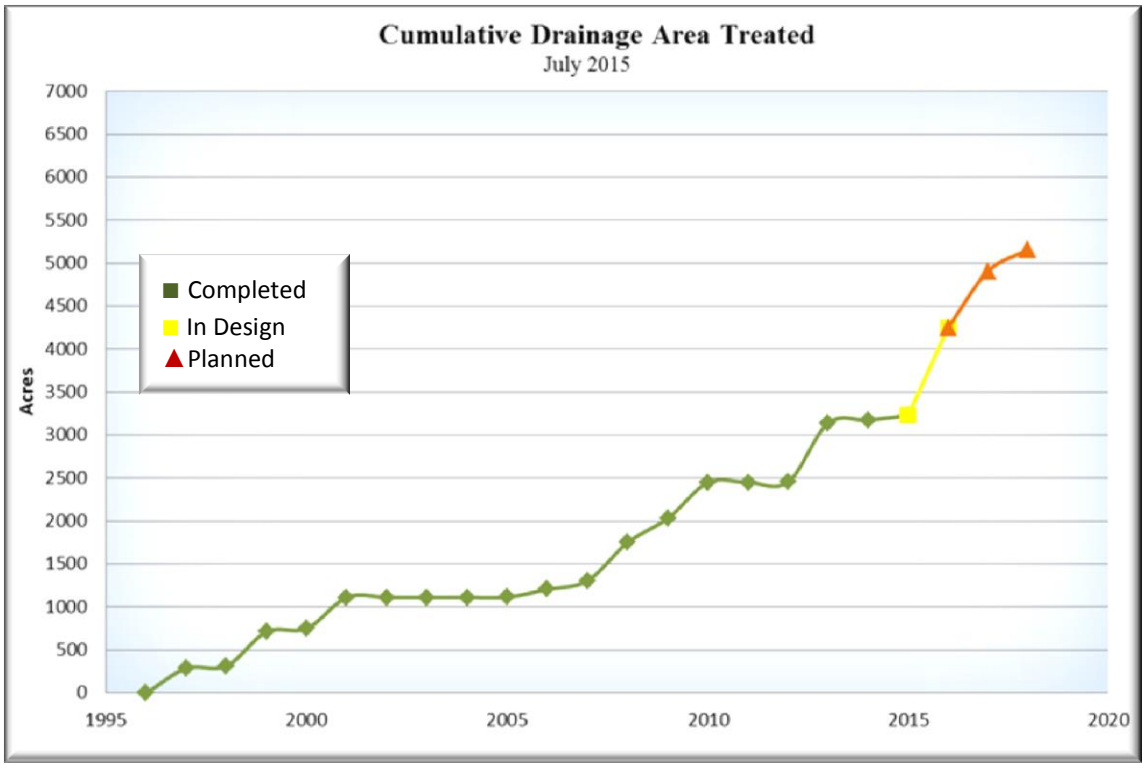


Figure 7: Drainage Area Acres Treated for Constructed, Under Design, and Planned Projects

Table 11
Water Quality Improvements - Watershed Restoration Projects (1997-2015)

Project Name	MDE8NAME	Drainage Area	Reported Impervious Area	Acres Planted	Total Nitrogen (lbs/year)*	Total Phophorus (lbs/year)*	TSS (tons/year)*
Cherry Branch Tree Planting Phase I	Double Pipe Creek		1.52	4.00	28.51	1.32	0.16
Wakefield Valley Tree Planting	Double Pipe Creek		3.35	8.81	62.80	2.92	0.35
Cherry Branch Tree Planting Phase II	Double Pipe Creek		1.14	3.20	22.81	1.06	0.13
Cherry Branch Tree Planting Phase III	Double Pipe Creek		0.57	1.50	10.69	0.50	0.06
Sunnyside	Double Pipe Creek	30.20	9.36		121.53	12.89	3.68
Double Pipe Creek Planting #1	Double Pipe Creek		3.97	10.47	74.63	3.47	0.42
Double Pipe Creek Planting #2	Double Pipe Creek		1.82	4.78	96.16	4.47	0.54
Total		***30.20***	***21.73***	***32.76***	***417.13***	***26.63***	***5.34***
Winter Street Shallow Marsh	Liberty Reservoir	0	0		0.00	0.00	0.00
Longwell County Park Channel Restoration	Liberty Reservoir	211.20	142.80		964.77	140.79	44.63
Longwell County Park Wetland	Liberty Reservoir	76.80	53.76		353.55	52.40	16.68
Carroll County Times Channel Reconstruction	Liberty Reservoir	6.60	0.50		24.26	1.80	0.43
Carroll County Times SWM Retrofit	Liberty Reservoir	10.26	3.02		41.05	4.27	1.21
East Middle School Water Quality Facility	Liberty Reservoir	10.18	0.80		37.47	2.80	0.67
Carroll County District Court	Liberty Reservoir	1.96	0		6.99	0.44	0.09
Eldersburg Elementary School	Liberty Reservoir	1.45	1.00		6.65	0.98	0.31
Carroll County MPC Parking Mgmt.	Liberty Reservoir	0.60	0.60		3.03	0.53	0.17
Carroll County Times	Liberty Reservoir	0.30	0.30		1.51	0.26	0.09
Carroll County Times Addition	Liberty Reservoir	6.80	0		24.24	1.52	0.31
Ralph Street Facility	Liberty Reservoir	29.50	16.50		129.64	17.41	5.39
Englar Business Park	Liberty Reservoir	95.00	80.00		457.38	73.66	23.93
Marriott Wood I Facility #1	Liberty Reservoir	3.00	0.56		11.52	1.04	0.28
Hickory Ridge	Liberty Reservoir	23.75	8.16		184.62	17.50	3.36
Bateman SWM Pond	Liberty Reservoir	47.25	17.76		36.15	3.72	1.07
Marriott Wood I Facility #2	Liberty Reservoir	7.12	3.88		28.02	4.23	1.04
Marriott Wood II	Liberty Reservoir	11.62	2.30		44.92	5.67	1.25
Westminster Airport Pond	Liberty Reservoir	204.84	110.50		410.47	108.77	28.49
Elderwood Village	Liberty Reservoir	15.28	6.42		60.44	9.58	2.40
Collins Estate	Liberty Reservoir	32.68	8.90		126.88	16.79	3.81
Oklahoma II Foothills	Liberty Reservoir	23.72	7.88		92.91	13.46	3.22
Oklahoma Phase I	Liberty Reservoir	24.44	12.36		96.32	14.77	3.64
Deer Park Tree Planting	Liberty Reservoir	16.28	0.57		117.73	5.94	0.77
Edgewood	Liberty Reservoir	38.00	16.97		60.44	9.58	2.40
Naganna Pond	Liberty Reservoir	24.50	14.00		98.09	17.20	4.49
High Point	Liberty Reservoir	9.40	2.37		46.08	4.18	1.13
Hoff Pond	Liberty Reservoir	77.30	42.61		293.27	29.06	5.26
Quail Meadows	Liberty Reservoir	55.40	14.50		108.60	23.80	5.72
Heritage Heights	Liberty Reservoir	21.40	10.25		83.05	10.94	2.48
Chrisman Property	Liberty Reservoir	6.75	1.60		26.37	3.72	0.88
Bennett Cerf Tree Planting	Liberty Reservoir		0.25		5.45	0.46	0.08
Westminster High School	Liberty Reservoir	115.00	63.18		457.70	76.48	19.58

Project Name	MDE8NAME	Drainage Area	Reported Impervious Area	Acres Planted	Total Nitrogen (lbs/year)	Total Phophorus (lbs/year)	TSS (tons/year)
Diamond Hills Section 5	Liberty Reservoir	51.80	19.51		204.63	32.06	7.97
Westminster Community Pond	Liberty Reservoir	250.22	43.92		490.85	108.29	26.11
Liberty Tree Plantings	Liberty Reservoir		2.07	5.44	38.99	1.81	0.22
Liberty Municipal Plantings	Liberty Reservoir		3.42	9.02	64.29	2.99	0.36
Total		***1,510.40***	***709.80***	***14.46***	***5,238.35***	***818.89***	***219.90***
Hampstead Valley 3 Dry Retention	Loch Raven Reservoir	79.19	32.27		330.15	38.85	11.54
North Woods Trail Dry Retention Facility	Loch Raven Reservoir	236.80	0		843.96	52.95	10.94
Roberts Field Wet Retention Pond Retrofit	Loch Raven Reservoir	47.20	0		168.22	10.55	2.18
Piney Run Buffer Project	Loch Raven Reservoir	0	0.40		4.04	0.52	0.10
Piney Run Channel Reconstruction	Loch Raven Reservoir	397.04	258.07		1798.28	257.87	81.36
Total		***760.23***	***290.74***		***3,144.65***	***360.74***	***106.12***
Lower Monocacy Tree Planting	Lower Monocacy	11.85	4.56	12.00	76.77	3.57	0.43
Total		***11.85***	***4.56***	***12.00***	***76.77***	***3.57***	***0.43***
Chung Project	S Branch Patapsco	92.00	10.00		342.74	27.12	6.69
Winfield Fire Department Addition	S Branch Patapsco	3.13	0.22		11.48	0.84	0.20
Neale Court Storm Drain	S Branch Patapsco	3.23	0.64		12.46	1.14	0.31
Piney Run Planting (Filbey)	S Branch Patapsco	47.20	1.14	3.00	339.83	16.73	2.12
Arthur's Ridge	S Branch Patapsco	51.17	5.14		97.97	16.53	3.35
South Carroll High School - Fine Arts Addition	S Branch Patapsco	28.19	14.32		121.73	15.69	4.80
Brimfield	S Branch Patapsco	34.69	29.30		281.28	38.34	8.69
Harvest Farms 1A	S Branch Patapsco	43.80	23.62		85.80	18.68	4.47
Parrish Park	S Branch Patapsco	94.23	18.20		182.89	36.21	8.22
Sun Valley	S Branch Patapsco	12.80	3.27		100.28	10.29	1.43
Clipper Hills Gardenia	S Branch Patapsco	33.19	16.62		131.49	21.12	5.32
Clipper Hills Hilltop	S Branch Patapsco	43.82	21.44		172.90	26.81	6.63
Benjamin's Claim	S Branch Patapsco	47.10	20.51		186.62	30.03	7.56
Carrolltowne 2B	S Branch Patapsco	34.61	10.38		68.22	15.74	3.88
Carrolltowne 2A	S Branch Patapsco	87.73	44.75		350.47	60.37	15.66
Friendship Overlook/Diamond Hills Section 2	S Branch Patapsco	82.01	19.92		159.81	33.02	7.68
Benjamin's Claim Basin 'B'	S Branch Patapsco	1.33	0.55		5.56	0.60	0.20
Eldersburg Estates 3-5	S Branch Patapsco	34.90	8.16		136.50	13.15	3.61
Braddock Manor West	S Branch Patapsco	49.30	7.65		187.07	16.04	4.15
South Branch Planting	S Branch Patapsco		3.60	9.43	28.24	2.39	0.41
Total		***824.43***	***259.43***	***12.43***	***3,003.34***	***400.83***	***95.38***
Prettyboy Tree Plantings	Prettyboy Reservoir	15.69	1.06	2.79	13.90	0.65	0.08
Prettyboy Municipal Planting	Prettyboy Reservoir		0.72	1.90	13.54	0.63	0.08
Total		***15.69***	***1.78***	***4.69***	***27.44***	***1.28***	***0.16***

Project Name	MDE8NAME	Drainage Area	Reported Impervious Area	Acres Planted	Total Nitrogen (lbs/year)	Total Phophorus (lbs/year)	TSS (tons/year)
Upper Monocacy Municipal Planting	Upper Monocacy		5.89	14.50	110.48	5.13	0.62
Total		***0.00***	***5.89***	***14.50***	***110.48***	***5.13***	***0.62***
Overall Watershed Total		***3,152.80***	***1,293.93***	***90.84***	***12,018.17***	***1,617.08***	***427.95***

*Note: *Nutrient reductions were derived from MDE's Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated guidance document for NPDES stormwater permits, August 2014.*

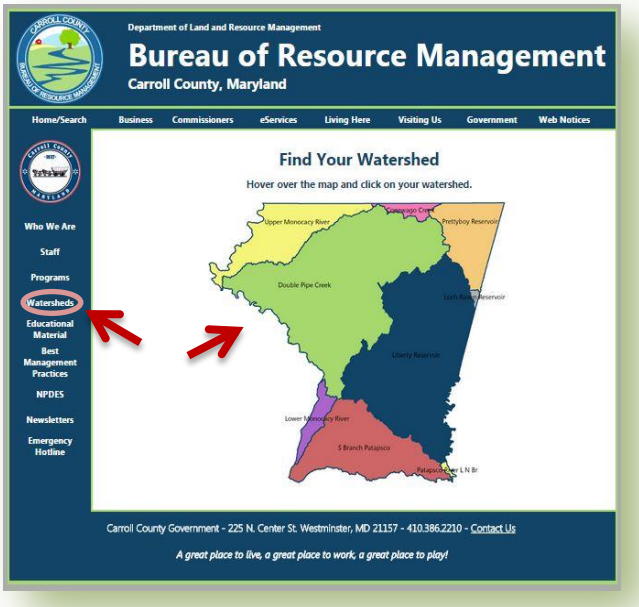
3. Public Participation

The process to develop a restoration plan is divided into two main components: the watershed assessment and the restoration plan. An SCA is completed and the results compiled into a watershed assessment itself. The watershed assessment document then provides a basis for the development of an iterative plan that describes measures that could be taken to improve water quality and the health of the stream corridor, which is called the restoration plan.

For each 8-digit watershed that lies either wholly or partially within Carroll County, a watershed assessment either has been, or will be, completed. Through the assessment, the general condition of a stream system can be qualitatively determined and measures identified to improve the overall health of the drainage network. Maryland Department of Natural Resources' (DNR) SCA tool is used to assess a 50-foot corridor on either side of the stream.

At the beginning of the process, every land owner whose property is crossed by a stream is mailed details regarding the assessment and what it involves. Property owners are requested to respond by returning a postcard to indicate if they will voluntarily participate by allowing access by staff to their property. Many property owners even participate in the actual stream walk with staff. Staff employs additional means to contact property owners who haven't responded, but may be able to fill important gaps in the corridor.

In 2014, assessment work focused on two major watersheds: Conewago Creek and Lower Monocacy. Fifty-two percent of property owners granted permission to perform the stream walk. As a result, staff accomplished assessments on roughly 21 of the 41 miles (51%) of stream corridors within these watersheds. The 2015 assessment focused on the Upper Monocacy Watershed. Property owners granted permission for access to 67 of the 133 stream miles (50%). Due to the cooperation of private landowners, as of June 2015, watershed assessments were achieved in seven of the nine watershed basins within the county, addressing over 588 of the 948 (62%) stream miles within these seven watersheds.



For information regarding each individual watershed, please visit the Bureau of Resource Management's website at http://ccgovernment.carr.org/ccg/resmgmt/, and click on the Watersheds tab on the left side of the page or click on the watershed of interest on the map.

The conditions found during each SCA are summarized in a watershed assessment document. It provides a general summary of the

conditions found, including erosion, buffer type/width, etc., as well as related statistics. The completed SCA documents are available to view or download on the Bureau of Resource Management website under the Watersheds tab or by clicking directly on the watershed of interest on the map (http://ccgovernment.carr.org/ccg/resmgmt/).

Property owners found to have inadequate buffers are sent a letter encouraging them to participate in the County's Stream Buffer Initiative. This initiative is completely voluntary; participating landowners must be willing to grant access to their property for ground preparation, planting, and maintenance of the planting. During the planning phase, staff meets with interested landowners to discuss potential planting areas. Landowners are provided with a native tree species list, which allows them to select the native trees they prefer to be planted on their property. Establishing streamside buffers offers many benefits, including sediment filtration, excess nutrient removal, stream bank stabilization, temperature regulation, and wildlife corridor establishment as well as one-on-one educational opportunities.

Once the watershed assessment and subsequent SCA is complete, staff develops a restoration plan to indicate the activities and measures that could be taken to help improve water quality and the health of the stream corridor. Draft restoration plans are submitted to MDE for review and comment. The draft is finalized upon notification from MDE that the plan is adequate. Upon notification that the draft is adequate, a minimum 30-day comment period via the County's website will be undertaken.

4. TMDL Compliance

The permit requires Carroll County to evaluate and document its progress toward meeting all applicable stormwater WLAs included in EPA-approved TMDLs. According to EPA's letter to MDE's Water Management Administration, regarding Supplemental Comments on Carroll County's Phase I MS4 Permit, dated September 23, 2014, EPA has reviewed this permit and considers the effluent limit – the 20 percent impervious surface restoration – consistent with the reductions contained within Maryland's WIP and the Chesapeake Bay Program's (CBP) 2017 interim goals. EPA was satisfied that this permit is consistent with the overall assumptions and requirements of the Chesapeake Bay TMDL WLA, the CBP goal of 2025, and other applicable TMDL WLAs identified in the permit (nutrients and sediment).

Carroll County continues to aggressively and consistently pursue measures to improve water quality and work towards meeting applicable stormwater WLAs. The County fully supports achieving pollutant load reductions through strong fiscal commitments, staff resources to implement the stormwater program, and coordination between co-permittees. The County's fiscal expenditures and capital budgeting – historical, current, and planned – demonstrate the implementation of this commitment. The County achieved the impervious mitigation goal of the third generation permit and has already made substantial progress toward meeting the fourth generation permit's impervious area restoration requirement. This progress demonstrates the County's aggressive implementation toward meeting these goals.

In addition to the percentage of impervious areas restored, the County tracks and documents pollution load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives. **Table 11** provides a detailed list of completed projects and associated pollutant load reductions demonstrating progress toward the TMDL WLAs. Annual TMDL assessments to evaluate the effectiveness of the County's restoration plans and how these plans are working toward achieving compliance with EPA-approved TMDLs will be reported following completion and subsequent implementation of the restoration plans for the individual watersheds. Attachment B of the County's permit lists the EPA-approved TMDLs for Carroll County.

The TMDL assessment for the restoration plans will use the Generalized Watershed Loading Function (GWLF) model, which is a GIS-based watershed modeling tool that uses hydrology, land cover, soils, topography, weather, pollutant discharges, and other critical environmental data to model sediment and nutrient transport within a watershed. The model is used to assess non-point source flow and sediment and nutrient loading from urban and rural watersheds. The GWLF model provides the ability to simulate runoff, sediment, and nutrient loadings (nitrogen and phosphorus) from a watershed given variable-size source areas (e.g., agricultural, forested, and developed land). It is a continuous simulation model, which uses daily time steps for weather data and water balance calculations.

MapShed is a customized GIS interface that is used to create input data for the GWLF watershed model. The MapShed tool uses GIS files and other information related to non-spatial model parameters to derive values for required model input parameters which are then written to the input file needed for model execution. Also accessed through the interface is regional climate data stored in Excel-formatted files that is used to create the necessary weather input file for a given watershed simulation. The MapShed tool allows the user to evaluate pollution mitigation strategies that could be applied in the watershed to achieve pollutant load reduction goals. The primary bases of comparison between current load conditions and restored watershed conditions are the average annual nutrient and sediment loads estimated for each. This tool allows for the integration of future land use.

In addition to nutrient and sediment TMDLs, Attachment B of the County's permit includes TMDLs for mercury. Based on MDE's *Guidance for Developing a Stormwater Wasteload Allocation Implementation Plan for Mercury Total Maximum Daily Loads* (May 2014), atmospheric deposition is the major loading source to mercury-impaired waters in Maryland, primarily originating from power plants. While urban stormwater conveyance systems transport the atmospherically deposited mercury downstream, the impervious surfaces and conveyance systems are not the source. Due to this source of anthropogenic mercury, the guidance document indicates that the majority of TMDL- and WLA-required mercury load reductions are expected to occur at the state and federal level.

The list of EPA-approved TMDLs for Carroll County, found in Attachment B of the permit, also includes bacteria. MDE's *Guidance for Developing a Stormwater Wasteload Allocation Implementation Plan for Bacteria Total Maximum Daily Loads* (May 2014) does not provide quantifiable methodology for tracking and measuring bacteria pollutant load reductions.

However, in Carroll County, both bacteria and mercury load reductions will primarily be addressed through the measures and BMPs implemented to address nutrient and sediment TMDLs in the county. Carroll County's primary approach to stormwater retrofits is use of enhanced infiltration and filtration. This strategy optimizes removal of mercury and bacteria. Therefore, while not strictly quantifiable, this approach provides enhanced removal of these constituents.

More specific details for non-nutrient and non-sediment TMDLs will be included in the restoration plans for each individual relevant watershed.

The County fully supports its stormwater program through strong fiscal commitments, staffing resources to implement the program, and coordination between co-permittees. The County's fiscal expenditures and capital budgeting – historically, currently, and planned – demonstrate the implementation of this commitment. The co-permittees further demonstrate the commitment to achieve the impervious restoration requirement and other provisions and requirements contained in the permit through the MOA signed by all co-permittees. This MOA obligates funding for the capital costs to meet the permit's impervious restoration requirements associated with the municipalities, as well as overall administrative support by the County.

Carroll County's annual operating expenditures for this program have more than doubled since 2008, from approximately $334,000 annually, to more than $1.1 million annually. From July 2005 to June 2015, the County invested more than $13 million – not including nearly $6 million in grants from outside sources – in capital outlays. Additionally, $22.59 million have been reserved for watershed restoration efforts in the Community Investment Program (CIP) for FY 2016 through FY 2021.

For the 14-year period from 2008 to 2021, Carroll County will invest more than $11.0 million in operating expenses, and more than $46.2 million will be available for capital expenditures, for a grand total of $57.2 million – assuming that the County receives no additional grants. Average annual expenditure for 14-year time period would equal approximately $3.3 million, with the average amount budgeted per year from FY 2016 to 2021 increasing to $3.8 million.

Details required by the permit for net change in pollutant loads, costs for completed projects, and cost estimates for planned projects and programs for meeting applicable stormwater WLAs will be addressed and referenced in the individual watershed restoration plans.

F. Assessment of Controls

1. Introduction

Purpose

Carroll County is required to conduct a discharge characterization as part of its NPDES permit conditions for the purpose of evaluating the efficacy of stormwater management. This component consists of monitoring the discharge from a stormwater management facility as well

as assessing impacts to the receiving water body as described below. The State of Maryland has developed a database of discharge data collected by several permit holders in order to characterize stormwater runoff associated with various stormwater management efforts.

The discharge characterization is implemented through the Part IV.F. Assessment of Controls of the permit, which prescribes specific data collection and analysis efforts to be undertaken. Carroll County has been collecting data in support of this program component since August 2000 downstream of the stormwater management facility associated with the Air Business Center just north of Westminster. This stormwater management facility was originally constructed as a wet pond in 1979 and was retrofitted in 2008 as a wet pond with a forebay to provide water quality, recharge volume, and channel volume protection.

Study Area and Requirements

The discharge characterization is completed in a first order stream that is a tributary to the West Branch of the North Branch Patapsco River. The location of the watershed where monitoring is conducted within the county is shown in **Figure 8**, while the location of the monitoring stations and other watershed features are shown in **Figure 9**. The study area is located near the topographic divide separating the eastern and western piedmont physiographic provinces. As shown in **Figure 8**, the unnamed tributary drains the upper-most extent of first order tributary and is located in the Liberty Reservoir watershed.

The Air Business Center regional stormwater management facility discharges via a constructed outfall to a small stream that travels southeast to the confluence within the West Branch. The stream receives the majority of water from the pond with contribution from overland flow from the drainage basin during precipitation events. A new stormwater management pond at the West Branch Trade Center has been constructed adjacent to and east of the Air Business Center stormwater management facility. This facility drains to the stream, which is just downstream of the outfall station.

Program Elements

The discharge characterization consists of three primary data collection efforts to assess the effectiveness of the stormwater controls on stream health: physical monitoring, chemical monitoring, and biological monitoring. These data are collected at the two monitoring stations

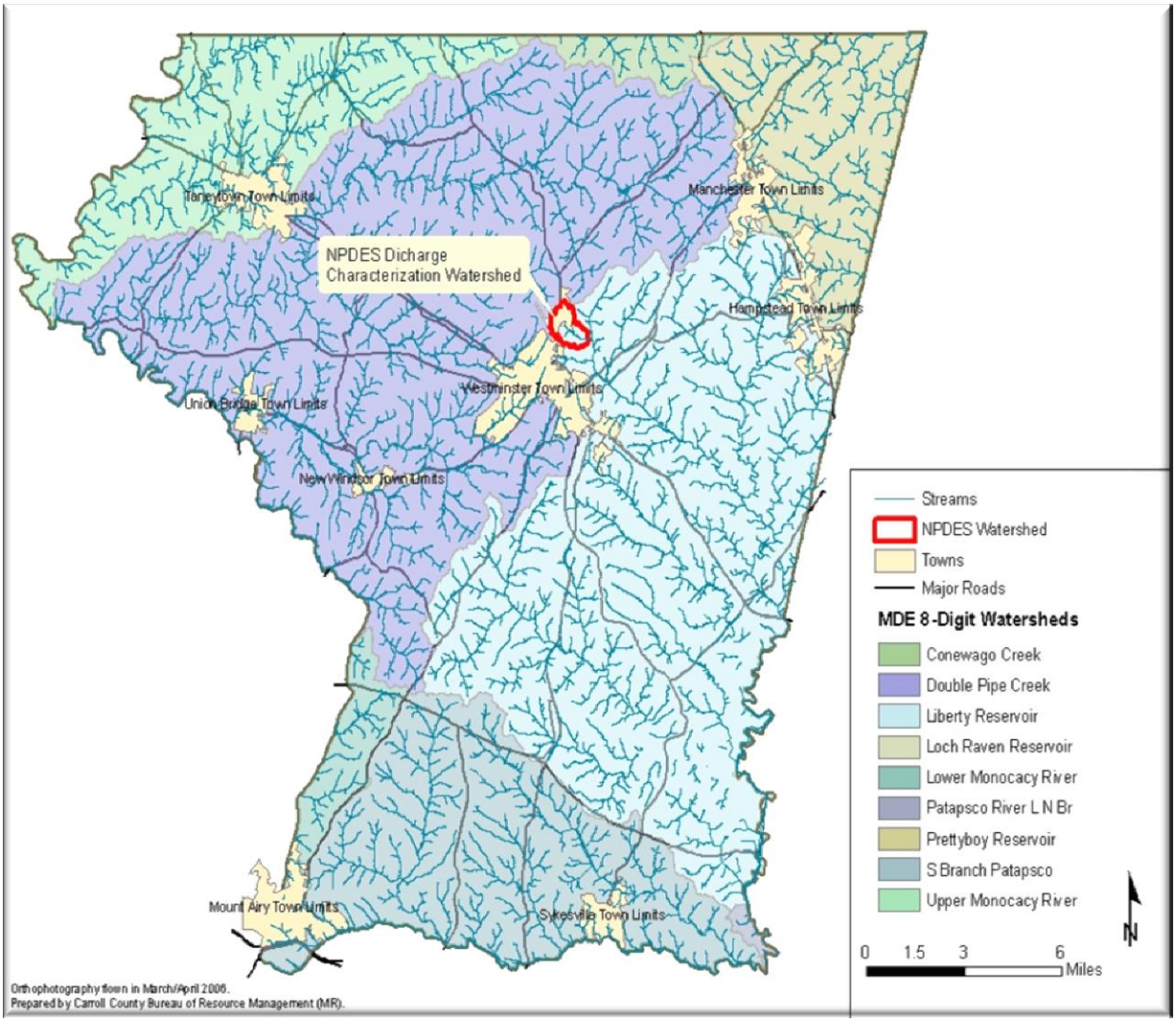


Figure 8: Carroll County NPDES Discharge Characterization Location

shown in **Figure 9** where the cumulative effects of watershed restoration efforts can best be assessed.

Physical monitoring is conducted in the spring of each reporting year and consists of the following elements:

- A geomorphic stream assessment to include an annual comparison of permanently monumented stream channel cross-sections and a stream profile to evaluate channel stability;
- A stream habitat assessment for evaluating areas of aggradation and degradation; and
- Analysis of the effects of rainfall discharge rates, stage, and continuous flow on geometry (if needed).

Chemical monitoring is completed throughout the reporting year and requirements consist of the following elements.

- Samples of eight storm events at each monitoring location, with at least two occurring each quarter. During extended dry periods, base-flow samples are collected one time per month.
- Sampling is completed with automated equipment to include pH and temperature, and each storm limb is characterized.
- Laboratory analysis is completed for a number of chemical constituents and Event Mean Concentrations (EMCs) calculated and reported.

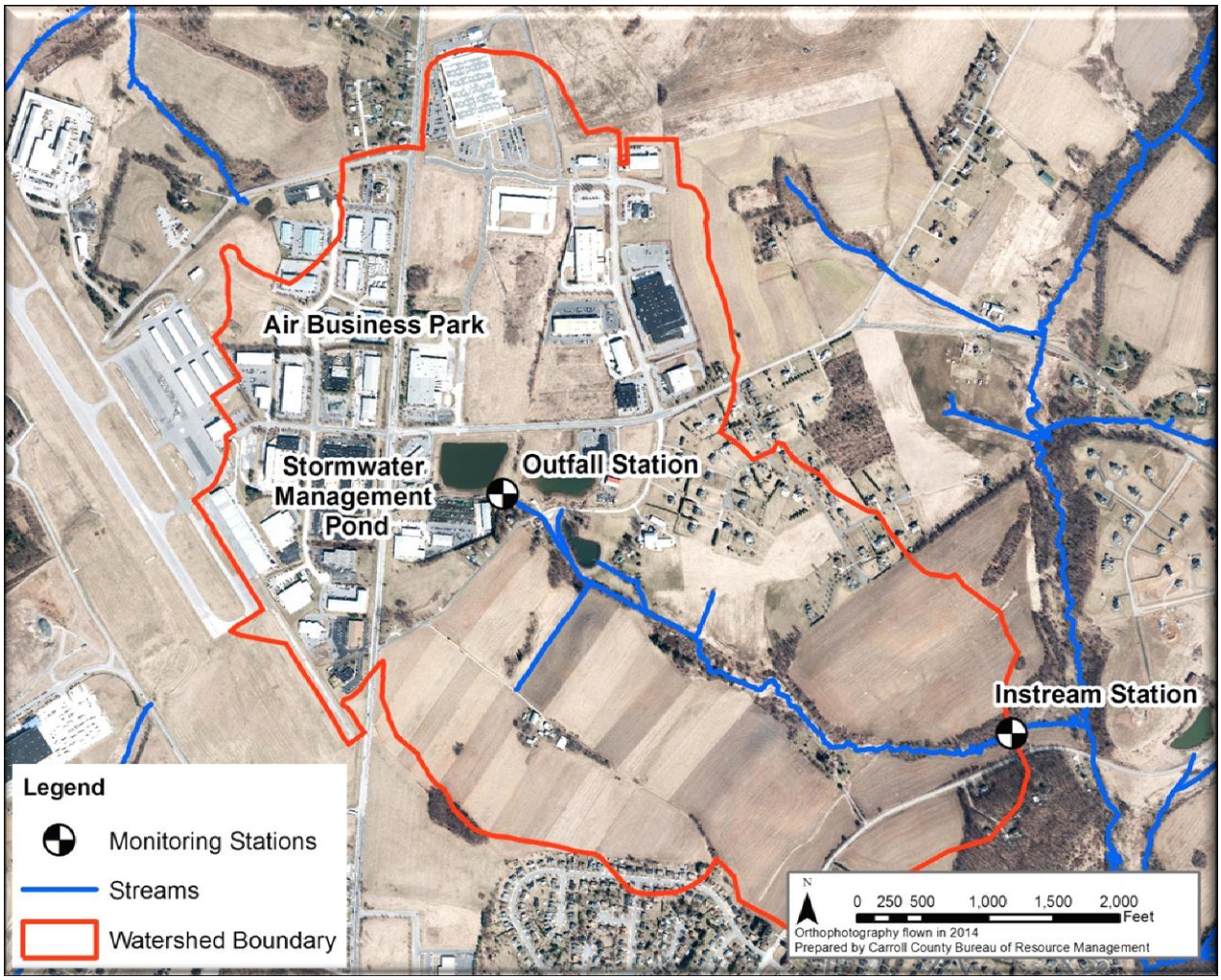


Figure 9: NPDES Discharge Characterization Watershed

Biological monitoring is completed in the spring of the reporting year and consists of the following elements:

- Assessment of benthic macro-invertebrates at both monitoring stations to assess stream health; and
- Completion of a spring habitat assessment.

