Carroll County Maryland

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

2017 ANNUAL REPORT

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Carroll County

NPDES ANNUAL REPORT

2017

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. 11-DP-3319 (MD0068331) issued for the County's municipal storm sewer systems. Permit No. 11-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 documentation under Carroll County's fourth generation permit from July 1, 2016, through June 30, 2017.

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Appendices

MDE 2016 Annual Report Assessment Response

ATTACHMENT 1

This section of the annual report addresses documentation received from the state regarding MDE's Assessment and Recommendations related to the previously submitted 2016 Annual Report; therefore, the response to comments from the assessment is focused on the reporting period July 1, 2015 to June 30, 2016. The August 31, 2017 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

Response to comments relating to inconsistencies and lack of data:

Over the past year, Carroll County has compiled the MDE requested data and populated it to the best of our ability in the MDE defined geodatabase. We have not made any changes to the MDE schema; however, we have noted many cases where there are discrepancies between the documentation and the schema. A full list of those discrepancies is included in our FY 17 Annual Report. We believe the data is now complete and all comments from the 2016 Annual Report have been addressed.

Stormwater Management

Response to comments related to MDE's triennial Stormwater Management Program review (2016):

The County is in the process of addressing the concerns voiced by MDE in the review of the program. Code changes have been approved by MDE and will be presented to the Board of County Commissioners by early 2018 at the same time the Sediment Control Code changes are requested for approval to proceed to Public Hearing.

Changes have been made to the Stormwater Management Code addressing concerns raised in relation to inspection and maintenance of underground structures. A standard operation procedure (SOP) has been put into place relating to inspecting these types of structures, and the County has purchased the equipment necessary to inspect these facilities safely.

Both structural and nonstructural practices are now in the geodatabase and are being inspected on a triennial basis.

Illicit Discharge Detection and Elimination (IDDE)

Response to comments regarding a clarity description:

Clarity values for observed flows per Attachment "A" of the permit were recorded at the time of screening and documented in our Access database file. The data was missed in the transfer to the MDE Geodatabase file in our submittal. There were no clarity issues and all data was collected. All outfall screening data including clarity will be confirmed prior to the next MDE Geodatabase submittal.

Property Management and Maintenance

Response to comments regarding herbicide use:

A Chemical Application table for Property Management and Maintenance was not included in Attachment "A" when the permit was issued. Per MDE, the MS4 Geodatabase V1.2 is to be implemented in December of 2017. All pertinent data will be provided in the geodatabase table format with the 2017 Annual Report.

The assessment of pollution reduction efforts goes beyond a numeric value in a table of total material used. There is a concern this will become the sole determinant of compliance. Will a percentage increase of total chemical used from one year to the next mean non-compliance? For herbicides there are numerous other variables to consider. It is important to acknowledge that best management practices are employed resulting in no or a more efficient use of material during maintenance activities. There is a concern that over time only the end number will be evaluated as a compliant or non-compliant measure.

Impervious Area Restoration

Response to comments regarding BMP data and buffer easements:

The geodatabase has been populated with the information required relating to BMPs; therefore, the FY 17 Annual Report reflects the necessary information to accurately calculate the treated acreage associated with our restoration efforts.

A detailed description of the forest and grass buffer easements has been added to the Water Quality Improvement Projects section of the FY 17 Annual Report. These easements have been added into the geodatabase and are placed on a triennial inspection cycle as requested.

Watershed Assessments, Restoration Plans, and TMDLs

Response to comment related to applicable WLA progress tracking:

Implementation schedule and associated load reductions were provided through the current Community Investment Program (CIP) (FY 2022), which was at the time of document submission past the end of the permit term. The County stands firm that it is fiscally not feasible to list or identify projects that haven't been vetted or approved beyond the current CIP. Pertinent information has been added to this Annual Report and will be included in future Annual Reports summarizing how work associated with meeting our local WLAs translates into actual Chesapeake Bay TMDL reductions.

Part I. Identification

A. Permit Number

11-DP-3319 (MD0068331)

B. Permit Area

This permit covers all stormwater discharges from the municipal separate storm sewer systems (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 all permittees to manage, implement, and enforce a stormwater management program (SWMP) in accordance with the Clean Water Act (CWA) and corresponding stormwater National Pollutant Discharge Elimination System (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 and its co-permittees have 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.

The County fully supports its stormwater program through strong fiscal commitments, adequate staffing resources, 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 this permit shows 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.

The U.S. Environmental Protection Agency (EPA), MDE, and the courts 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 Total Maximum Daily Load (TMDL) wasteload allocations (WLAs). The County and the municipal 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 resources 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 a 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 expectation is a very specific and substantial commitment of funds and projects that may or may not be needed to achieve WLA and TMDLs.

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. In addition the previously referenced municipal MOA also outlines specific programmatic and legal responsibilities between the County and co-permittees. 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 program administration can be found in **Appendix A**.

LRM has two dedicated positions, NPDES Compliance Specialists, assigned to the NPDES MS4 program. The NPDES Compliance Specialist positions are 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 Specialists implement certain aspects of NPDES MS4 program requirements. Key responsibilities for these positions 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;
- Conducts and coordinates illicit discharge inspection screenings and routine surveys with County/municipal personnel to discover and eliminate pollutant sources;
- Coordinates with County personnel in the design, implementation, and maintenance of the County's NPDES Geographic Information System (GIS) and MDE Geodatabase Submission applications for NPDES MS4 compliance; and
- Coordinates 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 operations, 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 environmental management of storm sewer systems.

The County/municipal joint permit eliminates political boundaries as a watershed planning consideration. Specific responsibilities related to permit reporting and support by the municipalities are outlined in the MOA. This working relationship has made compliance with the NPDES MS4 requirements more purposeful and effective. The NPDES Compliance

Specialists support each municipality in storm sewer system mapping, illicit discharge detection and elimination inspections and investigations, visual surveys, training, 12SW permit applicability, property management and maintenance practices, public education and outreach efforts, etc.

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 other specific 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	M/M
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	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	C/M	C/M
Bond	C	C	M	C	M	M	M	M
Inspection	C	C	C	C	C	M	C	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**

Source: Carroll County Bureau of Resource Management

** Review performed by / whose code*

***County assumed responsibilities associated with stormwater management in December 2015.*

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 ("County Code"). In addition, the 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 described in detail under Part 5.3 Management Programs Section of this report.

C. Source Identification

The Maryland Department of Environment published a geodatabase design (GDB) in 2015 to support reporting for municipal NPDES permits. The intent of the GDB is to provide a framework for the data required in "Attachment A" of the NPDES permits. MDE requested that if possible jurisdictions submit their Attachment A data in the new GDB format.

Over the past year, Carroll County has been migrating data from various internal data sources into the new GDB format. Carroll County will continue to work with MDE to refine the database design and perform quality assurance reviews of our data.

The County did have to make some revisions to the GDB provided by MDE to allow for the County data to be entered. Relationship classes were deleted as not all of the data is complete to support the relationships. Indices were sometimes deleted as null values in the County data did not support being loaded. Many of the not-null fields were changed to allow null values as the County data is not as complete as requested. It is anticipated that discussions with MDE regarding the relevancy of certain fields along with further quality assurance updates on the County data will lead to the County data loading clearly in the future. **Appendix G** provides documentation related to issues/concerns associated with the current GDB.

It is the mutual intent of the County and MDE to utilize the new GDB to facilitate the reporting and review of the Carroll County NPDES permit data. This transition period should be considered as a test phase and thus data conversion issues should be expected. We welcome the comments and dialogue that will develop from MDE's review of the data. We ask however that MDE keep in mind that there is a significant level of effort being expended by the County to migrate to this new format and the process is not yet complete. With the finalization of the MDE GDB schema and the ongoing cleanup of the County data, we expect that with our next permit term, the GDB will be functioning as required.

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.

1. Storm Drain System GIS Database

Carroll County maintains an inventory of storm drain infrastructure to facilitate the identification of source pollutants in stormwater runoff as required by the permit. Management of this information is implemented through the County's GIS that stores data representing the infrastructure using ArcMap 10.3 software. The GIS database has been restructured and developed by the BRM in conjunction with MDE's NPDES, MS4, Geodatabase Design, published in March, 2015 and revised May 2017. The goal of the County database design is to

meet internal recording requirements of the County, while facilitating the reporting parameters of the MDE database. Feature Classes represent graphic features in the GIS database including storm drain structures, such as pipes, inlets, outfalls, major outfalls and associated drainage areas. A new functional classification of structures includes the designation of an NPDES Study Point that includes major outfalls and other targeted outfalls monitored and screened for Illicit Discharge Detection and Elimination (IDDE) purposes. The **Appendix B** CD MS4 Geodatabase contains outfall and associated drainage area data.

2. Industrial and Commercial Sources

Carroll County maintains an inventory of industrial and commercial land uses and sites it has determined to have the potential to contribute significant pollutants as described in the previous annual report. This inventory is maintained in a geodatabase with periodic additions and subtractions based on the previous year's visual survey observations, and other MS4 permit activities.

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

The BRM manages stormwater management facility data for the County and municipalities in the new geodatabase. The geodatabase contains information related to facility location, ownership, review and approvals, drainage area, impervious area, inspections, and other potential information for the 2,152 active Best Management Practices (BMPs).

Currently, there are 955 as-built certified and approved structural stormwater facilities throughout the County and municipalities, excluding the City of Taneytown. All facilities, drainage areas, and outfalls have been mapped with associated data provided. There are 1,197 non-structural practices throughout the County with as-builts on file. The City of Taneytown reported 44 approved stormwater facilities. The City continues to review development files for as-builts having located and indexed plans for 18 facilities thus far. The City of Taneytown has 3 of the 1,197 non-structural practices within the corporate limits. They are currently working with their engineer to acquire the remaining as-builts and obtain the necessary documentation relating to these facilities.

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

4. Impervious Surfaces

An impervious surface area assessment consistent with the methods described in the MDE document *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for NPDES Stormwater Permit* (August 2014) was submitted on August 5, 2016 with a baseline of 8,317 acres of untreated impervious area. During MDE's evaluation of the revised impervious area assessment, it was noted that relevant information necessary to determine the post-2002 stormwater management treated impervious area was unavailable; therefore, MDE increased the 8,317 acres to include the 1,834 post-2002 stormwater management impervious area for a total of 10,160 acres. We are confident the geodatabase information provided in the

2017 Annual Report is sufficient to provide the information necessary to reflect the new baseline of 8,070 untreated impervious acres.

Carroll County's Fourth Generation Permit Impervious Surface Analysis (**Figure 1)** provides a breakdown of the history and future of our impervious area treatment. During our last permit term, 10 percent of untreated impervious area was required to be treated. Our baseline was based on the 6,720 acres of untreated impervious area in the County; this number did not include the municipalities (Phase II jurisdictions). Six hundred eighty-eight (688) acres of impervious area were treated during that permit term which exceeded the 672 required acres, yielding a remaining 6,032 acres of untreated impervious area.

As agreed upon with MDE, the County was permitted to work toward addressing the next 20 percent treatment requirement which was anticipated to be part of the next generation permit issued on December 29, 2014 (our current permit). In December of 2014, the County entered into a Memorandum of Agreement (MOA) with our 8 municipalities joining together as a Phase I jurisdiction on the existing permit. The untreated impervious acreage associated with the municipalities (2,038 acres) was then added to the remaining County untreated impervious areas (6,032 acres) for a new baseline of 8,070 acres.

Activities associated with treatment efforts which have been taken during this permit term are listed in **Table 11** "Listing of Watershed Restoration Efforts July 2017 NPDES". Impervious acres treated to date are 1,369 and there are projects under construction or in design, scheduled for completion in 2018 and 2019 which will treat an additional 595 acres bringing the anticipated County total for this permit to 1,964 acres, which is 122 percent of our 20 percent permit requirement of 1,614 acres.

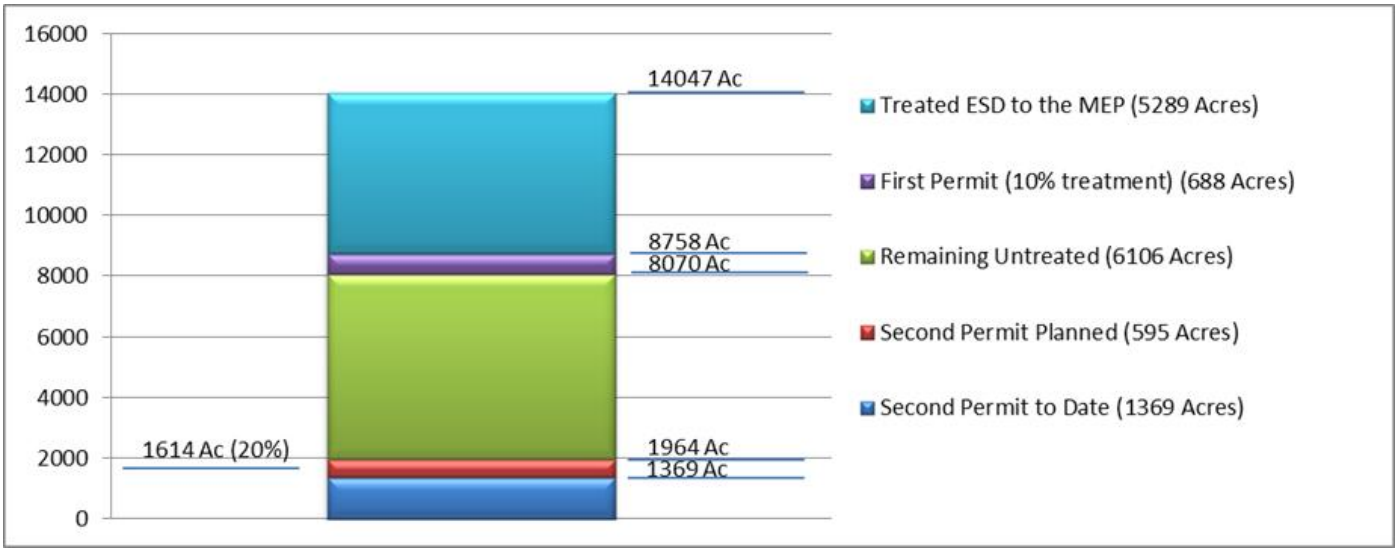


Figure 1: Carroll County Fourth Generation Permit Impervious Surface Analysis

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;
- implementing BMPs to manage existing untreated impervious areas; and
- planting stream buffers.

From July 1, 2016, through June 30, 2017, construction occurred on 3 stormwater management retrofit projects, equaling 92.02 acres of treated impervious area and 146.54 acres of treated drainage area. Six non-structural practices were installed at the Carroll County Farm Museum which totaled 3.2 acres of impervious area and 12.53 acres of drainage area and an outfall restoration project at Jenna Estates treating .5 acres of impervious area. **Table 2** provides an overview of restoration projects from 1993-2017 according to watershed. Included in our Annual Report in **Appendix F** are tables summarizing how work associated with meeting our local WLAs translates into actual Chesapeake Bay TMDL reductions.

The BRM maintains a GIS data layer for both forest and grass buffers which are portions of land acquired through the development review process in the form of a **perpetual** easement. The acquisition of stream buffer easements is directly adjacent to new development. As part of recordation, these easements are dedicated to the Board of County Commissioners and/or relevant municipalities in certain cases. As of June 30, 2017, the County holds easements on approximately 1,001 acres of forest buffer and 1,075 acres of grassed buffer.

Table 2							
Water Quality Improvements - Watershed Restoration Projects							
Permit Term	Project Name	MDE Watershed Name	Drainage Area (Acres)	Reported Impervious Area (Acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)	TSS (Tons/year)
1	1993-2005 Forest Buffer Easements	Double Pipe Creek		6.77	97.37	3.41	0.76
1	1993-2005 Grass Buffer Easements	Double Pipe Creek		18.45	222.83	11.73	2.63
				25.22	**320.20**	**15.14**	**3.39**
1	1993-2005 Forest Buffer Easements	Liberty Reservoir		81.34	1172.66	41.18	9.21
1	1993-2005 Grass Buffer Easements	Liberty Reservoir		80.50	974.82	51.31	11.49
1	Carroll County Times	Liberty Reservoir	6.6	0.50	15.00	12.16	4.49
1	Longwell County Park	Liberty Reservoir	211.2	142.80	45.00	36.48	13.47
				305.14	**2207.48**	**141.13**	**38.66**
1	Piney Run	Loch Raven Reservoir	397.04	258.07	70.20	56.91	21.01
				258.07	**70.20**	**56.91**	**21.01**
1	1993-2005 Forest Buffer Easements	Lower Monocacy		0.72	10.51	0.37	0.08
1	1993-2005 Grass Buffer Easements	Lower Monocacy		4.85	58.73	3.10	0.69
				5.57	**69.24**	**3.47**	**0.77**
1	1993-2005 Forest Buffer Easements	Prettyboy Reservoir		7.08	102.00	3.59	0.80
1	1993-2005 Grass Buffer Easements	Prettyboy Reservoir		6.79	82.40	4.35	0.97
				13.87	**184.40**	**7.94**	**1.77**
1	1993-2005 Forest Buffer Easements	S Branch Patapsco River		48.72	701.75	24.65	5.51
1	1993-2005 Grass Buffer Easements	S Branch Patapsco River		22.73	274.78	14.43	3.24
				71.45	**976.53**	**39.08**	**8.75**
1	1993-2005 Forest Buffer Easements	Upper Monocacy		2.84	40.70	1.43	0.32
1	1993-2005 Grass Buffer Easements	Upper Monocacy		6.11	73.88	3.88	0.87
				8.95	**114.58**	**5.31**	**1.19**
			Total Permit Term 1:	**688.27**	**3942.63**	**268.98**	**75.55**

Water Quality Improvements - Watershed Restoration Projects							
Permit Term	Project Name	MDE Watershed Name	Drainage Area (Acres)	Reported Impervious Area (Acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)	TSS (Tons/year)
2	2009-2017 Ag to Septic Developed	Conewago			16.20		
2	Septic Denitrification	Conewago		0.52	0.00	0.00	0.00
				0.52	**16.20**	**0.00**	**0.00**
2	2006-2017 Forest Buffer Easements	Double Pipe Creek		31.37	452.35	15.86	3.55
2	2006-2017 Grass Buffer Easements	Double Pipe Creek		50.78	614.77	32.34	7.24
2	2009-2017 Ag to Septic Developed	Double Pipe Creek			290.20		
2	2009-2017 Ag to Sewer Developed	Double Pipe Creek			1023.60		
2	2017 Inlet Cleaning	Double Pipe Creek		0.55	4.83	1.93	0.29
2	2017 Street Sweeping	Double Pipe Creek		4.11	35.27	3.92	2.63
2	Carroll County Farm Museum	Double Pipe Creek	6.44	0.50	42.83	2.34	0.46
2	Carroll County Maintenance Center	Double Pipe Creek	45.49	34.44	372.30	28.36	6.80
2	Farm Museum 1	Double Pipe Creek	11.61	2.55	87.70	5.96	1.35
2	Farm Museum 2	Double Pipe Creek	0.09	0.05	0.72	0.07	0.02
2	Farm Museum 3	Double Pipe Creek	0.79	0.06	5.26	0.29	0.06
2	Farm Museum 4	Double Pipe Creek	0.03	0.03	0.27	0.04	0.01
2	Farm Museum 5	Double Pipe Creek	0.01	0.01	0.09	0.01	0.00
2	Friendship Overlook/Diamond Hills	Double Pipe Creek	82.01	18.58	338.04	31.90	8.70
2	Septic Denitrification	Double Pipe Creek		11.18	0.00	0.00	0.00
2	Sunnyside Farms	Double Pipe Creek	30.20	3.30	128.71	13.61	3.90
2	Tree Plantings	Double Pipe Creek		20.71	388.40	18.04	2.17
				178.22	**3785.34**	**154.66**	**37.18**
2	2006-2017 Forest Buffer Easements	Liberty Reservoir		107.61	1551.45	54.41	12.19
2	2006-2017 Grass Buffer Easements	Liberty Reservoir		59.99	726.42	38.22	8.56
2	2009-2017 Ag to Septic Developed	Liberty Reservoir			1365.20		
2	2009-2017 Ag to Sewer Developed	Liberty Reservoir			746.40		
2	2017 Inlet Cleaning	Liberty Reservoir		6.89	60.28	24.11	3.62
2	2017 Street Sweeping	Liberty Reservoir		1.88	16.50	1.83	1.19
2	Bateman SWM Pond	Liberty Reservoir	47.25	6.20	324.80	20.72	4.53

Permit Term	Project Name	MDE Watershed Name	Drainage Area (Acres)	Reported Impervious Area (Acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)	TSS (Tons/year)
2	Collins Estate	Liberty Reservoir	16.34	3.90	150.01	13.68	3.66
2	Diamond Hills Section 5	Liberty Reservoir	51.80	16.27	221.10	23.48	6.74
2	Edgewood	Liberty Reservoir	38.00	16.70	314.76	24.91	6.07
2	Eldersburg Elementary School	Liberty Reservoir	1.36	1.40	7.93	1.17	0.37
2	Elderwood Village	Liberty Reservoir	7.64	3.40	73.31	7.89	2.27
2	Finksburg Industrial Park	Liberty Reservoir	67.80	22.34	266.55	29.81	8.73
2	Heritage Heights	Liberty Reservoir	21.38	4.10	98.12	8.91	2.38
2	Hickory Ridge	Liberty Reservoir	23.75	6.60	188.27	12.82	2.92
2	High Point	Liberty Reservoir	4.70	0.90	74.27	4.99	1.13
2	Marriott Wood I Facility #1	Liberty Reservoir	2.50	0.60	12.20	1.10	0.29
2	Marriott Wood I Facility #2	Liberty Reservoir	7.12	2.80	33.84	3.49	0.99
2	Marriott Wood II	Liberty Reservoir	7.51	1.90	52.74	4.60	1.20
2	Miller/Watts	Liberty Reservoir	39.65	35.24	188.87	26.61	8.39
2	Oklahoma II Foothills	Liberty Reservoir	23.72	8.10	111.08	11.01	3.06
2	Oklahoma Phase I	Liberty Reservoir	24.44	10.00	116.63	12.19	3.47
2	Quail Meadows	Liberty Reservoir	111.97	23.25	248.31	24.75	6.92
2	Septic Denitrification	Liberty Reservoir		19.24	0.00	0.00	0.00
2	Tree Plantings	Liberty Reservoir		5.43	101.86	4.73	0.57
2	Upper Patapsco Phase I - Naganna	Liberty Reservoir	24.60	13.90	121.72	14.34	4.27
2	Upper Patapsco Phase II - Hoff	Liberty Reservoir	101.80	4.10	296.46	20.32	4.55
2	Westminster Airport Pond	Liberty Reservoir	204.84	93.50	1016.16	120.37	35.91
2	Westminster Community Pond	Liberty Reservoir	250.22	87.85	1013.56	89.48	23.60
2	Westminster High School	Liberty Reservoir	117.25	44.81	562.81	63.56	18.63
2	Wilda Drive	Liberty Reservoir	6.75	1.63	27.99	2.70	0.74
				610.53	**10089.61**	**666.20**	**176.94**
2	2006-2017 Forest Buffer Easements	Loch Raven Reservoir		0.00	0.02	0.00	0.00
2	2006-2017 Grass Buffer Easements	Loch Raven Reservoir		0.32	3.82	0.20	0.04
2	2017 Inlet Cleaning	Loch Raven Reservoir		1.84	16.08	6.43	0.96
				2.16	**19.92**	**6.63**	**1.01**

Permit Term	Project Name	MDE Watershed Name	Drainage Area (Acres)	Reported Impervious Area (Acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)	TSS (Tons/year)
2	2006-2017 Forest Buffer Easements	Lower Monocacy		3.39	48.86	1.71	0.38
2	2006-2017 Grass Buffer Easements	Lower Monocacy		0.18	2.23	0.12	0.03
2	2009-2017 Ag to Septic Developed	Lower Monocacy			60.40		
2	2009-2017 Ag to Sewer Developed	Lower Monocacy			295.20		
2	2017 Inlet Cleaning	Lower Monocacy		0.15	1.29	0.52	0.08
2	Septic Denitrification	Lower Monocacy		1.04	0.00	0.00	0.00
2	Tree Plantings	Lower Monocacy		4.64	87.03	4.04	0.49
				9.40	**495.01**	**6.39**	**0.98**
2	2006-2017 Forest Buffer Easements	Patapsco River L N Br		1.15	16.53	0.58	0.13
2	2006-2017 Grass Buffer Easements	Patapsco River L N Br		0.00	0.03	0.00	0.00
				1.15	**16.56**	**0.58**	**0.13**
2	2006-2017 Forest Buffer Easements	Prettyboy Reservoir		8.98	129.37	4.53	1.02
2	2006-2017 Grass Buffer Easements	Prettyboy Reservoir		14.83	179.17	9.43	2.11
2	2009-2017 Ag to Septic Developed	Prettyboy Reservoir			122.80		
2	2009-2017 Ag to Sewer Developed	Prettyboy Reservoir			199.20		
2	2017 Inlet Cleaning	Prettyboy Reservoir		3.28	28.74	11.49	1.72
2	Hampstead Impervious Removal	Prettyboy Reservoir		0.13	0.34	0.22	0.06
2	Septic Denitrification	Prettyboy Reservoir		2.34	0.00	0.00	0.00
2	Tree Plantings	Prettyboy Reservoir		1.79	33.72	1.56	0.19
				31.35	**693.34**	**27.23**	**5.11**
2	2006-2017 Forest Buffer Easements	S Branch Patapsco River		37.68	543.47	18.99	4.27
2	2006-2017 Grass Buffer Easements	S Branch Patapsco River		21.05	254.32	13.39	3.00
2	2009-2017 Ag to Septic Developed	S Branch Patapsco River			532.20		
2	2009-2017 Ag to Sewer Developed	S Branch Patapsco River			288.00		
2	2017 Inlet Cleaning	S Branch Patapsco River		0.82	7.20	2.88	0.43
2	Arthur Ridge	S Branch Patapsco River	51.17	6.60	215.17	16.73	4.10
2	Benjamin's Claim	S Branch Patapsco River	47.10	20.55	202.60	22.04	6.39
2	Benjamin's Claim Basin B	S Branch Patapsco River	1.33	0.56	5.89	0.69	0.21

Permit Term	Project Name	MDE Watershed Name	Drainage Area (Acres)	Reported Impervious Area (Acres)	Total Nitrogen (lbs/year)	Total Phosphorus (lbs/year)	TSS (Tons/year)
2	Braddock Manor West	S Branch Patapsco River	49.30	10.52	222.86	19.12	4.95
2	Brimfield	S Branch Patapsco River	34.69	12.60	306.14	28.87	7.48
2	Carrolltowne 2A Gemini Drive	S Branch Patapsco River	87.73	47.26	385.30	44.54	13.20
2	Carrolltowne 2B	S Branch Patapsco River	34.61	14.27	146.96	15.36	4.38
2	Chung	S Branch Patapsco River	102.93	10.00	0.00	0.00	0.00
2	Clipper Hills - Gardenia	S Branch Patapsco River	33.19	15.24	142.71	15.51	4.49
2	Clipper Hills - Hilltop	S Branch Patapsco River	80.17	25.49	186.48	19.62	5.61
2	Eldersburg Estates 3-5	S Branch Patapsco River	34.91	11.22	144.57	13.89	3.82
2	Harvest Farms 1A	S Branch Patapsco River	43.80	11.25	183.02	18.13	5.05
2	Jenna Estates	S Branch Patapsco River	15.35	0.50	0.00	0.00	0.00
2	Parrish Park	S Branch Patapsco River	94.23	18.20	391.20	35.47	9.48
2	Septic Denitrification	S Branch Patapsco River		7.02	0.00	0.00	0.00
2	South Carroll High School	S Branch Patapsco River	24.22	12.90	220.41	21.09	5.45
2	Tree Plantings	S Branch Patapsco River		5.73	107.00	4.99	0.60
2	Winfield Fire Department	S Branch Patapsco River	0.22	0.20	20.79	1.13	0.23
				289.66	**4506.29**	**312.44**	**83.12**
2	2006-2017 Forest Buffer Easements	Upper Monocacy		2.78	40.23	1.43	0.32
2	2006-2017 Grass Buffer Easements	Upper Monocacy		3.75	45.29	2.38	0.53
2	2009-2017 Ag to Septic Developed	Upper Monocacy			67.40		
2	2009-2017 Ag to Sewer Developed	Upper Monocacy			38.40		
2	2017 Inlet Cleaning	Upper Monocacy		0.03	0.29	0.11	0.02
2	Septic Denitrification	Upper Monocacy		3.12	0.00	0.00	0.00
2	Tree Plantings	Upper Monocacy		10.67	200.22	9.30	1.12
				20.35	**391.83**	**13.22**	**1.99**
2	Septic Pumping			225.99	0.00	0.00	0.00
			Total Permit Term 2:	**1369.33**	**20014.10**	**1187.35**	**306.45**

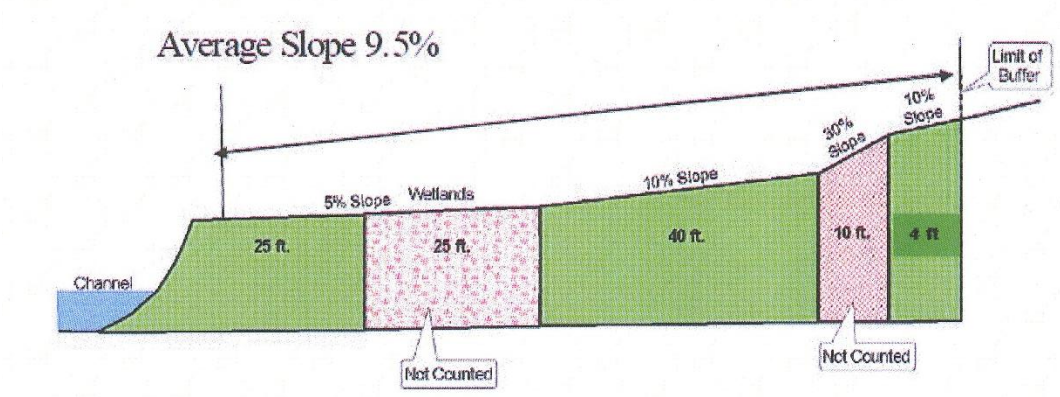
Grass and Forest Buffers

Riparian areas are important and sensitive components of the landscape because they are the transition area between the upland and the aquatic environment. Riparian buffers are the area where surface runoff, shallow groundwater flows, and subsurface flows interact and pass through unique soil and vegetation types to provide uptake and transformation of nutrients. This process has been extensively researched and documented along with the ecological benefits to temperature control, bank stability, erosion control, and leaf and limb litter for habitat and food.

While there is benefit to creating new riparian buffers, it should be recognized that using legislative methods to protect existing buffers is less expensive and more effective than creating new or restoring degraded ones. For maximum and long-term effectiveness, existing buffers should be protected from construction activities that compact the soil, urbanization practices that disrupt water flow patterns, and disruptions of the natural ecology.

Carroll County development projects that go through the subdivision or site plan development process must comply with Chapter 154, Water Resource Management, of the Carroll County Code. Included in the Code is the definition of a variable stream buffer width. The buffer is a minimum of 50 feet from each stream bank with incorporated increases based on bank slope and the presence of wetlands. The average bank slope is measured from the edge of stream to a point 100 feet from the edge of stream. Two feet of buffer are added for each one percent of slope. If wetlands or steep slopes greater than 25 percent are present, their widths are added to the buffer.

In the example below, the average slope of the bank is 9.5 percent, which corresponds to a buffer width for one side of the stream of 69 feet. (50 foot minimum + 19 feet). Since there are 25 feet of wetlands in the example and 10 feet of steep slope, the total buffer is determined to be 104 feet.



Additional water resources restrictions include a 25-ft wetland buffer and a 50-ft pond buffer around the outermost boundaries of a pond.

Carroll County projects that go through the subdivision/site plan process must also meet the requirements of Chapter 153 related to floodplains. If floodplain delineation is required by

Code, floodplains on a proposed site must be shown and any impacts to the floodplains must be shown to not create a rise in the water surface elevation.

