Carroll County Maryland

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

2020 ANNUAL REPORT

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Carroll County

NPDES ANNUAL REPORT

2020

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, 2019, through December 28, 2019. In addition, compliance efforts from December 29, 2019 to June 30, 2020 is provided via an administrative extension of the current permit granted by Mr. Raymond Bahr, Maryland Department of Environment, August 6, 2020.

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MDE 2019 Annual Report Assessment Response

This section of the annual report addresses the State's comments on the County's previously submitted 2019 Annual Report, as provided in Attachment 1 of MDE's Assessment and Recommendations document. The County's responses are therefore focused on the reporting period July 1, 2018 to June 30, 2019. The following is a discussion, presented by permit condition, of the issues which were identified within the assessment.

Source Identification

Response to comment: "261 outfall records. A difference of 89 records from the 305 records in the previous annual report. The County should provide an explanation for change in the number of records with the next annual report."

In the FY2019 MS4 Geodatabase submission, the change in outfalls occurred for the following reasons:

1) Removal of outfalls not qualifying as major (19)
2) Removal of outfalls converted to pipe connections (2)
3) Removal of an outfall not conveying stormwater (1)
4) Removal of an outfall belonging to SHA (1)
5) Removal of outfalls located at regulated MDE 12SW permitted facilities (19)
6) Removal of outfalls discharging to other storm drain systems (5)
7) Removal of an outfall erroneously (1)
8) Addition of new outfalls (4)

A geodatabase review conducted in FY2019 identified 19 previously submitted outfalls that did not meet the definition of a major outfall per 40 CFR 122.26. These outfalls were removed from the 2019 submission after an assessment of pipe size, drainage area, land use, and "hot spot" potential. Four additional outfalls were removed from the FY2019 submission for miscellaneous reasons: two were converted from outfalls to pipe connections during construction, one was a SHA outfall, and one was a non-stormwater feature discharge pipe conveying surface water to surface water. These 23 outfalls remain removed from the FY2020 submission.

Nineteen outfalls were removed from the FY2019 submission because they were located at regulated MDE 12SW permitted facilities with Stormwater Pollution Prevention Plans and outfall monitoring programs. Five additional outfalls were found to discharge to other storm drain systems and were removed from the FY2019 submission because they did not meet the definition of an NPDES outfall. Lastly, one outfall was removed erroneously. For the FY2020 Annual Report submission, the County has restored these 25 outfalls to the *Outfall* feature class in order to provide the comprehensive outfall database to MDE. Some may undergo further assessments as clarification and guidance are provided by MDE in the next generation permit process.

Lastly, four new outfalls were added to the County's FY2019 Annual Report and are also included in the FY2020 submission.

In total, between FY2018 and FY2019, 48 outfalls were removed and four new outfalls were added, explaining the change in outfall totals from 305 to 261. Of the 48 removed outfalls, 25 have been restored to the *Outfall* feature class for the FY2020 submission. The County will include an explanation for changes in outfall records in this and future annual reports.

Response to comment "The County should be prepared to provide calculations verifying any projects with an IAE greater than 0.03 where stream restoration protocols were used. If protocols were not used, the IAE should be 0.03. This information should be updated in the next Annual Report."

The Annual Report and geodatabase differed last year due to internal communications on the County's part. Adjustments have been made to the geodatabase (several projects removed). The remaining three projects were approved during the County's first generation permit and credit has been previously approved. All current and future stream restoration projects will have nutrient reductions calculated via approved stream protocols. The impervious area credit will be based on the 2020 Wasteload Allocation Manual.

Response to comment "The Department requests information regarding the County's procedures to address ongoing maintenance of stream restoration projects, specifically after large storm events."

The County has not, to date, invested heavily in stream restoration projects. Those projects that are complete were constructed more than 20 years ago. The County inspects them every three years and they continue to perform as designed. Projects that are currently under construction or planned will be monitored following construction as per our Army Corps of Engineer permits. At the completion of the permits, we will continue to monitor the restoration sites every three years. If conditions are observed that compromise the goals of the restoration projects, the County maintains perpetual easements on the properties to allow for maintenance activities should they be warranted.

Illicit Discharge Detection and Elimination (IDDE)

Response to comment: "The Department advises the County to enter the year an illicit discharge was eliminated in future data submissions."

The County has reviewed and entered the year eliminated for all pertinent records in the 2020 geodatabase submission and will continue to do so in the future upon elimination.

Restoration Plans and TMDL

Impervious Area Restoration

Response to comment: "The Department requests information regarding the County's procedures to address ongoing maintenance of stream restoration projects, specifically after large storm events."

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Impervious Area Restoration Compliance

Response to Comment: "The County shall provide calculations in the next annual report to account for the 405.6-acre difference between the verified restoration of 1,629 acres and the narrative statement of 2,034.6 restored acres. Once verified, these 405.6 acres may potentially be credited toward future restoration requirements."

In previous annual reports, the County applied credit for projects that were funded and under construction at the time of reporting. We have now revised our policy to delay reporting credit for projects until they are substantially complete and performing water quality treatment. All reporting in the GDB and this annual report have been adjusted in this manner. Those specific projects accounting for the 405.6-acre difference that are currently substantially complete are so indicated. Those projects that are still under construction have been designated as "Under Construction" and in this annual report have been designated for credit in FY2021.

Overall, the County and its municipal partners are proud of the permit compliance achieved with the fourth-generation permit. The success in funding, impervious mitigation, and programmatic advances have been very rewarding. Therefore, Carroll County and its co-permittees continue to develop and maintain a program which is comprehensive, effective, and continues to work aggressively toward compliance with the goals and objectives of the permit.

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, and 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 the Maryland Department of the Environment (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.

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 and its co-permittees fully support its stormwater program through strong fiscal commitments, adequate staffing resources, and interjurisdictional cooperation. The County has successfully met and exceeded ambitious impervious reduction goals, provided extensive annual public outreach, and coordinated among a diverse group of jurisdictions to strive for compliance with the NPDES MS4 permit. Fiscal expenditures and capital budgeting – past, present, and planned – demonstrate the continual commitment to this program. This is further reinforced by the Memorandum of Agreement (MOA) signed by all co-permittees, which obligates funding for the capital costs of the permit's impervious surface restoration requirements and defines overall administrative support responsibilities.

The U.S. Environmental Protection Agency (EPA), MDE, and the courts have determined that the 20% 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 implement an adaptive and substantial restoration program to achieve the fourth-generation permit's impervious treatment requirements. As shown in Part IV.G. Program Funding, 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, have been planned and budgeted for the permit term. Additionally, Part IV.D. Management Programs and Part IV.G. Program Funding demonstrate that the programmatic structure is in place to develop and implement restoration plans to address WLAs and approved TMDLs for all County watersheds with a TMDL requirement.

There is a critical disparity, however, between the iterative and adaptive implementation approach encouraged within the permit framework and the simultaneous requirement for specific projects, costs, and deadlines in WLA restoration plans. The current approach mandates a specific and substantial commitment of funds and projects that may or may not be needed to achieve WLAs and TMDLs; a more adaptable approach is necessary. Error and uncertainty within the modeling process should be allowed for and represented by a margin of error, or subsequently a margin of safety, that does not assume an underestimation of the effort needed to achieve water quality standards. A more appropriate method may be one analogous to that of the impervious surface area restoration program, which sets a percentage to be achieved in each permit term.

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 NPDES Compliance Specialists on staff assigned to the NPDES MS4 program. These positions are jointly funded by Carroll County and the eight incorporated municipalities. This arrangement was coordinated by the Water Resource Coordination Council (WRCC), a cooperative partnership between the County, municipalities, and Carroll County Health Department that addresses issues related to water, wastewater, and stormwater management. Under the direction of the LRM Director, the NPDES Compliance Specialists implement certain aspects of NPDES MS4 program requirements. Key responsibilities for these positions include:

- Technical 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 for NPDES MS4 compliance; and
- Coordinates development of compliance education, training, and outreach programs.

Within LRM, the Bureau of Resource Management (BRM) provides vital NPDES MS4 operational and technical support, including fieldwork, GIS operations, monitoring, inspections, compliance, watershed restoration, 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 Bureau of Resource Management, as a result of workload analysis, reassigned the Water Resource Technician position to a Stormwater Reviewer. The reassigned position will provide additional support for stormwater management design and implementation in Carroll County.**

The County/municipal joint permit eliminates political boundaries as a watershed planning and restoration consideration. Specific responsibilities related to permit reporting and support from 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/investigations, visual surveys, training, 12SW permit applicability, property management and maintenance practices, and public education and outreach efforts.

Annual written agreements between the County and each municipality further delineate the services the County will provide for implementation of and compliance with the permit. These agreements also define the environmental and land development codes, ordinances, and standards that uphold 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 (e.g. 12SW) lies with County agencies or municipalities that oversee the permitted 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.

On April 27, 2018, MDE issued a National Pollutant Discharge Elimination System General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (General Discharge Permit No. 13-IM-5500, General NPDES No. MDR055500). This Phase II permit covers the Frederick County side of the Town of Mt. Airy. In December 2014, the Town of Mt. Airy and the seven other municipalities within the County entered into an MOA relating to the NPDES MS4 Phase I requirements covering the portion of the town which is located within Carroll County. Concurrent with the issuance of the next-generation permit, a new MOA will be executed with a section pertaining to the Frederick County side of Mt. Airy and how restoration efforts for the April 2018 Phase II permit will be handled. Programs specified in the general permit (e.g. stormwater management, erosion and sediment control, IDDE, and public education) are implemented by Carroll County and reported in the County's Annual Report and Geodatabase submissions. Information relating to impervious acreage baseline, restoration planning and implementation, and Minimum Control Measures are highlighted in Appendix H "Town of Mt. Airy Phase II Permit Requirements."

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	C/M	C	C/M	C/C	M/M	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	C/ 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 manage and protect the MS4.

C. Source Identification

MDE published a geodatabase (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.

Carroll County has migrated 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 the data.

The County did have to make some revisions to the GDB provided by MDE to allow County data to be entered. It is anticipated that discussions with MDE regarding the relevancy of certain fields, along with further quality assurance updates, will lead to the County data loading cleanly in the future. **Appendix G** provides documentation related to issues and concerns associated with the current GDB. This documentation includes the above-mentioned changes, as the County feels that these changes should be formally made to the GDB format supplied by MDE.

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. We welcome comments and dialogue that will develop from MDE's review of the data. We ask that MDE keep in mind that there was a significant level of effort expended by the County to migrate to this new format and, while the process is complete, further opportunities remain for improving the GDB and its functionality. With the necessary revisions to the MDE GDB schema, we expect that in our next permit term the GDB will be functioning as required to allow for a smoother data submission.

The permit requires identification of 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 technology is employed to assist in mapping and data analysis to help identify drainage systems exhibiting stormwater quality deficiencies. GIS also provides detailed locations for issues identified during the watershed assessments, which aids in developing and implementing effective restoration plans.

1. Storm Drain System

Carroll County maintains an inventory of storm drain infrastructure to facilitate the identification of source pollutants in stormwater runoff within the County and co-permittee municipalities. System mapping maintenance efforts include the utilization of as-built surveys of newly submitted storm sewer systems in digital format, as required through the development review process. Other sources for data capture include archived records, desktop reviews, outfall screenings, and public works staff observations. Data representing stormwater infrastructure and related information is managed within a County GDB using ArcMap 10.8.1 software. This GDB has been structured to incorporate the MDE data reporting requirements described in the *MDE NPDES MS4 Geodatabase Design and User's Guide* (2014 and 2017 revised), allowing the County to simultaneously meet internal recordkeeping requirements and maintain the reporting parameters of the MDE GDB. A functional classification of structures involves the designation of NPDES Study Points, which include major NPDES outfalls and other targeted outfalls monitored and screened for Illicit Discharge Detection and Elimination (IDDE) purposes. The MS4 Geodatabase on the **Appendix B** CD contains outfall and associated drainage area data.

The storm drain infrastructure database includes an owner classification field to clarify County, municipal, and non-MS4 owner/operator status. This helps to define MS4 and non-MS4 interface connections in tracking potential source pollutants and system property management and maintenance responsibilities. County and municipal co-permittee personnel provide local system knowledge, mapping, and field verification in maintaining this data. Digital storm drain system map files and hard copy maps are available as a quick reference tool to each municipality and County agencies as needed. The County has also reached out to other agencies and businesses who own and maintain infrastructure within county limits to confirm ownership. County staff met with State Highway Administration (SHA) staff and contractors on April 2, 2019, to compare data and open the lines of communication between the two agencies regarding GIS data.

2. Industrial and Commercial Sources

Carroll County maintains an inventory of industrial and commercial land use areas that it has determined to have the potential to contribute significant pollutants to the MS4 and watershed drainage areas. This inventory is maintained in a geodatabase with periodic additions and subtractions based on the previous year's visual survey observations. In response to a 2017 IDDE program field review by MDE, the selection criteria methodology was adjusted, expanding the inventory for the program. The program update was found acceptable per MDE's 2019 Annual Report review comments.

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

The BRM manages stormwater management facility data for the County and municipalities in the County GDB. The GDB contains information related to facility location, ownership, reviews and approvals, drainage area, impervious area, inspections, and other potential information for the 2,806 active BMPs.

Currently, there are 985 as-built certified and approved structural stormwater management BMPs throughout the County and municipalities, excluding the City of Taneytown. Of these BMPs, there are 58 structural restoration practices. There are also 1,821 non-structural practices (ESD practices), six of which are non-structural restoration practices. All facilities, drainage areas, and outfalls have been mapped and associated data provided.

These values do not include those from the City of Taneytown, which maintains its own stormwater review, inspection, and maintenance program independent of the County. Taneytown currently has 44 active stormwater BMPs, including 41 structural and 3 ESD practices. The City has located and confirmed as-built plans for 18 facilities, and County staff will be assisting the City in acquiring or developing the remaining facility plans.

Appendix B includes a map of all newly asbuilted structural stormwater facilities for the 2020 permit year.

4. Impervious Surfaces

The Permit Impervious Surface Analysis for Carroll County (**Figure 1)** provides a breakdown of the historical and current impervious area restoration program. During the third-generation permit term, 10% of untreated impervious area was required to be treated. The baseline during that permit was 6,720 acres of untreated impervious area in the County; this number did not include the municipalities (Phase II jurisdictions). A total of 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, at the expiration of the third-generation permit, the County was permitted to work toward addressing the next 20% treatment requirement, which was anticipated to be part of the fourth-generation permit issued on December 29, 2014. In December 2014, the County entered into a MOA with the eight municipalities to join together as a Phase I jurisdiction on the existing permit. The untreated impervious acreage associated with the municipalities (2,265 acres) was then added to the remaining County untreated impervious areas (5,805 acres, determined during a re-evaluation of the County's impervious acreage) for a new baseline of 8,070 acres. The 8,070-acre baseline was affirmed and approved by MDE's review correspondence dated December 13, 2018 for the 2018 Annual Report.

The County concluded the fourth-generation permit in December 2019 with 1,629 acres of impervious area treated, exceeding the 1,614 acres required (20% of 8,070 acres). The County permit has now been administratively extended, and restoration work completed since January 1, 2020 is to be applied to the future fifth-generation permit. The County has restored 129 acres during that time period.

Activities associated with treatment efforts taken during each permit term are listed in **Table 10**. Impervious acres treated to date (July 2020) are 1,759. The County has met both the third- and fourth-generation permit requirements and has achieved 1.6% impervious area treatment toward the future requirement of the fifth-generation permit.

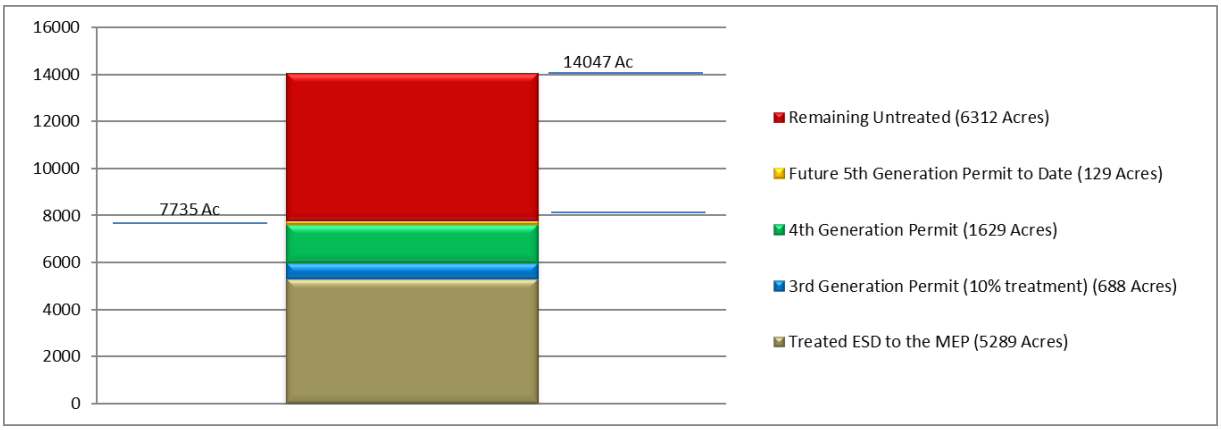


Figure 1: Carroll County Permit Impervious Surface Analysis

5. Monitoring Locations and Watershed Restoration

The BRM is responsible for the monitoring and watershed assessment efforts required under the NPDES MS4 permit. These include the survey and verification of existing conditions, the assessment of natural resources, and the identification of potential water quality issues. These efforts are integral to the NPDES MS4 program because the results provide a means for measuring program implementation.

In addition to MS4 monitoring requirements, the BRM conducts both internal and grant-funded monitoring programs. Currently the BRM is evaluating the self-recovery of stream channel stability in urban watersheds through the Chesapeake Bay Trust's Restoration Research Program.

Chesapeake Bay Trust Restoration Research

In May of 2016, Carroll County was awarded a Restoration Research Grant from the Chesapeake Bay Trust to study the effect of stormwater retrofits on the hydrogeomorphology of downstream channels and associated reductions in nutrient and sediment loads. Stormwater runoff from inadequately managed impervious surfaces can cause accelerated streambank erosion in downstream channels. As pervious land is converted to impervious, the proportion of rainwater that infiltrates into the ground decreases. This, in turn, causes an increase in runoff and an increase in the volume and velocity of flow in downstream receiving channels. The increase in volume and velocity intensifies erosion and increases sediment loads within the stream corridor.

There are two approaches to reducing the destabilizing velocities in the receiving channel. The first is traditional stream restoration, which involves increasing the plan form and bank resistance. The second is upland stormwater management, which can include storing the total runoff volume and dissipating the acquired kinetic energy as turbulence in the water pool.

In the Piedmont region, where Carroll County is located, many areas developed prior to 1982 were constructed without stormwater management. Subsequently, developments were designed with peak flow controls that only matched existing conditions, but did not return runoff characteristics to predevelopment conditions, as required now by COMAR 26.17.02.01. Meeting only the

existing runoff conditions failed to address existing streambank instability, restore streams, or reduce nutrient and sediment export to the Bay.

A foremost goal of stormwater management is to maintain, or return to, pre-development hydrologic conditions. For over 10 years, Carroll County has been experimenting with the use of enlarged, enhanced sand filters as primary stormwater management practices. An analysis of the County's standard design determined that these practices reduce the two-year storm peak flow to below that of the equivalent forested watershed in good condition. The potential stormwater management, water quality, and stream restoration benefits resulting from this are substantial.

Because the two-year flow is thought to control bank geometry, the ability to achieve pre-development two-year hydrologic conditions using sand filters holds high potential for improving downstream bank conditions. The downstream extent to which these effects stretch is dependent on various additional factors, including soil type and land use in the unmanaged portion of the watershed below the sand filter.

Although streambank regeneration is not currently an approved practice in the 2014 MDE guidance document (MDE, 2014), the guidance states that innovative practices that are not approved under the Maryland Stormwater Design Manual (MDE, 2000) nor have an MDE or CBP assigned pollution removal efficiency can be used to offer jurisdictions additional options toward watershed restoration activities, provided that there is proper documentation and monitoring to verify pollutant removal efficiencies acceptable to MDE. The County has developed a paired watershed approach to evaluate the effectiveness of upland stormwater management practices on stream channel protection and began a study in 2016 collecting the necessary data to document the sediment and nutrient reduction benefits associated with this practice. The results will inform recommendations to credit upland stormwater practices as a hydrogeomorphic stream stabilization technique for sediment reductions.

6. Water Quality Improvement Projects

Carroll County continues to determinedly pursue its watershed restoration efforts through impervious surface mitigation and water quality improvements. Projects are designed, managed, and implemented by BRM through a capital improvement program, titled "Watershed Assessment and Improvement (NPDES)" in the Carroll County Community Investment Plan (CIP). Funding for operating (administrative and 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 or greater,
- implementing BMPs to manage existing untreated impervious areas,
- planting stream buffers, and
- installing stream restoration and reconnecting floodplains.

Between January 1 and June 30, 2020, construction was completed on three stormwater management retrofit projects treating 113.5 acres of untreated impervious area. An additional

eight projects are currently under construction, with the anticipated treatment to be reported in the FY2021 annual report. **Appendix F** summarizes how restoration efforts are applied to local WLAs and Chesapeake Bay TMDL reductions.

D. Management Programs

As required by the permit, Carroll County maintains six management programs to help control stormwater discharges and address water quality problems: Stormwater Management, Erosion and Sediment Control, Illicit Discharge Detection and Elimination (IDDE), Litter and Floatables, Property Management and Maintenance, and Public Outreach. The Environmental Inspection Services Division (EISD) of the Bureau of Resource Management (BRM) is responsible for all inspections and enforcement actions necessary to ensure that conditions established in the review, approval, and permitting phases of development 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.

1. Stormwater Management

The County Stormwater Management Program is the responsibility of the BRM within LRM and implements Chapter 151, Stormwater, of the County Code. 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 from July 1, 2019 to June 30, 2020 consisted of 215 plan reviews, 13 structural as-built approvals, and 152 non-structural as-built approvals.

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 a map of newly as-built structural facilities are contained in **Appendix B** of this report.

According to COMAR 26.17.02, preventative maintenance inspections of all ESD treatment systems and structural stormwater management facilities must be conducted on at least a triennial basis. This function is performed by the County for all municipalities except the City of Taneytown, which performs its own inspections.

Inspections of facilities in the County and seven of the eight municipalities are handled by EISD. Each facility is inspected every three years, with letters sent to the owner indicating the condition of the facility and, if deficiencies exist, 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 Roads Operations, and BRM. The EISD performed 475 inspections this

year on 363 individual structural facilities/sites. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. Of those 363 structural facilities, 150 facilities needed corrective action, and 92 were brought into compliance as of June 30, 2020. In cases where violations still exist, no facilities were issued Notices of Violation, allowing an additional amount of time to resolve issues. Currently, 985 structural stormwater management facilities in Carroll County are on the list to be inspected: Of these, 341 will be inspected during calendar year 2021; 308 will be inspected in 2022; and 336 will be inspected in 2023.

Currently, there are 1,821 non-structural ESD practices throughout the County, and 198 inspections were performed in FY2020 on 181 practices. Nineteen of the structures failed inspections, and 12 were brought into compliance by the end of the permit year. The EISD inspectors will be scheduling inspections over the next three years to spread the inspections over the three-year period. At least 779 are planned to be inspected in FY2021, 714 in FY2022, and 328 in FY2023.

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 those 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 three years under the City of Taneytown's stormwater management ordinance. Per the City's "Stormwater Management Facilities Inspection Report" prepared by the City's consulting engineer, all stormwater management facilities within the City of Taneytown are inspected on a triennial basis. The consulting engineer did not inspect any of the facilities in FY2020, as all inspections were performed in FY2019. Facilities will be inspected again in FY2022.

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, Grading and Sediment Control, of the County Code. In 2018, MDE performed a review of the County program and granted the County's request for continued delegation of erosion and sediment control enforcement authority for two years, effective through June 30, 2021.

Inspection statistics relating to grading permits and inspections during the reporting timeframe included 132 grading permits issued and 3,756 sediment control inspections performed. All inspections are recorded with notices sent regardless of the site conditions. In nine cases, Stop Work Orders were posted for violations, which in most instances required compliance within 36 hours. Currently, there are five outstanding violations moving through the enforcement process. These permits and inspections are included in the GDB.

Grading permits are issued on all projects with disturbance in excess of 5,000 square feet. Pre-construction meetings are held with the contractor to discuss the sediment and erosion control plan associated with the project. Site meetings are held periodically with the foreman who holds a valid "Responsible Personnel Certification" throughout the duration of the project. As part of the NPDES permit requirements, grading permits issued with earth disturbance in excess of one acre are reported to MDE quarterly.

LRM staff were informed by MDE that a review process is in place for applications for projects located within Tier II watersheds. The purpose of MDE's Tier II review is to prevent the degradation of high-quality waters from permitted activities. To ensure that applicants were aware of this review, LRM sent a memorandum to Carroll County builders and surveyors in November 2019. The correspondence included MDE's Antidegradation Applicant Review Checklist, the Enhanced Best Management Practices for Tier II Waters (v. 5-2018), a Tier II High Quality Waters Map, and links to additional resources.

3. Illicit Discharge Detection and Elimination (IDDE)

The NPDES permit requires the implementation of an inspection and enforcement program to ensure that all non-stormwater discharges are either permitted by MDE, exempted under the NPDES Phase 1 MS4 permit, or eliminated. LRM performs illicit discharge monitoring, detection, and elimination and assists 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 were made to municipal ordinances or regulations related to Chapter 53 of the County Code this permit year.

Annual dry weather field screenings of at least 100 outfalls are conducted by EISD inspectors and NPDES Compliance Specialists. Staff participated in annual IDDE training prior to the inspection season. Current standard operating procedures (SOPs) are included in the County's 2016 IDDE Guidance Manual. Screenings are grouped by election district and assigned to staff most familiar with the stormwater facilities and land use activities in each district. Outfalls located in the eight municipalities are inspected by an NPDES Compliance Specialist in cooperation with municipal staff most knowledgeable of their local environs.

To facilitate IDDE screening, a unique outfall identifier is assigned to major NPDES outfalls and other non-major outfalls that have been targeted for their high illicit discharge potential (e.g. commercial and industrial land uses, densely populated areas, aging sewer infrastructure areas, or areas with past screening history). These outfalls are regularly evaluated and updated for relevance in order to maintain a productive outfall screening program.

There were 108 outfalls screened for the 2020 permit year. Fifty-six were located in the County, and 52 were within the municipalities. Outfall screenings were distributed among seven watersheds: Prettyboy Reservoir (9), Loch Raven Reservoir (3), Liberty Reservoir (39), Patapsco River - South Branch (23), Lower Monocacy River (7), Double Pipe Creek (22), and the Upper Monocacy River (5) (see outfall screening map in **Appendix C**).

There were 37 outfalls with dry-weather flows, each of which was chemically analyzed using a field screening test for the parameters defined by the permit. Three outfalls presented physical and/or chemical indicators of possible contaminants and illicit discharge. Source investigations from these outfalls up the storm drain network were conducted at the time of screening. Additional follow-up screenings and further investigation occurred as necessary until discharges were eliminated. A summary of outfalls investigated with actions taken is provided in **Appendix C.** The geodatabase includes the results of this year's outfall screening and can be found on the CD in **Appendix B**.

In addition to the outfall screening program, annual visual surveys are conducted at industrial and commercial sites that have a high potential for generating and discharging pollutants per Part IV.C.2 of the permit. Prior to conducting IDDE visual surveys, NPDES Compliance Specialists and EISD staff receive training and review permit regulations and procedures. Standard Operating Procedures (SOPs) for conducting visual surveys are utilized for discovering, documenting, and eliminating pollutant sources discharging to the MS4 or regulated waterways. A visual survey inspection form guides staff to identify significant pollutant sources that could be exposed to stormwater. The form focuses on key activities that are often hotspots for potential pollutants, evaluating the quality of related good housekeeping practices and their proximity to storm drain inlets or waterways.

If a significant pollutant source of concern or an illicit discharge is discovered, the property owner is contacted by the EISD or respective municipal authority. The SOP guidelines and Chapter 53, relating to enforcement measures, are followed until the source is eliminated. County or MDE Good Housekeeping/BMP 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 66 visual surveys were conducted during the 2020 permit year. These included 57 commercial sites and nine industrial sites across five watersheds. A map of visual survey site locations and summary of visual survey actions can be found in **Appendix C**. No illicit discharges were discovered during the surveys. However, two sites - an equipment rental business and a contractor's heavy equipment storage yard - were sent a stormwater pollution prevention letter with information on good housekeeping and best management practices. Businesses were also categorized to tailor future stormwater education and outreach to their specific operations. Of the 66 sites surveyed this year, 48 will be retained in the inventory for their high pollution potential. The remaining 18 will be removed; seven sites were found to have existing NPDES permits with Storm Water Pollution Prevention Plans, and 11 sites had no significant pollutant source potential.

Carroll County is required to maintain a program to address and respond to illegal discharges, dumping, and spills. The County maintains a Stormwater Pollution Hotline as indicated on County and Municipal websites. "Illicit Discharge Incident Response" SOPs have been implemented and are documented in the County IDDE Guidance Manual to quickly respond to and eliminate potential illicit/pollutant discharges in the MS4. A pollutant discharge database is in place and managed by the County EISD using the Accela software program. 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 investigations and reports. EISD closely coordinates with respective municipalities for elimination if an incident proves to be an illicit discharge.

During the 2020 permit year, 15 IDDE discharge complaints were processed: six from the Stormwater Hotline, five from trained County and Municipal employees, and four from MDE. Of these complaints, three were determined to be non-illicit discharges, three were potential illicit discharges, and nine were confirmed illicit discharges. The illicit events included six commercial, two residential, and one institutional discharge. All potential and confirmed illicit discharges were successfully eliminated or resolved through voluntary compliance or interagency efforts. An IDDE Incident Investigation Summary is included in **Appendix C**.

Chapter 53 of the County Code establishes methods for 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 the necessary enforcement authority, either solely or in conjunction with the County. **Table 2** lists the municipalities that have adopted this County Code and the responsible enforcement authority in each municipality.

Table 2
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

Each fall, an annual NPDES Stormwater Pollution Prevention training event is held for administrative and supervisory-level personnel of pertinent County bureaus and the eight municipalities. This year, the workshop had 48 attendees. Content included an overview of the NPDES program (including MS4 and 12SW Industrial Permit requirements), good housekeeping BMPs, Stormwater Pollution Prevention Plan practices, IDDE, property management and maintenance, employee training, and recordkeeping. The training also included a session by the Montgomery Parks Maryland-National Capital Park & Planning Commission on integrated pest management and a session by Maryland Environmental Service on 12SW Permit and SWPP implementation. The agenda is included in **Appendix C.**

County and municipal public works staff are also trained by their respective departments to perform visual inspections of storm drain systems during their workday and to report potential illicit discharges to supervisors. County and municipal staff 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 288 employees received training during the permit year, covering the MS4 permit, general stormwater pollution prevention, good housekeeping/BMPs, and IDDE.

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.

During the 2020 reporting year, Carroll County implemented several programs to reduce and control litter along roadways, which ultimately reduce litter to County waterways:

- Twelve groups actively volunteered 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.

- DPW staff spent 502 hours on roadside trash pickup in FY2020.

- 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 FY2020, 38 complaints were received, and three sites were abated by County contractors.

- The program for the County and the municipalities included 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 also 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 be partially attributed to the County's waste diversion efforts, which result in less waste to recycle. This decrease may also be due to the increasing costs of recycling for the companies that use the recycled materials, which has decreased market demand.