2. Data Collection and Analysis Methods

Climatological

The climate of Carroll County is characterized as temperate and moderately humid (Meyer and Beall, 1958). The 30-year average county temperature is 54° Fahrenheit (F) with monthly means ranging from 32°F in January to 76°F in July (NOAA, 2014). The 30-year average county precipitation is 43.4 inches with monthly means ranging from 2.5 inches in February to 4.3 inches in July (NOAA, 2014). Temperature data were collected from the weather station at the Carroll County Regional Airport as in the previous reporting years. This station is operated by the Carroll County Government in accordance with National Weather Service Standards. Precipitation data, previously collected at the Carroll County Regional Airport, were collected for this reporting period at the Westminster Wastewater Treatment Plant.

Hydrological

Continuous stream discharge data is necessary to understand the hydrology in the study watershed. Therefore, both monitoring stations are equipped with instrumentation to collect this continuous data. The outfall station has dedicated electric power and is equipped with an ISCO model 4250 flow meter and a model 3700 portable sampler. The instream station is also equipped with dedicated ISCO flow measuring and sampling equipment and is powered by a deep cycle, 12 volt marine battery. An ISCO model 6712 portable sampler and model 4230 bubbler-type flow meter are deployed at this station.

Hydrology data collection at the instream station consists of a stilling well, staff plate, and bubbler assembly which is part of the ISCO flow meter. The instrument converts the hydrostatic pressure required to maintain the bubble rate. This pressure is proportional to the stream stage. County staff regularly collects stage-discharge data to relate stage to discharge. The hydrology data collection at the outfall station consists of a dedicated stage/velocity meter anchored to the outfall pipe. The logging device uses Manning's equation and input from the sensor to convert stage to discharge. The pipe discharge stage is regularly checked to verify that the instrumentation is functioning properly.

Flowlink Version 5.1 software by ISCO is used to complete hydrologic data analysis. Data collected at the monitoring stations are downloaded to a laptop computer via serial communication. New hydrologic data is appended to the existing data record for each station. The stream characterization data is exported from Flowlink to Microsoft Excel for most analyses.

Due to multiple equipment malfunctions, stage-discharge measurements for one or both stations were unavailable at various times. Discharge was estimated during this time from several relationship models using the other station as a reference when available. Analogous storm events from periods with complete data were extracted to create relationship models with those storm events that occurred during periods with missing discharge measurements. Relationship models were created for each limb of the analogous storm events and were then used to estimate stage-discharge of the paired storm event using the other station as the reference.

Geomorphological

During the spring of 2015, Carroll County conducted a geomorphologic assessment for the entire stream reach from the outfall of the Air Business Park stormwater management facility to the confluence with the West Branch of the Patapsco River. As required, survey points were again collected at the six permanent, monumented cross-sections determined to be representative of each stream reach. At each of these monumented cross-sections, the County DPW's survey crew collected data for bank slope, toe, stream edges, channel bottoms, and tops.

The County survey crew continues to collect data at each of the 28 segments (approximately 200 foot intervals) along the same stream reach. The data collected for this effort are similar to the data collected at the six monumented cross-sections, describing the stream channel cross-section. The survey crew collected data for the stream channel bottom at the thalweg, the edge of water at each bank, and the top of each stream bank.

A Level 1 geomorphologic stream assessment has been conducted for the entire stream reach to assess potential geomorphologic changes to the stream. This assessment consisted of two major components: an assessment of stream channel changes and an interpretation of these changes.

The assessment of stream channel changes involves determining channel segment characteristics and assessing dimensional changes. The assessment evaluations include an interpretation of changes in channel response which was manifested through a comparative evaluation of channel geometry changes and included cross-sectional dimensions in the context of the physical setting.

Chemical

Carroll County continues to contract with Martel Laboratories, Inc., in Baltimore, Maryland, to conduct all of the sample collection and lab analyses of the eight required events during the reporting year. The sampling program consists of a first flush component for total petroleum hydrocarbons, bacteriological constituents, and physical parameters as well as chemical parameters collected during each of the three storm limbs. **Table 12** includes the required parameters for laboratory analysis, the laboratory method, and the corresponding method reporting limit.

Table 12
Laboratory Methods and Detection Limits for Parameters Tested

Parameter Tested	Method	Reporting Limit
First Flush Sample		
pH	EPA 150.1	-
Temperature	EPA 170.1	-
Specific Conductance	SM 2510 B-97	1.0 µmhos/cm
Total Petroleum Hydrocarbons	EPA 1664	5.0 mg/L
Escherichia Coli	SM 9223 B-94	1.0 organisms/ 100mL
Limb Samples		
Nitrate/Nitrite Nitrogen	SM 4500NO3-H00	0.05 mg/L
Biological Oxygen Demand	SM 5210 B-01	2.0 mg/L
Total Copper	EPA 200.8	2.0 µg/L

Parameter Tested	Method	Reporting Limit
Total Lead	EPA 200.8	2.0 µg/L
Total Zinc	EPA 200.8	20.0 µg/L
Total Kjeldahl Nitrogen	SM 4500NH3 C-97	0.5 mg/L
Total Phosphorus	SM 4500P-P E-99	0.01 mg/L
Total Suspended Solids	SM 2540 D-97	3.0 mg/L

The County continues to use the same type of storm event monitoring equipment manufactured by ISCO, Inc. to comply with this component of the County's NPDES MS4 permit. The instream station is equipped with an ISCO Model 6712 auto sampler, whereas the outfall station has an ISCO Model 3700 auto sampler. The outfall sampler is paced with an ISCO Model 4250 level flow meter, while the instream sampler is paced using an ISCO Model 4230 bubbler flow meter. Personnel from Martel Labs continue to collect storm flow events in the same manner as in previous years, but County staff recently began baseflow sample collection. The flow monitoring and event mean concentration (EMC) calculation methods are the same as those used in previous reporting years. Martel Labs continues to send results via email to the County where the new records are appended to the existing Microsoft Access database.

The event dates for this reporting year are shown in **Table 13.** Please note that only 15 total sampling events are reported.

Table 13
2014 – 2015 NPDES Discharge Characterization Sampling Events

Instream Physical Water Data				Outfall Physical Water Data			
Event	pH	Water Temp (F)	Conductivity (µmhos/cm)	Event	pH	Water Temp (F)	Conductivity (µmhos/cm)
2014-05	5.92	N/A	280	2014-05	5.86	N/A	240
2014-06	6.05	N/A	280	2014-06	6.13	N/A	210
2014-07	6.62	N/A	250	2014-07	6.56	N/A	230
2014-08	7	58	250	2014-08	7.3	63	240
2014-09	6.7	64	230	2014-09	7	66	210
2014-10	6.72	N/A	250	2014-10	6.71	N/A	200
2014-11	N/A	N/A	280	2014-11	N/A	N/A	280
2014-12	6.06	N/A	310	2014-12	6.18	N/A	420
2015-01	6.2	N/A	430	2015-01	6.12	N/A	1100
2015-02	6.12	N/A	520	2015-02	5.93	N/A	2200
2015-03	6.9	39.7	1000	2015-03	6.9	39.2	1900
2015-04	N/A	N/A	590	2015-04	N/A	N/A	480
2015-05	7.37	51	400	2015-05	7.15	54	640
2015-06	7.16	N/A	310	2015-06	6.97	N/A	680
2015-07	8.3	N/A	280	2015-07	8.34	N/A	250

Biological

Two monitoring sites corresponding to the outfall and instream stations have been characterized since the 2000 reporting period. The 75-meter sampling sites, shown in **Figure 10**, were not

randomly selected. Results from the data gathered over the years may reflect changes in stream conditions downstream of the regional stormwater management facility.

Data collection, macro-invertebrate identification, and analytical methods were in accordance with the Maryland Biological Stream Survey (MBSS) guidance manuals (Sampling Manual Field Protocols, 2014, http://www.dnr.state.md.us/streams/pdfs/R4Manual.pdf). The County continues to contract with DNR to identify and enumerate all benthic macro invertebrate samples. The samples were processed and identified by Ellen Friedman, DNR's Principal Taxonomist, who has over 20 years of identification experience. An Index of Biotic Integrity (IBI) score was calculated using the criteria located in **Table 14.** These six criteria are rated a one, three, or five depending on the species present. The average of all criteria is considered the overall IBI score. Narrative ratings can be found in **Table 15.**

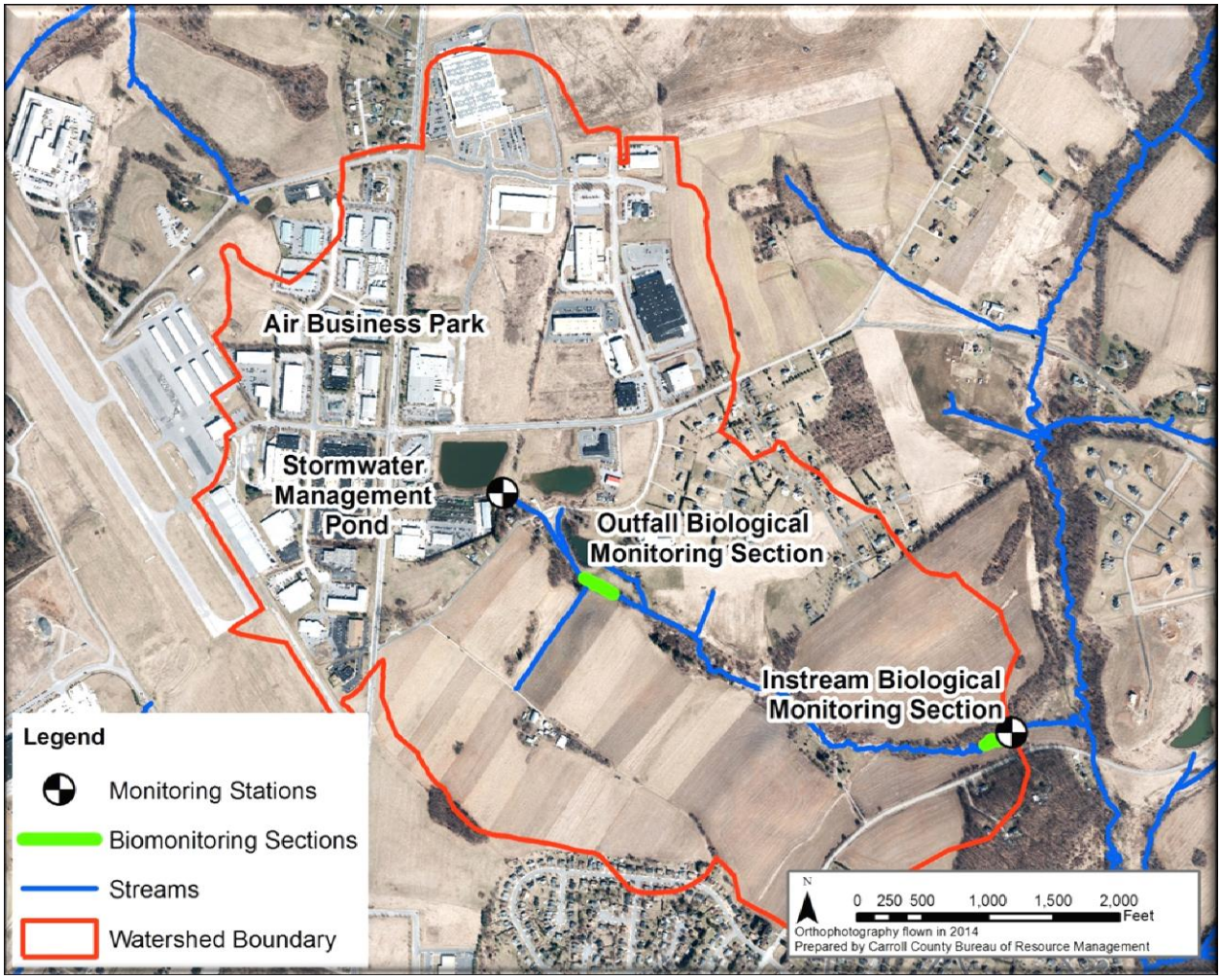


Figure 10: Biological Monitoring Station Locations

Table 14
MBSS Scoring Criteria for the Piedmont Region

Metric	IBI Score 5	3	1
Number of Taxa	≥25	15-24	<15
Number of EPT	≥11	5.0-10.0	<5
Number of Ephemeroptera	≥4	2.0-3.0	<2
% Intolerant Urban (Tolerance Values 0-3)	≥51	12.0-50	<12
% Chironomidae	≤4.6	4.7-63	>63
% Clingers	≥74	31-73	<31

Table 15
IBI Score Ranges and Corresponding Narrative Ratings

IBI Score Range	Narrative Rating	Interpretation
4.0-5.0	Good	Comparable to reference streams considered to be minimally impacted.
3.0-3.9	Fair	Comparable to reference conditions, but some aspects of biological integrity may not resemble the qualities of these minimally impacted streams.
2.0-2.9	Poor	Significant deviation from reference conditions, with many aspects of biological integrity, not resembling the qualities of these minimally impacted streams, indicating some degradation.
1.0-1.9	Very Poor	Strong deviation from reference conditions, with most aspects of biological integrity, not resembling the qualities of these minimally impacted streams, indicating severe degradation.

The assessment of spring habitat also utilized guidance from the *2014 Maryland Biological Stream Survey (MBSS) Sampling Manual: Field Protocols*. This approach is entirely subjective and bias is often high with this approach depending on the assessor(s) and other factors. The scoring criteria measures eight parameters as shown in **Table 16**. Each parameter can be scored a maximum of 20 points for a total maximum score of 160 points. Each parameter is subdivided into narrative ratings of poor, marginal, sub-optimal, and optimal.

Table 16
MBSS Habitat Assessment Criteria
(MBSS Sampling Manual Field Protocols, 2014)

MBSS Stream Habitat Assessment Guidance Criteria Sheet					
	Habitat Parameter	**Optimal 16-20**	**Sub-Optimal 11-15**	**Marginal 6-10**	**Poor 0-5**
1.	**Instream Habitat**	Greater than 50% of a variety of cobble, boulder, submerged logs, undercut banks, snags, root wads, aquatic plants, or other stable habitat.	30-50% of stable habitat. Adequate habitat.	10-30% mix of stable habitat. Habitat availability less than desirable.	Less than 10% stable habitat. Lack of habitat is obvious.
2.	**Epifaunal Substrate**	Preferred substrate abundant, stable, and at full colonization potential (riffles well developed and dominated by cobble and/or woody debris prevalent, not new, and not transient).	Abundance of cobble with gravel &/or boulders common or woody debris, aquatic veg., undercut banks, or other productive surfaces common but not prevalent/suited for full colonization.	Large boulders and/or bedrock prevalent; cobble, woody debris, or other preferred surfaces uncommon.	Stable substrate lacking; or particles are over 75% surrounded by find sediment or flocculent material.
3.	**Velocity/Depth Diversity**	Slow (<0.3 m/s), deep (>0.5 m); slow, shallow (<0.5m); fast (>0.3 m/s), deep; fast, shallow habitats all present.	Only 3 of the 4 habitat categories present.	Only 2 of the 4 habitat categories present.	Dominated by 1 velocity/depth category (usually pools).
4.	**Pool/Glide/Eddy Quality**	Complex cover/&/or depth > 1.5m; both deep (>.5 m)/shallows (<.2 m) present.	Deep (>0.5 m) areas present; but only moderate cover.	Shallows (<0.2 m) prevalent in pool/glide/eddy habitat; little cover.	Max depth <0.2 m in pool/glide/eddy habitat; or absent completely.
5.	**Riffle/Run Quality**	Riffle/run depth generally >10 cm, with maximum depth greater than 50 cm (maximum score); substrate stable (e.g. cobble, boulder) & variety of current velocities.	Riffle/run depth generally 5-10 cm, variety of current velocities.	Riffle/run depth generally 1-5 cm; primarily a single current velocity.	Riffle/run depth < 1cm; or riffle/run substrates concreted.
6.	**Embeddedness**	Percentage that gravel, cobble, and boulder particles are surrounded by line sediment or flocculent material			
7.	**Shading**	Percentage of segment that is shaded (duration is considered in scoring). 0% = fully exposed to sunlight all day in summer; 100% = fully and densely shaded all day in summer.			
8.	**Trash Rating**	Little or no human refuse visible from stream channel or riparian zone.	Refuse present in minor amounts.	Refuse present in moderate amounts.	Refuse abundant and unsightly.

3. Results and Discussion

Climatological

Monthly precipitation data for the 2014-2015 reporting year are summarized in **Figure 11**. Also included for reference are 30-year monthly averages and monthly high and low extremes from the previous 25 years that local data are available. The total precipitation for the reporting period was 46.51 inches, which is a 3.11 surplus from the normal yearly total. The wettest month was June 2015 with a 2.4 inch surplus while September 2014 was the driest month, with a deficit of

2.17 inches. This reporting year was the fifth wettest since reporting began at this station in 2000, an approximate 4-inch increase above the average year since 2000.

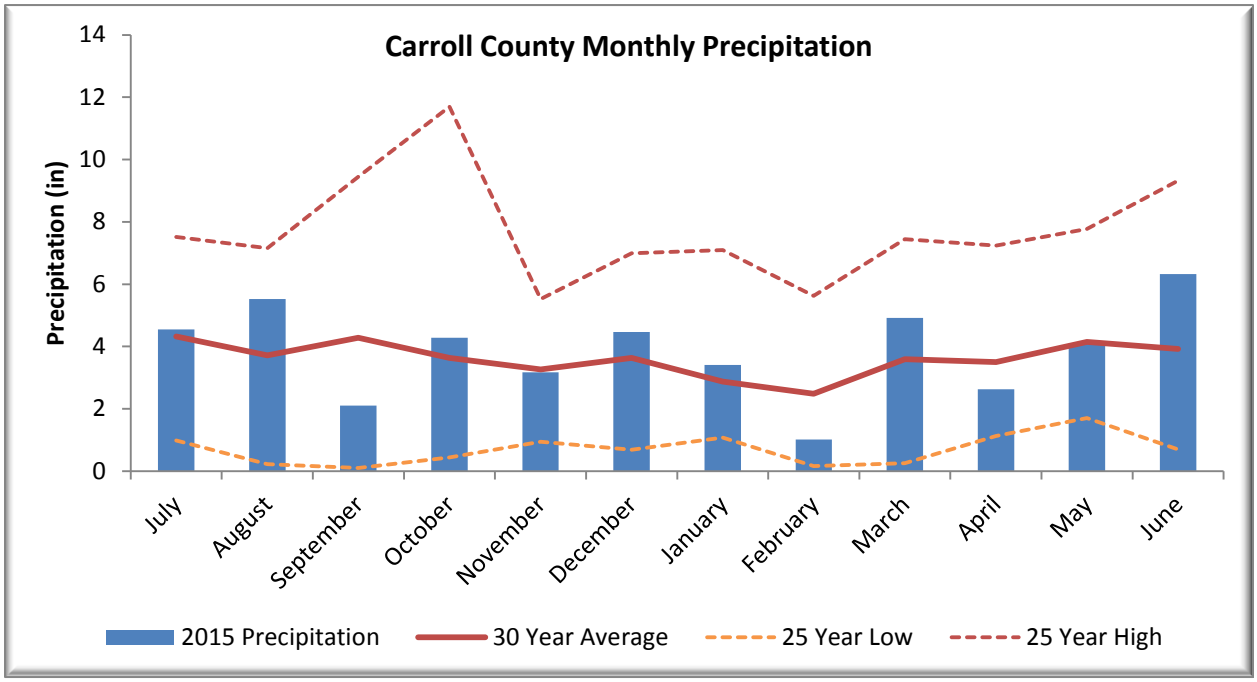


Figure 11: Monthly Precipitation Summary for the Reporting Period

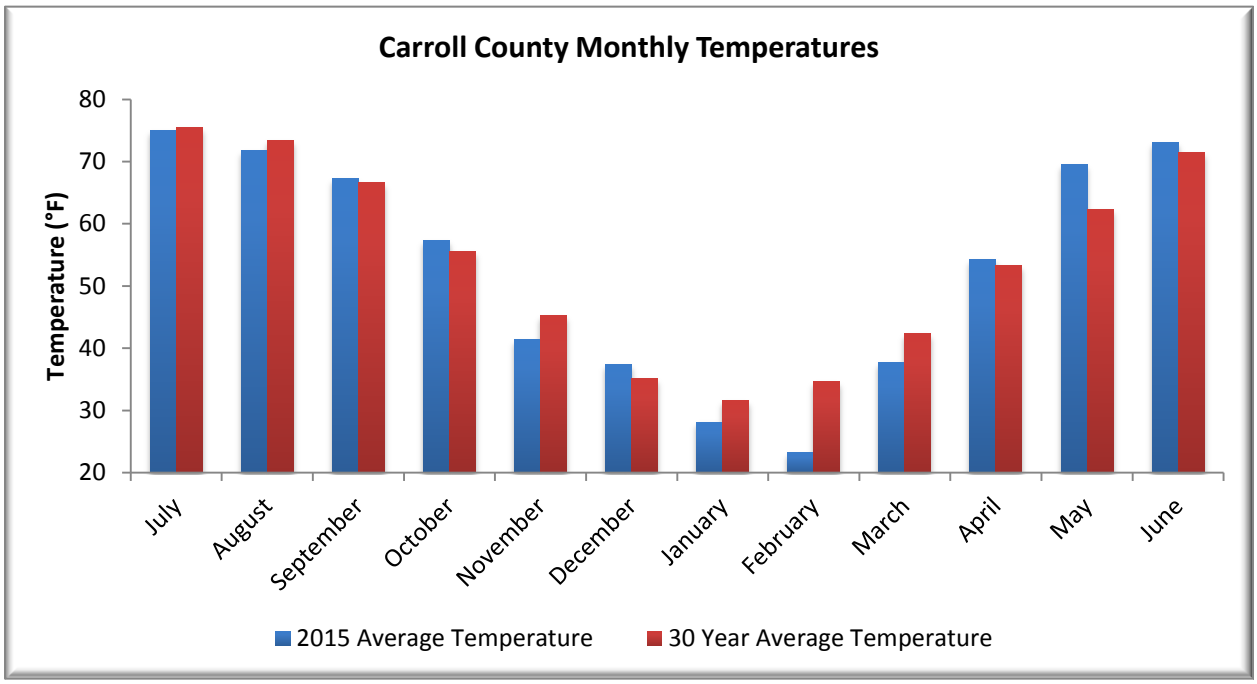


Figure 12: Monthly Temperature Summary for the Reporting Period

Monthly temperature data for the 2014-2015 reporting year are summarized in **Figure 12**. The 30-year monthly average temperatures are included for reference. Overall, the reporting period experienced an annual average temperature of 53°F, which was one degree cooler than the 30-year annual average and similar to the previous year. Combined monthly average temperatures from July through December average just below normal. Temperatures from January through March 2015 averaged a combined 6.5 degrees cooler than average, with the February 2015 average monthly temperature observed 11.4 degrees below normal. Spring 2015 was higher than average with a monthly average temperature disparity of 7.2 degrees during May 2015.

Hydrological

Hydrographs have been prepared for stage height and discharge for each monitoring station during the reporting period. Instream and outfall stage heights and discharge measurements, in addition to daily precipitation totals, are shown in **Figures 13** and **14**. This reporting period had a surplus of 3.11 inches from a normal year and experienced a high frequency of storm events.

Storage by the stormwater facility results in peak stage heights less than 0.5 feet at the outfall station except for the storm event on December 22, 2015, when 1.22 inches of precipitation was recorded over three days. The stage reached peak height at 0.7 feet with a maximum discharge of 2,388 gallons per minute (gpm). Baseflow at the outfall monitoring station was marginal, typically with a stage height of 0.08 feet. The resulting baseflow discharge was approximately 40 gpm.

Typical stage heights observed for the instream monitoring station were approximately 0.4 feet, or 700 gpm. During the March 11, 2015, storm event, stage height reached the peak for the reporting year at 1.49 feet. The resulting discharge was 12,786 gpm. There were two other storm events during this time where stage heights above one foot (6,600 gpm) were observed. These occurred on March 5, 2015, and June 27, 2015, with stage heights of 1.39 feet and 1.04 feet, respectively.

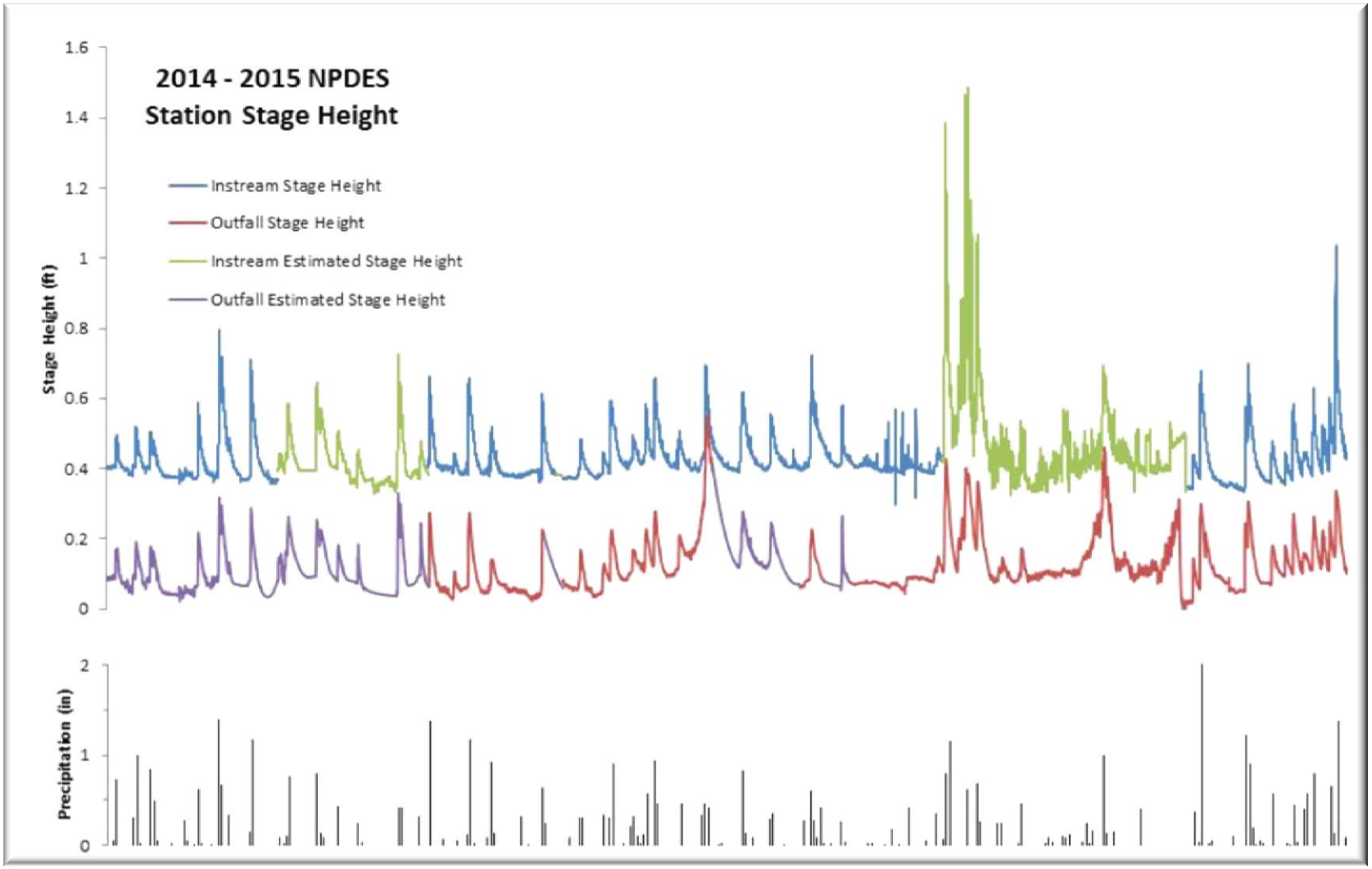


Figure 13: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2014 – 2015 Reporting Year

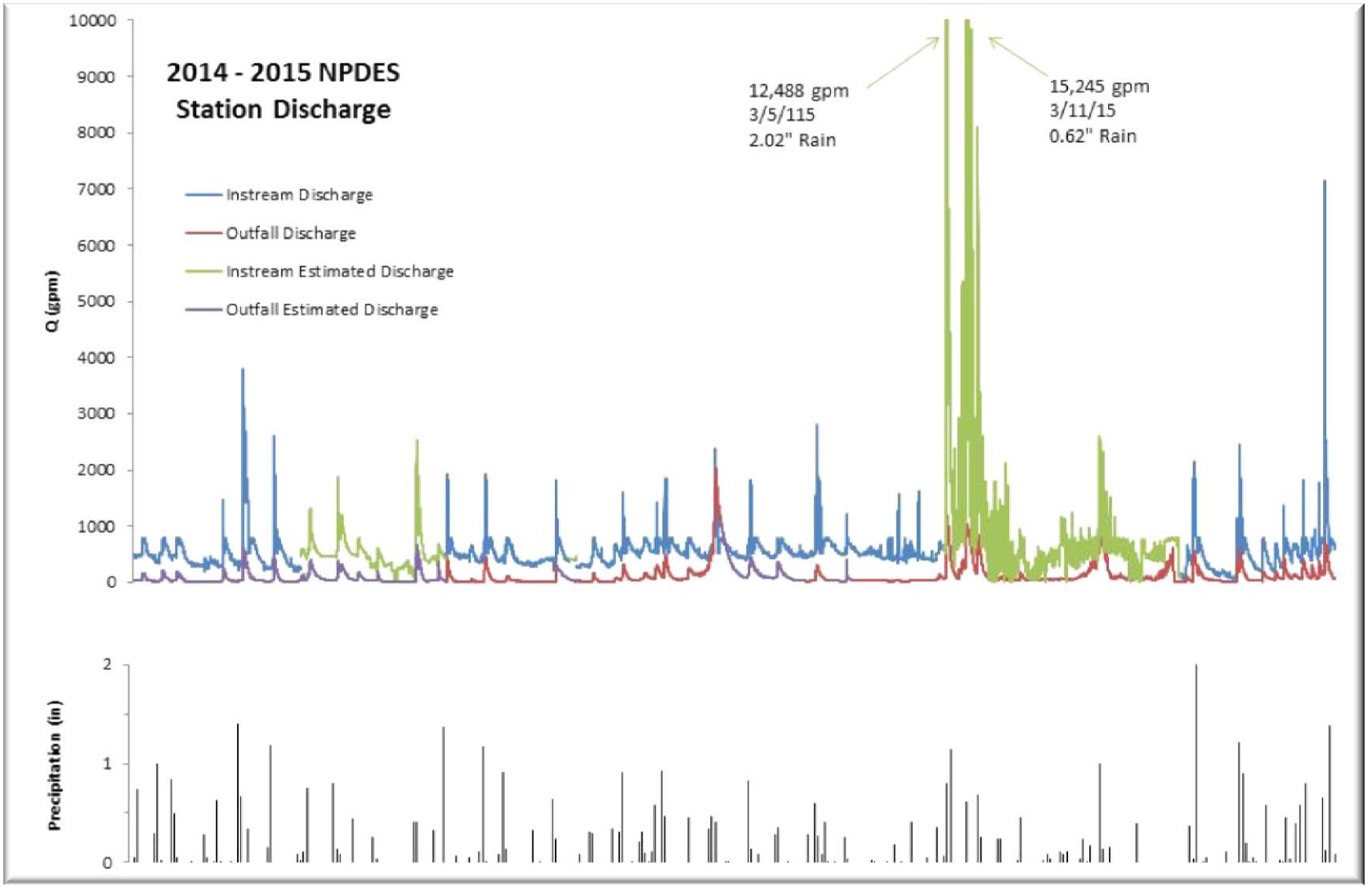


Figure 14: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2014 – 2015 Reporting Year

Total, seasonal, and categorical discharges for each monitoring station can be found in **Table 17**. Overall, only 19 percent of the discharge from the instream station was contributed from the stormwater pond (outfall station). The total discharge from the instream station during this reporting year was approximately 328 million gallons with 61 million gallons being contributed in total discharge from the outfall station. One third of the total discharge occurred during the winter months. The ratio of outfall to instream discharge moved between 25 and 14 percent depending on the season with higher contribution from the outfall station occurring in spring and autumn.

Please note that stage heights and discharges from both stations were periodically estimated. These data were lost due to equipment failure.