Permanent protective easements held by the Board of County Commissioners are then established on the stream buffer areas and floodplains to ensure that riparian areas and aquatic systems are protected and function to provide their full environmental benefit. Water resources easements are established at the limits of the calculated stream buffer and other restrictions described above. Floodplain easements are established at the maximum of the floodplain width, the stream buffer, or one hundred feet from the top of the stream bank on any mapped FEMA stream. Easement restrictions, which are put in place prior to construction activity and remain in perpetuity, for both water resources and floodplain easements include:

- Disturbing the soil by filling, grading, plowing, cultivating, or other practices;
- Storing or dumping any material such as yard waste, appliances, automobiles, garbage, chemicals, pesticides, and construction debris;
- Storing, maintaining, or operating motorized vehicles except on designated roads/driveways;
- Housing, grazing, or otherwise maintaining domestic animals; and
- Cutting or clearing of trees except for maintenance of dead or damaged trees.
- Burning of vegetation.
- Excessive mowing

Existing riparian buffers provide natural nutrient reductions through filtering, vegetative uptake, and denitrification processes. However, as stated in Recommendations of the Expert Panel to Reassess Removal Rates for Riparian Forest and Grass Buffers Best Management Practices, October 2014, "Buffers that treat areas of high-nutrient loading will be more effective than those that treat run-off with low nutrient loading." By requiring the creation of permanent easements around the riparian buffers, the County is establishing a Best Management Practice as part of a treatment train for new development.

Maryland state law requires Environmental Site Design for treatment of water quality in new development. The ESD practices that are put in place have efficiency rates on the order of 70 percent, 66 percent, and 57 percent respectively for TSS, TP, and TN as per the Accounting for Stormwater Wasteload Allocations, MDE 2014. Without the existing County Codes establishing permanent easements on riparian buffers, developers and more importantly homeowners could clear these areas and maintain turf grass to stream banks. Maintaining the riparian buffers in perpetuity establishes additional treatment of the higher nutrient loads from development. Credit for this increase in treatment should be recognized in the same manner that treatment of more than one inch of rainfall in structural BMPs receives extra credit for impervious treatment.

The County tracks these easements in a GIS database that includes easement type, recordation date, development name, and file number. This information is also recorded in the MDE geodatabase Alternate BMP Polygon feature class as either Grass Buffers or Forest Buffers. As with all BMPs, the County performs tri-annual inspections to ensure that there are no infringements within the easement as per the restrictions stated above.

The legal establishment of easements ensures **perpetual preservation** of an effective management practice for water quality as well as a critical ecological environment. The documented pollutant removal and equivalent impervious treatment rates in the 2011 Accounting for Stormwater Wasteload Allocations report are fair and valid representations of the benefits of preserving these important resources.

D. Management Programs

The Environmental Inspections Services Division (EISD) of the BRM is 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 9,824 environmental inspections which included inspections other than those required in the NPDES permit.

1. Stormwater Management

The County stormwater management program is the responsibility of the BRM within LRM and implements Chapter 151 of the Carroll County Code of Public Local Laws and Ordinances. The implementation of Chapter 151 is applied to the municipalities of Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, and Union Bridge. The City of Westminster has its own approved stormwater management code, which is implemented by the County. The City of Taneytown implements an approved stormwater management code 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. Review and approval of stormwater management during the period of July 1, 2016, through June 30, 2017, consisted of 504 plans reviewed, 25 structural as-builts, and 130 non-structural as-builts approved.

Residential stormwater management facilities and storm sewer systems in unincorporated areas are owned by the County while the municipalities own the residential facilities in their respective jurisdictions. All commercial and industrial facilities in the County and municipalities 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 7 of the 8 municipalities are handled by EISD. Maintenance inspections are performed each calendar year. The following is a breakdown of the 955 structural stormwater management facilities currently being inspected: 353 will be inspected during calendar year 2018, 301 will be inspected in 2019, and 301 will be inspected in 2020. Each facility is inspected every 3 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 369 inspections this year; 307 individual facilities were inspected. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. Of those 307 facilities, 89 facilities needed corrective action and 67 were brought into

compliance as of June 30, 2017. In cases where violations still existed 22 facilities were issued Notices of Violation allowing an additional amount of time to resolve issues.

Currently, there are 1,197 non-structural practices throughout the County and 408 inspections were performed in FY 2017 on 354 practices. Sixty-six of the structures failed inspections; however, 51 were brought into compliance by the end of the permit year. The EISD Inspectors will be scheduling inspections over the next 3 years to balance out the inspections performed over the 3 year period. They anticipate at least 399 inspections between July 1, 2017 and June 30, 2018.

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 the City of Taneytown. Taneytown performs its own inspections.

City of Taneytown

Stormwater management structures and infrastructure intended for ownership by the City are inspected as constructed, typically by City staff and the City's consultant engineer. Frequency of inspections, and reports of such inspections, are determined by project specific factors. Reports, including narratives and photographs, are submitted to the 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 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 or improvements to existing water, sewer, or stormwater infrastructure, are typical of these projects. These projects follow the same construction inspection, reporting, and report retention process as other projects intended for City ownership.

Stormwater management facilities, whether ESD, structural BMPs, or other features that are intended to remain under private ownership, are inspected during construction by the developer's engineer in accordance with approved construction drawings, utilizing an 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 projects, completes a review of 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 the 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 is currently working to compile a list of as-built stormwater management plans and dates said plans were certified.

The City of Taneytown is required to inspect all public and private stormwater management facilities every 3 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, all stormwater management facilities within the City of Taneytown are

inspected on a triennial basis. The consulting engineer inspected 41 stormwater management facilities for the City between May 24, 2017, and June 8, 2017.

2. Erosion and Sediment Control

The EISD of the BRM is responsible for inspection and enforcement of erosion and sediment control in accordance with Chapter 152 of the County Code. On October 24, 2016, MDE performed the delegation review along with County personnel and the Carroll Soil Conservation District (SCD). Delegation review consisted of inspection of 8 active construction sites totaling 644 acres of earth disturbance. Results of this field audit sent to the County on March 24, 2017, found most of the sites to be in good condition and routine enforcement by the County inspection staff generally effective in gaining compliance. Of concern to MDE is the recurring issue of lack of timely stabilization, both temporary and permanent, as well as the number of plan revisions allowed as field modifications.

EISD staff is working closely with the SCD to address the number of plan revisions allowed as field modifications and will submit their recommended changes to MDE for review when they become available. Staff has discussed the stabilization concerns raised by MDE and will continue to put a high emphasis on timely stabilization.

Based on the findings of the evaluation, and the understanding that the County will work toward further improvement to its program, MDE delegated enforcement authority to the County for two more years; through June 30, 2019. MDE also determined that the County's program is in compliance with the erosion and sediment control program elements stipulated in Part IV.D.2 of its MS4 permit.

Inspection statistics relating to grading permits and inspections during the reporting timeframe are as follows: 116 grading permits were issued and 3,907 sediment control inspections were performed. All inspections are recorded with notices sent regardless of the site conditions. In 12 cases, Stop Work Orders were posted for violations, which in most instances required compliance within 36 hours. Currently, there are 2 outstanding violations moving through the enforcement process.

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 1 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. LRM performs illicit discharge monitoring, detection, and elimination and provides support 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 in this permit year.

Field screening of at least 100 outfalls annually is performed by the EISD of the BRM and NPDES Compliance Specialists. Staff participated in annual IDDE training prior to the inspection season. Current standard operating procedures (SOPs) were updated in the County's IDDE Guidance Manual and provided in the previous annual report. Screening assignments are prepared by County election district groupings and performed by EISD staff most familiar with stormwater management BMP facilities and local land use activities in these areas. Outfalls located in the 8 incorporated municipalities are inspected by an NPDES Compliance Specialist in cooperation with municipal staff most knowledgeable of their local environs.

To facilitate IDDE screening, an NPDES Study Point classification is assigned to major NPDES and other targeted outfalls that have greater illicit discharge potential, such as commercial and industrial land uses, densely populated areas, aging sewer infrastructure areas, or areas with past screening history. Outfalls with the study point designation and other outfalls are regularly evaluated and updated for relevance to facilitate a productive outfall screening program. Over 300 outfalls currently have the NPDES Study Point designation and will be inspected on a triennial basis. There were 102 outfalls screened for the permit year. Approximately 60 percent were located in the County and 40 percent were within the municipalities. Outfall screenings were distributed among 7 watersheds as follows: Prettyboy Reservoir (7), Loch Raven Reservoir (3), Liberty Reservoir (51), Patapsco River - South Branch (12), Lower Monocacy River (3), Double Pipe Creek (23), and the Upper Monocacy River (3) (see outfall screening map in **Appendix C**).

Dry weather screening found 25 outfall flows. Each outfall having a flow received a chemical field screening test for parameters defined by the permit. No outfalls were identified as having an illicit discharge. One outfall of interest was noted for follow-up observation. Deposit and maintenance comments were also recorded. The geodatabase includes the results of this year's outfall screening and can be found on CD in **Appendix B**.

Specific industrial and commercial land use areas with 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 Specialists and EISD staff receive training and review permit regulations and procedures. If significant pollutant sources of concern or an illicit discharge are discovered, the property owner is contacted by the EISD or respective municipal authority. The SOP guidelines and County Code Chapter 53 relating to enforcement measures are followed until the source is eliminated. Good housekeeping/best management practice information may be provided in person or sent to businesses with potential significant sources as a result of the visual survey process.

A total of 60 visual surveys were conducted during the permit year. No illicit discharges were discovered. Four sites were listed to receive good housekeeping/BMP information. A Visual Survey (VS) Accela database is in place and managed by the County EISD. Updating the

commercial/industrial site inventory database will be based on these observations and includes retaining 32 of the sites for future surveys while 28 sites will be removed. A number of these sites were determined to have active NPDES permits (w/pollution prevention plans) per the MDE Wastewater Interactive Search Portal, and the remaining sites had a "no-exposure" condition with regard to "significant" pollutant sources, such as commercial offices, mini-storage facilities, and vacant business space.

The MS4 permittee 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. "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 respective municipalities for elimination if an incident proves to be an illicit discharge. Fifteen illicit discharge complaints were processed during the permit reporting year. Seven were confirmed illicit discharges: 4 residential related, 2 commercial restaurants, and 1 institutional. All were resolved through voluntary compliance action. An IDDE investigation summary is located in **Appendix C** 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 3** lists the municipalities that have adopted this County Code and the responsible enforcement authority.

Table 3
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 fall for administrative and public works manager/supervisory-level personnel of pertinent County bureaus and the 8 municipalities. Average attendance during this permit term is 58. 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 recordkeeping. Many County and municipal public works staffs are trained through their respective departments to perform visual inspections of storm drain systems as they go about their workday and report potential illicit discharges to their supervisors. County and municipal staffs performing IDDE investigations and enforcement, responding to and reporting illicit discharges, dumping, spills, etc., per the permit, received training coordinated by the LRM NPDES MS4 staff. A total of 302 employees received training during the permit year covering the MS4 permit, general stormwater pollution prevention, good housekeeping/BMPs, and IDDE during the permit year.

4. Litter and Floatables

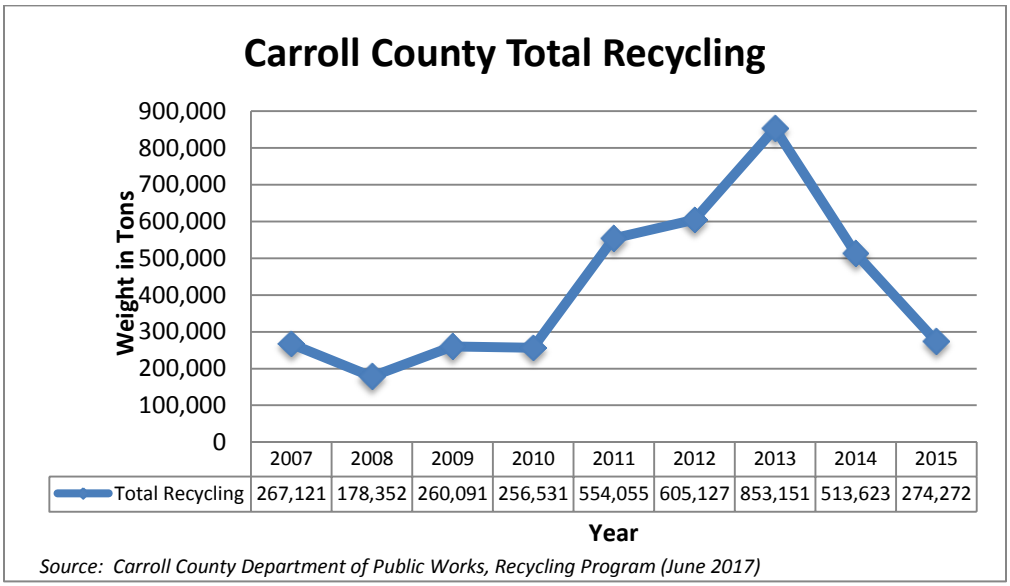
The permit requires the permittees to address problems associated with litter and floatables in waterways that adversely affect water quality. MDE is concerned with litter discharges to receiving waters and has required Carroll County to evaluate its current litter control associated with discharges from its storm drain system. The permit requires that a public outreach and education program 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. In addition no state listing or identified TMDL exists within Carroll County related to litter and floatables. Therefore, a problem with litter and floatables is not an identified concern in Carroll County, as it relates to this permit.

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

- Seven groups actively volunteer to pick up trash along an individually designated mile stretch of roadway once in the fall and once in the spring, as part of the Carroll County DPW Adopt-A-Road program. This program was initiated to control and reduce litter on Carroll County's roads and invites public, individual, and civic group volunteer participation. This program is promoted through an online video entitled, "A Cleaner Carroll" found on the Roads Operations' webpage. Equipment is provided along with safety guidelines and tips on how to pick up trash along roadways for disposal at the County's Resource Recovery Facility. Signs recognizing individual or group efforts in helping keep Carroll clean are provided by the County. Additionally, the Bureau of Facilities provides trash/ litter and recycling receptacles at facilities where they are considered practical.
- DPW staff spent 1,589 hours on roadside trash pickup in FY 2017. An additional 620 hours were spent by trustees from the Sheriff's Office picking up trash. Hours provided by the Sheriff's Office are variable depending on the trustees.
- 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 FY 2017, 58 complaints were received, and 5 sites were abated by County contractors.
- The program for the County and the municipalities includes a combination of trash receptacles along streets and in parks, litter ordinances, street sweeping, trash and recycling collection service, litter collection along roads and in public spaces, trash guards at storm drain inlets, and public education through newsletters, websites, social media, radio, television/cable, informational materials, and special events. Special events

include, but are not limited to, clean-up days with local college volunteers and Boy Scouts, festivals, and fairs.

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 2**, recycling participation in Carroll County was on the rise from 2008 to 2013. The drop in recycling from 2013 to 2014 can partially be attributable to the County's waste diversion efforts, which result in less waste to recycle. This decrease may also be partially due to the increasing costs of recycling to the companies that use the recycled materials, which, among other factors, has pushed down the market demand. 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.



Source: Carroll County Department of Public Works, Recycling Program (June 2017)

Figure 2: Total Recycling

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 add 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 plus 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. The Loading Dock offers recycling of reusable building materials 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. Several municipalities offer curbside yard waste pickup.

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. Public education materials have been created and are provided at events and on the website.

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 2014, the Maryland General Assembly passed Senate Bill 781, Environment – Recycling – Special Events. The law requires organizers of special events meeting certain criteria to provide a recycling receptacle adjacent to each trash receptacle, ensure recycling receptacles are clearly distinguished from trash receptacles, and ensure that recycled materials are collected for recycling. Special event organizers must conduct recycling in accordance with the County's Ten-Year Solid Waste Management Plan. The law also required each County to update its plan by October 2015 to address the collection and recycling of recyclable materials from special events.

In FY 2017, the County hosted several "Reduce, Reuse, Recycle!" public outreach efforts as explained below.

1. Two residential household hazardous waste drop-off events took place on October 22, 2016, and May 13, 2017. 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 compost bin sale event on April 22, 2017, to provide rain barrels and composting bins to residents at a reduced cost.

Through all recycling efforts, the County has achieved a 49.07 percent recycling waste diversion rate that includes a 5 percent source reduction credit in 2015 (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 by the Board of County Commissioners 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 (www.recyclecarroll.org). 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 Office also hosts a Facebook page for followers to receive regular information and updates.

In addition to the "Reduce, Reuse, 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.

The 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 along with its contracts for trash and recycling services.

Additionally, County Recycling staff partners with the CCPS 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. This program is available upon request by a school.

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 were raised to 20 percent or 35 percent, respectively, 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 percent) 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 3, "Carroll County MRA Recyclables," and **Figure 4,** "Carroll County Recycling & Waste Diversion Rates," demonstrate the trend in both the recycling weight and rates, respectively, in Carroll County from 2007 to 2015 (2016 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 impacted 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.

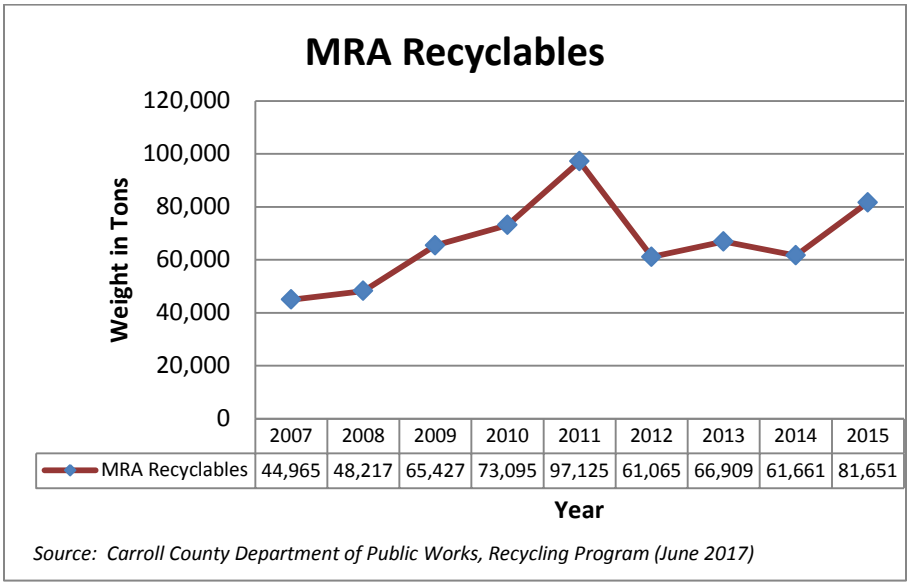
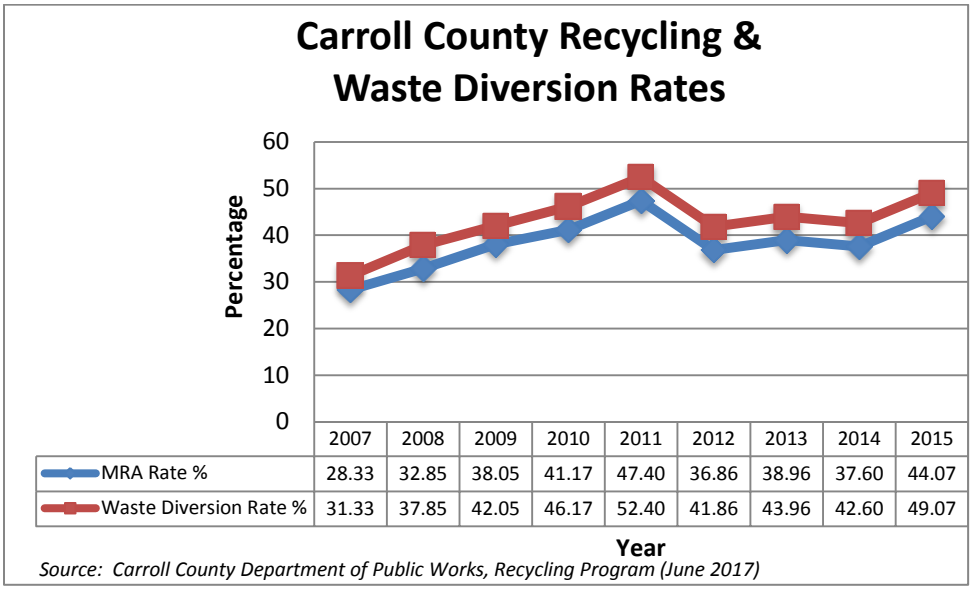


Figure 3: Carroll County MRA Recyclables

Figure 4, "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).



	2007	2008	2009	2010	2011	2012	2013	2014	2015
MRA Rate %	28.33	32.85	38.05	41.17	47.40	36.86	38.96	37.60	44.07
Waste Diversion Rate %	31.33	37.85	42.05	46.17	52.40	41.86	43.96	42.60	49.07

Source: Carroll County Department of Public Works, Recycling Program (June 2017)

Figure 4: Carroll County Recycling & Waste Diversion Rates

Non-MRA recyclables may include automobile components, construction/building materials, and other materials. The County's MRA recycling rate has decreased since 2011, which is subsequently reflected in the drop in total recycling from 2013 to 2014. However, overall, the County's total recycling still reflects an increase between 2007 and 2015 and is still meeting the 35 percent recycling rate required by the MRA (see **Figure 2).** This success continues to divert waste from the landfills. The decrease in total recycling overall from 2013 to 2014 is likely due, in part, to the County's waste diversion efforts, resulting in less available resources to recycle. The County DPW's Bureau of Roads Operations 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' webpage. 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.

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 4** lists those facilities owned by County or municipal co-permittee requiring current 12SW permit registration.

The permit also requires that the status of stormwater pollution prevention plan (SWPPP) development and implementation for each facility be reviewed, documented, and submitted to MDE annually. **Table 5** reflects each facility manager's response with respect to their facility's SWPPP status. A total of 263 employees participated in 12SW/SWPPP training at their facilities.

Table 4
Carroll County Co-Permittees – 12SW General Stormwater Industrial Permit Status

County or Municipal Owned Facility	Review Applicability	SWPPP Submitted to MDE	NOI Submittal Date	MDE REGISTRATION
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
County Northern Municipal Landfill	5/01/2014	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660
County 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 Gill Maintenance Shop	2/18/2014	Yes	June 16, 2014	MDE Registration: 07/30/14 12SW2213 / MDR002213
Manchester Public Works Maintenance Shop	12/19/2013	Yes	May 5, 2014	MDE Registration: 06/04/14 12SW2201/MDR02201
Mount Airy Public Works Maintenance Shop	3/27/2014	Yes	June 6, 2015	MDE Registration: 06/24/15 12SW2257/MDR002257
Mount Airy Public Works WWTP	3/27/2014	Yes	March 30, 2015	MDE Registration: 04/10/15 12SW2258/MDR002258
Taneytown Public Works Maintenance Facility	2/20/2014	Yes	June 16, 2014	MDE Registration: 07/17/14 12SW2263 / MDR001743
Taneytown Public Works WWTP	2/20/2014	Yes	June 16, 2014	MDE Registration: 06/26/14 12SW1743 / MDR001743
Westminster Public Works Streets Maintenance Shop	3/04/2014	Yes	March 31, 2014	MDE Registration: 06/26/14 12SW2292/MDR002292
Westminster Public Works WWTP	3/05/2014	Yes	July 3, 2014	MDE Registration: 08/14/14 12SW2252 / MDR002252
Westminster Public Works Utilities	3/07/2014	Yes	June 17, 2014	MDE Registration: 07/28/14 12SW2455 / MDR002455

Jurisdictions having facilities with 12SW permits listed in **Table 5**, are responsible for developing and maintaining their 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 routine inspections of the site include storm drain system infrastructure. Visual grab samples, personnel training, and annual evaluations continuously improve on-site pollution prevention effectiveness. Carroll County Regional Airport (CCRA) has an Oil Operations permit issued by MDE requiring the facility to implement a *Spill Prevention Control and Countermeasures Plan* (SPCC) submitted to MDE as part of the renewal application and inspection process.

Table 5
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 and Certified *Y/N*	Annual Comprehensive Evaluation Report Prepared and Posted in SWPPP *Date*
County Regional Airport	Y	Y	Y/2	10/28/16	Y	Y	9/16/16
County Maintenance Center	Y[1]	Y	Y/173	7/2016	Y[2]	Y	7/07/17
Northern Municipal Landfill	Y	Y	Y/9	12/20/16	Y	Y	10/21/16
Hoods Mill Landfill (Convenience Drop-Off)	Y	Y	Y/9	12/20/16	Y	Y	10/21/16
Hampstead – Public Works Gill Maintenance Shop	Y	Y	Y/8	12/20/16	Y	Y	12/20/16
Manchester Public Works Maintenance Shop	Y	Y	Y/5	3/29/17	Y	Y	6/20/17
Mount Airy Public Works Maintenance Shop	Y	Y	Y/3	12/1/16	Y	Y	12/1/16
Mount Airy Public Works WWTP	Y	Y	Y/2	12/1/16	Y	Y	12/1/16
Taneytown Public Works Maintenance Facility	Y	Y	Y/7	9/6/16	Y	Y	4/25/17
Taneytown Public Works WWTP	Y	Y	Y/3	9/6/16	Y	Y	4/25/17
Westminster Public Works Streets Maintenance Shop	Y	Y	Y/18	12/7/16	Y	Y	12/1/16
Westminster Public Works WTTP	Y	Y	Y/13	12/7/16	Y	Y	12/9/16
Westminster Public Works Utilities	Y	Y	Y/11	12/7/16	Y	Y	10/4/16

*Status reported by jurisdiction/facility.
[1] Update in progress.
[2] Partial grab samples completed with no prior issues. Frequency self-corrected by facility.

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. County and municipal co-permittees under the MS4 permit, in a cumulative effort, reduce pollutants thru various maintenance activities. NPDES Stormwater Pollution Prevention and IDDE training is provided annually to County and municipal manager and DPW supervisory 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 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 an equipment wash facility and park-related facilities having access roads and parking lots. The County's fleet maintenance operation includes a garage/shop, a fuel island area, fleet wash facility, and warehouse all managed and maintained by the Bureau of Fleet Management and Warehouse using applicable best management practices including auto fluid recycling. The Bureau of Roads Operations provides routine maintenance of the roads including roadside mowing, pavement patching, pavement line striping, drainage work, pipe cleaning and replacement, tree trimming and removal, storm drain maintenance and repair, and surface sealing operations for approximately 988 miles of predominantly rural open section roadways (923 miles paved/65 miles gravel), 154 bridges, and salt dome facilities. CCRA, with a 5,100-foot runway and supporting tarmac and small parking lot, is maintained by the DPW Airport Operations. Access roads and parking lots for the water and wastewater treatment plants and their small 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 maintains facilities for three natural resource-related parks, while the Department of Economic Development provides maintenance for the Carroll County Farm Museum tourism venue. See **Table 6: MS4 Permittee Reported Pollution Reduction Activities Associated with Facility Maintenance Activities** for permittee maintenance pollution reduction efforts.

Table 6
MS4 Permittee Reported Pollution Reduction Activities Associated with Facility Maintenance Activities (Parks, Roads, Parking Lots, etc.)

	Street Sweeping (1)	**Inlet Inspection and Cleaning** (1)	**Integrated Pest Management practices used to reduce the use of pesticides, herbicides, fertilizers, and other pollutants associated with vegetation management**	**Reducing use of deicing materials through research, continual testing and improvement of materials, equipment calibration, employee training, and effective decision making.**	**Ensuring staff receives adequate training in pollution prevention and good housekeeping practices**
Total MS4	✓	✓	✓	✓	✓
Carroll County	✓ Roads/Facilities (6) ✓ Solid Waste (4,5,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13,14)	✓ (3)
Hampstead	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12)	✓ (3)
Manchester	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12,13)	✓ (3)
Mount Airy	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12,13)	✓ (3)
New Windsor	✓ (6)	✓ (7,8)	✓ (2,10)	✓ (11,12)	
Sykesville	✓ (6)	✓ (8,9)	✓ (2,10)	✓ (11,12)	✓ (3)
Taneytown	✓ (3,4,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13)	✓ (3)
Union Bridge	✓ (5,6)	✓ (7,8)	✓ (2,10)	✓ (11,12)	✓ (3)
Westminster	✓ (3,4,5,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13,14,15)	✓ (3)

(1) Restoration credits applied when approved Alternative BMP parameters met.
(2) No fertilizer usage reported in vegetation maintenance practices. Herbicide usage reported.
(3) Annually
(4) Monthly
(5) Weekly
(6) As Needed – Construction, Emergencies, and after Special Events
(7) Visual/Daily Maintenance Activities
(8) As Needed - Complaints or Clogging
(9) Visual/Scheduled
(10) Mechanical control primarily used for vegetation management, ie. mowing/hand trimming, etc.
(11) Training, Research or technical Information
(12) Visual observations/effective decision making
(13) Equipment calibration
(14) Salt Brine / Pre-Treatment
(15) Dry Salt/Salt Brine Mix (lower temp activation and less bouncing off road)

Street Sweeping

Street sweeping maintenance programs are implemented in numerous municipal co-permittee urban and suburban areas covered by the permit as shown in **Table 6**. Carroll County does not have a street sweeping program for their predominantly rural open section roadways. The County Bureau of Solid Waste sweeps weekly at the Northern Landfill and monthly, and as needed, at the Hoods Mill residential drop-off facility. Approximately 1,088 linear miles of streets were swept countywide. These services are performed by a combination of County, municipal operations, and contractors. Municipal co-permittees typically prioritize road selections for street sweeping on downtown commercial business districts and higher density residential zoned areas with known heavier traffic patterns expanding out through primary

ingress and egress street routes to commercial and residential suburb areas. Street sweeping also occurs in all permittee jurisdictions as a BMP when necessary for emergency management, construction-related activities, or after special events.

Inlet Inspection and Cleaning

All permittees conduct regularly scheduled, complaint-driven, or clog-driven inlet inspections and clean-out programs. A total of 1,188 storm drain inlets were cleaned countywide through manual, vacuum, or a combination of both cleaning methods during the permit reporting year. **Table 6** shows each permittee's pollution reduction efforts associated with maintenance activities.

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

Carroll County and all co-permittees employ Integrated Pest Management (IPM) practices to reduce herbicide usage associated with vegetation management through mechanical control. The County's Bureau of Facilities, which manages over 40 properties, utilizes an IPM program resulting in efficient, minimal, and/or no usage of chemical materials in maintenance and turf management practices. No fertilizer usage for vegetation maintenance purposes was reported by all permittees for the permit year. Pollution reduction efforts at park venues managed by the Bureau of Parks only use mechanical controls for vegetation management. The CCRA facility has reduced the use of herbicides for vegetation management through increasing mechanical control methods and minimizing application area. 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. Related herbicide usage for this application is reported through MDA. Pollution reduction efforts are noted in **Table 6** and in the MS4 Geodatabase Chemical Application table.

Deicing Materials

The management of roadway deicing material distribution and applications is the responsibility of all permittees within their legal jurisdictional boundaries. Carroll County Roads Operations has installed "Limit of Maintenance" signs marking these jurisdictional lines for road crews to follow for efficient but effective salt applications for public safety.

Permittees reduce the use of winter weather deicing materials through research, continual testing and improvement of materials, equipment calibration, and/or employee training as shown in **Table 6** and the MS4 Geodatabase Chemical Application table. Research and materials, salt management, and equipment calibration are periodically covered in training. All permittee jurisdictions have been provided with a copy of the SHA's salt management program/plan and other salt management technical resources.

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 that cover 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.

The County and municipalities manage their salt storage facilities through employee training and the use of good housekeeping BMPs that include 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. In the County, the increased use of salt brine is utilized whenever feasible for pre-wetting of road surfaces in advance of winter storm events forecasted by national and local winter weather advisory sources. Snow plowing and salt application procedures are designed to limit the number of necessary passes to prevent overlapping and over usage of deicer 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 and in the most environmentally sound manner, when practicable. Gravel roads do not receive deicer applications. Stone applications are provided as needed to improve traction. Citizen information is provided on the Roads Operations' webpage 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 deicer/chemical technologies with reduced environmental impact.

Deicers 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. These actions result in the reduction of salt in solid form in everyday practice. Fewer storm events and mild conditions resulted in an approximate 45 percent reduction in deicer use for the MS4 during the permit year.

Proper management of snow and ice at 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. Additionally, keeping ahead of winter storm events through using proper mechanical practices minimizes chemical usage until conditions necessitate the use of deicers in dry form. Effective decision making with regard to deicer 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 deicers that reduce pollutants includes keeping current with industry-related technical resource bulletins and information.

Staff Training

A total of 302 employees were trained under the NPDES MS4 permit for Carroll County. Each fall an annual NPDES MS4 permit training workshop event is held for pertinent County and municipal co-permittee managerial and supervisory staff who oversee maintenance activities within their agencies or jurisdictions. The annual workshop was held on October 28, 2016 at Bear Branch Nature Center, Westminster, MD. Highlights of the training included a "BMP Exchange" presentation of maintenance programs and pollution prevention ideas by key co-permittee management and program staff and MDE 12SW inspection staff from the MDE/WMA Compliance Program.