Recycling markets have tightened, and recovered material is being scrutinized for contamination. A significant portion (60%) of U.S. recyclables has been exported to China in the past. However, the Chinese government announced a plan to ban all recovered material imports by 2020. China's initiatives impose stricter quality standards for materials entering its ports and set deadlines for material bans. China has since softened its approach, deciding in April 2020 to realize the zero import of solid waste more gradually. Certain types of exports are still expected to cease in 2020 and 2021. New processing facilities are now being developed in the U.S. The main focus for the County at this point is to eliminate contamination of items that are recycled to increase marketability of the County's recycling products.

In 2017, Carroll County began the process of eliminating the collection of plastic grocery shopping bags in curbside collection. These bags create problems for the machinery, and the Material Recovery Facility (MRF) must shut down to clean out the plastic from the equipment. All recycling is now required to be loose and not in plastic bags. Plastic grocery bags now go to supermarket or retail outlets with collection receptacles.

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.

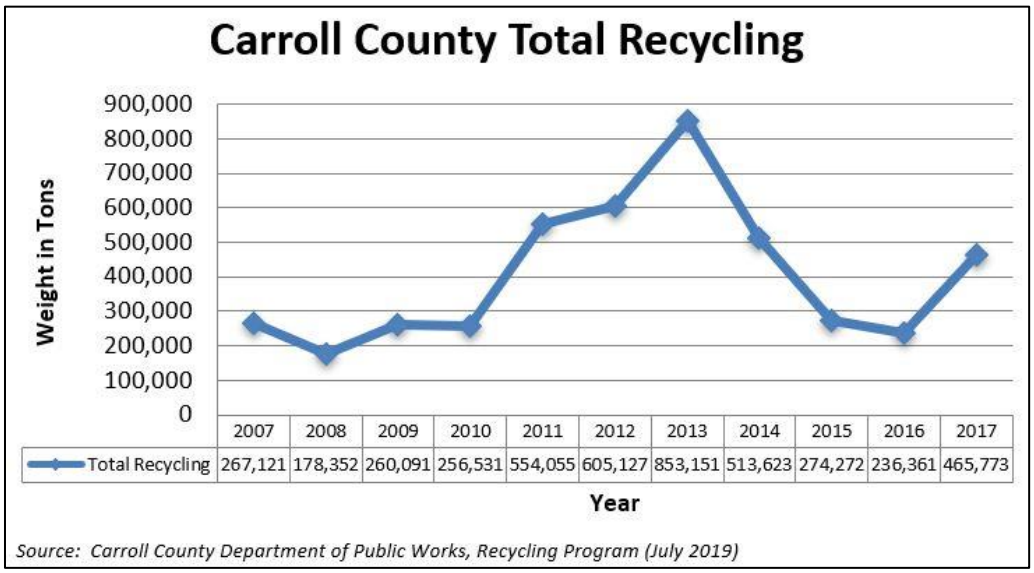


Figure 2: Total Recycling

Curbside, single-stream recycling was implemented in 2007 and expanded in 2008, making it easy and convenient for residents to participate. Most standard household recyclables can simply be placed at the curb. Carroll County took advantage of grant opportunities in 2009 to purchase and distribute large recycling containers that add to the ease of handling curbside recycling.

Carroll County's Recycling Operations staff offer voluntary recycling opportunities for all Carroll County residents and businesses. Licensed haulers are required to offer all customers 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 an additional drop-off site at Hoods Mill Landfill. The Hoods Mill Landfill was closed for the last quarter of FY2020 due to COVID-19 restrictions. Carroll's Resource Recovery Park is conveniently located in the center of the County. There is no charge for recycling at the County's drop-off location.

The Recycling Center accepts all materials recycled through the County's curbside program plus many items that are not eligible for curbside pickup, including textiles, rigid plastics, electronics, car and truck batteries, used motor oil, antifreeze, and cooking oil. Aluminum can reimbursement is also available and fluctuates with the market value. White goods/scrap metal are also accepted, and the Loading Dock offers onsite recycling of reusable building materials.

In 2019, the Maryland General Assembly passed legislation – House Bill 109 (HB 109 or Chapter 579) – prohibiting businesses and institutions from using certain expanded polystyrene (EPS) food service products, effective July 1, 2020. Businesses and institutions are prohibited from providing EPS food service products, effective October 1, 2020. The DART company in Hampstead provided a collection site for polystyrene foam but eliminated the collection site once the ban was adopted. The Carroll County Environmental Advisory Council developed a public outreach program to provide information to help businesses understand how to comply with the new law and to whom it applies.

In 2019, the Maryland General Assembly also passed Senate Bill 370, Environment – Recycling – Office Buildings, requiring the collection of recyclable materials from office buildings that have 150,000 square feet or greater of office space. The bill requires each owner of an office building to provide recycling receptables for the collection of recyclable materials and for the removal of certain materials for further recycling by October 1, 2021. This program has been included in the Carroll County Ten-Year Solid Waste Plan and will be implemented in relevant Carroll County facilities.

In 2014, the Maryland General Assembly passed Senate Bill 781, Environment – Recycling – Special Events. The law requires organizers of special events that meet certain criteria to provide a clearly marked recycling receptacle adjacent to each trash receptacle and to ensure that the 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.

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, several municipalities have an oil and antifreeze recycling program managed by either the municipality or Maryland Environmental Service (MES).

Since 1994, the County has prohibited 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 promote the theme of "Reduce, Reuse, Recycle, Compost!"

In FY2020, the County hosted several "Reduce, Reuse, Recycle, Compost!" public outreach efforts as explained below.

1. One residential household hazardous waste drop-off event took place on October 26, 2019. Typically, at least two events would be held each year, but the spring 2020 event was canceled due to COVID-19 restrictions. Events such as these provide County residents with a safe means for disposing of household chemicals, shredding 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 throughout the County.

3. The County typically hosts a rain barrel and compost bin sale event in April each year to provide rain barrels and composting bins to residents at a reduced cost. This event had to be canceled in FY2020 due to COVID-19 restrictions.

Through all recycling efforts, the County has achieved a 52% recycling waste diversion rate that included a 5% source reduction credit in 2017 (based on MDE's Recycling Report). The State-mandated recycling rate is 35% (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 SWAC continues to meet as needed and as restrictions related to COVID-19 allow.

The Recycling Office hosts a webpage that 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 disseminating regular information and updates.

In addition to the "Reduce, Reuse, Recycle, Compost!" events, information is given to residents about hard-to-recycle items such as CFL bulbs, pharmaceuticals, kitchen grease, and latex paint. Recycling program staff also attend many festivals and community events, where an educational booth and materials are provided and staff are available to answer questions.

In addition to 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 the 2009 House Bill 1290, Environment – Recycling – Public School Plans, 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 partner with the CCPS Science, Technology, Engineering, & Math (STEM) programs upon request to educate and engage students, usually in elementary school, on issues related to recycling that coincide with the curriculum.

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 for picking 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.

The Maryland Recycling Act (MRA) required all counties with populations over 150,000 to recycle 35% of the waste generated by December 31, 2015. In addition, Maryland established a voluntary waste diversion goal of 60% and a voluntary recycling rate of 55% by 2020. The waste diversion goal is comprised of the recycling rate plus source reduction credits (maximum 5%) that are earned 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, Compost!" 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 2017 (2018 and 2019 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. This downturn has 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, as well as to reach out to the public about the importance of reducing contamination in the recycling stream. The recycling rate (as shown in **Figure 4**) has been on the rise since 2012. **Figure 4** also includes the waste diversion rate, which reflects the source reduction credit (added to the recycling rate).

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 2018 and is still meeting the 35% recycling rate required by the MRA (see **Figure 2).** This success continues to divert waste from the landfills.

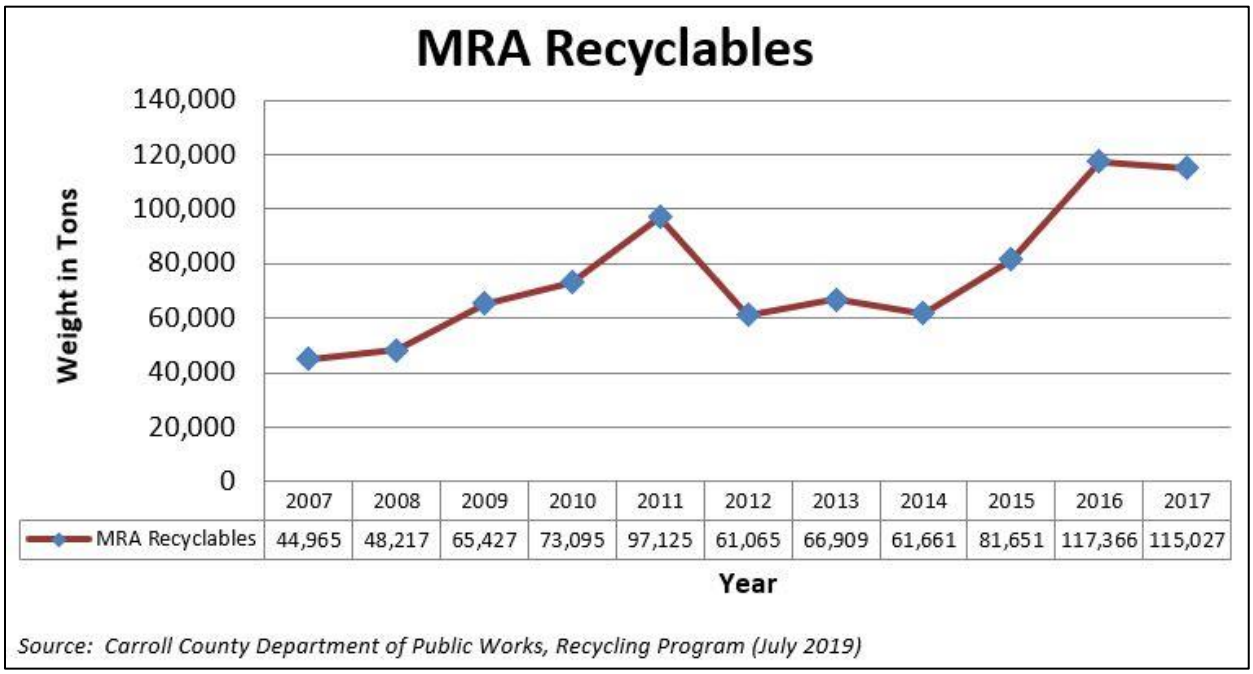


Figure 3: Carroll County MRA Recyclables

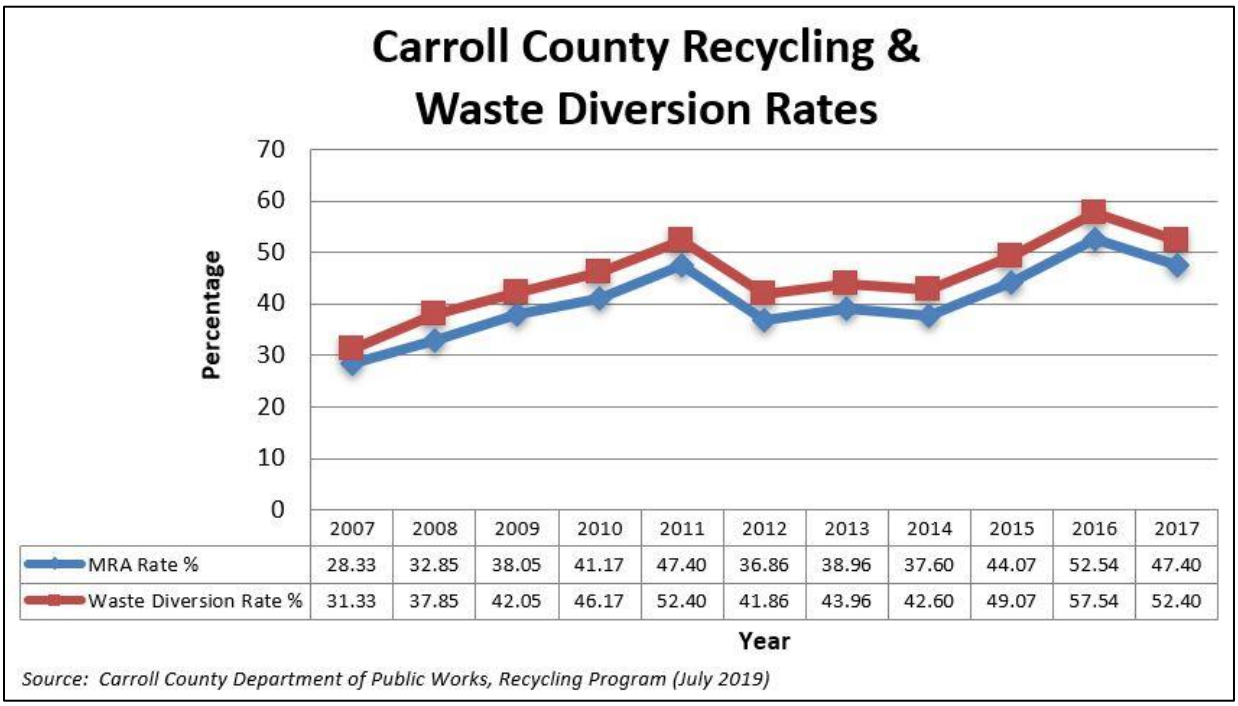


Figure 4: Carroll County Recycling & Waste Diversion Rates

5. Property Management and Maintenance

The County's Property Management and Maintenance Program seeks to reduce pollutants associated with maintenance activities at County- or municipal-owned facilities and to ensure that any facilities requiring NPDES stormwater general permit coverage submit a Notice of Intent (NOI) to MDE. **Table 3** lists facilities requiring 12SW industrial permit registrations.

Table 3
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	10/11/2019	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1755/MDR001755
County Maintenance Center	9/11/2019	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1861/MDR001861
County Northern Municipal Landfill	12/2/2019	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660
County Hoods Mill Landfill (Convenience Drop-off)	12/2/2019	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0661/MDR000661
Hampstead – Public Works Gill Maintenance Shop	9/5/2019	Yes	June 16, 2014	MDE Registration: 07/30/14 12SW2213 / MDR002213
Manchester Public Works Maintenance Shop	9/9/2019	Yes	May 5, 2014	MDE Registration: 06/04/14 12SW2201/MDR02201
Mount Airy Public Works Maintenance Shop	12/18/2019	Yes	June 6, 2015	MDE Registration: 06/24/15 12SW2257/MDR002257
Mount Airy Public Works WWTP	12/18/2019	Yes	March 30, 2015	MDE Registration: 04/10/15 12SW2258/MDR002258
Taneytown Public Works Maintenance Facility	9/6/2019	Yes	June 16, 2014	MDE Registration: 07/17/14 12SW2263 / MDR001743
County- or Municipal-Owned Facility	**Review Applicability**	**SWPPP Submitted to MDE**	**NOI Submittal Date**	**MDE REGISTRATION**
Taneytown Public Works WWTP	9/6/2019	Yes	June 16, 2014	MDE Registration: 06/26/14 12SW1743 / MDR001743
Westminster Public Works Streets Maintenance Shop	8/23/2019	Yes	March 31, 2014	MDE Registration: 06/26/14 12SW2292/MDR002292
Westminster Public Works WWTP	823/2019	Yes	July 3, 2014	MDE Registration: 08/14/14 12SW2252 / MDR002252
Westminster Public Works Utilities	8/23/2019	Yes	June 17, 2014	MDE Registration: 07/28/14 12SW2455 / MDR002455

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 4** reflects each facility manager's response with respect to their facility's SWPPP status. A reported total of 250 employees participated in 12SW/SWPPP training at their facilities.

Jurisdictions having facilities with 12SW permits are responsible for developing and maintaining their SWPPPs, which include non-structural BMP and 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 sites

include storm drain system infrastructure inspections. 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), which must be submitted to MDE as part of the renewal application and inspection process. Carroll County DPW contracted AECOM to update the Spill Control and Countermeasures Plans at several 12SW permitted County facilities during the permit term. AECOM met with appropriate County personnel on-site and reviewed 12SW SWPPP plans for coordination with those spill control and countermeasure practices and personnel.

Carroll County Risk Management staff are included in the County's 12SW SWPPP teams and provide additional support for SWPPP implementation, inspections, and annual evaluations. One staff member has an office at the Carroll County Maintenance Center and provides general observation support to facility staff.

Table 4
MS4 Co-Permittee – 12SW General Stormwater Industrial Permit
SWPPP Status*

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	10/18/19	Y[1]	Y	4/22/20
County Maintenance Center	Y	Y	Y/146[2]	9/26/19 12/24/19 2/13/20	Y[1]	Y	6/23/20
Northern Municipal Landfill	Y	Y	Y/10	1/2/19	Y[1]	Y	11/21/19
Hoods Mill Landfill (Convenience Drop-Off)	Y	Y	Y/10	1/2/19	Y[1]	Y	11/21/19
Hampstead – Public Works Gill Maintenance Shop	Y	Y	Y/8	12/13/19	Y	Y	12/13/19
Manchester Public Works Maintenance Shop	Y	Y	Y/13	7/25/19	Y	Y	2/21/20
Mount Airy Public Works Maintenance Shop	Y	Y	Y/10	6/28/19	Y	Y	12/11/19
Mount Airy Public Works WWTP	Y	Y	Y/4	6/28/19	Y	Y	12/6/19
Taneytown Public Works Maintenance Facility	Y	Y	Y/7	6/13/19	Y	Y	6/13/19
Taneytown Public Works WWTP	Y	Y	Y/3	6/13/19	Y	Y	6/13/19
Westminster Public Works Streets Maintenance Shop	Y	Y	Y/20	3/6/20	Y	Y	1/10/20
Westminster Public Works WTTP	Y	Y	Y/13	6/25/20	Y	Y	6/19/20
Westminster Public Works Utilities	Y	Y	Y/14	5/7/20	Y	Y	12/11/19

*Status reported by jurisdiction/facility.
[1] Partial. Self-corrected by facility SWPPP Team.
[2] Training/3 Bureaus (Fleet and Warehouse, Roads Operations, Facilities)

The permit requires the County to implement a program to reduce pollutants associated with maintenance activities at County-owned facilities, including parks, roadways, and parking lots. In a cumulative effort, County and municipal co-permittees reduce pollutants through BMPs for various maintenance activities. NPDES Stormwater Pollution Prevention training is provided annually to pertinent County and municipal managers, supervisors and staff. Training includes good housekeeping BMPs for non-hazardous spill or leak containment and clean-up, IDDE, and procedures for reporting to the appropriate authorities.

County-owned facilities are maintained by numerous bureaus under the Carroll County Department of Public Works (DPW). The Bureau of Facilities provides general maintenance for over 40 County-owned properties, ranging from administrative buildings to park facilities. The Bureau of Fleet Management/Warehouse manages the County's fleet maintenance operation, which includes a garage/shop, fuel island area, fleet wash facility, and warehouse, and uses applicable BMPs such as auto fluid recycling. The Bureau of Roads Operations provides routine maintenance of the roads, including roadside vegetation management, pavement patching, pavement line striping, drainage work, pipe cleaning and replacement, tree trimming and removal, storm drain maintenance and repair, and surface sealing operations. This Bureau is responsible for approximately 988 miles of predominantly rural open-section roadways (923 miles paved, 65 miles gravel), 154 bridges, and salt dome facilities. Carroll County Regional Airport, with a 5,100-foot runway, supporting tarmac, and parking lot, is maintained by DPW Airport Operations. The Bureau of Utilities maintains the water and wastewater treatment plants, a small maintenance facility, and access roads and parking lots. The Bureau of Solid Waste maintains access roads to and from the County's active landfill and convenience drop-off location.

Lastly, the Bureau of Parks within the Department of Recreation and Parks maintains facilities for three natural resource-related parks. The Department of Economic Development provides maintenance for the Carroll County Farm Museum tourism venue.

During the 2019 permit year, County staff developed and implemented the use of an electronic form to aid in submission of property management and maintenance data from county agencies and municipal co-permittees. The web application JotForm was utilized. See **Table 5** for a summary of permittee maintenance pollution reduction efforts.

Table 5
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 (6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13,14,16,17,19)	✓ (3)
	✓ Solid Waste (4,5,6)		✓ (2a,10, 18)	✓ (11,12,13)	✓ (3)
	✓ Utilities (6)		✓ (2,10,18)	✓ (11,12)	✓ (3)
	✓ Facilities (6)		✓ (2,10,18)	✓ (11,12,19)	✓ (3)
	✓ Fleet/Warehouse			✓ (11,13)	✓ (3)
	Airport	✓ (9)	✓ (2,10)	✓ (11,12,19)	✓ (3)
	Parks	✓ (8)	✓ (2a,10)	✓ (11,12)	✓ (3)
	Farm Museum	✓ (4,8,9)	✓ (2,10,18)	✓ (11,12,13,19)	✓ (3)
Hampstead	✓ (3,6)	✓ (9,3)	✓ (2b,10, 18)	✓ (11,12,13,16,17,19)	✓ (3)
Manchester	✓ (3,6)	✓ (9,3)	✓ (2,10,18)	✓ (11,12,13,16,19)	✓ (3)
Mount Airy	✓ (3,6)	✓ (6,3)	✓ (2,10,18)	✓ (11,12)	✓ (3)
New Windsor	✓ (6)	✓ (7,8)	✓ (2,10)	✓ (11,12,16,19)	✓ (3)
Sykesville	✓ (6)	✓ (8,9)	✓ (2a,10, 18)	✓ (11,12,19)	✓ (3)
Taneytown	✓ (3,4,6)	✓ (7,8)	✓ (2,10,18)	✓ (11,12,13,19)	✓ (3)
Union Bridge	✓ (5,6)	✓ (7,8)	✓ (2,10,18)	✓ (11,12,16,17,19)	✓ (3)
Westminster	✓ (3,4,5,6)	✓ (7,8)	✓ (2,10,18)	✓ (11,12,13,14,15,17,19)	✓ (3)

(1) Restoration credits applied when approved Alternative BMP parameters met.
(2) a) No fertilizer usage reported in vegetation maintenance practices. b) 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, i.e. mowing/hand trimming, etc.
(11) Training, Research or technical Information, Weather reporting source data, SHA Guidance Document
(12) Visual observations/effective decision making, Supervision/real time road evaluations
(13) Equipment calibration
(14) Salt Brine / Pre-Treatment
(15) Dry Salt/Salt Brine Mix (lower temp activation and less bouncing off road)
(16) Written Sales Management Procedures or Plan
(17) Contractor Training
(18) Weed pulling, mulching
(19) Post event evaluation, salt tracking

Street Sweeping

Street sweeping programs are implemented in numerous municipal co-permittee urban and suburban areas, as shown in **Table 5**. 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, or as needed, at the Hoods Mill residential drop-off facility. Approximately 1,088 linear miles of streets continue to be swept countywide. These services are performed by a combination of County, municipal, and contractor operations. Municipal co-permittees typically prioritize downtown commercial business districts and higher density residential areas with heavier traffic patterns, expanding out through primary ingress and egress 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. Alternative BMP restoration credits for these practices are included in the GDB on the **Appendix B** CD.

Inlet Inspection and Cleaning

All permittees conduct regularly scheduled, complaint-driven, or clog-driven inlet inspection and clean-out programs. Approximately 704 storm drain inlets were cleaned countywide using manual and/or vacuum methods during the permit reporting year. **Table 5** shows each permittee's pollution reduction efforts associated with maintenance activities. Alternative BMP restoration credits for these practices are included in the GDB on the **Appendix B** CD.

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 guide herbicide usage associated with vegetation management, primarily through mechanical control. During the 2020 permit year, overall herbicide usage associated with vegetation management and maintenance activities increased from 173.09 gallons to 228.79 gallons, a 32% increase from the previous year. This change can be attributed to the various programmatic changes noted below.

Carroll County Bureau of Roads Operations reported that mowing crews typically average two rounds of mowing on grass shoulders of all County roads (approximately 988 miles) during the growing season. Due to the discontinuance of a County-run inmate weed trimming program, a targeted guardrail herbicide spray test program was initiated in the spring of 2019 to help control vegetation. Twenty-five gallons of glyphosate (41% formulation) were used during the 2019 permit year; this increased to 60 gallons when the program was fully implemented for the entire growing season of FY2020. Each spraying application was documented and recorded as required per MDA regulations. All staff applicators maintain Maryland Department of Agriculture (MDA) applicator certifications under an MDA licensed contractor and are required to successfully complete an MDA-approved training program. MDA training and certification sessions cover new laws, regulations, or policies and new pest control or pesticide technologies. Integrated Pest Management (IPM) principles and methodologies are incorporated into the

program, along with a combination of the following topics: pesticide safety, environmental concerns, pest biology, control techniques, and chemical storage and disposal. Carroll County Roads Operations evaluates methods for program improvement for the efficient use of limited herbicide application as part of their vegetation management program. Roads Operations reported no other pesticide, fertilizer or herbicide usage for the permit year.

The Carroll County Bureau of Facilities, which manages over 40 properties, reported that responsibilities increased during the 2020 permit term due to recreational park and grounds expansion projects, while staffing levels remained the same. The Bureau's existing integrated vegetation management program consists primarily of mechanical controls (e.g. mowing, hand trimming, hand pulling weeds, and mulching) and the targeted use of selective and non-selective herbicides under MDA licensed and certified staff. With the increase in program responsibilities, non-selective herbicide use increased from seven to 27 gallons for weed control during the permit year. Thirteen gallons of selective herbicide were used for specific weed control where appropriate. Selective herbicides, both granular and liquid form, had been used in prior years but not in FY2019 due to the retirement of licensed staff. New licensed personnel began to re-incorporate this tool as part of the integrated vegetation management program during the 2020 permit year.

Fluctuations in herbicide use for co-permittee vegetation maintenance programs varied by municipality. The City of Westminster had a decrease in herbicide use between FY2019 and FY2020 due to their contracted licensed applicator being out during most of the spring growing season. The City of Taneytown also achieved a reduction in herbicide use by incorporating spot spraying applications into their vegetation management and maintenance program. Conversely, the Town of Manchester reported an increase in herbicide usage as their vegetation management and maintenance returned to typical operations; their 2019 prior year usage was down due to maintenance staff activities that were redirected to meet other program needs at the time. These programs all use MDA licensed certified staff.

The Carroll County Bureau of Parks Maintenance manages pollution reduction efforts at three natural resource-related parks (e.g. Piney Run Park), where they conduct a mechanical-only vegetation control program.

The Carroll County Regional Airport facility has gradually reduced the use of herbicides for vegetation management over time by increasing mechanical control methods and minimizing application area. This program is also managed by MDA licensed certified staff.

Limited fertilizer use for vegetation maintenance was reported by the Town of Hampstead for the permit year.

The County Land and Resource Management continues to provide "Reducing the Use of Pesticides, Herbicides, Fertilizers, and Other Pollutants Associated with Vegetation Management

through Increased Use of Integrated Pest Management*"* in NPDES training programs and guidance documentation to all co-permittees.

The overall management of noxious weeds along County road rights-of-way and on private properties occurs through an agreement with MDA in accordance with state law. Contracted MDA licensed and certified personnel perform spot spraying along County rights-of-way as well as on private lands. Related herbicide usage for this application is reported and regulated through MDA.

A summary of integrated vegetation management practices is included in **Table 5**. Chemical use data is provided in the Chemical Application table within the geodatabase on the **Appendix B** CD.

Deicing Materials

Carroll County Roads Operations and most municipalities have written salt management procedures, and contractors are increasingly being trained as reported in **Table 5**. 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 and effective salt applications and to avoid overlap. Co-permittees reduce the use of winter weather deicing materials through research, continual testing and improvement of materials, equipment calibration, and employee training, as shown in **Table 5**. 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 plan and other salt management technical resources. Overall road salt usage for the MS4 decreased from 39,500 tons to 14,000 tons (65%) from the previous year primarily due to a mild winter season, training, implementation of salt management plans, improved salt brine quality, and effective decision making by managers and staff.

Carroll County Roads Operations developed and implemented their own Carroll County Salt Management Plan during the permit year. The plan was developed based on their own Standard Operating Procedures, SHA salt management plan guidelines, staff input, and other resources. The plan is available to the public and can be downloaded at the link below.

https://www.carrollcountymd.gov/government/directory/public-works/roads-operations/carroll-county-department-of-public-works-bureau-of-roads-operations-salt-management-plan/

Carroll County Roads Operations also provides general information to the public about their Snow/Ice Guidelines for Carroll County at the County website link below.

https://www.carrollcountymd.gov/government/directory/public-works/roads-operations/carroll-county-department-of-public-works-bureau-of-roads-operations-salt-management-plan/

Carroll County Roads Operations also provides an outline of their Standard Operating Procedures and a contact number on the County website link below.

https://www.carrollcountymd.gov/government/directory/public-works/roads-operations/snowice-removal-guidelines-for-carroll-county-md/operations/

Roads Operations hosted a winter weather coordination meeting for the 2019-2020 season on Thursday, November 7, 2019. The meeting was held at the County Office Building located at 225 North Center Street, Westminster, MD 21157 from 1:30 to 4:30 P.M. The meeting provided an opportunity for information sharing between Appointed, Elected, Emergency Medical Services, Fire, Law Enforcement, Public Safety (Emergency Communications/Emergency Management), MDSHA and Public Works representatives from all cities, towns, the County, and the State. The meeting focused on the goal to reduce winter weather road salt deicers for the improvement of water quality while providing safe, passable road conditions.

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 for both County and contractor trucks. Twenty-four contractors participated in the winter weather pre-season training.

Planning and preparing are necessary to utilize available resources in an effective and efficient manner. Carroll County Roads Operations begins planning up to four days in advance. Staff continue daily meetings until the day of the event. On the day of the event, the meetings are every four hours. Trucks are loaded well in advance of the predicted storm start time. Traffic cameras positioned around the state are used to track the snow in real time. The supervisor vehicles are equipped with thermometers to monitor air and surface temperatures.

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 way, 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 help salt crews limit the number of return passes necessary to clear roadways and reduce the amount of salt applications. Staff research materials, methods, and technologies and attend 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.

In the County and the City of Westminster, the 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 passes necessary in order to prevent overlapping and overuse of deicer materials.

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.

Deicers are used at pertinent facilities managed by the Carroll County Bureau of Facilities and the Carroll County Farm Museum 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.

Proper management of snow and ice at Carroll County Regional Airport (CCRA) is essential for safe winter operations. This includes aircraft and support equipment movements during servicing, taxiing, and takeoff. Ensuring safe conditions on the tarmac for outside boarding of passengers, flight crews, and maintenance ground personnel activities is crucial. No deicing of aircraft is performed at the facility, thereby reducing potential pollutants. Additionally, keeping ahead of winter storm events by 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 288 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 18, 2019 at the Carroll County Public Safety Training Center, Westminster, MD. The agenda is located in **Appendix C**.

Topics included:

- NPDES MS4 Permit Overview and Regulatory Update
- Successful 12SW Industrial Stormwater Permit & SWPPP Implementation (Maryland Environmental (MES) Inspection Chief)
- MDE/MES Used Oil & Anti-freeze Recycling Facilities Program (MES Operations Manager)
- Montgomery Parks: Protecting the Environment through Integrated Pest Management (Plant Health Horticulturalist/Montgomery Parks Maryland -National Capital Park & Planning Commission)
- Property Management and Maintenance Pollution Reduction Technologies – “Roadside Stormdrain System Maintenance” - Pierce County, WA- DPW video)
- Staff Reporting Illicit Discharge Investigation Procedures

Permittees ensure their pertinent public works maintenance staff are trained in municipal stormwater pollution prevention and good housekeeping/BMP practices, IDDE, and 12SW SWPPP training for permitted facilities. Of 288 total employees trained under the Carroll County MS4 for the permit year, 246 were maintenance staff.