Table 17
Categorical Discharges and Stage Heights for the 2014 – 2015 Reporting Year

	Instream	Outfall	Difference	Outfall Contribution (%)
Total (gallons)	*327,866,204*	*61,465,507*	*266,400,698*	*19*
Avg Stage (ft)	0.43	0.12	0.31	-
Median Stage (ft)	0.41	0.10	0.31	-
Avg Q (gpm)	624	117	507	19
Median Q (gpm)	498	51	447	10
Spring Q (gallons)	72,622,452	18,251,674	54,370,778	25
Summer Q (gallons)	68,266,956	9,298,234	58,968,723	14
Autumn Q (gallons)	72,756,011	18,465,301	54,290,710	25
Winter Q (gallons)	114,220,785	15,450,298	98,770,487	14
Dry (<700gpm)	186,243,565	29,421,449	156,822,116	16
Wet (>700gpm)	141,622,639	32,044,058	109,578,582	23

To compare pre- and post-retrofit hydrology of the pond, cumulative discharge frequency was plotted in **Figure 15**. This figure compares the discharge frequencies from the outfall monitoring station for the 2006-2007 and 2014-2015 reporting years. The maximum discharge during the pre-retrofit period (2007) was an order of magnitude higher than the post-retrofit period (2015). The maximum discharge in 2007 was 23,537 gpm while the maximum in 2015 was only 2,022 gpm. Additionally, the frequency and magnitude of high discharge events was greater during the pre-retrofit period. Sixty-nine percent of all discharge measurements were below or equal to 100 gpm. This contrasts with the pre-retrofit measurements where only 23 percent of measurements were below 100 gpm. Ten percent of all measurements in 2007 were greater than 2,000 gallons per minute, which is greater in magnitude than the highest discharges from 2015.

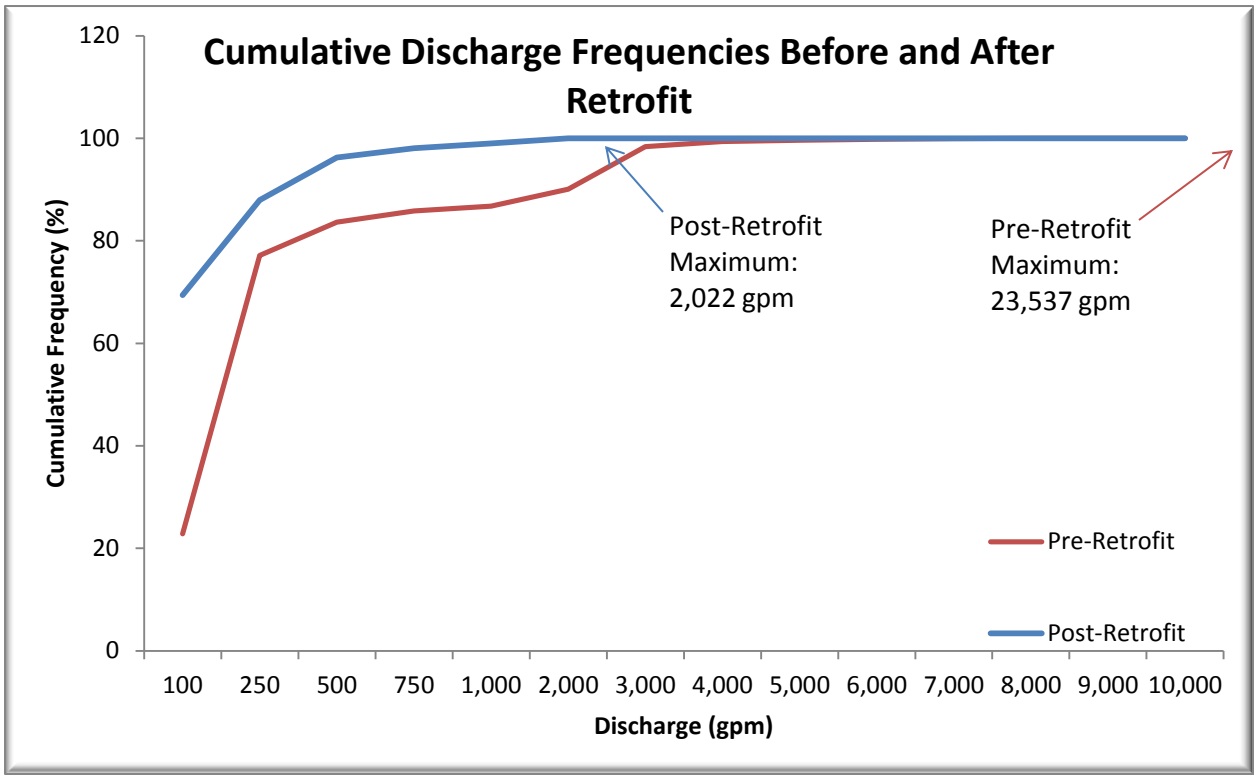


Figure 15: Outfall Discharge Frequencies for 2007 and 2015

Analyzing individual components of the hydrograph allows one to observe the distinct mechanism behind any changes in cumulative frequencies throughout the year. **Figure 16** represents two analogous storm events, one before and one after the stormwater retrofit, and a hydrological comparison therein. This figure contains hydrographs before and after retrofit for instream and outfall stage heights and discharges. The pre-retrofit event had 0.39 inches of precipitation observed while the post-retrofit event had 0.58 inches of precipitation observed. All pre-retrofit hydrographs show a distinctly steeper slope for the ascending storm limb and greater maximum stage and discharge. This is particularly true at the outfall station where the slope and peak were even more distinct. The outfall to instream station discharge ratio for the post-retrofit storm event maintained an approximate contribution of 21 percent, as was roughly the case for the overall discharge and separated stormflow for the reporting period. During the pre-retrofit storm however, the outfall station contributed about 70 percent of the total instream discharge. The period of baseflow recession after the storm event was much shorter during the pre-retrofit storm as well. Overall, longer baseflow recessions and lower peak discharges were observed with the current stormwater configuration.

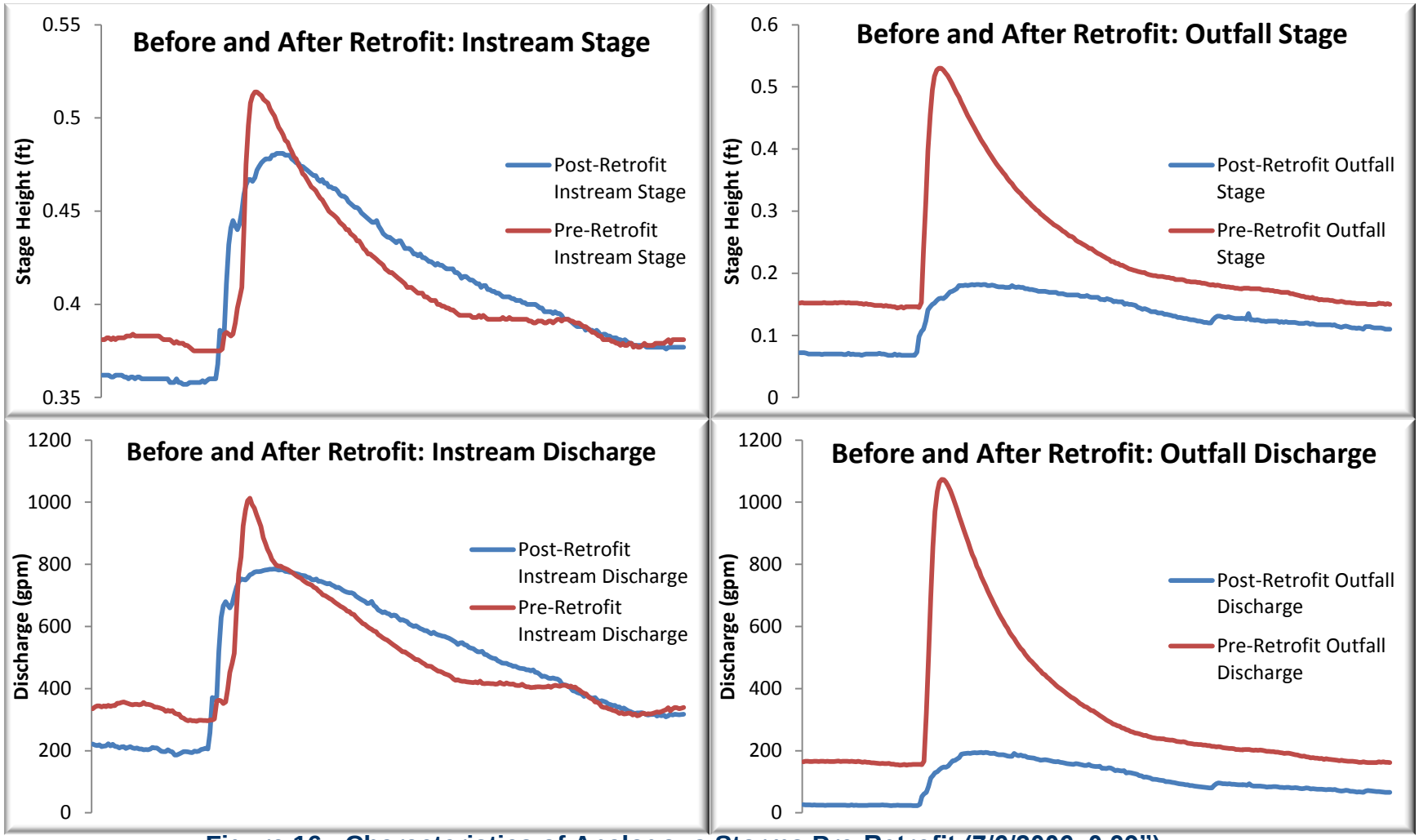


Figure 16: Characteristics of Analogous Storms Pre-Retrofit (7/6/2006, 0.39") and Post-Retrofit (6/8/2015, 0.58")

Geomorphological

The physical stream assessment consists of evaluating the six monumented cross-sections and 28 sections for stream physical character, shape, and slope. Physical data collection stations are shown in **Figure 17**.

Results from this permit year's monumented cross-section data collection are provided in Appendix F. Since this monitoring effort is in part designed to detect changes to the stream system over time, staff compared results from this permit year at the six permanent cross-sections with results from 2000, the initial year this type of monitoring was initiated.

There does not appear to be large-scale degradation or aggradation of the stream channel in the last 15 years. At the first cross-section, located approximately 500 feet downstream of the pond outfall, the left bank has moved approximately two feet to the west but has not experienced any down-cutting. Aggradation along the right edge was observed at this location and it now has a much steeper bank. This section is located approximately 200 feet downstream of a road culvert and just upstream of the input location from the West Branch Stormwater Management Pond.

Cross-sections two and three are generally unchanged since 2000, with only minor changes in stream channel shape. Located approximately 65 feet downstream of a series of bends and two draws, section four has shown relatively significant aggradation of the channel since 2000. The channel bottom and associated floodplain have been elevated by almost one foot since 2000. In the past year, the channel bottom has moved slightly cutting the left bank. This aggradation explains the reduction of stream gradient from approximately 1 percent to 0 percent over the previous 10 years. Section five is essentially unchanged since 2000; however, the right bank has moved west by approximately one foot while the left bank has moved east to narrow the channel slightly.

Consistent with past findings, analysis at monumented cross-section six indicates that the stream channel has widened by four feet since 2000, extending from a width of five feet to a width of nine feet. This width is unchanged during the past several years. This monumented cross-section is located approximately 200 feet upstream of the confluence on a straight reach of stream that precedes a series of bends. As discussed below, this region of the stream has the steepest slope and corresponding highest energy for stream bank erosion. Bank soils in this area are of the Manor Series, which is characterized as highly erodible (USDA, 1969).

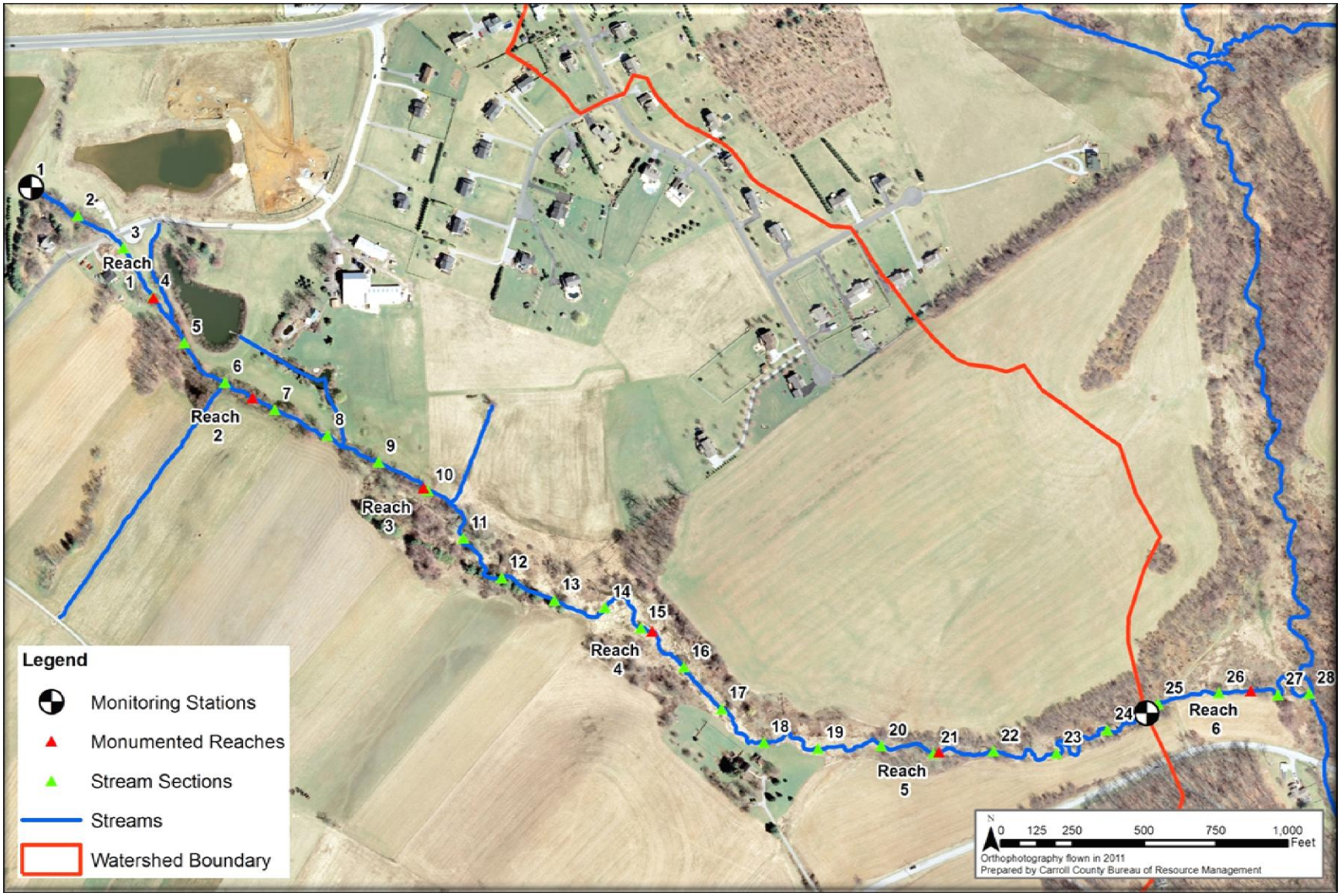


Figure 17: Physical Data Collection Stations

Table 18 displays thalweg elevation and section gradient for selected years from 2004 through 2015. One notable observation from the table is the low, and in some cases, negative gradients found in the center section of the tributary. This observation coincides with the section four stream survey which discovered locally significant sediment deposition from year to year, which one would expect to find in an area with low gradients. **Figure 17** displays stream gradients from reporting years 2015, 2014, and 2004 as a longitudinal profile along with the locations of the six monumented stream reaches.

The overall average gradient has remained unchanged over this period and has remained a gentle slope with only one section above a 2 percent gradient, but some individual sections have changed significantly. In general, increases in gradient between stations are indicative of higher energy and potential for increased channel scour. The first third of the stream profile has remained relatively unchanged during this period, but the gradient is generally higher than that of the final two thirds of the tributary. This can be seen in the survey of monumented section one where the stream channel has moved laterally approximately two feet over this period. The gradient has changed significantly over the second third of the stream profile and ranges from 0.11 percent to 1.07 percent. These ever-changing low gradients can explain why there is so much deposition at monumented section four, which has roughly a flat gradient. The final third of the stream profile changes gradient a number of times, but slopes are relatively similar for 2015 and 2004.

Figure 18 displays the longitudinal stream profile for elevation and depth of deposition or incision at each of the 28 sections along the profile. Included are the six monumented reaches for reference. The profile shows the low gradients in the center section of the stream and that the areas with lowest gradient have moved down stream, the cause of elevated deposition at monumented reach four. Aggradation and degradation is most significant in the center section of the stream. Elevation change during the past ten years has not exceeded one foot at the channel bottom. However, since the stream has two small tributaries, varying bends and straight segments, as well as a number of soils series represented along the channel, it is important to monitor the physical characteristics of the stream channel over time.

Table 18
Cross-Section Station Results for Selected Years 2004 - 2015

		2015		2014		2012		2010		2008		2006		2004	
Station	Distance (ft)	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope
1	0							730.89		730.89		730.68		730.89	N/A
2	201	728.12		728.09		728.04		728.01	1.43%	728.01	1.43%	727.83	1.42%	727.90	1.49%
3	394	724.68	1.78%	724.75	1.73%	724.73	1.72%	724.58	1.78%	724.56	1.79%	724.26	1.85%	724.20	1.92%
4	592	721.87	1.42%	721.79	1.50%	721.86	1.45%	722.06	1.27%	721.49	1.55%	721.30	1.50%	721.51	1.36%
5	786	718.02	1.98%	717.95	1.97%	717.91	2.03%	717.78	2.20%	717.81	1.89%	717.77	1.81%	717.75	1.93%
6	988	715.85	1.07%	716.26	0.84%	715.84	1.03%	716.73	0.52%	716.61	0.59%	716.27	0.74%	715.82	0.96%
7	1,184	715.59	0.13%	715.67	0.30%	715.55	0.15%	715.58	0.59%	715.70	0.46%	715.60	0.34%	715.49	0.17%
8	1,388	714.14	0.71%	714.33	0.66%	714.18	0.67%	714.28	0.64%	714.24	0.72%	714.30	0.64%	714.42	0.52%
9	1,589	712.94	0.60%	712.86	0.73%	712.89	0.64%	712.80	0.74%	712.78	0.73%	712.83	0.73%	712.74	0.84%
10	1,787	711.17	0.89%	711.35	0.76%	711.40	0.75%	711.59	0.61%	711.66	0.57%	711.20	0.82%	711.22	0.77%
11	1,986	709.93	0.62%	710.17	0.59%	710.28	0.56%	709.93	0.84%	710.06	0.81%	709.58	0.82%	709.61	0.81%
12	2,189	709.44	0.24%	709.48	0.34%	709.32	0.47%	709.16	0.38%	709.58	0.24%	709.02	0.28%	709.48	0.06%
13	2,386	708.52	0.47%	708.45	0.52%	708.61	0.36%	708.46	0.35%	709.04	0.27%	709.81	-0.40%	709.45	0.02%
14	2,564	708.55	-0.02%	708.65	-0.11%	708.30	0.18%	708.17	0.16%	707.88	0.66%	707.94	1.06%	707.74	0.97%
15	2,707	707.43	0.78%	707.49	0.81%	707.45	0.59%	707.02	0.80%	707.06	0.57%	707.07	0.61%	706.81	0.65%
16	2,910	705.19	1.10%	705.31	1.07%	705.58	0.92%	705.44	0.78%	705.55	0.74%	705.20	0.92%	705.18	0.80%
17	3,106	704.16	0.53%	704.55	0.39%	704.64	0.48%	704.78	0.34%	704.48	0.55%	704.37	0.43%	704.18	0.51%
18	3,298	703.5	0.34%	703.65	0.47%	703.43	0.63%	703.62	0.60%	703.27	0.63%	703.16	0.63%	702.94	0.64%
19	3,490	701.62	0.98%	701.66	1.04%	701.85	0.82%	701.75	0.97%	701.48	0.93%	701.48	0.88%	701.69	0.65%
20	3,704	698.98	1.23%	699.06	1.21%	699.07	1.30%	698.90	1.33%	698.92	1.19%	698.92	1.19%	698.99	1.26%
21	3,896	697.8	0.62%	697.81	0.65%	697.74	0.69%	697.73	0.61%	697.69	0.64%	697.83	0.57%	697.95	0.54%
22	4,100	695.2	1.27%	695.20	1.28%	694.91	1.39%	694.70	1.48%	694.78	1.42%	694.90	1.43%	694.62	1.63%
23	4,320	694.1	0.50%	694.11	0.49%	693.92	0.45%	693.90	0.36%	693.73	0.48%	693.44	0.66%	693.42	0.54%
24	4,511	691.1	1.57%	691.01	1.63%	691.04	1.51%	691.17	1.43%	691.10	1.38%	691.05	1.25%	691.12	1.21%
25	4,717	689.45	0.80%	689.45	0.76%	689.31	0.84%	689.35	0.88%	689.41	0.82%	689.52	0.74%	689.65	0.71%
26	4,933	687.44	0.93%	687.39	0.96%	687.38	0.90%	687.38	0.91%	687.59	0.84%	687.71	0.84%	687.59	0.96%
27	5,137	685.7	0.85%	685.43	0.96%	685.47	0.94%	685.44	0.95%	685.45	1.05%	685.53	1.07%	685.82	0.87%
28	5,248	683.34	2.12%	682.97	2.21%	682.93	2.28%	682.80	2.37%	682.70	2.47%	682.71	2.53%	682.83	2.68%

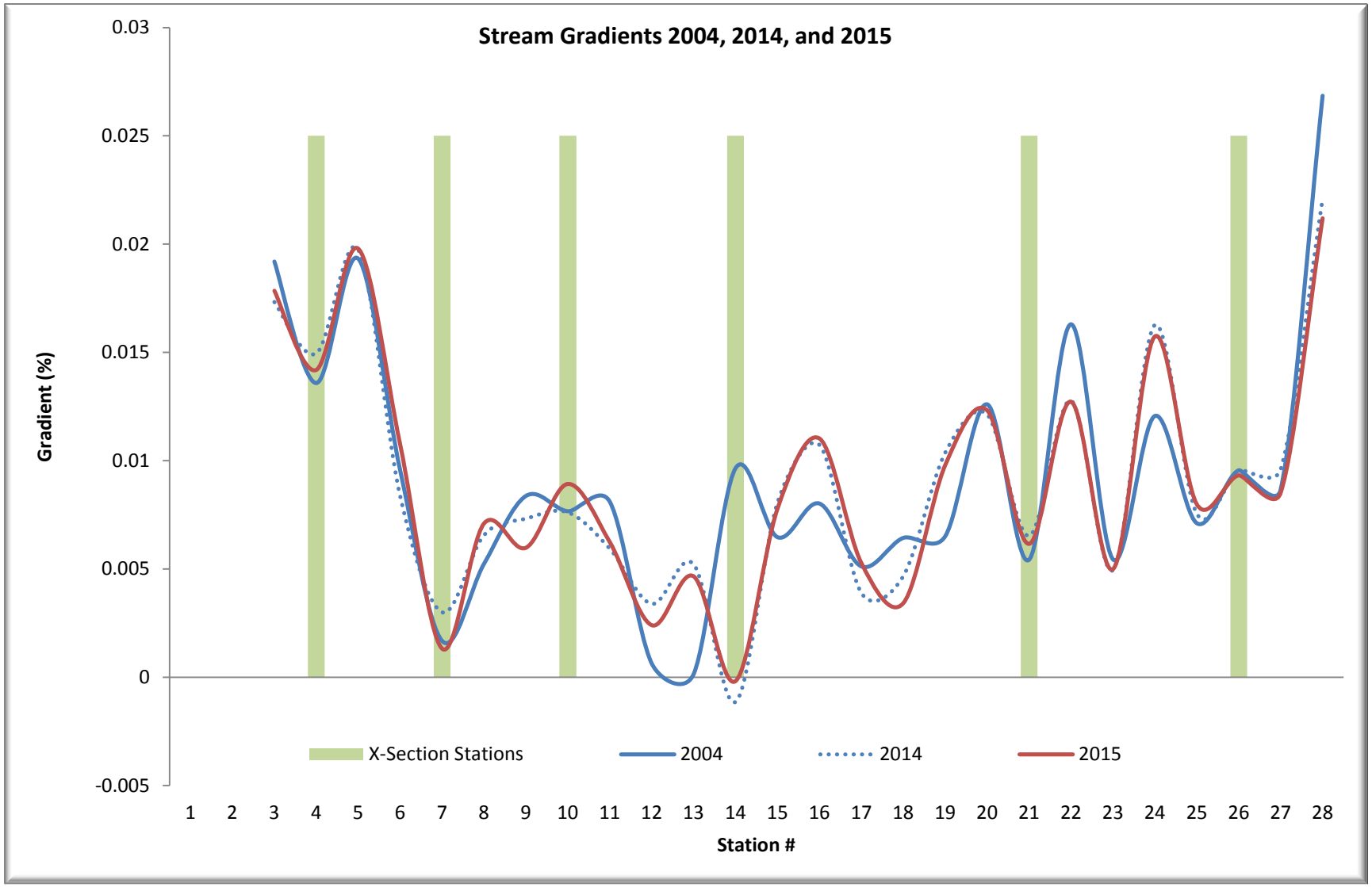


Figure 17: Stream Gradient Change from 2004 – 2015

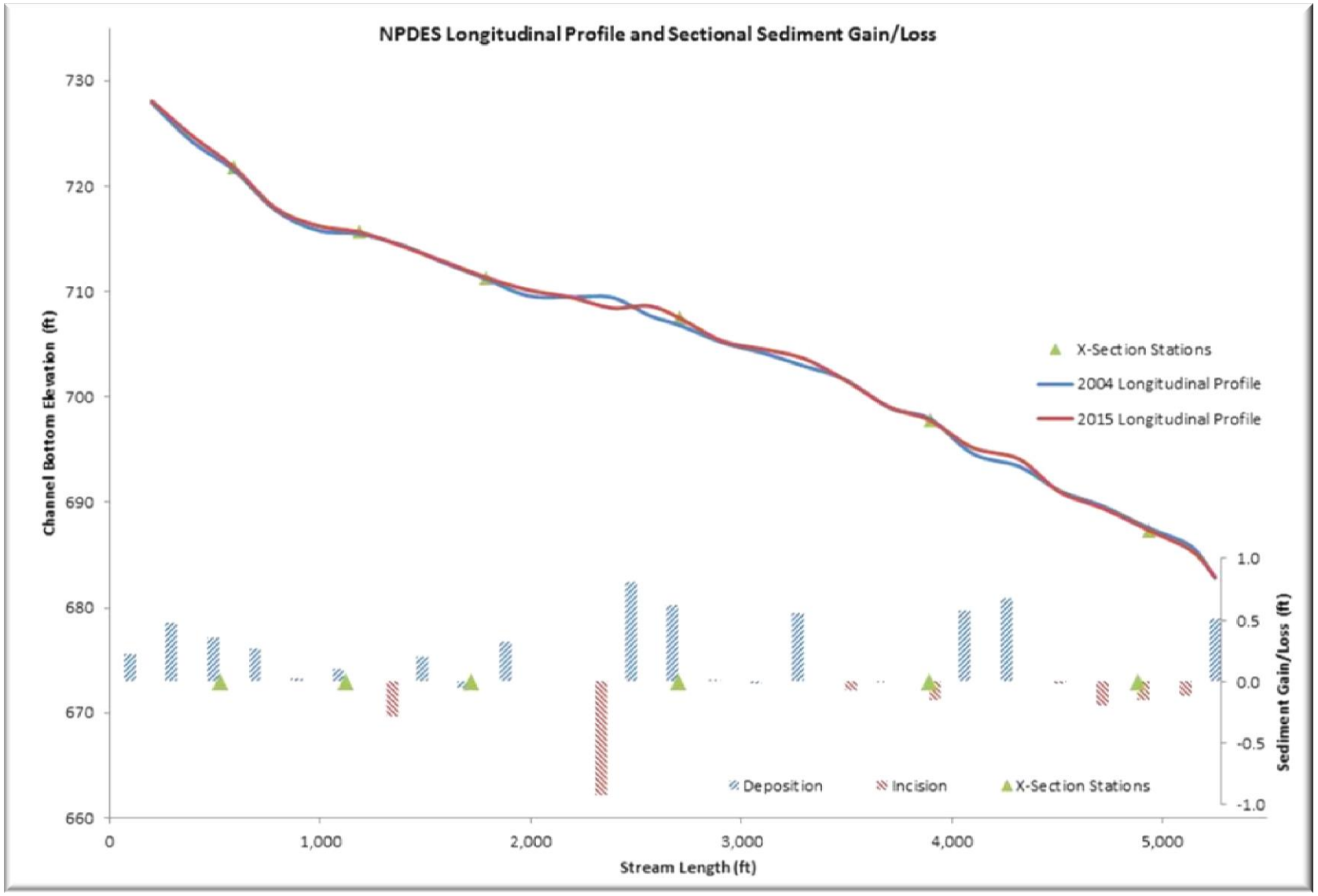


Figure 18: Comparison of Longitudinal Profile and Sectional Deposition/Incision from 2004 - 2015

Chemical

Physical Water Data

Physical water analysis results for both monitoring stations are displayed in **Table 19**. Overall, the outfall station water samples were more basic and exhibited higher temperatures and conductivities than in previous years.

On average, temperatures at the outfall station were 4 percent warmer than those at the instream station. Temperature differences ranged from 0.5°F during storm sampling in March 2015 to 5°F during September 2014. The increased temperatures at the outfall station are most likely due to solar heating of water stored in the pond. Additionally, groundwater interaction and shading at and upstream of the instream station could be cooling the water relative to the outfall station.

Conductance was generally greater at the outfall station, 11 percent greater on average. Conductance at the outfall station ranged from 200 µmhos/cm to 2,200 µmhos/cm. The instream station ranged from 230 µmhos/cm to 1,000 µmhos/cm throughout the reporting year. Both stations displayed trends of elevated conductivities in the winter and spring and decreasing conductivity levels throughout the summer and autumn seasons suggesting that conductance levels may be influenced by de-icing operations during the winter months.

Table 19
Physical Water Data for 2014 – 2015 Reporting Year

Instream Physical Water Data				Outfall Physical Water Data			
Event	pH	Water Temp (F)	Conductivity (µmhos/cm)	Event	pH	Water Temp (F)	Conductivity (µmhos/cm)
2014-05	5.92	N/A	280	2014-05	5.86	N/A	240
2014-06	6.05	N/A	280	2014-06	6.13	N/A	210
2014-07	6.62	N/A	250	2014-07	6.56	N/A	230
2014-08	7	58	250	2014-08	7.3	63	240
2014-09	6.7	64	230	2014-09	7	66	210
2014-10	6.72	N/A	250	2014-10	6.71	N/A	200
2014-11	N/A	N/A	280	2014-11	N/A	N/A	280
2014-12	6.06	N/A	310	2014-12	6.18	N/A	420
2015-01	6.2	N/A	430	2015-01	6.12	N/A	1100
2015-02	6.12	N/A	520	2015-02	5.93	N/A	2200
2015-03	6.9	39.7	1000	2015-03	6.9	39.2	1900
2015-04	N/A	N/A	590	2015-04	N/A	N/A	480
2015-05	7.37	51	400	2015-05	7.15	54	640
2015-06	7.16	N/A	310	2015-06	6.97	N/A	680
2015-07	8.3	N/A	280	2015-07	8.34	N/A	250

In past years, pH measurements at the outfall are generally more basic with higher variance than those at the instream station. The pH measurements at both stations, however, averaged 6.7 and ranged from 5.9 to 8.3 pH units. This pattern is atypical as the pH at the outfall station is generally more basic, possibly due to the local goose population, biological activity within the pond, stormwater interaction with carbonate rocks and concrete used in the construction of the stormwater facility, and influence of roadway derived materials such as road salt.

Event Mean Concentrations

The event mean concentration (EMC) mean values and ranges observed for the 15 storm flow and baseflow events for this reporting year are displayed in **Table 20**. Of the observed analytes, nitrate/nitrite and Total Kjeldahl Nitrogen (TKN) were the only two analytes to show a significant difference between the two stations. In this case, nitrates/nitrites were significantly greater at the instream station and TKN significantly greater at the outfall station.