Topics included:

- NPDES MS4 Permit Overview and Regulatory Update
- Watershed Restoration: Total Maximum Daily Loads
- MS4 Property Management and Maintenance
    - MS4 Permit Requirements
    - Source Pollutants and Municipal Activities
    - MS4 Pollution Reduction BMP "Exchange"
        - Street Sweeping
        - Inlet Inspection and Cleaning
        - Vegetation Maintenance/Integrated Pest Management
        - Winter Weather Salt Management
        - Employee Training
- 12SW Spill Prevention and Response
    - Stormwater Pollution Prevention Plan (SWPPP)
    - Spill Prevention Control and Countermeasures (Video)
- MS4 Illicit Discharge Detection and Elimination
    - Investigations and Procedures
- 12SW Industrial General Stormwater Permit
    - 12SW Regulatory Inspections

Permittees ensure their pertinent public works maintenance staffs are trained in municipal stormwater pollution prevention and good housekeeping/BMP practices, IDDE and 12SW SWPPP training for permitted facilities. Of 302 total employees trained under the Carroll County MS4 for the permit year, 279 were maintenance staff.

The Carroll County Department of Land and Resource Management created a guidance document entitled: "Carroll County MS4 Property Management and Maintenance Resource Guide, *Municipal Stormwater Pollution Prevention Guidance* for MS4 Co-Permittee Personnel" designed to provide practical user friendly resources to maintenance staff that includes both the IDDE manual and the *Carroll County MS4 Pollution Prevention Maintenance BMP Guidance Manual* for the purpose of reducing pollutants associated with municipal facilities. This overall guidance manual also includes sections on Training, 12SW Inspections/Evaluations, and Reporting. The guidance document can be found on CD under **Appendix B**.

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.

Hotline

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.

Webpages

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/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. This page also provides helpful links and documents available to download including, but not limited to, 2012 to 2016 annual reports, various EPA and MDE NPDES-related websites, and educational brochures and materials.

The NPDES webpage housed under the Bureau of Resource Management's (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 2016 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 BRM webpage describes the various agricultural and urban BMPs. Copies of the Bureau's quarterly newsletter, *Down to Earth*, are available on the webpage which include educational information and reporting on stormwater activities and program implementation. The Stormwater Pollution Prevention Hotline and emergency numbers are duplicated on this website.

The "Water Resource Coordination Council" (WRCC) webpage http://ccgovernment.carr.org/ccg/lrm/wrcc/ provides access to the resolution creating the Council. The Memorandum of Agreement (MOA) and Memorandum of Intent (MOI) prescribing the coordination between the County and municipalities are also available for download.

The Carroll County "Environmental Advisory Council" (EAC) webpage (http://ccgovernment.carr.org/ccg/eac/) provides access to materials related to stormwater pollution, TMDLs, recycling and waste reduction, and other relevant environmental topics. All presentations are posted on the webpage for public access and viewing. Reports and information related to relevant projects completed and topics discussed by the EAC are available to view as well. These include links to EAC-sponsored business and general public stormwater workshops and public education materials developed.

The webpage, "Workshop: Homeowners & Stormwater," provides information on previous and upcoming workshops designed to equip Carroll County homeowners and residents with knowledge regarding how to minimize stormwater runoff and prevent stormwater pollution from residential properties. Materials and resources related to stormwater pollution prevention and past workshop presentations are available for viewing by the public as well. (http://ccgovernment.carr.org/ccg/npdes/homeowner/)

The webpage, "Workshop: Carroll County Businesses for Clean Water," provides information on previous and upcoming workshops designed to equip Carroll County businesses with knowledge of the good housekeeping and BMPs that will protect water quality and prevent issues for these businesses in the future. Materials related to stormwater pollution prevention and past workshop presentations are available for viewing by the public as well. (http://ccgovernment.carr.org/ccg/npdes/workshop/)

The Carroll County Recycling Office hosts a webpage, entitled "Recycling," which provides extensive public education materials and opportunities (recyclecarroll.org). 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 Office also hosts a Facebook page for followers to receive regular information and updates. Public Service Announcements are periodically run on WTTR, the local radio station.

All of the municipalities host websites that include links to the relevant Carroll County webpage(s), various publications, and municipal newsletters.

Materials and Publications

All permittees provide stormwater pollution prevention materials at their municipal offices, at the Carroll County Office Building, on their websites, through social media, and at various events held throughout the year.

The "Protecting Carroll County Waters" webpage (http://ccgovernment.carr.org/ccg/npdes/) includes resources related to the regulated community. Miscellaneous information, links, and materials are available. Brochures are available that describe good housekeeping practices applicable to specific types of businesses that tend to be more vulnerable to having illicit discharges. The materials are provided at public events and workshops, available online, and provided to property owners during visual inspections and courtesy visits. The County's EAC will plan and implement another workshop for businesses in 2018.

The BRM produces a quarterly newsletter, *Down to Earth*, which is available on the website, emailed to recipients via a database of interested parties, and available in hardcopy in multiple locations. The newsletter content includes educational articles for the general public, as well as updates on stormwater projects and events and other relevant happenings.

Each municipality also produces a regular newsletter for its citizens. Municipal newsletters also periodically share event information, educational content, and other material relevant to stormwater pollution prevention. The Town of Hampstead included a several-page spread on BMPs for homeowners in its June 2017-September 2017 newsletter, which is sent to all property owners in the town.

Events

All permittees participated during the permit year in outreach efforts associated with a workshop for homeowners entitled "Homeowners & Stormwater," which was held March 18, 2017. In addition, storm drain stenciling is implemented throughout the County and is often coordinated as a volunteer or outreach event. A complete listing of specific FY 2017 events can be found in **Table 7**.

Table 7
Carroll County NPDES Phase 1 MS4 Public Outreach Events

Event	Date	Watershed(s)	Description
Chesapeake Bay Awareness Week Stormwater Tour	June 6, 2017	◆ Multiple	Tour – guided tour of local stormwater facilities. Nearly 30 participants in all-day event, including representatives from each of 8 municipalities, University of Maryland Extension Office, and Fairfax County employees. Event was open to public.
Carroll County Employee Appreciation Day	May 17, 2017	◆ Multiple	Booth – recycling materials and direct discussion w/ attendees
Carroll County Household Hazardous Waste Fall Clean-Up	May 13, 2017	◆ Multiple	The County hosted an event to allow homeowners to drop off hazardous household materials, which keeps them from being dumped down the drain on in the yard. In addition, paper shredding was offered and the shredded paper recycled.
Westminster Flower & Jazz Festival	May 13, 2017	◆ Multiple	Booth – materials and direct discussion w/ attendees
Charlotte's Quest Nature Center Spring Fest	May 7, 2017	◆ Prettyboy Reservoir ◆ Double Pipe Creek ◆ Liberty	Booth – materials, interactive stormwater pollution prevention game, and direct discussion w/ attendees. Recycling also was provided.
Sykesville Annual Spring Clean Up Day	April 29, 2017	◆ South Branch Patapsco	Stream bank cleaning
New Windsor Town Beautification Day	April 29, 2017	◆ Double Pipe Creek	Cleaned up streams of trash and stenciled inlets.
Hampstead Arbor Day Tree Planting	April 28, 2017	◆ Liberty	Tree planting at Panther Park
Rain Barrel & Composting Event	April 22, 2017	◆ Multiple	The County hosted a rain barrel and composting event to provide rain barrels and composting bins to residents at a reduced cost.
Carroll County Farm Museum Earth Day Celebration & Tree Planting	April 27, 2017	◆ Double Pipe Creek	Consisted of planting the bio retention facility, stormwater education at the Farm Museum SWM pond, tree planting along the stream (outreach to 55 Outdoor School students), micro –invertebrate education, identification to determine stream health, and tours of five newly installed stormwater management practices at the Farm Museum.
Environmental Advisory Council	April 19, 2017	◆ Multiple	Informational presentation about the County's tree planting program, forest conservation ordinance, and other tree-related activities that contribute to stormwater mitigation under the NPDES Ph 1 MS4 permit.
3rd Annual Backyard Buffers Education Day	April 8, 2017	◆ Multiple	The Carroll County Extension Service and Carroll County Forestry Board hosted a workshop to educate the public on the importance of riparian forest buffers to Chesapeake Bay health, water quality, as well, as best management practices for arranging, planting, and maintaining your seedlings.
Center for Watershed Protection's 2017 National Watershed and Stormwater Conference	April 4, 2017	◆ Multiple	The County helped to promote this conference as an educational opportunity for local residents and businesses, including a link to the conference webpage from the *Protecting Carroll County Waters* webpage.
Carroll County Seniors on the Go Expo	April 5, 2017	◆ Multiple	Booth – materials and direct discussion w/ attendees

Carroll County Home Show	April 8, 2017	◆ Multiple	Booth – materials and direct discussion w/ attendees
Homeowners & Stormwater Workshop	March 18, 2017	◆ Multiple	Workshop – ½ day workshop for public. Presentations/classes offered on 8 different topics. Exhibitors available for each topic plus additional exhibitors.
Hampstead-Manchester Business & Community Expo	March 11, 2017	◆ Multiple	Booth – materials and direct discussion w/ attendees
Carroll Arts Council Festival of Wreaths	November 25-December 4, 2017	◆ Multiple	Booth – materials and direct discussion w/ attendees
Union Bridge Boy Scouts Inlet Stenciling	October 31, 2016	◆ Double Pipe Creek	Boy Scout troop stenciled storm drain inlets.
Carroll County Household Hazardous Waste Fall Clean-Up	October 22, 2016	◆ Multiple	The County hosted an event to allow homeowners to drop off hazardous household materials, which keeps them from being dumped down the drain on in the yard. In addition, paper shredding was offered and the shredded paper recycled.
Hampstead Fall Fest	October 7-8, 2016	◆ Multiple	Booth – materials and direct discussion w/ attendees
Westminster FallFest	September 22-25, 2016	◆ Multiple	Booth – materials and direct discussion w/ attendees; Enviroscapes Watershed model provided for public education and demonstration
Sykesville Fall Festival	September 10, 2016	◆ South Branch Patapsco ◆ Liberty	Booth – materials and direct discussion w/ attendees
McDaniel Clean-Up Day	August 27, 2016	◆ Multiple	Volunteers collected trash from Dutterer SWM pond, drainage ditch along railroad track from George Street to Westminster Fire Department, and alleys along Pennsylvania Ave.
National Night Out	August 2, 2016	◆ Multiple	Booth – materials and direct discussion w/ attendees
Carroll County 4H Fair	July 30 - August 5, 2016	◆ Multiple	Booth and materials and direct discussion w/ attendees, including water quality and recycling

On June 6, 2017, staff from the BRM led a guided tour of several local stormwater management facilities. Nearly thirty individuals participated in the all-day event, including County staff, representatives from each of the County's eight municipalities, the University of Maryland Extension Office, and Fairfax County, Virginia, government employees. The stops along the tour included facilities from several areas around the County, each in varying stages of design and construction. Topics covered included engineering design, the construction process, water quality monitoring studies, and state and federal grant funding awards. A Q&A session was also held at each of the sites to provide insight on the successes and challenges faced in the management and execution of these projects. The event was also open to the public, educational in nature, and the County's way of honoring and participating in the 2nd Annual Chesapeake Bay Awareness Week celebration (https://www.allianceforthebay.org/events/chesapeake-bay-awareness-week/).

During 2016-17, the County's EAC partnered with the WRCC to develop a free public workshop designed to help equip homeowners with good housekeeping practices they can use in their homes and around their yards. Development and outreach activities began in summer 2016 and

concluded with holding the workshop, including news releases, newsletters, flyers, phone calls, website, letters, etc. The workshop was held on March 18, 2017. The EAC will partner with the WRCC again in 2019 to develop and conduct another free workshop geared to the general public.

Media and Social Media

The County engages in regular outreach efforts through media resources, such as social media, press releases, and radio.

The County actively utilizes cable TV resources to convey public service information. This may include upcoming events, presentations, good housekeeping BMPs, and other resources. In FY 2017, LRM staff, in conjunction with Carroll's Community Media Center (CMC), produced the first in a series of videos on BMPs for homeowners entitled "Stormwater Pollution Prevention for Homeowners, Part 1 – Stormwater and Homeowners". The video introduced homeowners to stormwater and why it is important. The next video will incorporate various sources of pollutants in residential yards and simple practices homeowners can employ to reduce runoff and prevent pollution. The video aired on local cable television in the spring of 2017 and is available online and at the County's social media sites, including the County's YouTube channel (https://youtu.be/jtjcuGhihL8?list=PLwx-zJZmRR9swwLZb0WMo2r-sJDQ5lZDa) and on the CD in **Appendix B**. It also was shown continuously at the Homeowners & Stormwater Public Workshop on March 18, 2017.

Appointed and Staff Groups

Carroll County continues to provide an open forum on environmental issues and concerns through the 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, generally in conjunction with Earth Day and Arbor Day.

The EAC's Carroll County Environmental Stewardship booklet, which is updated every other year, 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. The process to update the booklet began in the spring of 2017 and was completed in the summer of 2017.

The Carroll County Solid Waste Advisory Council (SWAC) was formed in 2014 by the Board of County Commissioners. The purpose of the SWAC is to provide assistance to County staff to

advance the sustainable, responsible, and cost effective practices of Solid Waste Management and Recycling in the best interests of the citizens of Carroll County and the environment. The SWAC researches and discusses issues related to solid waste and recycling and provides recommendations to the Board as requested. The SWAC meets on a regular basis, and all meetings are open to the public. Two members of the EAC sit on both councils and report the status of the SWAC initiatives regularly to the other EAC members.

In addition, the Carroll County Recycling Manager sits on the Board of Directors for the Maryland Recycling Network, which provides an additional resource to the County for public education content and influence.

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, including monthly updates on co-permittee stormwater projects.

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. The WRCC will continue to serve in this role as the MidPoint Assessment is complete and the State turns to local jurisdictions to assist with developing the Phase III WIP.

The Mount Airy Water and Sewer Commission was created to monitor all functions of the Town's water and sewer infrastructure and contribute useful research to making the system more efficient. This also includes detailed research and analysis into water and sewer operations, costs, and rates for the Town's citizens. These meetings are open to the public.

The Mount Airy Parks and Recreation Commission promotes ongoing clean-up efforts for the Rails to Trail right-of-way from the downtown area to Watkins Park, which helps to clean up the watershed.

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 of month	4th Monday of month
Sykesville	2nd & 4th Monday of month	1st Monday of month
Taneytown	2nd Monday of month	Last Monday of month
Union Bridge	4th Monday of month	3rd Thursday of month
Westminster	2nd & 4th Monday of month	2nd Thursday of month

Public Outreach Plan

The WRCC developed a Public Outreach Plan in permit year 2014-15. 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 was submitted as Appendix E of the 2015 Annual Report and is available online as well. **Table 9** indicates the activities/programs under the Public Outreach Plan objectives that have been implemented thus far.

Table 9 Public Outreach Plan Activities Implemented Under Plan Objectives			
Objective	**Activity/Program**	**Page**	**Implementation**
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)	25	This is an ongoing effort.
Continue to provide educational material related to litter	Develop additional materials to focus on reducing the amount of litter that reaches waterways	25	Separate materials for businesses and homeowners were developed and added to the following webpages: Business Workshop, Homeowner Workshop, Carroll Clean Water Partnership.
Create comprehensive website that is more user-friendly and accessible	Add materials to website to address broader range of issues and needs	26	Materials directed separately to homeowners and businesses were developed and posted to the following webpages: Homeowner Workshop, Business Workshop, Carroll Clean Water Partnership.
Increase awareness of compliance hotline availability and improve access	Create a more prominent location on NPDES website for hotline	27	The hotline is easier to see on the Protecting Carroll County Waters webpage, as it is now bold and in a different color. In addition, the hotline was added to the Bureau of Resource Management website.
	Explain in more detail the purpose of the hotline	27	The webpage explains for what to call the hotline and when an emergency should warrant a call to 911.
	Add hotline # to more informational materials	27	The hotline phone number was included on the business and homeowner outreach materials developed during this permit year.
Continue to offer opportunities and materials for increased public awareness and access to permit-related, water quality information.	Conduct workshop to education general public	27	A workshop, *Homeowners & Stormwater*, was held on March 18, 2017.
Educate businesses about permit requirements, good housekeeping measures, and pollution prevention	Conduct workshop to educate businesses	28	A workshop, *Workshop: Carroll County Businesses for Clean Water,* was held on January 5, 2016.
	Create a self-inspection checklist for businesses to identify additional measures they could take	28	A self-inspection checklist was created and provided to participants in the business workshop. The checklist was also posted to the following webpages: Business Workshop, Carroll Clean Water Partnership.
	Develop additional materials to address good housekeeping measures for businesses in the target audience	28	Materials directed to businesses were developed and posted to the following webpages: Business Workshop, Carroll Clean Water Partnership. Materials also provided on courtesy visits to businesses.

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	29	Prior to completing the assessments, notice is provided on the County's website. In addition, letters are sent to all property owners with a stream on the property to request permission to access and to invite to join. Double Pipe Creek was completed in January 2016, with letters sent October 2015. Watershed assessments and restoration plans have been completed for all watersheds.
	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.	29	Draft restoration plans were submitted to MDE for all watersheds. The County is awaiting response from MDE before posting notice of opportunity to provide comment on the documents.
Continue to build or improve existing partnerships between the County and other entities to promote action, awareness, and recognition	County & Municipalities: WRCC	31	The WRCC continues to meet on a regular basis and looks for ways to expand collaboration and education opportunities.
	County & Municipalities: EAC	31	The EAC continues to meet on a regular basis. The number of issues and projects continues to expand, as does the EAC's public education initiatives.
	County & Municipalities: MOA	32	The County and municipalities continue to work cooperatively toward meeting their collective permit obligations.
	LRM staff & DPW staff	32	DPW staff provided the needed documentation for the Annual Report and continued to implement the Recycling program.
	Public Engagement – Volunteer Opportunities: Individuals / Groups	32	Volunteers assisted with several projects this year: Homeowners & Stormwater Workshop, Farm Museum Earth Day Celebration & Tree Planting, Stormwater & Homeowners video Part 1. EAC members volunteered at the Sykesville Harvest Festival, the Mount Airy Fall Fest, and the Rain Barrel & Compost Bin Day.
Explore concept of a partnership between the County and the business community to promote action, awareness, and recognition. If Carroll Clean Water Partnership (CCWP) moves forward…	Develop materials for businesses to conduct in-house, self-inspection	33	A self-inspection checklist was created and also posted to the following webpages: Business Workshop, Carroll Clean Water Partnership. It is also provided on courtesy visits to businesses.
	Partner LRM staff w/ WRCC and EAC as sponsors of CCWP, working together to comply w/ permit and provide public outreach	33	LRM staff, WRCC, and EAC continue to work together. A CCWP website was developed and is publicly available. Two workshops have been held for public outreach.
	Seek feedback at Business Community Workshop on concept	33	Participants in the Business Workshop offered feedback through an evaluation form.

	Develop educational materials focusing on good housekeeping measures for specific types of businesses in target audience	33	Materials were developed specifically for the auto-related industry as well as the food-service industry. Materials were posted to the following webpages: Business Workshop, Carroll Clean Water Partnership.
	Develop eligibility criteria for businesses to become official "Partners"	34	Criteria were developed and attached to the self-inspection checklist.
	Create certificates and window decals to present to official "Partners"	34	Window decals for designated business "Partners" were created and are available.

Community Partnership

The Carroll Clean Water Partnership (CCWP) program was initiated in January 2016, with its kickoff at the January 5, 2016, *Workshop: Carroll County Businesses for Clean Water*. The CCWP is a cooperative effort of LRM staff, the EAC, and the WRCC. The sponsors of the CCWP hope to foster a business-friendly environment for local businesses to identify and address potential pollutants and good housekeeping measures, and, as a result, gain community recognition for "Partners" for their contribution to achieving clean water. The program aims to assist Partners with voluntary activities related to stormwater pollution prevention. Static cling window decals are provided to Partners. A webpage was developed (http://ccgovernment.carr.org/ccg/npdes/ccwp) and provides informational materials, the self-inspection checklist, event information, a list of Partners (as they are designated), and other relevant information.

Businesses start by assessing their current activities and identifying any specific actions needed to prevent pollution and improve water quality stewardship. For this assessment, a self-inspection checklist, titled "Completing Your Stormwater Pollution Prevention Self-Inspection Checklist and Action Plan," is available to guide business owners in identifying good housekeeping measures that could be implemented. This checklist then may also be used as an action plan to assist businesses in planning. A copy of the checklist is available online at http://ccgovernment.carr.org/ccg/npdes/workshop/doc/SelfInspectionChecklist.pdf?x=1496428164543. County staff is available to assist in this process if desired.

In 2016-17, staff, including municipal staff when applicable, held individual meetings with six restaurants to raise awareness of BMPs and the CCWP program. Mitigating runoff from car wash fundraisers has been a focus of business outreach as well.

Other Outreach Activities

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 CCPS Outdoor School Program each year to educate and engage sixth 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.

Carroll County Department of Recreation and Parks launched a campaign to encourage additional community involvement to help keep County parks clean. The Helping Hands Keep Parks Green initiative is modeled after similar efforts, such as Adopt-A-Road, and is designed to invest community members in the care of parks. While volunteer recreation councils already perform countless hours of maintenance related to athletic fields, the Helping Hands campaign is focused more on general park cleanliness, trash pickup, and trail maintenance. It focuses on soliciting volunteers from organizations such as service clubs, scout troops, churches, homeowner associations, and local businesses.

E. Restoration Plans and Total Maximum Daily Loads

1. Watershed Assessments

Watershed Assessments have been completed for each of the 9 watersheds within Carroll County. Each assessment is completed on the 8-digit level, and further divided down to the 12-digit level for a subwatershed analysis. Each watershed assessment consists of a stream corridor assessment (SCA) and a characterization plan.

The County conducted SCAs in accordance with the Stream Corridor Assessment Survey Protocols, developed in 2001 by the Maryland Department of Natural Resources (DNR), Watershed Restoration Division. Assessments were performed between January and March by County staff through cooperation of private landowners and municipalities. Landowner permission for access to stream corridors is obtained through a mailing detailing the purpose and timing of the assessment with a return response postcard. The County received permission to assess 786 miles of the 1,464 miles, or approximately 54 percent, of the stream miles within the County **(Table 10**).

During each SCA, field teams collect information relating to eroded streambanks, channel alterations, exposed utility pipes, drainage pipe outfalls, fish barriers (debris jams), inadequate streamside buffers, trash dumps, and construction activity that are either in or near the stream. Any unusual conditions are also noted. Each impairment is then ranked on a scale of 1 to 5 in relation to the impairment's severity, accessibility, and correctability. The goal of the numeric ranking is to identify and rank current impairments within the watershed to assist in prioritizing locations for restoration implementation.

In addition to the on-the-ground field assessments, County staff have also conducted a desktop analysis of each of the nine 8-digit watersheds in a characterization plan. Each watershed's characterization plan describes the unique background of the watershed including the natural and human characteristics of the watershed and any water quality and living resource data that has been collected within the watershed. The characterization plans are intended to provide a background on the hydrological, biological, and other natural characteristics of the watershed as well as discuss human characteristics that may have an impact within the watershed.

Table 10 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	71	128	55%	2015
Double Pipe	Monocacy/ Potomac	266	514	52%	2016
Loch Raven	Gunpowder	2	3	66%	2016
	Total:	***786***	***1,464***	**54%**	

2. Restoration Plans

Each restoration plan focuses on identified impacts discovered during the Stream Corridor Assessments (SCAs) and prioritizes projects at a 12-digit scale based on the water quality data. Six of the nine 8-digit watersheds in Carroll County have an associated TMDL WLA for developed source types. Restoration plans for these 6 watersheds were sent to MDE in August 2016 for review. The 6 watersheds were Prettyboy, Liberty, Loch Raven, Lower Monocacy, Upper Monocacy, and Double Pipe Creek. The submission included SCAs and Watershed Characterizations for each of the watersheds; as well as the Restoration Plans.

In September 2017 the County received written comments from MDE's Sediment, Stormwater, and Dam Safety Program, and Water and Science Administration relating to our TMDL implementation plans (restoration plans). The County anticipates working closely with the Center for Watershed Protection when addressing various points and shortcomings provided by MDE; however, would appreciate MDE's consideration on establishing fiscally sound approaches to requirements associated with the restoration plans. Responses to MDE's comments and revisions to the Restoration Plans are underway and will continue into the FY 18 permit year.

Carroll County continues implementing an aggressive program related to watershed restoration projects. The County's actual completed restoration as of June 30, 2017 was 1,369 impervious acres treated and 2,114 acres of drainage area treated (green in **Table 11**). The projects listed in blue on **Table 11** indicate the restoration efforts which addressed the initial 10 percent requirement in the 3rd generation permit. The percentage of treatment as of June 2017 was 85 percent of the 1,614 acres required to be treated under this permit.

Table 11 provides a complete accounting of impervious areas as well as drainage area treated or planned to be treated. As indicated in **Table 11**, there are projects under construction or in design scheduled for completion in 2018 and 2019 which will treat an additional 595 acres (orange in **Table 11**) bringing the anticipated County total for this permit of treated impervious acres to 1,964 which is 122 percent of the County's and co-permittee's 20 percent permit requirement. Projects indicated in red in **Table 11** are projects in the planning stage.

Figures 5 and **6** depict a graphic representation of acres restored (green), acres in the design phase (orange), and acres in the planning phase (red) for projects to restore impervious surfaces and to treat the associated drainage areas. These graphs provide an excellent representation related to the level of true watershed restoration accomplished via the County's restoration efforts. Retrofit projects are designed to treat all of the contributing drainage area, not just the impervious surface.

Table 11
Listing of Watershed Restoration Efforts, July 2017
NPDES

Carroll County First Permit Requirements					
Year	**Project Name**	**Project Type**	**Project Status**	**Impervious Area Credit**	**MDE Watershed**
1997	Longwell County Park	600 LF Stream Restoration	Completed	142.80	Liberty Reservoir
1998	Carroll County Times	200 LF Stream Restoration	Completed	0.50	Liberty Reservoir
1999	Piney Run	936 LF Stream Restoration	Completed	258.07	Loch Raven Reservoir
1993-2005	Forest Buffer Easements	Forest Buffer	Completed	147.47	
1993-2005	Grass Buffer Easements	Grass Buffer	Completed	139.43	
	Completes 1st permit term requirement of 10% treatment			**688.27**	

Listing of Watershed Restoration Efforts July 2017 NPDES					
Year	**Project Name**	**Project Type**	**Project Status**	**Impervious Area Credit**	**MDE Watershed**
2005	Eldersburg Elementary School	Retrofit	Completed	1.40	Liberty Reservoir
2006	Chung	Outfall Restoration	Completed	10.00	S Branch Patapsco River
2007	Marriott Wood I Facility #1	Retrofit	Completed	0.60	Liberty Reservoir
2007	Winfield Fire Department Addition	New Construction	Completed	0.20	S Branch Patapsco River
2009	Bateman SWM Pond	New Construction	Completed	6.20	Liberty Reservoir
2009	Collins Estate	Retrofit	Completed	3.90	Liberty Reservoir
2009	Hickory Ridge	Retrofit	Completed	6.60	Liberty Reservoir
2009	Marriott Wood I Facility #2	Retrofit	Completed	2.80	Liberty Reservoir
2009	Marriott Wood II	Retrofit	Completed	1.90	Liberty Reservoir
2009	South Carroll High School	New Construction	Completed	12.90	S Branch Patapsco River
2009	Westminster Airport Pond	Retrofit	Completed	93.50	Liberty Reservoir
2010	Brimfield	Retrofit	Completed	12.60	S Branch Patapsco River
2010	Elderwood Village	Retrofit	Completed	3.40	Liberty Reservoir
2010	High Point	Retrofit	Completed	0.90	Liberty Reservoir
2010	Oklahoma II Foothills	Retrofit	Completed	8.10	Liberty Reservoir
2010	Upper Patapsco Phase I - Naganna Pond	New Construction	Completed	13.90	Liberty Reservoir
2010	Upper Patapsco Phase II - Hoff Pond	New Construction	Completed	4.10	Liberty Reservoir
2011	Arthur Ridge	Retrofit	Completed	6.60	S Branch Patapsco River
2011	Edgewood	Retrofit	Completed	16.70	Liberty Reservoir
2011	Heritage Heights	Retrofit	Completed	4.10	Liberty Reservoir
2011	Oklahoma Phase I	Retrofit	Completed	10.00	Liberty Reservoir

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2011	Quail Meadows	Retrofit	Completed	23.25	Liberty Reservoir
2012	Hampstead Impervious Area Removal	Impervious Removal	Completed	0.13	Prettyboy Reservoir
2012	Clipper Hills - Gardenia	Retrofit	Completed	15.24	S Branch Patapsco River
2012	Clipper Hills - Hilltop	Retrofit	Completed	25.49	S Branch Patapsco River
2012	Harvest Farms 1A	Retrofit	Completed	11.25	S Branch Patapsco River
2012	Parrish Park	Retrofit	Completed	18.20	S Branch Patapsco River
2012	Sunnyside Farms	New Construction	Completed	3.30	Double Pipe Creek
2012	Wilda Drive	New Construction	Completed	1.63	Liberty Reservoir
2013	Westminster Community Pond	New Construction	Completed	87.85	Liberty Reservoir
2013	Westminster High School	New Construction	Completed	44.81	Liberty Reservoir
2013	Tree plantings	Tree plantings	Completed	7.13	
2014	Benjamin's Claim	Retrofit	Completed	20.55	S Branch Patapsco River
2014	Carrolltowne 2A Gemini Drive	Retrofit	Completed	47.26	S Branch Patapsco River
2014	Carrolltowne 2B	Retrofit	Completed	14.27	S Branch Patapsco River
2014	Diamond Hills Section 5	Retrofit	Completed	16.27	Liberty Reservoir
2014	Friendship Overlook/Diamond Hills Section 2	Retrofit	Completed	18.58	Double Pipe Creek
2014	Tree plantings	Tree plantings	Completed	9.64	
2015	Benjamin's Claim Basin B	Retrofit	Completed	0.56	S Branch Patapsco River
2015	Braddock Manor West	Retrofit	Completed	10.52	S Branch Patapsco River
2015	Eldersburg Estates 3-5	Retrofit	Completed	11.22	S Branch Patapsco River
2015	Tree plantings	Tree plantings	Completed	20.25	
2016	Tree plantings	Tree plantings	Completed	11.97	
2017	Carroll County Maintenance Center	Retrofit	Completed	34.44	Double Pipe Creek
2017	Farm Museum - Bioretention A	New Construction	Completed	0.50	Double Pipe Creek
2017	Farm Museum - Bioretention B	New Construction	Completed	2.55	Double Pipe Creek
2017	Farm Museum - Drywell	New Construction	Completed	0.03	Double Pipe Creek
2017	Farm Museum - Landscape Infiltration	New Construction	Completed	0.06	Double Pipe Creek
2017	Farm Museum - Rain Barrel	New Construction	Completed	0.01	Double Pipe Creek
2017	Farm Museum - Rain Garden	New Construction	Completed	0.05	Double Pipe Creek
2017	Finksburg Industrial Park	Retrofit	Completed	22.34	Liberty Reservoir
2017	Jenna Estates	Outfall Restoration	Completed	0.50	S Branch Patapsco River
2017	Miller/Watts	Retrofit	Completed	35.24	Liberty Reservoir
2006-2017	Forest Buffer Easements	Forest Buffer	Completed	192.96	

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2006-2017	Grass Buffer Easements	Grass Buffer	Completed	150.88	
2017	Inlet Cleaning (updated yearly)	Inlet Cleaning	Completed	13.56	
2017	Septic Upgrades (to date)	Retrofit	Completed	44.46	
2017	Septic Pumping (updated yearly)	Septic Pumping	Completed	225.99	
2017	Street Sweeping (updated yearly)	Street Sweeping	Completed	5.99	
	Completed toward 20% goal			**1369.33**	

Carroll County Projects in Design or Under Construction for Current Permit Requirements					
Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2018	Small Crossing Sand Filter	Retrofit	Under Construction	11.02	Prettyboy Reservoir
2018	Small Crossings Bioretention	New Construction	Under Construction	0.53	Prettyboy Reservoir
2018	Blue Ridge Manor	Retrofit	Design	9.07	Double Pipe Creek
2018	Central Maryland (Wet Facility)	Retrofit	Design	52.66	Liberty Reservoir
2018	Elderwood Village Parcel B/Oklahoma 4	Retrofit	Design	90.53	Liberty Reservoir
2018	Hawks Ridge	Retrofit	Design	25.10	S Branch Patapsco River
2018	Langdon (Jantz)	New Construction	Design	92.10	Double Pipe Creek
2018	Manchester Skate Park	New Construction	Design	27.46	Double Pipe Creek
2018	Merridale Gardens	Retrofit	Design	25.13	S Branch Patapsco River
2018	Roberts Mill	Retrofit	Design	87.00	Upper Monocacy River
2018	Shannon Run	Retrofit	Design	46.89	S Branch Patapsco River
2018	Whispering Valley Phase 4	Retrofit	Design	25.50	Prettyboy Reservoir
2019	Eden Farms-Willow Pond	Retrofit	Design	102.30	Liberty Reservoir
	Anticipated toward 20% goal			**595.29**	