The County LRM maintains a guidance document entitled, "Carroll County MS4 Property Management and Maintenance Resource Guide, Municipal Stormwater Pollution Prevention Guidance for MS4 Co-Permittee Personnel". It is designed to provide practical, user-friendly resources to maintenance staff and 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 and evaluations, and reporting.

6. Public Education

The permit requires Carroll County 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 can call the non-emergency Stormwater Pollution Prevention Hotline at 410-386-2210. The hotline for Carroll County and each municipality is readily visible on the Stormwater Pollution Hotline webpage at https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/stormwater-pollution-hotline/.

Websites

The following municipalities host websites that include links to various publications and municipal newsletters, as well as to the relevant Carroll County webpage(s), EPA, and/or MDE websites: Hampstead, Manchester, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster.

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

LRM hosts a dedicated NPDES webpage entitled "Protecting Carroll County Waters (NPDES)" (https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/), which is now the primary hub for information related to the NPDES MS4 permit. The website includes links to the following pages, which are located either within the updated Protecting Carroll County Waters website or under the Bureau of Resource Management website:

- *Stormwater Pollution Hotline*: This page contains the non-emergency stormwater pollution hotline phone number, as well as the emergency contacts for each public water and sewer system. There is a quick link to this page from the main webpage, and the municipalities provide a link to this page from their municipal websites.

- *NPDES Permit*: This page contains the permit that is currently in effect for Carroll County and its municipal co-permittees.

- *Annual Reports*: NPDES MS4 Annual Reports for the past five years are available.

- *Watershed Restoration Plans*: The Bureau of Resource Management (BRM) hosts this page, which includes the characterization plan for each of Carroll's nine watersheds, along with each stream corridor assessment.

- *Stormwater Projects*: An interactive map provides information on planned, active, and completed stormwater projects.

- *Public Outreach*: This page describes actions the average property owner may take to help prevent stormwater runoff pollution. Carroll County public outreach publications can be found here, along with outreach videos and workshop information.

- *Carroll Clean Water Partnership*: Information is provided on this voluntary partnership program that encourages and recognizes local businesses to/that identify and address potential pollutants and good housekeeping measures.

- *Links | Resources*: Links to additional information on the web regarding various aspects of the permit, stormwater pollution prevention, public outreach, and more are provided.

In addition to hosting the Watershed Restoration Plans (called "Watershed" on the BRM site) and Stormwater Projects webpages, the BRM's "Resource Management" website (https://www.carrollcountymd.gov/government/directory/land-resource-management/resource-management/) hosts additional educational materials for both children and homeowners on its "Outreach" page (carrollcountymd.gov/government/directory/land-resource-management/resource-management/outreach/). Links to various agricultural and urban BMPs are also available from this website. 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 "Water Resource Coordination Council" (WRCC) webpage provides access to the resolution creating the WRCC. The Memorandum of Agreement (MOA) and Memorandum of Intent (MOI) prescribing the coordination between the County and municipalities on permit implementation and compliance are also available for download. (carrollcountymd.gov/government/boards-commissions/water-resource-coordination-council/)

The Carroll County "Environmental Advisory Council" (EAC) website (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/)

provides access to materials related to stormwater pollution, TMDLs, recycling and solid waste reduction, and other relevant environmental topics. Presentations are posted on the website 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 that have been developed (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/stormwater/).

The webpage, "Stormwater Workshop for Homeowners," provides information on previous and upcoming workshops designed to educate homeowners and residents on minimizing stormwater runoff and preventing 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. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/stormwater/stormwater-workshop-for-homeowners/)

The webpage, "Stormwater Workshop for Businesses," provides information on previous and upcoming workshops designed to educate Carroll County businesses on 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 to the public as well. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/stormwater/stormwater-workshop-for-businesses/)

The webpage, "Stormwater Workshop for Municipal Residents," provides information and materials related to a series of workshops geared toward residents of Carroll's municipalities. Each workshop shares information similar to the countywide general homeowner workshop, but tailors the information to residents who live in a specific municipality or group of municipalities. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/stormwater/stormwater-workshop-for-municipal-residents/)

The Carroll County Recycling Office hosts a website, entitled "Welcome to the Carroll County Recycling Office," which provides extensive public education materials and opportunities. The homepage provides general information and materials on recycling, as well as information targeted to recycling in the home, at schools, and at 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 (a local radio station), the County's social media outlets, and various other venues. (carrollcountymd.gov/government/directory/public-works/office-of-recycling/)

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 (NPDES)" website (https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/) and the Bureau of Resource Management website (carrollcountymd.gov/government/directory/land-resource-management/resource-management/) include 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. An effort was initiated and completed in FY2020 to create a website, titled "Protecting Carroll County Waters," to serve as a comprehensive hub for information relevant to NPDES MS4 information for Carroll County and its municipal co-permittees.

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 Environmental Advisory Council (EAC) sends out a periodic electronic newsletter which shares information related to EAC projects, including those related to stormwater, water quality, water reuse, recycling, and other relevant projects.

The EAC developed a public outreach piece to provide businesses and the general public with information on what expanded polystyrene (EPS) is, requirements of the new state law to prohibit food service establishments from providing single-use EPS products to customers, and additional resources. (https://www.carrollcountymd.gov/media/12518/eps-business-ban-public-outreach-2020-aug-26.pdf)

Programs and Exhibits

Five stormwater management practices onsite at the Carroll County Farm Museum serve as educational exhibits for visitors to learn about the importance and function of stormwater pollution mitigation practices, including a rain garden, landscape infiltration, rain barrel, drywell, and bioretention facility. Each practice features detailed signage to explain the practice and how it works. These exhibits are included in tours or in educational events for school-aged youth.

Events

All permittees participated in public and commercial outreach efforts during the permit year. In addition, storm drain stenciling and tree planting are implemented throughout the County and are often coordinated as a volunteer or outreach event. A complete listing of specific FY2020 events can be found in **Table 6**. A significant number of regular annual events had to be canceled due to the COVID-19 pandemic emergency and associated restrictions.

During 2018-19, the County's EAC partnered with the WRCC to develop a workshop designed to help educate homeowners in Carroll County's municipalities on how to minimize stormwater runoff from residential properties and prevent stormwater pollution. The workshop was held on Saturday, September 7, 2019, from 9:00 am to 11:30 am at the North Carroll Senior and Community Center and was focused on Hampstead and Manchester residents. Experts provided helpful materials and answers to individual questions on the topics listed below, as they related to stormwater pollution prevention:

1. General Homeowner BMPs, including Residential Car Care and Washing, Swimming Pool Water Discharge, Lawn Care, and Recycling
2. Permeable Pavement
3. Rain Gardens, Rain Barrels, and Drywells
4. Tree Planting and Landscaping
5. Stormwater Projects in the Area – Current and Future
6. Monitoring Efforts
7. Charlotte's Quest Nature Center
8. Manchester Valley High School Enviro Club
9. Town of Hampstead and Manchester

Table 6
Carroll County NPDES Phase 1 MS4 Public Outreach Events in FY2020

Event	Date	Watershed(s)	Description
National Night Out	August 6, 2019	◆ Multiple	Materials and direct discussion w/ attendees in several municipalities
Hampstead Fireman's Carnival	August 12-17, 2019	◆ Multiple	Booth – materials and direct discussion w/ attendees
New Windsor Community Day	August 24, 2019	◆ Double Pipe Creek	Booth – materials and direct discussion w/ attendees
Stormwater & Municipal Residents Workshop	September 7, 2019	◆ Multiple	Workshop to provide info to residents of towns re: car wash, pool discharge, law care, rain gardens/barrels, recycling, tree planting, permeable pavement, stormwater projects in area, and more.
Westminster FallFest	September 26-29, 2019	◆ Multiple	Materials and direct discussion w/ attendees; Enviroscapes Watershed model provided for public education and demonstration
Taneytown Harvest Fest	October 5, 2019	◆ Multiple	Booth – materials and direct discussion w/ attendees
Water Resource Coordination BMP Tour	October 9, 2019	◆ Multiple	Tour to provide education and show progress on stormwater projects for permit compliance
Carroll County NPDES MS4 Permit Annual Stormwater Pollution Prevention Compliance Training	October 18, 2019	◆ Multiple	Training provided to key management, supervisory, and assistant supervisory level personnel responsible for NPDES stormwater permit regulations, requirements, and implementation for County and municipalities.
Carroll County Household Hazardous Waste Fall Clean-Up	October 26, 2019	◆ Multiple	Hazardous household materials drop off for homeowners, which keeps them from being dumped down the drain on in the yard. Paper shredding also offered and then recycled.
Hampstead Fall Fest	October 27, 2019	◆ Multiple	Materials and direct discussion w/ attendees
Hampstead Tree Commission Tree Planting	November 16, 2019	◆ Multiple	Planted 12 new trees with the help of 15 adult and 5 youth volunteers. Six of the trees were planted at Panther Park, and the other 6 were planted in additional areas around the town.
Hampstead 2nd Grade Field Trips	Fall 2019	◆ Loch Raven Reservoir ◆ North Branch Patapsco ◆ Prettyboy Reservoir	Event to introduce children how to be a good citizen and various town roles. Included discussion about water conservation and keeping the waters of Maryland clean through BMPs.
Sykesville Craft Beer Festival	November 9, 2019	◆ South Branch Patapsco	Booth – materials and direct discussion w/ attendees
America Recycles Day	November 15, 2019	◆ Multiple	Recycling materials and direct discussion w/ attendees
Carroll Arts Council Festival of Wreaths	November 29 to December 8, 2019	◆ Multiple	Recycling materials and direct discussion w/ attendees
Piney Run Watershed Study Public Meeting	February 25, 2020	◆ South Branch Patapsco	Public information regarding information gained from various reservoir studies completed by AECOM.
Hampstead-Manchester Business & Community Expo	March 14, 2020	◆ Multiple	CANCELED due to Pandemic – Materials and direct discussion w/ attendees

Event	Date	Watershed(s)	Description
Carroll Forestry Board Spring Thaw Workshop	March 14, 2020	◆ Multiple	Experts from private, state, federal, and local government agencies presented topics covering trout streams; stream restoration; USDA programs for financial assistance; conservation land management practices; wildland fire in the east; bugs and blights threatening MD trees; bog turtles and riparian wildlife; vegetation history of MD's landscape; MD's forests & climate change; and more.
Sykesville Annual Spring Clean Up Day	April 2020	◆ South Branch Patapsco	CANCELED due to Pandemic – Stream bank cleaning
New Windsor Town Beautification Day	April 25, 2020	◆ Double Pipe Creek	Clean stream areas and parks of trash, clean up brush and limbs, stencil inlets, plant new flowers, trees and mulching
Carroll County Seniors on the Go Expo	April 15, 2020	◆ Multiple	CANCELED due to Pandemic – Recycling materials and direct discussion w/ attendees
Carroll County Household Hazardous Waste Spring Clean-Up	April 18, 2020	◆ Multiple	CANCELED due to Pandemic – Hazardous household materials drop off for homeowners, which keeps them from being dumped down the drain on in the yard. Paper shredding also offered and then recycled.
Carroll County Home Show	April 18-19, 2020	◆ Multiple	CANCELED due to Pandemic – Recycling materials and direct discussion w/ attendees
Carroll County Envirothon	April 21, 2020	◆ Multiple	CANCELED due to Pandemic – Partnership with Carroll County Conservation District. Provides hands-on environmental and natural resource management education to high school students.
Fall Earth Day @ Westminster Community Pond	April 22, 2020	◆ Multiple	CANCELED due to Pandemic – Inform 6th grade students from West Middle School about SWM, perform maintenance on adjacent Forest Conservation planting, plant aquatic plants along ed of pond.
Rain Barrel & Composting Event	April 25, 2020	◆ Multiple	CANCELED due to Pandemic – County-hosted rain barrel and composting event. Provides rain barrels and composting bins to residents at a reduced cost.
City of Westminster Tree Planting	April 2020	◆ Multiple	Planted trees in urban areas
McDaniel College Clean-Up Day	May 2020	◆ Double Pipe Creek	CANCELED due to Pandemic – Volunteers (22 students) collected 100 pounds of trash from drainage ditch along railroad track and alleys along Pennsylvania Ave. Tree pits were cleaned.
Westminster Flower & Jazz Festival	May 9, 2020	◆ Multiple	CANCELED due to Pandemic – Materials and direct discussion w/ attendees
Carroll County Employee Appreciation Day	May 13, 2020	◆ Multiple	CANCELED due to Pandemic – Recycling materials and direct discussion w/ attendees

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 FY2018, 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 introduces 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 continues to be available online and at the County's social media sites, including the County's YouTube channel (youtu.be/jtjcuGhihL8?list=PLwx-zJZmRR9swwLZb0WMo2r-sJDQ5lZDa). The video is also used at public workshops and within a GIS story map (ESRI) being developed for use at public workshops.

From June 25 through July 22, 2019, a five-part series of news releases were sent out to help raise awareness for recycling. The series topics included Recycling 101; No Plastic Bags in Curb-side Recycling; Dos and Don'ts of Recycling… When in Doubt, Throw it Out; Recycling… Awkward Items; and Recycling… A Final Note. The news releases were also available on the County website.

Many of the municipalities also provide information on stormwater pollution prevention and other related topics through social media and cable television.

Appointed and Staff Groups

Carroll County continues to provide an open forum on environmental issues and concerns through the Carroll County Environmental Advisory Council (EAC). This Commissioner-appointed citizen board holds monthly meetings that 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 acts in the best interest of County residents by promoting effective environmental protection and management principles. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/)

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, typically in conjunction with Earth Day and/or Arbor Day. The 2018 award winners were recognized in a presentation ceremony with the EAC and members of the Board of County Commissioners. Information about the award winners is available on the EAC webpage and was disseminated through a news release, social media, and newsletters (hardcopy and electronic). The award winners were also honored at a tree planting ceremony held at Carroll Community College on September 28, 2018 (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/environmental-awareness-awards/).

In 2019-2020, the EAC evaluated its awards process, including the awards categories, nomination criteria, and evaluation criteria. The goal was to increase participation and improve the process moving forward. Nominations will be taken in early 2021, and the awards presentation will be held in conjunction with the Bureau of Resource Management's Earth Day event, which is typically held in April.

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 efforts and initiatives undertaken by the County to demonstrate environmental stewardship and protection, including stormwater mitigation and management projects and progress. The booklet was updated in 2019 and will be updated again in 2021 (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/environmental-stewardship-in-carroll-county/).

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 assist County staff in advancing sustainable, responsible, and cost-effective practices of Solid Waste Management and Recycling. The SWAC researches and discusses issues related to solid waste and recycling and provides recommendations to the Board as requested. The group meets on a regular basis and all meetings are open to the public. A member of the EAC sits on both councils and regularly reports the status of SWAC initiatives 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 Water Resource Coordination Council (WRCC) was formed in 2007 through a cooperative partnership between the County, the eight municipalities, and the Carroll County Health Department by a formal joint resolution to discuss and address issues related to water resources. The WRCC discusses and collaborates on pertinent issues related to water, wastewater, and stormwater management. The monthly meetings, which are open to the public, provide a valuable opportunity 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 (carrollcountymd.gov/government/boards-commissions/water-resource-coordination-council/).

The WRCC serves as the local Watershed Implementation Plan (WIP) team for local implementation of Maryland's 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 State turns to local jurisdictions to assist with implementing its 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 improving system efficiency. 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.

Several municipalities (New Windsor, Sykesville, Westminster) hold an annual clean-up day to collect trash from streams, wetlands, floodplains, and/or stormwater facilities, as well as other activities that improve the watershed and reduce the amount of trash and other pollutants to streams and waterbodies. The Mount Airy Parks and Recreation Commission promotes ongoing clean-up efforts for the Rails to Trails right-of-way from the downtown area to Watkins Park.

The town/city councils and the municipal planning commissions meet regularly. Discussions related to expenditure of funds and approval of stormwater projects may take place at these meetings, which are open to the public. **Table 7** provides the regular meeting time for each of the co-permittee's public bodies.

Table 7
Co-Permittee Elected Officials and Planning Commissions
Regular Meeting Schedule

Jurisdiction	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. **Table 8** indicates the activities/programs under the Public Outreach Plan objectives that have been implemented thus far. Out of 31 activities/programs, 28 have been implemented.

The plan will be revised upon issuance of the next generation permit and included in the appendices of the first annual report for the fifth-generation permit. The WRCC and staff are discussing possible activities and programs to add to the plan at that time.

Table 8
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 materials 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: Stormwater

Objective	Activity/Program	Page	Implementation
			Workshop for Businesses, Homeowner Workshop, Carroll Clean Water Partnership, Municipal Residents Workshop, Stormwater Public Outreach Publications. Educational materials are continuously provided by the Recycling Office and posted online or sent out in mail or via social media or news release.
Continue to improve and foster the Adopt-a-Road campaign	Update the Adopt-a-Road video on the website	25	Not yet implemented
Create comprehensive website that is more user-friendly and accessible	Restructure website to bring NPDES under one umbrella	26	Carroll County completed the process to revamp its entire website in April 2019. The NPDES page was included in this process. Various items related to NPDES were brought together in one place, under the BRM website. The new website is intended to be more user friendly.
Create comprehensive website that is more user-friendly and accessible	Restructure website to bring NPDES under one umbrella	26	Dedicated website developed to create hub of NPDES-related information. In addition to the main page, "Protecting Carroll County Waters (NPDES)" site includes following webpages/links: Stormwater Pollution Hotline, NPDES Permit, Annual Reports, Watershed Restoration Plans, Stormwater Projects, Public Outreach, Carroll Clean Water Partnership, and Links | Resources. Municipalities' websites include link to this site.
	Add materials to website to address broader range of issues and needs	26	Separate materials directed to homeowners and businesses were developed and posted to the following webpages: Homeowner Workshop, Stormwater Workshop for Businesses, Municipal Resident Workshop, Carroll Clean Water Partnership, Municipal Residents Workshop, Stormwater Public Outreach Publications. Homeowners & Stormwater video added to webpage & County YouTube.
Increase awareness of compliance hotline availability and improve access	Create a more prominent location on NPDES website for hotline	27	A "Stormwater Pollution Hotline" page was created has part of the new NPDES hub website – Protecting Carroll County Waters (NPDES). A quick link to this page is included on the main page. The municipalities include a link to the webpage from their own websites.
	Explain in more detail the purpose of the hotline	27	The webpage explains when to call the hotline versus when an emergency should warrant a call to 911. It includes phone numbers for each municipality for public water and sewer emergencies.
	Add hotline # to more informational materials	27	The hotline phone number was included on the business and homeowner outreach materials developed during the 2016 - 2018 permit years. It is included on most

Objective	Activity/Program	Page	Implementation
			stormwater educational materials and municipal websites.
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 countywide workshop, *Homeowners & Stormwater*, was held on March 18, 2017. A workshop for residents of the Towns of Hampstead and Manchester was developed. It focused on educational information and stormwater projects specific to that area and was held on September 7, 2019.
Educate businesses about permit requirements, good housekeeping measures, and pollution prevention	Conduct workshop to educate businesses	28	A general workshop, *Workshop: Carroll County Businesses for Clean Water,* was held on January 5, 2016. A workshop for 12SW/SR permittees was held on February 16, 2018, re: complying with permit requirements. Business workshops are intended to be held every other year.
	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: Stormwater Workshop for Businesses, Carroll Clean Water Partnership. The checklist is provided to businesses at visual inspections and during courtesy visits.
	Create slide shows & associated handouts to be part of Department speakers' bureau	28	A presentation is available.
	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: Stormwater Workshop for Businesses, Carroll Clean Water Partnership, Stormwater Public Outreach Publications. 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 was provided on the County's website. In addition, letters were 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. Restoration plans for all watersheds were posted online in October 2019 for public comment.
	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 for all watersheds were submitted for review to MDE. MDE provided feedback. Starting October 1, 2019, each plan was posted on the BRM website for a 30-day comment period. An online comment form was available. After the 30 days, comments were addressed, and the plans were submitted to MDE as an appendix to the 2019 Annual Report.

Objective	Activity/Program	Page	Implementation
	Develop procedure for providing copies of watershed assessments and restoration plans to interested parties upon request	30	Restoration plans began being posted online in October 2019 for public comment. Additionally, hard copies of plans were printed and made available within the Bureau of Resource Management in lieu of online access.
	Provide 30-day comment period before finalizing watershed assessments and restoration plans	30	Watershed Restoration Plans were released for 30-day public comment in a staggered method beginning on October 1, 2019. Upper and Lower Monocacy Watersheds were open for public comment from October 1st to October 30th, Prettyboy and Loch Raven Watersheds were open for public comment from October 14th to November 14th, and Double Pipe Creek and Liberty Watersheds were open for public comment from October 28th through November 28th.
	Add summary in each annual report of how County addressed or will address any materials comment received from public	30	The County received extremely limited feedback from the public related to the six restoration plans. A discussion of the feedback and its applicability to the restoration plans were provided in the County's 2019 annual report.
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 and website resources.
	County & Municipalities: MOA	32	The County and municipalities continue to work cooperatively toward meeting their collective permit obligations. Upon issuance of the next gen tentative permit, the County and municipalities will revisit and renew the MOA describing responsibilities and funding between co-permittees.
	LRM staff & Economic Development staff	32	Not yet implemented
	LRM staff & DPW staff	32	DPW staff provided the needed documentation for the Annual Report and continued to implement the Recycling program. DPW staff attends the monthly WRCC meetings. The departments work together to plan and implement and maintain water, wastewater, and stormwater projects.
	Public Engagement – Volunteer Opportunities: Individuals / Groups	32	Volunteers assisted with several projects in FY15-FY20. The events for FY20 are described in Table 6.

Objective	Activity/Program	Page	Implementation
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 posted to the following webpages: Stormwater Workshop for Businesses, 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. Four workshops have been held for public outreach. The three groups also continue to co-host and plan the regular workshops for homeowners.
	Seek feedback at Business Community Workshop on concept	33	Participants in the 2016 Business Workshop offered feedback through an evaluation form and will be considered in developing future workshops. Feedback is accepted from businesses at any time.
	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: Stormwater Workshop for Businesses, Carroll Clean Water Partnership, Stormwater Public Outreach Publications. With the rollover to the new website, these materials were added to a public education materials page under the EAC's Stormwater page.
	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.
	Explore concept of expanding partnership to include residential community	34	Not yet implemented

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 as "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 participants. A webpage was developed (https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/carroll-clean-water-partnership/) and provides informational

materials, the self-inspection checklist, event information, the list of Partners (as they are designated), and other relevant information. This page was brought into the Protecting Carroll County Waters (NPDES) website hub. The program will be periodically reviewed and updated, as needed.

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 can then be used as an internal action plan for the business to assist in planning. A copy of the checklist is available online at carrollcountymd.gov/media/5611/selfinspectionchecklist.pdf. County staff are available to assist in this process if desired.

Other Outreach Activities

In Carroll County, staff are continuously involved in environmental education efforts. LRM staff regularly volunteer to speak at schools, community organizations, club meetings, and other venues to help provide effective and timely environmental information to the community.

Each year, staff partner with the CCPS Outdoor School Program 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.

In addition to the education events for school-aged youth included in **Table 6**, the Carroll County Farm Museum showcases several different types of structural and non-structural stormwater BMPs onsite. Each includes an educational kiosk/sign describing to visitors in detail how the BMP works.

E. Restoration Plans and Total Maximum Daily Loads

1. Watershed Assessments

Watershed Assessments have been completed for each of the nine watersheds within Carroll County. Each assessment is done 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 DNR Watershed Restoration Division. Assessments were performed between January and March, in the years assessed, by County staff through cooperation with private landowners and municipalities. Landowner permission for access to stream corridors was obtained through a mailing detailing the purpose and timing of the assessment with a return response postcard. The County received permission to assess 786 of the 1,464 miles, or approximately 54% of all stream miles within the County **(Table 9**).

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

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

Table 9
Watershed Assessment Status

8-Digit Watershed	Major Basin	Miles Assessed	Total Miles	% Assessed	Year Assessed
Watersheds Assessed					
Prettyboy	Gunpowder	80	97	82%	2011
Liberty	Patapsco	255	458	56%	2012
South Branch Patapsco	Patapsco	156	218	72%	2013
Lower N. Branch Patapsco	Patapsco	6	6	100%	2014
Lower Monocacy	Monocacy/Potomac	10	23	43%	2014
Conewago Creek	Susquehanna	11	18	61%	2014
Upper Monocacy	Monocacy/Potomac	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

Carroll County consists of nine 8-digit watersheds, six of which have an associated TMDL WLA for developed source types. The six watersheds with an approved TMDL are: Prettyboy, Liberty, Loch Raven, Lower Monocacy, Upper Monocacy, and Double Pipe Creek. The

restoration planning process focused on addressing these impairments though the implementation of water quality improvement projects.

Watershed restoration plans for these six watersheds were originally sent to MDE in August of 2016 for review. In addition to the restoration plans, this submission also included Watershed Characterizations and Stream Corridor Assessment (SCA) summaries for each watershed. The SCA assisted in the restoration planning process, focusing on impacts and findings documented during the assessment.

In September 2017 the County received written comments from MDE's Sediment, Stormwater, and Dam Safety Program and Water and Science Administration highlighting various points and deficiencies related to the submitted TMDL implementation plans (restoration plans). Following another review of the restoration plans by MDE's Integrated Water Planning Program (IWPP) in 2018, the County revised the six watershed restoration plans and began releasing them for public comment in October of 2019. Feedback from the public, although limited, was incorporated into the six restoration plans prior to the final submission to MDE in December of 2019. A timeframe of the release of the restoration plans to the public is discussed further in Section IV.E.3 Public Participation.

Carroll County continues implementing an aggressive program of watershed restoration projects. The County's restoration achievements under the fourth-generation permit, which ended in December 2019, included 1,629 impervious acres (IA) treated (green in **Table 10**). The projects listed in blue in **Table 10** indicate the restoration efforts that addressed the initial 10% restoration requirement of the third-generation permit. Projects shown in orange were completed in FY2020, but after the end of the fourth-generation permit. These 129 acres of treatment will be applied to the County's fifth-generation permit when it is issued.

Projects planned or in design that are scheduled for completion between 2021 and 2026 are shown in red and will address future impervious acre and nutrient reduction requirements anticipated in the fifth-generation permit. To date, approximately 1,316 acres are planned to be treated. These acres keep the County moving in a positive direction for addressing both untreated impervious acreage and local and Chesapeake Bay nutrient reduction requirements.

Figures 5 and 6 depict the number of acres restored (green) and acres in planning and design phases (red) for projects to restore impervious surfaces and associated drainage areas to the mitigation projects. These graphs provide an excellent representation of the level of true watershed restoration accomplished through the County's restoration efforts.

Table 10
Listing of NPDES Watershed Restoration Efforts
July 2020

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	
	Completed 1st permit term requirement of 10% treatment			**688.27**	

Carroll County Second Permit Requirements - Completed December 31, 2019					
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

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
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
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	15.47	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

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2014	Friendship Overlook/Diamond Hills Section 2	Retrofit	Completed	18.58	Double Pipe Creek
2014	Tree plantings	Tree plantings	Completed	9.64	
2006-2014	Forest Buffer Easements	Forest Buffer	Completed	177.59	
2006-2014	Grass Buffer Easements	Grass Buffer	Completed	119.48	
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
2018	Blue Ridge Manor	Retrofit	Completed	11.25	Double Pipe Creek
2018	Central Maryland (Wet Facility)	Retrofit	Completed	35.51	Liberty Reservoir
2018	Eldersburg Business	Retrofit	Completed	70.36	Liberty Reservoir
2018	Exceptional Center	Retrofit	Completed	16.57	Double Pipe Creek
2018	Feeser Property	New Construction	Completed	1.72	Liberty Reservoir
2018	Hawks Ridge	Retrofit	Completed	25.10	S Branch Patapsco River
2018	Randomhouse	Retrofit	Completed	22.52	Liberty Reservoir
2018	Small Crossings Bioretention	New Construction	Completed	0.53	Prettyboy Reservoir

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2018	Small Crossings Sand Filter	Retrofit	Completed	11.02	Prettyboy Reservoir
2018	Tree plantings	Tree plantings	Completed	7.13	
2019	Aspen Run	Retrofit	Completed	1.86	Liberty Reservoir
2019	Central Maryland (Dry Facility)	Retrofit	Completed	31.86	Liberty Reservoir
2019	Elderwood Village Parcel B	Retrofit	Completed	61.00	Liberty Reservoir
2019	Elmer Wolfe	Retrofit	Completed	4.85	Double Pipe Creek
2019	Merridale Gardens	Retrofit	Completed	28.39	S Branch Patapsco River
2019	Oklahoma 4	Retrofit	Completed	19.96	Liberty Reservoir
2019	Shannon Run	Retrofit	Completed	46.89	S Branch Patapsco River
2019	Whispering Valley Phase 4	Retrofit	Completed	26.75	Prettyboy Reservoir
2019	Tree plantings	Tree plantings	Completed	5.40	
2015-2019	Forest Buffer Easements	Forest Buffer	Completed	59.46	
2015-2019	Grass Buffer Easements	Grass Buffer	Completed	30.14	
2019	Inlet Cleaning	Inlet Cleaning	Completed	16.00	
2019	Septic Upgrades to 2019	Retrofit	Completed	57.20	
2019	Street Sweeping (updated yearly)	Street Sweeping	Completed	1.00	
	Completed toward 20% goal			**1629.25**	

Listing of Watershed Restoration Efforts January 1, 2020 to July 1, 2020					
Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2020	Benjamins Claim - Jacobs	Retrofit	Completed	2.05	S Branch Patapsco River
2020	Roberts Mill	Retrofit	Completed	91.80	Upper Monocacy River
2020	Shiloh Middle	Retrofit	Completed	19.61	Liberty Reservoir
2020	Forest Conservation Buffer	Protections	Completed	2.00	
2020	Riparian Conservation Landscaping	Protections	Completed	0.61	
2020	Non-Riparian Conservation Landscaping	Protections	Completed	0.02	

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2020	Manchester Impervious Removal	Impervious Removal	Completed	0.22	Double Pipe Creek
2020	Inlet Cleaning	Inlet Cleaning	Completed	8.03	
2020	Street Sweeping (Increase over last permit)	Street Sweeping	Completed	3.71	
2020	Septic Upgrades	Retrofit	Completed	1.44	
	Completed toward next permit			**129.49**	

Carroll County Projects in Planning					
Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2021	Greens of Westminster Sec 2 #6	Retrofit	Under Construction	16.42	Double Pipe Creek
2021	Langdon (Jantz)	New Construction	Under Construction	92.10	Double Pipe Creek
2021	Locust wetland	New Construction	Design	11.00	Double Pipe Creek
2021	Mayberry	Stream Restoration	Design	279.31	Double Pipe Creek
2021	Tree Plantings	Tree Plantings	Under Construction	64.90	
2021	Trevanion Terrace	Retrofit	Design	52.00	Upper Monocacy River
2021	Willow Pond	Retrofit	Under Construction	100.00	Liberty Reservoir
2021	Willow Pond - Stream restoration	Stream Restoration	Under Construction	28.20	Liberty Reservoir
2021	Woodsyde Estates Large Facility	Retrofit	Under Construction	19.28	S Branch Patapsco River
2021	Woodsyde Estates Small Facility	Retrofit	Under Construction	0.82	S Branch Patapsco River
2021	Woodsyde Stream Restoration	Stream Restoration	Under Construction	59.57	S Branch Patapsco River
2022	Brynwood	New Construction	Design	54.19	Liberty Reservoir
2022	Hampstead Valley 1	Retrofit	Planned	23.20	Loch Raven
2022	IDA Property (Mt. Airy)	New Construction	Design	20.52	S Branch Patapsco River
2022	Melstone Valley	Retrofit	Design	22.50	S Branch Patapsco River