Table 20
EMC Values for 2014 – 2015 Reporting Year

Event Mean Concentration		Instream Station			Outfall Station			Significance
Analyte	**Units**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**	**p-value**
BOD	mg/L	4.43	2.00	18.06	6.35	2.00	16.34	0.254
TKN	mg/L	0.62	0.50	1.01	1.28	0.5	2.59	0.001
NO2/NO2	mg/L	5.19	0.86	7.60	0.47	0.05	1.80	$4.2x10^{-7}$
Phosphorus	mg/L	0.09	0.01	0.79	0.07	0.02	0.12	0.625
TSS	mg/L	11.13	1.00	58.74	15.05	2.00	36.46	0.436
Copper	µg/L	1.75	0.50	2.60	5.09	2.00	45.10	0.262
Lead	µg/L	1.68	0.50	2.16	1.67	0.50	2.00	0.961
Zinc	µg/L	23.46	20.00	33.00	82.06	20.00	823.00	0.288
TPH	mg/L	5.00	5.00	5.00	5.00	5.00	5.00	1

Figures 19 and **20** present annual mean EMC values for eight analytes from the 2001 through 2015 reporting years. Also presented are mean EMC values before and after the stormwater retrofit. The only analyte with a significant observed difference between the outfall and instream stations consistently from 2001 through 2015 was nitrites/nitrates, with the exception of the 2004 reporting year. The pre and post retrofit graph reinforces this difference with an observed difference in mean EMC concentrations for each station before and after the retrofit; a similar difference was observed with TKN. Though not all mean EMC values were significantly different for the three metals at the instream station, copper, lead, and zinc, all EMC values decreased at the outfall station after the retrofit. This is not unexpected given the increased residence within the stormwater facility. Please note that a single outlying measurement in July 2014 caused a large increase in average zinc for this reporting year.

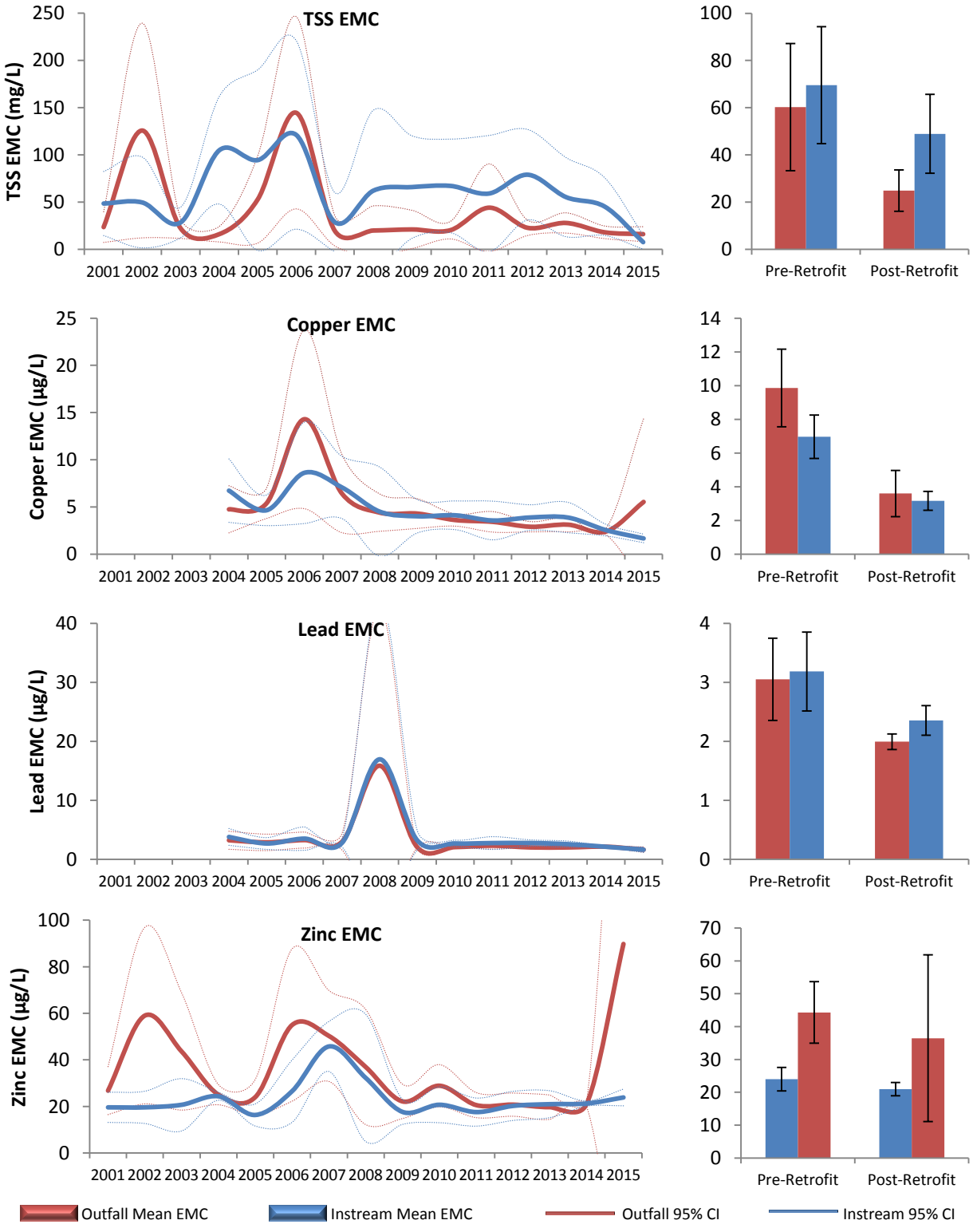


Figure 20: EMC Values from 2001 – 2015 for TSS, Copper, Lead, and Zinc

Annual Pollutant Loads

A discharge hydrograph was created for this reporting period for each monitoring station. Baseflow separation revealed that storm flow was evident above 700 gpm discharge at the instream station. Estimations for baseflow, storm flow, and total annual loading based on EMC values and discharge data are located in **Table 21**.

Expectedly, greater analyte loads were observed at the instream station. The contribution of analyte loading at the outfall station to total loading (instream station) increases during storm flow. Similar to previous observations evident in **Figure 12**, outfall contribution of nitrates/nitrites were low overall. All other analytes had estimated outfall contributions during storm flow of 17 percent to 36 percent. Results for baseflow were mixed with biochemical oxygen demand (BOD), nitrite/nitrate (NO2/NO3), copper, and zinc decreasing and phosphorus and total suspended solids (TSS) increasing outfall contribution.

Table 21
Annual Pollutant Loads for the 2014 – 2015 Reporting Year

		Annual Pollutant Loading (lbs/year)								
Loc.	Type	BOD	TKN	NO2/NO3	Phosphorus	TSS	Copper	Lead	Zinc	TPH
Instream	Base	4,663	777	10,025	23	6,217	3	3	33	7,771
	Storm	11,819	993	1,371	142	35,800	3	3	24	5,910
	Total	***16,482***	***1,770***	***11,396***	***165***	***42,017***	***6***	***6***	***57***	***13,681***
Outfall	Base	982	258	85	12	2,210	0.5	0.5	7	1,228
	Storm	4,249	342	35	32	6,108	0.7	0.5	8	1,337
	Total	***5,232***	***600***	***120***	***44***	***8,318***	***1.2***	***1***	***15***	***2,565***

Seasonal Pollutant Loads

Seasonal discharge for each monitoring station is provided in **Figure 21** for reference. The instream station unsurprisingly displayed greater discharges for each season; therefore, it is not unexpected to have greater loadings. Seasonal loadings based on the EMC values and seasonal discharges from **Figure 21** are located in **Table 22**.

Many of the analytes had the greatest loadings in the winter season. This is not surprising considering that the winter season had the greatest total discharge of the reporting period. Total suspended solids displayed expected results for the instream station with highest loadings in the spring and winter when discharge was high and there were many intense storm events. These two seasons had 65 percent of the total suspended solids load for the instream station, but only 33 percent for the outfall station. Phosphorus and nitrates/nitrites both had a single season with the majority of the load at the instream station. The phosphorus load was greatest in the spring for the instream station with 62 percent of the total load. Nitrate/nitrite loading was greatest in the winter with 40 percent of the total load occurring during that season. The outfall station relatively consistently correlates to values estimated for the instream station.

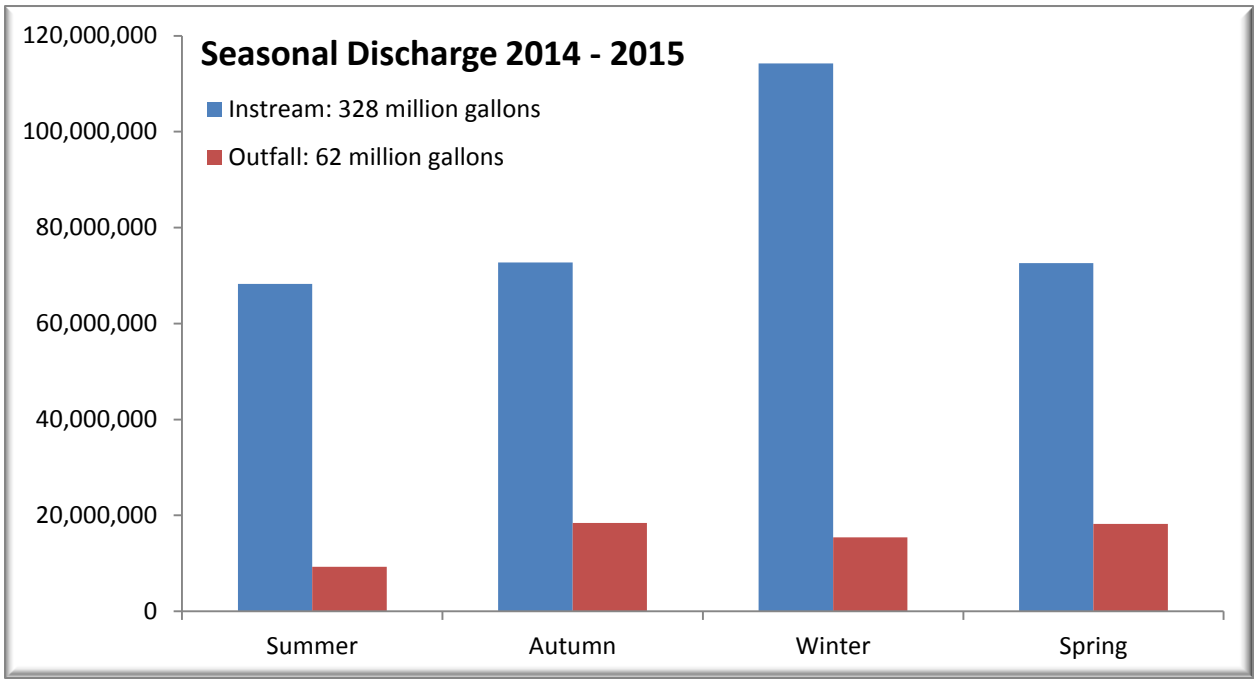


Figure 21: Seasonal Discharge for the 2014 – 2015 Reporting Year

Table 22
Seasonal Pollutant Loads for the 2014 – 2015 Reporting Year

		Seasonal Pollutant Loading (lbs/year)								
Loc.	**Season**	**BOD**	**TKN**	**NO2/NO3**	**Phosphorus**	**TSS**	**Copper**	**Lead**	**Zinc**	**TPH**
Instream	Spring	2,424	303	3,333	49	3,030	0.6	0.6	17	3,030
	Summer	1,709	285	3,675	11	2,527	1.1	1.1	11.4	2,849
	Autumn	1,318	304	3,157	9	1,214	1.2	1.2	12.3	3,036
	Winter	3,813	477	6,673	10	3,813	0.7	0.5	31.5	4,766
	Total	***9,264***	***1,369***	***16,838***	***79***	***10,584***	***4***	***3***	***72.2***	***13,681***
Outfall	Spring	609	122	14	7	1,371	0.3	0.2	5.3	762
	Summer	504	167	11	7	2,018	0.2	0.2	1.6	388
	Autumn	1,002	177	50	11	2,003	0.3	0.3	3.6	771
	Winter	516	193	155	8	645	0.3	0.1	3.9	645
	Total	***2,631***	***659***	***230***	***33***	***6,037***	***1.1***	***0.8***	***14.4***	***2,566***

Biological

A complete list of species found at each site and the frequency of their occurrence can be found in Appendix G. MBSS scoring criteria for the genus level benthic macro-invertebrate indices of biotic integrity (IBI) for the Eastern Piedmont region of Maryland is shown in **Table 23**. An IBI score was calculated for each station by dividing the total score by the six metrics used for this index, thus deriving an average IBI score. Corresponding narrative ratings were also determined for each station in accordance with MBSS Standards. The narrative rating guidelines can be found in **Table 15.**

The biological health of the outfall and instream monitoring stations are summarized by **Tables 23** and **24**. The stations for the 2015 reporting year displayed poor and fair health ratings. The outfall station had an IBI score of 2 while the instream station had an IBI score of 3.

Table 23
Outfall Station IBI Score for the 2014 – 2015 Reporting Year

Metric	Result	Score
Number of Taxa	16	3
Number of EPT	3	1
Number Ephemeroptera	0	1
% Intolerant Urban	36	3
% Chironomidae	68	1
% Clingers	34	3
	Total Score	12
	IBI Score	2
	Narrative Rating	Poor

Table 24
Instream Station IBI Score for the 2014 – 2015 Reporting Year

Metric	Result	Score
Number of Taxa	22	3
Number of EPT	7	3
Number Ephemeroptera	2	3
% Intolerant Urban	11	1
% Chironomidae	17	3
% Clingers	85	5
	Total Score	18
	IBI Score	3
	Narrative Rating	Fair

Figure 22 presents these scores annually from 2001 through 2015. The trends of both stations appear to be correlative throughout this time period. On average, the score for the instream station remains 0.8 greater than that of the outfall station. The average score for the outfall station is 2.3, which is rated as poor biological health according to MBSS guidelines. The average score for the instream station is 3.1, which is on the boundary between poor and fair biological health according to MBSS guidelines. Despite having similar number of taxa and individuals, the instream reach had the presence of Ephemeroptera, more EPT individuals and clingers, and fewer chironomids and intolerant taxa resulting in a higher IBI score. The number of taxa was the only scoring parameter that was the same for both reaches. The outfall station appears to still be relatively intolerable for most sensitive species as only 11 percent of the individuals recovered were considered sensitive with a large percentage of tolerant species present.

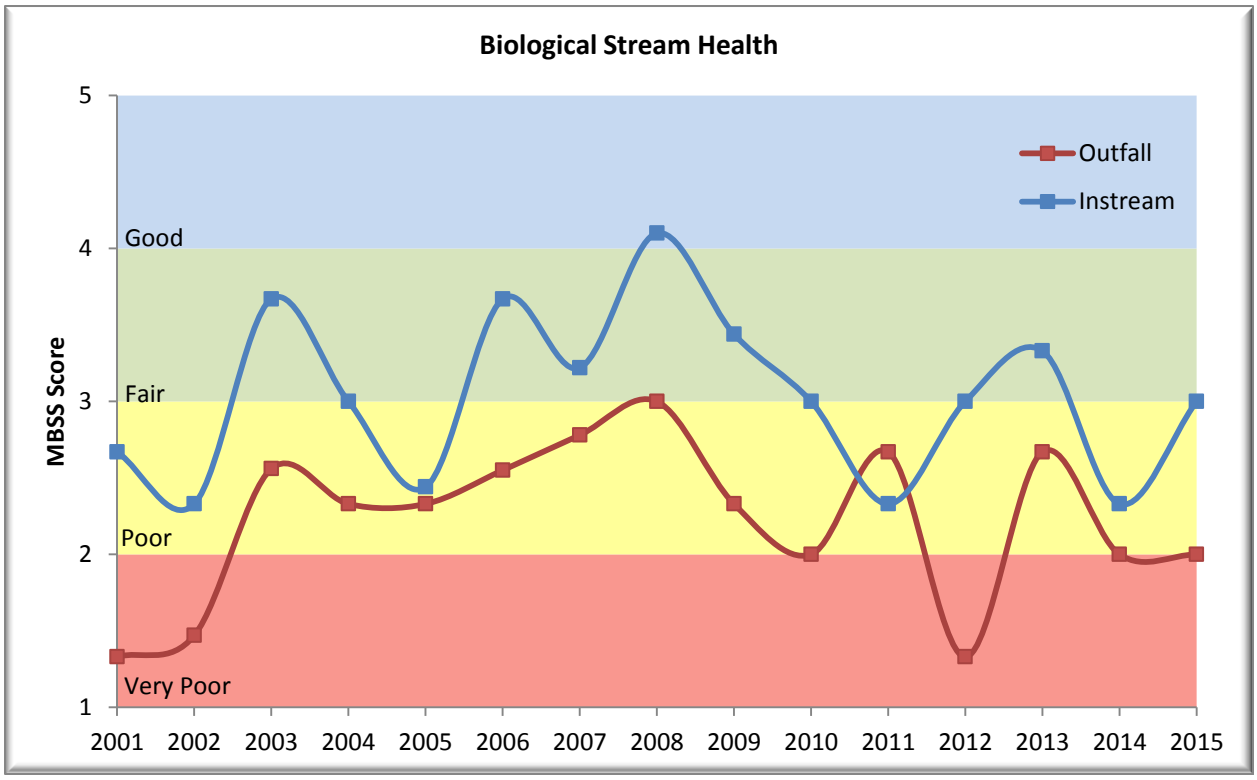


Figure 22: Macro-Invertebrate IBI Analysis 2001 – 2015

The biological habitat assessment results for each station are summarized in **Table 25**. The scores are out of a maximum 160 points based on eight parameters as shown in **Table 15**. Overall, the quality of biological habitat at the instream station remains higher than the outfall station with overall habitat scores of 95 and 64. From 1998 through 2015 (excluding 2001), as shown in **Figure 23**, the stations have average habitat scores of 92 for the instream station and 70 for the outfall station. This was a fairly typical year for both stations with the instream scoring 3 points higher and the outfall scoring 6 points below average. The weakest parameters for both stations are riffle/run quality, embeddedness, and shading. The outfall station also showed a loss of some stable habitat as it scored much lower than the previous year.

Table 25
Spring 2015 Habitat Assessment Results

Parameter	Outfall	Category	In-stream	Category
Instream Habitat	8	marginal	12	sub-optimal
Epifaunal Substrate	5	poor	12	sub-optimal
Velocity/Depth Diversity	13	sub-optimal	12	sub-optimal
Pool/Glide/Eddy Quality	10	marginal	11	sub-optimal
Riffle/Run Quality	8	marginal	10	marginal
Embeddedness	4	poor	10	marginal
Shading	4	poor	10	marginal
Trash Rating	12	sub-optimal	18	optimal
Total Score (max. of 160)	***64***		***95***	
Score (percent)	***40%***		***59%***	

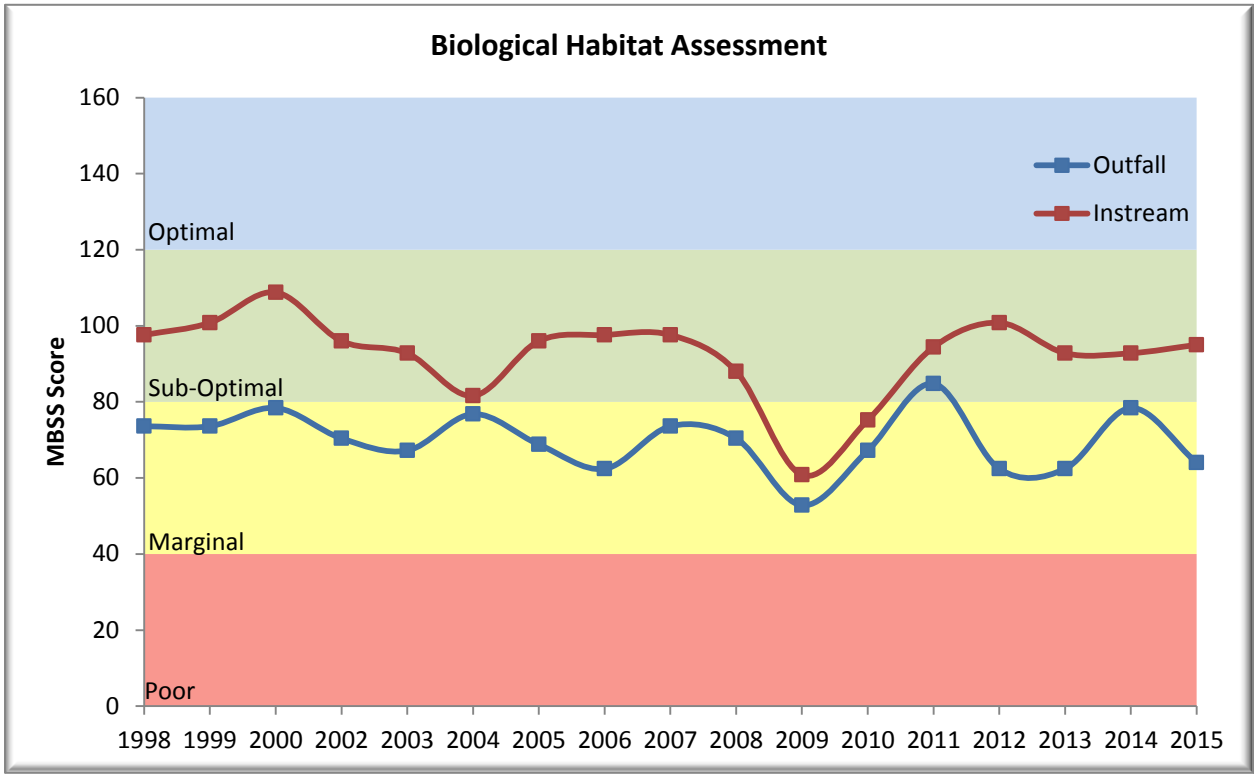


Figure 23: Comparison of NPDES Station Habitat 1998 – 2015 (Excluding 2001)

It should be noted that the habitat assessment is wholly subjective. Slight changes may be a result of inconsistencies in assessor'(s) scoring methodology. To show a general relationship between the habitat and biological scores, these have been plotted for the outfall and instream stations in **Figures 24** and **25**, respectively. These are plotted on each assessments overall scoring range. Though not unexpected, it is evident that the lower the quality of habitat in this case, the lower the biological quality found in the habitat. Both stations appear to have a one- to two-year period of latency between habitat and biological changes. The certainty of any evident relationship is low given the high degree of bias and chance that is probable in these assessments.

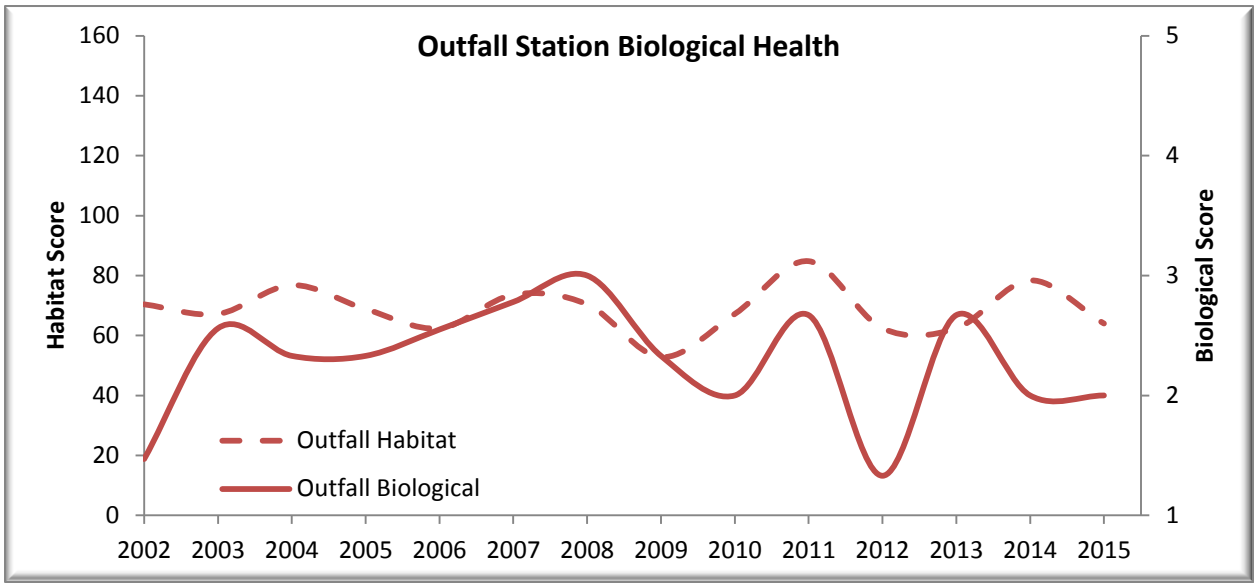


Figure 24: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2015

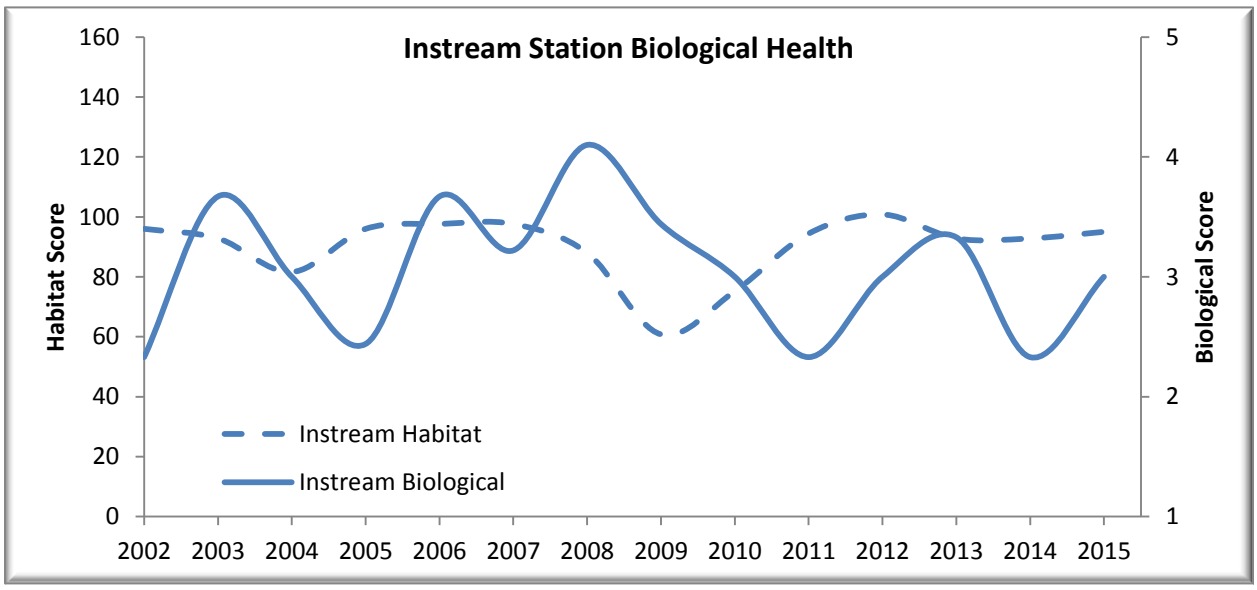


Figure 25: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2015

G. Program Funding

1. Operational Expenses

In its 2012 session, the Maryland legislature passed House Bill 987: Stormwater management – Watershed Protection and Restoration Program. This legislation then became Chapter 151 of the

Annotated Code of Maryland. The purpose of the legislation was to require NPDES Phase 1 MS4 jurisdictions to establish a fee to help cover stormwater remediation costs. The law allowed each jurisdiction the ability to determine the level and structure of the fee, as well as other components of the required program. In addition to a fee, the legislation required the establishment of a Watershed Protection and Restoration Fund. The fund and fee were to be adopted and implemented on or before July 1, 2013.

On June 27, 2013, the Carroll County Board of Commissioners adopted Resolution #888-2013 A-D concerning compliance with Chapter 151. The resolutions established the Fund, as well as certain funding for stormwater management costs, an annual evaluation of stormwater remediation allocations, and a general funding of compliance with the Environmental Article §4-202.1 of the Maryland Annotated Code. The Fund and funding related to operating expenses have been adopted by the Board of County Commissioners and can be seen in **Figure 26**.

During the 2015 legislative session, the General Assembly adopted Senate Bill 863. This legislation repealed the mandatory requirement for the NPDES Phase I MS4 jurisdictions to adopt a fee as the funding mechanism for a jurisdiction's stormwater program. All affected jurisdictions must still create and maintain a local watershed protection and restoration fund. The legislation, which became Chapter 124 of the Maryland Annotated Code, allows Phase I jurisdictions that established a fee before July 1, 2013, to repeal or reduce those fees before July 1, 2016. However, each jurisdiction must demonstrate sufficient funding for its stormwater program.

Watershed Protection and Restoration Fund

The Watershed Protection and Restoration Special Revenue Fund was established in FY 2015 to ensure adequate funding for operating expenses related to the County's National Pollutant Discharge Elimination System (NPDES) Permit and Watershed Restoration efforts. Property Tax revenue equal to the projected operating expenses for this purpose will be dedicated to the fund on an annual basis.

Sources of Funding	FY 14 Actual	FY 15 Budget	FY 16 Budget	Increase (Decrease)
Dedicated Property Tax	$0	$1,066,890	$1,098,230	$31,340
Total Sources of Funding	**$0**	**$1,066,890**	**$1,098,230**	**$31,340**
Uses of Funding				
Personnel	$0	$907,950	$922,770	$14,820
Operating	0	158,940	175,460	16,520
Total Uses of Funding	**$0**	**$1,066,890**	**$1,098,230**	**$31,340**

Figure 26: Watershed Protection and Restoration Fund

The following information estimates time spent by each Carroll County Government position on tasks related to compliance with the NPDES MS4 permit. In reality, due to the fact that the permit requires Carroll County to maintain an adequate stormwater management program and an erosion and sediment control program, the totality of those elements of the budget should be included. However, since the stormwater management program is required by legislation and the erosion and sediment control program has been accepted by Carroll County through delegation, only a percentage related to NPDES MS4 compliance, other than those direct program responsibilities, has been reported. Each contributing function is identified by job title and indicates a percentage of time spent compared to their overall responsibilities. These expenditures are the sum of salary and fringe.

(1) **Director, Department of Land and Resource Management** – The following general tasks are performed by the Director of Land and Resource Management requiring approximately **50%** of the position's time:

- Administration of the permit;
- Report writing and compilation responsibility;
- Monitoring of project progress; and
- Any other necessary activity to ensure compliance.

Total estimated expenditure ***~$64,517.32***

(2) **Chief, Bureau of Resource Management** – The following general tasks are performed by the Bureau Chief, requiring approximately **75%** of the position's time.

- Coordinates the BRM staff to perform tasks required under permit;
- Identifies projects and coordinates budgeting;
- Oversees and monitors the project progress; and
- Participates in watershed assessment process.

Total estimated expenditure ***~ $80,397.00***

(3) **NPDES Compliance Specialist** – This position is **100%** dedicated to the NPDES MS4 compliance effort. The salary is funded through an agreement with the municipalities related to permit compliance. The position is responsible for the following tasks:

- Storm sewer system mapping;
- Illicit discharge detection and elimination inspections;
- Liaison to MDE;
- Coordinate, manage, and implement permit regulation requirements in accordance with federal, state, and local laws;
- Coordinate with County/municipal personnel, other government officials, and citizens regarding NPDES MS4 compliance issues;
- Coordinate illicit discharge inspections and routine surveys with County/municipal personnel to discover and eliminate pollutant sources;

- Design, coordinate, and maintain GIS and GPS applications for NPDES MS4 compliance; and
- Coordinate development of compliance education, training, and outreach programs.

Total estimated expenditure ***~ $74,236.21***

(4) **Administrative Office Associate I** – The following general tasks are performed by the Administrative Office Associate I, requiring approximately **40%** of the position's time:

- Administrative support for the Deputy Director;
- Maintaining compliance deadline tickler system;
- Assisting in the preparation of the Annual Report; and
- Tracking expenditures for NPDES projects.

Total estimated expenditure ***~ $25,161.20***

(5) **Office Associate IV** – The following general tasks are performed by the Office Associate, requiring approximately **5%** of the position's time, essentially in coordination of BRM staff support for the permit.

- Management of data base; and
- Coordination and scheduling of trainings.

Total estimated expenditure ***~ $2,681.34***

(6) **Office Associate III** – The following general tasks are performed by the Office Associate supporting the inspection staff, requiring approximately **10%** of the position's time:

- Scheduling environmental inspections, types related correspondence; and
- Tracking investigations related to compliance actions.

Total estimated expenditure ***~ $5,021.10***

(7) **Division Head, Environmental Inspection Services Division** – The following are general tasks that are performed by the Division Head related to NPDES compliance. This requires approximately **30%** of the position's time:

- Illicit discharge inspections;
- Coordination of regular site inspections;
- Stormwater management facility maintenance inspections; and
- Stormwater management facility maintenance and other related enforcement action.