Carroll County Projects in Planning					
Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2018	Locust wetland	New Construction	Concept	11.00	Double Pipe Creek
2019	Hampstead Regional Facility	Retrofit	Concept	116.88	Liberty Reservoir
2020	Squires	Retrofit	Concept	13.75	Liberty Reservoir
2020	Taneytown Elementary School	Retrofit	Concept	60.50	Upper Monocacy River
2021	Candice Estates	New Construction	Concept	17.88	Lower Monocacy River
2021	Central Maryland (Dry Facility)	Retrofit	Concept	61.88	Liberty Reservoir

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2021	Piney Ridge Village As-built 57	Retrofit	Concept	11.00	S Branch Patapsco River
2022	Greens of Westminster	Retrofit	Concept	104.50	Double Pipe Creek
2022	IDA Property (Mt. Airy)	New Construction	Concept	14.44	S Branch Patapsco River
	Anticipated impervious treatment			**411.83**	

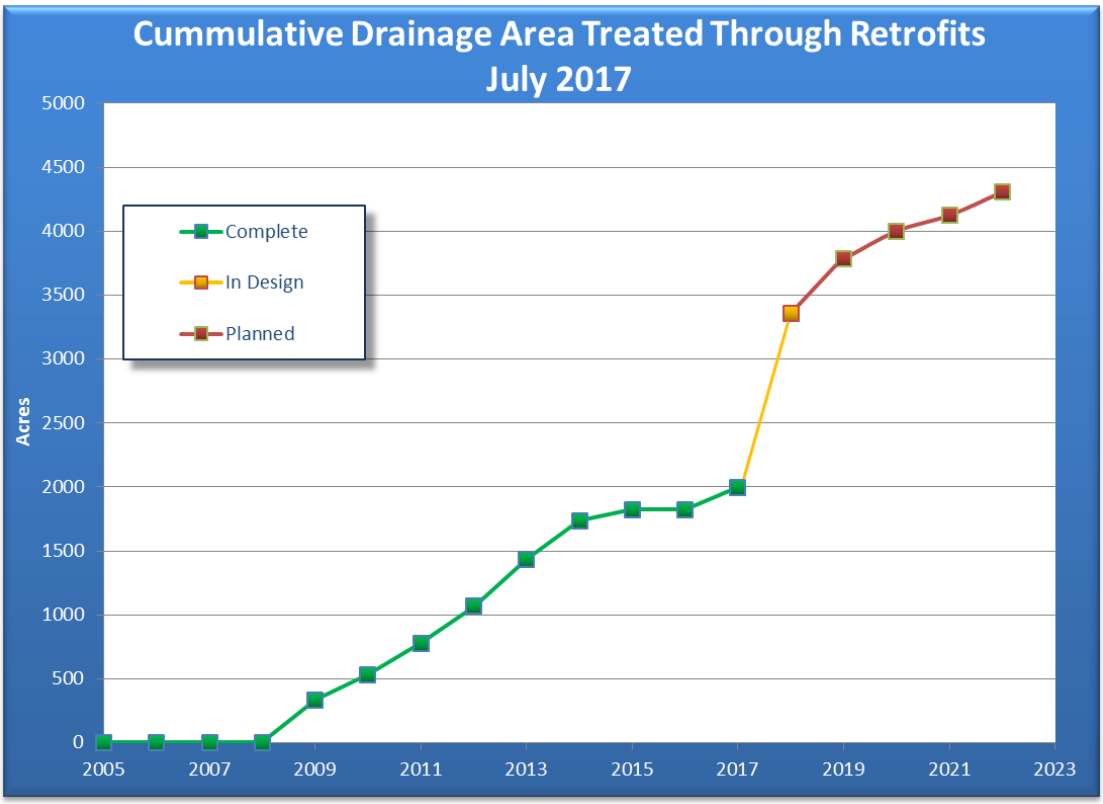


Figure 5: Drainage Area Acres Treated for Constructed, Under Design, and Planned Projects

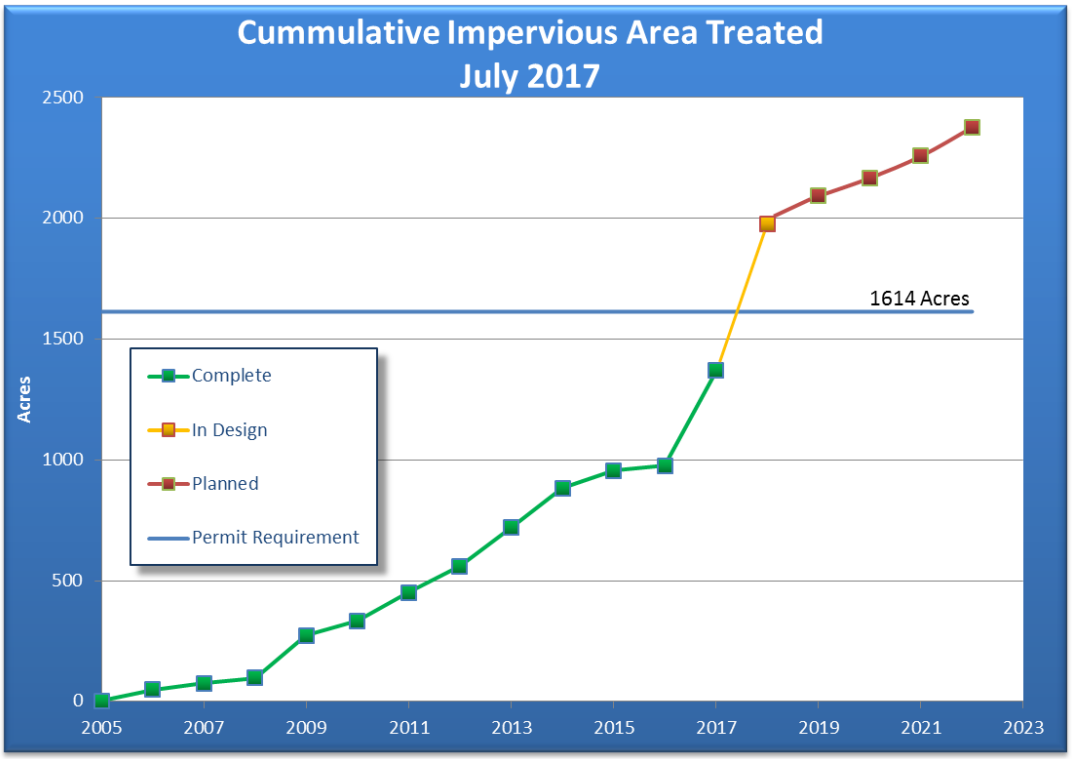


Figure 6: Impervious Surface Acres Treated for Constructed, Under Design, and Planned Projects

3. Public Participation

As part of the watershed restoration efforts, staff reached out to the public to share best management practices designed to equip homeowners with good housekeeping practices they can use in their homes and in their yards. At a workshop held at Carroll Community College on March 18, 2017, homeowners were offered individual breakout sessions focusing on composting, rain gardens, lawn care and landscape management, septic maintenance, recycling, permeable pavement, stream buffers and tree planting, and general homeowner BMPs. A video introducing homeowners to stormwater was available and played continuously. In addition, booths were available with printed information and staffed with experts to answer participants' questions on each of these topics, as well as additional topics related to stormwater and/or watershed restoration. Staff produced several publications for this event, which also are now available for use at other events or for viewing or downloading online. Several non-profit groups participated in this outreach event, also providing a resource to homeowners who attended. The workshop was sponsored by the Carroll County Environmental Advisory Council, in cooperation with County staff and the Carroll County Water Resource Coordination Council. The next homeowner workshop will be held in 2019.

4. TMDL Compliance

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 is working toward meeting the fourth generation permit's impervious area restoration requirement as well. This progress demonstrates the County's aggressive implementation toward meeting these goals.

In addition to 85 percent of the untreated impervious area restored to date, 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 2** provided a detailed list of completed projects and associated pollutant load reductions demonstrating progress toward the TMDL WLAs. **Appendix F** consists of tables summarizing how work associated with our restoration efforts translates into requirements associated with meeting our local WLA and actual Chesapeake Bay TMDL reductions. 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 approval of the restoration plans for the individual watersheds. Attachment B of the County's permit lists the EPA-approved TMDLs for Carroll County.

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 the 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 to the maximum extent practicable.

More specific details for non-nutrient and non-sediment TMDLs are included in the restoration plans for each individual relevant watershed currently being revised by the County after receiving comments from MDE.

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 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 tripled since 2008, from approximately $334,000 annually, to more than 2.1 million annually. These expenses cover salaries and benefits of employees, monitoring supplies, educational material, monitoring analysis, training information, consultant fees, stormwater management facility maintenance contractor costs, equipment needs, and bond interest and principle.

Additionally, $25.5 million has been reserved for watershed restoration efforts in the Community Investment Program (CIP) for FY 2018 to FY 2023. Costs associated with restoration efforts have been offset through the success of our grants program. Since 2008, more than $12.0 million of grant funding has been awarded to Carroll County.

For the 15 year period from 2008 to 2023, Carroll County will invest more than $13.0 million in operating expenses, and more than $45.5 million through capital expenditures; for a grand total of $58.5 million. Average annual expenditures for the 15 year time period would equal

approximately $3.9 million, with the average amount budgeted per year in the CIP for FY 2018 to FY 2023 increasing to an average of $4.25 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 Assessment of Controls (Part IV.F.) of the permit, which delineates 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 as a wet pond with forebay to provide water quality, recharge volume, and channel volume protection in 2008.

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 7**, while the location of the monitoring stations and other watershed features are shown in **Figure 8** The study area is located near the topographic divide separating the eastern and western piedmont physiographic provinces. As shown in **Figure 7**, 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 with 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, just downstream of the outfall station.

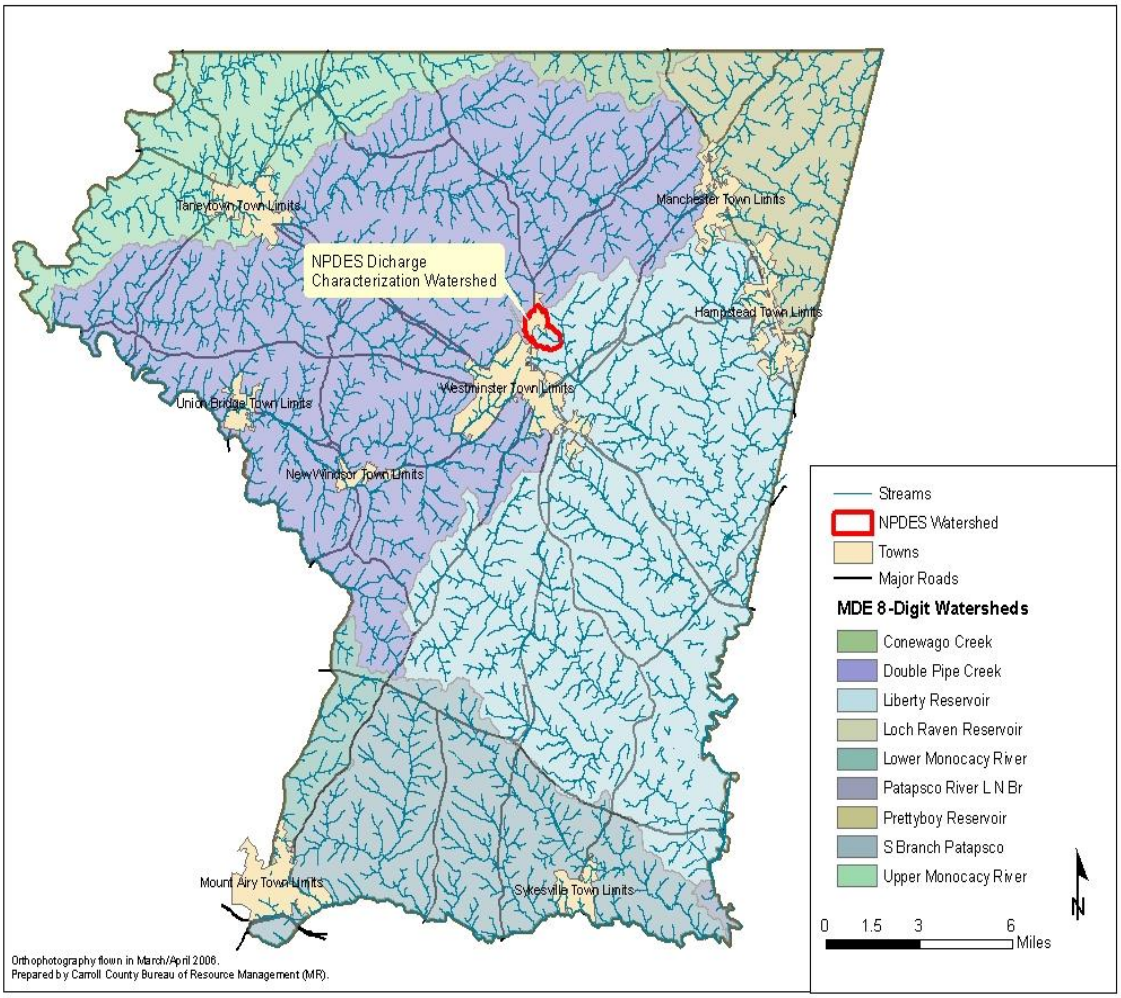


Figure 7: Carroll County NPDES Discharge Characterization Location

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 shown in **Figure 8** 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:

- Geomorphic stream assessment to include an annual comparison of permanently monumented stream channel cross-sections and a stream profile to evaluate channel stability; and
- A stream habitat assessment for assessing 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 calendar year 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.

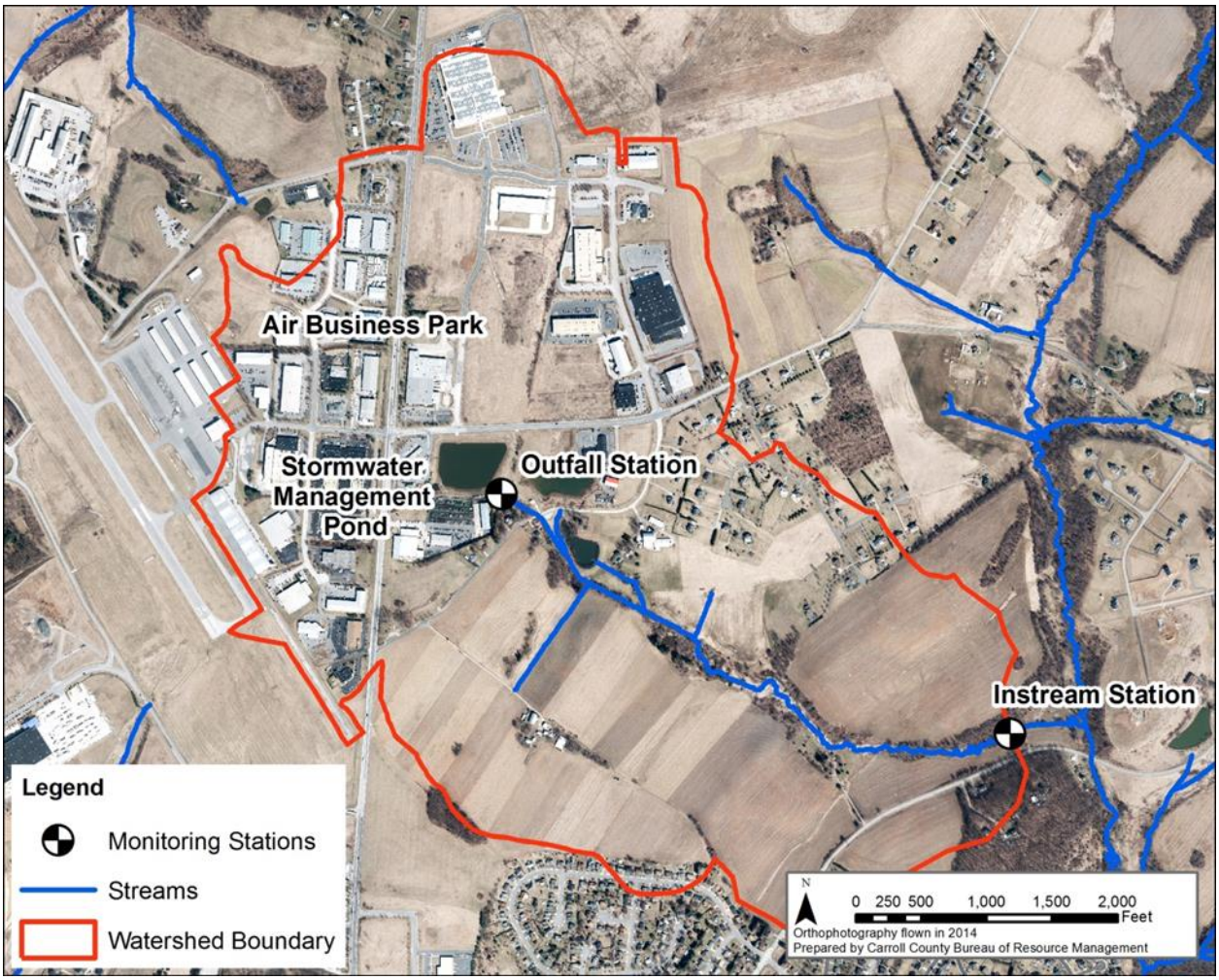


Figure 8: NPDES Discharge Characterization Watershed

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 Waste Water Treatment Plant.

Hydrological

To understand the hydrology in the study watershed, continuous stream discharge data is necessary. 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 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 excel for most analyses.

Due to equipment malfunctions, stage-discharge measurements for one or both stations were unavailable at various times. Discharge was estimated during these times 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 2017, 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 survey department 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 on 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, manifested through a comparative evaluation of channel geometry changes, including cross-sectional dimensions, in the context of the physical setting.

Chemical

Carroll County staff collects all storm and baseflow chemical samples while continuing to contract with Martel Laboratories, Inc., in Baltimore, MD to conduct all of the lab analyses. 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
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	1.0 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 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. This reporting was the first that all chemical sampling was collected by Carroll County staff. Personnel from Martel had previously collected some or all chemical samples. 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 e-mail to the County where the new records are appended to the existing MS Access database and NPDES geodatabase.

The event dates for this reporting year are shown in **Table 13.** Please note that 17 total sampling events are reported; 8 of the total events were storm events.

Table 13
2016 – 2017 NPDES Discharge Characterization Sampling Events

Event	Date	Event Type	Instream Physical Water Data			Outfall Physical Water Data		
			pH	Water Temp (F)	Conductivity (µmhos/cm)	pH	Water Temp (F)	Conductivity (µmhos/cm)
2016-06	7/21/2016	Base Flow	7.76	63	310	9.21	79	220
2016-07	8/25/2016	Base Flow	7.77	66	320	8.55	78	200
2016-08	9/19/2016	Storm	7.22	66	N/A*	7.5	74	N/A*
2016-09	9/22/2016	Base Flow	7.62	61	320	7.77	71	280
2016-10	9/28/2016	Storm	7.2	62	N/A*	8.51	69	N/A*
2016-11	10/20/2016	Base Flow	7.54	60	320	7.71	64	300
2016-12	11/17/2016	Base Flow	7.61	44	280	7.54	44	350
2016-13	11/29/2016	Storm	7.29	47	290	7.52	48	330
2016-14	12/6/2016	Storm	7.97	44	260	9.42	42	250
2017-01	2/15/2017	Base Flow	8.53	40	480	8.63	39	1000
2017-02	3/23/2017	Base Flow	7.16	40	780	8.95	45	1900
2017-03	3/28/2017	Storm	8.02	52	1000	9.4	53	1700
2017-04	3/31/2017	Storm	8.1	45	830	8.81	49	1300
2017-05	4/6/2017	Storm	8.29	51	510	9.11	56	880
2017-06	5/5/2017	Storm	7.8	N/A*	370	7.98	N/A*	540
2017-07	5/18/2017	Base Flow	7.43	62	320	7.63	64	390
2017-08	6/27/2017	Base Flow	7.53	63	331	8.62	77	323

* Analyte not measured because of equipment malfunction

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 9**, 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, MD DNR principal taxonomist with 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.**

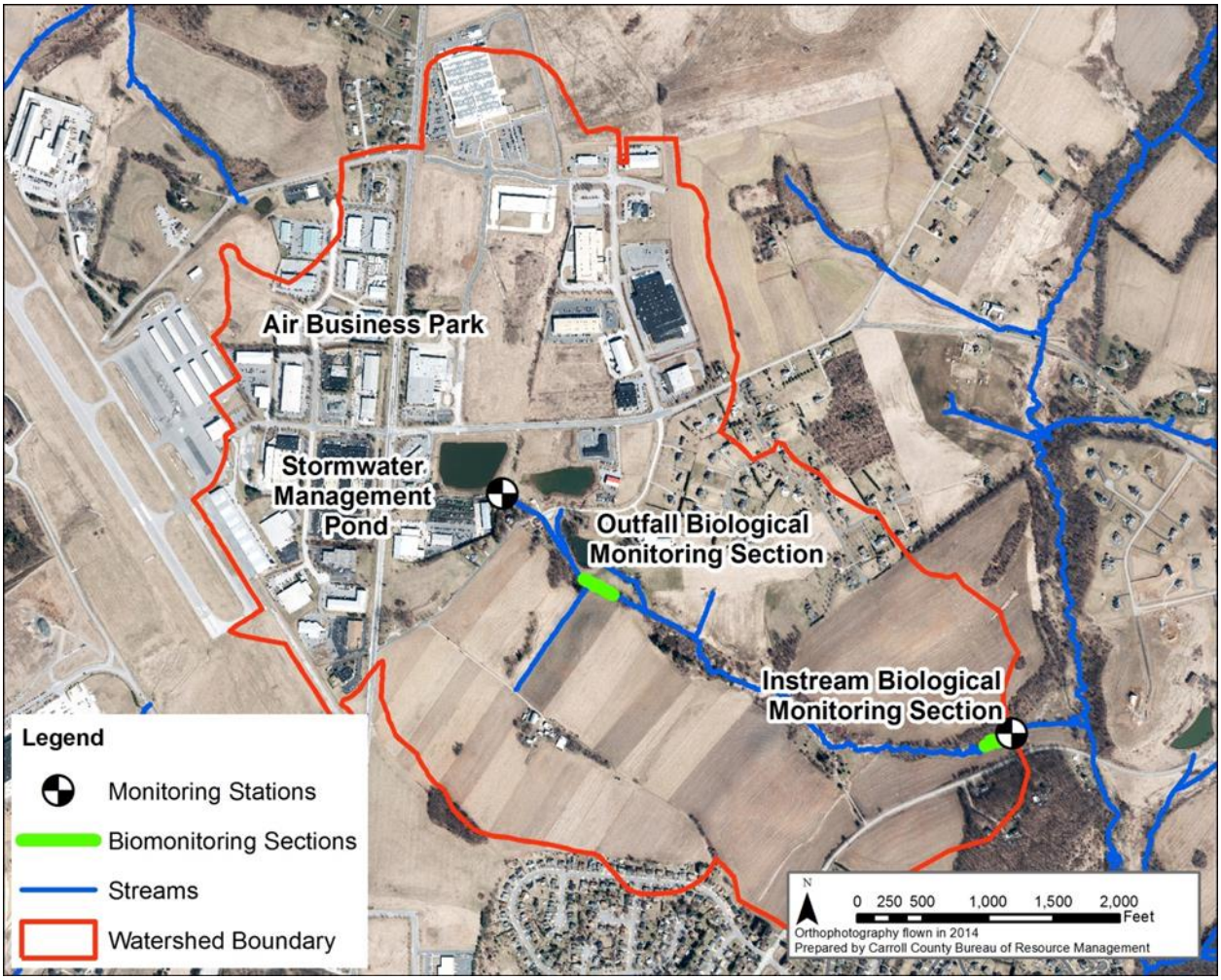


Figure 9: Biological Monitoring Station Locations

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)	Abund. 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 2016 – 2017 reporting year are summarized in **Figure 10**. Also included for reference are 30 year monthly averages and monthly high and low extremes from the previous 27 years that local data are available. The total precipitation for the reporting period was 38.71 inches, a 4.69 inch deficit from the normal yearly total. Relative to normal monthly average precipitation, May 2017 was the wettest month with a surplus of 1.48 inches

while July 2016 was the driest month with a deficit of 2.01 inches. This reporting year was the fifth driest year for total precipitation since reporting began at this station in 2000.

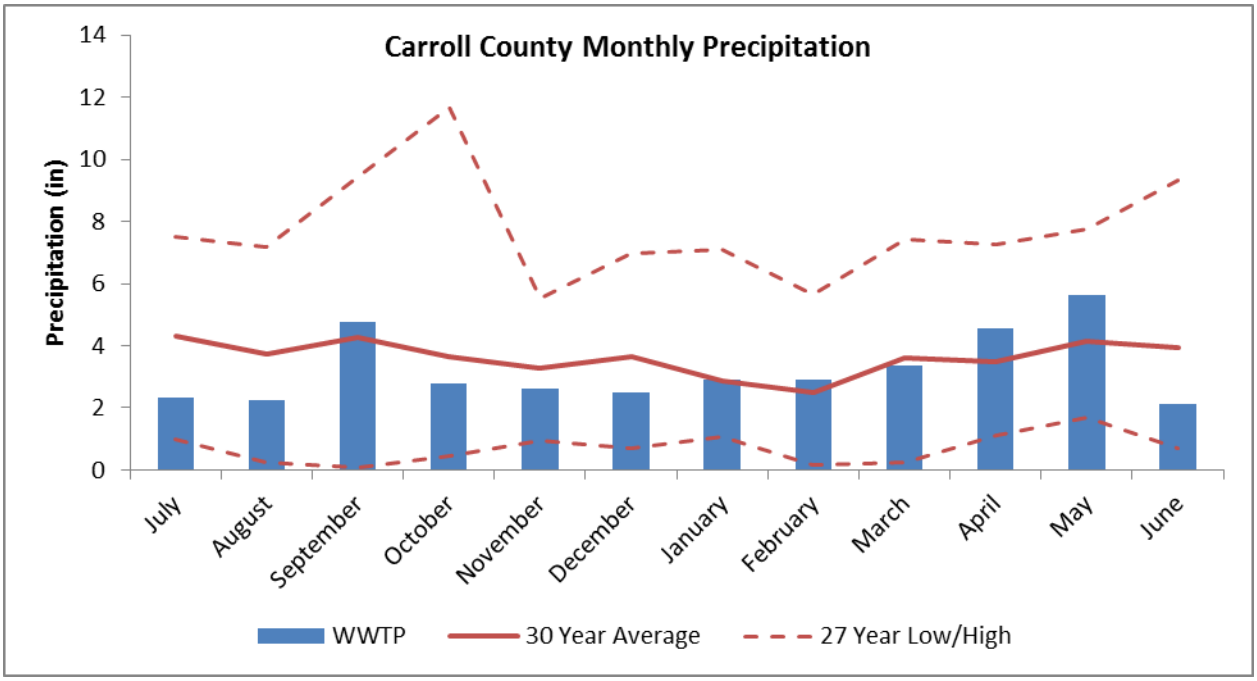


Figure 10: Monthly Precipitation Summary for the 2016 – 2017 Reporting Period

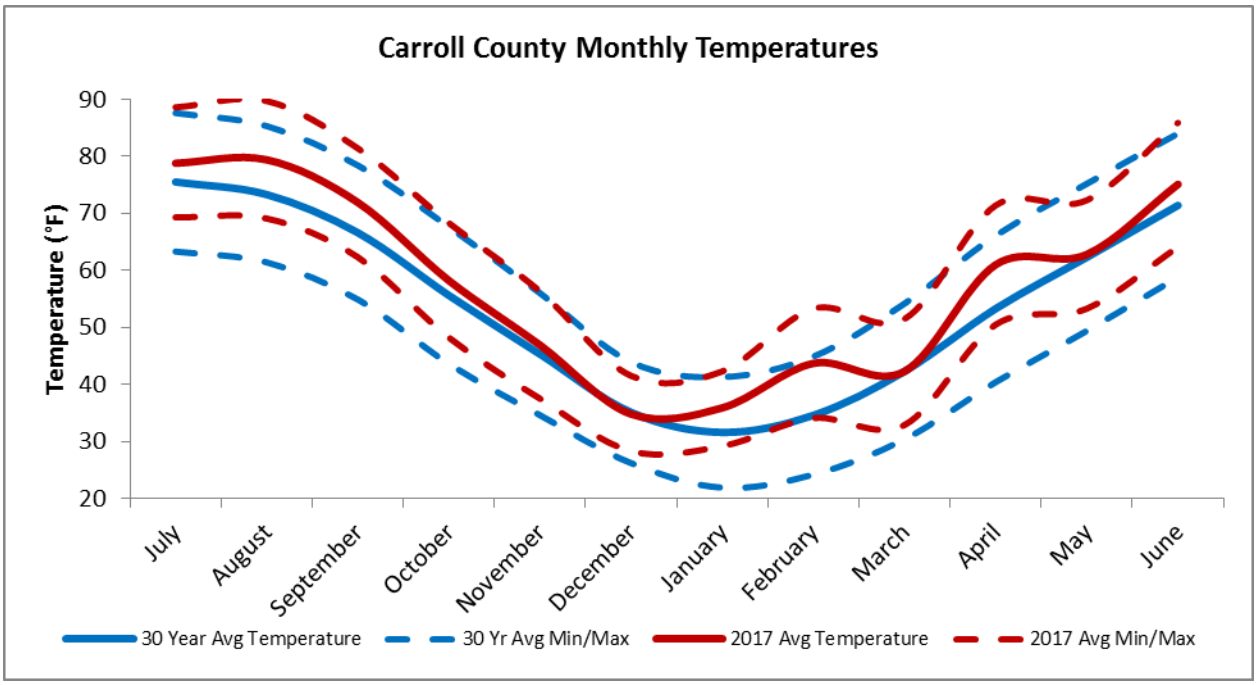


Figure 11: Monthly Temperature Summary for the 2016 – 2017 Reporting Period

Monthly temperature data for the 2016 – 2017 reporting year are summarized in **Figure 11**. The 30 year monthly average temperatures are included for reference. Overall, the reporting period experienced an annual average temperature of 57.6°F, 3.7 degrees warmer than the 30 year annual average. 11 of the 12 months were warmer than average with those months averaging 4 degrees warmer than normal. 1 of the 12 months were cooler than average with that month averaging only 0.3 degrees cooler than normal. February and April 2017 in particular were significantly warmer than normal with a 9.1 and 7.7 degree increase, respectively, from normal temperatures. It should be noted that warmer than average daily minimum temperatures were observed for every month; the average for this reporting period was 5.8 degrees above normal.

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 12 and 13,** respectively. A deficit of 4.69 inches of precipitation was observed during this reporting period relative to a normal year with only a few large storm events and a moderate frequency of smaller storm events. It should be noted that weir height at the instream station was lowered on September 22, 2016 to maintain stability and reduce leakage. A new rating curve (R^2=0.99) was used after this date to estimate discharge.

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 July 30-31, 2016 when 2.39 inches of precipitation was recorded. The stage reached peak height at close to 0.56 feet with a maximum discharge of 2,070 gallons per minute (gpm). Baseflow at the outfall monitoring station was marginal, typically with a stage height of 0.09 feet. The resulting baseflow discharge was approximately 37 gpm. In general, the storm events were fewer and less intense than previous years with a lower than normal baseflow.

Typical stage heights observed for the instream monitoring station were approximately 0.28 feet, or 183 gpm. During the July 30-31 storm event, stage height reached the peak for the reporting year at 1.83 feet. The resulting discharge was 18,153 gpm. There were three other storm events during this time where stage heights above 1 foot (6,600 gpm) were observed. These occurred on July 8, 2016, April 6, 2017, and May 5, 2017, with peak discharges of 10,116 gpm, 11,604 gpm, and 11,832 gpm, respectively.