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2022	Tree Plantings	Tree Plantings	Planned	12.50	
2023	Carroll Co Health Department	New Construction	Planned	6.72	Double Pipe Creek
2023	Hampstead Valley 4	Retrofit	Planned	20.70	Loch Raven
2023	Manchester East	New Construction	Planned	36.60	Prettyboy Reservoir
2023	Manchester Elementary	New Construction	Planned	3.59	Prettyboy Reservoir
2023	Saint Georges Gate	Retrofit	Design	5.00	Liberty Reservoir
2023	Stone Manor	Retrofit	Design	5.60	Liberty Reservoir
2023	Tree Plantings	Tree Plantings	Planned	12.50	
2023	Valley Vista	New Construction	Planned	4.73	Prettyboy Reservoir
2024	Candice Estates	New Construction	Planned	13.00	Lower Monocacy River
2024	Hampstead Valley 2&3	Stream Restoration	Planned	13.50	Loch Raven
2024	New Windsor Railroad	New Construction	Planned	15.34	Double Pipe Creek
2024	Piney Ridge Village As-built 57	Retrofit	Planned	11.00	S Branch Patapsco River
2024	Tree Plantings	Tree Plantings	Planned	12.50	
2024	Winters Street	Retrofit	Planned	36.01	Liberty Reservoir
2025	Eldersburg Crossing (Walmart)	Retrofit	Planned	25.03	Liberty Reservoir
2025	Hampstead Regional Facility	Retrofit	Planned	116.88	Liberty Reservoir
2025	Squires	Retrofit	Planned	13.75	Liberty Reservoir
2025	Tree Plantings	Tree Plantings	Planned	12.50	
2026	Bevard Square	Retrofit	Planned	36.10	Liberty Reservoir
2026	Meadow Ridge (2)	Retrofit	Planned	5.73	Double Pipe Creek
2026	Tree Plantings	Tree Plantings	Planned	12.50	
2026	Westminster Market	Retrofit	Planned	24.00	Liberty Reservoir
2026	Wind Song Est.	New Construction	Planned	16.00	Lower Monocacy River
	Anticipated impervious treatment for 5th Generation Permit			**1315.79**	

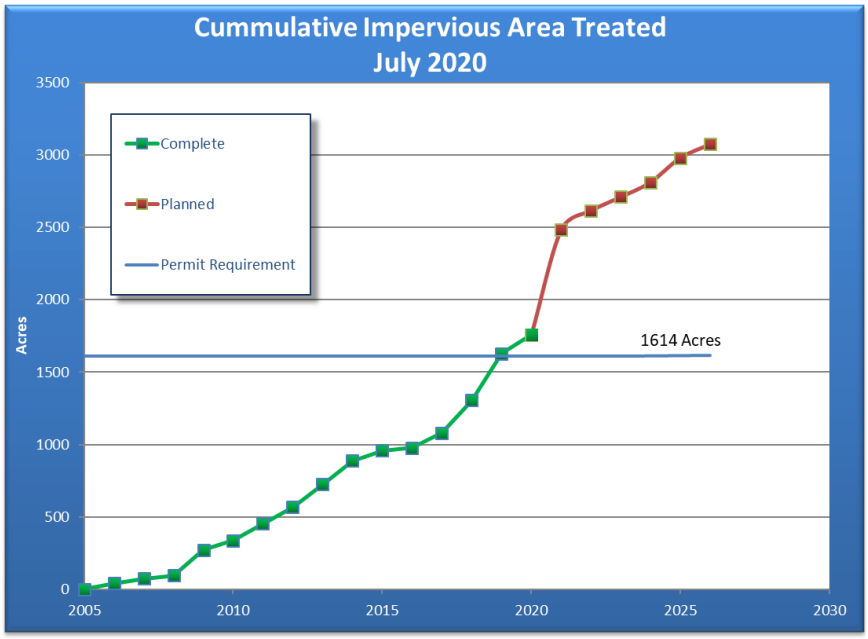


Figure 5: Impervious Surface Acres Treated: Projects Completed (Constructed/Under Construction) and Planned (including Under Design)

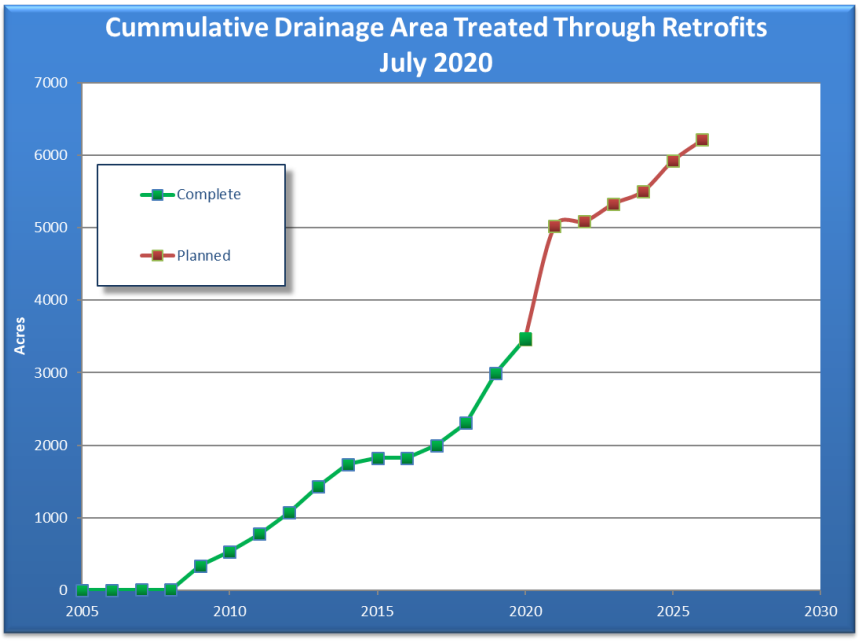


Figure 6: Drainage Area Acres Treated: Projects Completed (Constructed/Under Construction) and Planned (including Under Design)

3. Public Participation

As part of the watershed restoration efforts, Carroll County solicited input from the public regarding development of the County's TMDL implementation plans. Public involvement occurred following interim submissions of the restoration plans to MDE, which provided feedback and subsequent revisions to the plans. Interim submissions to MDE included Watershed Characterizations, Stream Corridor Assessment summaries, and Watershed Restoration Plans for the six 8-digit watersheds in Carroll County with an approved TMDL WLA for developed source types.

Following two rounds of review by MDE, the County began releasing the restoration plans for public comment in October of 2019. Notice of this release was sent to the Carroll County Times and posted on the Carroll County webpage. The County provided hard copies of the plans within the BRM for review and comment, as well as posted the plans on the Bureau's webpage to allow for electronic comments to be submitted.

Following the press release on September 26, 2019, the Watershed Restoration Plans were released for 30-day public comment in a staggered method beginning on October 1, 2019. Upper and Lower Monocacy Watersheds were open for public comment from October 1st to October 30th, Prettyboy and Loch Raven Watersheds were open for public comment from October 14th to November 14th, and Double Pipe Creek and Liberty Watersheds were open for public comment from October 28th to November 28th.

The County received extremely limited feedback from the public related to the six restoration plans. A discussion of the feedback and its applicability to the restoration plans were provided in the County's 2019 Annual Report.

In May 2020 the County received correspondence from MDE that all six restoration plans were approved as they met the require technical merits and included all the necessary watershed planning components.

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 and water quality improvements 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 completed the impervious mitigation goal of the third-generation permit and achieved the fourth-generation permit's impervious area restoration requirement as well. This progress demonstrates the County's determined approach to meeting these goals.

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. **Appendix F** consists of tables summarizing the

net change in pollutant load reductions from all completed structural and nonstructural water quality improvement projects and alternative stormwater measures. The tables also demonstrate how work associated with restoration efforts translates into requirements associated with meeting local WLA and actual Chesapeake Bay TMDL reductions. Edge of stream (EOS) load reductions and their associated Chesapeake Bay reductions are also provided by segment shed in **Appendix F**. 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 are likewise provided for the individual watersheds.

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. For this reason, 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 a quantifiable methodology for tracking and measuring bacteria pollutant load reductions. In Carroll County, both bacteria and mercury load reductions will primarily be addressed through the same measures used to achieve nutrient and sediment TMDLs, particularly surface sand retrofits of wet or failing facilities.

Carroll County's principal approach to stormwater retrofits is the use of enhanced infiltration and filtration. The County continues to focus on retrofitting older facilities to current standards or higher, maintaining existing facilities that prevent wildlife sources of bacteria from entering the County's MS4 network, and implementing alternative practices (e.g. street sweeping and inlet cleaning) that minimize potential bacteria loads.

In lieu of guidance from MDE on bacteria reduction efficiencies or loading rates by land use, Carroll County has implemented a trend monitoring program for bacteria. This program began in December 2017 and documents long term trends of bacteria concentrations within the urbanized areas of Carroll County associated with the WLA. Additional sites have subsequently been added, expanding the monitoring program to include the 8-digit watersheds with approved bacteria TMDLs. The County currently monitors 18 trend sites on a monthly basis.

Carroll County's bacteria trend monitoring program is performed year-round. Results are differentiated by flow rate (low vs. high) and analyzed for both annual and seasonal (May – September) geometric means. Each individual sample is also analyzed against the single sample exceedance standards for full-body contact.

The County's evolving approaches to nutrient, sediment, mercury, and bacteria load reductions provide enhanced removal of these constituents to the maximum extent practicable.

Carroll County's annual operating expenditures for this program have more than tripled since 2008, from approximately $334,000 to almost $2.3 million. These expenses cover salaries and benefits of employees, monitoring supplies, educational materials, monitoring analyses, training information, consultant fees, stormwater management facility maintenance, contractor costs, equipment needs, and bond interest and principle. Additionally, $22.3 million has been reserved for 33 watershed restoration efforts in the Community Investment Program (CIP) for FY2021 to FY2026.

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.

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.

Study Area and Requirements

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 since August 2000. The study location is situated downstream of the Air Business Center stormwater management facility, just north of Westminster. This structural facility was originally constructed as a wet pond in 1979 and was retrofitted in 2008 as a wet pond with forebay to provide water quality, recharge volume, and channel volume protection.

The facility discharges to a first-order unnamed tributary to the West Branch of the North Branch Patapsco River, which ultimately flows to Liberty Reservoir. The location of the watershed where monitoring is conducted is shown in **Figure 7**, and 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**, this is a headwater stream draining the upper-most extent of the watershed.

The Air Business Center regional stormwater management facility discharges through a constructed outfall to a small stream that flows southeast to its confluence with the West Branch. The stream receives the majority of its flow from the pond's outfall, with additional 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 also drains to the stream, just below the outfall station.

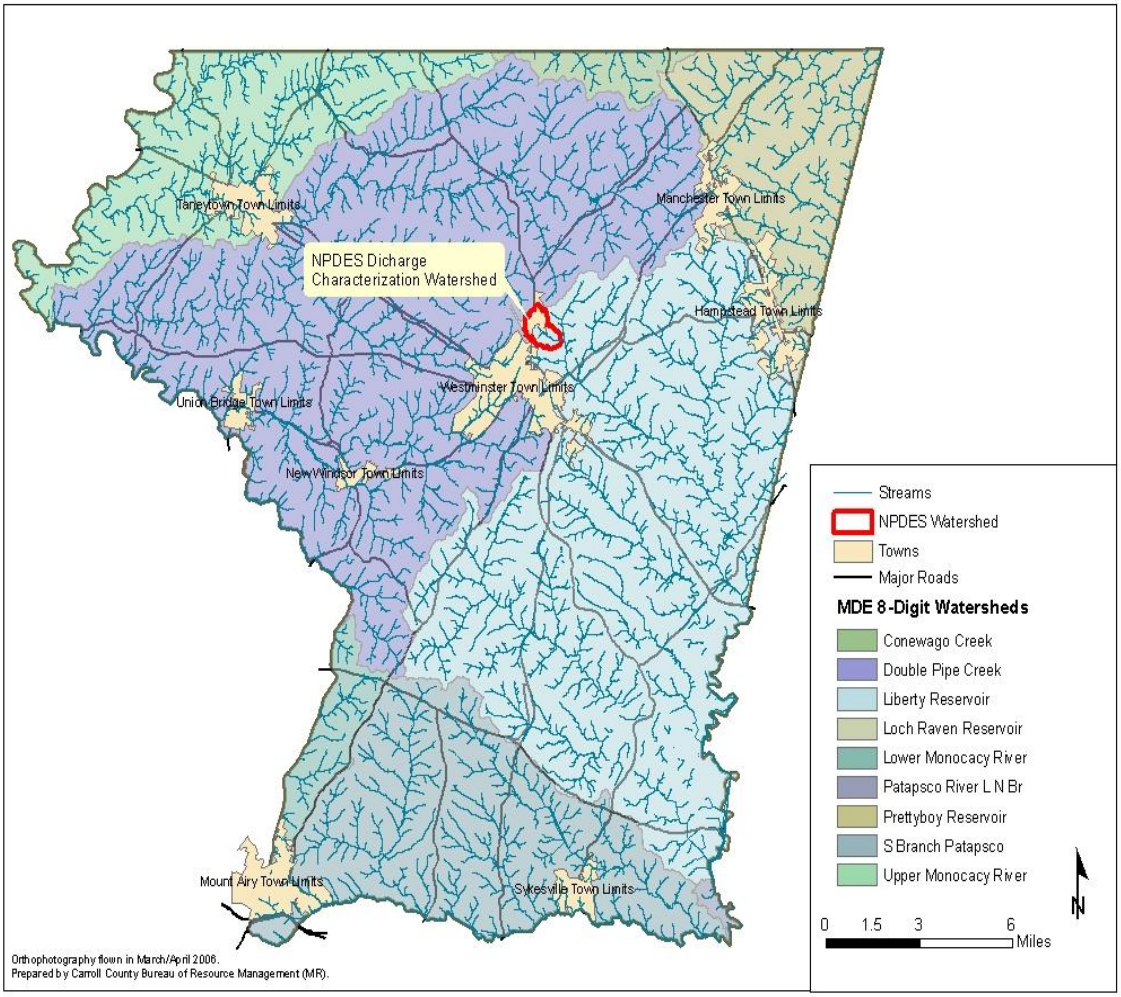


Figure 7: Carroll County NPDES Discharge Characterization Location

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 between 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, including an annual comparison of permanently monumented stream channel cross-sections and a stream profile to evaluate channel stability;
- 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 consists 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 once per month.
- Sampling is completed with automated equipment to include pH and temperature, and each storm limb is characterized.
- Laboratory analysis is completed for various chemical constituents and Event Mean Concentrations (EMCs) are calculated and reported.

Biological monitoring is completed in the spring of each 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.

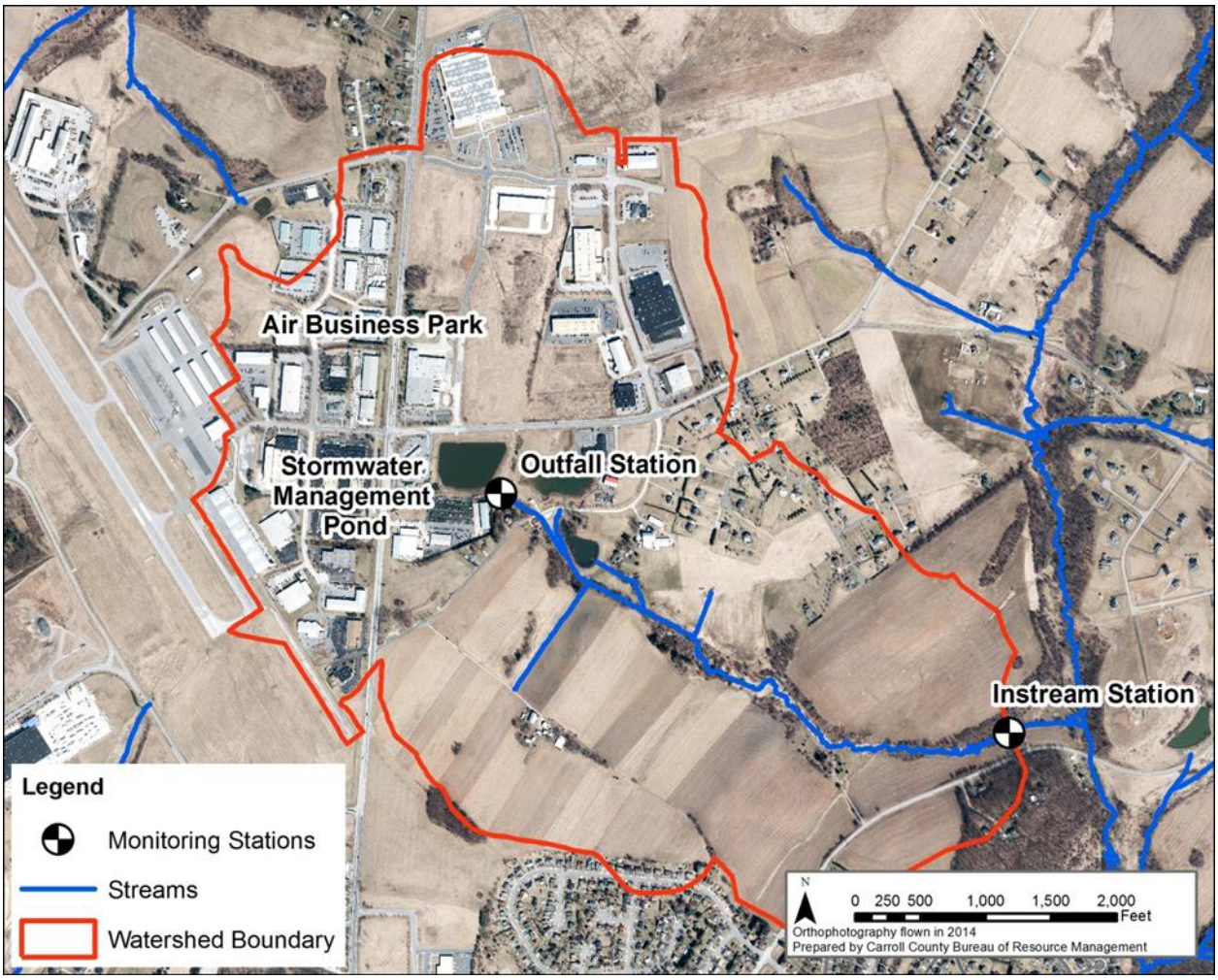


Figure 8: NPDES Discharge Characterization Watershed

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 annual 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 (CCRA), as in the previous reporting years. This station is operated by Carroll County Government in accordance with National Weather Service Standards. Precipitation data, previously collected at the CCRA and/or the Westminster Wastewater Plant, were collected at the Carroll County Maintenance Center using a HOBO Rain Gauge Data Logger, operated and maintained by County staff. This is the first year that data from this rain gauge are being used for this report.

Hydrological

To characterize the hydrology of the study watershed, both monitoring stations (**Figure 8**) are equipped with instrumentation to collect continuous stream discharge 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 powered by a deep cycle, 12-volt marine battery and equipped with an ISCO model 6712 portable sampler and model 4230 bubbler-type flow meter.

The hydrologic 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. At the instream station, the ISCO flow meter contains a stilling well, staff plate, and bubbler assembly that record hydrologic data by converting the hydrostatic pressure required to maintain the bubble rate to stream stage. County staff regularly collect stage-discharge data to relate stage to discharge.

Flowlink Version 5.1 software by ISCO is used to complete hydrologic data analyses. Data collected at the monitoring stations are downloaded to a computer in the field. 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.

During the 2020 reporting period, collection efforts at the outfall station were impaired by equipment destruction/malfunction and power surges. Limited staffing due to COVID-19 and database errors accounted for the loss of data at both stations from March through May 2020. Additionally, the instream station battery was stolen during the spring season, also resulting in a loss of data. Some missing data were able to be estimated during these periods. About one quarter of hydrological data is missing for winter and spring 2020 at the instream monitoring station. About 39% of the outfall data is missing for the winter season and 61% is missing for the spring season. All estimates for both stations contain a greater-than (>) symbol for measurements taken during winter and spring 2020, representing a minimum value based on recorded data.

Physical Geomorphological

The physical geomorphological assessment consists of evaluating six permanent monumented cross-sections and 28 additional cross-sectional stations for stream physical character, shape, and slope. The entire stream segment being studied is comprised of six stream reaches, and a permanent, monumented cross-section is located within each reach at a location representative of that reach. The 28 additional points are GPS-located and distributed at approximately 200 ft intervals along the stream segment. Physical data collection stations are shown in **Figure 9**.

During the spring of 2020, Carroll County conducted a geomorphologic assessment for the entire stream segment, from the outfall of the Air Business Park stormwater management facility to the confluence with the West Branch of the North Branch Patapsco River. As required, survey data

were again collected at the six permanent monumented cross-sections. At each location, the County survey crew collected data for bank slope, toe, stream edges, channel bottoms, and tops.

Data were also collected at each of the 28 additional cross-sections along the same stream segment. The parameters measured for this effort were similar to those at the six monumented cross-sections and described 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 segment to assess potential geomorphologic changes to the stream. This assessment included a physical evaluation of stream channel changes and an interpretation of those changes. The physical evaluation involved determining channel segment characteristics and assessing dimensional changes. The results of the physical evaluation were then translated into a channel response by comparing changes in channel geometry (e.g. cross-sectional dimensions) in the context of the physical setting.

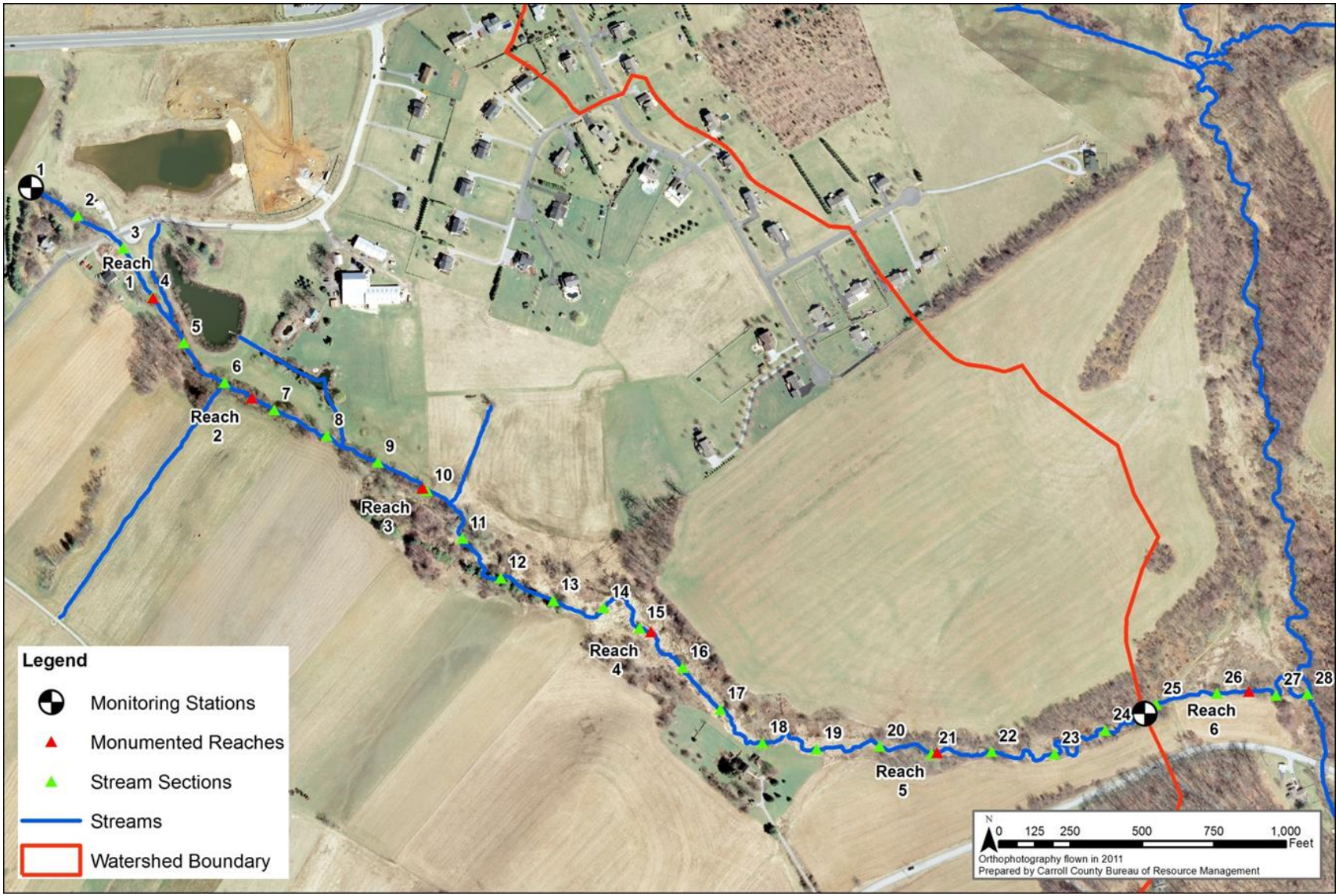


Figure 9: Physical Data Collection Stations

Chemical

Chemical assessments take place throughout the year at the outfall and instream monitoring stations (**Figure 8**). Carroll County staff collect all storm and baseflow chemical samples and continue to contract with Martel Laboratories, Inc., in Baltimore, Maryland, for laboratory 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 11** lists the required parameters for laboratory analysis, the laboratory method, and the corresponding method reporting limit.

Table 11
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 uses storm event monitoring equipment manufactured by ISCO, Inc. to comply with this component of the county's NPDES permit, as described above in the Hydrological section. This reporting year was the third year 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 12.** Please note that 15 total sampling events are reported, seven of which were storm events. As previously stated, the outfall station does not have hydrological and chemical data for storm events for most of the reporting period. Values for the outfall station during storm events have been populated with "N/A". Any seasonal or annual flow-weighted chemical loadings have greater-than (>) symbols, representing a minimum value based on available recorded data.

Table 12
2019 – 2020 NPDES Discharge Characterization Sampling Events

Event	Date	Event Type	Outfall Physical Water Data		Instream Physical Water Data			
			pH	Water Temp (F)	Event	Date	Event Type	pH
2019-08	7/22/19	Storm	9.3	78	2019-08	7/22/19	Storm	9.3
2019-09	9/19/19	Base Flow	8.56	67	2019-09	9/19/19	Base Flow	8.56
2019-10	10/31/19	Storm	6.79	61	2019-10	10/31/19	Storm	6.79
2019-11	11/14/19	Base Flow	N/A	41	2019-11	11/14/19	Base Flow	N/A
2019-12	12/9/19	Storm	7.71	41	2019-12	12/9/19	Storm	7.71
2019-13	12/19/19	Base Flow	6.7	34	2019-13	12/19/19	Base Flow	6.7
2020-01	1/23/20	Base Flow	7.59	39	2020-01	1/23/20	Base Flow	7.59
2020-02	1/25/20	Storm	N/A	N/A	2020-02	1/25/20	Storm	N/A
2020-03	2/6/20	Storm	8.06	N/A	2020-03	2/6/20	Storm	8.06
2020-04	2/20/20	Base Flow	8.64	41	2020-04	2/20/20	Base Flow	8.64
2020-05	3/10/20	Base Flow	8.63	49	2020-05	3/10/20	Base Flow	8.63
2020-06	5/21/20	Base Flow	N/A	61	2020-06	5/21/20	Base Flow	N/A
2020-07	6/17/20	Base Flow	N/A	72	2020-07	6/17/20	Base Flow	N/A
2020-08	6/22/20	Storm	7.93	75	2020-08	6/22/20	Storm	7.93
2020-09	6/24/20	Storm	8.1	76	2020-09	6/24/20	Storm	8.1

Biological

Two monitoring sites, corresponding to the outfall and instream stations, have been characterized annually during the Spring Index Period (March 1 to April 30) since 2000. Data collection, macro-invertebrate identification, and analytical methods were in accordance with the Maryland Biological Stream Survey (MBSS) guidance manual (Sampling Manual Field Protocols, 2019, https://dnr.maryland.gov/streams/Publications/R4Manual.pdf). The 75-meter sampling sites, shown in **Figure 10,** were not randomly selected. The county contracts with Ellen Friedman, former MD DNR principal taxonomist with over 20 years of identification experience, to identify and enumerate all benthic macro-invertebrate samples. An Index of Biotic Integrity (IBI) score was calculated using the six component metrics listed in **Table 13.** Each metric is rated a one, three, or five depending on the taxa present. The average of the component metric scores is considered the overall IBI score. Narrative ratings can be found in **Table 14.**

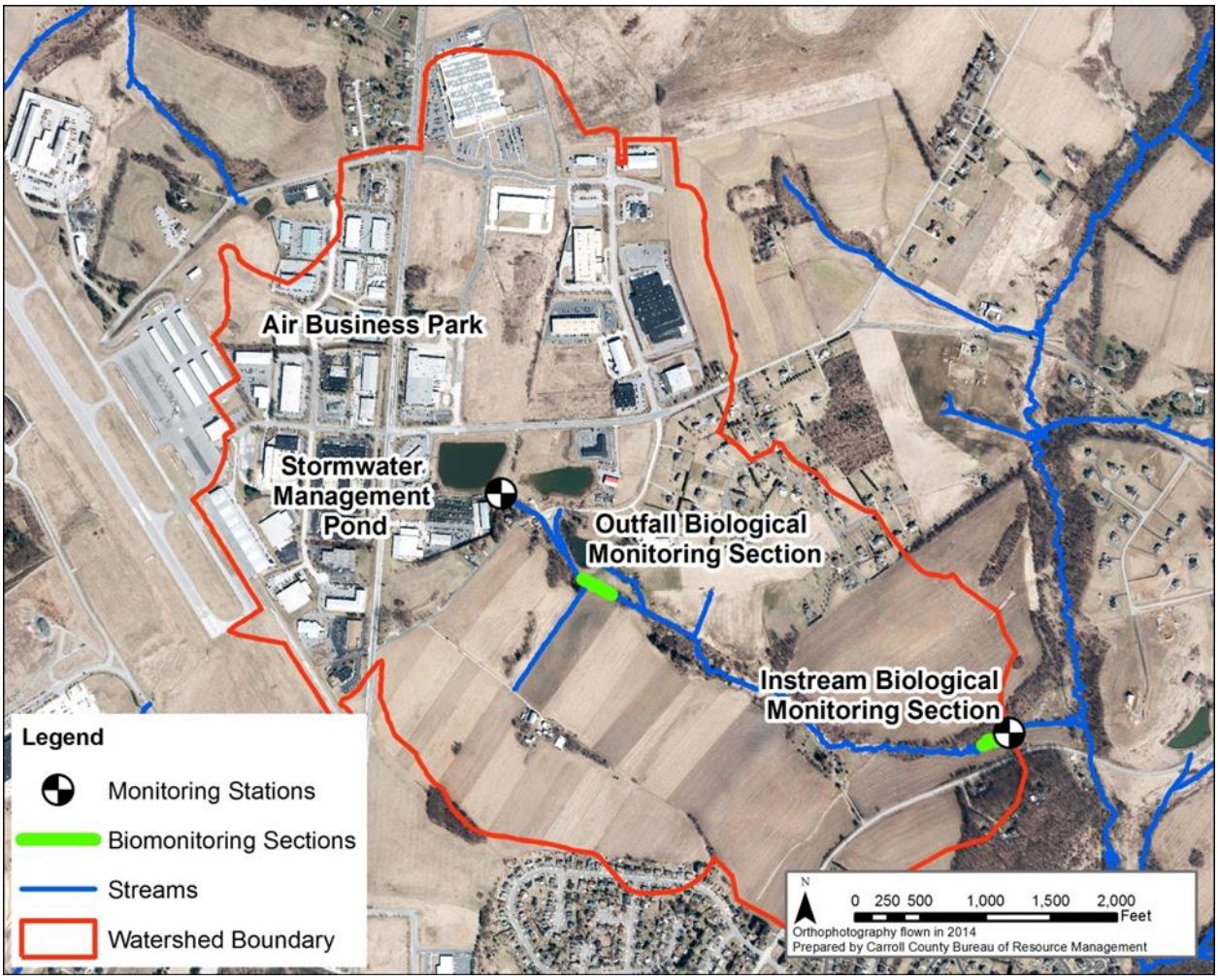


Figure 10: Biological Monitoring Station Locations

Table 13

MBSS IBI Metrics and 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 14
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.