Total estimated expenditure ***~ $23,886.60***

(8) **Environmental Inspectors (4 total)** – The following general tasks are performed by the Environmental Inspectors related to NPDES MS4 compliance. They require approximately **25%** of one

inspector's time:

- Regular illicit discharge inspections; and
- Field investigations.

~ ***$66,040.28***

Total estimated expenditure (for all four inspectors)

(9) **Stormwater Management Program Engineer** – The following general tasks are performed by the Stormwater Management Program Engineer related to NPDES MS4 compliance. They require approximately **40%** of the position's time:

- Design activities on special projects; and
- Technical assistance related to permit compliance.

Total estimated expenditure ~ ***$50,126.96***

(10) **Stormwater Management Review Assistant** – The following are general tasks performed by the Stormwater Management Review Assistant related to NPDES MS4 compliance. They require approximately **60%** of the position's time:

- Maintenance inspections;
- Review of SWM plan submittals;
- Field monitoring of special projects; and
- Database management.

Total estimated expenditure ~ ***$49,841.31***

(11) **Watershed Management Specialist** – The following are general tasks performed by the Watershed Management Specialist related to NPDES MS4 compliance. The tasks require approximately **80%** of the position's time:

- Biological and physical data collection, interpretation, and reporting;
- Technical assistance;
- Watershed management planning and coordination for restoration activities; and
- Coordination and facilitation of local watershed groups.

Total estimated expenditure ~ ***$55,603.55***

(12) **Watershed Restoration Engineer** – The following are general tasks performed by the Watershed Restoration Engineer related to NPDES MS4 compliance. These tasks require approximately **80%** of the position's time:

- Design of stormwater management retrofit projects;
- Field management and contractor oversight during construction of stormwater retrofit projects;
- GIS data management; and
- General technical assistance.

Total estimated expenditure ~ ***$85,449.65***

(13) **Water Resource Supervisor** – The following are general tasks performed by the Water Resource Supervisor related to NPDES MS4 compliance. These tasks require approximately **80%** of the position's time:

- Watershed management planning;
- Biological and physical data collection, interpretation, and reporting; and
- Technical assistance.

Total estimated expenditure ~ ***$58,703.98***

(14) **Water Resource Technician** – The following are general tasks performed by the Water Resource Technician related to NPDES MS4 compliance. These tasks require approximately **20%** of the position's time:

- GIS data input; and
- Field delineation of storm drains, drainage areas, and best management practices.

Total estimated expenditure ~ ***$12,932.12***

(15) **Water Resource Specialist** (2 total) – The following are general tasks performed by the Water Resource Specialist to NPDES MS4 compliance. These tasks require approximately **80%** of each position's time:

- Coordination and facilitation of local watershed groups;
- Watershed management planning; and
- Biological and physical data collection, interpretation, and reporting.

Total estimated expenditure (for 2 Water Resource Specialists) ~ ***$108,432.04***

(16) **Floodplain Management Specialist** – The following are general tasks performed by the Floodplain Management Specialist related to NPDES MS4 compliance. These tasks require approximately **60%** of the position's time:

- GIS data input;
- Field delineation of storm drains, drainage areas, and best management practices; and
- Prepares GIS maps and information for watershed planning.

Total estimated expenditure ~ ***$41,702.66***

(17) **Forest Conservation Specialist** – The following are general tasks performed by the Forest Conservation Specialist related to NPDES MS4 compliance. These tasks require approximately **10%** of the position's time:

- Provides technical assistance with buffer and tree plantings on public and private properties; and

- Watershed Management Planning.

Total estimated expenditure ~ ***$7,635.42***

(18) **Watershed Grants Analyst** – The following are general tasks performed by the Watershed Grants Analyst related to NPDES MS4 compliance. These tasks require approximately **100%** of the position's time:

- Securing financial assistance through various sources (i.e. non-profit organizations, state/federal, private);
- Working with homeowners on small projects associated with grants;
- Administration and reporting associated with any grants received; and
- Preparing newsletters and website information for keeping the public informed about the County's efforts related to improving our water quality.

Total estimated expenditure ~ ***$63,105.27***

The total estimated salary expenditure for personnel in the 2014/2015 permit year ***$875,474.01***

Supplies and Contract Services

Nitrate testing kits, thermometer, swing sampler and pole, easel and materials for public education, hip boots, and biological monitoring chemicals for sampling ***$3,729.62***

Expenses for physical and biological monitoring analysis, and monitoring equipment for the 2014/2015 permit year ***$10,268.10***

NPDES training webinar and training video ***$583.95***

Total expenditures for supplies and contract services in the Operating Budget for 2014/2015 permit year ***$14,581.67***

Stormwater Pond Maintenance

The annual maintenance cost for County stormwater management facilities was necessary to meet NPDES MS4 compliance.

Contractor Cost for 2014/2015	***$76,901.00***
Equipment (gas, other)	***$2,822.82***
Total maintenance cost for stormwater management facilities in permit year 2014/2015	***$79,723.82***
TOTAL OPERATING EXPENDITURES FOR 2014/2015 PERMIT YEAR	***$969,779.50***

2. Capital Expenses

A capital budget was established early in the program to support compliance needs for the County's NPDES MS4 permit responsibilities. Capital expenditures in this program are principally associated with the permit's Watershed Assessment and Restoration requirements.

Watershed Assessment and Improvement (NPDES) project appropriation for 2014/2015 permit year	***$3,033,000.00***
Environmental Compliance appropriation for FY 2014 – 2015	***$75,000.00***

Cumulative capital expenditures for the program since 2005 can be found in **Table 27**, **Table 28, Table 29,** and **Table 30** provide the approved FY 2016-2021 CIP estimates for program funds. It is important to note that funding beyond FY 2016 is subject to future budget review and approval processes. Therefore, no guarantee is made to future appropriations beyond FY 2016.

Table 27
Total NPDES MS4 Capital Expenditures
Carroll County, Maryland
July 15, 2005 through June 30, 2015

Permit Year	Capital Expenditure
7/15/05 to 6/30/06	$36,040.19
7/1/06 to 6/30/07	$53,593.00
7/1/07 to 6/30/08	$1,978,829.14
7/1/08 to 5/30/09	$816,823.30
7/1/09 to 5/30/10	$1,744,986.91
7/1/10 to 6/30/11	$672,479.04
7/1/10 to 6/30/11	$23,269.00
7/1/11 to 6/30/12	$1,635,671.32
7/1/12 to 6/30/13	$1,012,067.26
7/1/13 to 6/30/14	*$2,147,337.51*
7/1/14 to 6/30/15	*$2,964,442.44*
Total permit expenditures, to date	***$13,085,539.11***

Approved Community Investment Plan 2016 – 2021

Table 28
Watershed Assessment and Improvement (NPDES)

	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	130,000	35,000	265,000	110,000	80,000				**620,000**
Land Acquisition									**0**
Site Work									**0**
Construction	4,786,000	5,813,000	3,573,000	3,360,000	2,690,000	1,750,000			**21,972,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**4,916,000**	**5,848,000**	**3,838,000**	**3,470,000**	**2,770,000**	**1,750,000**	**0**	**0**	**22,592,000**

Table 29
Environmental Compliance

	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design									**0**
Land Acquisition									**0**
Site Work									**0**
Construction	75,000	75,000	75,000	75,000	75,000	75,000			**450,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**0**	**0**	**450,000**

The Board of County Commissioners approved a capital program in spring 2015 to address the renovation of existing stormwater management facilities (**Table 30**). The program which the funding is designed to support provides for long-term improvements to existing stormwater management facilities which are beyond routine maintenance but are not undertaken as part of the County's retrofit program. The program will evaluate and repair five to ten facilities per year over a 30-year period. The funding is planned to be used for pipe replacement, erosion repairs, filter media replacement, and other items which will extend the useful life of a facility and to maintain compliance. The program has been approved beginning in FY 2016, which began July

1, 2015. Therefore, no expenditures from this new program are being reported as part of this submittal.

Table 30
Stormwater Facility Renovations

	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	60,000	50,000	60,000	125,000	70,000	60,000			**425,000**
Land Acquisition									**0**
Site Work									**0**
Construction	220,000	250,000	270,000	165,000	370,000	250,000			**1,525,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**280,000**	**300,000**	**330,000**	**290,000**	**440,000**	**310,000**	**0**	**0**	**1,950,000**

Part IV. Special Programmatic Conditions

Carroll County actively participated in the Chesapeake Bay TMDL efforts. In addition to attending the regional workshops held by MDE, staff also has participated in webinars offered by the EPA and MDE regarding the Bay TMDL and Maryland's Phase II WIP. The WRCC continues to serves at the County's local WIP team, and participates in discussions and development of Phase II WIP efforts. The WRCC continues to provide progress updates on the two-year milestones. County staff has been working with MDE staff to update the historical BMP inventory and to provide GIS data needed for land use data to update the CBP model for the 2017 Midpoint Assessment. The WRCC continues to address issues related to the WIP as they arise.

A brief discussion of clarification is provided related to this permit and "toward meeting the Chesapeake Bay TMDL by 2025." The permittees continue to work toward compliance with the 20 percent restoration requirement as it relates to compliance with the Chesapeake Bay TMDL. It should be noted that there is still no agreement with Maryland's Phase II WIP, State-derived, Carroll County-specific nutrient load numbers. The numbers were calculated based on the Maryland Assessment and Scenario Tool (MAST) model, which, to date, has not clearly identified input parameters nor output values which are transparent or appear technically sound. Therefore, we will continue to support and work toward the clearly definable 20 percent restoration strategy, with any other TMDL requirements pending sound, quantitative, reasonable science.

Carroll County staff members participate in many inter-jurisdictional efforts related to stormwater management, reservoir protection, water supply management, water reuse, and other water issues. Staff members participate with several groups that address these issues.

The Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to discuss issues of common concern regarding protection of the watersheds. Staff has a very close working relationship with the local Soil Conservation District Board (District). County and District staff coordinate efforts on projects as well as provide technical assistance to one another. This has been a very important relationship for Carroll County where projects are located in the urban/rural fringe areas.

Staff has participated in or attended meetings of numerous efforts and work groups regarding various other initiatives, including, but not limited to, updates to stormwater management regulations, water reuse regulation development and update, growth offsets and trading policy and regulations, legislative proposals, discussions related to implementation of permit requirements, and various other initiatives. Participation in regional and statewide management and protection issues will continue to be a priority for Carroll County.

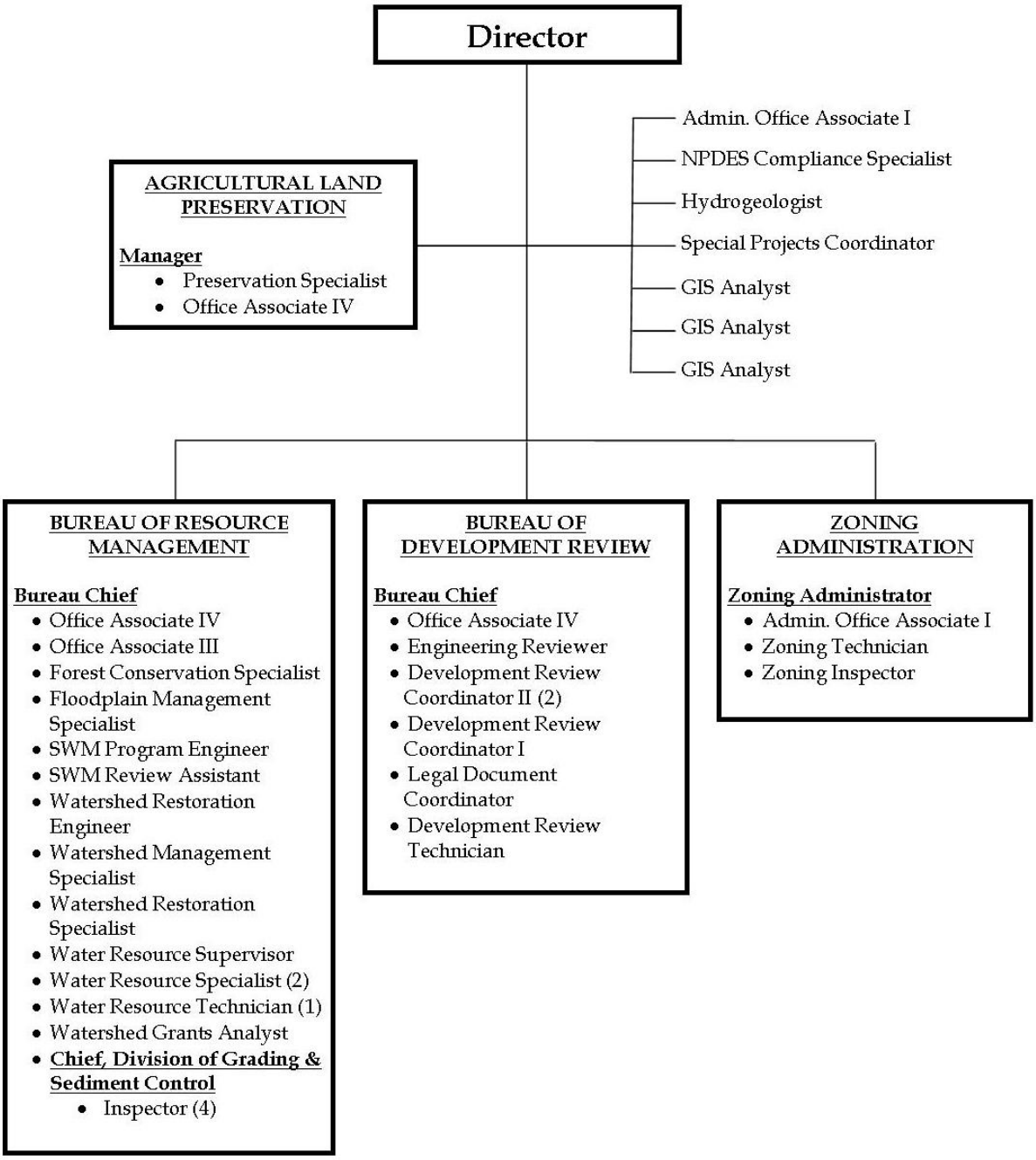
The County and municipalities adopted a comprehensive Water Resources Element (WRE) in April 2010 after a very thorough study of water supply, wastewater, and water quality issues in Carroll County and extensive coordination and collaboration with MDE staff. The WRE provides long-term direction to the County and municipalities regarding public water supply needs and issues and limitations related to wastewater treatment.

Appendix A

Organizational Chart:
Department of Land and Resource Management

Appendix A

Department of Land & Resource Management



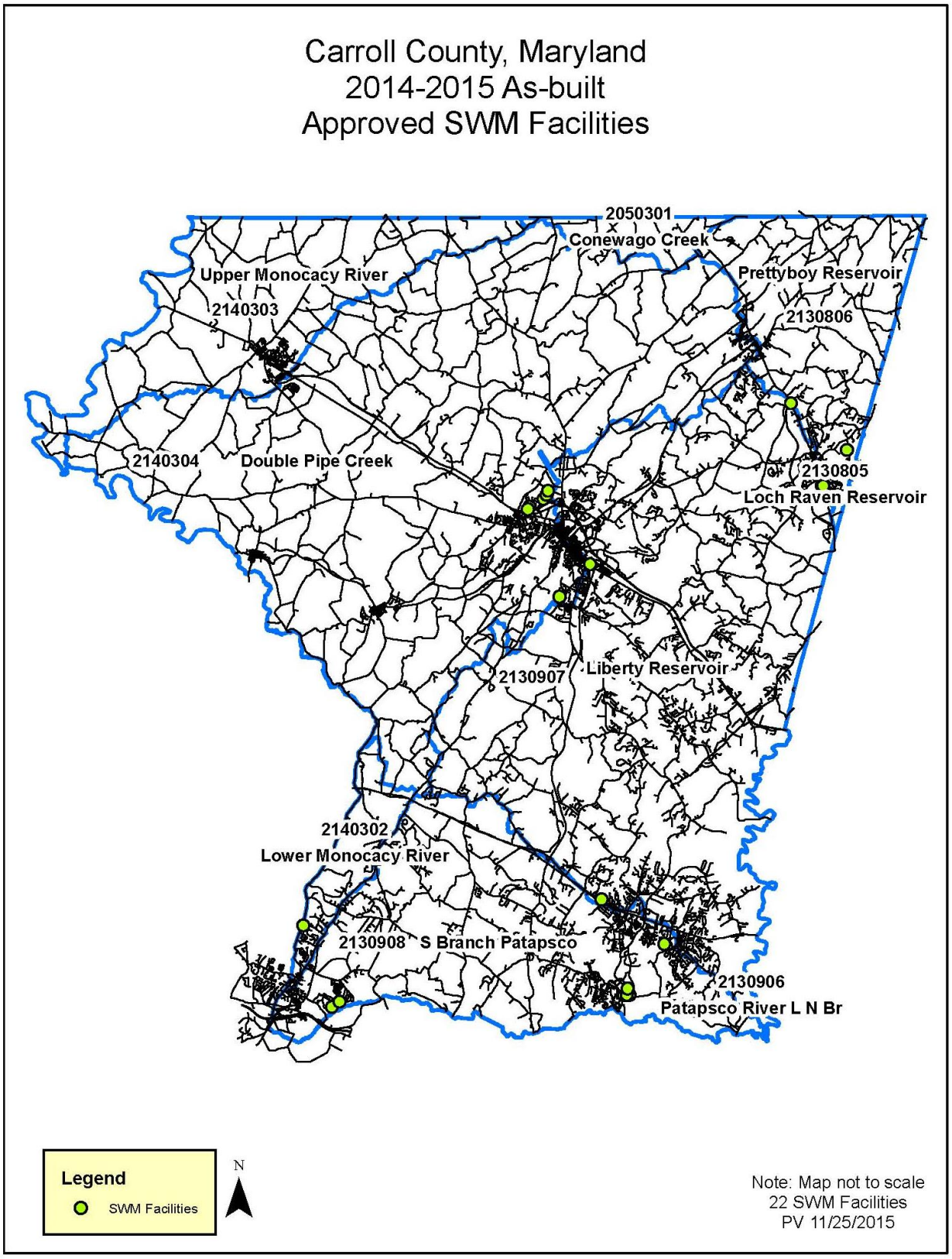
Appendix B

County NPDES MS4 Database CD

(Available Upon Request)

Carroll County, Maryland, 2014-2015 As-built Approved SWM Facilities Map

Appendix B


Carroll County, Maryland
2014-2015 As-built
Approved SWM Facilities
2050301
Conewago Creek
Upper Monocacy River
2140303
Prettyboy Reservoir
2130806
2140304
Double Pipe Creek
2130805
Loch Raven Reservoir
2130907
Liberty Reservoir
2140302
Lower Monocacy River
2130908
S Branch Patapsco
2130906
Patapsco River L N Br
Legend
SWM Facilities
N
Note: Map not to scale
22 SWM Facilities
PV 11/25/2015

Appendix C

Visual Survey Methodology and Procedures

- Standard Operating Procedures: MS4 - Annual Visual Survey of Commercial/Industrial Areas
- NPDES Commercial/Industrial Property Selection Methodology
- Carroll County Maryland Watersheds (Map)
- Carroll County Routine Visual Survey Form, Commercial/Industrial Areas

Appendix C

Standard Operating Procedures
MS4 - Annual Visual Survey of Commercial/Industrial Areas

DISCOVER/DOCUMENT/ELIMINATE

1. Identify commercial/industrial land use areas that have the potential to contribute significant pollutants. Areas to be surveyed are determined and selected through GIS analysis based on parameters in the permit as described in "NPDES Commercial/Industrial Property Selection Methodology" (Appendix C). A geodatabase containing the list of properties to be surveyed will be maintained as well as an Accela database for survey tracking, managed by the County's Bureau of Resource Management, Environmental Inspection Services Division, capable of exporting results compatible with the MDE Geodatabase. Each survey will be tagged with a VS number (ex.VS-15-0001). Each property will have a unique ID number which will be the Tax ID number for the property.

2. Selected commercial/industrial areas will be surveyed during the permit cycle. An aerial sketch with mapped storm drain systems, property lines, contours and streams of the area may be provided or electronic device with map referencing capability will be available for each survey.

3. Field staff performing the surveys will receive in-house training using some of the materials listed below and other appropriate training and reference material prior to field surveys.
   a. Video: *Municipal Storm Water Pollution Prevention* (Everyday Best Management Practices)
   b. Video: IDDE *a grate concern* – Illicit Discharge Detection & Elimination
   c. Video: *Stormwater Pollution Prevention Plan* (Industrial SWPPP)
   d. MDE - *Stormwater Pollution Prevention Guidance* (Stormwater Hotspots)

4. Commercial/Industrial Visual Surveys will be conducted with observations recording significant pollutant sources with potential to reach County/municipal MS4 or nearby watercourses using the "Carroll County Routine Visual Survey for Commercial/Industrial Areas" form. This initial visual survey will be taken from locations generally accessible by the public. It is not an on-site inspection. Follow-up actions will be reserved for trained personnel if needed. Key activities to observe are: vehicle operations, loading/unloading areas and paved surfaces, waste management and outdoor material storage.

5. Site potential for significant pollutant sources that could enter the County/municipal MS4 or nearby watercourse will be checked as "yes" or "no" on the survey form. Sites needing

follow-up actions will be addressed by contacting the applicable property owner with appropriate MS4 stormwater pollution prevention education effort sufficient to eliminate the significant pollutant source. The Accela database tracking system including survey details, findings, and elimination pollutant sources will be maintained throughout the process.

6. Areas surveyed will be reported annually according to the MS4 permit.

Appendix C

NPDES Commercial/Industrial Property Selection Methodology

To identify specified properties within Carroll County, ArcGIS 10.3 was used to determine which properties fit certain characteristics.

1. The selected properties were those greater than one acre that were both within 300 feet of a stream and had a current land use of industrial, commercial, extractive, or mixed use.

2. A definition query was first used to reduce the Carroll County properties greater than one acre and those with the land uses listed above.

3. Best Management Practices (BMPs), BMP drainage area, and the active permit shapefile database were then spatially joined to the property shapefile to give the property shapefile important attributes such as; presence of General Industrial Stormwater Permits, General Discharge Permit from Mineral Quarries, Borrow Pits, and Concrete and Asphalt Plants, Individual Permit for Discharges to Surface Water and/or Groundwater, and presence of BMPs.

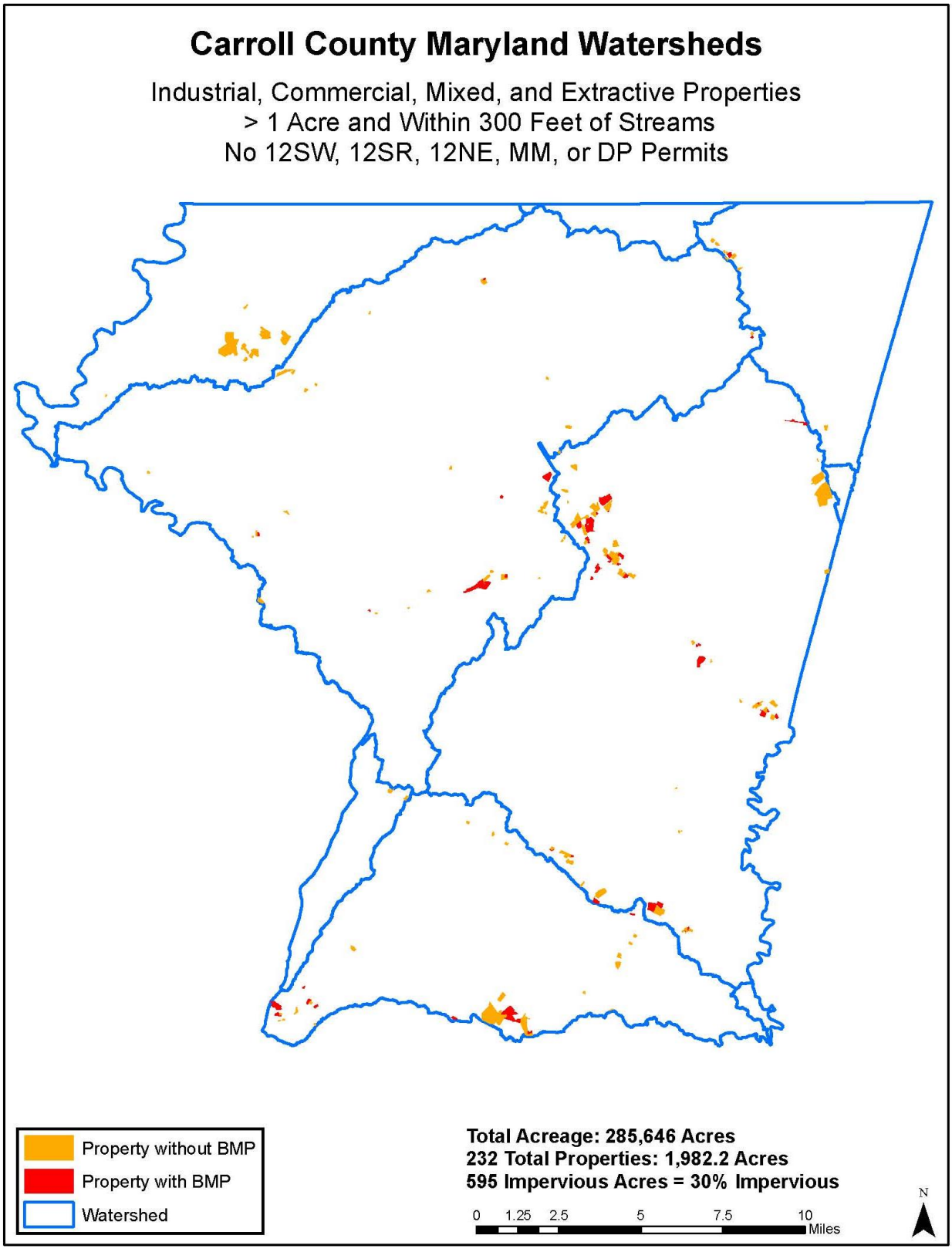
4. A 300-foot buffer was then created from the streams within the county and a spatial selection and export were used to create a final property shapefile which included 232 total properties of interest.

5. The Carroll County impervious surface shapefile was then clipped to the 232 properties of interest. The determination within each watershed of the number of properties, property acres, number of properties with BMPs, percent of properties containing a BMP, impervious acres, and average percent impervious were calculated through multiple iterations using the “tabulate intersection” tool with the 8-digit watersheds as zones.

6. The tabulate intersection tool was used again to calculate the percent and number of acres impervious for each property, using the properties as zones, followed by a subsequent join to the property shapefile.

It should be noted that acreage calculations for properties within more than one watershed were not split but rather wholly included in both watersheds. One would simply have to locate those few properties and observe the watershed that is encompassed for each proportion of the property.

Appendix C


Carroll County Maryland Watersheds
Industrial, Commercial, Mixed, and Extractive Properties
> 1 Acre and Within 300 Feet of Streams
No 12SW, 12SR, 12NE, MM, or DP Permits
Property without BMP
Property with BMP
Watershed
Total Acreage: 285,646 Acres
232 Total Properties: 1,982.2 Acres
595 Impervious Acres = 30% Impervious
0 1.25 2.5 5 7.5 10
Miles
N

Appendix C

Carroll County Routine Visual Survey Form
Commercial/Industrial Areas

Unique Site (Tax Account) ID #:	*VS#:* *(ex. VS-15-0001)*	
Field Survey Date:	Time:	
Survey Staff Name(s):	Election District:	
Nearest Receiving Tributary:	Watershed:	
Northing: Easting:	Jurisdiction: ___ County ___ Municipal: _____	
Business Name:	Street Address:	
Business Contact Name:	Title:	Phone:

Commercial/Industrial Land Use Information

Category: ☐ Commercial ☐ Industrial

Basic Description of Operation:

_____

_____

Observations: Significant pollutant sources present that could be exposed to stormwater: (check all that apply)

Activity	N/A	Poor Housekeeping (Liquids)	Poor Housekeeping (Solids)	Pollutant Discharge near or in MS4 storm drain inlet or waterway (1)	Description (1)
Vehicle Operations (Maintenance & Repair, Fueling, Washing, Storage)					
Loading/Unloading Areas & Paved Surfaces					
Waste Management (Dumpster Condition and Location)					
Outdoor Material Storage					

(1) Note any unusual physical indicators such as oil sheen, grease, turbidity, visible foam, floating solids, color, odors at discharge points or waterways if observable.

Photo # _____
Photo # _____

Site Potential for Pollutant Source? ___ Yes ___ No
Comment:

Sketch:

Follow-up Action:
☐ N/A ☐ MS4 Stormwater Pollution Prevention Education
☐ Recommend removal from survey list/no or low potential pollutant source

10/08/2015

CHAPTER 53: ENVIRONMENTAL MANAGEMENT OF STORM SEWER

POLLUTANT

(1) A contaminant that may result in any alteration of the physical, chemical, or biological properties of groundwater or surface water, including any change in temperature, taste, color, turbidity, or odor of the receiving waters or discharge or deposit of any organic matter, harmful organism, or liquid, gaseous, solid, radioactive, or other substance into groundwater or surface water that may render the waters harmful, or detrimental to the public health or welfare, to any domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial use of the water, to any livestock, wild animals, birds, fish, or other aquatic species that may use the water; or

(2) Any substance that may cause or contribute to pollution, including but not limited to paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordnances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

SIGNIFICANT MATERIALS

Includes but is not limited to raw materials, petroleum derivative products; any controlled hazardous substances pursuant to COMAR 26.13; industrial waste pursuant to COMAR 26.08.01.01; infectious waste pursuant to COMAR 26.04.07.02; materials such as solvents or detergents; finished materials such as metallic products; raw materials used in food processing or production; fertilizers; pesticides; waste products such as ashes, slag, and sludge, or any other material that could result in pollution of waters of the state as a constituent in stormwater discharge.

53.04 EXEMPTIONS (Allowable Discharges)

- Water line flushing or other potable water sources;
- Landscape irrigation or lawn watering;
- Permitted diverted stream flows;
- Rising groundwater;
- Groundwater infiltration to storm drains;
- Uncontaminated pumped groundwater;
- Uncontaminated discharge from foundation drains or pumps;
- Air conditioning condensation;
- Springs;
- Noncommercial washing of vehicles;
- Natural riparian habitat or wetland flows;
- Firefighting activities;
- Any water source not containing pollutants;
- Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety;
- Dye testing with prior verbal notification to the authorized enforcement agency; and
- Any nonstormwater discharge legally permitted under a NPDES permit issued by the Maryland Department of the Environment, provided that the discharger is in full compliance with all requirements of the issued permit and with all other applicable laws and regulations and with prior written approval of discharge to the CS4 (County/Municipal Storm Drain System)

Typical illicit surface discharges that may be observed in commercial/industrial area by field personnel:

- Untreated radiator flushing wastewaters;
- Untreated engine degreasing wastes;
- Over-application of fertilizers, pesticides or herbicides onto landscaping and impervious surfaces;
- Dewatering of construction sites;
- Improper washing of concrete ready-mix trucks;
- Commercial use of soaps and detergents used in cleaning pavement, vehicles and equipment outside;
- Latex/oil-based paints and solvents disposed of in gutters or inlets;
- Improper disposal of restaurant grease;
- Improperly storing chemicals or maintaining equipment;
- Leaking dumpsters;
- Car lots for used and new vehicles dripping fluids on the pavement;
- Fuel spills;
- Hazardous materials dumped; and
- Unidentified substances dumped in secluded areas.