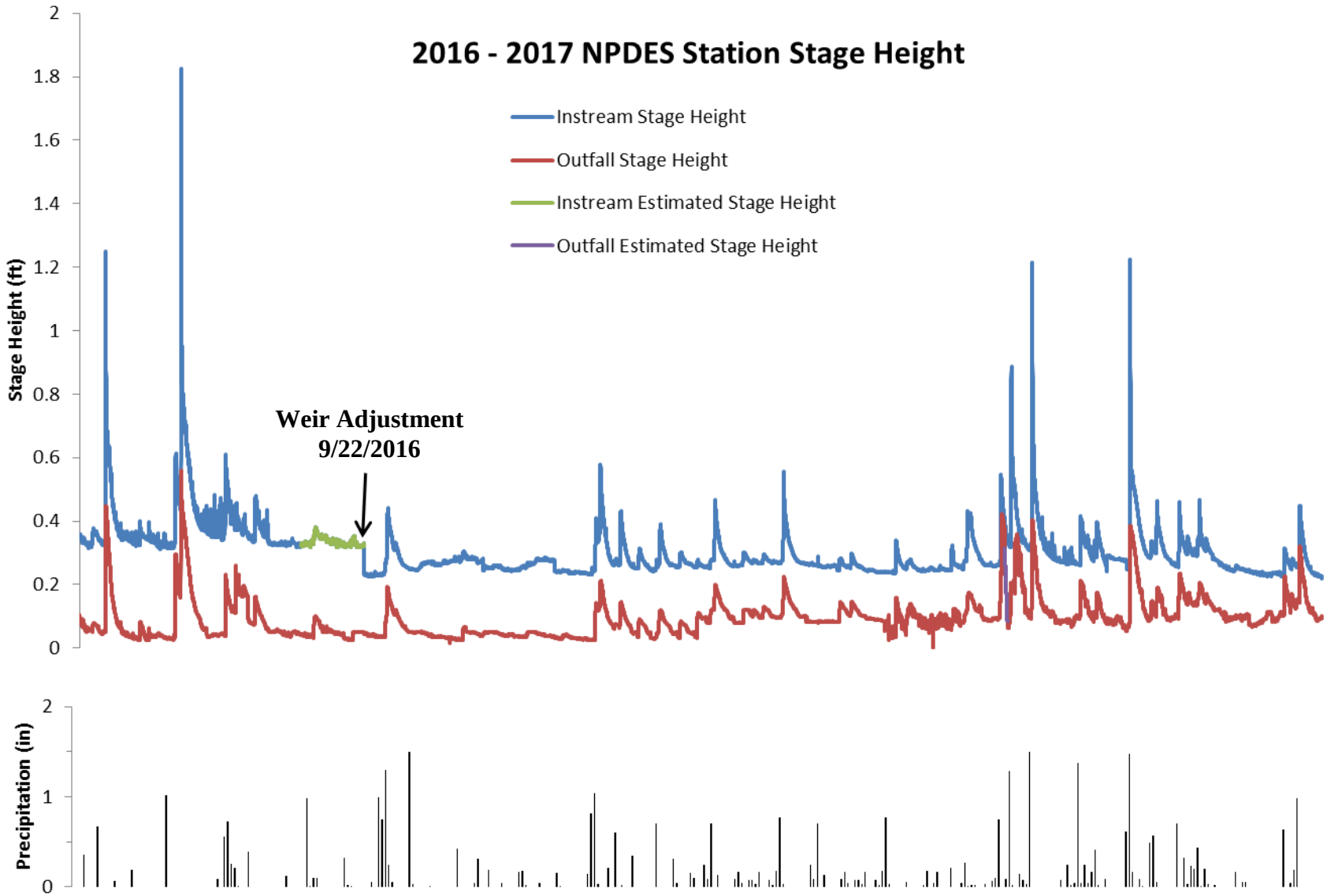


Figure 12: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2016 – 2017 Reporting Year

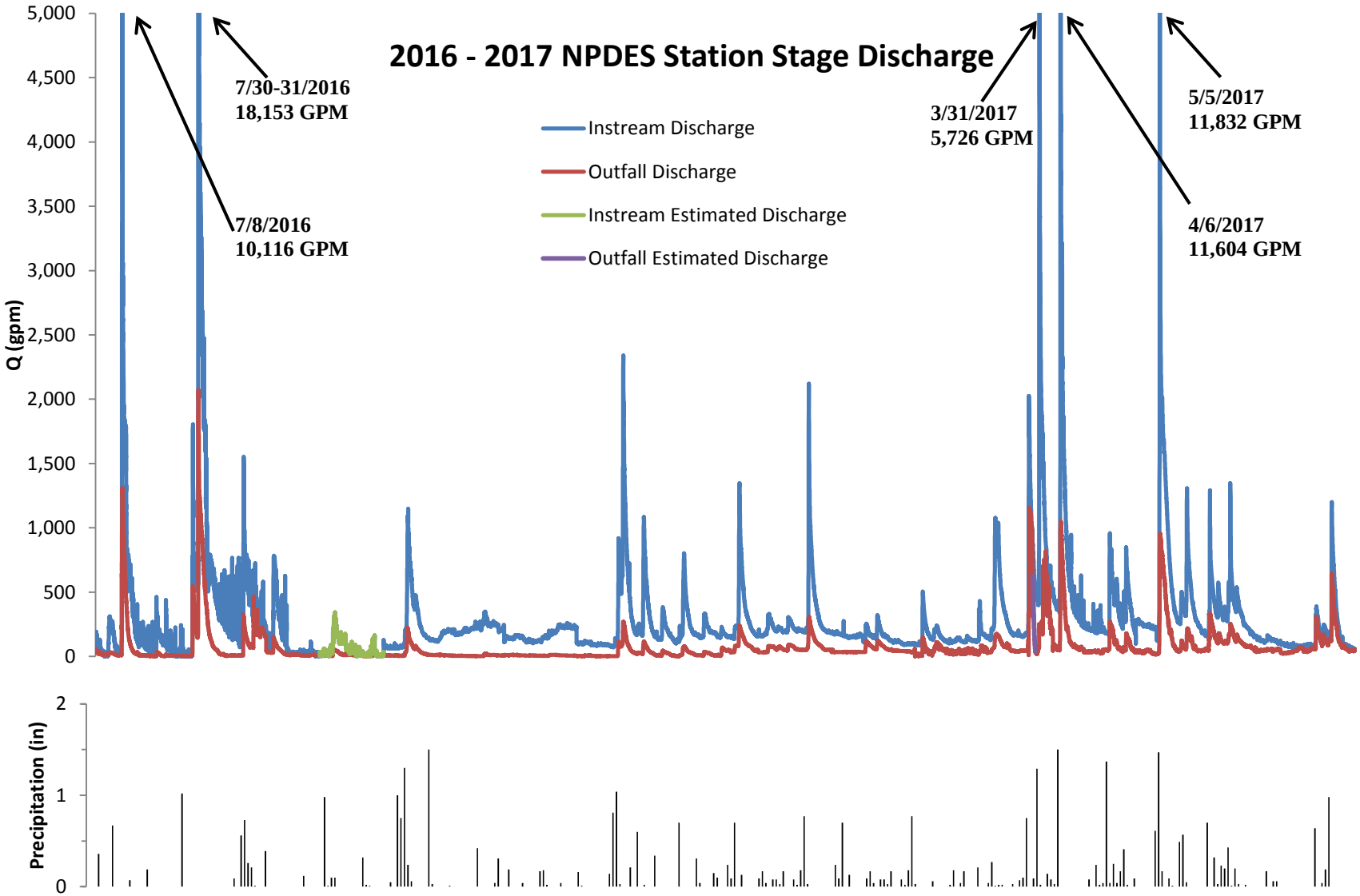


Figure 13: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2016 – 2017 Reporting Year

Total, seasonal, and categorical discharges for each monitoring station can be found in **Table 17**. Overall, only 25 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 156 million gallons with 39 million gallons being contributed in total discharge from the outfall station. About a third of the total discharge occurred during the spring months. The ratio of outfall to instream discharge moved between 32 and 25 percent; the outfall contribution during autumn 2016 decreased to 9 percent, likely due to a combination of dry weather and equipment malfunction.

Please note that stage heights and discharges from both stations were periodically estimated. These data were lost due to equipment failure. Additionally, the instream station weir height was adjusted and a new rating curve (R^2=0.99) was established after September 22, 2017.

Table 17
Categorical Discharges and Stage Heights for the 2016 – 2017 Reporting Year

	Instream	Outfall	Difference	Outfall Contribution (%)
Total (gallons)	156,099,034	39,252,742	116,846,292	25
Avg Stage (ft)	0.30	0.09	0.21	-
Median Stage (ft)	0.28	0.09	0.19	-
Avg Q (gpm)	297	75	222	25
Median Q (gpm)	183	37	146	20
Summer Q (gallons)	40,414,981	10,209,277	30,205,704	25
Autumn Q (gallons)	29,223,481	2,726,109	26,497,372	9
Winter Q (gallons)	34,071,049	9,818,849	24,252,200	29
Spring Q (gallons)	52,389,523	16,498,506	35,891,016	32
Dry (<700gpm)	98,719,207	23,043,268	75,675,939	23
Wet (>700gpm)	57,379,827	16,209,474	41,170,353	28

To compare pre and post pond retrofit hydrology, cumulative discharge frequency was plotted in **Figure 14**. This figure compares the discharge frequencies from the outfall monitoring station for the 2006 – 2007 and 2016 – 2017 reporting years. The maximum discharge during the pre-retrofit period (2007) was an order of magnitude higher than the post-retrofit period (2017). The maximum discharge in 2007 was 23,537 gpm while the maximum in 2017 was only 2,070 gpm. Additionally, the frequency and magnitude of high discharge events was greater during the pre-retrofit period. 83 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 are greater in magnitude than the most of the highest discharges from 2017. Only 1.25 hours during one storm event did the outfall discharge exceed 2,000 gallons per minute in the 2017 reporting year.

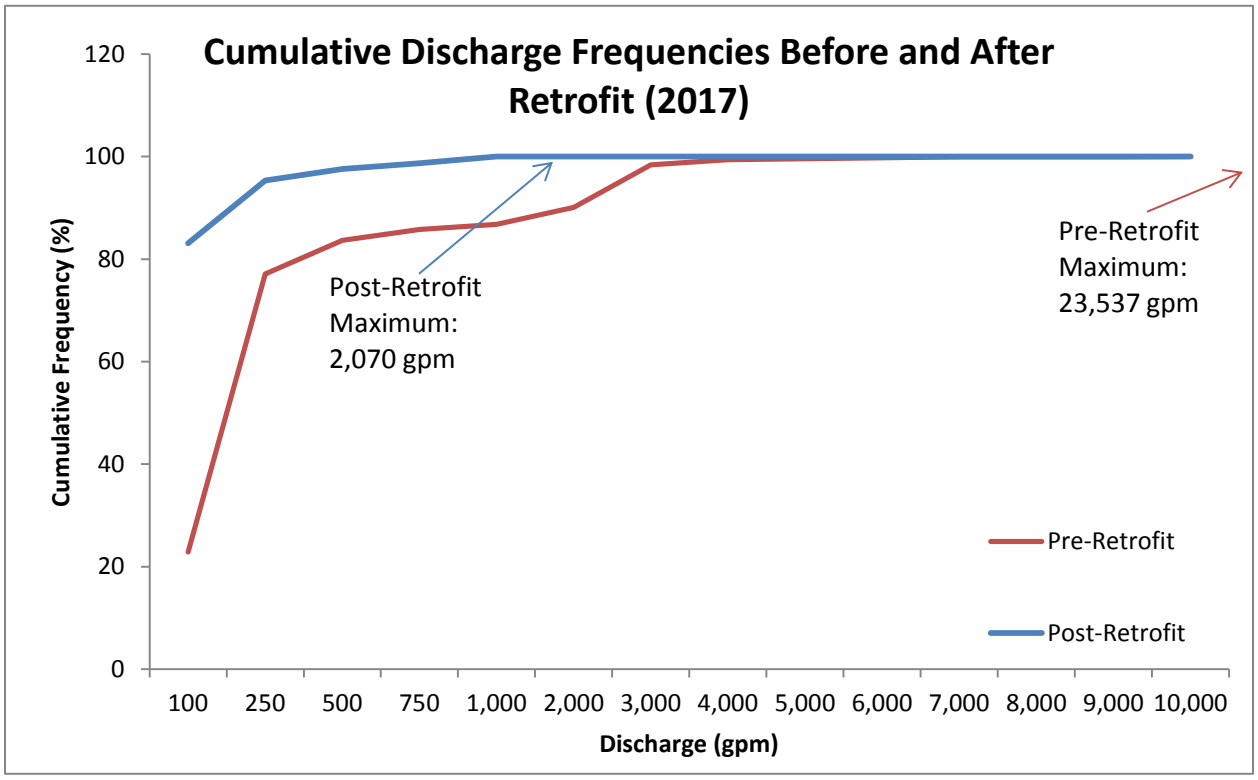


Figure 14: Outfall Discharge Frequencies for 2007 and 2016

Looking at individual components of the hydrograph allows one to observe the distinct mechanism behind any changes in cumulative frequencies throughout the year. **Figure 15** 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. Unlike previous years which compared storm events with nearly identical precipitation totals, this comparison is of a larger storm event to the same pre-retrofit storm. The pre-retrofit event had 0.39 inches of precipitation observed while the post-retrofit event had 0.6 inches of precipitation observed. Despite the higher precipitation total and intensity, the ascending limb for the post-retrofit outfall station still had a lower slope and peak discharge than the hydrograph of the pre-retrofit outfall station with a smaller storm event. The outfall to instream station discharge ratio for the post-retrofit storm event maintained a ~18 percent contribution 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 ~70 percent of the total instream discharge. The lesser contribution during the post-retrofit storm event is evident in the instream station hydrographs. The post-retrofit storm event at the instream station has a similar volume discharged compared to the pre-retrofit storm even with less volume discharged from the outfall station. 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.

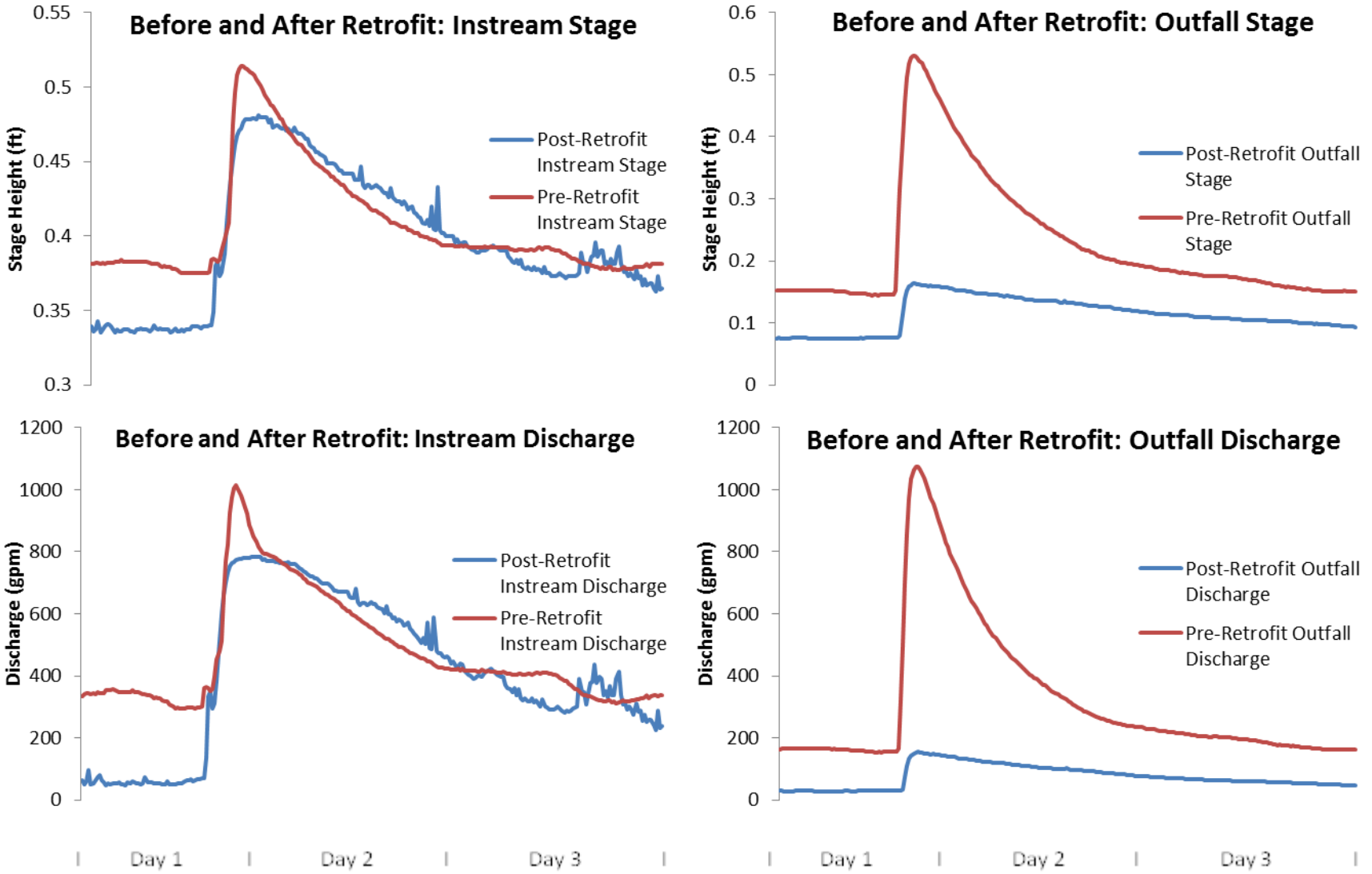


Figure 15: Characteristics of Analogous Storms Pre-Retrofit (7/23/2006, 0.39") and Post-Retrofit (8/21/2016, 0.6")

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 16**.

Results from this year's monumented cross-section data collection are provided in **Appendix D**. Since this monitoring effort is in part designed to detect changes to the stream system over time, staff compared results from this 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 17 years. At the first cross-section, located approximately 500 feet downstream of the pond outfall, the left bank has moved approximately two to three 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 still 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 and narrowing 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 and steepening 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 channel has widened and moved slightly west over the last 17 years. Over the past year, some aggradation occurred along the east bank, narrowing 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 is 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).

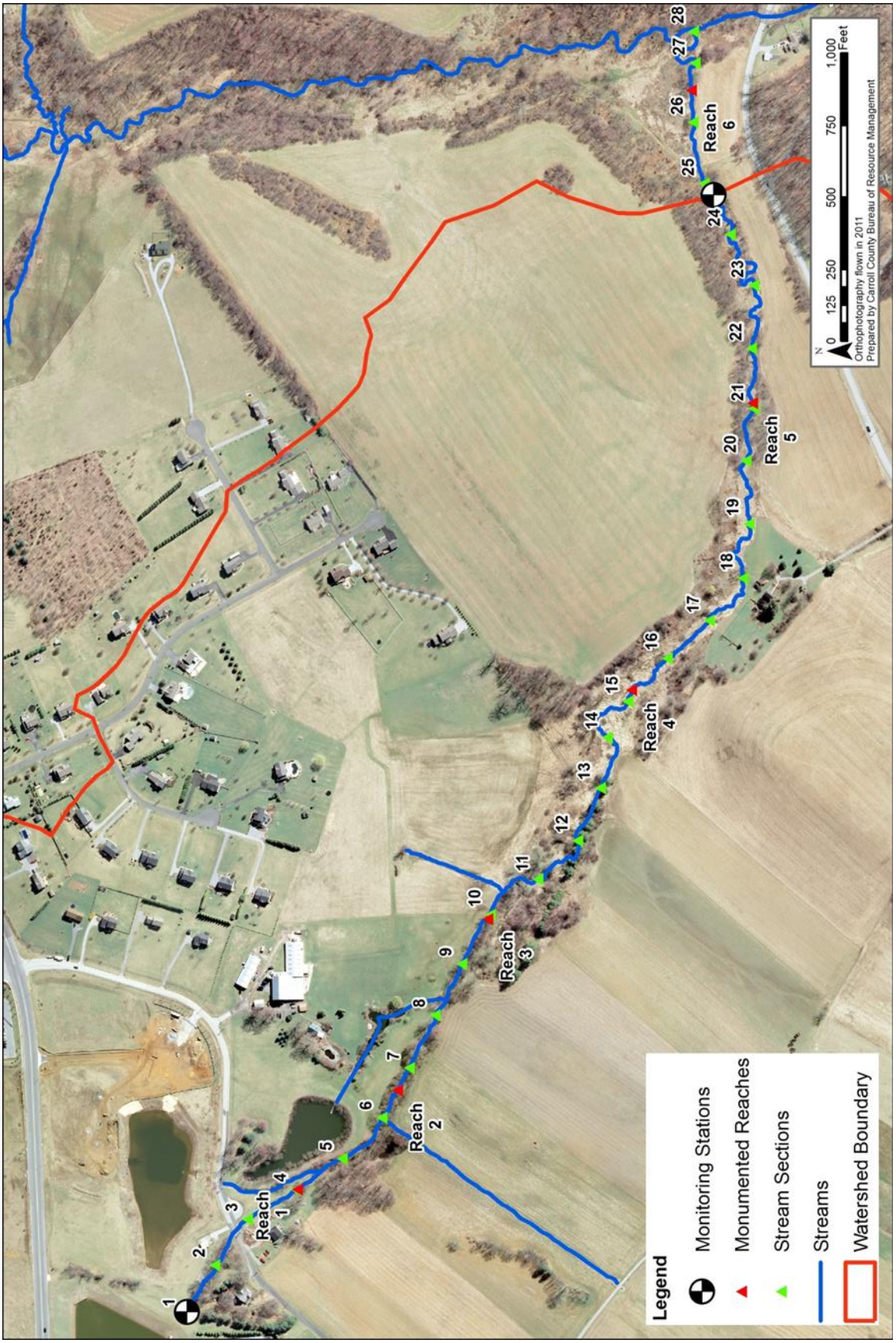


Figure 16: Physical Data Collection Stations

Table 18 displays thalweg elevation and section gradient for selected years from 2004 through 2017. One notable observation from the table is the low 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 the current reporting year (2017), 2016, 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 two 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 to three feet over this period. The gradient has changed significantly over the second third of the stream profile and ranges from 0.06 percent to 0.96 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 2017 and 2004; the slope at station 22 has a decreasing gradient while station 24 has an increasing gradient over time. **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 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 - 2017

		2017		2016		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	728.15		728.13		728.04		728.01	1.43%	728.01	1.43%	727.83	1.42%	727.90	1.49%
3	394	725.19	1.54%	725.03	1.61%	724.73	1.72%	724.58	1.78%	724.56	1.79%	724.26	1.85%	724.20	1.92%
4	592	721.87	1.68%	721.75	1.66%	721.86	1.45%	722.06	1.27%	721.49	1.55%	721.30	1.50%	721.51	1.36%
5	786	718.11	1.93%	718.09	1.88%	717.91	2.03%	717.78	2.20%	717.81	1.89%	717.77	1.81%	717.75	1.93%
6	988	716.14	0.98%	716.14	0.97%	715.84	1.03%	716.73	0.52%	716.61	0.59%	716.27	0.74%	715.82	0.96%
7	1184	715.75	0.20%	715.79	0.18%	715.55	0.15%	715.58	0.59%	715.70	0.46%	715.60	0.34%	715.49	0.17%
8	1388	714.36	0.68%	714.47	0.65%	714.18	0.67%	714.28	0.64%	714.24	0.72%	714.30	0.64%	714.42	0.52%
9	1589	713.27	0.54%	712.97	0.75%	712.89	0.64%	712.80	0.74%	712.78	0.73%	712.83	0.73%	712.74	0.84%
10	1787	711.27	1.01%	711.22	0.88%	711.40	0.75%	711.59	0.61%	711.66	0.57%	711.20	0.82%	711.22	0.77%
11	1986	709.77	0.76%	709.63	0.80%	710.28	0.56%	709.93	0.84%	710.06	0.81%	709.58	0.82%	709.61	0.81%
12	2189	709.39	0.19%	709.39	0.12%	709.32	0.47%	709.16	0.38%	709.58	0.24%	709.02	0.28%	709.48	0.06%
13	2386	708.60	0.40%	708.66	0.37%	708.61	0.36%	708.46	0.35%	709.04	0.27%	709.81	-0.40%	709.45	0.02%
14	2564	708.50	0.06%	708.54	0.07%	708.30	0.18%	708.17	0.16%	707.88	0.66%	707.94	1.06%	707.74	0.97%
15	2707	707.25	0.87%	707.42	0.78%	707.45	0.59%	707.02	0.80%	707.06	0.57%	707.07	0.61%	706.81	0.65%
16	2910	705.40	0.91%	705.44	0.97%	705.58	0.92%	705.44	0.78%	705.55	0.74%	705.20	0.92%	705.18	0.80%
17	3106	704.58	0.42%	704.16	0.66%	704.64	0.48%	704.78	0.34%	704.48	0.55%	704.37	0.43%	704.18	0.51%
18	3298	703.68	0.47%	703.65	0.26%	703.43	0.63%	703.62	0.60%	703.27	0.63%	703.16	0.63%	702.94	0.64%
19	3490	701.84	0.96%	701.74	1.00%	701.85	0.82%	701.75	0.97%	701.48	0.93%	701.48	0.88%	701.69	0.65%
20	3704	699.10	1.28%	699.12	1.22%	699.07	1.30%	698.90	1.33%	698.92	1.19%	698.92	1.19%	698.99	1.26%
21	3896	697.96	0.60%	697.80	0.69%	697.74	0.69%	697.73	0.61%	697.69	0.64%	697.83	0.57%	697.95	0.54%
22	4100	695.43	1.24%	695.57	1.09%	694.91	1.39%	694.70	1.48%	694.78	1.42%	694.90	1.43%	694.62	1.63%
23	4320	694.15	0.58%	694.18	0.63%	693.92	0.45%	693.90	0.36%	693.73	0.48%	693.44	0.66%	693.42	0.54%
24	4511	691.11	1.60%	691.14	1.60%	691.04	1.51%	691.17	1.43%	691.10	1.38%	691.05	1.25%	691.12	1.21%
25	4717	689.53	0.76%	689.47	0.81%	689.31	0.84%	689.35	0.88%	689.41	0.82%	689.52	0.74%	689.65	0.71%
26	4933	687.51	0.94%	687.45	0.94%	687.38	0.90%	687.38	0.91%	687.59	0.84%	687.71	0.84%	687.59	0.96%
27	5137	685.81	0.83%	685.78	0.82%	685.47	0.94%	685.44	0.95%	685.45	1.05%	685.53	1.07%	685.82	0.87%
28	5248	683.10	2.43%	683.13	2.38%	682.93	2.28%	682.80	2.37%	682.70	2.47%	682.71	2.53%	682.83	2.68%

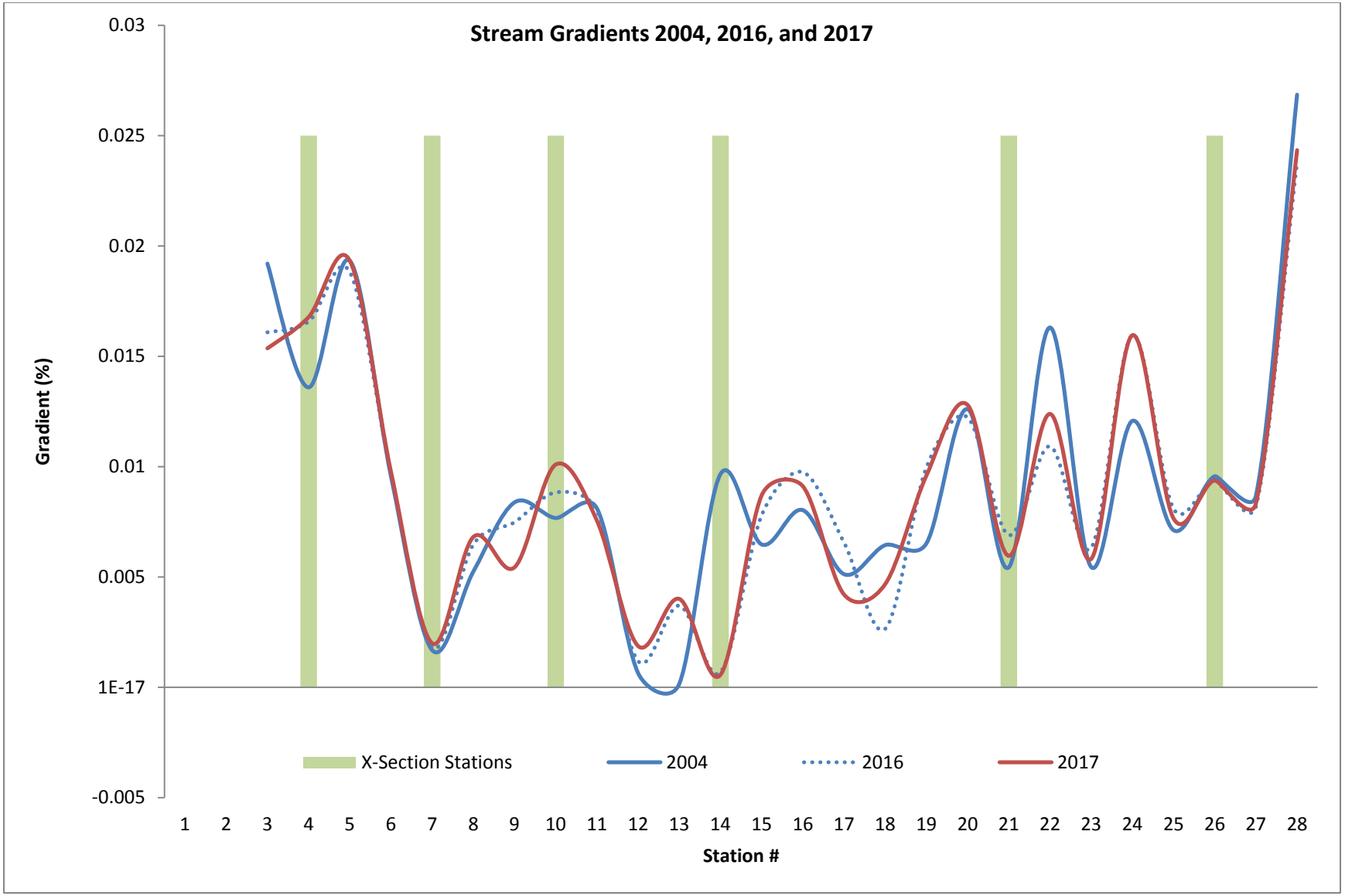


Figure 17: Stream Gradient Change from 2004 – 2017

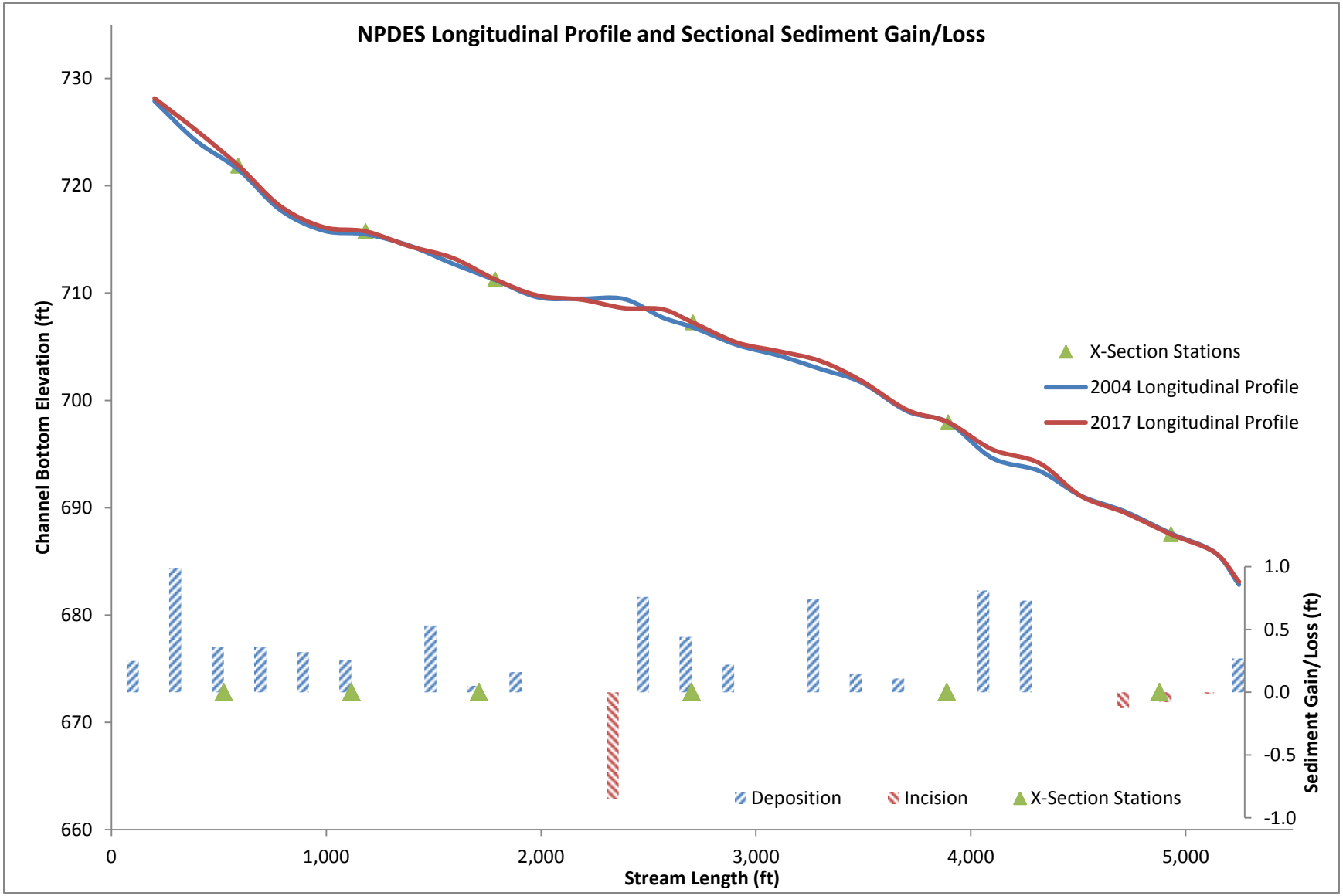


Figure 18: Comparison of Longitudinal Profile and Sectional Deposition/Incision from 2004 - 2017

Chemical

Physical Water Data

Physical water analysis results for both monitoring stations are displayed in **Table 19**. Overall, the outfall station water samples were slightly more basic and exhibited higher temperatures and conductivities as in previous years. On average, temperatures at the outfall station were 9 percent warmer than those at the instream station. Temperature differences ranged from -2°F during storm sampling in December 2016 to 16°F during July 2016. 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.