Habitat assessments were also conducted in accordance with MBSS Sampling Manual Field Protocols (2019) during the Spring Index Period. The assessment uses scoring criteria that measure eight parameters, as shown in **Table 15**. Each parameter can score 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. It should be noted that the habitat assessment is entirely qualitative, and results can be impacted by the subjectivity of assessor scoring and other factors. Additionally, data from this and the other assessments reflect the cumulative impacts of not only the regional stormwater management facility, but of the entire upstream contributing watershed to each study point as well.

Table 15
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 2020 reporting year are summarized in **Figure 11**. The 30-year monthly precipitation average and high/low extremes are also included. The total precipitation for the reporting period was 41.42 inches, a 1.98-inch deficit from the mean yearly total. Relative to mean monthly precipitation totals, July 2019 was the wettest month, with a surplus of 4.39 inches, while September 2019 was the driest month, with a deficit of 3.93 inches.

This reporting year was the eighth driest year for total precipitation since reporting began at this station in 2000.

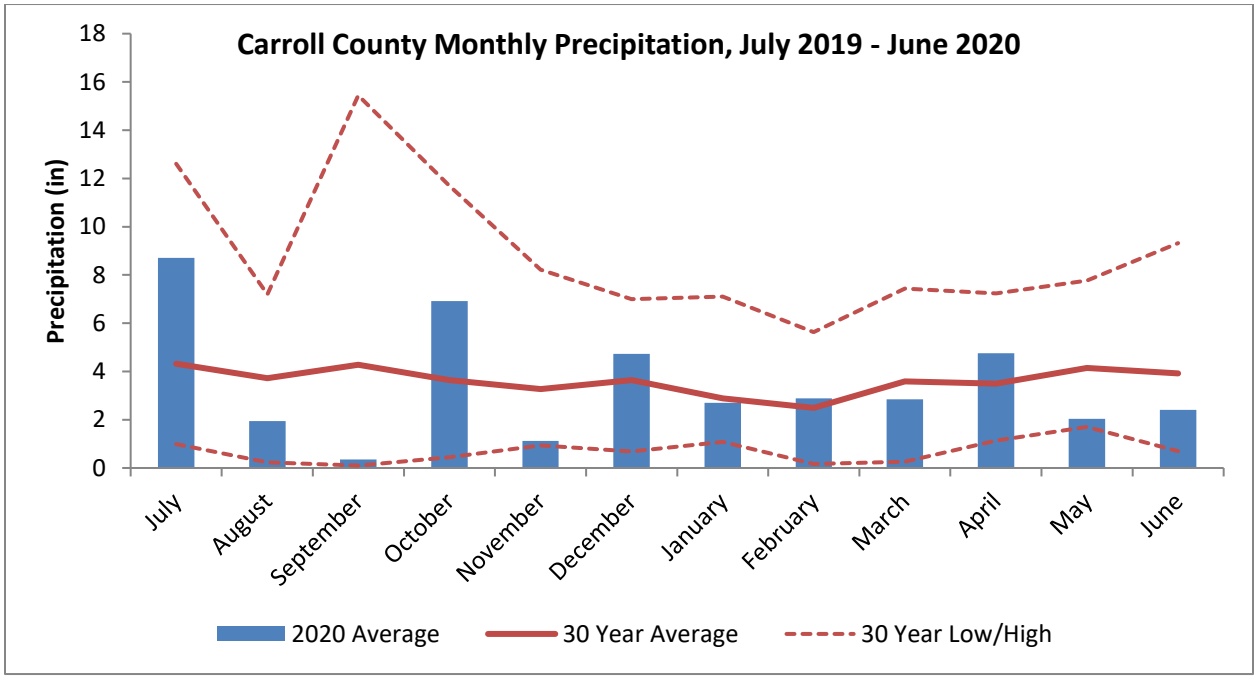


Figure 11: Monthly Precipitation Summary for the 2020 Reporting Period

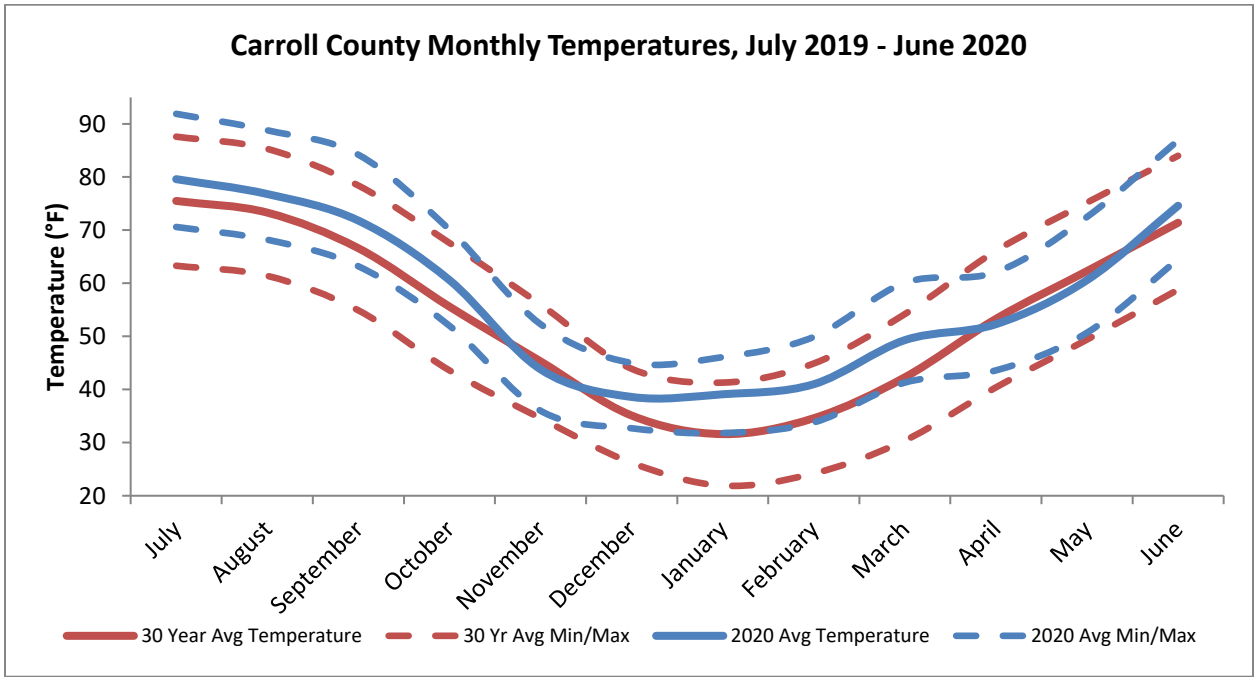


Figure 12: Monthly Temperature Summary for the 2020 Reporting Period

Monthly temperature data for the 2020 reporting year are summarized in **Figure 12**. The 30-year monthly average temperatures and high/low temperature extremes are included for reference. Overall, the reporting period experienced an annual average temperature of 57.3°F, which was 3.4°F warmer than the 30-year annual average. Three months were cooler than average, with a mean of 1.4°F cooler than normal. Nine months were warmer than average, with a mean of 5.0°F warmer than normal. January and February 2020, in particular, were significantly warmer than average with a 7.5°F and 6.4°F increase, respectively, above normal temperatures. It should be noted that warmer-than-average daily minimum temperatures were observed for every month; the mean for this reporting period was 6.6°F above normal.

Hydrological

Hydrographs have been prepared for stage height and discharge at each monitoring station for the reporting period. Instream and outfall stage heights and discharge measurements are shown in **Figures 13 and 14**, respectively. A deficit of 1.98 inches of precipitation was observed during this reporting period relative to the average year. The reporting period had a few moderate storm events and a typical frequency of smaller storm events, primarily in the wetter periods during July and October 2019. 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.

As previously stated, due to COVID-19 and equipment malfunction/failure, limited discharge data were recorded for both stations during the winter and spring 2020. Recorded discharge data are available for 71% of the year for the outfall station and 86% of the year for the instream station. Many outfall data that were recorded during spring had to be estimated because of equipment malfunction due to power surges. Most hydrologic data were recorded for summer and autumn 2019 for both stations, with most gaps in data occurring in late winter and early spring 2020.

Typical stage heights at the outfall monitoring station were approximately 0.1 feet, or 57 gpm. Peak discharge occurred on November 1, 2019 when a stage height of 0.47 feet was recorded. The resulting discharge was 1,432 gpm. Only one other storm event with a discharge greater than 1,000 gpm occurred during the reporting period.

Typical stage heights observed for the instream monitoring station were approximately 0.3 feet, or 275 gpm. Peak discharge at this monitoring station occurred during the same storm event as the outfall station. Peak observed stage height was 1.6 feet and peak discharge was 19,964 gpm. Peak observed discharge for most storm events at the instream station were less than 5,000 gpm; only three storm events had peak discharge measurements greater than 5,000 gpm.

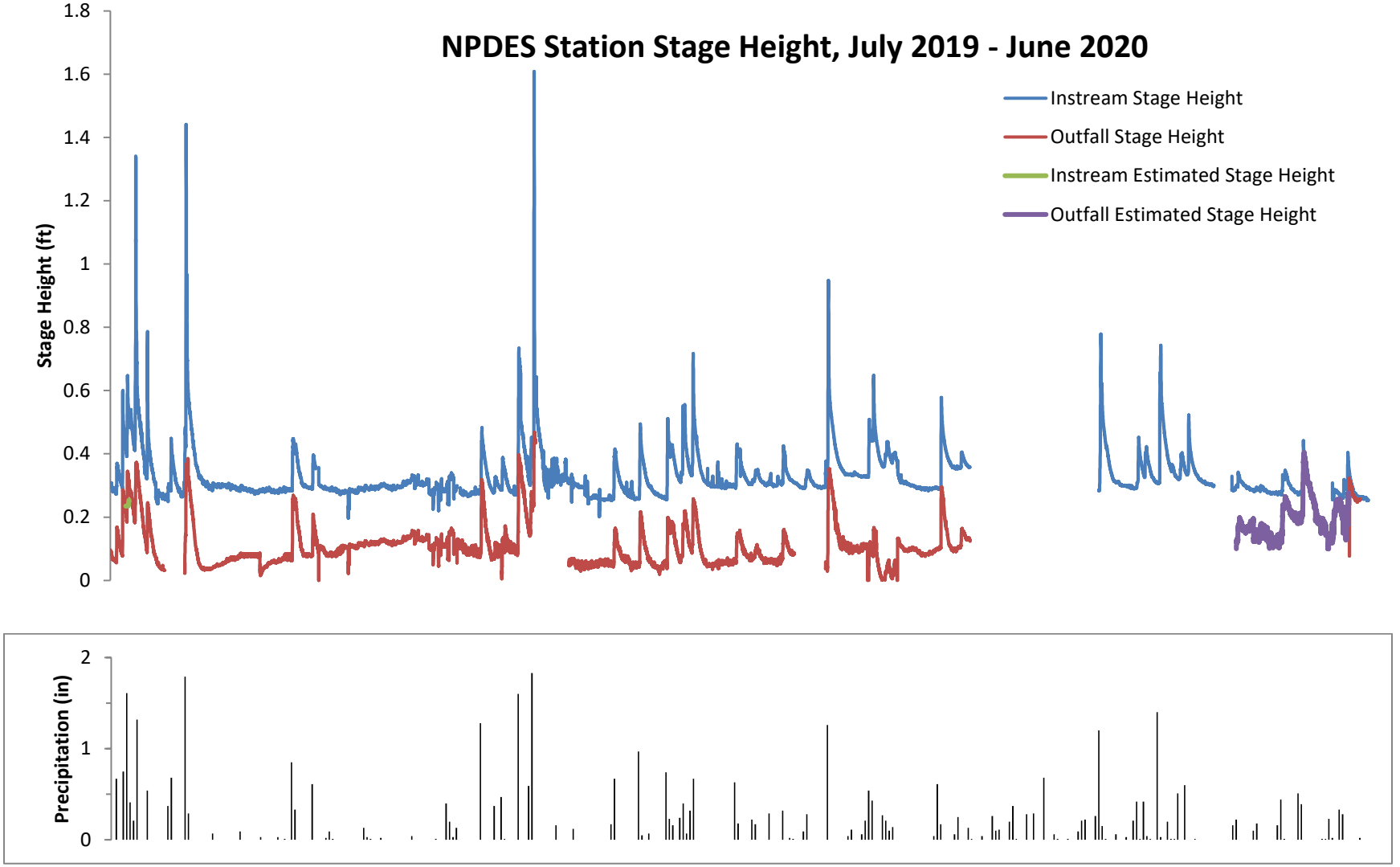


Figure 13: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2020 Reporting Year

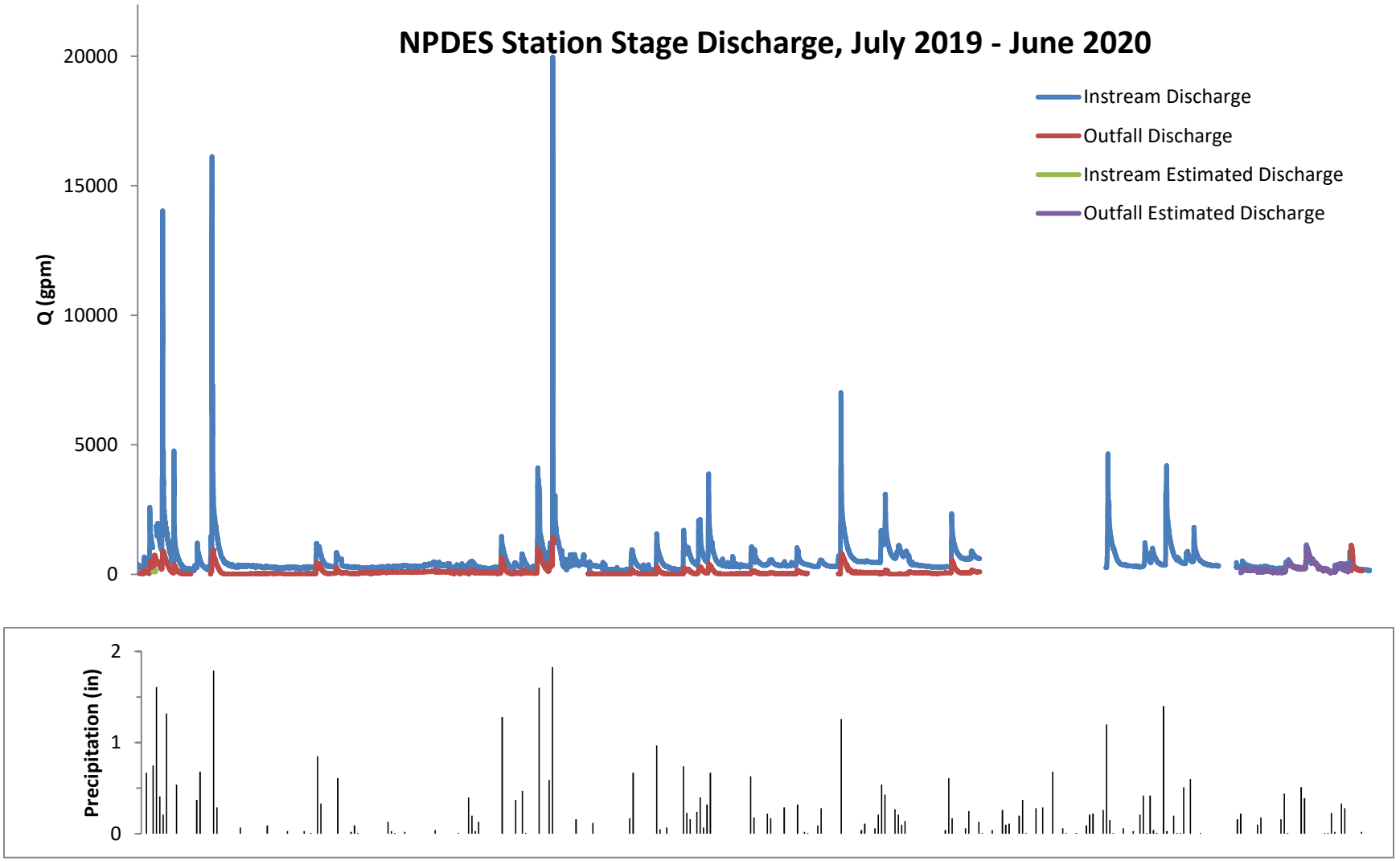


Figure 14: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2020 Reporting Year

Total, seasonal, and categorical discharges for each monitoring station can be found in **Table 16**. Due to the previously stated issues at both stations throughout the reporting year, seasonal discharge cannot be estimated as in most years. Typically, stormwater contribution from the outfall pond is 20% to 50% of the instream discharge for an average precipitation year. Outfall contribution holds a positive relationship with the total precipitation and number of moderate to high intensity storm events. During this reporting period, the outfall would be expected to contribute a lesser percentage of the total discharge at the instream station because of the precipitation deficit. During the two seasons with mostly complete data sets, summer and autumn 2019, outfall contributions were roughly 20% of the total instream discharge. These two seasons also contained the three largest storm events. Discharge was spread fairly evenly throughout the four seasons, and baseflow stage heights dominated the period, as there were fewer storm events and slightly less precipitation than a typical year. In contrast to the previous reporting year, which had record high precipitation, observed instream station discharge during summer and autumn 2019 was only 25% of the observed discharge recorded during the same period in 2018.

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, 2016.

Table 16
Categorical Discharges and Stage Heights for the 2020 Reporting Year

	Instream	Outfall	Difference	Outfall Contribution (%)
Total (gallons)	>229,585,758	>41,784,110	<187,801,648	N/A
Avg Stage (ft)	0.33	0.12	0.21	-
Median Stage (ft)	0.3	0.10	0.20	-
Avg Q (gpm)	508	112	397	21.9 %
Median Q (gpm)	331	57	275	17.1 %
Summer Q (gallons)	64,402,015	12,383,020	<52,018,995	N/A
Autumn Q (gallons)	65,325,885	10,428,954	<54,896,931	N/A
Winter Q (gallons)	>54,423,114	>6,050,844	<48,372,270	N/A
Spring Q (gallons)	>45,434,744	>12,921,293	<32,513,452	N/A
Dry (<700gpm)	>127,462,133	>22,075,117	<105,387,017	N/A
Wet (>700gpm)	>102,123,625	>17,028,650	<85,094,975	N/A

To assess the impact of the retrofit on hydrology, cumulative discharge frequencies at the outfall monitoring station were compared for the 2007 (pre-retrofit) and 2020 (post-retrofit) reporting years (**Figure 15)**. The maximum discharge during the pre-retrofit period is typically an order of magnitude higher than that of the post-retrofit period. The maximum discharge in 2007 was 23,537 gpm, while the maximum in 2020 was only 1,432 gpm. During the previous reporting period, with record precipitation and a high frequency of large magnitude storm events, the maximum discharge was still only 13,496 gpm. During this reporting period, 73% of all

discharge measurements were below or equal to 100 gpm. This contrasts with the pre-retrofit measurements where only 23% of measurements were below 100 gpm. 10% of all measurements in 2007 were greater than 2,000 gallons per minute, which are greater in magnitude than most of the highest discharges from post-retrofit years. It should also be noted that only 71% of the yearly discharge measurements were recorded due to the previously stated equipment problems at the outfall station.

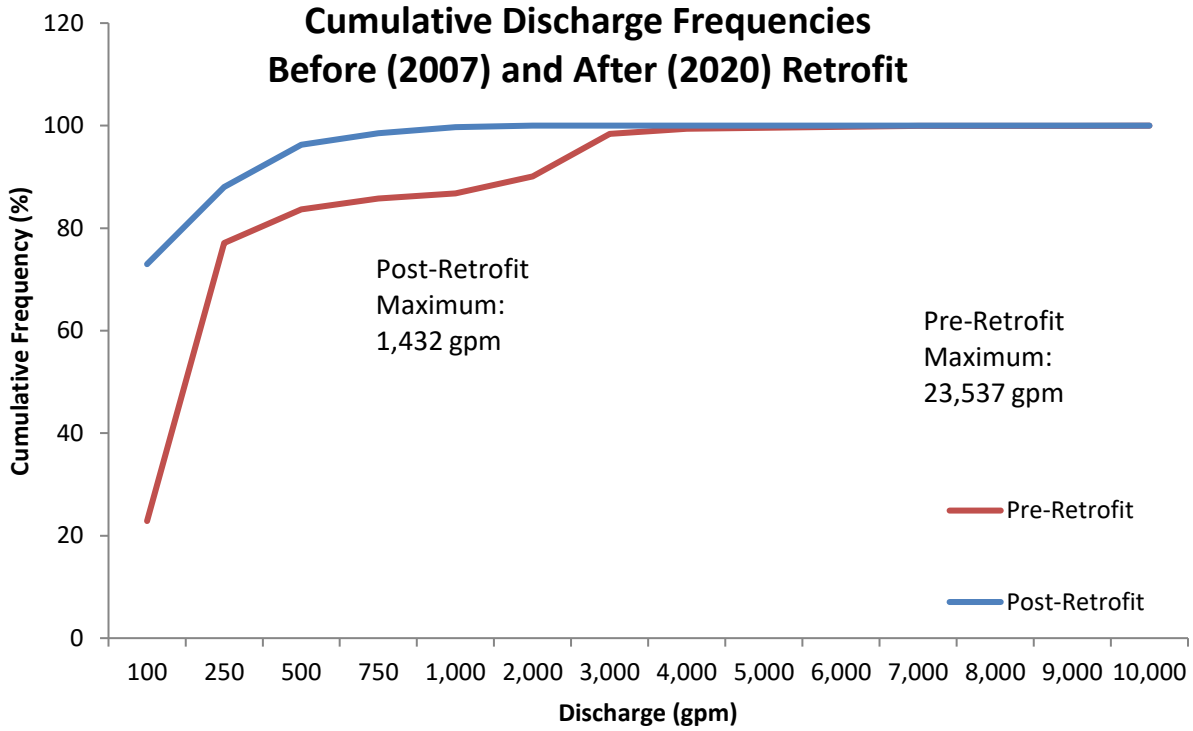


Figure 15: Outfall Discharge Frequencies for FY2007 and FY2020

An examination of individual events on the hydrograph demonstrates the distinct mechanisms driving changes in cumulative frequencies. **Figure 16** represents two analogous storm events, one before and one after the stormwater retrofit, and a hydrological comparison therein. This figure contains hydrographs before and after retrofit for instream and outfall stage heights and discharges. Unlike previous years, which compared storm events with nearly identical precipitation totals, this comparison is of a slightly 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 0.54 inches of precipitation observed. Despite the higher precipitation intensity and total, 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. The outfall-to-instream station discharge ratio for the post-retrofit storm event averaged a 17% contribution, peaking at 25%, as was roughly the case for the overall discharge and separated stormflow for the reporting period. During the pre-retrofit storm, however, the outfall station contributed about 70% of the total instream discharge. The lesser contribution during the post-retrofit storm event is evident in the instream station hydrographs. Overall, longer baseflow recessions and lower peak discharges were observed with the current stormwater configuration.

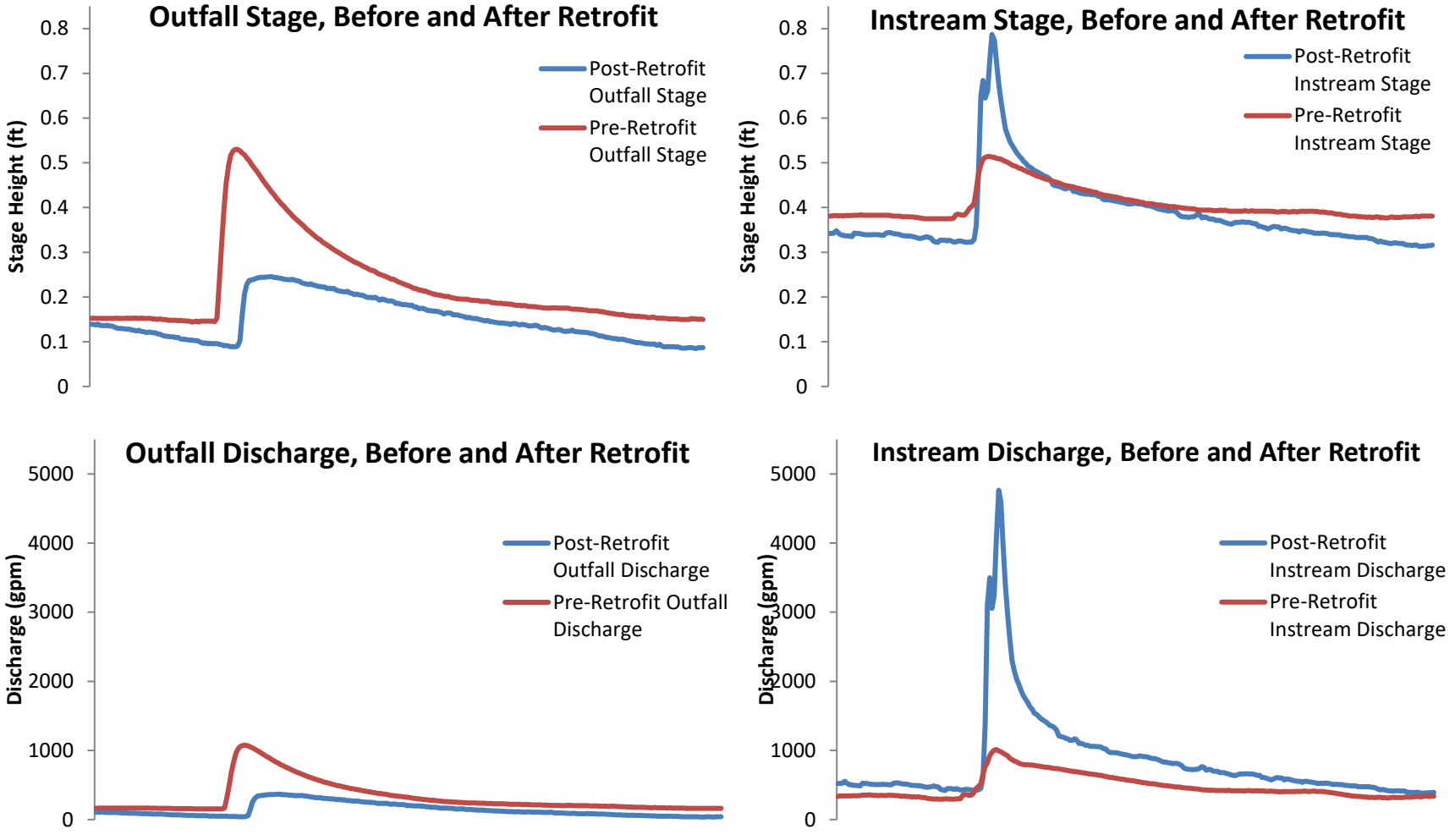


Figure 16: Characteristics of Analogous Storms Pre-Retrofit (7/23/2006, 0.39") and Post-Retrofit (7/11/2019, 0.54")

Geomorphological

Results from this year's monumented cross-section data collection are provided in **Appendix D**. Because this monitoring effort is designed to detect changes to the stream system over time, staff compared results at the six permanent cross-sections from this year to results from 2000, the first year this type of monitoring was initiated. There was no indication of large-scale degradation or aggradation of the stream channel over this time period.

At the first cross-section, located approximately 500 feet downstream of the pond outfall, the left bank had previously moved approximately two to three feet to the west, but has recently migrated closer to the location of the original channel, though the thalweg has migrated about a foot east of its 2018 location due to scour. Aggradation along the right edge was observed at this location, which has created a steeper bank. This section is also located approximately 200 feet downstream of a road culvert and just upstream of the input location from the West Branch Stormwater Management Pond.

The second cross-section had developed, for the first time, an incision of approximately one foot during the 2019 reporting year. During the 2020 reporting year, this site experienced aggradation, which brought the bottom of the stream channel to its previous historical level.

Cross-section three is still generally unchanged since 2000, with only minor shifts in stream channel shape. The left bank has continued to slowly erode and migrate west over time, but remains at the same location as the previous reporting period.

Located approximately 65 feet downstream of a series of bends and two draws, cross-section four has shown relatively significant aggradation and narrowing of the channel since 2000. Aggradation occurred during all previous years except this and the previous reporting periods, in which it experienced minor incision. The channel shape remains relatively unchanged from the previous year, apart from the minor incision.

Cross-section five remains essentially unchanged since 2000; however, the channel has widened and moved slightly west over the last 20 years. Over the past year, some incision occurred along the west bank, widening the channel.

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 has remained the same over 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 are characterized as highly erodible (USDA, 1969).

Thalweg elevation and section gradient for selected years from 2004 through 2020 are shown in **Table 17**. 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 over many years except 2019, as is expected in a low-gradient area.

Figure 17 displays stream gradients from the 2020, 2019, and 2004 reporting years 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 maintained a gentle slope with only one section above a 2% gradient, though 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 0.02% to 1.26%. 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 numerous times, but slopes are relatively similar for 2019 and 2004; the slope at station 22 has a decreasing gradient, while station 24 has an increasing gradient over time. Increased sinuosity and slope have been observed at the terminus of the tributary. The tributary has abandoned the previous channel at station 27 and formed a new channel, explaining the increase in thalweg elevation at this location.

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 locations of 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 downstream, the cause of elevated deposition at monumented reach four. Over the previous reporting period, deposition once again increased in the first third of the tributary, while there was some minor incision in the final third of the tributary. Aggradation in the first third of the stream channel is consistent with increases in embeddedness noted in the biological habitat assessment. Overall, there was no major sediment loss or gain over the previous year; no station exceeded a one-foot change in thalweg elevation from the original survey. Because the stream has two small tributaries, varying bends, straight segments, and various soil types, it is important to monitor the physical characteristics of the stream channel over time.