FOLLOW-UP ACTION REPORT
Carroll County Routine Visual Survey Form
Commercial/Industrial Areas

Unique Site (Tax Account) ID #:	*VS#:*	*(ex. VS-15-0001)*
Field Meeting Date:	Time:	
Staff:	Election District:	
Nearest Receiving Tributary:	Watershed:	
Northing: Easting:	Jurisdiction: ___ County: ___ Municipal: _____	
Business Name:	Street Address:	
Business Contact Name:	Title:	Phone:

Commercial/Industrial Land Use Information

Category: ☐ Commercial ☐ Industrial

Basic Description of Operation (Name, etc.):

_____

_____

_____

FOLLOW-UP ACTION (Description)

___ Initial Follow-up Meeting ___ Additional Meeting

COMPLETION (Pollutant Source Eliminated)

Completion Date:

Description/Comments:

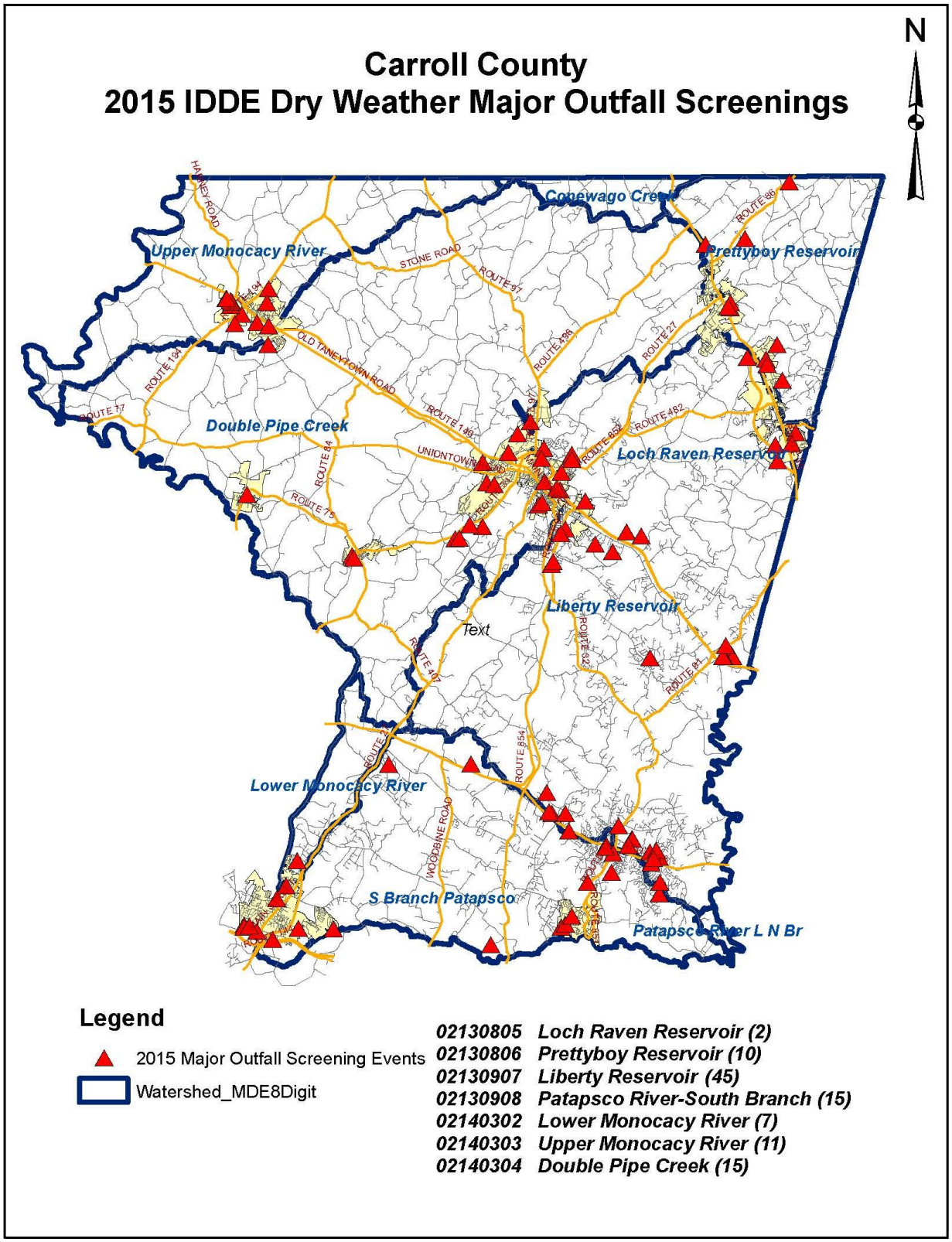
10/08/2015

Appendix D

Illicit Discharge Detection and Elimination (IDDE)

- 2015 IDDE Dry Weather Major Outfall Screenings (Map)
- 2014-2015 Illicit Discharge Summary, Illicit Discharge Complaints Processed from July 1, 2014 - June 30, 2015

Appendix D


Carroll County
2015 IDDE Dry Weather Major Outfall Screenings
N
Upper Monocacy River
Conewago Creek
Prettyboy Reservoir
Double Pipe Creek
Loch Raven Reservoir
Liberty Reservoir
Lower Monocacy River
S Branch Patapsco
Patapsco River L N Br
Text
HANNEY ROAD
STONE ROAD
ROUTE 97
ROUTE 194
OLD TANEYTOWN ROAD
ROUTE 140
ROUTE 496
ROUTE 27
ROUTE 482
ROUTE 852
UNIONTOWN ROAD
ROUTE 84
ROUTE 75
ROUTE 86
ROUTE 77
ROUTE 91
ROUTE 832
ROUTE 407
ROUTE 27
ROUTE 854
WOODBINE ROAD
ROUTE 32
Legend
2015 Major Outfall Screening Events
Watershed_MDE8Digit
02130805 Loch Raven Reservoir (2)
02130806 Prettyboy Reservoir (10)
02130907 Liberty Reservoir (45)
02130908 Patapsco River-South Branch (15)
02140302 Lower Monocacy River (7)
02140303 Upper Monocacy River (11)
02140304 Double Pipe Creek (15)

Appendix D

IDDE Program

2015/2016 Industrial/Commercial Visual Survey Summary (In Progress)

Visual Survey #	Unique Property ID #	Date	Location	Land Use	Activity Observations	Potential Significant Pollutant Source	Follow-Up Action	Survey Status
VS-15-0001	0701030299	11/17/15	3543 Harney Road Taneytown, MD 21787	C	Inactive Auto Garage/Vehicle Storage/Paved Area	N	N/A	Closed
VS-15-0002	0708001375	11/17/15	630 Hanover Pike Hampstead, MD 21074	I	Indoor Warehouse/ Transportation Loading/Paved Area/Dumpster	N	N/A	Closed
VS-15-0003	0707044526	11/17/15	N/S Lucabaugh Mill Road Westminster, MD 21157	C	Multi-Business/Warehouse/ Vehicle Activity/Loading/ Paved Area/Dumpster	N	N/A	Closed
VS-15-0004	0707017332	11/17/15	404 Lucabaugh Mill Road Westminster, MD 21157	C	RV/Auto Business/Paved Area/Dumpster	N	N/A	Closed
VS-15-0005	0701012134	11/17/15	3959 Old Taneytown Road Taneytown, MD 21787	C	Inactive Mixed Retail/Residential Use/Vehicle Storage/ Paved Area, Dumpster	N	N/A	Closed
VS-15-0006	0701000381	11/17/15	4327 Old Taneytown Road Taneytown, MD 21787	C	Mixed Commercial/Beauty Shop/Residential, Paved Area	N	N/A	Closed

Appendix D

IDDE Program

2014-2015 Illicit Discharge Summary

Illicit Discharge Complaints Processed from July 1, 2014 – June 30, 2015

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-14-0004	County Inter-Agency Staff reported County Public Works vehicle hydraulic line failure. 7/24/2014	County Safety Inspector (NPDES trained) investigated hydraulic line failure along grassed roadside and reported to MDE Emergency Response Division. Per MDE instructions, soil with hydraulic fluid was removed and disturbed area seeded and mulched. No fluid entered ditches, stormdrains or waterways. Filed report with MDE.	Spill/Illicit Discharge due to hydraulic line failure. **Case Closed: 07/28/2014**	County Old Meadow Branch Road Westminster, MD
PD-14-0005	Municipal agency reported possible small oil spill. 9/23/2014	County DPW addressed small spill using absorbent materials/dry clean-up measures. Did not reach inlet.	Spill/Non-Illicit Discharge **Case Closed: 09/23/2014**	City of Westminster 10 Distillery Drive Westminster, MD
PD-14-0006	Citizen complaint of night dumping of shingles along private use-in common driveway. 9/30/2014	Investigation by EISD confirmed materials. County Public Works cannot remove materials on private properties. Reported incident to County Sherriff Department. Citizen reported contacting MDE Solid Waste who sent enforcement letter to adjacent landowner to clean property. Dumping not in MS4 jurisdiction.	Illegal Dumping not in MS4 Jurisdiction. State Agency Enforcing under State Litter Law. **Case Closed: 11/18/2014**	County Papermill Drive Hampstead, MD
PD-14-0007	Citizen complaint regarding auto dealership discharging vehicle wash water from auto detailing shop to outside ground surface near stream. 10/17/2014	Investigation by City of Westminster Zoning Enforcement Officer and County NPDES Compliance Specialist. Met with Maintenance Manager and Detail Shop foreman. Explained complaint and regulations. Management cooperative and walk thru visual inspection confirmed two drain openings in south wall of auto detailing shop where some vehicle wash water may discharge. Shop floor in drain confirmed to go to oil/water separator and sanitary. Letter and remediation measures to close wall openings sent and complied with. Follow-up inspection confirmed sealing of discharge openings.	Illicit Discharge Connection Eliminated. **Case Closed: 12/16/2014**	City of Westminster Corner of MD 140 and Center Street Westminster, MD
PD-14-0008	County Inter-Agency Staff Observation reported overflowing grease traps, grease recycle bins overflowing, and kitchen equipment wash off near storm drain inlet. 11/12/2014	Investigation included Town of Hampstead Public Works, County NPDES Compliance Specialist and EISD Supervisor who met with manager of restaurant. Grease found on pavement from poorly maintained grease recycle bin sitting in front of a rain downspout discharge point. Kitchen equipment outside. Educated owner on stormwater pollution regulations and BMPs. Checked inlet and storm pond inflow pipe. Instructed restaurant to clean up and properly maintain grease bin and move it away from downspout. No outdoor washing of equipment unless captured by sanitary sewer. Violation letter sent. Re-inspection found site to be in proper order.	Illicit Discharge Eliminated. **Case Closed: 1/05/2015**	City of Hampstead 2315 Hanover Pike Hampstead, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-14-0009	EPA forwarded a citizen complaint to County. Complaint stated auto center at commercial shopping complex was washing antifreeze down storm drain system at specific time. 11/19/2014	Investigation by City of Westminster Zoning Enforcement Officer & County NPDES Compliance Specialist. Met with auto center manager and recalled the auto repair at that time was for a flat tire and provided a bright green non-toxic tire sealant that was used. (MSDS sheet confirmed non-toxic status). Visual observation of inlets and inflow pipes to SWM facility showed no material. Lab sample of SWM pond outfall was taken with normal results. Auto center manager also explained all anti-freeze is properly recycled. Although material not a contaminant, a violation letter was issued for washing down residual materials into storm drain system and BMPs must include all waste water to stay inside shop and properly captured to sanitary sewer or dry clean-up measures and not discharge outside. Auto center business environmental division responded confirming action taken. Met w/Shopping Center Complex Manager and provided MS4 permit information and copied on correspondence. Site re-inspected. EPA copied on investigation findings.	Illicit Discharge Eliminated. **Case Closed: 1/26/2015**	City of Westminster 400 N. Center Street Westminster, MD
PD-15-0001	Citizen complaint regarding of fluids from autos and equipment leaking on ground from a hauling company, a tenant of the property. 1/05/2015	Investigation by EISD staff found on 2/13/2015 (delay due to snow cover) found no fluids, stains, etc. in the parking lot or nearby pipe outfall. Contacted the owner/property management and sent letter regarding stormwater pollutant regulations and best management practices. (Plaintiff and tenant are business competitors).	Non Illicit Discharge **Case Closed: 4/02/2015**	County 4600 Hanover Pike Manchester, MD
PD-15-0002	MDE Underground Injection Control Program complaint to CC Health Department regarding potential illicit connection to storm drain system. 03/23/2015	Investigation by CC Health Department and County NPDES Compliance Specialist and Town of Sykesville's Public Works Director met with Auto Related Business owner to review MDE's UIC inspection and related MS4 Permit regulations regarding illicit connections. Several shop drain connections made decades ago unknown by owner. Sykesville DPW conducted dye tests confirming illicit connection to municipal storm drain system. Violation letter sent. Owner sealed drains and provided dry clean-up measure BMPs by the Town.	Illicit Connection Eliminated **Case Closed: 08/4/2015**	Town of Sykesville Springfield Avenue Sykesville, MD
PD-15-0003	Municipal Agency reported grease residue at storm drain inlet out the back door of restaurant. 03/30/2015	Investigation with City of Westminster Zoning Officer and County NPDES Compliance Specialist. Area had been cleaned upon inspection. Spoke w/restaurant owner near inlet that uses oils and explained regulations with regard to illegal dumping and bmps. Claims it was done by others. Spoke with a neighboring restaurant that uses no grease and provided same information to them. Spoke with local police officer regarding incident and to contact the City should he see evidence of any dumping activities.	Illegal Dumping Inconclusive Site to receive ongoing monitoring. **Case Closed. 3/30/2015**	City of Westminster 43 E. Main Street Westminster, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-15-0004	Citizen complaint regarding excessive trash/litter in upland drainage area on private property. 4/17/2015	City of Taneytown Zoning Enforcement Officer investigated. Site was cleaned up on 5/5/15 and re-inspected on 5/6/15.	Pollution Discharge Eliminated. **Case Closed: 5/6/15**	City of Taneytown Corner of Bentley and Buffalo Streets, Taneytown, MD.
PD-15-0005	Citizen complaint of neighbors work related activity taking equipment apart with contaminants may be getting in stream. 4/24/2015	EISD staff met with owner, walked around garage and area leading to stream and stream area. No signs of oils or auto fluids or stains on ground. A car approximately 20 feet from stream was reported to have fluids removed by owner. Old empty oil drums with no liquid contaminants observed. No refrigeration units observed.	Non-Illicit Discharge. **Case Closed: 4/30/2015**	County 1524 Manchester Road Westminster, MD
PD-15-0006	Citizen complaint regarding homeowner dumping grass clippings into storm drain inlet in front of residence. 05/05/2015	Investigation by EISD staff found minimal amount of grass and cherry blossoms in the inlet. Notification letter sent to homeowner informing of no dumping of materials in storm drain system along with grass clipping management brochure. Owner responded that he is not dumping but some may have been blown in while mowing. Follow-up inspection found no grass in inlet.	Illegal Dumping Inconclusive **Case Closed: 5/21/2015**	County 416 Ronsdale Road Eldersburg, MD
	Follow-up complaint received. 8/24/2015	Investigation by EISD found storm drain to have a noticeably larger amount of grass clippings that would fill a grocery bag. No one at home at time of inspection. Phone call made to homeowner denying any dumping. Phone conversation with homeowner on 8/25/2015 with reiteration of first incident. Inspection on 11/9/2015 found no clippings.	Illegal Dumping Inconclusive **Case Closed: 11/09/2015**	
PD-15-0007	County Inter-Agency Staff Observation reported algae presence at storm drain outfall. 5/07/2015	Investigation of outfall and newly retrofitted SWM pond and inlets. Chemical lab sample taken with analysis showing only slight elevation of potassium and ammonia. Site engineer confirmed all building refrigerator units and drains connected to sanitary sewer. Algae believed to be underdrain groundwater discharge exposed to high temperatures and sunlight exposure	Non-Illicit Discharge. Outfall is regularly checked during stormwater BMP maintenance inspections. **Cased Closed: 6/09/2015**	County 1333 Avondale Road County E/S of Avondale at Corner of Medford Road

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-15-0009	County Staff 2015 IDDE Dry Weather Screening Reported 7/29/2015	Dry weather screening of major outfall #MA033. Obvious physical indicators at non-flowing outfall found strong rancid odor and light tan film at plunge pool. Tracked up storm drain system. Investigation confirmed multiple illicit discharge sources from nearby shopping center. Fat/oil/grease from a leaking trash compactor at a grocery store and poor good housekeeping measures behind a restaurant (grease bin, etc.) from nearby shopping center. Enforcement coordination with local municipality. Promptly addressed by conducting on-site meeting with property management company and two commercial business representatives. Regulatory compliance regulations, remediation measures, and educational BMP information reviewed with all parties. Documented in an enforcement letter to property management company. Voluntary compliance and remediation achieved. Portion of storm drain blocked off, jetted and cleaned. Pavement areas bermed up and cleaned. Poor good housekeeping activities eliminated. Follow-up inspection of outfall plunge pool clean and odor free.	Illicit Discharge Eliminated **Case Closed: 9/02/2015**	Town of Mount Airy S/E Corner of Twin Arch Road and Ridge Road
PD-15-0011	County Staff 2015 IDDE Dry Weather Screening Reported 8/31/2015	Dry weather screening of major outfall #C0886. Chemical screening indicated slightly elevated level of chlorine. Investigation found contractor's sprinkler flow for watering newly installed sod at active high residential density townhouse construction area partially flowing onto pavement and running into storm drain inlet inflow into pond. Activity immediately adjusted onto lawn. Erosion and Sediment Control inspector notified construction company regarding BMP and will monitor through regular site inspections.	Illicit Discharge Eliminated **Case Closed: 8/31/2015**	County Cassandra Drive, Eldersburg, MD
	Total:	***15 Complaints***		

Appendix E

Public Outreach Plan

Carroll County & Municipalities NPDES MS4 Public Outreach Plan

Final Working Draft

August 5, 2015

CARROLL COUNTY & MUNICIPALITIES
NPDES MS4 PUBLIC OUTREACH PLAN (POP)

Table of Contents

EXECUTIVE SUMMARY

Introduction. Carroll County and its eight municipalities – Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster – are co-permittees on the County's fourth generation National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4) permit, issued December 29, 2014. The primary driver of this public outreach plan is, first and foremost, compliance with the NPDES MS4 permit.

Plan Purpose. This plan provides a review of the public outreach opportunities currently available to residents and businesses in Carroll County and the municipalities regarding specific requirements of the permit and related stormwater program activities. As a result of this review, activities are suggested to round out those opportunities and improve outreach. The intent is to raise public awareness and encourage residents and businesses to take measures to reduce and prevent stormwater pollution.

Goals. The goals address two different areas: actions the permittees can take to improve the public outreach campaign and raising public awareness in such a way as to engage the public to elicit action.

Goal 1: To build upon the County's current public education and outreach program with the intent of fostering a more cohesive and function-based approach that results in easier access and broader dissemination of information.

Goal 2: To raise public awareness of stormwater pollution, prevention measures, their benefits and importance, and to provide activities in which residents and businesses can engage to further reduce and prevent stormwater pollution and runoff.

Objectives.

- Continue to deliver effective Reduce/Reuse/Recycle public outreach campaign.
- Continue to provide educational materials focused on reducing the amount of litter.
- Continue to improve and foster the Adopt-a-Road campaign.
- Create comprehensive website that is more user-friendly and accessible.
- Increase awareness of compliance hotline availability and improve access.
- Continue to offer opportunities and materials for increased public awareness and access to permit-related, water quality information.

- Educate businesses about permit requirements, good housekeeping measures, and pollution prevention.
- Provide opportunities for public participation during the development of watershed assessments and restoration plans.
- Continue to build or improve existing partnerships between the County and other entities to promote action, awareness, and recognition.
- Explore concept of a partnership between the County and the business community to promote action, awareness, and recognition.

Areas of Public Outreach. Three areas of the permit require public outreach and education. PART IV.D.4. Litter and Floatables requires a public education and outreach program to reduce littering and increase recycling. PART IV.D.6. requires a public outreach program to provide information to the general public and to the regulated community. PART IV.E.3. requires public participation in the restoration planning process.

Current Programs & Activities. Carroll County and the municipalities already implement an extensive public outreach program to address many of these issues. Program activities include websites, materials, events, a hotline, media, and work with several councils on public outreach and coordination. An extensive recycling outreach campaign and materials are in place as well.

Target Audience. The permit requires outreach to County and municipal staff, the general public, and the regulated community. Outreach efforts will focus on facilities with industrial permits and businesses at a higher risk for stormwater pollution or potential illicit discharges. Emphasis will be given to homeowner associations and school students to further efforts to reach the general public. Institutional uses, such as hospitals and colleges, will benefit from the same good housekeeping measures appropriate for businesses.

The Message. Public outreach efforts will focus on the issues and topics prescribed by the permit. The varied audiences and issues may require different messages to fit different needs. In general, the County wants to convey to the target audiences that it seeks a voluntary approach to addressing potential problems and issues, and implementing good housekeeping measures. The County would like to provide support to and, where appropriate, partner with stakeholders to understand what the issues are, why they are important, their relevance to individuals and businesses, and the benefits to implementing best management and good housekeeping measures.

The Method & Means. **The County's primary efforts will be, first and foremost, to continue those current successful programs, activities, and materials**. Additional specific activities to meet the objectives include, but are not limited to, restructuring the website to bring NPDES-related outreach efforts and materials under one umbrella, conducting workshops for both businesses and the general public, creating a self-inspection checklist for businesses, and developing the concept of a Carroll Clean Water Partnership.

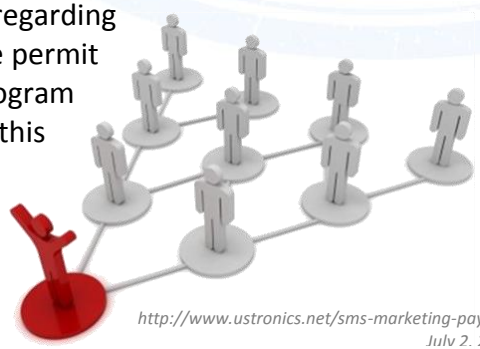
CHAPTER 1: BACKGROUND

1. BACKGROUND

1.1. Purpose

Carroll County and its eight municipalities – Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster – are co-permittees on the County's fourth generation National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4) permit, issued December 29, 2014. Therefore, the requirements of the permit apply to the municipalities as well as the County. Any references in this plan to the "County" regarding requirements of the permit apply to the county's municipalities as well.

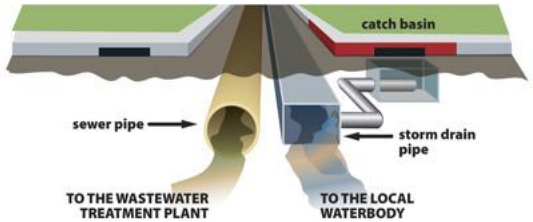
This plan provides a review of the public outreach opportunities currently available to residents and businesses in Carroll County and the municipalities regarding specific requirements of the permit and related stormwater program activities. As a result of this review, activities are suggested to supplement those opportunities and improve outreach. The intent is to raise public awareness and encourage residents and businesses to take measures to reduce and prevent stormwater pollution.



http://www.ustronics.net/sms-marketing-payad/, July 2, 2015

The Carroll County Department of Land & Resource Management (LRM) is responsible for the administration, the majority of the operational activities associated with the permit, and oversight and management of the design and construction of stormwater mitigation projects.

It should be noted that this plan, as indicated in the permit, is a dynamic document. The iterative nature of the process means that the contents of the plan need to be flexible and subject to change based on current and completed activities, progress, and evaluations. This plan does not represent a specific commitment to implement the objectives and/or suggested programs and activities within, but rather is a guide for how to proceed based on current circumstances.



1.2. Driving Forces

1.2.1 *National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4) Permit*

In 1972, Congress passed the Clean Water Act. This law was developed to control water pollution from wastewater discharges and stormwater runoff. Beginning in 1990, the U.S. Environmental Protection Agency (EPA) required large municipalities, certain industrial facilities, and construction sites to obtain NPDES permits for stormwater discharges. Phase I permits are required of larger jurisdictions, generally with a population of 100,000 or greater. The County holds a National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System permit, or "NPDES Phase I MS4". This permit is an individual permit with requirements specific to Carroll County. While smaller jurisdictions and municipalities are subject to a general permit, called an NPDES Phase II MS4 permit, Carroll's eight municipalities officially became co-permittees on the County's permit on December 29, 2014, the date when the County's fourth generation permit was issued.

In Maryland, EPA has delegated authority to the Maryland Department of the Environment (MDE) for permit administration and enforcement. EPA has retained permit review and approval authority, as well as additional enforcement authority. The overall NPDES MS4 permit for Carroll County and its municipalities is administered through LRM.

The permit requires reduction and treatment, or "mitigation," of stormwater runoff on an additional 20 percent of untreated impervious surfaces.

This is an increase beyond the 10 percent previously required for the unincorporated areas of the County in the third generation permit, for a total of 30 percent. Impervious surfaces are areas through which water cannot penetrate such as pavement, buildings, and even compacted soils on driveways and parking lots.

The County has developed a very comprehensive, active NPDES restoration effort via the addition of appropriate staff and capital funding. The approval of staffing and funding by the Board of County Commissioners confirms the commitment to water quality protection and enhancement by the County and its municipalities.

Among the many requirements contained in the permit, public education and outreach is expected to continue to be implemented and integrated with other aspects of the County's activities. The public outreach and education campaign is intended to raise public awareness of stormwater pollution and its effects, the benefits of management and mitigation practices to minimize its impacts, and activities in which homeowners can engage to help the County address and comply with its permit and pollution reduction requirements. ***The primary driver of this public outreach plan is, first and foremost, compliance with the NPDES MS4 permit.***

1.2.2. *Memorandum of Agreement: Carroll County and Municipalities*

On October 23, 2014, the Board of County Commissioners and all eight of Carroll County's municipalities officially agreed to share the cost of joint stormwater mitigation projects. A Memorandum of Agreement (MOA) signed by the Board and all eight mayors provided the framework for the County and municipalities to become co-permittees on the County's federal stormwater permit.

The County has been budgeting for and implementing these projects for numerous years, and has anticipated the increased treatment requirements that the fourth generation permit includes; however, although anticipated and expected, the specific requirement to treat 20 percent of untreated impervious surfaces is new for the municipalities. The cost to address this requirement for the municipalities was estimated to be around $12 million over the five-year term of the permit.

County staff has been implementing projects to address the Phase I permit requirements. However, the majority of impervious surfaces are concentrated around municipalities. Since watersheds do not follow jurisdictional boundaries, joint projects could result in "credit" for the County as well as the municipalities. Project costs per acre decrease when more impervious surface can be treated per project. By becoming co-permittees, more options for location of projects become available, and the County and municipalities both benefit by receiving "credit" for areas treated regardless of the location.

The MOA establishes administrative responsibilities, including the construction, inspection, and maintenance of stormwater mitigation projects. The MOA also outlines how costs will be shared. The County will pay 80 percent of the capital costs for the projects needed to address the municipalities' 20 percent of untreated impervious area. The MOA will be in effect until all stormwater mitigation projects needed to address this permit's requirements are complete and the next permit is issued by MDE, at least five years from the issue date of the current permit.

Using the Carroll County Water Resources Coordination Council (WRCC) as the forum for discussing and developing the MOA, County and municipal staff collaborated to develop this forward-thinking agreement. Carroll is among a few jurisdictions across the country with such an agreement, demonstrating the benefits and efficiency that can result from such a long-standing working relationship.

For more information on the WRCC or to view a copy of the MOA, visit the WRCC's webpage at http://ccgovernment.carr.org/ccg/plan/wrcc/.

The **Water Resources Coordination Council**, or WRCC, was formed in March 2007 by a non-binding joint resolution (#697-07) between the County, municipalities, and Carroll County Health Department. The WRCC provides a mechanism for cooperative problem solving of critical water resource management issues facing the County and municipalities. The WRCC fosters discussion between jurisdictions in order to develop regional (watershed) or countywide approaches to policies, procedures, and solutions regarding water resource development and protection. The WRCC offers a forum for the dissemination of ideas, solutions, and cost-saving approaches to water resource development and protection in Carroll County. These meetings are held monthly and are open to the public, with agendas posted on the County website.

1.2.3. Total Maximum Daily Loads (TMDLs)

Permit Part IV.E requires stormwater controls to reduce the discharge of pollutants to the *maximum extent practicable* (MEP). By regulation 40 CFR §122.44, best management practices (BMPs) and programs implemented pursuant to this permit must be consistent with applicable wasteload allocations (WLAs) developed under EPA-approved TMDLs.

Permit Part III.2. requires the permittee to attain applicable WLAs for each established or approved TMDL for each receiving water body (Part III.2.)

1.2.3.1. Chesapeake Bay Restoration & Watershed Implementation Plans (WIP)

In 1998, the Chesapeake Bay and many of its tidal tributaries were added to the State's list of impaired waters (known as the 303(d) list), thus requiring the development of a TMDL to comply with the Clean Water Act.

TMDLs for the Chesapeake Bay were set by EPA in December 2010. All states in the Chesapeake Bay watershed were then required to develop a plan to show how these limits would be achieved. In Maryland, nitrogen, phosphorous, and sediment (total suspended solids) are the pollutants addressed by the Bay TMDLs. This meant that MDE had to identify strategies for reducing the current levels of these pollutants entering the Bay. Through this process, pollutant load targets were developed by river segment, by source sector, and by county. Maryland's Phase I WIP outlines the reduction requirements and general strategies that will be implemented to achieve the reduction goals. Maryland Phase II WIP details more specific strategies to be taken. Through the WIPs, MDE committed to EPA to increase requirements in the permits (administered by the State) to clean up stormwater runoff. This was one strategy that led to the increased stormwater mitigation requirements.

More info about the Bay TMDL can be found on the EPA website at http://www.epa.gov/chesapeakebaytmdl/. TMDLs require a very specific implementation plan, with "reasonable assurances" (e.g., enforceable permit limits) that pollutant load allocations will be achieved.

TMDL stands for **Total Maximum Daily Load**. A load refers to the amount of a given type of pollutant found in a body of water coming from all sources. Simply put, the TMDL itself is the highest amount of a pollutant that a body of water can accept from all sources and still meet water quality standards.

An impairment is identified when water quality monitoring data suggest that a waterbody (river, lake, estuary, or ocean) does not meet, or is not expected to meet, water quality standards. Maryland water quality standards have been adopted per the Federal Clean Water Act, Section 101, to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Individual standards are established to support the beneficial uses of water bodies, such as fishing, aquatic life, drinking water supply, boating, water contact recreation, as well as terrestrial wildlife that depend on water.

To set a TMDL, pollution from sources throughout the watershed are calculated and portions assigned, or allocated, to the various contributing sources. The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution (e.g., permitted waste treatment facilities, stormwater sources, etc.) is referred to as the **wasteload allocation** (WLA). The WLA is less than the existing load, with the difference being the amount the pollutant needs to be reduced.

1.2.3.2. Local TMDLs

When a waterbody is listed, the cause (pollutant) and the priority of the impairment are identified. Waters scheduled for TMDL development in the next two years are also identified in the list. The local TMDLs set prior to the issuance of this generation of permit can be found on the map titled "Carroll County, MD Local TMDLs and Watershed Boundaries."

More information on TMDLs in Maryland can be found on MDE's website at: http://www.mde.state.md.us/programs/Water/TMDL/Pages/Programs/WaterPrograms/TMDL/index.aspx.

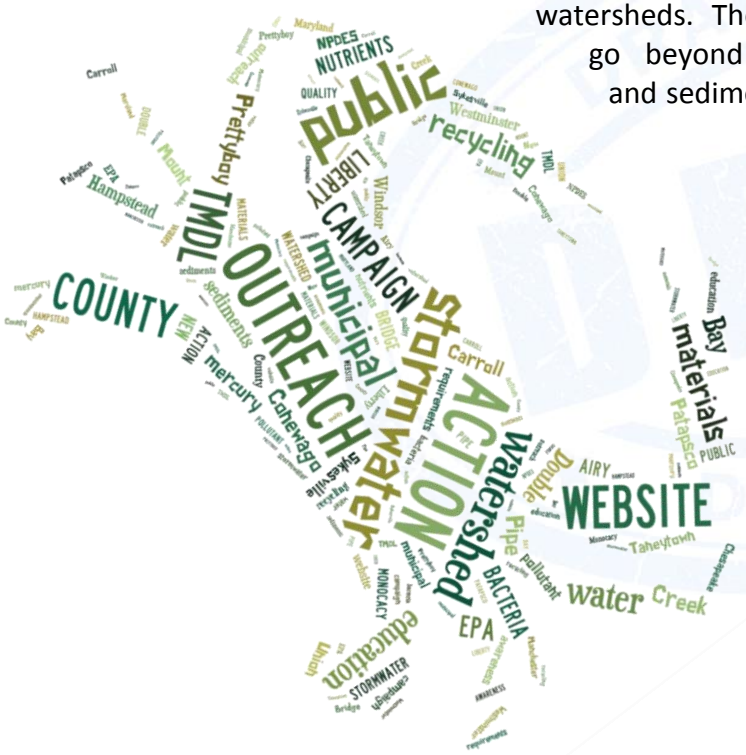
1.3. Carroll County Watersheds

At the most basic level, a watershed is the total land area that drains surface water and/or groundwater into a common body of water. Because of the nature of gravity, watersheds (also known as drainage or catchment basins) are confined by their surrounding topography. Water, both above and below ground, originates at the highest point and drains downhill to the lowest ground area. As one waterbody flows into another, the flows gradually increase in size. A small spring turns into a run and progressively merges with ever-larger creeks, streams, and rivers.