Table 19
Physical Water Data for 2016 – 2017 Reporting Year

Event	Date	Event Type	Instream Physical Water Data			Outfall Physical Water Data		
			pH	Water Temp (F)	Conductivity (µmhos/cm)	pH	Water Temp (F)	Conductivity (µmhos/cm)
2016-06	7/21/2016	Base Flow	7.76	63	310	9.21	79	220
2016-07	8/25/2016	Base Flow	7.77	66	320	8.55	78	200
2016-08	9/19/2016	Storm	7.22	66	N/A*	7.5	74	N/A*
2016-09	9/22/2016	Base Flow	7.62	61	320	7.77	71	280
2016-10	9/28/2016	Storm	7.2	62	N/A*	8.51	69	N/A*
2016-11	10/20/2016	Base Flow	7.54	60	320	7.71	64	300
2016-12	11/17/2016	Base Flow	7.61	44	280	7.54	44	350
2016-13	11/29/2016	Storm	7.29	47	290	7.52	48	330
2016-14	12/6/2016	Storm	7.97	44	260	9.42	42	250
2017-01	2/15/2017	Base Flow	8.53	40	480	8.63	39	1000
2017-02	3/23/2017	Base Flow	7.16	40	780	8.95	45	1900
2017-03	3/28/2017	Storm	8.02	52	1000	9.4	53	1700
2017-04	3/31/2017	Storm	8.1	45	830	8.81	49	1300
2017-05	4/6/2017	Storm	8.29	51	510	9.11	56	880
2017-06	5/5/2017	Storm	7.8	N/A*	370	7.98	N/A*	540
2017-07	5/18/2017	Base Flow	7.43	62	320	7.63	64	390
2017-08	6/15/2017	Base Flow	7.53	63	331	8.62	77	323

* Analyte not measured because of equipment malfunction

Conductance was generally greater at the outfall station, 31 percent greater on average. Conductance at the outfall station ranged from 200 µmhos/cm to 1,900 µmhos/cm. The instream station ranged from 260 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.

In past years, pH measurements at the outfall were generally more basic with higher variance than those at the instream station. pH measurements at the outfall averaged 8.4 and the instream station averaged a pH of 7.7. The pH values ranged from 7.2 to 9.4 pH units. This pattern is typical 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 17 storm flow and baseflow events for the reporting year are displayed in **Table 20**. Of the observed analytes, Nitrite/Nitrate was the only one to show a significant difference between the two stations for this reporting year. In this case, Nitrite/Nitrate were significantly greater at the instream station.

Table 20
EMC Values for 2016 – 2017 Reporting Year

Event Mean Concentration		Instream Station			Outfall Station			Significance
Analyte	**Units**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**	**p-value**
BOD	mg/L	5.93	2.00	23.02	6.96	2.00	17.71	0.366
TKN	mg/L	1.26	0.50	3.90	1.39	0.50	2.77	0.679
NO2/NO3	mg/L	4.08	0.94	7.00	0.25	0.05	0.97	$8.9x10^{-7}$
Phosphorus	mg/L	0.21	0.01	1.12	0.10	0.05	0.17	0.126
TSS	mg/L	75.47	1.00	492.88	43.44	4.00	398.77	0.452
Copper	µg/L	4.96	2.00	17.64	2.62	2.00	3.82	0.052
Lead	µg/L	3.23	2.00	9.80	2.11	2.00	3.85	0.090
Zinc	µg/L	27.15	20.00	60.45	22.76	20.00	30.05	0.157
TPH	mg/L	5.41	5.00	12	5.00	5.00	5.00	0.332

Figures 19 and 20 present annual mean EMC values for eight analytes from the 2001 through 2017 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 – 2017 was Nitrite/Nitrate, 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, all EMC values for Copper, Lead, and Zinc 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 that reporting year.

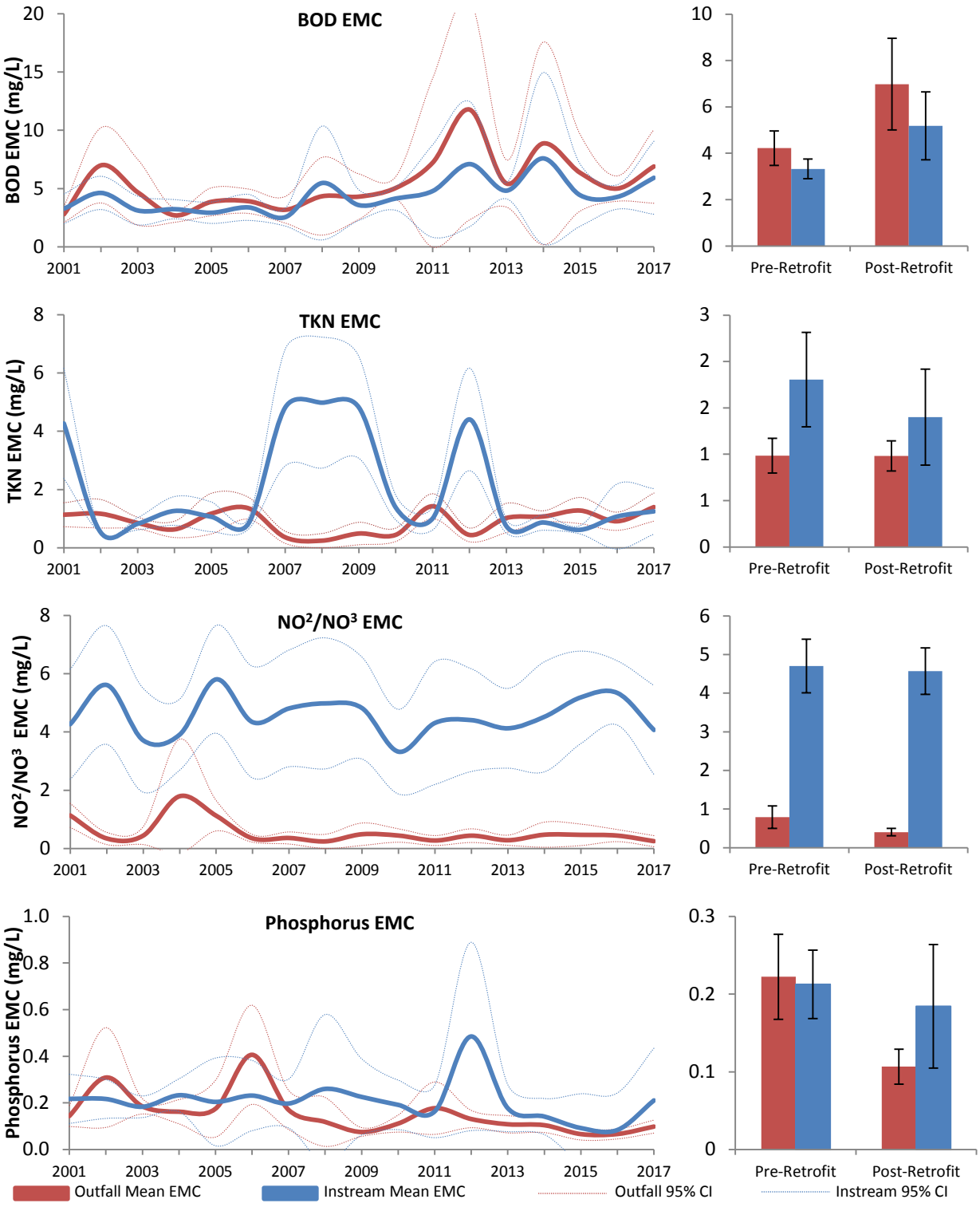


Figure 19: EMC Values from 2001 – 2017 for BOD, TKN, NO^2/NO^3, and Phosphorus

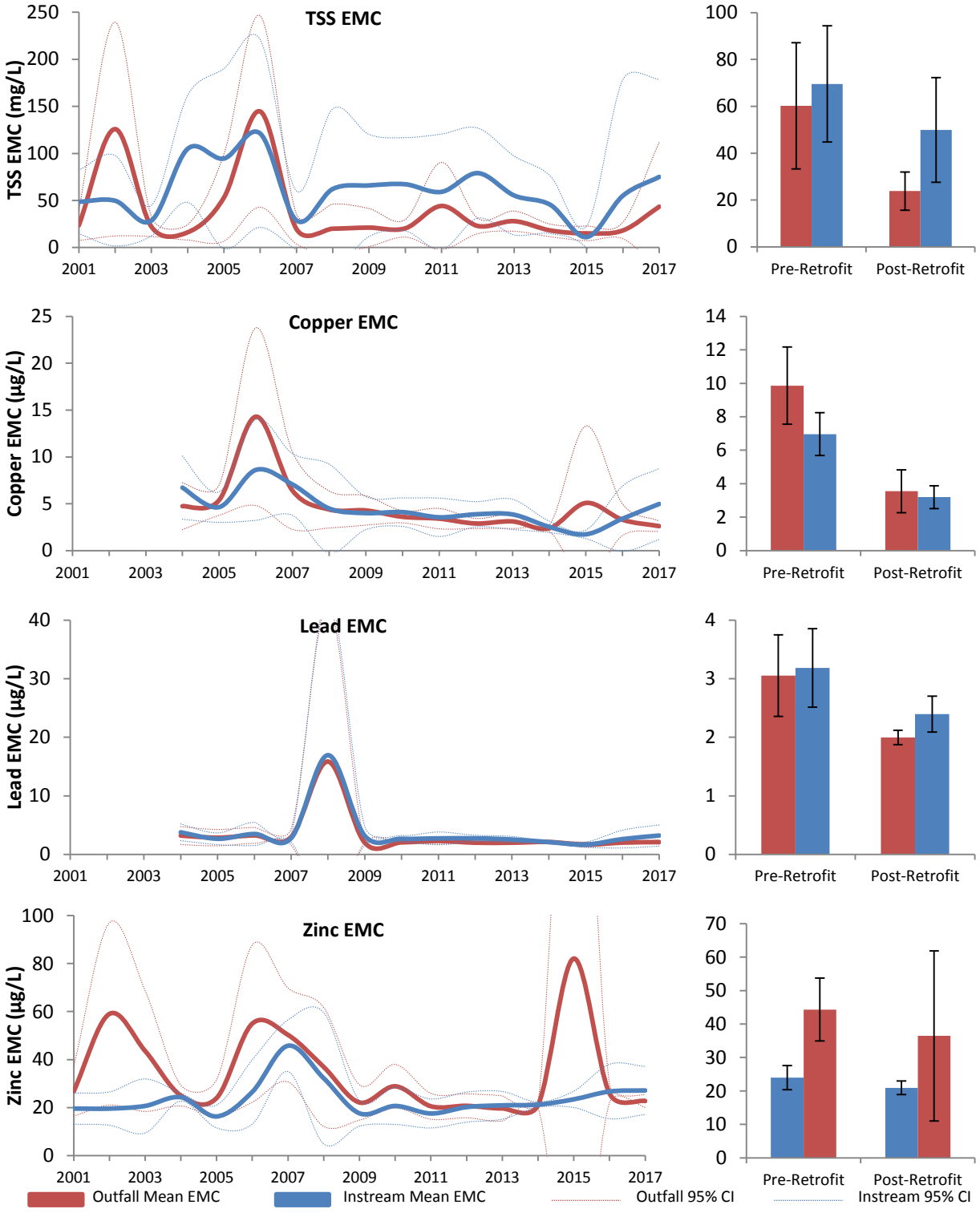


Figure 20: EMC Values from 2001 – 2017 for TSS, Copper, Lead, and Zinc

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 19**, outfall contribution of Nitrites/Nitrates were low overall. All other analytes had estimated outfall contributions during storm flow of 10 percent to 31 percent, higher than the previous year. Results for baseflow were mixed with TKN, Phosphorus, TSS, and the metals increasing and BOD and NO_2/NO_3 decreasing outfall contribution relative to stormflow. It should be noted that for loading calculation, the detection limit concentrations were used instead of zero values with samples below detection. Therefore, actual loadings are likely less than values displayed below. Additionally, 32 of 34 total TPH samples were below detection. One sample concentration of 12 mg/L at the instream station elevated the loading for baseflow at that station.

Table 21
Annual Pollutant Loads for the 2016 – 2017 Reporting Year

Annual Pollutant Loading (lbs/Year)										
Loc.	Type	BOD	TKN	NO2/NO3	Phosphorus	TSS	Copper	Lead	Zinc	TPH
Instream	Base	3,295	412	4,614	25	3,295	1.7	1.7	17	4,119
	Storm	3,618	987	831	163	29,469	3.2	1.6	14	2,394
	Total	6,913	1,399	5,445	188	32,764	5.0	3.0	31	6,513
Outfall	Base	769	289	21	14	2,115	0.4	0.4	4	962
	Storm	1,111	156	27	16	4,137	0.4	0.3	3	676
	Total	1,880	445	48	30	6,252	0.8	0.7	7	1,638

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**.

Several analytes had the greatest loadings in the spring season. This is not surprising considering the spring season had the greatest total discharge of the reporting period. Total suspended solids were highest during the spring season for both stations with a majority of total TSS at the instream station and a large portion at the outfall station, as with previous years. Eighty-eight

percent of the TSS loading occurred in spring at the instream station and 43 percent of total outfall loading occurred during spring. As usual, spring was also the season with greatest loading of Phosphorus and TKN at the instream station with 64 percent and 44 percent of total loading, respectively. Nitrite/Nitrate loading at the instream station, however, was greatest in the summer with 32 percent of the total load occurring during that season. The outfall station relatively consistently correlates to values estimated for the instream station. Observed loadings for all of the metals and TPH were highest in the spring season.

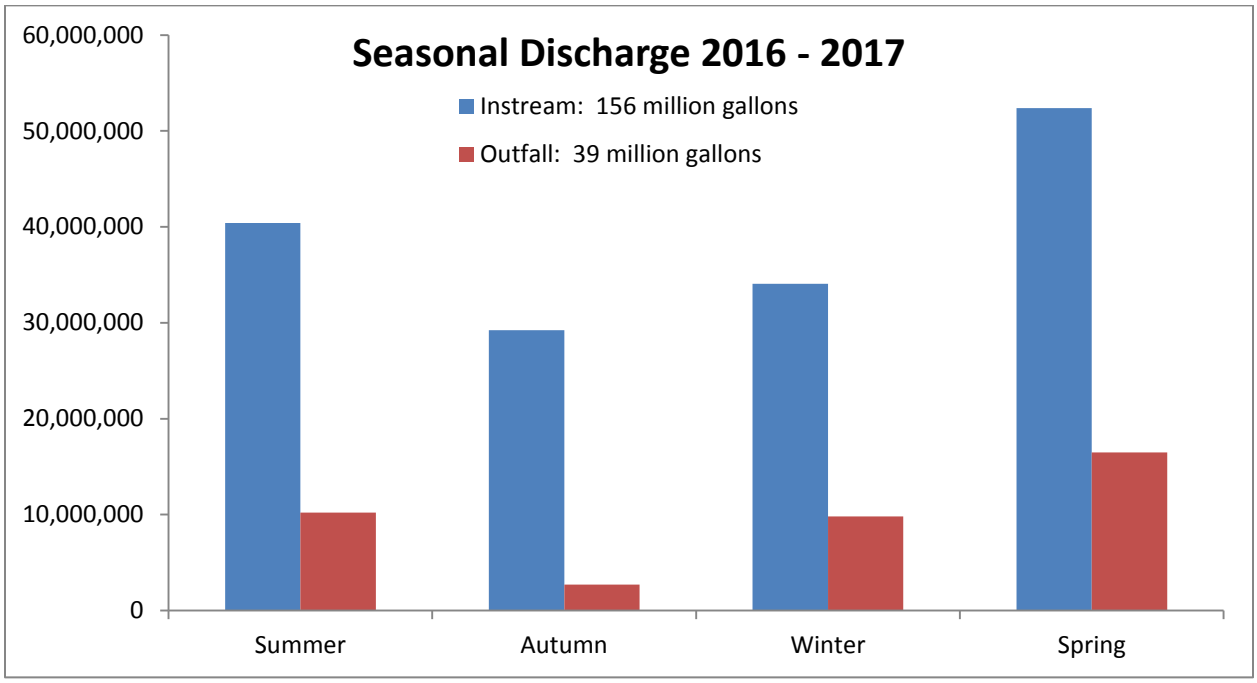


Figure 21: Seasonal Discharge for the 2016 – 2017 Reporting Year

Table 22
Seasonal Pollutant Loads for the 2016 – 2017 Reporting Year

Seasonal Pollutant Loading (lbs)										
Loc.	**Season**	**BOD**	**TKN**	**NO2/NO3**	**Phosphorus**	**TSS**	**Copper**	**Lead**	**Zinc**	**TPH**
Instream	Summer	1,349	169	1,720	10	2,361	0.7	0.7	6.8	1,686
	Autumn	1,545	194	1,171	18	2,599	0.6	0.5	5.0	1,219
	Winter	1,137	428	1,025	64	3,704	2.0	1.2	9.9	1,422
	Spring	1,935	612	1,563	166	60,720	2.4	1.4	11.6	2,186
	Total	5,966	1,403	5,479	258	69,384	6	4.0	33.0	6,513
Outfall	Summer	767	162	4	10	2,471	0.2	0.2	1.7	426
	Autumn	171	36	7	2	215	0.1	0.1	0.5	114
	Winter	331	58	37	6	1,441	0.2	0.2	2.1	410
	Spring	551	127	14	14	3,097	0.5	0.3	3.1	688
	Total	1,820	383	62	32	7,224	1.0	1.0	7.0	1,638

Biological

A complete list of species found at each site and the frequency of their occurrence can be found in **Appendix E**. MBSS scoring criteria for the genus level benthic macro-invertebrate Index of Biotic Integrity (IBI) for the Eastern Piedmont region of Maryland is shown in **Table 14**. 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 Maryland Biological Stream Survey 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**, respectively. The stations for the 2017 reporting year displayed fair and poor 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 2016 – 2017 Reporting Year

Metric	Result	Score
Number of Taxa	22	3
Number of EPT	3	1
Number Ephemeroptera	0	1
% Intolerant Urban	11	1
% Chironomidae	61	3
% Clingers	45	3
	Total Score	**12**
	IBI Score	**2**
	Narrative Rating	**Poor**

Table 24
Instream Station IBI Score for the 2016 – 2017 Reporting Year

Metric	Result	Score
Number of Taxa	31	5
Number of EPT	7	3
Number Ephemeroptera	3	3
% Intolerant Urban	38	3
% Chironomidae	51	3
% Clingers	24	1
	Total Score	**18**
	IBI Score	**3**
	Narrative Rating	**Fair**

Figure 22 presents these scores annually from 2001 through 2017. 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 2.2, which is rated as poor biological health according to MBSS guidelines. The average score for the instream station is 3, which is on the boundary between poor and fair biological health according to MBSS guidelines. This year, the instream reach had a significantly higher number of taxa and individuals, along with a higher score in all but one scoring parameter. Percentage Chironomidae 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; no Ephemeroptera were observed.

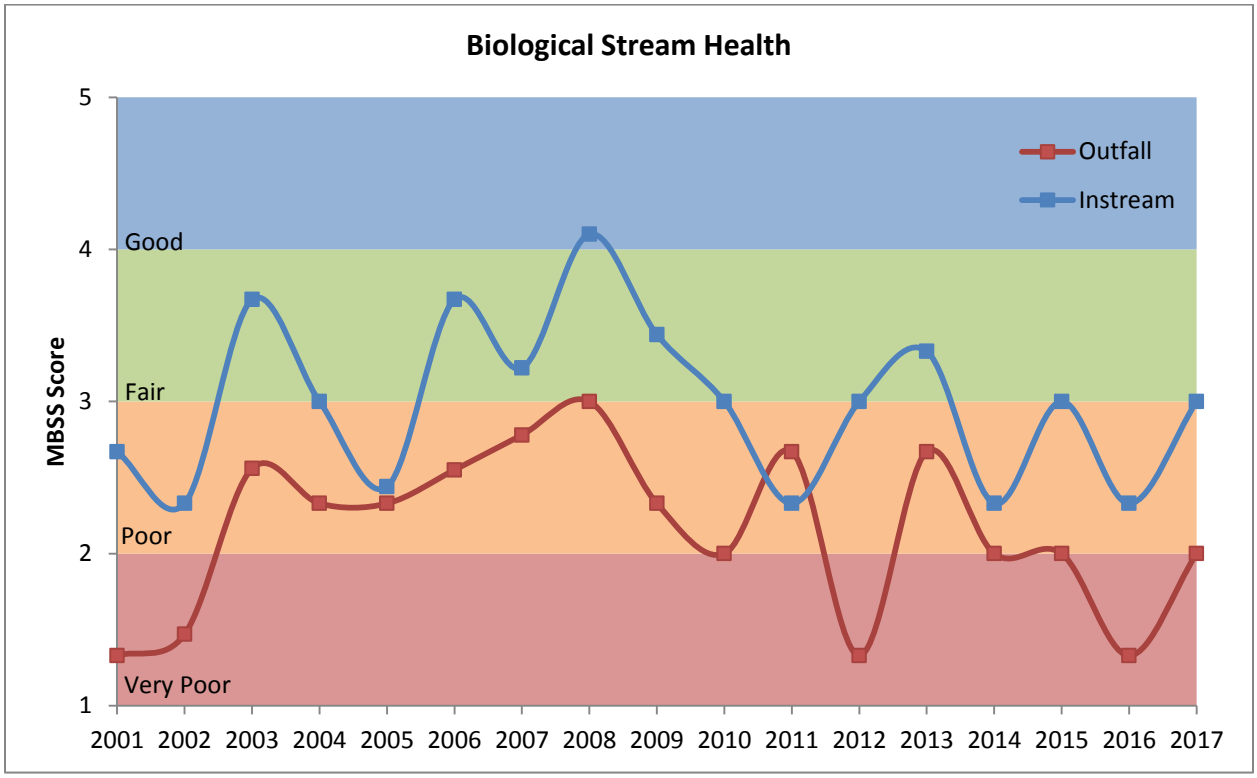


Figure 22: Macro-Invertebrate IBI Analysis 2001 – 2017

The biological habitat assessment results for each station are summarized in **Table 25**. The scores are of a maximum 160 points based on eight parameters as shown in **Table 16**. Overall, the quality of biological habitat at the instream station remains higher than the outfall station with overall habitat scores of 97 and 62, respectively. From 1998 through 2017 (excluding 2001), as shown in **Figure 23**, the stations have average habitat scores of 92 for the instream station and 69 for the outfall station. This was a fairly typical year for both stations with the instream scoring five points higher and the outfall scoring seven 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 lower than the previous years.

Table 25
Spring 2017 Habitat Assessment Results

Parameter	Outfall	Category	In-stream	Category
Instream Habitat	8	marginal	12	sub-optimal
Epifaunal Substrate	5	poor	11	sub-optimal
Velocity/Depth Diversity	10	marginal	13	sub-optimal
Pool/Glide/Eddy Quality	10	marginal	12	sub-optimal
Riffle/Run Quality	9	marginal	12	sub-optimal
Embeddedness	5	poor	10	marginal
Shading	4	poor	12	sub-optimal
Trash Rating	11	sub-optimal	15	sub-optimal
Total Score (max. of 160)	**62**		**97**	
Score (percent)	**39%**		**61%**	

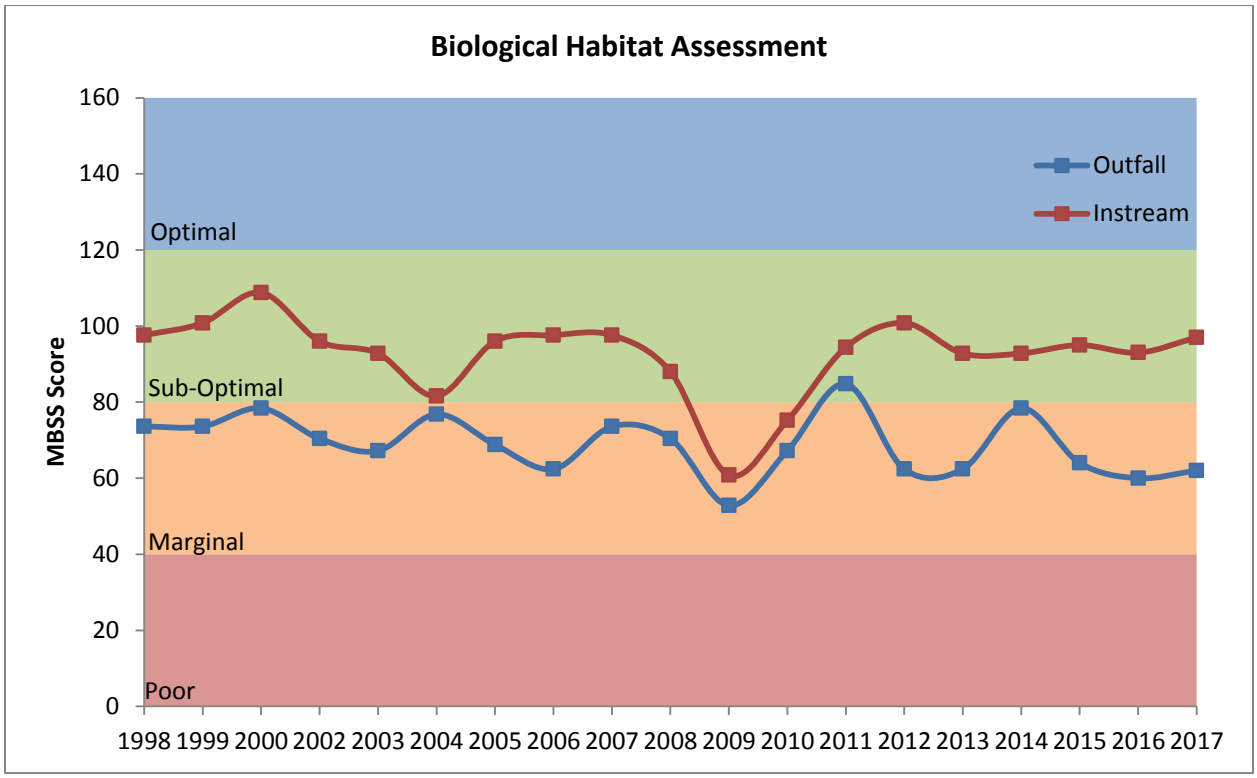


Figure 23: Comparison of NPDES Station Habitat 1998 – 2017 (Excluding 2001)

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 said 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.

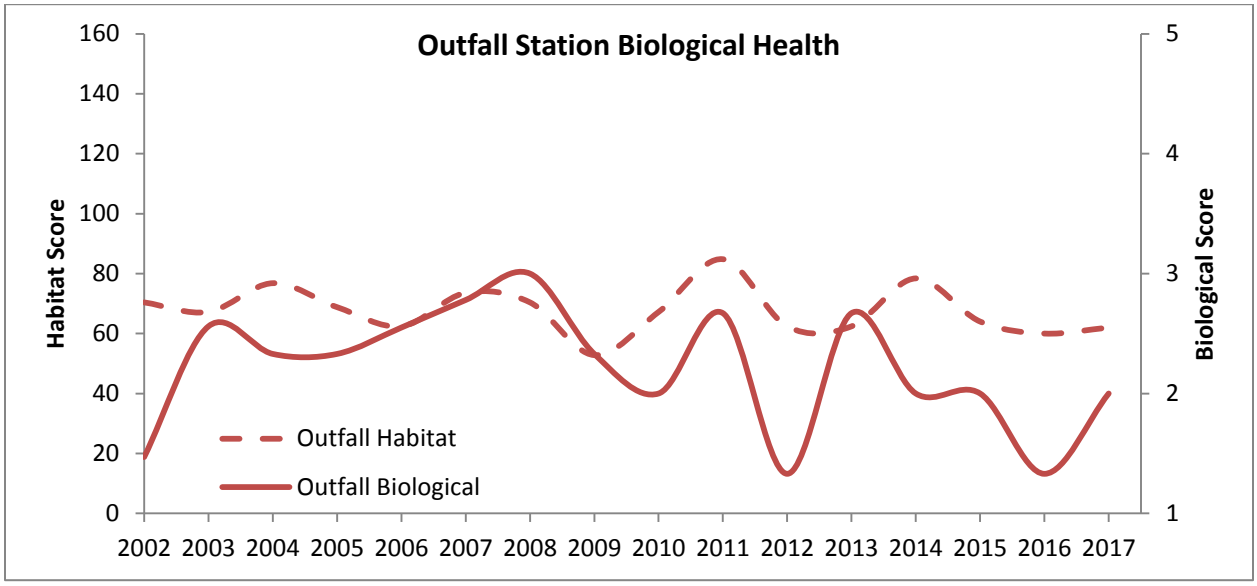


Figure 24: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2017

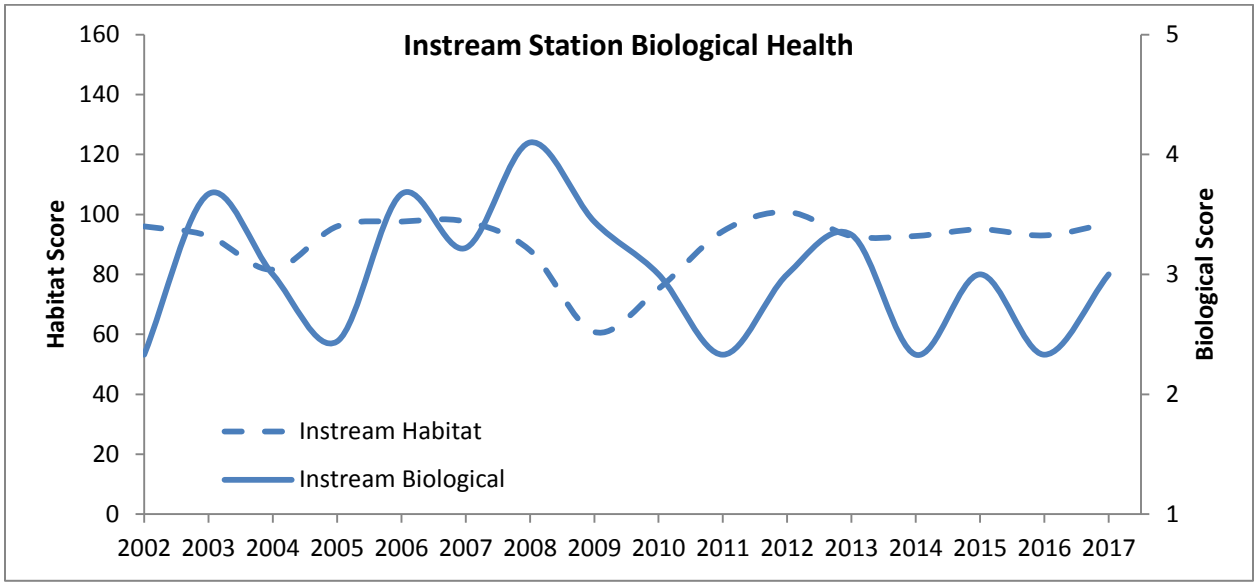


Figure 25: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2017

G. Program Funding

1. Operational Expenses

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, is reported. Each contributing function is identified by job title and indicates an estimated percentage of time spent compared to their overall responsibilities. The 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 **40%** 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 ***~$59,121***

(2) **Chief, Bureau of Resource Management** – The following general tasks are performed by the Bureau Chief, requiring approximately **60%** 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 ***~ $67,476***

(3) **NPDES Compliance Specialist** (2 total) – 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 (for 2 NPDES Compliance Specialists) ***~ $130,525***

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

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

Total estimated expenditure ***~ $31,083***

(5) **Office Technician** – 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 ***~ $2,753***

(6) **Office Associate** – 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 ***~ $5,457***

(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 ***~$25,575***

(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:

- Stormwater management facility maintenance inspections;
- Regular illicit discharge inspections; and
- Field investigations.