Table 17
Cross-Section Station Results for Selected Years 2004 – 2020

		2004		2006		2008		2010		2018		2019		2020	
Station	Distance (ft)	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope
1	0	730.89	N/A	730.68		730.89		730.89							
2	201	727.9	1.49%	727.83	1.42%	728.01	1.43%	728.01	1.43%	728.12		728.12		728.18	
3	394	724.2	1.92%	724.26	1.85%	724.56	1.79%	724.58	1.78%	724.99	1.62%	724.93	1.65%	725.06	1.62%
4	592	721.51	1.36%	721.3	1.50%	721.49	1.55%	722.06	1.27%	721.86	1.58%	721.97	1.50%	721.9	1.60%
5	786	717.75	1.93%	717.77	1.81%	717.81	1.89%	717.78	2.20%	718.15	1.91%	718.36	1.86%	718.39	1.80%
6	988	715.82	0.96%	716.27	0.74%	716.61	0.59%	716.73	0.52%	716.16	0.99%	716.35	1.00%	716.44	0.97%
7	1184	715.49	0.17%	715.6	0.34%	715.7	0.46%	715.58	0.59%	715.75	0.21%	716.27	0.04%	716.31	0.07%
8	1388	714.42	0.52%	714.3	0.64%	714.24	0.72%	714.28	0.64%	714.38	0.67%	714.27	0.98%	714.52	0.88%
9	1589	712.74	0.84%	712.83	0.73%	712.78	0.73%	712.8	0.74%	713.02	0.68%	712.94	0.66%	713.05	0.73%
10	1787	711.22	0.77%	711.2	0.82%	711.66	0.57%	711.59	0.61%	711.24	0.90%	711.17	0.89%	711.31	0.88%
11	1986	709.61	0.81%	709.58	0.82%	710.06	0.81%	709.93	0.84%	709.89	0.68%	709.92	0.63%	709.95	0.68%
12	2189	709.48	0.06%	709.02	0.28%	709.58	0.24%	709.16	0.38%	709.41	0.24%	709.4	0.26%	709.53	0.21%
13	2386	709.45	0.02%	709.81	-0.40%	709.04	0.27%	708.46	0.35%	708.7	0.36%	708.72	0.34%	708.97	0.28%
14	2564	707.74	0.97%	707.94	1.06%	707.88	0.66%	708.17	0.16%	708.4	0.17%	708.44	0.16%	708.37	0.34%
15	2707	706.81	0.65%	707.07	0.61%	707.06	0.57%	707.02	0.80%	707.26	0.79%	706.98	1.02%	706.92	1.01%
16	2910	705.18	0.80%	705.2	0.92%	705.55	0.74%	705.44	0.78%	705.42	0.91%	705.22	0.87%	705.32	0.79%
17	3106	704.18	0.51%	704.37	0.43%	704.48	0.55%	704.78	0.34%	704.49	0.48%	704.32	0.46%	704.41	0.47%
18	3298	702.94	0.64%	703.16	0.63%	703.27	0.63%	703.62	0.60%	703.57	0.48%	703.41	0.47%	703.3	0.58%
19	3490	701.69	0.65%	701.48	0.88%	701.48	0.93%	701.75	0.97%	701.83	0.91%	701.8	0.84%	701.89	0.74%
20	3704	698.99	1.26%	698.92	1.19%	698.92	1.19%	698.9	1.33%	699.16	1.25%	698.86	1.37%	698.83	1.43%
21	3896	697.95	0.54%	697.83	0.57%	697.69	0.64%	697.73	0.61%	697.78	0.72%	697.74	0.59%	697.88	0.50%
22	4100	694.62	1.63%	694.9	1.43%	694.78	1.42%	694.7	1.48%	695.79	0.97%	695.57	1.06%	695.59	1.12%
23	4320	693.42	0.54%	693.44	0.66%	693.73	0.48%	693.9	0.36%	694.22	0.71%	694.19	0.63%	693.94	0.75%
24	4511	691.12	1.21%	691.05	1.25%	691.1	1.38%	691.17	1.43%	691.24	1.56%	691.01	1.67%	691	1.54%
25	4717	689.65	0.71%	689.52	0.74%	689.41	0.82%	689.35	0.88%	689.57	0.81%	689.41	0.77%	689.46	0.75%
26	4933	687.59	0.96%	687.71	0.84%	687.59	0.84%	687.38	0.91%	687.55	0.94%	687.37	0.95%	687.42	0.95%
27	5137	685.82	0.87%	685.53	1.07%	685.45	1.05%	685.44	0.95%	685.78	0.87%	686.14	0.60%	686.24	0.58%
28	5248	682.83	2.68%	682.71	2.53%	682.7	2.47%	682.8	2.37%	683.37	2.16%	683.46	2.41%	683.36	2.59%

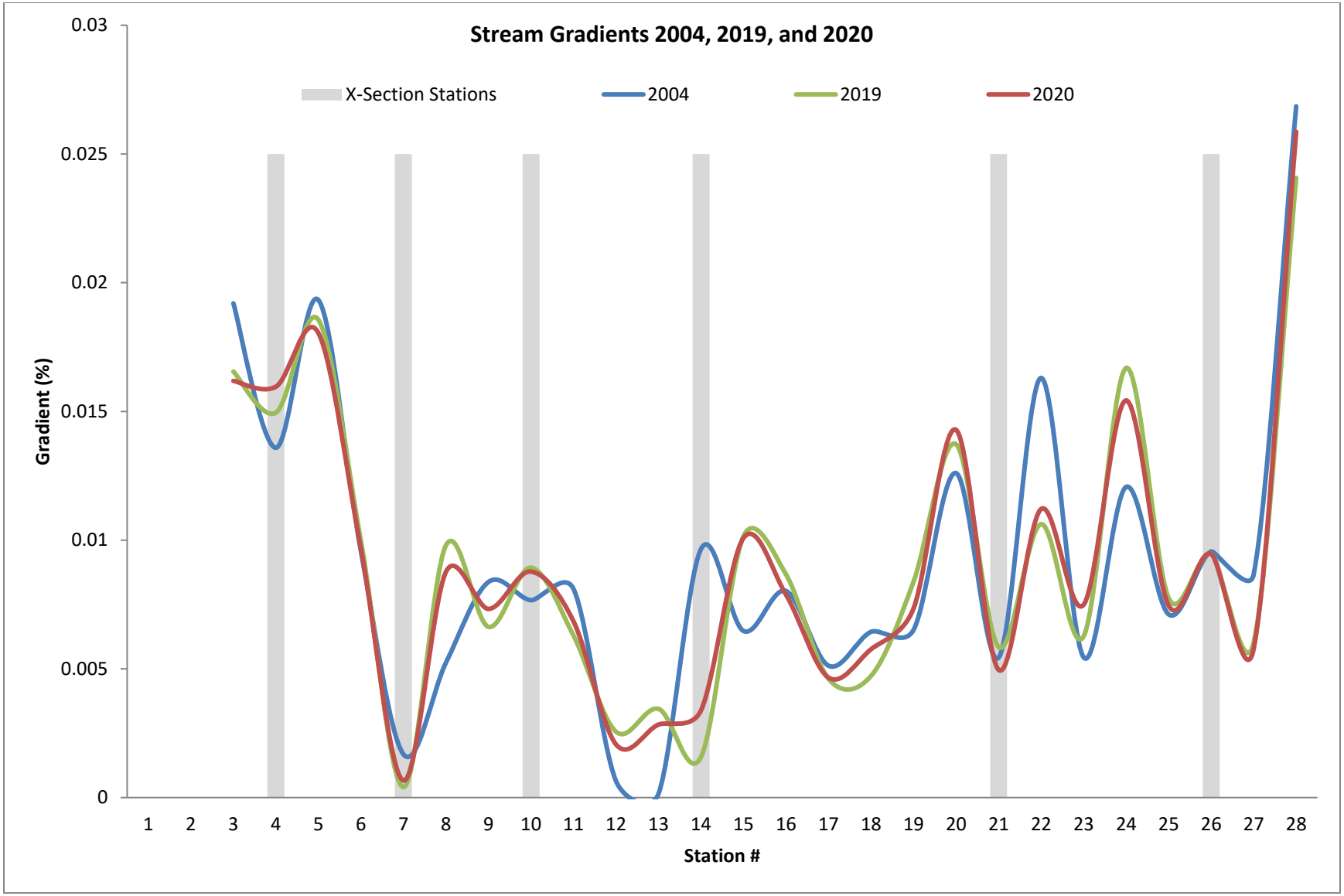


Figure 17: Stream Gradient Change from 2004 – 2020

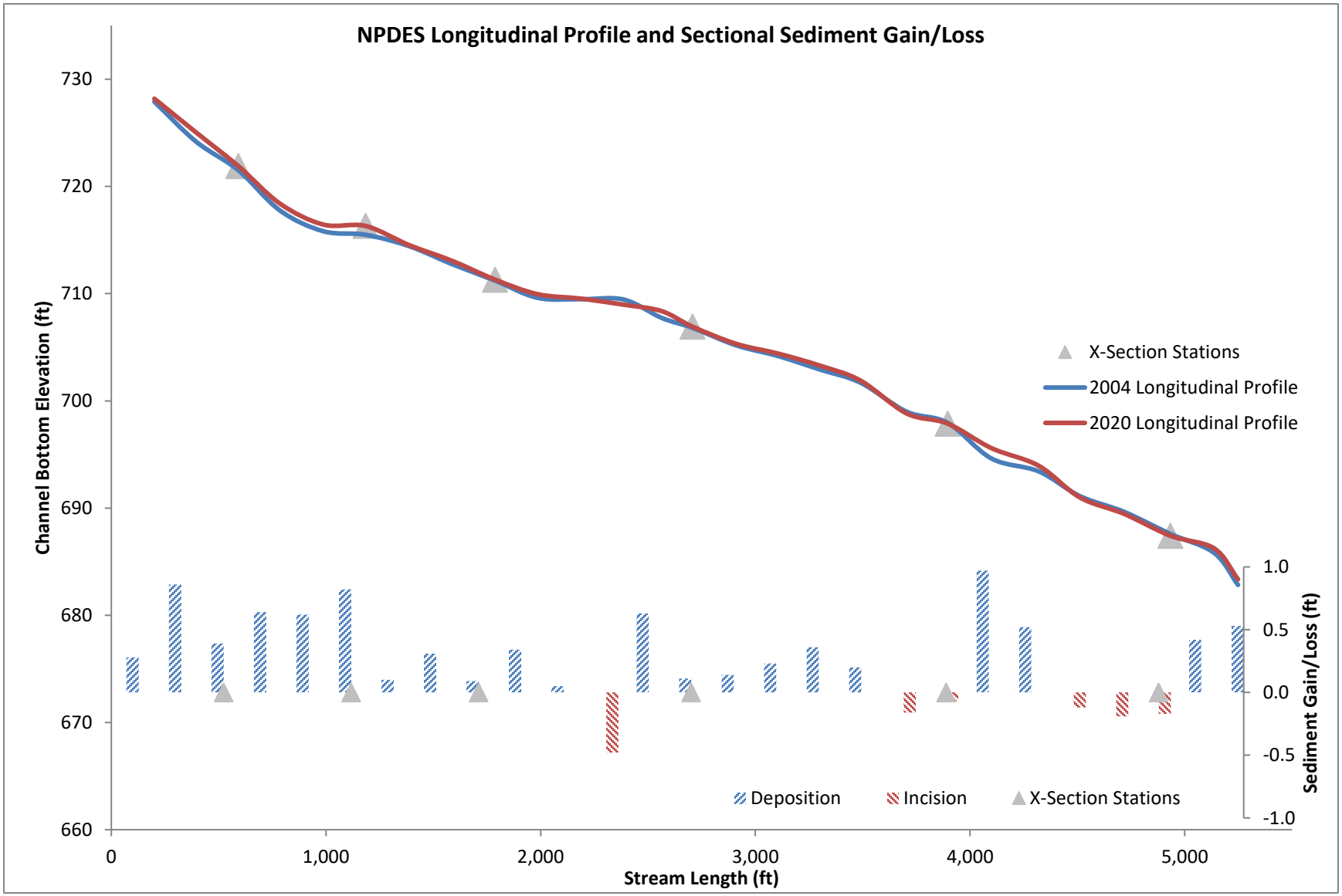


Figure 18: Comparison of Longitudinal Profile and Sectional Deposition/Incision, 2004 and 2020

Chemical

Physical Water Data

Physical water analysis results for both monitoring stations are displayed in **Table 18**. Overall, the outfall station water samples had higher temperature, conductivity, and pH values, apart from late summer/early autumn, as in previous years.

On average, temperatures at the outfall station were 6% warmer than those at the instream station. Temperature differences ranged from -4°F during base flow sampling in December 2019 to 11°F during September 2019. Temperatures at the outfall station are likely to be more influenced by air temperature and solar heating due to the surface area of the pond, compared to temperatures at the instream station, which are likely to be more moderated by contributions from groundwater and subsurface flow. Additionally, shading at and upstream of the instream station could also impact water temperatures relative to the outfall station.

Table 18
Physical Water Data for 2020 Reporting Year

			Outfall Physical Water Data			Instream Physical Water Data		
Event	Date	Event Type	pH	Water Temp (F)	Conductivity (µmhos/cm)	pH	Water Temp (F)	Conductivity (µmhos/cm)
2019-08	7/22/19	Storm	9.3	78	270	7.95	75	310
2019-09	9/19/19	Base Flow	8.56	67	340	8.29	56	340
2019-10	10/31/19	Storm	6.79	61	220	6.65	56	260
2019-11	11/14/19	Base Flow	N/A	41	240	N/A	41	320
2019-12	12/9/19	Storm	7.71	41	290	6.37	45	310
2019-13	12/19/19	Base Flow	6.7	34	530	6.43	36	430
2020-01	1/23/20	Base Flow	7.59	39	1200	6.6	39	490
2020-02	1/25/20	Storm	N/A	N/A	1100	N/A	N/A	N/A
2020-03	2/6/20	Storm	8.06	N/A	860	7.9	44	430
2020-04	2/20/20	Base Flow	8.64	41	560	7.69	42	410
2020-05	3/10/20	Base Flow	8.63	49	570	7.54	48	380
2020-06	5/21/20	Base Flow	N/A	61	430	N/A	54	340
2020-07	6/17/20	Base Flow	N/A	72	400	N/A	63	350
2020-08	6/22/20	Storm	7.93	75	410	7.71	68	330
2020-09	6/24/20	Storm	8.1	76	380	7.72	71	350

Conductance was greater at the outfall station by a mean of 33%. Conductance ranged from 220 µmhos/cm to 1,200 µmhos/cm. 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. The average pH at the outfall was 8.0 and at the instream station was 7.4. The pH values ranged from 6.4 to 9.3. This pattern is typical, as the pH at the

outfall station is generally more basic. This is possibly due to a local goose population, biological activity within the pond, stormwater interaction with carbonate rocks and concrete at the stormwater facility, or the influence of roadway-derived materials such as road salt.

Event Mean Concentrations

The event mean concentration (EMC) values and ranges for the 15 storm flow and baseflow events for this reporting year are displayed in **Table 19**. Of the observed analytes, nitrate/nitrite was the only one to show a significant difference between the two stations for this reporting year. In this case, nitrate/nitrite was significantly greater at the instream station.

Table 19
EMC Values for 2020 Reporting Year

Event Mean Concentration		Instream Station			Outfall Station			Significance
Analyte	Units	Mean	Min	Max	Mean	Min	Max	p-value
BOD	mg/L	2.59	2.00	6.95	3.47	2.00	5.00	0.089
TKN	mg/L	0.76	0.50	1.88	0.68	0.50	1.50	0.673
NO_2/NO_3	mg/L	4.16	0.79	6.10	0.30	0.08	0.59	$5.4x10^{-7}$
Phosphorus	mg/L	0.12	0.01	0.53	0.08	0.02	0.17	0.268
TSS	mg/L	77.06	1.00	261.73	30.87	4.00	225.29	0.047
Copper	µg/L	3.68	2.00	11.36	2.33	2.00	3.21	0.047
Lead	µg/L	2.51	2.00	5.66	2.01	2.00	2.22	0.100
Zinc	µg/L	22.96	20.00	46.20	22.05	20.00	29.85	0.378
TPH	mg/L	5.00	5.00	5.00	7.00	5.00	25.00	0.208

Figures 19 and 20 present annual mean EMC values for eight analytes from reporting years 2001 through 2020. 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 to 2020 was nitrate/nitrite. The pre- and post-retrofit graph reinforces this difference. 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. The instream concentration increases over outfall for 2019 are due to the non-paired analysis. Seven storm events were measured for the instream station as opposed to only one for the outfall station.

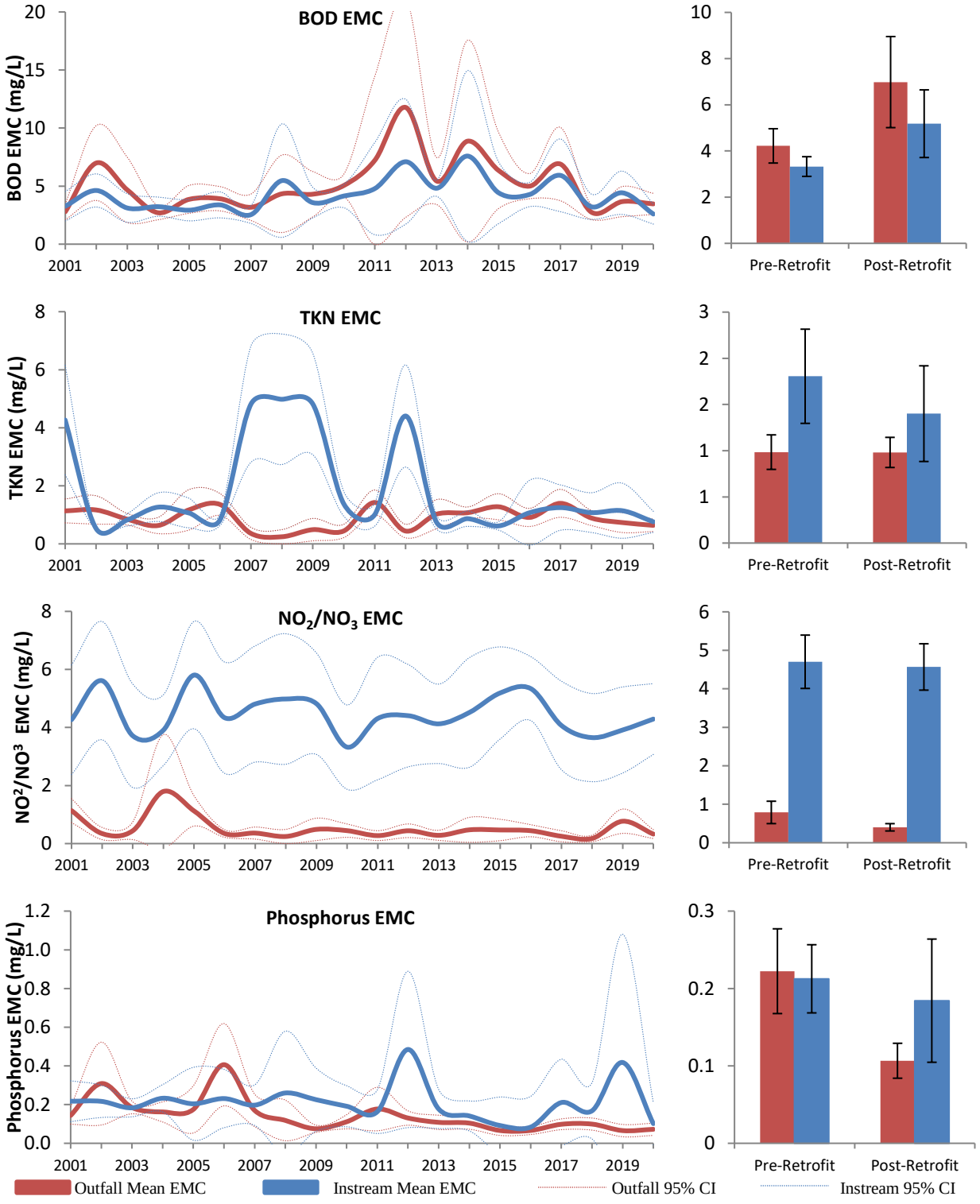


Figure 19: EMC Values from 2001 – 2020 for BOD, TKN, NO_2/NO_3, and Phosphorus

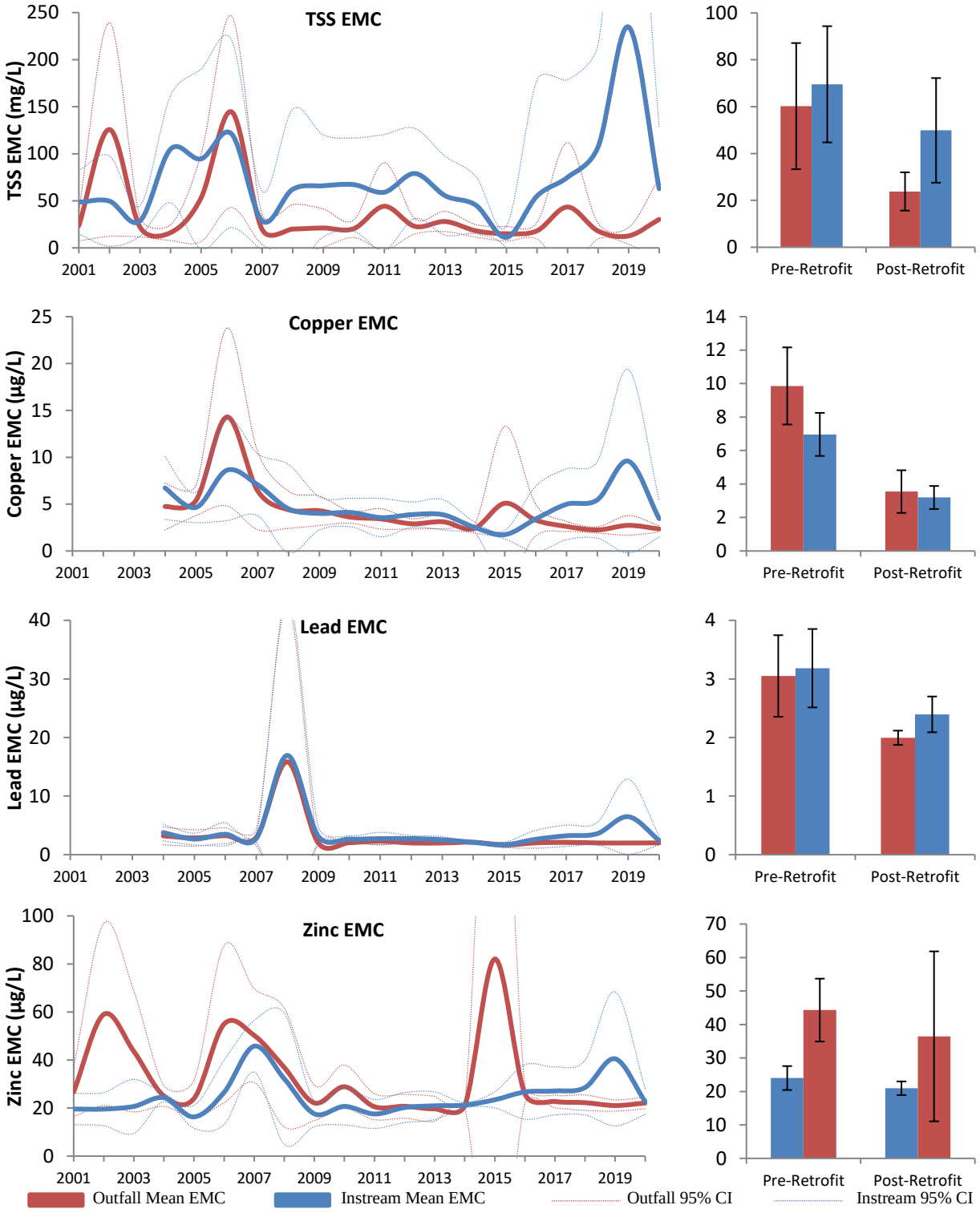


Figure 20: EMC Values from 2001 – 2020 for TSS, Copper, Lead, and Zinc

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 19**.

As expected, greater analyte loads were observed at the instream station. Annual loading is typically reported and analyzed in this report as a measure of outfall contribution to the instream station. Due to the lack of station data, primarily in winter and spring, a comparison of the two sites is not possible. In the table below, greater-than (>) symbols are used to represent minimum loadings based on available data. Typically, the contribution of analyte loading at the outfall station to total loading at the instream station decreases during storm flow; TSS and phosphorus in particular have very small contributions, likely due to the operational efficiency of the stormwater facility. As in most years, nitrate/nitrite outfall contributions were very low, particularly during baseflow when concentrations are often near detection limits. During this reporting period, baseflow loadings were typical of a year with at or slightly below average annual precipitation. Compared to the previous year, storm flow loadings were significantly less since record annual precipitation was previously observed; all analytes were significantly elevated the previous year for storm flow, particularly TSS, for which 21 times more was estimated at the instream station during storm flow. It should be noted that for loading calculations, the detection limit concentrations were used instead of zero values for samples below detection. Therefore, actual loadings are likely less than values provided below. Additionally, most Total Petroleum Hydrocarbon (TPH) samples were below detection.

Table 19
Annual Pollutant Loads for the 2020 Reporting Year

Annual Pollutant Loading (lbs/Year)										
oc.	Type	BOD	TKN	NO_2/NO_3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Base	2,127	532	5,616	21	5,319	2.1	2.1	21	5,319
	Storm	2,318	761	1,838	165	118,754	5.0	2.7	23	4,261
	Total	4,445	1,293	7,454	1186	124,073	7.1	4.8	44	9,580
Outfall	Base	>576	>122	>65	>11	>2,050	>0.4	>0.4	>4	>1,406
	Storm	>441	>81	>27	>13	>6,112	>0.4	>0.3	>3	>894
	Total	>1,017	>203	>92	>24	>8,162	>0.8	>0.7	>7	>2,300

Seasonal Pollutant Loads

Seasonal discharge for each monitoring station is provided in **Figure 21.** The instream station predictably displayed greater discharges for each season compared to the outfall station. Therefore, it is not unexpected to have greater loadings there as well. Seasonal loadings based on the EMC values and seasonal discharges from **Figure 21** are located in **Table 20**. The estimation of seasonal loading encounters the same problem as with annual loadings with the lack of data at the outfall station, as previously stated.

Apart from nitrates/nitrites at the outfall station, the largest loadings for all analytes were observed in either summer or autumn. This is expected, as the summer and autumn seasons had the greatest total discharge and precipitation of the reporting period. Unlike many years, seasonal loadings were relatively even, with only one loading (Autumn TSS) accounting for a majority (56%) of the annual loading across the four seasons. Additionally, unlike most years, several TPH samples at the outfall station were above detection limits, accounting for slightly elevated TPH loadings. Elevated (above detection) instantaneous TPH measurements were observed in samples at the outfall station from November 2019 through January 2020; this is unusual considering only very sporadic elevated measurements have been observed since 2000. The previous two reporting periods had at least one elevated sample for TPH also. It should be noted that a gas station and an agricultural equipment business are both adjacent to the outfall station. The agricultural equipment business was issued a Class I Exterior Washwater Permit in 2017, which allows exterior-only equipment washwater to be discharged at a rate of less than 500 gallons per week. Typically, the outfall station correlates to values estimated for the instream station. It should be noted that for loading calculations, the detection limit concentrations were used instead of zero values with samples below detection. Therefore, actual loadings are likely less than values provided below.

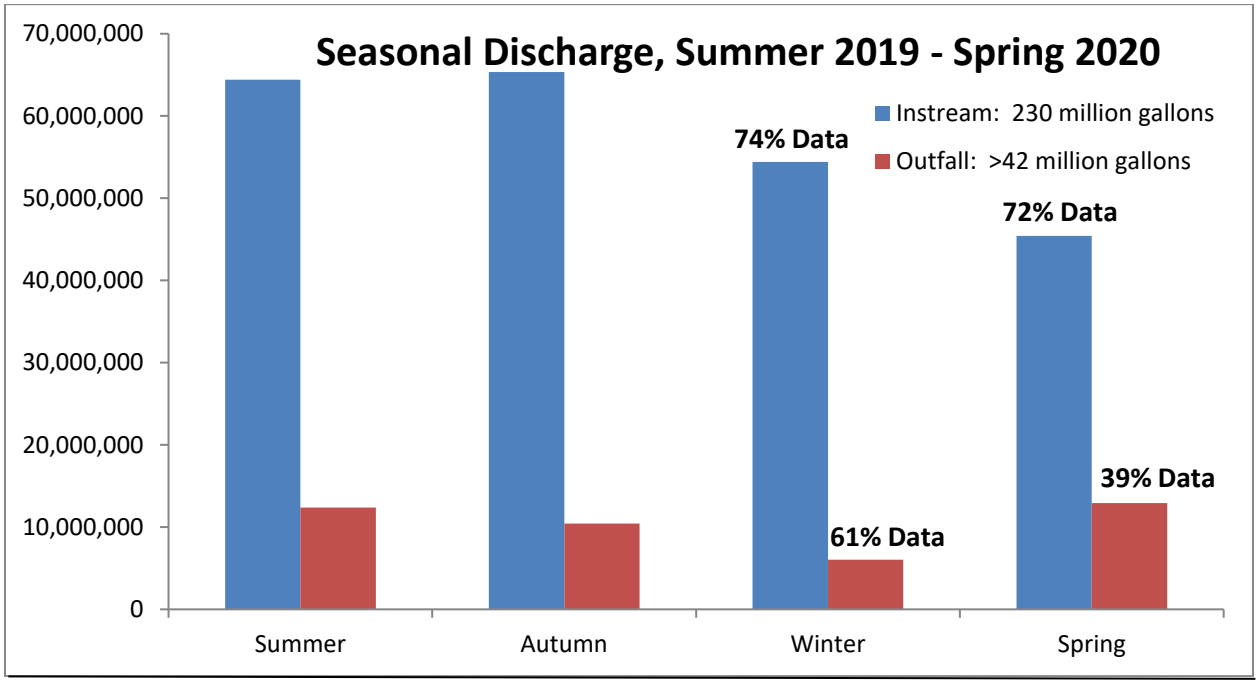


Figure 21: Seasonal Discharge for the 2020 Reporting Year

Table 20
Seasonal Pollutant Loads for the 2018 – 20209 Reporting Year

Seasonal Pollutant Loading (lbs)										
Loc.	Season	BOD	TKN	NO_2/NO_3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Summer	1,456	553	2,071	60	32,942	2.0	1.4	12	2,687
	Autumn	1,326	453	2,012	89	43,051	2.5	1.6	14	2,726
	Winter	>709	>193	>1,648	>18	>12,886	>0.9	>0.8	>7	>1,771
	Spring	>1,115	>259	>1,704	>39	>35,559	>1.3	>0.9	>8	>1,896
	Total	>4,606	>1,458	>7,436	>206	>124,439	>6.6	>4.6	>42	>9,080
Outfall	Summer	444	118	9	11	2,626	0.2	0.2	2.3	513
	Autumn	306	52	22	8	6,453	0.2	0.2	2.1	938
	Winter	>128	>25	>24	>3	>688	>0.1	>0.1	>1.1	>294
	Spring	>302	>62	>24	>9	>1,563	>0.2	>0.2	>2.1	>510
	Total	>1,181	>257	>79	>31	>11,330	>0.8	>0.7	>7.6	>2,254

Biological

A complete list of taxa 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 IBI for the Eastern Piedmont region of Maryland is shown in **Table 13**. An IBI score was calculated for each station by calculating the mean of the six component metric scores, thus deriving an average IBI score. Corresponding narrative ratings were also determined for each station in accordance with MBSS Standards. The narrative rating guidelines can be found in **Table 14**.

The biological health of the outfall and instream monitoring stations are summarized by **Tables 21 and 22**, respectively. Biological samples were unable to be collected for the outfall station stream segment because of delays in sampling due to COVID-19 and nesting geese that prevented access to the site. The instream station for the 2020 reporting year received a stream health rating of poor and an IBI score of 2.67.