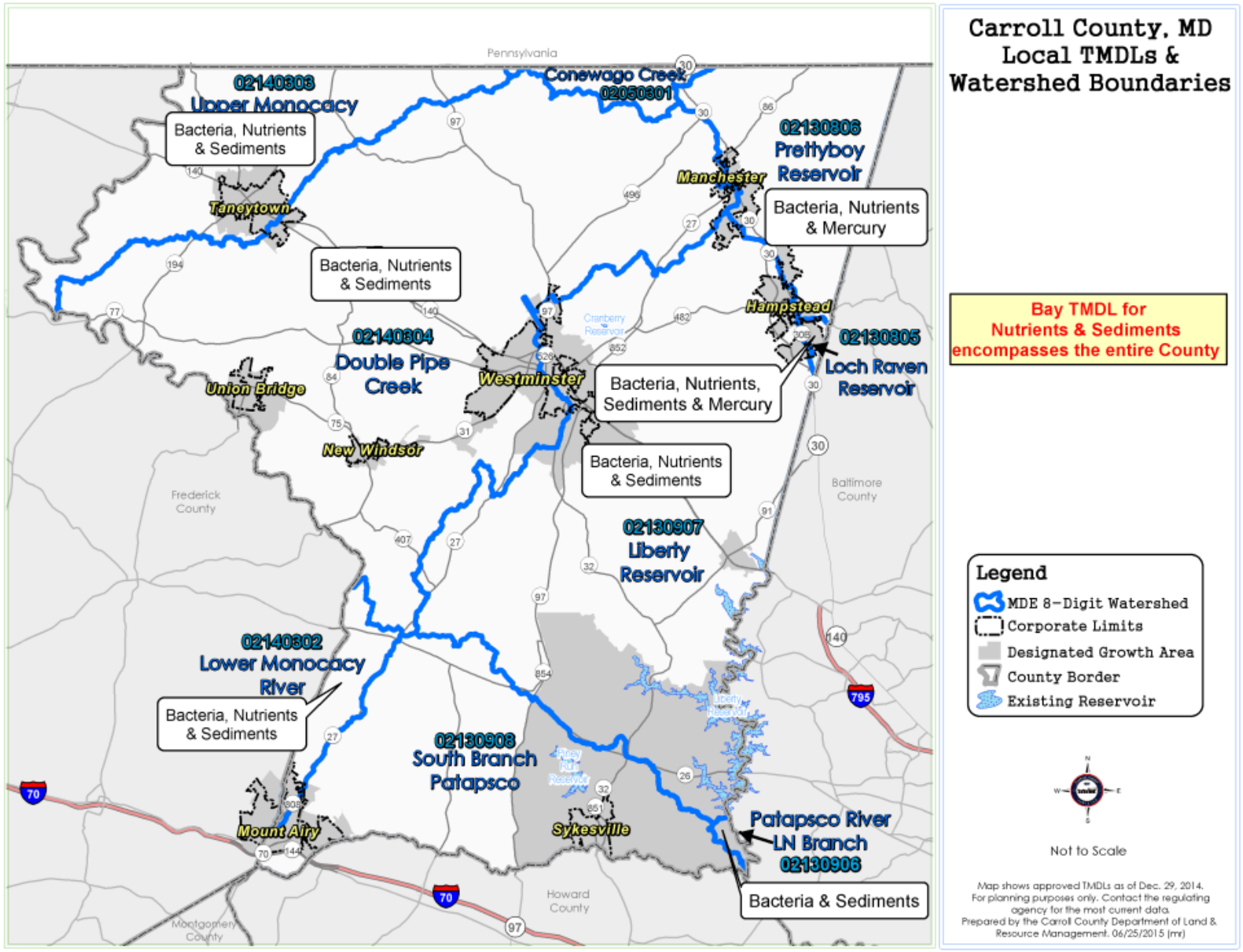
Ultimately, these flows collect into the largest water bodies, such as the Chesapeake Bay, and eventually feed into the world's oceans.

Watersheds can be defined at many different scales. The United States Geological Survey (USGS) developed a ranked system for mapping all of the national's watersheds. They are grouped from largest to smallest, and are assigned a code based on size. Currently, Carroll's local TMDLs are set based on Maryland's system of 8-digit watersheds.

While the TMDLs for the Chesapeake Bay address nutrients and sediment pollution in the Bay, TMDLs have also been developed for local watersheds. These TMDLs go beyond nutrients and sediment and, in Carroll County, address a broad spectrum of additional pollutants, including bacteria, mercury, metals, and biological. The permit requires that progress is made toward achieving the local TMDLs in addition to the Bay TMDLs.



Along with the local TMDLs in each watershed, the map titled "Carroll County Local TMDLs and Watershed Boundaries" depicts the nine 8-digit watersheds found wholly or partially in Carroll County. Watersheds throughout the county eventually drain to the Chesapeake Bay. Additional watershed maps and information regarding each individual watershed can be found at the Bureau of Resource Management website at under "Watersheds" (http://ccgovernment.carr.org/ccg/resmgmt/).


Carroll County, MD
Local TMDLs &
Watershed Boundaries
Pennsylvania
02140303
Upper Monocacy
Bacteria, Nutrients & Sediments
Conewago Creek
02050301
02130806
Prettyboy
Reservoir
Manchester
Bacteria, Nutrients & Mercury
Taneytown
Bacteria, Nutrients & Sediments
Hampstead
02140304
Double Pipe
Creek
Union Bridge
Westminster
Bacteria, Nutrients, Sediments & Mercury
02130805
Loch Raven
Reservoir
New Windsor
Bacteria, Nutrients & Sediments
Frederick
County
Baltimore
County
02130907
Liberty
Reservoir
02140302
Lower Monocacy
River
Bacteria, Nutrients & Sediments
02130908
South Branch
Patapsco
Mount Airy
Sykesville
Patapsco River
LN Branch
02130906
Bacteria & Sediments
Howard
County
Montgomery
County
Bay TMDL for
Nutrients & Sediments
encompasses the entire County
Legend
MDE 8-Digit Watershed
Corporate Limits
Designated Growth Area
County Border
Existing Reservoir
Not to Scale
Map shows approved TMDLs as of Dec. 29, 2014.
For planning purposes only. Contact the regulating
agency for the most current data.
Prepared by the Carroll County Department of Land &
Resource Management. 06/25/2015 (mr)

CHAPTER 2: OVERALL GOALS & GENERAL OUTCOMES

2. OVERALL GOALS & GENERAL OUTCOMES

2.1. Overall Goals

This plan is intended to move the County and municipalities toward two general goals. The first goal is aimed at improving the County's public outreach program, with the second goal being the off-shoot of program improvements, which is related to public perceptions and activities. The more individual property owners can do to reduce and prevent stormwater pollution, the more effective and efficient the County's stormwater program will be.

Goal 1: To build upon the County's current public education and outreach program with the intent of fostering a more cohesive and function-based approach that results in easier access and broader dissemination of information.

Goal 2: To raise public awareness of stormwater pollution and prevention measures, their benefits and importance, and to provide activities in which residents and businesses can engage to further reduce and prevent stormwater pollution and runoff.

2.2. General Outcomes & Objectives

The goals of this plan address two different areas: actions the permittees can take to improve the public outreach campaign and engaging the public to elicit action through raising public awareness.

The following objectives are based on the goals of this plan and result from a review of the current programs and activities in place. More specific activities or products to achieve these objectives are outlined in Chapter 7. The Method & Means (*Suggested Programs and Activities*).

- Continue to deliver effective Reduce/Reuse/Recycle public outreach campaign.
- Continue to provide educational materials focused on reducing the amount of litter.
- Continue to improve and foster the Adopt-a-Road campaign.
- Create comprehensive website that is more user-friendly and accessible.
- Increase awareness of compliance hotline availability and improve access.
- Continue to offer opportunities and materials for increased public awareness and access to permit-related, water quality information.
- Educate businesses about permit requirements, good housekeeping measures, and pollution prevention.
- Provide opportunities for public participation during the development of watershed assessments and restoration plans.
- Continue to build or improve partnerships between the County and other entities to promote action, awareness, and recognition.
- Explore concept of a partnership between the County and the business community to promote action, awareness, and recognition.

CHAPTER 3: CURRENT PROGRAMS & ACTIVITIES

3. CURRENT PROGRAMS & ACTIVITIES

Three areas of the permit require public outreach and education. PART IV.D.4. Litter and Floatables requires a public education and outreach program to reduce littering and increase recycling. PART IV.D.6. requires a public outreach program to provide information to the general public and to the regulated community. PART IV.E.3. requires public participation in the restoration planning process.

Carroll County and the municipalities already implement an extensive public outreach program to address many of these issues. This chapter, as well as Chapter 7: Suggested Program and Activities, addresses each of these areas and summarizes the programs and activities currently in place.

3.1. Management Programs, Litter and Floatables

Within one year of permit issuance, as part of the public education program described in PART IV.D.6., the permit requires the County to develop and implement a public education and outreach program to reduce littering and increase recycling. This shall include: (PART IV.D.4.b.)

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

The permit also requires the County to evaluate the effectiveness of the education program annually. Information detailing the progress toward implementing the public education and outreach program must be included in the annual report required by the permit. The report shall describe the status of public outreach efforts including resources expended (e.g., personnel and financial) and the effectiveness of all program components. (PART IV.D.4.c.&d.)

The Carroll County Department of Public Works (DPW) is responsible for solid waste and recycling in the county. The Recycling Program manages recycling initiatives and associated public education and outreach.

The vision of the Carroll County Recycling Operation is…

> *…To encourage a culture of waste reduction, reuse, and recycling. It is our goal to recommend and facilitate programs; education students, residents, and businesses to*

minimize the waste stream; and maximize the recovery of valuable and useful materials. This is our commitment to the environment and the people of our communities.

[Source: DPW Website, July 2015, http://ccgovernment.carr.org/ccg/recycle/gen-info.asp.]

3.1.1. Reduce, reuse, and recycle

Carroll County actively seeks to divert waste from the landfill. Recycling participation is on the rise in Carroll County. Options for both curbside and drop off opportunities have increased, as has the type of materials that can be recycled.

Curbside, single-stream recycling was implemented in 2007 (and expanded in 2008), making it easy and convenient for residents to participate. Most standard household recycling can simply be placed at the curb. Carroll County has taken advantage of grant opportunities to purchase and distribute large recycling containers that added to the ease of handling curbside recycling.

Carroll's Resource Recovery Facility is conveniently located in the center of the county and accepts many items that are not eligible for curbside pickup, such as Styrofoam, electronics, automobile batteries, antifreeze/waste oil, cooking oil, and textiles.

Carroll County also encourages property owners to divert yard waste from the landfill. Citizens can dispose of grass, leaves, and branches in the mulching area of the Resource Recovery Facility. These items are mulched, and the mulch is made available to the public. Citizens are encouraged to consider backyard composting. The County provides an opportunity to purchase compost bins and rain barrels at a discounted rate in the spring. Information and announcements related to these opportunities can be found at the Solid Waste website at recyclecarroll.org.

The Recycling program offers a semi-annual household hazardous waste collection to ensure household chemicals are not improperly discarded. The Recycling office diligently works to inform citizens and instill the "Reduce, Reuse, Recycle!" theme.

In **FY 2014**, the County again hosted residential household waste drop-off events for County residents. Two events took place during that time, held on October 19, 2013, and April 19, 2014. Events such as these provide County residents with a safe means for disposing of residential household chemicals, shredding of unneeded documents, and an opportunity to learn many ways in which to protect the environment. Collection of unused prescription and non-prescription drugs can be made to designated law enforcement agencies in the county. The County also hosted a rain barrel and composting event on March 22, 2014, to provide rain barrels and composting bins to residents at a reduced cost.

Through all recycling efforts, **the County has achieved a 41 percent recycling waste diversion rate that includes a 5 percent source reduction credit in 2012** (based on Maryland Department of the Environment Recycling Report). The State-mandated recycling rate is 35 percent.

To proactively address changing and future solid waste needs, a Solid Waste Work Group evaluated options and prepared a report with recommendations. A Solid Waste Advisory Council (SWAC)

was established in 2014 to help implement recommendations of the various solid waste plans and advise staff.

3.1.2. Signs, articles, and other media outlets

The Solid Waste Recycling Program hosts a **website** providing extensive public education materials and opportunities entitled "*Recycling"* (http://ccgovernment.carr.org/ccg/recycle/) under "*Living Here"* on the Carroll County Government home page. The website hosts information for multiple types of users regarding multiple aspects of recycling. The homepage provides general information and materials on recycling, as well as information targeted to recycling in the home, at schools, and for businesses. All recycling events are posted on the website, and related educational materials and documents are posted and available for download. The Recycling Program also hosts a Facebook page for followers to receive regular information and updates.

Multiple **events** throughout the year promote reduction, reuse, and recycling and provide products or services to facilitate this result. These events include, but are not limited to, compost bin and rain barrel sales, household hazardous waste clean-up collections, paper-shredding service days, and other specialty events for collection of items that cannot be recycled through single-stream recycling (such as CFL bulbs, pharmaceuticals, kitchen grease, and latex paint). Recycling program staff also attend many festivals and community events where an educational booth and materials are provided and staff is available to answer questions.

In addition to all the educational and information materials available on the Recycling website and at events, **information** is routinely **disseminated** to the public through mailers, advertisements in local print media, local cable channels, and local radio stations.

3.1.3. Programs in schools, businesses, community associations, etc.

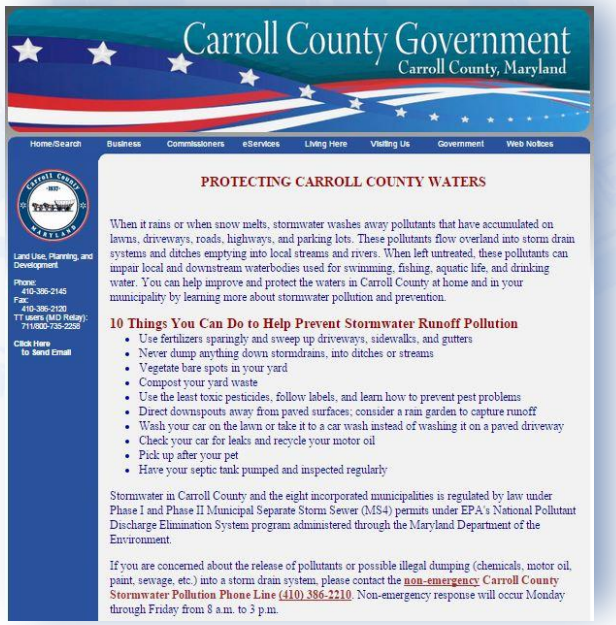
Carroll County DPW Recycling staff coordinates closely with Carroll County Public Schools (CCPS) and Carroll Community College to address the requirements of House Bill 1290 – Environment – Recycling – Public School Plans (2009) to implement a strategy for collecting, processing, marketing, and disposing of recyclable materials from its public schools. Single-stream recycling was implemented at the schools, as with the residential community. Various types of collection containers are available throughout the schools. The Carroll County Board of Education is responsible for the administration of the program in all publicly funded schools, and contracts for trash and recycling services. Annual evaluations by the CCPS assess the collection and marketing program.

Additionally, County Recycling staff partners with the Carroll County Public Schools STEM (Science, Technology, Engineering, & Math) programs each year to educate and engage students, usually in elementary school, on issues related to recycling that coincide with the curriculum. Information related to recycling in the schools can be found on the County's Recycling webpage at http://ccgovernment.carr.org/ccg/recycle/school.asp.

3.2. Management Programs, Public Education: General Public

The County's/municipalities' permit requires continued implementation of a public education and outreach program to reduce stormwater pollutants (PART VI.D.6.). Outreach efforts may be integrated with other aspects of the County and municipal activities. These efforts are to be documented and summarized in each annual report. Specific performance goals and deadlines must be implemented to inform the general public about the benefits of:

- Increasing water conservation;
- Residential and community stormwater management implementation and facility maintenance;
- Proper erosion and sediment control practices;
- Increasing proper disposal of household hazardous waste;
- 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.);
- Residential car care and washing; and
- Proper pet waste management.



The permit also requires the County to maintain a compliance hotline or similar mechanism for public reporting of water quality complaints, including suspected illicit discharges, illegal dumping, and spills.

3.2.1. *Website*

Carroll County Department of Land & Resource Management hosts several webpages that provide information and materials to local residents and businesses.

A dedicated NPDES website entitled "*Protecting Carroll County Waters*" (http://ccgovernment.carr.org/ccg/plan/npdes/) under "*Living Here*" on the Carroll County Government website and home page is the primary source of information related to the NPDES MS4 permit. The webpage describes basic information regarding actions the average property owner may take to help prevent stormwater runoff pollution. The page also features a readily visible Pollution Prevention Hotline to be used for non-emergency concerns. This page also provides a list of helpful links and documents available to download, including, but not limited to, 2012 to 2014 annual reports, U.S. Environmental Protection Agency (EPA) and MDE NPDES-related websites, and educational brochures and materials.

Earth Day at Ebb Valley:

By Jon Bowman, BRM Staff

On April 23, 2015, fourth and fifth grade students from Ebb Valley Elementary School braved cool temperatures and blustery winds to participate in an ambitious Earth Day event. The event was funded by a $10,759 grant from the Chesapeake Bay Trust's Outreach and Restoration program and made possible through a partnership between the Carroll County Bureau of Resource Management (BRM), Ebb Valley Elementary School, the Carroll County Outdoor School, and the Chesapeake Bay Trust.

Much of the effort and funding focused on the replacement of a rain garden near the front entrance of the school. The rain garden was meant to absorb and filter stormwater runoff from the surrounding parking lot; however, compacted soil prevented this from really happening. As a solution, BRM Watershed Restoration Engineer, Chris Heyn, designed a bioretention facility to replace the rain garden. While students were away for spring break, the rain garden was excavated and a drain pipe, stone, sand, and topsoil were installed. Heavy spring rains immediately put the new facility to the test, and it functioned perfectly. On the day of the event, students joined with stormwater experts Chris Heyn and Myron Frock to plant native shrubs and plants in the bioretention facility and spread mulch as the finishing touch. The plants will absorb some water and nutrients that come into the facility, and once established, they will provide food and habitat for birds, butterflies, and other insects.

In addition to the bioretention facility planting activity, fourth grade students also experienced three other stations led by BRM staff. At the forestry station, BRM staff members Jon Bowman, Theresa Amoss, Janet O'Meara, and Gale Engles had the students ponder the many benefits that trees provide. Specifically, they talked about trees cleaning the air, cooling stream temperatures, filtering stormwater, feeding and sheltering wildlife, and shading buildings and outdoor spaces. The students were able to get a hands on experience by planting 18 native trees on the school grounds. At the second station, Water Resource staff Byron Madigan, Tracy Eberhard, Rob Flora, and Pat Page led the students in an examination of a nearby stream. The students netted fish and macroinvertebrates (small aquatic insect larvae) and used charts to identify them. The staff explained how the organisms provide valuable information about the quality of the water in the stream. At the last station, staff members Martin Covington and Pat Varga taught the students that when rain falls on rooftops, parking lots, and other impervious surfaces, it runs off as stormwater and must be managed. Together, the students walked around a nearby stormwater management basin and learned about the various components. Students were shown the outfall where water leaves the basin and enters a stream. Through show and tell, students were able to understand how managing stormwater improves the water quality in the stream and protects the stream banks from being eroded. Later, the students were given educational materials and homeowner tips for them to take home to their families.

While the fourth graders went station to station, Outdoor School teacher, Joe Stevens, led fifth graders around the school grounds in a roving exploration of bird habitat and biodiversity. Ultimately all students were given unique insight into the natural resources right outside their school's front door. Also, they were taught about the planning and facilities that are put in place to protect those resources. Maybe the best thing about the event was observed by Ebb Valley Elementary fourth grade teacher, Dolly Mersinger, who said, "The children got to see the 'real work' of people in engineering, forestry, land management, and water management. This will no doubt create thoughts in their minds of possible career paths in the future."

Source: *down to earth* newsletter, Summer 2015, CC BRM

The NPDES webpage housed under the *Bureau of Resource Management* website describes some of the basic permit requirements and terms, provides the same basic pollution prevention information found on the Protecting Carroll County Waters webpage, and provides another location at which the public can access the 2012 to 2014 annual reports. (http://ccgovernment.carr.org/ccg/resmgmt/)

The *Bureau of Resource Management* website provides a webpage with further information regarding the County and municipalities' stormwater program and County and municipal contacts. Educational materials for both kids and homeowners are available for viewing or download. The Best Management Practices (BMP) webpage describes the various agricultural and urban BMPs. Copies of the Bureau's quarterly newsletter, *down to earth*, includes educational information and reporting on stormwater activities and program implementation. (See an excerpt from newsletter on Page 15). The Stormwater Pollution Prevention Hotline and emergency numbers are also available on this website as well.

3.2.2. Events

In Carroll County, staff is continuously involved in environmental education efforts. LRM staff regularly volunteer to speak at schools, community organizations, club meetings, and other venues in an effort to ensure that good and timely environmental information is available to the community.

Staff partners with the Carroll County Public Schools' elementary and science programs each year to educate and engage fourth and fifth grade students on issues related to water quality that coincide with the curriculum. Sessions are provided on topics such as biological/stream health, stormwater, and the importance and benefits of tree planting.

The number of specific public education venues increased during FY 2014, which provided additional opportunities to distribute information related to stormwater management, water quality, and other various environmental issues. FY 2014 events included:

- Wakefield Valley Golf Course Tree Planting (Westminster)
- Envirothon Aquatic Education (High School Level) (2X)
- Earth Day with Piney Run Elementary 5th Grade re: Watershed Modeling and Assessment (2X)
- Charlotte's Quest Nature Center Spring Fest (Manchester)
- Cherry Branch Stream Buffer Planting (Union Bridge)
- Westminster Flower & Jazz Festival (Westminster)
- East Middle School "Engineering is Environmental" (Westminster)
- Baltimore City's Liberty Reservoir Day

3.2.3. Media

The County actively utilizes cable TV resources to place public service information on the television.

3.2.4. Hotline

Individuals are encouraged to report any evidence of illicit discharge or illegal dumping. Citizens can call the non-emergency

Carroll County stormwater pollution phone line (hotline) at 410-386-2210.

3.2.5. Contractors & Developers

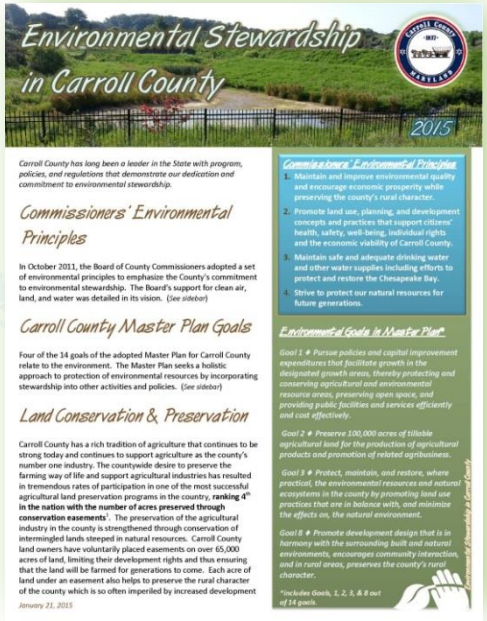
Carroll County regularly informs contractors of their responsibility to secure an NPDES permit at construction sites. In addition, development review applicants are informed of the applicability of any state or federal permit to their project or facility.

3.2.6. Councils

Carroll County continues to provide an open forum on environmental issues and concerns through its **Environmental Advisory Council** (EAC). This Commissioner-appointed citizen board holds monthly meetings, which are open to the public. The EAC functions at the direction of the Carroll County Board of Commissioners; works cooperatively with County environmental staff to research environmental policy issues; advises the Board of County Commissioners on environmental issues; fosters environmental education; and generally acts in the best interest of County residents by promoting effective environmental protection and management principles. The EAC also serves as the County's Tree Commission.

In its role to promote environmental awareness and outreach, every other year, the EAC accepts nominations for Environmental Awareness Awards. Winners are recognized in a joint ceremony with the Board of County Commissioners, in the press, and on the EAC's website.

Since 2014, the **EAC** annually prepares a Carroll County **Environmental Stewardship booklet**, which is made available on the website, as well as provided at various venues. The booklet describes various efforts and initiatives undertaken by the County to demonstrate environmental stewardship and protection, including stormwater mitigation and management projects and progress.


Environmental Stewardship in Carroll County

2015

Carroll County has long been a leader in the State with program, policies, and regulations that demonstrate our dedication and commitment to environmental stewardship.

Commissioners' Environmental Principles

In October 2011, the Board of County Commissioners adopted a set of environmental principles to emphasize the County's commitment to environmental stewardship. The Board's support for clean air, land, and water was detailed in its vision. (See sidebar)

Carroll County Master Plan Goals

Four of the 14 goals of the adopted Master Plan for Carroll County relate to the environment. The Master Plan seeks a holistic approach to protection of environmental resources by incorporating stewardship into other activities and policies. (See sidebar)

Land Conservation & Preservation

Carroll County has a rich tradition of agriculture that continues to be strong today and continues to support agriculture as the county's number one industry. The countywide desire to preserve the farming way of life and support agricultural industries has resulted in tremendous rates of participation in one of the most successful agricultural land preservation programs in the country, **ranking 4th in the nation with the number of acres preserved through conservation easements**[1]. The preservation of the agricultural industry in the county is strengthened through conservation of intermingled lands steeped in natural resources. Carroll County land owners have voluntarily placed easements on over 65,000 acres of land, limiting their development rights and thus ensuring that the land will be farmed for generations to come. Each acre of land under an easement also helps to preserve the rural character of the county which is so often imperiled by increased development

January 21, 2015

Commissioners' Environmental Principles

1. Maintain and improve environmental quality and encourage economic prosperity while preserving the county's rural character.
2. Promote land use, planning, and development concepts and practices that support citizens' health, safety, well-being, individual rights and the economic viability of Carroll County.
3. Maintain safe and adequate drinking water and other water supplies including efforts to protect and restore the Chesapeake Bay.
4. Strive to protect our natural resources for future generations.

Environmental Goals in Master Plan*

Goal 1 ♦ Pursue policies and capital improvement expenditures that facilitate growth in the designated growth areas, thereby protecting and conserving agricultural and environmental resource areas, preserving open space, and providing public facilities and services efficiently and cost effectively.

Goal 2 ♦ Preserve 100,000 acres of tillable agricultural land for the production of agricultural products and promotion of related agribusiness.

Goal 5 ♦ Protect, maintain, and restore, where practical, the environmental resources and natural ecosystems in the county by promoting land use practices that are in balance with, and minimize the effects on, the natural environment.

Goal 8 ♦ Promote development design that is in harmony with the surrounding built and natural environments, encourages community interaction, and in rural areas, preserves the county's rural character.

*Includes Goals, 1, 2, 5, & 8 out of 14 goals.

The **Water Resource Coordination Council** (WRCC) was formed in 2007 through a cooperative partnership between the County, the eight municipalities, and the Carroll County Health Department by a formal joint resolution to discuss and address issues related to water resources. The WRCC discusses and collaborates on pertinent issues related to water, wastewater, and stormwater management. The monthly meetings, which are open to the public, provide an excellent venue for members to coordinate on various current issues. The WRCC discusses NPDES technical and administrative issues on a regular basis.

WRCC took the lead in coordinating and developing a joint Water Resources Element, which was adopted by the County and seven municipalities. The WRCC serves as the local Watershed Implementation Plan (WIP) team for the development and implementation of Maryland's Phase II WIP and continues in this role to address WIP issues and tasks as they arise.

In FY 2013 and 2014, they collaborated to develop, sign, and implement a Memorandum of Agreement to cost-share the capital costs of meeting the municipalities' stormwater mitigation requirements, for the County to continue to provide administrative and operating support services for the stormwater mitigation program, and for the WRCC to act as the forum for setting project priorities.

Also during this time, members of the WRCC participated on a Stormwater Fee Advisory Group to review and make recommendations regarding how a fee could be implemented as a result of House Bill 987 – Watershed Protection and Restoration Program. The Board chose not to adopt a fee.

3.3. Management Programs, Public Education: Regulated Community

The County's/municipalities' permit also requires (PART IV.D.6.) continued implementation of a public education and outreach program to reduce stormwater pollutants through providing information regarding the following water quality issues to the regulated community when requested:

- NPDES permitting requirements;
- Pollution prevention plan development;
- Proper housekeeping; and
- Spill prevention and response.

The website entitled "*Protecting Carroll County Waters*" (http://ccgovernment.carr.org/ccg/plan/npdes/) includes resources related to the regulated community. Each municipality provides a link from its website to this webpage. In addition to the information and materials described above under Public Education for the General Public, brochures are available describing good housekeeping practices applicable to specific type of businesses that tend to have more opportunities for illicit discharges.

In connection with discharge complaints, facilities suspected of needing to secure an NPDES permit or other permit not administered by the County are referred to the applicable agency for investigation.

3.4. Restoration Plans and TMDLs, Public Participation

According to the permit (PART IV.E.3.), Carroll 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. Carroll County shall provide:

- Notice in local newspaper and County's website outlining how public may obtain information on development of watershed assessments and stormwater watershed restoration plans and opportunities for comment
- Procedures for providing copies of watershed assessments and stormwater watershed restoration plans to interested parties upon request
- A minimum 30-day comment period before finalizing watershed assessments and stormwater watershed restoration plans
- A summary in each annual report of how the County addressed, or will address, any material comment received from the public

The process to develop a restoration plan is divided into two main components – the watershed assessment and the restoration plan. The watershed assessment is completed and the results compiled in a stream corridor assessment. This document then provides a basis for the development of an iterative plan that describes measures that could be taken to improve water quality and the health of the stream corridor – the restoration plan.

For each 8-digit watershed that lies either wholly or partially within Carroll County, a **watershed assessment** either has been or will be completed. Through the assessment, the general condition of a stream system can be quickly assessed and measures identified to improve the overall health of the drainage network. Maryland Department of Natural Resources' (DNR) **stream corridor assessment** tool is used to assess a 50-foot corridor on either side of the stream.

At the beginning of the process, every property owner whose property is crossed by a stream is mailed details regarding the assessment and what it involves. Property owners are requested to respond by returning a postcard to indicate if they will voluntarily participate by allowing access to their property. Many property owners even participate in the actual stream walk with staff. Staff employs additional means to contact property owners who haven't responded, but may be able to fill important gaps in the corridor. As of June 2015, due to the cooperation of landowners (588 of 948 landowners or 62%), staff overall achieved assessment in 7 of the 9 major watershed basins within the county.

The conditions found during the watershed assessment are summarized in a "stream corridor assessment" document. It provides a general summary of the conditions found, including

A **Stream Corridor Assessment** is a tool developed by the Maryland Department of Natural Resources to efficiently assess the general condition and health of a stream system and identify the location of common environmental concerns to improve the overall health of the drainage network.

This assessment identifies stream impairments, such as stream bank erosion, less than adequate streamside buffer, trash dumps, pipe outfalls, exposed pipes, channel alteration, in-stream construction, and fish blockages. After identification, the impairments are assessed based on three factors – the severity of the problem, the accessibility of the location, and the complexity of the modification process.

erosion, buffer type/width, etc., as well as related statistics. The stream corridor assessment is made available to view or download on the website under "Watersheds" or by clicking directly on the watershed of interest on the map. (http://ccgovernment.carr.org/ccg/resmgmt/)

Owners of property that has been found to have inadequate buffers are sent a letter encouraging them to participate in the County's Stream Buffer Initiative. This initiative is completely voluntary; participating landowners must be willing to grant access to their property for ground preparation, planting, and maintenance of the planting. During the planning phase, staff meets with interested landowners to discuss potential planting areas. Landowners are provided with a native tree species list, which allows them to select the native trees they prefer to be planted on their property. Establishing streamside buffers offers many benefits, including sediment filtration, excess nutrient removal, stream bank stabilization, temperature regulation, and wildlife corridor establishment, as well as one-on-one educational opportunities.

Once the watershed assessment and subsequent stream corridor assessment is complete, staff develops a **restoration plan** to indicate the activities and measures that could be taken to help improve water quality and the health of the stream corridor. A draft of the completed restoration plan is submitted to MDE for review and comment. The draft is finalized upon notification from MDE that the plan is adequate. Once a restoration plan is finalized, it will be available on the Resource Management website.