Total estimated expenditure (for all four inspectors) ***~ $69,285***

(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 **30%** of the position's time:

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

Total estimated expenditure ***~ $38,494***

(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 **50%** of the position's time:

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

Total estimated expenditure ***~ $43,499***

(11) **Watershed Management Coordinator** – 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;
- Public outreach;
- Watershed management planning and coordination for restoration activities; and
- Work with state and federal agencies on permitting issue.

Total estimated expenditure ***~ $62,879***

(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 engineering of stormwater retrofit projects;
- GIS data management; and
- General technical assistance.

Total estimated expenditure ***~$89,603***

(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 ***~ $65,131***

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

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

Total estimated expenditure ***~ $55,099***

(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) ***~ $113,214***

(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 ***~ $44,039***

(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 ***~ $8,525***

(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 ***~ $65,764***

Other post-employment benefits (OPEB) ***$46,360***

The total estimated salary expenditure for personnel in the 2016/2017 permit year ***$1,023,882***

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 ***$5,472.64***

Expenses for physical and biological monitoring analysis, and monitoring equipment for the 2016/2017 permit year	***$15,251.75***
NPDES training webinar and training video	***$150.00***
Consultant Fees	***$49,762.50***
Total expenditures for supplies and contract services in the Operating Budget for 2016/2017 permit year	***$70,636.89***

Stormwater Pond Maintenance

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

Contractor Cost for 2016/2017	***$120,374.05***
Equipment (gas, other)	***$4,412.75***
Total maintenance cost for stormwater management facilities in permit year 2016/2017	***$124,786.80***
Bond Interest and Principle	***$911,992.45***
TOTAL OPERATING EXPENDITURES FOR 2016/2017 PERMIT YEAR	***$2,131,298.14***

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 expenditures for 2016/2017 permit year	***$4,291,961.22***
Environmental Compliance expenditures for FY 2016 – 2017	***$354,609.09***
Stormwater Facility Renovations FY 2016 – 2017	***$204,881.30***

Cumulative capital expenditures for the program since 2005 can be found in **Table 26**. **Table 27, Table 28,** and **Table 29** provide the approved FY 2018-2023 CIP estimates for program funds. It is important to note that funding beyond FY 2018 is subject to future budget review and approval processes. Therefore, no guarantee is made to future appropriations beyond FY 2018.

Table 26
Total NPDES MS4 Capital Expenditures
Carroll County, Maryland
July 15, 2005 through June 30, 2017

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
7/1/15 to 6/30/16	$2,297,193.78
7/1/16 to 6/30/17	$4,851,451.61
Total permit expenditures, to date	***$20,234,184.50***
Grants received	***$5,448,020.50***
Actual County expenditures	***$14,786,164.00***

Approved Community Investment Plan 2018 – 2023

Table 27
Watershed Assessment and Improvement (NPDES)

	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design		105,000		345,000	230,000	90,000			**770,000**
Land Acquisition									**0**
Site Work									**0**
Construction	3,300,000	3,295,000	3,500,000	3,826,000	4,070,000	4,340,000			**22,331,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**3,300,000**	**3,400,000**	**3,500,000**	**4,171,000**	**4,300,000**	**4,430,000**	**0**	**0**	**23,101,000**

Table 28
Environmental Compliance

	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	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**

Table 29
Stormwater Facility Renovations

	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	50,000	70,000	70,000	50,000	60,000	50,000			**350,000**
Land Acquisition									**0**
Site Work									**0**
Construction	285,000	265,000	265,000	285,000	275,000	285,000			**1,660,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**335,000**	**335,000**	**335,000**	**335,000**	**335,000**	**335,000**	**0**	**0**	**2,010,000**

The Board of County Commissioners approved a capital program in spring 2015 to address the renovation of existing stormwater management facilities. The program funding is designed to support 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 5 to 10 facilities per year over a 30-year period. The funding is 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 **(Table 29)**. The fiscal year begins July 1, 2016, with the following expenditures during FY 17: $204,881.30.

Table 30 provides a project list and the status of the individual project in the approved capital budget for the Stormwater Facility Renovation Program.

Table 30
Stormwater Management Facility Renovation Program
2016-2022

Year	Project Name	MDE8NAME
Project Completed		
2016	Poole Meadows	Liberty Reservoir
2016	Carroll Highlands	Liberty Reservoir
2016	Grand Valley Farms Sec. 2	Double Pipe Creek
2016	Washington Square	Liberty Reservoir
2016	Oklahoma Phase 1 Pond #2	Liberty Reservoir
2016	Jenna Estates Sec. 2 Ph. 1 Pond 1	S Branch Patapsco
2017	Oklahoma Sweetwater	Liberty Reservoir
2017	Grand View Resub. Lot 38	S Branch Patapsco
2017	Eldersburg Estates Sec. 1	S Branch Patapsco
2017	Sun Valley Waterloo Section	Liberty Reservoir
2017	Carrollyn Manor Section 6	Double Pipe Creek
2017	O'Brecht Estates	S Branch Patapsco
2017	Carmae Acres	S Branch Patapsco
2017	Kalten Acres Sec. 1	Double Pipe Creek

Projects Under Construction		
2018	Wilmot Manor	Liberty Reservoir
2018	Woodsyde Estates Surf. Sand	S Branch Patapsco
2018	Matthews Meadows Sec. 2	Liberty Reservoir
2018	Exceptional Center	Double Pipe Creek
2018	Carroll Woods Est. Sec. 7	Lower Monocacy River
2018	C. C. Commerce Center	Liberty Reservoir
Projects Planned		
2018	Larash Manor	Liberty Reservoir
2019	Aspen Run - Winterberry	Liberty Reservoir
2019	St. Georges Gate Sec. 2	Liberty Reservoir
2020	Sherlock Holmes Sec. 3B	Liberty Reservoir
2020	Stafford Estates Sec. 1	Liberty Reservoir
2020	Piney Ridge Village 7	S Branch Patapsco
2020	North Carroll Library	Prettyboy Reservoir
2020	North Carroll Library	Prettyboy Reservoir
2020	Hunters Crossing #2	S Branch Patapsco
2020	Ronsdale Road	Liberty Reservoir
2020	Northern Landfill	Liberty Reservoir
2020	Hoods Mill Landfill Closure	S Branch Patapsco
2021	Melstone Valley	S Branch Patapsco
2022	Stone Manor Pond 1	Liberty Reservoir
2022	Stone Manor Pond 2	Liberty Reservoir
2022	Carrollyn Manor Section 7	Double Pipe Creek
2022	Squire Village	Liberty Reservoir
2023	Ralph Street Extension	Liberty Reservoir
2023	C. C. Assoc. Retarded Citizens	Liberty Reservoir
2023	Carroll Co. Multi. Parking	Liberty Reservoir
2023	Benjamins Claim Condo's	S Branch Patapsco
2023	Benjamins Claim Basin A	S Branch Patapsco
2023	Center Street Road Extension	Liberty Reservoir
2023	Farm Museum Pond	Double Pipe Creek
2023	Sumners Hollow Pond 1	Liberty Reservoir
2023	Sumners Hollow Pond 2	Liberty Reservoir
2023	Sun Valley Sec. 2	Double Pipe Creek

Part IV. Special Programmatic Conditions

Carroll County actively participates in the Chesapeake Bay TMDL efforts. In addition to attending regional workshops held by MDE, staff also participates in webinars offered by the EPA and MDE regarding the Bay TMDL and Maryland's WIP processes. The WRCC continues to serve as the County's local WIP team, and participates in discussions and development of WIP efforts. The WRCC continues to provide progress updates on the 2-year milestones. County staff completed work with MDE staff to update the historical BMP inventory and provide GIS data needed for land use data to update the CBP model for the 2017 Midpoint Assessment. Staff continue to participate in review of the land use/land cover data under development by CBP and other agencies.

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 endpoint 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.

County staff participate as members of the Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to discuss issues of common concern regarding protection of the watersheds. Staff also 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

Carroll County Board of Commissioners

Land & Resource Management - Director

- Administrative Assistant
- NPDES Specialist (2)
- Hydrogeologist
- Special Projects Coordinator
- GIS Analyst III
  - GIS Analyst II
  - GIS Analyst I

AGRICULTURAL LAND PRESERVATION

Manager
- Preservation Specialist
- Office Technician

MOA 10/23/14
Town of Hampstead
Town of Manchester
Town of Mount Airy
Town of New Windsor
Town of Sykesville
City of Taneytown
Town of Union Bridge
City of Westminster

BUREAU OF RESOURCE MANAGEMENT

Bureau Chief
- Office Technician
- Office Associate
- Forest Conservation Specialist
- Floodplain Mgmt/GIS Specialist
- SWM Program Engineer
- SWM Review Assistant
- Watershed Restoration Engineer
- Watershed Mgmt. Coordinator
- Watershed Grants Analyst
- **Water Resource Supervisor**
  - Water Resource Specialist (2)
  - Water Resource Technician (1)
- **Chief, Environmental Inspection Services Division**
  - Inspector (4)

BUREAU OF DEVELOPMENT REVIEW

Bureau Chief
- Office Technician
- Engineering Reviewer
- Development Review Coordinator II
- Development Review Coordinator II
- Development Review Coordinator I
- Legal Document Coordinator
- Development Review Technician

ZONING ADMINISTRATION

Zoning Administrator
- Administrative Assistant
- Zoning Technician
- Zoning Inspector

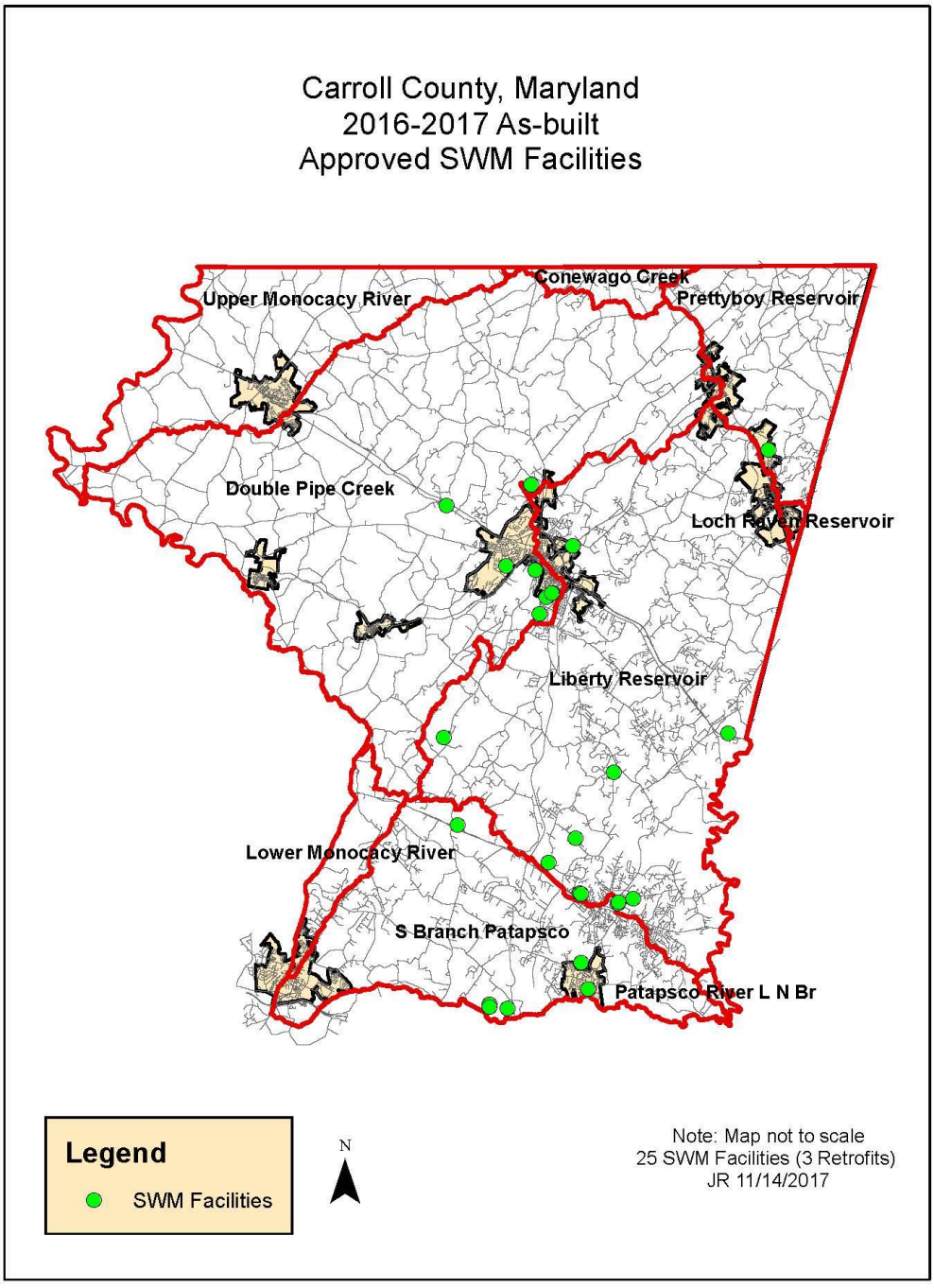
Appendix B

County NPDES MS4 Database CD

(Available Upon Request)

Carroll County, Maryland, 2016-2017 As-built Approved SWM Facilities Map

Appendix B


Carroll County, Maryland
2016-2017 As-built
Approved SWM Facilities
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
Legend
SWM Facilities
N
Note: Map not to scale
25 SWM Facilities (3 Retrofits)
JR 11/14/2017

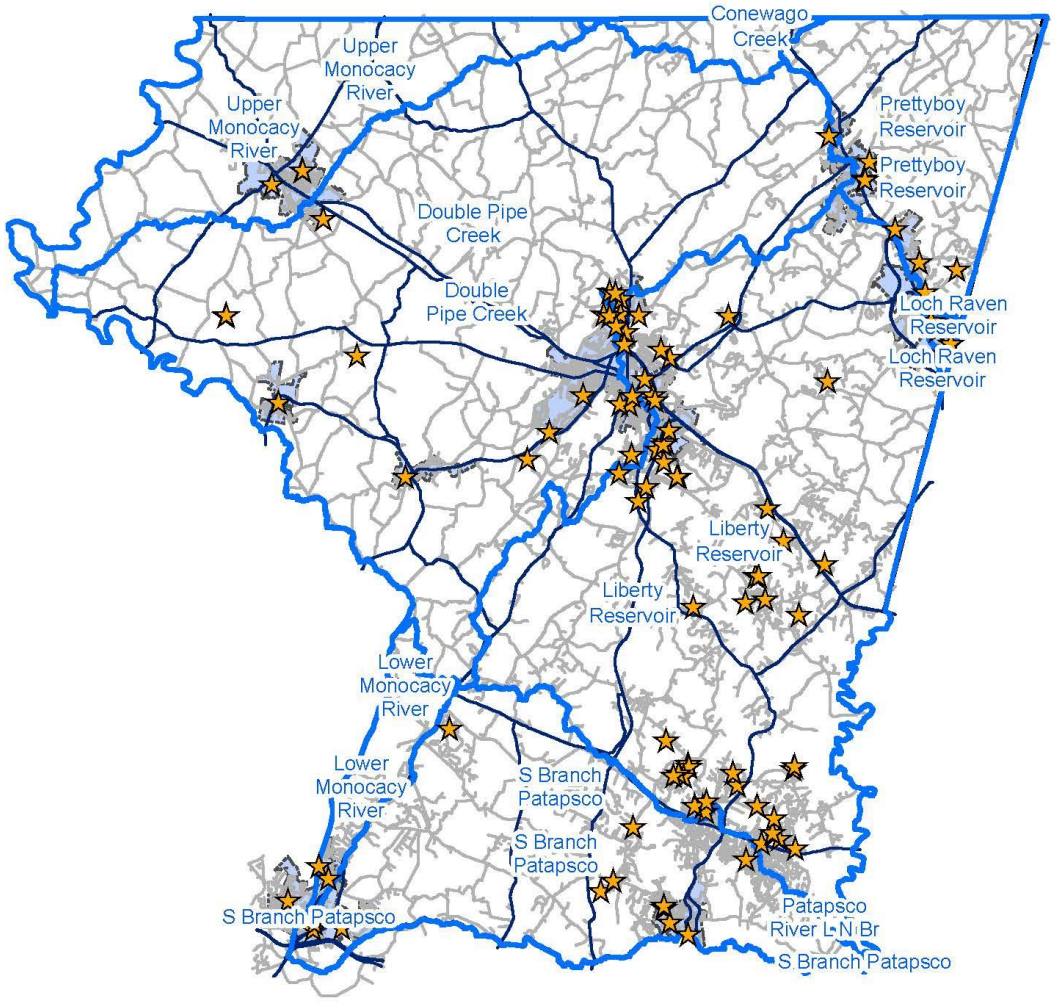
Appendix C

Illicit Discharge Detection and Elimination (IDDE)

- Carroll County MS4 2017 IDDE Outfall Screenings (Map)
- 2017 Illicit Discharge Summary, Illicit Discharge Complaints Processed from July 1, 2016 - June 30, 2017
- 2017 IDDE Commercial/Industrial Survey Locations Map
- 2017 Visual Survey Summary

Appendix C

Carroll County
2017 IDDE Dry Weather Outfall Screenings



Legend

- MS4 Outfall Study Points (102)
- CorporateLimits
- MDE 8 Digit Watershed

Watershed	Screenings
Double Pipe Creek	23
Liberty Reservoir	51
Loch Raven Reservoir	3
Lower Monocacy River	3
Prettyboy Reservoir	7
S. Branch Patapsco River	12
Upper Monocacy River	3

Appendix C

IDDE Program

2017 Illicit Discharge Summary

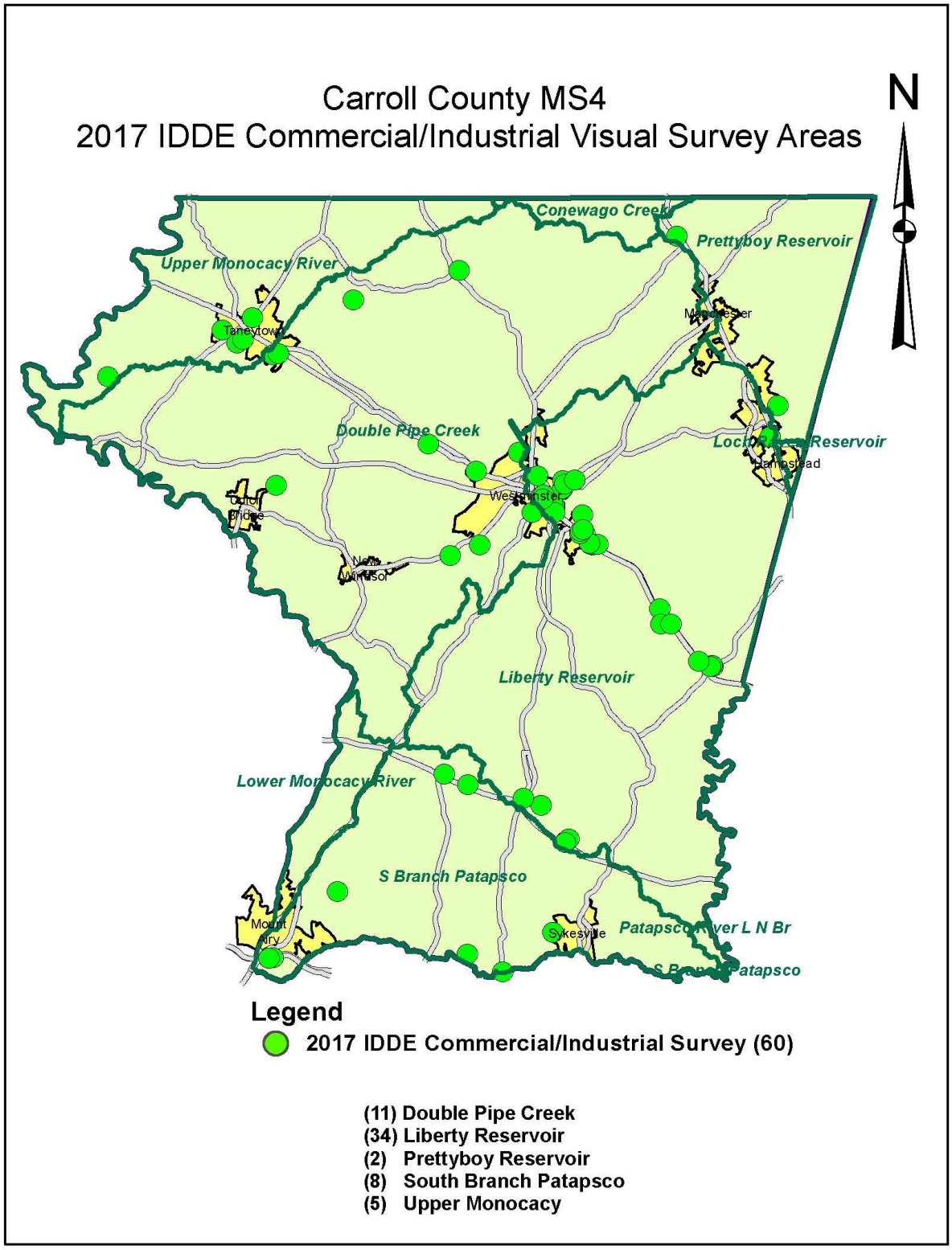
Illicit Discharge Complaints Processed from July 1, 2016 – June 30, 2017

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-16-0008	City of Westminster DPW Utilities reported cloudy observation in stream. Reported: 08/04/16	City DPW Utilities investigated for possible sanitary break. Discovered discharge at unmapped storm drain pipe outfall. Contacted owner and performed dye test and determined wastewater from floor refurbishing at institutional facility dumped in or near old storm drain inlet during maintenance activity. Activity immediately stopped. Coordinated follow-up meeting, with owner/maintenance management, provided MS4 permit educational and BMP materials. Owner immediately addressed w/ all maintenance staff/employees.	Illicit Discharge Eliminated 08/08/16 Case Closed: 09/12/16	Longwell Ave Westminster, MD
PD-16-0009	County DLRM reported visual physical parameters (light foam and algae) noted on a monitored NPDES screened outfall. Reported: 07/12/16	County DLRM / Resource Management personnel conducted lab sample analysis 7/12/16 and 7/29/16 at outfall, multiple inflow points and manholes for multiple parameters; phenols, TOC, ammonia nitrogen, boron and potassium looking for potential sewage infiltration or other contaminants. Lab sample results were negative. Possible eutrophication in older swm pond. Pond scheduled for restoration.	Non-Illicit Discharge Case Closed: 8/26/16	Clauser Court New Windsor, MD
PD-16-0010	County DLRM reported blue green plume in pond in HOA community. Reported: 08/31/16	Field stormwater chem test conducted with negative results. Community HOA contacted who noted pond dye packets (food dye) just placed in pond to reduce algae. Label/MSDS sheet reviewed. HOA provided a MDNR permit for algae pond management by professional. Provided homeowner bmp information to HOA community on stormwater pollution prevention including yard waste management including efficient fertilizer usage.	Non-Illicit Discharge Case Closed: 10/05/2016	Cable Drive Eldersburg, MD
PD-16-0011	Citizen reported grey water discharge from neighbor's newly	County BRM Environmental Inspector investigated and found no unauthorized discharge leaving	Illicit Discharge Eliminated Case Closed:	Bark Hill Road Union Bridge, MD

	constructed property. Reported: 08/25/16	the residence 08/25/16. Citizen re-reported sewage discharges. Follow-up investigations determined no sewage discharge by CCHD but a water treatment system discharge for iron. System permitted and modified to infiltrate.	09/30/2016	
PD-16-0012	Citizen reported excessive oil leaking from neighbor's truck and car parked on public street. Reported: 11/08/16	County DLRM staff investigated and confirmed leakage. Truck removed at time of investigation. No evidence of oil in storm drain system. Enforcement letter sent to vehicle owner to remove or repair leaking vehicles and to clean up pavement using dry cleanup measures only.	Illicit Discharge Eliminated Case Closed: 12/14/2016	Slash Pine Court Eldersburg, MD
PD-16-0013	County DPW Utilities reported a milky colored discharge in drainage ditch. Who tested it for chlorine Reported: 10/14/16	County BRM Environmental Inspector determined the potential source was a nearby restaurant discharging wastewater to storm drain system. Referred to CC Health Department who confirmed illicit connection and worked with the owner to eliminate by proper connection to sanitary per code.	Illicit Discharge Eliminated Case Closed: 11/07/16	Oklahoma Road Eldersburg, MD
PD-16-0014	Citizen reported concern neighbor dumping oil on driveway and dumped tires in rear of property. Reported: 11/03/16	County BRM Environmental Inspector investigated. Property posted no trespassing. Property abandoned in apparent foreclosure. Stained area on gravel drive and tires observed. Could not determine what was dumped or leaked onto driveway or source of tire dumping. Zoning enforcement action in progress. Follow-up inspection found tires removed and property cleaned up. No additional concerns observed.	Potential Illicit Discharge Case Closed: 12/14/2016	Humbert Schoolhouse Road Westminster, MD
PD-16-0015	City of Westminster DPW reported concrete washout near storm drain inlet from homeowner/contractor driveway repair activity. Reported: 10/20/16	City of Westminster, DPW Streets Superintendent met with owner and stopped future/potential concrete washout activity near/at inlet. City of Westminster issued enforcement letter w/bmp information. DPW supervised completion of remaining project.	Illicit Discharge Eliminated Case Closed: 12/12/2016	W.Middle Grove Ct, Westminster, MD
PD-17-0001	Citizen reported concern neighbor's truck and trailer leaving mud and oil all over the street. Reported: 01/04/17	County BRM Environmental Inspector investigated and observed no oil on road. Faint insignificant track from edge of driveway (winter time / wet condition. Site monitored.	Non-Illicit Discharge Case Closed: 02/14/2017	Sandel Lane Westminster, MD
PD-17-0002	Citizen reported large blue green spill area along side of road. Reported 02/27/17	County DLRM staff investigated spill area near trout stream. Requested MDE Emergency Spill support for verification. MDE determined	Non-Illicit Discharge Case Closed: 02/28/2017	Marriottsville RD #2 Marriottsville, MD

		hydroseeding slurry mix with possible insignificant amount of fertilizer and determined no action necessary.		
PD-17-0003	Citizen reported neighbor's dump truck leaking oil onto roadway. Reported: 03/03/2017	County BRM Environmental Inspector investigated and observed a few drippings of oil. No significant oil observed along entire roadway.	Non-Illicit Discharge Case Closed: 03/13/2017	Old New Windsor Road New Windsor, MD
PD-17-0004	Citizen reported via MDE Compliance Program trash and syringes found at storm drain outfall in past in back yard. Reported: 4/12/2017	County DLRM staff investigated. County storm drain system and outfall w/easement in back yard of property. Some trash, glass and debris observed. Owner concerned about children. Owner concerned about their dog and placed a lattice of wood and bike over outfall to prevent it from traveling up pipe underneath road to other side. Reviewed with SWM staff and Roads. Roads met with owner and to install fence around easement by Roads maintenance. Citizen to contact County for immediate clean up should syringes, etc. be observed.	Non-Illicit Discharge Eliminated Case Closed: 04/25/2017	Walz Drive Westminster, MD
PD-17-0005	Citizen reported neighbor dumping oil liquid along property line and tree stump that is going onto her property. Reported: 04/18/2017	City of Manchester staff investigated. Owner had tree cut down several weeks and contacted her tree arborist who checked into it and reported the discharge was "slime flux", a tree disease that causes sap to ooze and why the tree needed to be removed.	Non-Illicit Discharge Case Closed: 04/19/2017	Church Street Manchester, MD
PD-17-0006	Citizen reported trash, litter and syringes (in past) and downed tree branches causing blockages and erosion in stream behind house. Reported: 04/13/17	City of Taneytown staff investigated and had branches removed by resident. Trash removal addressed through local sanitary code.	Illicit Discharge Eliminated Case Closed: 05/11/2017	Bison Street Taneytown, MD

Appendix C


Carroll County MS4
2017 IDDE Commercial/Industrial Visual Survey Areas
N
Conewago Creek
Prettyboy Reservoir
Upper Monocacy River
Taneytown
Double Pipe Creek
Westminster
Hampstead
Liberty Reservoir
Lower Monocacy River
S Branch Patapsco
Mount Airy
Sykesville
Legend
2017 IDDE Commercial/Industrial Survey (60)
(11) Double Pipe Creek
(34) Liberty Reservoir
(2) Prettyboy Reservoir
(8) South Branch Patapsco
(5) Upper Monocacy

Appendix C

IDDE Program

2017 Commercial Industrial Visual Survey Summary

Visual Survey Areas Requiring Follow-up Actions

Processed from July 1, 2016 – June 30, 2017.

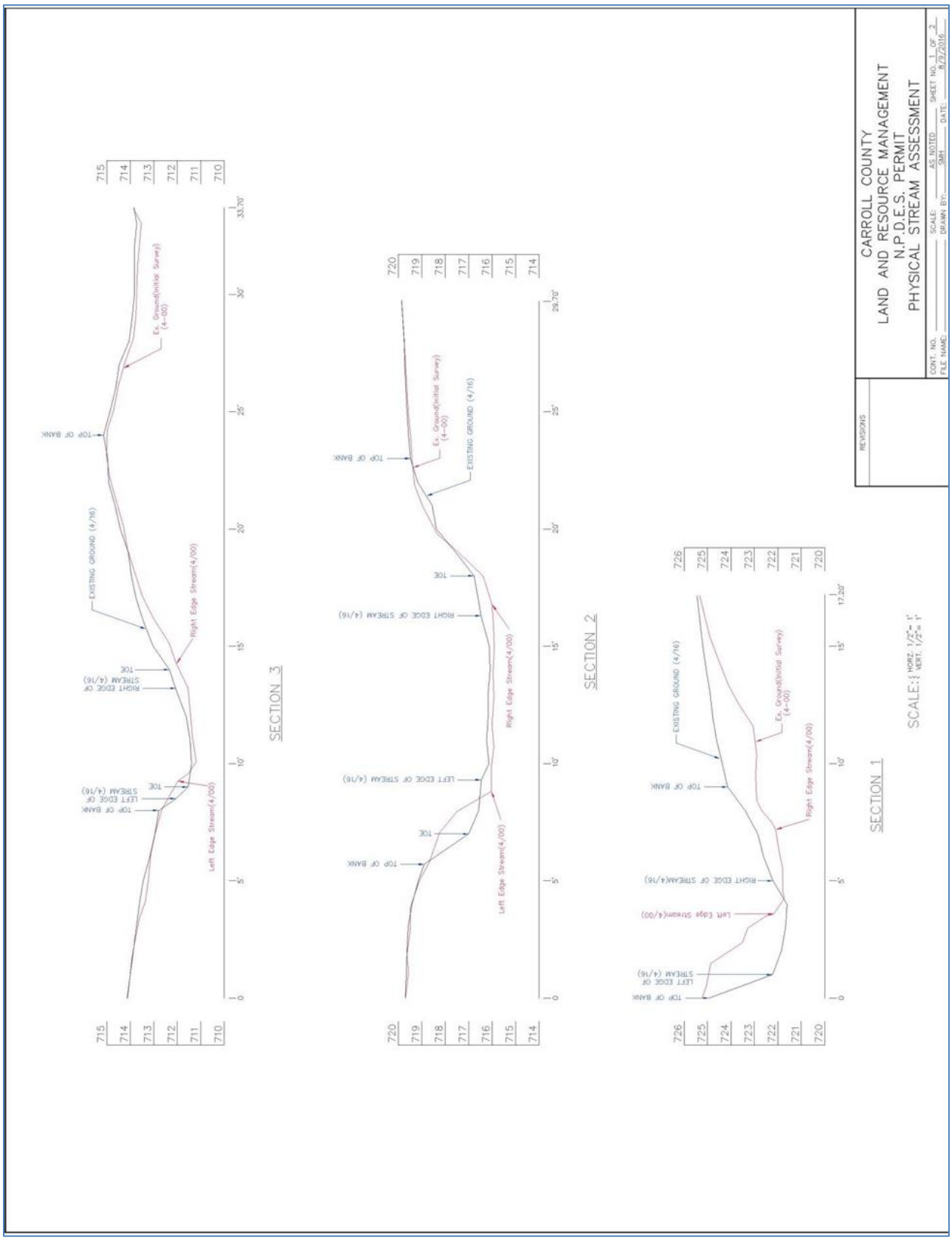
This table presents the 4 of 60 Commercial/Industrial Visual Surveys recommended for follow-up.
No Illicit Discharges Observed

Unique ID#	Visual Survey # Date	Land Use	Activity/ Location/ Watershed	Potential Significant Pollutant Source	Follow-Up Action/Status
0707001193	VS-17-0020 06/28/17	C	John Street Westminster, MD	Multi-Business Fuel Oil Business Auto Industry Collision Repair Shop near storm drain	Provide Stormwater Pollution Prevention Awareness / General Business and Auto Industry BMP Good Housekeeping brochures. Fuel Oil business MDE Oil Operations Permit # 2008-OPT-4506
0707025157	VS-17-0033 01/26/17	I	Baltimore Blvd Westminster, MD	Tire Retread Plant Outdoor storage	Provide Stormwater Pollution Prevention Awareness / General Business and Auto Industry BMP Good Housekeeping brochures.
0707026471	VS-17-0040 01/27/17	C	Gorsuch Road Westminster, MD	Auto and Junk Salvage Yard outdoor activities near waterway concern.	Confirmed Registered MDE 12SW Facility w/WQ Benchmark Monitoring, Permit # 12SR3148. Site should be under SWPPP per permit, monitored by MDE.
0711003028	VS-17-0048 02/08/17	C	New Windsor Road Westminster, MD	Wood Products Mfgr. Outdoor storage	Provide Stormwater Pollution Prevention Awareness / General Business BMP Good Housekeeping brochure.