Table 21
Outfall Station IBI Score for the 2020 Reporting Year

Metric	Result	Score
Number of Taxa	N/A	N/A
Number of EPT	N/A	N/A
Number Ephemeroptera	N/A	N/A
% Intolerant Urban	N/A	N/A
% Chironomidae	N/A	N/A
% Clingers	N/A	N/A
	Total Score	**N/A**
	IBI Score	**N/A**
	Narrative Rating	**N/A**

Table 22
Instream Station IBI Score for the 2020 Reporting Year

Metric	Result	Score
Number of Taxa	22	3
Number of EPT	6	3
Number Ephemeroptera	3	3
% Intolerant Urban	1	1
% Chironomidae	57	3
% Clingers	46	3
	Total Score	**16**
	IBI Score	**2.67**
	Narrative Rating	**Poor**

Figure 22 presents these scores annually from 2001 through 2020. The trends of both stations appear to be correlative throughout this time period. On average, the score for the instream station remains 0.8 higher 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 2.9, which is just below the boundary between poor and fair biological health according to MBSS guidelines. The outfall station was not sampled this reporting year due to delays because of COVID-19 and nesting geese. Historically, the outfall station has never received any score that was not poor or very poor. This is usually due to a lack of any intolerant taxa and a large percentage of Chironomidae. The instream reach score increased from the previous year. While the total number of taxa was only slightly higher than the previous year, the percentage of Chironomidae in the sample decreased while the number of EPT taxa, particularly Ephemeroptera, increased, resulting in a higher score than the previous year. Both stations appear to be relatively intolerable for sensitive species.

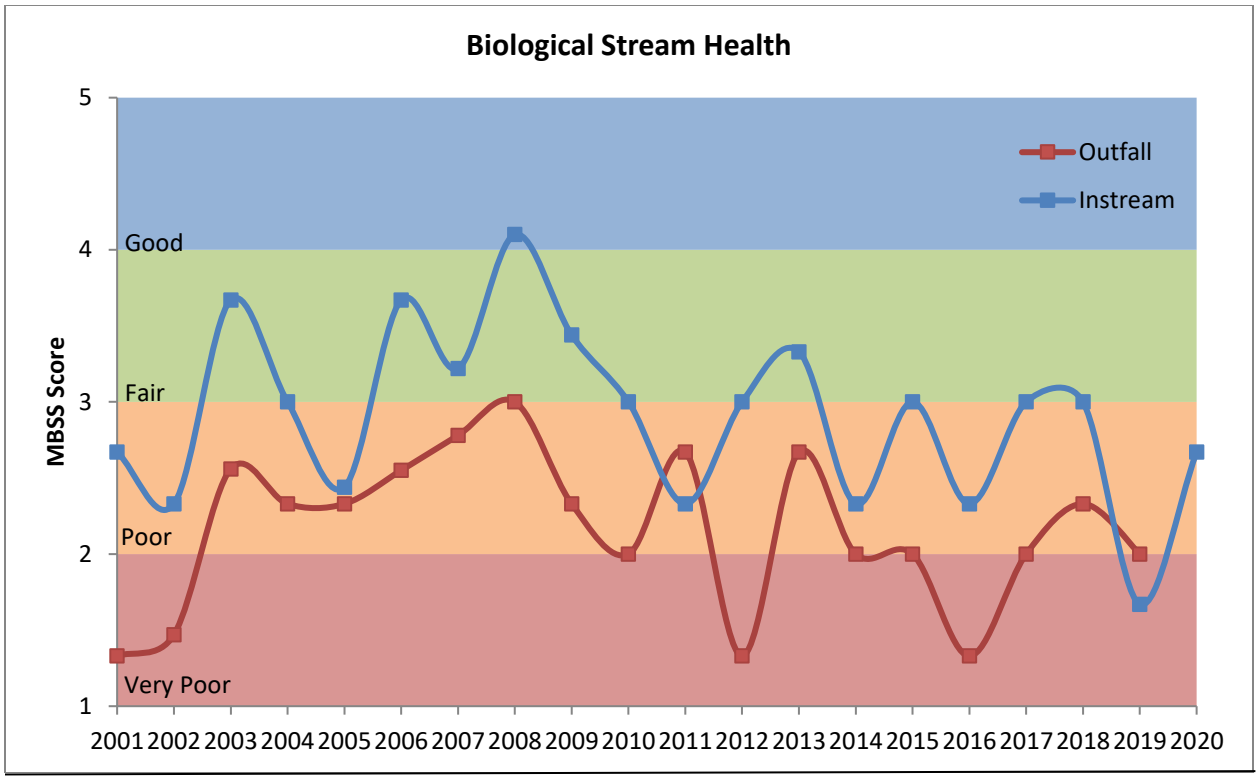


Figure 22: Macro-Invertebrate IBI Analysis 2001 – 2020

The biological habitat assessment results for each station are summarized in **Table 23**. The scores are out of a maximum 160 points, based on the eight parameters in **Table 15**. Overall, the quality of biological habitat at the instream station remains higher than at the outfall station, with overall habitat scores of 104 and 67, respectively. From 1998 through 2020 (excluding 2001), as shown in **Figure 23**, the mean habitat scores of the instream station and outfall station were 94 and 69, respectively. The 2020 reporting year was a typical year for both stations; the instream station scored 10 points higher, but the outfall station scored two points below average, with a considerable decrease in the embeddedness metric. The weakest parameters for both stations are embeddedness, particularly for the outfall station, at which almost the complete stream segment was embedded with silt. Both stations however, improved their ratings for shading and trash.

Table 23
Spring 2020 Habitat Assessment Results

Parameter	Outfall	Category	In-stream	Category
Instream Habitat	8	marginal	14	sub-optimal
Epifaunal Substrate	6	marginal	13	sub-optimal
Velocity/Depth Diversity	7	marginal	14	sub-optimal
Pool/Glide/Eddy Quality	7	marginal	12	marginal
Riffle/Run Quality	6	marginal	13	sub-optimal
Embeddedness	1	poor	8	marginal
Shading	13	sub-marginal	11	sub-optimal
Trash Rating	19	optimal	19	optimal
Total Score (max. of 160)	**67**		**104**	
Score (percent)	**42%**		**65%**	

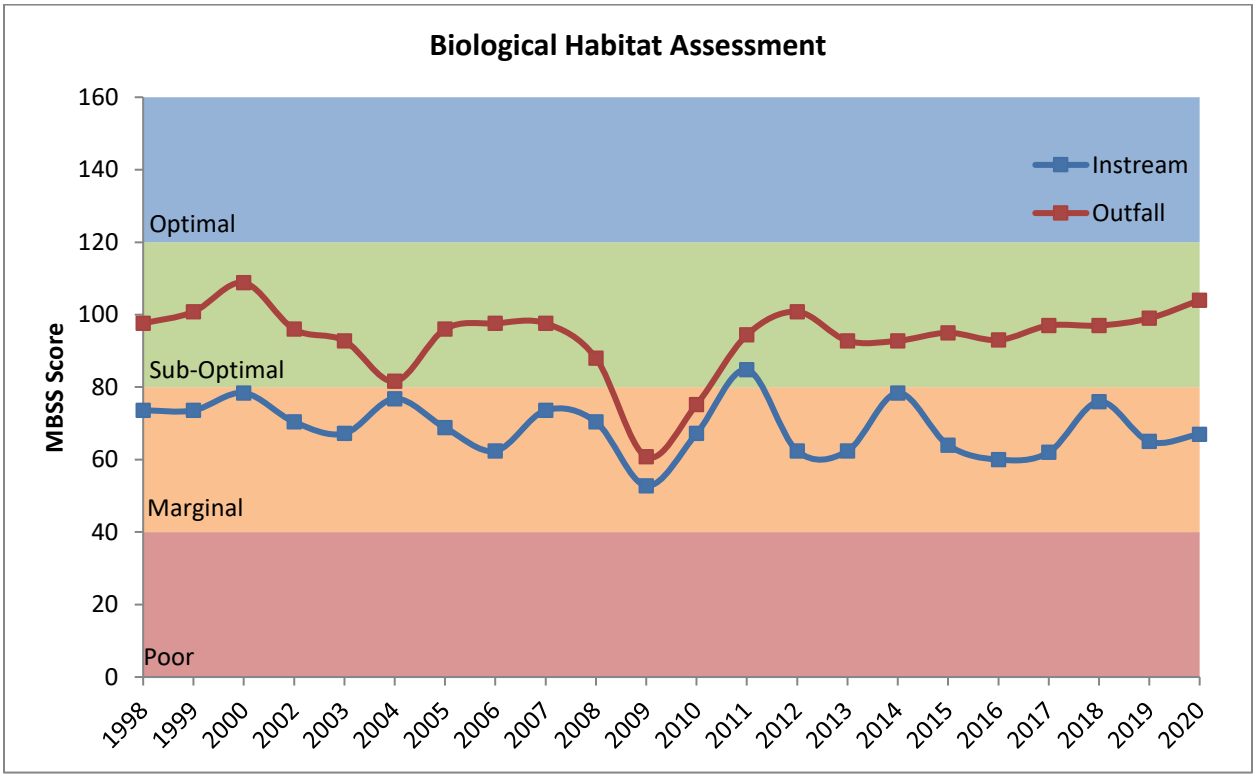


Figure 23: Comparison of NPDES Station Habitat 1998 – 2020 (Excluding 2001)

It should be noted that the habitat assessment is a qualitative assessment only. Variations in scores may be a result of inconsistencies in assessor scoring methodology, among other factors. To show a general relationship between the habitat and biological scores, these data have been plotted for the outfall and instream stations in **Figures 24 and 25**, respectively. These are plotted on each assessment's overall scoring range. As is typical, lower habitat quality is correlated with lower instream biological integrity. Both stations appear to have a one- to two-year period of latency between habitat and biological changes. These relationships, however, are impacted by a small sample size and the subjectivity of the habitat assessment. The certainty of

any evident correlation is low given the inherent degree of bias and chance that accompanies these types of assessments.

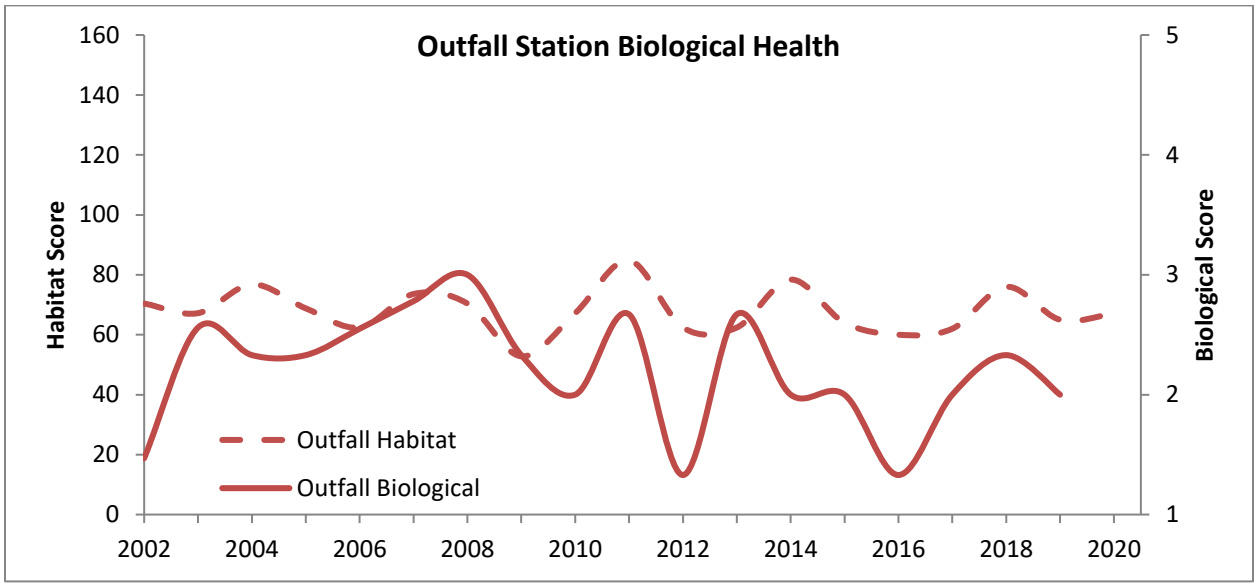


Figure 24: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2020

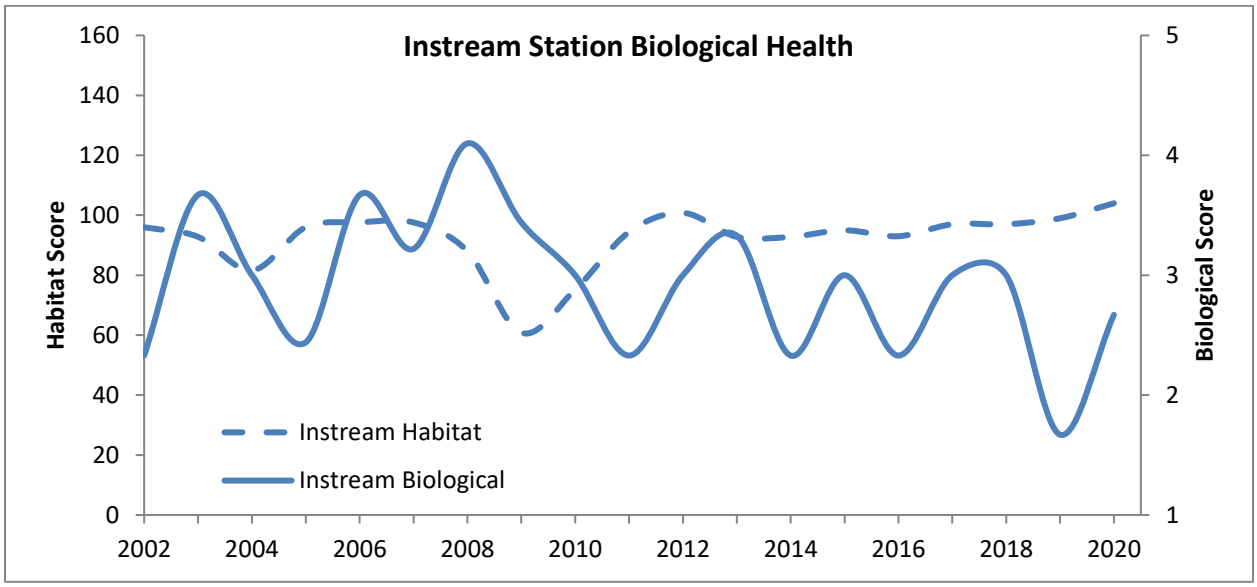


Figure 25: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2020

G. Program Funding

1. Operational Expenses

Table 24 relates to the operating budget expenses that support compliance needs for the County's NPDES MS4 permit requirements. Operating expenditures in this program are principally associated with administration of the permit, monitoring, maintenance of BMPs, debt service, and other responsibilities associated with the daily operations of the LRM and BRM.

Table 24
Operating Expenses

Operating Program Elements	Expenditures
Administration - Salaries and Benefits	$1,119,689.38
Operation and Maintenance - Mowing, Gasoline, Repairs/Parts	$129,121.15
Public Education and Outreach	$2,447.28
Lab Testing/Supplies, Contract Services, Small Equipment, Conferences	$16,512.00
Debt Service Payment	$1,140,908.32
Total Operating Expenditures for FY2020	***$2,408,678.13***

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 (**Table 25**) in this program are principally associated with the permit's Watershed Assessment and Restoration requirements.

Table 25
Capital Expenses

Capital Programs	Expenditures
Watershed Assessment and Improvement (NPDES)	$4,711,000.00
Stormwater Facility Renovations	$258,590.00
Total Capital Expenditures for FY2020	***$4,969,590.00***

Cumulative capital expenditures for the program since 2005 can be found in **Table 26**. The approved FY2021-2026 CIP estimates of program funds can be found in **Tables 27 and 28**. It is important to note that the funding beyond FY2020 is subject to future budget review and approval processes. Therefore, no guarantee is made to future appropriations beyond FY2020.

Approved Community Investment Plan 2021 – 2026

Table 26
Total NPDES MS4 Capital Expenditures
Carroll County, Maryland
July 15, 2005 through June 30, 2020

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
7/1/17 to 6/30/18	$2,137,222.04
7/1/18 to 6/30/19	$5,271,843.68
7/1/19 to 6/30/20	$4,969,590.00
Total permit expenditures, to date	***$32,612,840.22***
Grants received	***$9,222,006.50***
Actual County expenditures	***$23,390,833.72***

Table 27
Watershed Assessment and Improvement (NPDES)

	FY 21	FY 22	FY 23	FY 24	FY 25	FY26	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	140,000	130,000	485,000	170,000	200,000	350,000			**1,475,000**
Land Acquisition									**0**
Site Work									**0**
Construction	3,210,000	3,320,000	3,065,000	3,480,000	3,550,000	3,500,000			**20,125,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**3,350,000**	**3,450,000**	**3,550,000**	**3,650,000**	**3,750,000**	**3,850,000**	**0**	**0**	**21,600,000**

The Stormwater Management Facility Renovation Program CIP (**Table 28)** has renovated 31 of the 209 existing County-owned structural stormwater management facilities back to as-built condition. Renovation work has involved removal of woody vegetation, replacement of corrugated metal pipes, repair of eroded areas at the outfall or inflow points of the facility, and removal of accumulated sediment. Another important factor taken into consideration when evaluating the facilities prior to renovation is the accessibility to the facility and ease of maintenance. Priority of projects is based on tri-annual inspection reports and the age of the facility. To date, close to $1,206,000.00 has been spent on this renovation effort.

Table 28
Stormwater Management Facility Renovations

	FY 21	FY 22	FY 23	FY 24	FY 25	FY26	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	10,000	35,000				10,000			**55,000**
Land Acquisition									**0**
Site Work									**0**
Construction	315,000	265,000	300,000	300,000	300,000	290,000			**1,770,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**325,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**0**	**0**	**1,825,000**

Table 29 provides a project list and the status of the individual projects in the approved capital budget for the Stormwater Management Facility Renovation Program.

Table 29
Stormwater Management Facility Renovation Program
2016-2025

Year	Project Name	MDE8NAME
	PROJECTS 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	South Branch Patapsco
2017	Oklahoma Sweetwater	Liberty Reservoir
2017	Grand View Resub. Lot 38	South Branch Patapsco
2017	Eldersburg Estates Sec. 1	South Branch Patapsco
2017	Sun Valley Waterloo Section	Liberty Reservoir
2017	Carrollyn Manor Section 6	Double Pipe Creek
2017	O'Brecht Estates	South Branch Patapsco
2017	Carmae Acres	South Branch Patapsco
2017	Kalten Acres Sec. 1	Double Pipe Creek
2018	Wilmot Manor	Liberty Reservoir
2018	Matthews Meadows Sec. 2	Liberty Reservoir
2018	Piney Ridge Village 7	South Branch Patapsco
2018	Exceptional Center	Double Pipe Creek
2018	Carroll Woods Est. Sec. 7	Lower Monocacy River
2018	C. C. Commerce Center	Liberty Reservoir
2018	Larash Manor	Liberty Reservoir
2018	Squires Subdivision	Liberty Reservoir
2018	Stafford Estates	Liberty Reservoir
2019	Aspen Run	Liberty Reservoir
2019	Eldersburg 3-5	South Branch Patapsco
2019	Hoff Pond	Liberty Reservoir
2019	Hunters Crossing #2	South Branch Patapsco
2020	Bluebird Hills	Prettyboy Reservoir
2020	Sumners Hollow Pond 2	Liberty Reservoir
2020	Benjamins Claim – Jacobs	South Branch Patapsco
2020	Tydings Acres	South Branch Patapsco
	PROJECTS PLANNED	
2021	North Carroll Library	Prettyboy Reservoir
2021	Northern Landfill	Liberty Reservoir
2021	Hoods Mill Landfill Closure	South Branch Patapsco

2021	Sumners Hollow Pond 1	Liberty Reservoir
2021	Carrollyn Manor Section 7	Double Pipe Creek
2021	Ralph Street Extension	Liberty Reservoir
2021	Center Street Road Extension	Liberty Reservoir
2021	Sullivan Heights	Liberty Reservoir
2021	Sun Valley Sec. 2	Double Pipe Creek
2022	Benjamins Claim Condo	South Branch Patapsco
2022	Center Street Road Extension	Liberty Reservoir
2022	Farm Museum Pond	Double Pipe Creek
2022	Johanna's Joy 2	Double Pipe Creek
2022	Meadow Ridge ED Pond 1	Double Pipe Creek
2022	Meadow Ridge ED Pond 2	Double Pipe Creek
2022	Meadow Ridge ED Pond 3	Double Pipe Creek
2022	Cranberry Hill Resub. Lot	Liberty Reservoir
2022	Patapsco Valley Overlook	South Branch Patapsco
2022	Stoffle Park	Liberty Reservoir
2023	Bark Hill Park	Double Pipe Creek
2023	C. C. Regional Airport	Liberty Reservoir
2023	C. C. Regional Airport	Liberty Reservoir
2023	C. C. Regional Airport	Liberty Reservoir
2023	C. C. Regional Airport	Liberty Reservoir
2023	C. C. Regional Airport	Liberty Reservoir
2023	Edgewood Sec. 7	Liberty Reservoir
2024	Safe Haven	Double Pipe Creek
2024	Tira Estates	Liberty Reservoir
2024	Piney Ridge Village 5/6	South Branch Patapsco
2024	Piney Ridge Village 5/6	South Branch Patapsco
2024	Piney Ridge Village 5/6	South Branch Patapsco
2024	Bradford Knoll	Liberty Reservoir

Part V. Special Programmatic Conditions

Chesapeake Bay Restoration by 2025

Carroll County and its municipal co-permittees are actively engaged and committed to the Chesapeake Bay 2025 restoration efforts. As presented in this annual report, compliance during the fourth-generation permit was achieved related to the restoration of 20% of previously developed impervious land with little or no controls. The County's strategy focused on upland stormwater facility retrofits, new upland construction, and riparian tree plantings. These practices, in combination with well-established review and enforcement programs and active community engagement, provide for an effective County-wide effort in support of the Chesapeake Bay 2025 TMDL.

The co-permittees meet monthly, as the formally adopted WRCC, in order to comprehensively address permit planning and implementation. The WRCC continues to serve as the County's local WIP team and authors the two-year milestone progress reports. This group has been meeting since its inception in 2008, which has allowed permit compliance, stormwater mitigation, and the Chesapeake Bay clean-up effort to remain as top priorities.

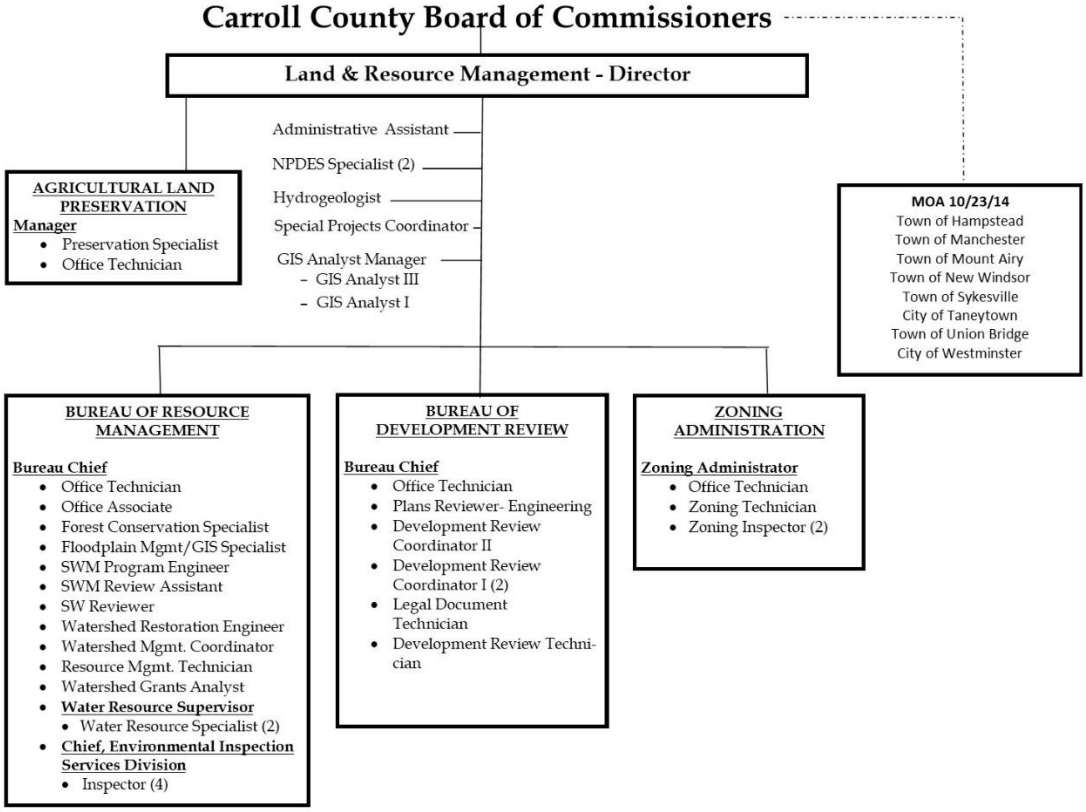
County staff also participate in various other water quality protection and improvement organizations throughout the Chesapeake Bay region. The County is an active member of the Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to engage in issues of common concern regarding protection of Baltimore City Reservoir watersheds. Staff are active members of the local Soil Conservation District. The County and Conservation Partnership coordinate efforts and provide technical assistance to one another related to water quality improvements. Regionally, the County is a member of the Western Maryland RC&D Council, which has as one of its major objectives water quality improvement.

Participation in local and regional water quality protection and management issues is, and will continue to be, a top priority for Carroll County.

Appendix A

Organizational Chart:
Department of Land and Resource Management

Appendix A

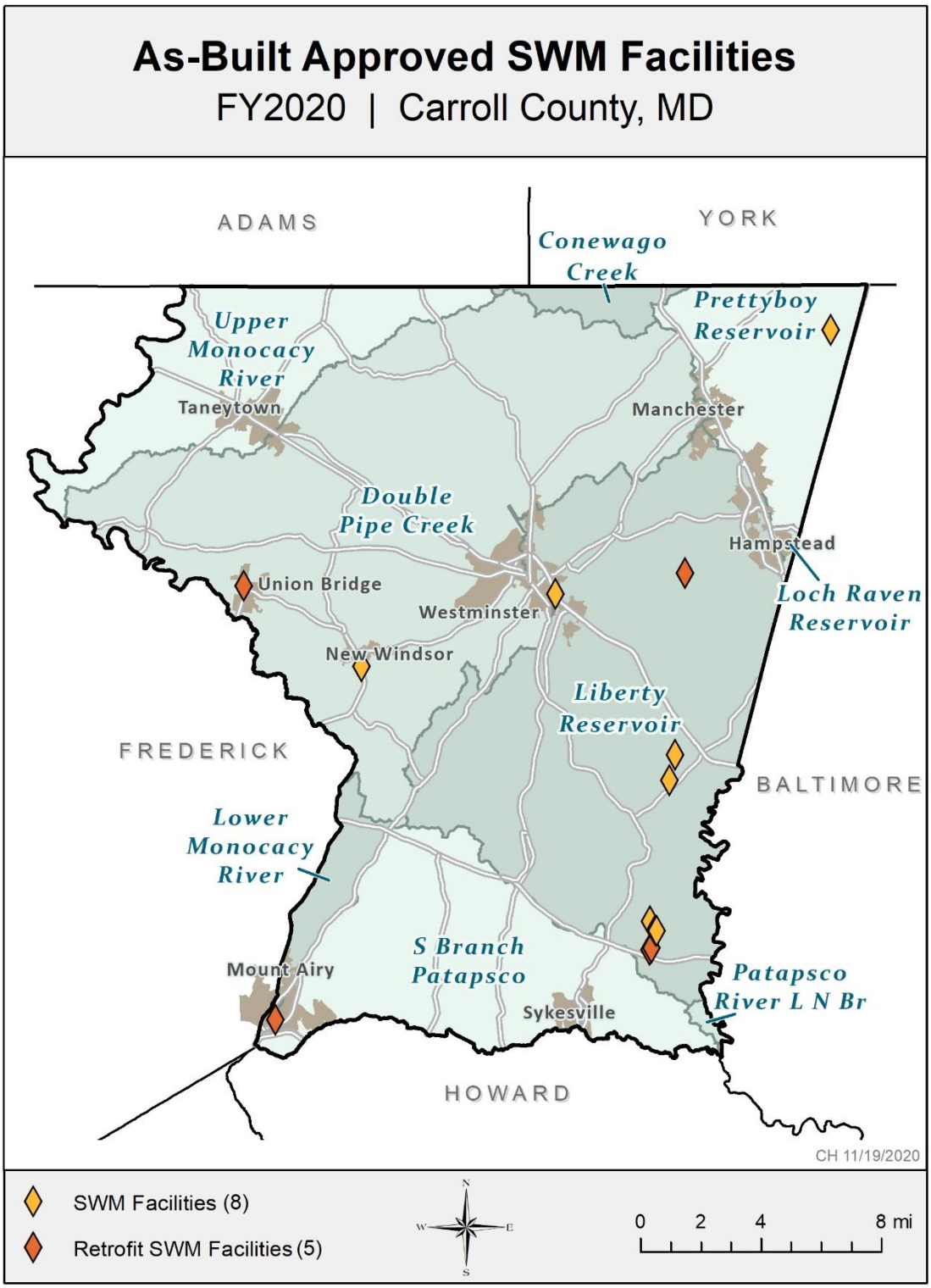

Carroll County Board of Commissioners
Land & Resource Management - Director
Administrative Assistant
NPDES Specialist (2)
Hydrogeologist
Special Projects Coordinator
GIS Analyst Manager
– GIS Analyst III
– GIS Analyst I
AGRICULTURAL LAND PRESERVATION
Manager
• Preservation Specialist
• Office Technician
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
• SW Reviewer
• Watershed Restoration Engineer
• Watershed Mgmt. Coordinator
• Resource Mgmt. Technician
• Watershed Grants Analyst
• Water Resource Supervisor
• Water Resource Specialist (2)
• Chief, Environmental Inspection Services Division
• Inspector (4)
BUREAU OF DEVELOPMENT REVIEW
Bureau Chief
• Office Technician
• Plans Reviewer- Engineering
• Development Review Coordinator II
• Development Review Coordinator I (2)
• Legal Document Technician
• Development Review Technician
ZONING ADMINISTRATION
Zoning Administrator
• Office Technician
• Zoning Technician
• Zoning Inspector (2)

Appendix B

Carroll County 2020 MS4 Annual Report
"Appendix B" CD
(Available Upon Request)

- **Carroll County MS4 Geodatabase**
- **12SW Facility Stormwater Pollution Prevention Plans**
- **12SW Annual Comprehensive Evaluation Reports**
- **Mt. Airy Phase II MS4 Guidance Documents**