In 2014, assessment work focused on two major watersheds – Conewago Creek and Lower Monocacy. Fifty-two percent of property owners granted permission to perform the stream walk. As a result, staff accomplished assessments on roughly 21 of the 41 miles (51%) of stream corridor within these watersheds. The 2015 assessment focused on the Upper Monocacy Watershed. Property owners granted permission for access to 67 of the 133 stream miles (50%). Due to the cooperation of private

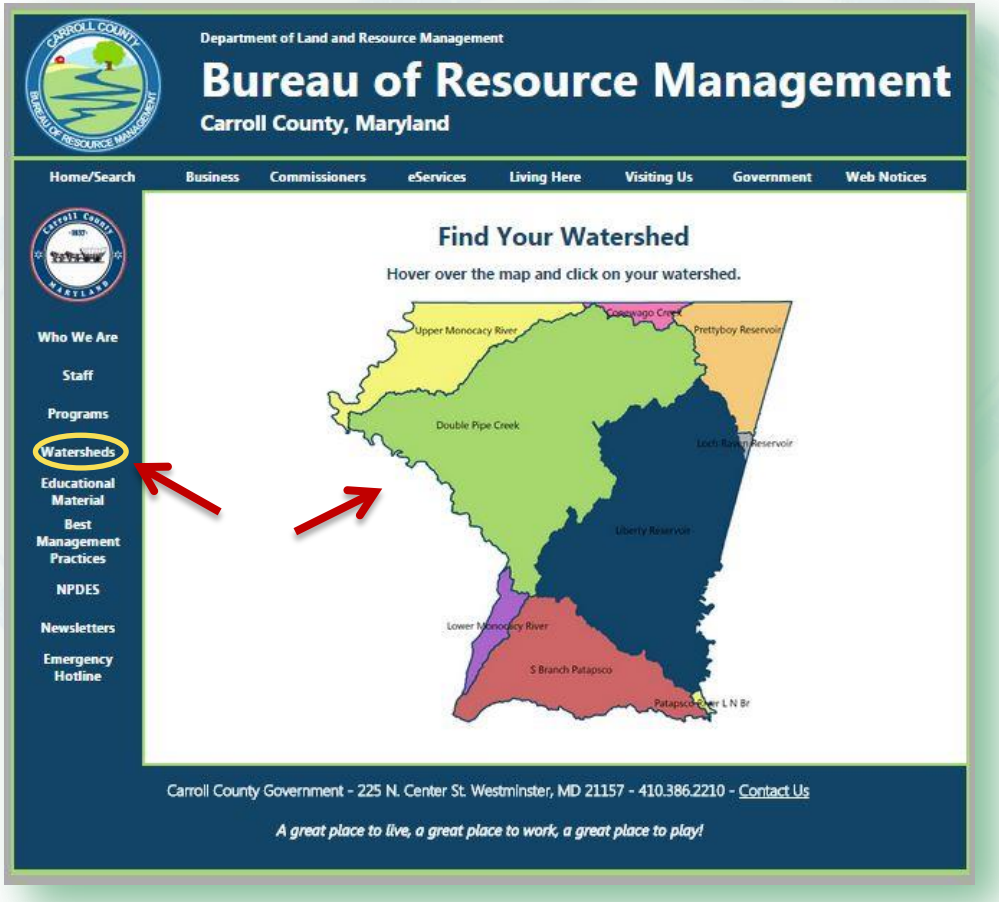
The **Stream Buffer Initiative** was developed by the Bureau of Resource Management to identify and remediate inadequate streamside buffers located on private properties within the county's watersheds. Inadequate buffers are identified through the Stream Corridor Assessment (SCA) conducted as part of the watershed assessment performed by staff in an attempt to ultimately protect streams from unmanaged runoff.

The benefits of establishing streamside buffers include sediment filtration, excess nutrient removal, stream bank stabilization, temperature regulation, and wildlife corridor establishment.

During the planning period, Resource Management staff meet with interested landowners to review tree planting options for the property that include planting locations, species preference, and potential short- and long-term outcomes. Landowners, who voluntarily participate in the initiative, then grant property access for site preparation, planting, tri-annual maintenance, and long-term maintenance inspections of these plantings.

landowners, as of June 2015, watershed assessments were achieved in 7 of the 9 watershed basins with the County, addressing over 585 of the 953 stream miles within these 7 watersheds.

For information regarding each individual watershed, please visit the Resource Management website at http://ccgovernment.carr.org/ccg/resmgmt/ and click on "Watersheds" on the left side of the page or click on the watershed of interest on the map.



CHAPTER 4: FACTORS INFLUENCING SUCCESS *(OR CHALLENGES)*

4. FACTORS INFLUENCING SUCCESS *(OR CHALLENGES)*

4.1. Misinformation, Perception, Convenience

People have varying understanding of, and priorities related to, issues surrounding water quality and stormwater. With the busy lives people lead, many people may not even realize that their actions impact water quality, both in local streams and waterways, and ultimately the Chesapeake Bay. Once people understand the importance of stormwater as it relates to water quality and the benefits that their individual actions can produce, they often are motivated to make adjustments that can improve water quality.

Other times, it is simply a matter of misinformation that creates a barrier to individual action. However, general perception is reality for most people. Providing information that changes their perceptions helps to motivate change or new actions.

Habit and convenience are also factors in influencing people's willingness to modify or engage in new behaviors that will make a difference. Once again, the right information and delivery may encourage people to make changes that will improve their individual impact to water quality.

http://www.dothedreamvdi.org/en_US/blog/heres-a-great-strategic-plan-for-overcoming-any-challenge, July 2, 105/

CHAPTER 5: TARGET AUDIENCES

5. TARGET AUDIENCES

To ensure the greatest efficiency of effort and impact of changes in people's activities that might affect stormwater pollution and prevention, identifying target audiences will help the County and municipalities to achieve the goals and comply with the permit more effectively. The target audiences are those groups of people to reach with the outreach messages.

The permit requires the County to address certain issues in its public outreach campaign that necessitate a very broad target audience. However, where possible, messages need to be tailored to more specific target audiences. The message, or type of information to be provided, may be different for each group, and the tools to engage that audience may vary as well.

5.1. County & Municipal

The permit requirements directly require certain actions of the County and the municipalities. In addition to stormwater mitigation projects implemented to meet the restoration requirements of the permit, the County also holds individual industrial permits (12 SW) on four of its facilities – the **Maintenance Center, Carroll County Regional Airport, the Northern Landfill Resource Recovery Park, and Hoods Mill Landfill**. Hampstead, Manchester, Mount Airy, Taneytown, and Westminster each hold one or more industrial permits for individual facilities. County LRM staff is very knowledgeable regarding the technical aspects of the permit, as well as the benefits, needs, funding, and other aspects of stormwater pollution, prevention, mitigation, etc. However, it is also important for staff in other agencies within the County and municipalities, particularly Department of Public Works and those where pollution prevention may be relevant, to understand NPDES permitting requirements, pollution prevention plan development, proper housekeeping measures, and spill prevention and response.

5.2. Commercial & Industrial Community

While not all commercial and industrial properties hold their own individual permits, these properties are expected to comply with stormwater regulations and requirements regarding pollution prevention. The County's permit prohibits pollutants in stormwater discharges, as well as enforcement of corrective action for identified illicit discharges. Therefore, education regarding pollution prevention is an important requirement of the permit as well.

The permit requires the County to provide information regarding water quality issues to the regulated community when requested. The issues include the same as those that local government staff need to understand and practice: NPDES permitting

requirements, pollution prevention plan development, proper housekeeping measures, and spill prevention and response.

The County makes information available to all businesses within the county and municipalities. However, properties most at risk for illicit discharges or for which pollution prevention and good housekeeping measures are most relevant are a target audience for business outreach efforts. These businesses will impact pollution reduction and mitigation efforts the greatest and are those identified through the **source identification** section (PART IV.C.2.) of the permit. In general, the commercial and industrial types include **auto-related businesses, gas stations, industrial facilities and stormwater permit holders, restaurants and food industry, lawn and landscaping, mobile pressure washers, fleet operations, and property owners/management**.

5.3. Residents & Homeowner Associations (HOAs)

The permit requires the County to continue to implement a public outreach and education campaign and provide information to the general public about the benefits of certain measures and activities. The **general public** is a very broad audience, and many of the issues – such as water conservation and disposal of household hazardous waste – apply to the entire population. Materials and activities to address these issues will, therefore, be targeted to the residents and businesses at large.

Other issues – such as community stormwater management and facility maintenance and pet waste management – may be applicable to a subset of the population. In these cases, efforts may be focused toward certain stakeholders or interest groups where the message will most resonate and most spur resulting action. **Homeowner associations** may be targeted for outreach efforts related to residential activities, as they generally have additional avenues through which to disseminate information to their members. Information may be able to be disseminated to residents through various businesses or facilities that relate to stormwater issues, such as lawn fertilizer and pet waste.

5.4. Schools & Other Institutional Uses

The permit specifically requires that programs to reduce littering and increase recycling be promoted in schools. **School students** offer a wonderful audience to target learning opportunities that effect their interests, priorities, and actions. Students' learning often cascades into actions by the adults that surround them, both teachers and family members, as the students share what they have learned. County staff can support the students' current learning and provide field opportunities for hands-on, applied learning that coincides with their current curriculum.

Other institutional uses, such as **hospitals** and **colleges**, often reside on large areas with multiple buildings and/or parking areas. Due to their size, these uses are a target audience, but would benefit from applying the same good housekeeping measures that would be appropriate for businesses.

http://startupmywebsite.com/how-do-i-reach-my-target-audience/, July 28,

CHAPTER 6: THE MESSAGE

Engaging the Public to Elicit Action

6. THE MESSAGE

The County will focus its public outreach campaign on the issues and topics prescribed by the permit in PART IV.D.4. & 6. The varied audiences and issues may require different messages to fit different needs. In general, the County wants to convey to the target audiences that it seeks a voluntary approach to addressing potential problems and issues and implementing good housekeeping measures. The County would like to provide support to and, where appropriate, partner with the public and businesses to understand what the issues are, why they are important, their relevance to individuals and target audiences, and the benefits to implementing best management and good housekeeping measures. Assistance with voluntary compliance builds effective professional relationships and helps to minimize, for both the County and the property owner, costs and enforcement actions by MDE and/or EPA. Saving money by minimizing or avoiding these costs benefits all the County's taxpayers in the long run.

Source: http://blog.jodena.com/throw-away-megaphone/, July 2015

CHAPTER 7: THE METHOD & MEANS

Suggested Programs & Activities

7. THE METHOD & MEANS

A review of the permit requirements, goals of the public outreach plan, current programs and activities in the County's public outreach campaign, and the messages that need to be delivered help to identify the actions that can be taken to continue the program, make improvements where needed, and comply with the permit.

As described in Chapter 3 of this plan, Current Activities & Programs, the County's program currently includes extensive outreach measures. Therefore, **the County's primary efforts will be, first and foremost, to continue those current successful programs, activities, and materials**.

However, additional measures can be taken to continue to improve and round out the program to achieve the goals outlined in Chapter 2, shown below.

> ***Goal 1**: To build upon the County's current public education and outreach program and strategies with the intent of fostering a more holistic, coordinated approach that results in easier access and broader dissemination of information.*

> ***Goal 2**: To raise public awareness of stormwater pollution and prevention measures, their benefits and importance, and activities in which residents and businesses can engage to further reduce and prevent stormwater pollution and runoff.*

The suggested programs and activities that follow are grouped by the permit sections that address each topic. The activities or products suggested are those that could help improve upon existing measures if implemented. All suggested activities, if implemented, and aside from ongoing measures, would be completed within this permit period. As an iterative plan with the adaptive management framework of certain requirements within the permit, suggested actions or programs within this plan will be periodically reviewed and may be adjusted or deleted, or new measures added.

7.1. Litter & Floatables – *Public Education Program* (PART IV.D.4.)

DPW's Recycling Program addressed all three "Rs" of reducing the solid waste stream – reduce, reuse, and recycle. Related efforts address a wide range of daily residential and business activities.

Suggested Programs or Activities: Litter & Floatables					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Continue to deliver effective Reduce/Reuse/Recycle public outreach campaign.					
Take advantage of and share existing resources and initiatives available through Keep America Beautiful (KAB)	◆ Are KAB materials & initiatives shared? YES or NO	◆ Summer 2016 (initial) ◆ Ongoing	◆ DPW, Recycling	◆ Staff time	Anti-litter organization (www.kab.org)
Objective: Continue to provide educational materials related to litter.					
Develop additional materials to focus on reducing the amount of litter that reaches waterways	◆ Were materials developed? YES or NO	◆ Summer 2017	◆ LRM ◆ DPW, Recycling	◆ Staff time	Materials to be developed by LRM, reviewed by DPW before finalizing, and posted on NDPES and Recycling websites
Objective: Continue to improve and foster the Adopt-a-Road campaign.					
Update the Adopt-a-Road video on the website	◆ Video update completed? YES or NO	◆ Fall 2017	◆ DPW, Engineering ◆ Media Specialist	◆ Staff time	

LRM = Land & Resource Management; DPW = Dept. of Public Works

7.2. Public Education – *Outreach to General Public & Regulated Community to Raise Awareness* (PART IV.D.6.)

Activities and products related to the general public are applicable to the regulated community as well. (Activities and products targeted specifically to the business community can be found at Section 7.3.) Suggested activities below focus on rounding out current programs and activities and making materials and information more accessible.

Suggested Programs or Activities: General Public & Regulated Community					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Create comprehensive website that is more user-friendly and accessible.					
Restructure website to bring NPDES under one umbrella	◆ Was the website restructured? YES or NO ◆ # of hits before and after website revised	◆ Winter 2016	◆ LRM ◆ ITS	◆ Staff time	
Add materials to website to address broader range of issues and needs	◆ # of materials available on website before and after revisions	◆ Spring 2016: materials for business / industry ◆ Spring 2017: materials for homeowner ◆ Spring 2018: materials for institutional uses	◆ LRM	◆ Staff time ◆ Funds for printing	

Suggested Programs or Activities: General Public & Regulated Community					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Increase awareness of compliance hotline availability and improve access.					
Create a more prominent location on NPDES website for hotline	◆ Is hotline more visible? YES or NO	◆ Winter 2016	◆ LRM	◆ Staff time	
Explain in more detail the purpose of the hotline	◆ Was purpose of hotline added to website? YES or NO	◆ Winter 2016	◆ LRM	◆ Staff time	
Add hotline # to more informational materials	◆ # of materials displaying hotline before and after	◆ Winter 2018	◆ LRM	◆ Staff time	
Objective: Continue to offer opportunities and materials for increased public awareness and access to permit-related, water quality information.					
Conduct workshop to educate general public	◆ Was a workshop held? YES or NO	◆ Fall 2016	◆ LRM ◆ EAC	◆ Staff time ◆ Refreshments (donor)	

LRM = Land & Resource Management; ITS = Information Technology Services; EAC = Environmental Advisory Council

7.3. Public Education – *Outreach to Regulated Community to Raise Awareness* (PART IV.D.6.)

The permit requires that information related to certain water quality issues be made available when requested. Current efforts will be expanded to offer greater opportunities for outreach to businesses. The intent of these initiatives is to partner with of businesses via educational outreach efforts that support voluntary compliance based on knowledge and personal relevance.

Suggested Programs or Activities: Regulated Community					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Educate businesses about permit requirements, good housekeeping measures, and pollution prevention.					
Conduct workshop to educate businesses	◆ Was a workshop held? YES or NO	◆ Fall 2015	◆ LRM ◆ EAC	◆ Staff time ◆ Refreshments (donor)	
Create a self-inspection checklist for businesses to identify additional measures they could take	◆ Was a checklist developed? YES or NO ◆ # of businesses that have inquired about it	◆ Fall 2015	◆ LRM	◆ Staff time	
Create slide shows & associated handouts to be part of Department speakers' bureau*	◆ Were slide shows created? YES or NO ◆ # of issues addressed before and after	◆ Spring 2016	◆ LRM	◆ Staff time	Use slide show templates to "brand" NPDES public outreach efforts.
Develop additional materials to address good housekeeping measures for businesses in the target audience	◆ # of issues addressed before and after ◆ # of materials before and after	◆ Winter 2016	◆ LRM	◆ Staff time	

LRM = Land & Resource Management; EAC = Environmental Advisory Council

**Note: The speakers' bureau is a group of staff that is versed on water quality topics that may impact businesses and are available to speak to business groups upon request.*

7.4. Public Participation – *Public Participation in Restoration Plans* (PART IV.E.3.)

Landowners whose private properties have streams on them are encouraged to participate in the watershed assessment process. They are invited to participate, walk the streams with staff, and are provided a copy of the stream corridor assessment afterwards. The assessment provides a basis for developing a restoration plan for improving water quality and stream health. The suggested programs and activities below are consistent with permit requirements and are intended to create awareness and provide opportunities for public participation in the restoration plan process.

Suggested Programs or Activities: Public Participation in Restoration Plans					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Provide opportunities for public participation during the development of watershed assessments and restoration plans.					
Provide notice on the County's website outlining how public may obtain information on development of watershed assessments and opportunities for comment	◆ Were property owners notified at beginning of each watershed assessment process? YES or NO	◆ At beginning of each plan process (notice) ◆ When stream corridor assessment is complete (sent to property owners & posted online)	◆ LRM ◆ CAO	◆ Staff time ◆ Legal ad ($$)	Property owners with stream to be notified by mail. Follow up with non-respondents.
Provide notice in local newspaper and the County's website outlining how public may obtain information on development of restoration plans and opportunities for comment	◆ Was notice provided on website at beginning of each planning process? YES or NO ◆ Was notice provide in local newspaper of comment period? YES or NO	◆ At beginning of each plan process ◆ When draft is available for public comment	◆ LRM ◆ CAO	◆ Staff time ◆ Legal ad ($$)	Notice will be posted on the website at beginning of process to develop plan. Notice will be posted on website and in local newspaper when public comments to be accepted. News releases may be prepared to increase public awareness.

Suggested Programs or Activities: Public Participation in Restoration Plans					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Develop procedures for providing copies of watershed assessments and restoration plans to interested parties upon request	◆ Were procedures available? YES or NO	◆ Summer 2016	◆ LRM	◆ Staff time	Website to describe how to obtain: 1. downloading on website 2. e-mail 3. call
Provide 30-day comment period before finalizing watershed assessments and restoration plans	◆ Was 30-day comment period provided? YES or NO	◆ As draft plans are completed	◆ LRM	◆ Staff time	
Add summary in each annual report of how County addressed or will address any material comment received from public	◆ Was summary provided in annual report? YES or NO	◆ Annually	◆ LRM	◆ Staff time	Summarize substantive comments received and substantive changes made as a result.

LRM = Land & Resource Management; CAO = County Attorney's Office

7.5. Partnerships – *Special Partnerships to Promote Action, Awareness, & Recognition*

Carroll County continues its long-standing tradition of nurturing a cooperative relationship with its municipalities. Partnerships between the County and the municipalities, such as Water Resources Coordination Council (WRCC) and the joint permit status, will continue to bolster Carroll's strong public outreach efforts. Partnerships with other agencies, County boards and commissions, and the local community will provide additional avenues to reach the community with efforts to raise awareness and engage the public in actions that improve water quality.

Suggested Programs or Activities: Partnerships					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Continue to build or improve existing partnerships between the County and other entities to promote action, awareness, and recognition.					
County & Municipalities: WRCC	◆ WRCC continues to meet? YES or NO	◆ Ongoing	◆ LRM	◆ Staff time	Formed in 2007; County, munis, & Health Dept; meets monthly to discuss water resource issues; open to public
County & Municipalities: Environmental Advisory Council (EAC)	◆ EAC continues to meet? YES or NO ◆ EAC continues to provide educational materials & initiatives? YES or NO	◆ Ongoing	◆ LRM	◆ Staff time	Appointed by BCC; meets monthly to discuss environmental issues of concern to BCC; open to public; public education is one role; sponsors and coordinates workshops for stormwater outreach campaign

Suggested Programs or Activities: Partnerships					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
County & Municipalities: MS4 Memorandum of Agreement (MOA)		Ongoing	LRM	Staff time	Signed October 21, 2014, by County and all municipalities; joint permit; cooperative relationship to implement stormwater mitigation projects
LRM staff & Economic Development staff	Econ Dev provided assistance? YES or NO	Ongoing	LRM	Staff time	Work together to get word out to businesses about events and materials related to regulated community
LRM staff & DPW staff (Facilities, Roads, Solid Waste)	DPW provided needed documentation? YES or NO DPW continued Recycling public campaign? YES or NO	Ongoing	LRM	Staff time	DPW responsible for solid waste & recycling program; work together to document and summarize efforts related to permit
Public Engagement - Volunteer Opportunities: Individuals / Groups	Opportunities for public engagement available? YES or NO	Ongoing	LRM	Staff time	Tree planting opportunities, etc.

Suggested Programs or Activities: Partnerships					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Objective: Explore concept of a partnership between the County and the business community to promote action, awareness, and recognition. If the Carroll Clean Water Partnership concept moves forward…					
Develop materials for businesses to conduct in-house, self-inspection	◆ Materials developed? YES or NO	◆ Winter 2016	◆ LRM	◆ Staff time	Partner with business community for self-inspection, voluntary compliance, and implementation of good housekeeping measures. Staff provide courtesy visit for assistance. Partnership for compliance to avoid discharges.
Partner LRM staff w/ the WRCC and EAC as sponsors of CCWP, working together to comply w/ permit and provide public outreach	◆ Each party participating? YES or NO	◆ Ongoing	◆	◆ Staff time	
Seek feedback at Business Community Workshop (see 7.3) on concept	◆ Concept feedback sought & received? YES or NO	◆ Fall 2015	◆	◆ Staff time	
Develop educational materials focusing on good housekeeping measures for specific types of businesses in the target audience	◆ Materials developed? YES or NO	◆ Winter 2016	◆	◆ Staff time	$$ for design & printing of materials (~$500)

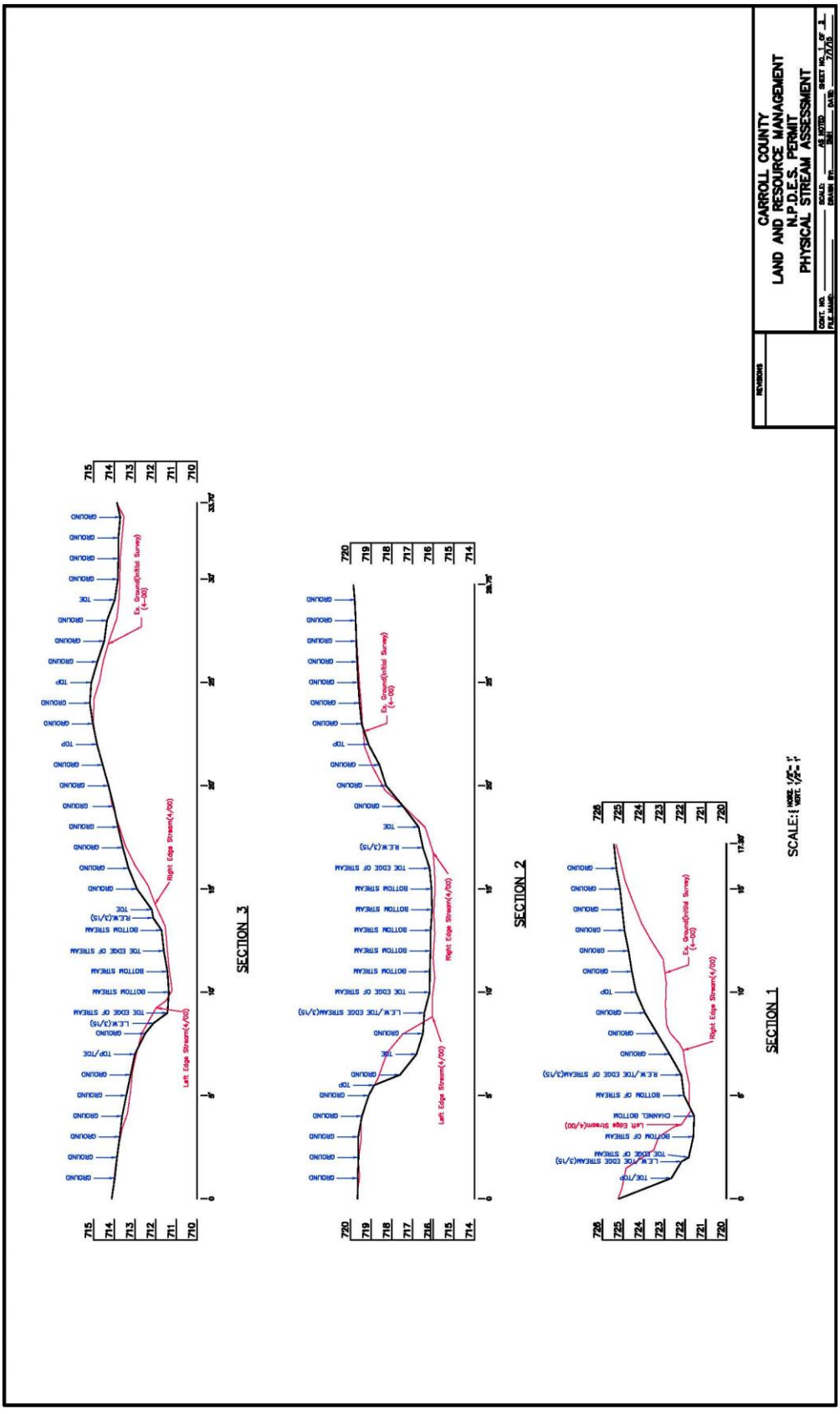
Suggested Programs or Activities: Partnerships					
Activity / Product	**Potential Evaluation Indicators**	**Time Frame / Due Date**	**Agencies Involved**	**Resources Needed**	**Status / Comments**
Develop eligibility criteria for businesses to become official "Partners"	◆ Criteria developed? YES or NO	◆ Winter 2016	◆	◆ Staff time	
Create certificates and window decals to present to official "Partners"	◆ Materials developed? YES or NO	◆ Winter 2016	◆	◆ Staff time	$$ for decals (~$375 per 20 partners)
Explore concept of expanding partnership to include residential community	◆ Concept feedback sought & received? YES or NO	◆ Fall 2016	◆	◆ Staff time	

LRM = Land & Resource Management; CAO = County Attorney's Office; DPW = Dept. of Public Works

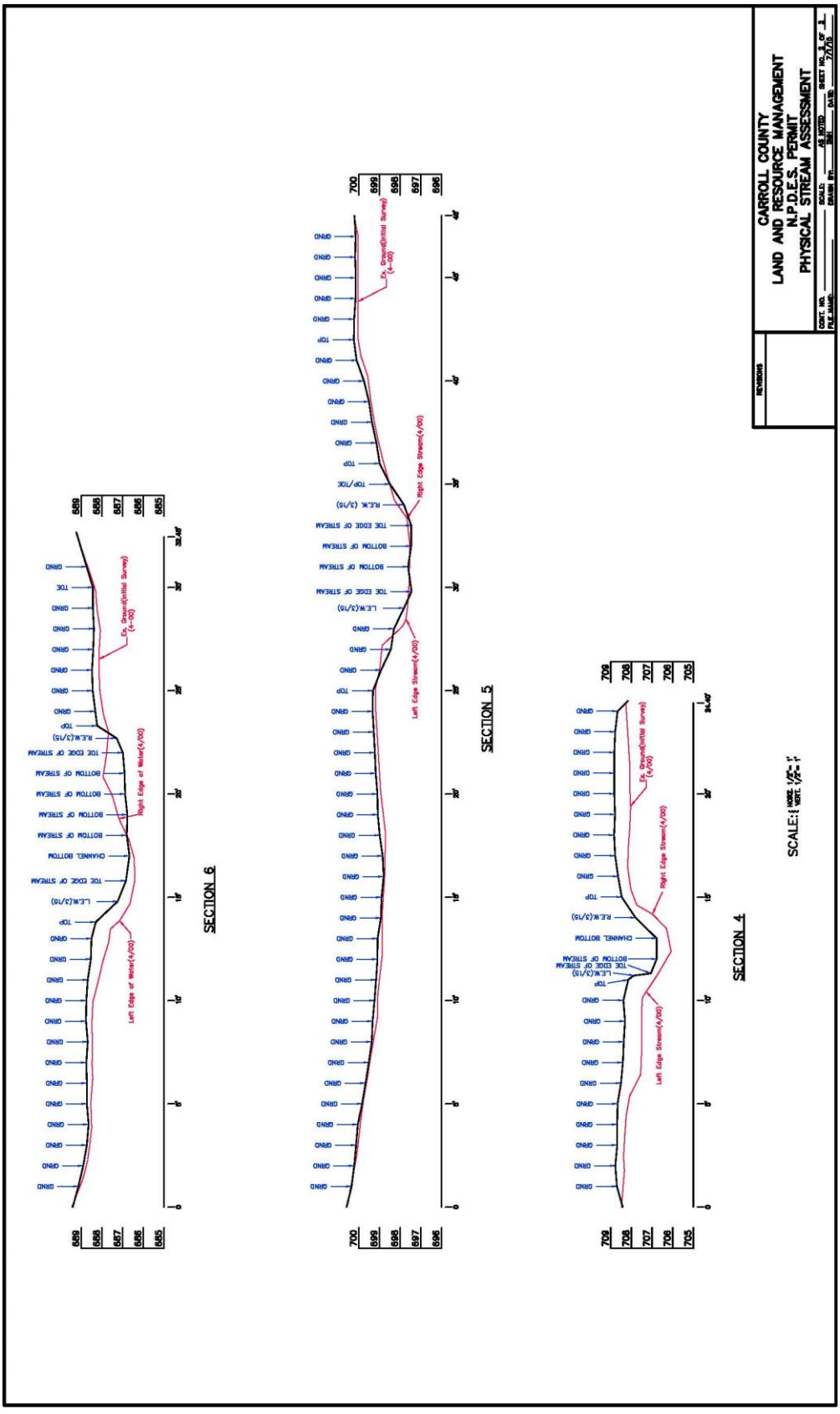
Appendix F

Monumented Cross Sections

- Physical Stream Assessment, Sections 1-6 (graphs)


CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
SECTION 3
SECTION 2
SECTION 1
SCALE: 1" = 5'
Ex. Ground(Initial Survey)
Right Edge Stream(4/00)
Left Edge Stream(4/00)
GROUND
TOE
TOP
BOTTOM STREAM
TOE EDGE OF STREAM
TOP/TOE
CHANNEL BOTTOM

Appendix F


CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
SECTION 6
SECTION 5
SECTION 4
SCALE: 1" = 5' HORZ. 1" = 5' VERT.

Appendix F

Appendix G

Macroinvertebrate Taxonomic Identification Results

- Taxonomic Identification of 2014-2015 Macroinvertebrate Results

Appendix G

Taxonomic Identification of 2014-2015 Macroinvertebrate Results

Order	Family	Taxon	Outfall	Instream
Basommatophora	Physidae	Physa		1
Coleoptera	Elmidae	Optioservus		16
Coleoptera	Elmidae	Stenelmis	15	6
Coleoptera	Ptilodactylidae	Anchytarsus		4
Diptera	Ceratopogonidae	Stilobezzia	2	
Diptera	Chironomidae	Brillia	1	1
Diptera	Chironomidae	Micropsectra	43	
Diptera	Chironomidae	Microtendipes	4	
Diptera	Chironomidae	Orthocladiinae	1	1
Diptera	Chironomidae	Orthocladius	3	
Diptera	Chironomidae	Parametriocnemus	11	4
Diptera	Chironomidae	Paraphaenocladius		1
Diptera	Chironomidae	Phaenopsectra	1	
Diptera	Chironomidae	Polypedilum		1
Diptera	Chironomidae	Rheotanytarsus		1
Diptera	Chironomidae	Stictochironomus	6	
Diptera	Chironomidae	TANYTARSINI	1	
Diptera	Chironomidae	Tanytarsus		2
Diptera	Chironomidae	Thienemannimyia Group	9	6
Diptera	Chironomidae	Tvetenia		4
Diptera	Simuliidae	Prosimulium		2
Diptera	Simuliidae	Simulium	4	
Diptera	Tipulidae	Antocha		4
Diptera	Tipulidae	TIPULIDAE		1
Ephemeroptera	Baetidae	Diphetor		3
Ephemeroptera	Heptageniidae	Maccaffertium		1
Haplotaxida	Naididae	NAIDIDAE	1	
Trichoptera	Hydropsychidae	Cheumatopsyche	8	31
Trichoptera	Hydropsychidae	Hydropsyche	4	14
Trichoptera	Philopotamidae	Chimarra	1	12
Trichoptera	Rhyacophilidae	Rhyacophila		1
Trichoptera	Uenoidae	Neophylax		7
Tubificida	Tubificidae	TUBIFICIDAE	3	
		Total Individuals	***118***	***124***
		Total Taxa	***16***	***22***