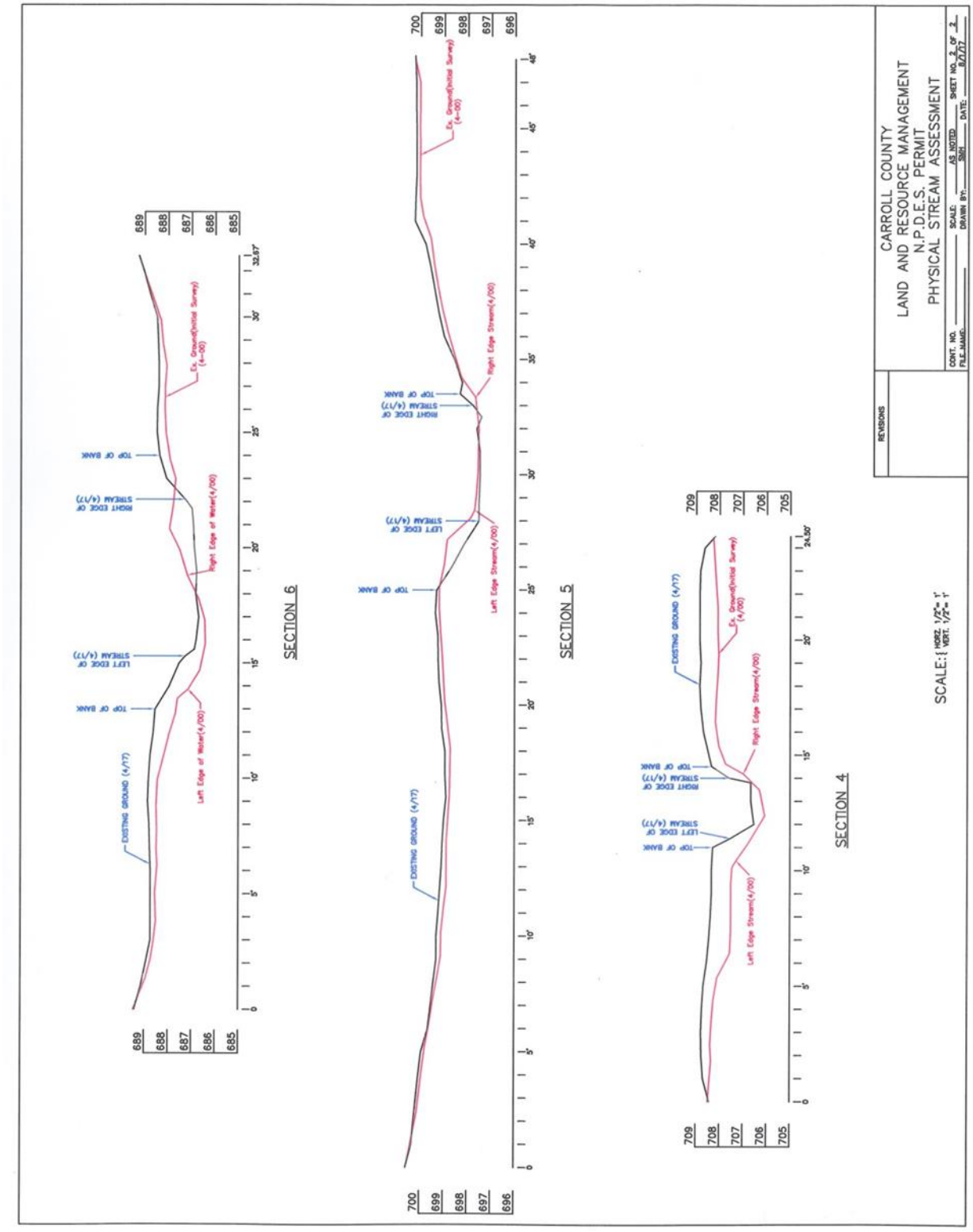
Appendix D

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
CONT. NO.
FILE NAME:
SCALE: AS NOTED
DRAWN BY: SMH
SHEET NO. 1 OF 2
DATE: 8/9/2016
SECTION 3
SECTION 2
SECTION 1
SCALE: HORZ. 1/2"= 1'
VERT. 1/2"= 1'
EXISTING GROUND (4/16)
Ex. Ground(Initial Survey) (4-00)
Right Edge Stream(4/00)
Left Edge Stream(4/00)
TOP OF BANK
TOE
RIGHT EDGE OF STREAM (4/16)
LEFT EDGE OF STREAM (4/16)

Appendix D


CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
SECTION 6
SECTION 5
SECTION 4
SCALE: 1" HORIZ. 1/2"= 1'
VERT. 1/2"= 1'
EXISTING GROUND (4/17)
Left Edge of Water(4/00)
Right Edge of Water(4/00)
Left Edge Stream(4/00)
Right Edge Stream(4/00)
Ex. Ground(Initial Survey) (4-00)
Ex. Ground(Initial Survey) (4/00)
TOP OF BANK
LEFT EDGE OF STREAM (4/17)
RIGHT EDGE OF STREAM (4/17)

Appendix D

Appendix E

2017 Macro-Invertebrate Taxonomic Identifications Results

Order	Family	Taxon	Outfall	Instream
Coleoptera	Elmidae	Dubiraphia		2
Coleoptera	Elmidae	Microcylloepus		2
Coleoptera	Elmidae	Optioservus		13
Coleoptera	Elmidae	Stenelmis	32	16
Coleoptera	Psephenidae	Ectopria		1
Coleoptera	Ptilodactylidae	Anchytarsus		1
Diptera	Ceratopogonidae	CERATOPOGONIDAE	3	
Diptera	Chironomidae	Chaetocladius	12	
Diptera	Chironomidae	Diamesa	1	
Diptera	Chironomidae	Micropsectra	12	
Diptera	Chironomidae	Microtendipes		1
Diptera	Chironomidae	Nanocladius	1	
Diptera	Chironomidae	Nilotanypus		1
Diptera	Chironomidae	Orthocladiinae	4	
Diptera	Chironomidae	Orthocladius		1
Diptera	Chironomidae	Parametriocnemus	17	17
Diptera	Chironomidae	Phaenopsectra	2	
Diptera	Chironomidae	Polypedilum	4	1
Diptera	Chironomidae	Rheocricotopus		8
Diptera	Chironomidae	Rheotanytarsus	2	15
Diptera	Chironomidae	Tanytarsus	6	16
Diptera	Chironomidae	Thienemannimyia Group	15	7
Diptera	Chironomidae	Tribelos		1
Diptera	Chironomidae	Trissopelopia		1
Diptera	Chironomidae	Tvetenia	1	2
Diptera	Chironomidae	Zavrelimyia	1	
Diptera	Empididae	Hemerodromia		1
Diptera	Tipulidae	Antocha	1	4
Diptera	Tipulidae	Hexatoma		1
Diptera	Tipulidae	Pseudolimnophila		1
Ephemeroptera	Baetidae	Diphetor		11
Ephemeroptera	Heptageniidae	Maccaffertium		2
Ephemeroptera	Heptageniidae	Stenacron		1
Isopoda	Asellidae	Caecidotea	2	

Order	Family	Taxon	Outfall	Instream
Trichoptera	Hydropsychidae	Cheumatopsyche	2	2
Trichoptera	Hydropsychidae	Hydropsyche	4	2
Trichoptera	Leptoceridae	Oecetis	1	
Trichoptera	Rhyacophilidae	Rhyacophila		1
Trichoptera	Uenoidae	Neophylax		9
Tubificida	Tubificidae	TUBIFICIDAE	3	1
Veneroida	Pisidiidae	PISIDIIDAE	1	
		Total Individuals	127	142
		Total Taxa	22	30

Appendix F

Local and Chesapeake Bay TMDL Reductions

Local TMDL Restoration Progress-Phosphorus

Watershed	% Reduction Required	% Reduction Achieved	% TMDL Met
Double Pipe Creek	72.5%	7.0%	10.0%
Liberty Reservoir	50.0%	12.0%	24.0%
Loch Raven	15.0%	29.0%	100.0%
Lower Monocacy	30.0%	4.0%	13.0%
Prettyboy Reservoir	15.0%	9.5%	63.0%
Upper Monocacy	5.0%	16.0%	100.0%

Local TMDL Restoration Progress-Sediment

Watershed	% Reduction Required	% Reduction Achieved	% TMDL Met
Double Pipe Creek	33.8%	7.0%	21.0%
Liberty Reservoir	37.0%	8.0%	22.0%
Loch Raven	n/a	n/a	n/a
Lower Monocacy	n/a	n/a	n/a
Prettyboy Reservoir	n/a	n/a	n/a
Upper Monocacy	43.5%	26.0%	60.0%

Chesapeake Bay TMDL Restoration Progress-Phosphorus

[1]Percent reduction represents the combined County/Municipal required for entire County

[2]BMP load reductions reflect delivery ratios that have been applied to the edge-of-stream load reductions for each individual watershed

Watershed	% Reduction Required[1]	% Reduction Achieved[2]	% TMDL Met
Double Pipe Creek	23.88%	2.0%	8.5%
Liberty Reservoir	23.88%	0.0%	0.0%
Loch Raven	23.88%	<1.0%	<1.0%
Lower Monocacy	23.88%	<1.0%	<1.0%
Prettyboy Reservoir	23.88%	<1.0%	<1.0%
Upper Monocacy	23.88%	1.2%	5.2%
		Total % Met:	**13.7%**

Chesapeake Bay TMDL Restoration Progress-Nitrogen

[1]Percent reduction represents the combined County/Municipal required for entire County

[2]BMP load reductions reflect delivery ratios that have been applied to the edge-of-stream load reductions for each individual watershed

Watershed	% Reduction Required[1]	% Reduction Achieved[2]	% TMDL Met
Double Pipe Creek	10.05%	<1.0%	8.7%
Liberty Reservoir	10.05%	0.0%	0.0%
Loch Raven	10.05%	<1.0%	<1.0%
Lower Monocacy	10.05%	<1.0%	<1.0%
Prettyboy Reservoir	10.05%	<1.0%	1.1%
Upper Monocacy	10.05%	<1.0%	9.0%
		Total % Met:	**18.80%**

Appendix G

Discrepancies Between Documentation and the Geodatabase Design

Carroll County maintains a MS4 geodatabase throughout the permit year. This geodatabase contains data specifically requested by MDE and additional data that Carroll County staff and personnel have determined is useful to conduct operations. At the conclusion of the permit year, the data contained within the County's geodatabase is migrated to the geodatabase designed by MDE. This is done to abide by the format MDE requires that the data be submitted in and to filter out any extraneous data used only by the County. During the process of migrating data from the County database to the MDE database, a variety of errors were found in the Maryland Department of the Environment's *National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4), Geodatabase Design and User's Guide* and MDE's geodatabase design. A handful of these errors have been brought to MDE's attention previously but remain. Carroll County would like to make note of these errors in hopes that they are corrected as soon as possible. Some of the errors resulted in inaccurate data being submitted, through no fault of our own, as well as lengthy work-around processes that required staff time and resources to implement.

Additionally, indications are that the geodatabase format as described in the documentation will be integrated with the County's next NPDES permit. The County requests that not only these issues be addressed, but follow-up with other discussed schema issues and changes be addressed before finalization of the next permit.

Below, each associated table and feature class contained within MDE's geodatabase and any issues or errors found during the submission process are outlined.

1. PermitInfo, Associated Table

The documentation states that the FEDERAL_NUM field requires a 10 digit federal permit number. The Carroll County federal permit number is MD0068331, which is only 9 digits. To avoid confusion, the documentation should be adjusted.

2. Outfall, Feature Class

It is required that a construction year be provided for each outfall in this feature class. Some of the outfalls that are contained in this feature class pre-date records being kept. If the year of construction is known, then that attribute is populated, otherwise the year is estimated from nearby property as-built years when possible. Any unknown built-years are populated with 9999 to meet the requirement of providing a value, but acknowledging that the value is not known. It is unclear why this information is required by MDE or what use this information has in the submitted geodatabase. Populating this attribute for some outfalls would require resources and time beyond what is reasonable for an attribute with little use and no justification.

3. OutfallDrainage Area, Feature Class

No issues found at this time.

4. BMPPOI, Feature Class

No issues found at this time.

5. BMP, Associated Table

In the MDE provided user's guide, the ON_OFF_SITE field is noted as being optional. During meetings with MDE, it was agreed that this field has no value and in the future should be removed from the database schema. However, the schema in the geodatabase lists this field as mandatory and requires it be populated in order for the data to be loaded. We populated this field with accurate data for submittal. In this instance, the geodatabase's schema needs to be corrected.

The APPR_DATE is noted as being mandatory in the user's guide while the schema in the geodatabase allows for null values. Similarly, the data type that populates this field should be a date according to the user's guide, but the geodatabase's schema requires a double data type. This is an error with the geodatabase's schema that needs to be corrected. The information has been provided, as the user's guide requests, in the double data type required by the geodatabase's schema to avoid making edits to MDE's geodatabase schema. To submit the data in double format, the data was exported from ArcMap into Excel. There, each date was converted to a general number. After this process, data was then moved into a personal geodatabase. This data was joined to existing data. The personal geodatabase had a table that mimicked the required table to avoid directly editing MDE's geodatabase or the County's correctly maintained data. The field calculator was then used to individually populate fields. Lastly, the data load was completed from this table into MDE's geodatabase. Because our data is stored in the correct Date/Time format, this work around was especially time consuming and problematic. Determining the appropriate work around that would ultimately provide MDE with the required data took nearly an entire day of work for one employee along with time contributed from other employees that aided in solving the problem. Viewing a piece of data meant to be a date as a general number doesn't provide MDE with easily interpreted, useful data and wasted employee efforts and taxpayer money.

Address, City, State, and Zip are coded as mandatory fields. There are process based issues with populating these attributes for features that may not have physical addresses, or may be collections of ESD BMPs. MDE has directed the County to pick addresses that make the most sense for the administration of the program. However, the County does not feel that addresses provide any value to the administration of our program. For this submission, we populated the fields through a spatial join to the closest address point feature class. The fields are populated, but we advise caution in their use. We recommend that MDE allow these attributes to be optional, or remove them altogether.

6. BMPDrainageArea, Feature Class

The BMPPOI_ID attribute is noted as being mandatory in the user's guide. However, the schema in the geodatabase allows for null values. This makes the data optional. The geodatabase's schema needs to be corrected.

7. ImperviousSurface, Associated Table

No issues found at this time.

8. MonitoringSite, Feature Class

No issues found at this time.

9. MonitoringDrainageArea, Feature Class

No issues found at this time.

10. AltBMPLine, Feature Class

The IMPL_COST field only exists in the user's guide and doesn't at all exist in the geodatabase. This field should be added. This field is indicated as being a short integer data type. Short integer data types are limited to values ranging from -32,768 to 32,768. This would prevent us from entering any project costs above $32,768. This data type should be changed to a long integer type. This problem exists in other tables and feature classes within the geodatabase and has been noted to MDE before this submission with no changes having been made to date. It is imperative that this be updated so that accurate project costs can be loaded into MDE's geodatabase and submitted. Because the field doesn't exist in the geodatabase but is noted as being mandatory, the data that would normally reside in this field can be found in general comments so that it could be submitted and compliance attained.

The field PROJECTED_IMPL_YR is noted in the user's guide as being a conditional piece of data. However, the schema of the database makes this a mandatory data point and does not allow for null values to be submitted. Because some projects are completed, and thus don't have a projected implementation year, a work around was required to populate this mandatory field. Projected years are listed for projects that are indicated as 'in planning' or 'under construction' and actual implementation years are entered for projects that have been completed. The geodatabase's schema needs to be corrected to allow null values.

The TP_LOAD, TN_LOAD, TSS_REDUCATION, TP_REDUCATION, and TN_REDUCTION fields are noted in the user's guide as being a conditional piece of data. However, the schema of the database requires that these fields be populated and does not allow for null values. For this reason, we populated these fields with 999 to allow for data to be loaded. MDE's stormwater waste load allocation manual states that outfall restoration does not receive any pollutant removal credit so it can't be a mandatory field. The geodatabase's schema needs to be corrected to allow null values.

The BMP_DRAIN_AREA, PROJECT_CITY, PROJECT_STATE, PROJECT_ZIP, and LU_COUNTY fields are noted as being optional in the user's guide. However, the schema of the database require that these fields be populated and does not allow for null values. This data was entered to allow for data to load and to avoid editing MDE's geodatabase, but we are requesting that the schema or user's guide be corrected moving forward.

11. StrRestProtocols, Associated Table

No issues found at this time.

12. ShorelineManagementPractices, Associated Table

No issues found at this time.

13. AltBMPPoint, Feature Class

The PROJECT_ADDRESS field is noted as being an optional field in the user's guide. However, the geodatabase's schema requires this field be populated.

IMPL_COST field is indicated as being a short integer data type in the user's guide. This prevents us from entering any project costs above $32,768. This data type should be changed to a long integer type. This problem exists in other tables and feature classes within the geodatabase and has been noted to MDE before this with no changes having been made to date. It is imperative that this be updated so that accurate project costs can be loaded into MDE's geodatabase. In the meantime, any implementation costs $32,000 or lower are accurately entered. Any projects with costs above $32,000 were rounded down to $32,000 to allow for submission of data. However, because data is accurately stored in Carroll County's geodatabase, additional steps to alter the data in personal geodatabases were required to accomplish this task. This required employee time, effort, and resources only to provide incorrect information.

The County receives impervious treatment credit for septic pumping, which is recorded in the AltBMPPoint feature class. The documentation states that this feature class is only for septic upgrades, which is incorrect.

14. AltBMPPoly, Feature Class

IMPL_COST field is indicated as being a short integer data type in the user's guide. This prevents us from entering any project costs above $32,768. This data type should be changed to a long integer type. This problem exists in other tables and feature classes within the geodatabase and has been noted to MDE before this with no changes having been made to date. It is imperative that this be updated so that accurate project costs can be loaded into MDE's geodatabase. In the meantime, any implementation costs $32,000 or lower are accurately entered. Any projects with costs above $32,000 were rounded down to $32,000 to allow for submission of data. However, because data is accurately stored in Carroll County's geodatabase, additional steps to alter the data in personal geodatabases were required to accomplish this task. This required employee time, effort, and resources only to provide incorrect information.

The PROJECT_CITY and PROJECT_ZIP fields are noted as being optional in the user's guide. However, the geodatabase's schema requires these fields be populated.

The field PROJECTED_IMPL_YR is noted in the user's guide as being a conditional piece of data. However, the schema of the database makes this a mandatory data point and does not allow

for null values to be submitted. Because some projects are completed, and thus don't have a projected implementation year, a work around was required to populate this mandatory field. Projected years are listed for projects that are indicated as in planning or under construction and actual implementation years are entered for projects that have been completed. The geodatabase's schema needs to be corrected to allow null values.

In the user's guide, the PERMIT_NUM field appears twice in the table outlining the feature class attributes. Also, this feature class is missing from the table of contents in the user's guide.

The ACRES_Planted field is a short integer field. MDE has indicated that values of less than an acre should not be rounded up to 1 acre. This is not acceptable as credit should be recognized for smaller planting sites. This field should be changed to double, or acreages should be allowed to be rounded up.

15. RestBMP, Feature Class

IMPL_COST field is indicated as being a short integer data type in the user's guide. This prevents us from entering any project costs above $32,768. This data type should be changed to a long integer type. This problem exists in other tables and feature classes within the geodatabase and has been noted to MDE before this with no changes having been made to date. It is imperative that this be updated so that accurate project costs can be loaded into MDE's geodatabase. In the meantime, any implementation costs $32,000 or lower are accurately entered. Any projects with costs above $32,000 were rounded down to $32,000 to allow for submission of data. However, because data is accurately stored in Carroll County's geodatabase, additional steps to alter the data in personal geodatabases were required to accomplish this task. This required employee time, effort, and resources only to provide incorrect information.

The field PROJECTED_IMPL_YR is noted in the user's guide as being a conditional piece of data. However, the schema of the database makes this a mandatory data point and does not allow for null values to be submitted. Because some projects are completed, and thus don't have a projected implementation year, a work around was required to populate this mandatory field. Projected years are listed for projects that are indicated as in planning or under construction and actual implementation years are entered for projects that have been completed. The geodatabase's schema needs to be corrected to allow null values.

The BMPPOI_ID and BMP_DRAIN_ID fields are noted as being mandatory in the user's guide provided by MDE. However, the schema in the geodatabase allows for null values. The geodatabase schema needs to be corrected. We provided the information, as the user's guide requests.

Impervious area is the metric that is being used to track our permit. The amount we have, the amount we treated, and the amount we are working to treat. In the Alternative BMP features, there is a field for EQU_IMP_ACR, which states the equivalent impervious area treated. When we perform retrofit projects, we can achieve extra credit for treating more than 1" of rainfall. To accurately account for the impervious area treated, there should be a similar EQU_IMP_ACR field in this feature class.

16. SWM, Associated Table

No issues found at this time.

17. BMPInspections, Associated Table

The REINSP_STATUS and REINSP_DATE fields are noted in the user's guide as being optional. However, in MDE's geodatabase, the properties state that these fields cannot contain null values. Despite this, a data load was successful without having populated these fields. While this is not a current issue, it could become one in the future. The REINSP_STATUS and REINSP_DATE fields' schema should allow for null values. Complete removal of these fields as a schema change has been discussed with MDE.

18. AltBMPLineInspections, Associated Table

The REINSP_STATUS and REINSP_DATE fields are noted in the user's guide as being optional. However, in MDE's geodatabase, the schema in the geodatabase does not allow null values. In order to complete a data load, the REINSP_STATUS fields were set to Pass and the REINSP_DATE was entered as 9/9/9999. Carroll County creates a new inspection record for each inspection, including reinspections. This allows the capture of every single inspection instead of just the initial and final inspections. In the case of a BMP that requires reinspection multiple times, using MDE's methodology would lead to any inspections between the initial and final inspections being lost. Carroll County's method allows you to easily see every inspection record by BMP ID beyond just the initial and final. The REINSP_STATUS and REINSP_DATE fields' schema should allow for null values. Complete removal of these fields as a schema change has been discussed with MDE.

19. AltBMPPointInspections, Associated Table

There are three types of AltBMPPoints, Septic connections to WWTP, Septic Denitrification, and Septic Pumping. The only one that is conducive to having inspections performed is septic denitrification. This BMP is achieved by implementing BAT technology on septic systems, which is then inspected by MDE on an annual basis. The data records obtained from MDE for these inspections were not easily relatable to the installations. A significant amount of time was spent conflating the data. Is there merit to spending considerable amounts of time to report inspections performed by MDE back to MDE? This table should be deleted. If the table is kept, proper guidance regarding protocols should be included.

The REINSP_STATUS and REINSP_DATE fields are noted in the user's guide as being optional. However, in MDE's geodatabase, the schema in the geodatabase does not allow null values. In order to complete a data load, the REINSP_STATUS fields were set to Pass and the REINSP_DATE was entered as 9/9/9999. Carroll County creates a new inspection record for each inspection, including reinspections. This allows the capture of every single inspection instead of just the initial and final inspection. In the case of a BMP that requires reinspection multiple times, using MDE's methodology would lead to any inspections between the initial and final inspections being lost. Carroll County's method allows you to easily see every inspection

record by BMP ID beyond just the initial and final. The REINSP_STATUS and REINSP_DATE fields' schema should allow for null values. Complete removal of these fields as a schema change has been discussed with MDE.

20. AltBMPPolyInspections, Associated Table

The REINSP_STATUS and REINSP_DATE fields are noted in the user's guide as being optional. However, in MDE's geodatabase, the schema in the geodatabase does not allow null values. In order to complete a data load, the REINSP_STATUS fields were set to Pass and the REINSP_DATE was entered as 9/9/9999. Carroll County creates a new inspection record for each inspection, including reinspections. This allows the capture of every single inspection instead of just the initial and final inspection. In the case of a BMP that requires reinspection multiple times, using MDE's methodology would lead to any inspections between the initial and final inspections being lost. Carroll County's method allows you to easily see every inspection record by BMP ID beyond just the initial and final. The REINSP_STATUS and REINSP_DATE fields' schema should allow for null values. Complete removal of these fields as a schema change has been discussed with MDE.

21. RestBMPInspections, Associated Table

The REINSP_STATUS and REINSP_DATE fields are noted in the user's guide as being optional. However, in MDE's geodatabase, the properties state that these fields cannot contain null values. Despite this, a data load was successful without having populated these fields. While this is not a current issue, it could become one in the future. The REINSP_STATUS and REINSP_DATE fields' schema should allow for null values. Complete removal of these fields as a schema change has been discussed with MDE.

22. ErosionSedimentControl, Associated Table

No issues found at this time.

23. QuarterlyGradingPermits, Feature Class

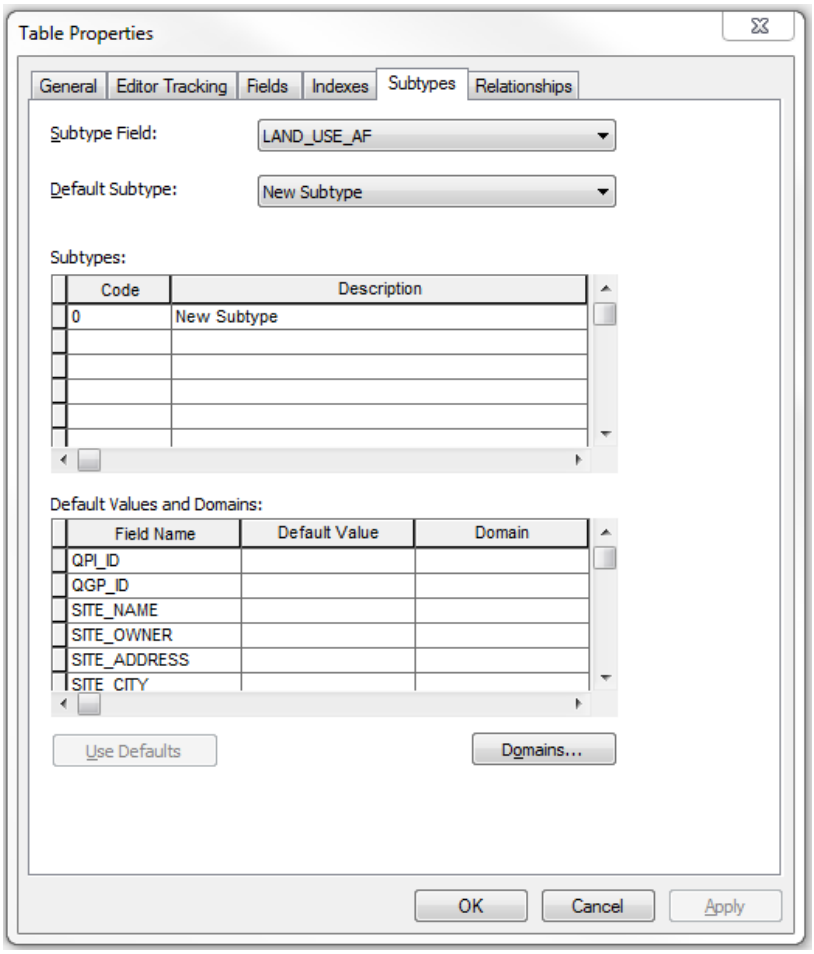
The PERMIT_NUM field is noted in the user's guide as being a mandatory data point. However, the schema in the geodatabase allows for null values. Every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

There is no field for reporting year as there is with every other table or feature class (REPORTING_YEAR). Nearly every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

24. QuarterlyGradingPmtInfo, Associated Table

In the geodatabase user's guide, LAND_USE_BF, LU_COUNTY_BF, LAND_USE_AF, and LU_COUNTY_AF are noted as being mandatory. However, LU_COUNTY_BF and LAND_USE_AF both allow for null values to be entered in the geodatabase. Because the user's guide dictates that these attributes are mandatory, the information was supplied. Carroll County would like to request that MDE explain what benefit this information provides to MDE. Providing this information is labor intensive and requires more effort than benefit. Carroll County believes this information should be optionally provided.

When the data load was attempted, the LAND_USE_AF field would not populate. If individual records were attempted to be changed after the load, changing this field would cause unintended and unwanted changes to other fields within the record. After looking through the schema and properties of the table, an option under the Subtypes tab in the table properties showed a New Subtype for this field. This is preventing this field from being populated. An image of the table's properties is provided to illustrate the issue. To solve this problem, we are utilizing the QuarterlyGradingPmtInfo associated table from MDE's geodatabase provided in 2015. In this older version, the issue with the LAND_USE_AF is not present. The major differences are seen in the 2015 table allowing more fields to contain null values than the 2017 table. Care has been taken to provide all mandatory information as outlined in the user's guide despite these fields allowing null values. Again, this problem required the time and effort of three separate employees that spanned several days to determine what was causing the data to not load correctly. Issues like this and several others mentioned waste valuable time and taxpayer money that could be better spent.



25. RespPersonnelCertInfo, Associated Table

Almost every field in this table is noted in the user's guide as being optional. However, the geodatabase's schema doesn't allow for null values. Despite this, a data load was successful without having populated these fields. While this is not a current issue, it could become one in the future. MDE instructed Carroll County to populate this table with a single blank record, which was done. As this information is managed by MDE and there is no requirement for the County to populate any data, it is recommended that this table be removed from the schema.

26. IDDE, Associated Table

No issues found at this time.

27. MunicipalFacilities, Feature Class

The QUARTER field is indicated as being mandatory in the user's guide. However, this field accepts null values. Carroll County provided this information as it was listed as mandatory in the user's guide. This is an error that needs to be corrected with the geodatabase's schema.

There is no field for reporting year as there is with every other table or feature class (REPORTING_YEAR). Nearly every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

28. ChemicalApplication, Associated Table

The user's guide states that the field CHEM_AM_UNITS is a double data type. However, the geodatabase stores this data as a text string. In this instance we think the documentation is incorrect and should be corrected to agree with the schema present in the geodatabase currently.

29. CountywideStormwaterWatershedAssessment, Associated Table

No issues found at this time.

30. LocalStormwaterWatershedAssessment, Associated Table

No issues found at this time.

31. ChemicalMonitoring, Associated Table

No issues found at this time.

32. LocalConcern, Associated Table

No issues found at this time.

33. Biological Monitoring, Associated Table

Per MDE's user's guide, the FIBI field is optional. However, when loading our data into MDE's geodatabase, the schema dictates that this field be populated. Part IV.F.1.b. of Carroll County's MS4 permit designates the minimum requirements for biological monitoring as part of discharge characterization. It requires that we take benthic macroinvertebrate samples somewhere between the outfall and instream monitoring stations. Carroll County samples just downstream of the outfall station and at the instream station according to MBSS methods. To allow for data to be uploaded, the value 999 was entered into the field to prevent an error stopping the load process. The geodatabase's schema needs to be corrected.

The QUAL_DESCRIP and HABITAT_DESCRIP fields are noted in the user's guide as being conditional and the HABITAT field is noted as optional. However, the geodatabase requires that these fields be populated. In these instances, we had data for each of these fields so there was no load error, but we believe that the geodatabase's schema needs to be corrected to actually allow these fields to be conditional or optional and allow for null values when necessary.

The EVENT_DATE field is listed as mandatory in the user's guide, however the geodatabase allows for null values. This is an error that needs to be corrected with the geodatabase's schema.

34. FiscalAnalyses, Associated Table

No issues found at this time.

35. NarrativeFiles, Associated Table

The MON_STATION_ID field is noted as being optional in the user's guide. However, the geodatabase's schema requires this field be populated. This field was populated with 999 to allow the data to load. The geodatabase's schema needs to be corrected.