Carroll County, Maryland
2020 As-Built Approved SWM Facilities Map


As-Built Approved SWM Facilities
FY2020 | Carroll County, MD
ADAMS
YORK
Conewago Creek
Prettyboy Reservoir
Upper Monocacy River
Taneytown
Manchester
Double Pipe Creek
Hampstead
Union Bridge
Loch Raven Reservoir
Westminster
New Windsor
Liberty Reservoir
FREDERICK
BALTIMORE
Lower Monocacy River
S Branch Patapsco
Mount Airy
Patapsco River L N Br
Sykesville
HOWARD
CH 11/19/2020
SWM Facilities (8)
Retrofit SWM Facilities (5)
N
W
E
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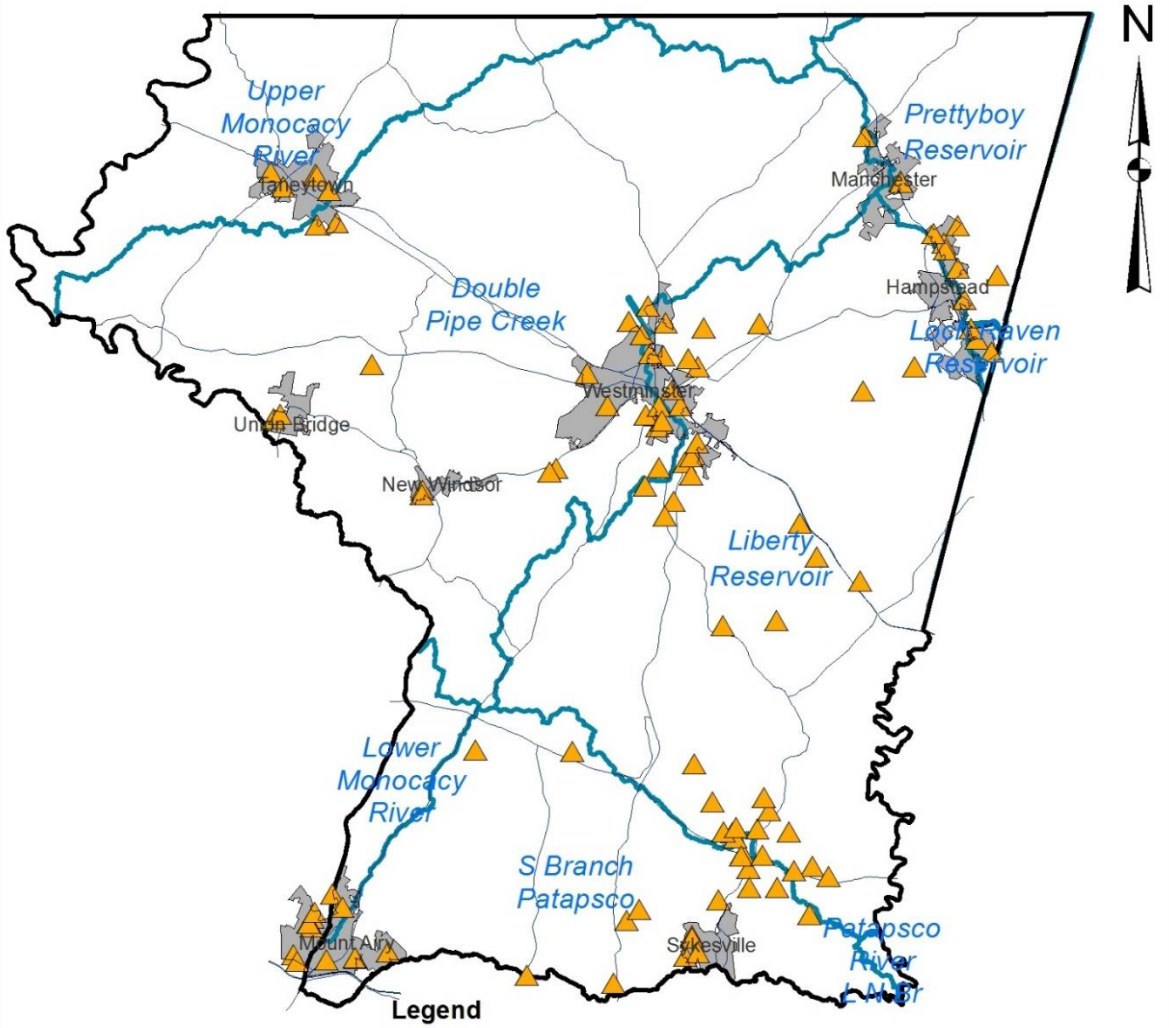
0 2 4 8 mi

Appendix C

Illicit Discharge Detection and Elimination (IDDE)

- **2020 Outfall Location Map**
- **2020 Illicit Discharge Outfall Screening Actions Taken**
- **2020 Commercial/Industrial Visual Survey Location Map**
- **2020 Commercial/Industrial Visual Survey Summary**
- **2020 Illicit Discharge Incident Report Summary**
- **2020 NPDES MS4 Permit Annual Training Stormwater Pollution Prevention Workshop Agenda**

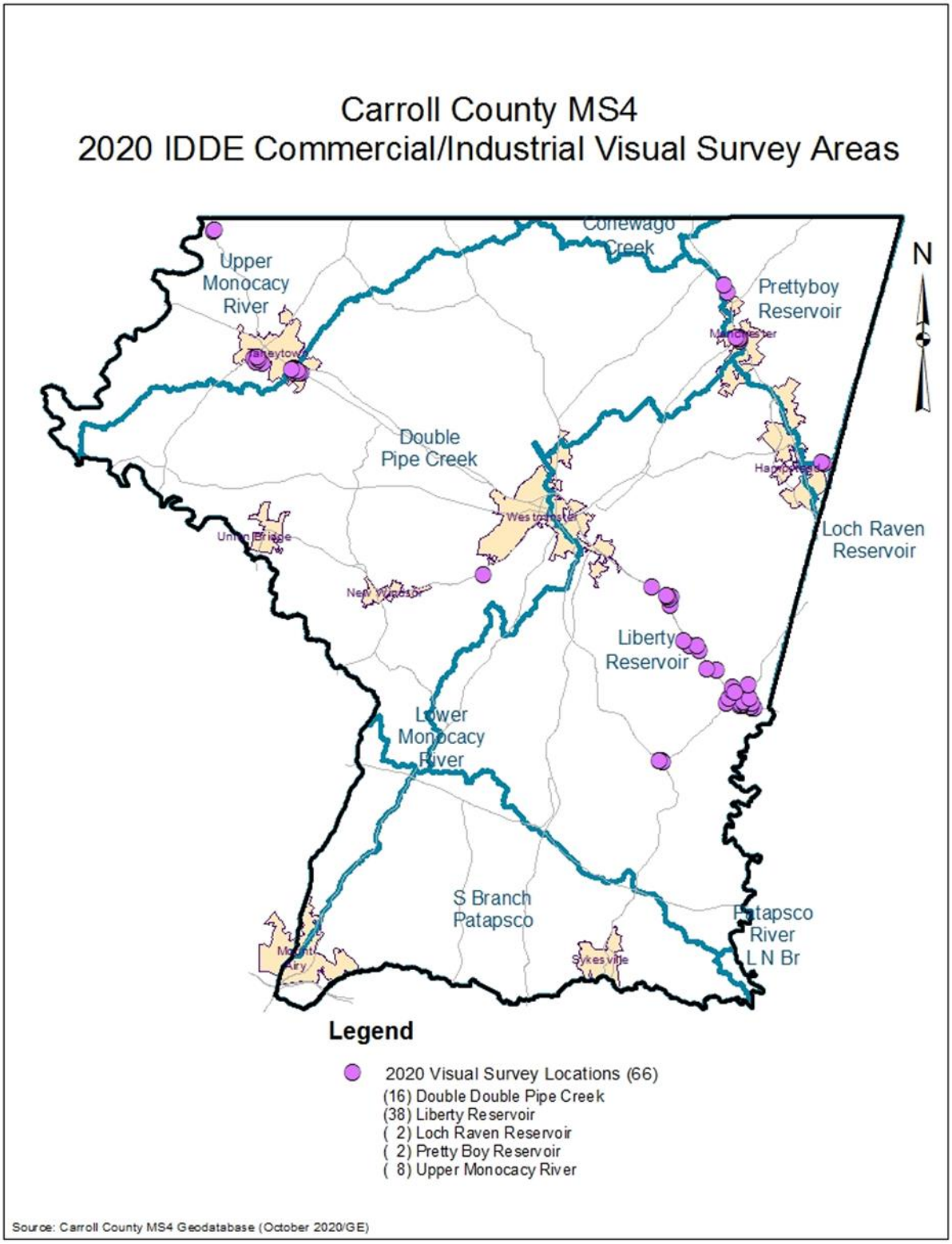
Carroll County MS4
2020 NPDES Study Point Location Map



# Outfalls	MDE 8-Digit	Watershed
3	2130805	Loch Raven Reservoir
9	2130806	Prettyboy Reservoir
39	2130907	Liberty Reservoir
23	2130908	Patapsco River - South Branch
7	2140302	Lower Monocacy River
5	2140303	Upper Monocacy River
22	2140304	Double Pipe Creek

Appendix C
IDDE Program
2020 Illicit Discharge Outfall Screening Actions Taken
July 1, 2019 – June 30, 2020

Outfall/NPDES Study Point	Action Taken
CR15OUT000264 **Local ID: C0087**	An elevated detergent level was detected at this wet stormwater pond facility outfall discharge. Physical indicators included cloudy clarity and yellowish color. All storm drain inflow pipes to the facility were checked with no evidence of an active continuous flow. Connected storm drain system networks were checked for illicit pipe connections, flows, residual materials or stains at inlets and surrounding surface areas in the residential subdivision. The City of Westminster Utilities as requested checked for water/sewer leaks with none detected nor were any SSO's reported in area. After a second screening with similar results, a lab sample analysis was performed with results leaning toward possible washwater contaminant however a source was unable to be confirmed. The source may have been a possible dumping. The stormwater facility was slowly dewatered after the screening investigation for a scheduled restoration retrofit construction. A 3rd outfall screening of the dewatering discharge was clear with flow noted as groundwater/spring flow with no contaminants. Issue Resolved/Source eliminated.
CR15OUT000270 **Local ID: C0304**	Physical indicator observations at this storm drain outfall had clear flow however part of the plunge pool had a whitish cloudy appearance. The requisite chemical test panel on the flow was negative. The storm drain system was traced up through older residential areas with no visible source of illicit connections or residual materials from a possible dumping. A follow-up outfall screening found the flow and outfall clear. The County will continue to monitor the outfall when in the area and at the next scheduled inspection. Issue Resolved/Source eliminated.
CR15OUT000078 **Local ID: MA037**	This discharge had slightly elevated detergent, elevated pH, and small amount of white foam at this SWM facility outfall. No immediate source of detergents was located up the storm drain system in the newer residential subdivision. Potential sources may be residential car washing or swimming pool related. Detergent concentrations and pH were in within thresholds with no foam observed at the time of the second inspection. Staff will continue to monitor the outfall at the next scheduled inspection. Issue Resolved/Source eliminated.


Carroll County MS4
2020 IDDE Commercial/Industrial Visual Survey Areas
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
N
Legend
2020 Visual Survey Locations (66)
(16) Double Double Pipe Creek
(38) Liberty Reservoir
(2) Loch Raven Reservoir
(2) Pretty Boy Reservoir
(8) Upper Monocacy River
Source: Carroll County MS4 Geodatabase (October 2020/GE)

Appendix C
IDDE Program
2020 Commercial Industrial Visual Survey Summary
Visual Survey Areas Requiring Follow-up Actions
Processed from July 1, 2019 – June 30, 2020

This table presents the1 0f 66 Commercial/Industrial Visual Surveys recommended for follow-up.
No Illicit Discharges Observed / Potential Sources or Activity

Unique ID#	Visual Survey # Date	Land Use	Activity/ Location/ Watershed	Potential Significant Pollutant Source	Follow-Up Action/Status
0704027833	VS-20-0010 01/09/20	C	Baltimore Blvd Finksburg, MD	General Contractor Equipment Storage	Provide Stormwater Pollution Prevention Awareness Letter w/ County and MDE Stormwater Pollution Prevention Guidance Documents.
0704029720	VS-20-0012 01/09/20	C	Baltimore Blvd Finksburg, MD	Equipment Rental Agency (Fueling, Loading and Unloading, Equipment Cleaning, Outdoor Equipment Storage	Provide Stormwater Pollution Prevention Awareness Letter w/ County and MDE Stormwater Pollution Prevention Guidance Documents.

Appendix C
IDDE Program
2020 Illicit Discharge Incident Report Summary
Illicit Discharge Complaints Processed from July 1, 2019 – June 30, 2020

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-19-0009	Citizens reported street festival vendor equipment leaking grease onto street near storm drain inlet. Reported: 07/16/2019	Local municipal police investigated, confirmed cooking oil/grease and documented complaint after late evening event. City of Westminster Public Works was notified who performed significant clean up early morning of sidewalk and street noting minimal material if any in storm drain inlet basin. City enforced local IDDE code Chapter 135 by in person contact and enforcement letter requiring vendor reimburse City for cleanup expenses and prohibiting future event participation until vending equipment repaired. Restaurant Industry BMP information provided.	Illicit Discharge Eliminated Case Closed: 08/15/2019	North Court and Winter Street Intersection City of Westminster, MD
PD-19-0010	County staff reported brick and mortar dust slurry from building restoration draining down across sidewalk to street gutter pan toward inlet. Reported: 07/02/2019	NPDES Compliance Specialist and City of Westminster Public Works Assistant Streets Superintendent met with contractor on site stopping the activity until containment and sediment control measures installed including absorbent measures for liquids. Dry cleanup measures employed. MS4 system regulations and protection explained. Site monitored through project completion.	Illicit Discharge Eliminated Case Closed: 07/18/2019	North Court Street City of Westminster, MD
PD-19-0011	MDE Compliance forwarded a complaint received by CC Health Department (CCHD) regarding hood baffles being power washed by a restaurant's contractor outdoors to a municipal storm drain inlet. Reported: 07/31/19	County NPDES Compliance staff coordinated with CCHD (who had the restaurant scheduled for their regulatory inspection), for Town of Sykesville Public Works Director to be present regarding storm drain inlet and outfall as part of inspection to check for any residual materials. No discharge visible. DPW Director reviewed MS4 regulations, Town Code IDDE Code, and Restaurant BMP flyer provided by County with the restaurant owner. Corrective actions taken immediately by having their cleaning vendor move all kitchen equipment cleaning (including mats, etc.) indoors to ensure discharge to sanitary sewer as confirmed by CCHD and DPW Public Works Director. Restaurant letter affirming action provided.	Illicit Discharge Eliminated Case Closed: 08/12/2019	Main Street Town of Sykesville, MD
PD-19-0012	Citizen reported concern regarding an HOA maintenance crew possible over spraying herbicide on residential pathway near a stream in	County NPDES Compliance staff investigated and found the maintenance performed by the HOA's contractor to have followed standard maintenance practice with no indication of overspray. Staff contacted MDE Compliance Chief to reviewed findings who concurred based on my reported observations. County staff returned call to complainant regarding findings	Non-Illicit Discharge Case Closed: 08/09/2019	Near Mayfair Way Eldersburg, Carroll County,

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
	neighboring subdivision open space. Reported: 07/31/2019	and provided MDA's Pesticide Citizen Complaint website link formation.		
PD-19-0013	MDE Compliance forwarded a citizen complaint received by EPA Region 3 regarding waste oil and fuel leaking from storage containers at a business running down road to storm drain. Reported: 08/20/2019	CC EISD staff received and investigated the complaint on 08/26/2019 after MDE Oil Operations investigation on August 13th occurred. The business owner already taking corrective actions as instructed. CC EISD found the inlet and storm drain system clear at the time of the investigation noting some small amounts of absorbent was still observed being utilized per MDE Oil Operations instructions. Therefore, no illicit discharge was observed at the time of CC's investigation at the private MS4 deferring to MDE Oil Operations with regard to their preceding investigation and action.	Non-Illicit Discharge Case Closed: 08/26/2019	Tech Court City of Westminster, MD
PD-19-0014	Citizen report to County Roads staff regarding trash truck with fuel leak on side of road. Reported: 07/25/2019	On -site County Roads Operations staff reported accidental spill on pavement and contaminated soil and vegetation along road edge. NPDES Compliance staff instructed on-site Roads Staff to contact MDE Spill # who provided instructions for cleanup and remediation that included partial pavement replacement, soil removal disposal, with replacement and stabilization.	Illicit Discharge Case Closed: 08/14/2019	Newport Road Mount Airy Area Carroll County
PD-19-0015	Citizen reported oil dumping around 11/28/2019 at residential subdivision. Reported: 12/04/2019	CC EISD staff investigated noting some oil on storm drain inlet grate and slight oil sheen at SWM facility. Reported and referred to MDE WSA Compliance for enforcement who dispatched to MDE Oil Operations Program.	Illicit Discharge Case Closed: 12/06/2019	Tydings Road Eldersburg Area Carroll County
PD-20-0001	Citizen reported foam discharging onto grass and street toward storm drain system after a recent volunteer fire company lot activity. Reported: 10/21/2019	NPDES Compliance Specialist coordinated investigation with Municipal code enforcement staff. Municipal staff met with fire company representative confirming a foam being generated and diluted during an on-site volunteer fire company activity in their parking lot. No residual was observed. The substance used was a Class "A" Foam Concentrate. County staff reviewed the manufacturer's Safety Data Sheet and contacted the manufacturer's representative who verified the product is Fluorine Free and does not contain any PFAS chemical additives. Updated Safety Data Sheet was provided to fire company. An enforcement notification letter with required corrective measures was issued to the fire company. This included citing local ordinance Chapter 94-1 regarding the control and prevention of potential illicit discharges through use of structural or non-structural BMP's, etc.	Illicit Discharge Case Closed: 02/13/2020	Cottonwood Ave. Town of Mount Airy, MD
PD-20-0002	Municipal staff reported leaking oil/grease bin from restaurant onto pavement draining	NPDES Compliance Specialist coordinated investigation with Municipal code enforcement staff confirming complaint. Municipal staff met with new restaurant owner who was not using bin left in poor condition by prior restaurant	Illicit Discharge Case Closed: 02/13/2020	Hotel Street Town of Mount Airy, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
	to nearby storm drain inlet. Reported: 11/22/2019	owner. Enforcement letter with corrective actions for cleanup per local code including storm drain inlet and BMP info. New owner took corrective actions for cleanup in cooperation with Municipal DPW, acquired new bin placed under cover at new location far from storm drain inlet.		
PD-20-0003	Municipal staff reported possible leaking oil/grease bin at rear of restaurant. Reported: 11/22/2019	NPDES Compliance Specialist coordinated investigation with Municipal code enforcement staff. Oil/Grease bin and pavement in good condition with apparent good housekeeping practices currently in place.	Non-Illicit Discharge Case Closed: 11/22/2020	Ridgeville Blvd Town of Mount Airy, MD
PD-20-0004	Citizen reported discolored liquid in SWM facility to local fire department. Reported: 01/12/2020	Manchester Fire Department responded to call and contacted Carroll County Hazmat for investigation who field tested and determined substance was non-hazardous. Manchester DPW investigated and noted recent possible automotive fluid stain at nearby Keating Court with storm drain inlet basin discharge to SWM facility in an isolated pool area. Manchester DPW performed cleanup with absorbent pads and continued to monitor after subsequent rainstorms.	Illicit Discharge Case Closed: 1/31/2020	Keating Court Town of Manchester, MD
PD-20-0005	Municipal staff reported fluid spill on roadway pavement. Reported: 01/15/2020	Town of Manchester coordinated investigation with NPDES Compliance staff and determined a hydraulic line had blown from a truck spilling fluid on the pavement near storm drain inlets. Storm drain system checked and was clear. Manchester DPW applied absorbent and performed dry clean up measures. Contacted waste hauler who recently in neighborhood and checked noting none of their crews reported any line breaks.	Illicit Discharge Case Closed: 01/28/2020	Michelle Road Town of Manchester, MD
PD-20-0006	MDE Compliance reported a local permitted environmental business had self-reported an on-site spill of ethyl glycol on gravel parking lot of their business. Reported: 02/24/2020	MDE provided details from the local business self-report noting the spill of 5-10 gallons was contained and did not runoff site to a stream, ditch or storm drain. Reported clean up included vacuuming up liquid with vac truck and scraping off saturated soil with bobcat skid loader for landfill disposal. Permitted site has a SWPPP. County NPDES Compliance staff performed visual perimeter check of property, intermittent stream and local MS4 system finding no discharge issues. Confirmed to MDE Compliance.	Potential Illicit Discharge Case Closed: 02/25/2020	27 Liberty Street City of Westminster, MD
PD-20-0007	Municipal staff reported parked truck at private apartment complex with significant automotive fluid leak under vehicle expanding on pavement with old absorbent applied on old stains.	NPDES Compliance staff investigated noting a food truck step van in apartment complex parking area confirming complaint. Storm drain inlet at end of complex driveway that discharges to a swale was clear. Enforcement notification letter noting Chapter 53 ordinance with required corrective actions sent to property management company who is addressing with tenant. Homeowner educational flyer w/automotive good housekeeping BMPs included. Property	Potential Illicit Discharge Case Closed: 06/22/2020	N. Main Street Hampstead, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
	Reported: 06/10/2020	management company acknowledged problem rectified.		
PD-20-0008	County Bureau of Utilities staff reported to County Bureau of Resource Mgmt staff they were notified late evening by County Emergency Operations Center (EOC) of a sanitary sewer overflow at a commercial shopping center noting discharge entering the private MS4 system. Reported: 06/18/2020	EOC contacted Carroll County Health Department, MDE, Property contact and Utility contractor for the business. NPDES Compliance staff confirmed with MDE the call was received and dispatched to MDE Water. County EISD staff performed inspection next day of the storm drain system, SWM facility and downstream SWM facility with no visual evidence of a contaminant discharge to the system or outfalls. MD SHA MS4 is connected downgrade of the commercial shopping center MS4. Their contact was sent an email notification regarding the reported discharge.	Potential Illicit Discharge Case Closed: 06/19/2020	Gamber Road, Finksburg, MD County

2019 NPDES MS4 Permit Annual Training

Stormwater Pollution Prevention Workshop

(Manager/Supervisory Level)

Carroll County and Incorporated Municipalities

Phase I Municipal Separate Storm Sewer System (MS4) Permit Co-Permittees
& 12-SW Industrial Stormwater General Permit Holders
(Carroll County Public Safety Training Center ~ 50 Kate Wagner Road, Westminster, MD)

Friday, October 18, 2019

8:30 - 9:00am (Sign In, Coffee & Refreshments)
9:00 am – 12:00 noon

AGENDA

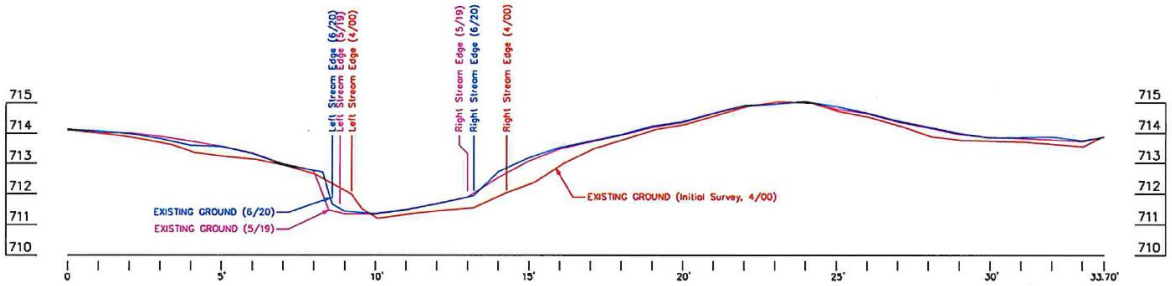
9:00 - 9:20AM	**Welcome, NPDES MS4 Permit Overview & Update** ▪ NPDES MS4 Permit Overview ▪ Next Generation MS4 Permit Update ▪ Next Generation 12SW and 11HT Permits Update ▪ Property Management and Maintenance Permit Requirements	**Tom Devilbiss** Director, Carroll County Land & Resource Management CCLRM
9:25 - 10:05AM	**Successful 12-SW Permit & SWPPP Implementation** ▪ 12-SW Stormwater Pollution Prevention Best Management Practices ▪ MD/MES Used Oil & Anti-freeze Recycling Facilities Program	**John Agnoli** Environmental Section Chief **Dale Younker** Operations Manager Maryland Environmental Service
	Break (10)	
10:15 - 11:20AM	**Montgomery Parks: Protecting the Environment through Integrated Pest Management** ▪ Introduction to Montgomery Parks & our NPDES permit ▪ How pesticide reduction and IPM programs support our permit Minimum Control Measures ▪ Education & certifications related to pesticide use ▪ What? Why? How to manage pests with IPM ▪ Innovative vegetation management methods	**Jody Fetzer** Plant Health Horticulturalist Montgomery Parks Maryland-National Capital Park & Planning Commission
	Break (10)	
11:30 - 11:40AM	**Property Management and Maintenance Pollution Reduction Technologies** ▪ Roadside Storm Drain System Maintenance (4 min video)	**Joanna (Jo) Birch** NPDES Compliance Specialists, CCLRM
11:40 - 11:50AM	**Staff Reported Illicit Discharge Investigation Procedures** ▪ How to Spot and Report Stormwater Pollution (7 min video) ▪ SOP, Reporting, Code Enforcement Responsibilities ▪ Staff Reported Discharge Investigation	**Glenn Edwards** NPDES Compliance Specialists, CCLRM
11:50	**Wrap Up / Q & A**	**Tom Devilbiss**

NOTES:

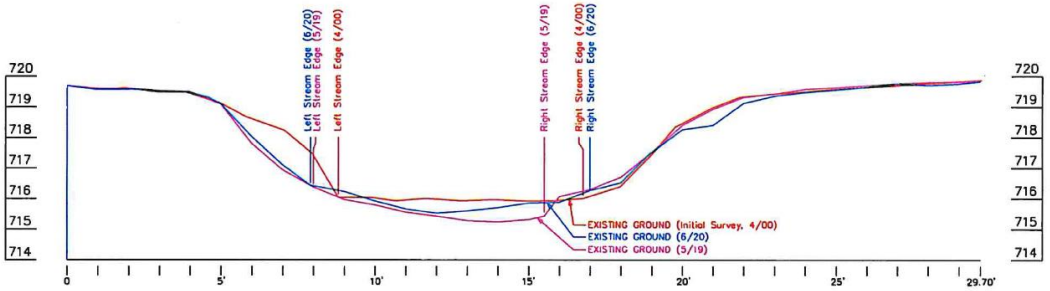
Appendix D

Monumented Cross Sections

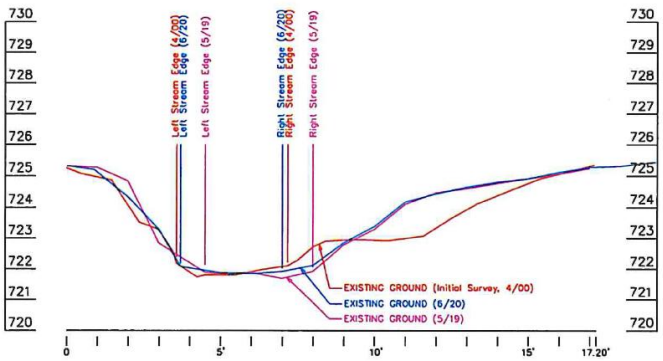
- **Physical Stream Assessment, Sections 1-6 (graphs)**



SECTION 3



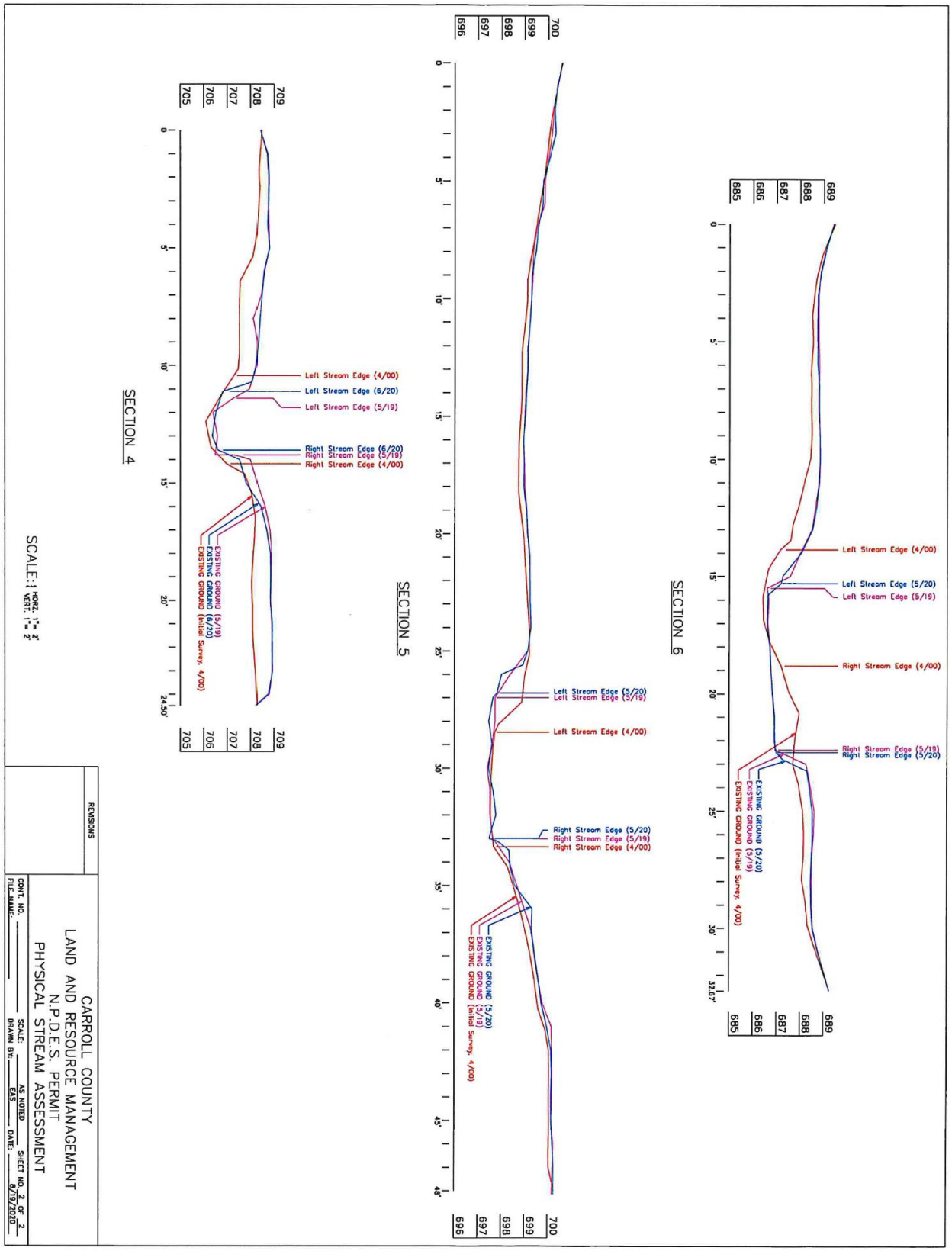
SECTION 2



SECTION 1

SCALE: HORZ. 1"= 2'
VERT. 1"= 2'

REVISIONS	CARROLL COUNTY LAND AND RESOURCE MANAGEMENT N.P.D.E.S. PERMIT PHYSICAL STREAM ASSESSMENT
	CONT. NO. _____ SCALE: AS NOTED SHEET NO. 1 OF 2 FILE NAME: _____ DRAWN BY: EAS DATE: 8/19/2020


SECTION 4
SECTION 5
SECTION 6
Left Stream Edge (4/00)
Left Stream Edge (6/20)
Left Stream Edge (5/19)
Right Stream Edge (6/20)
Right Stream Edge (5/19)
Right Stream Edge (4/00)
EXISTING GROUND (5/19)
EXISTING GROUND (6/20)
EXISTING GROUND (Initial Survey, 4/00)
Left Stream Edge (5/20)
Left Stream Edge (5/19)
Left Stream Edge (4/00)
Right Stream Edge (5/20)
Right Stream Edge (5/19)
Right Stream Edge (4/00)
EXISTING GROUND (5/20)
EXISTING GROUND (5/19)
EXISTING GROUND (Initial Survey, 4/00)
Left Stream Edge (4/00)
Left Stream Edge (5/20)
Left Stream Edge (5/19)
Right Stream Edge (4/00)
Right Stream Edge (5/19)
Right Stream Edge (5/20)
EXISTING GROUND (5/20)
EXISTING GROUND (5/19)
EXISTING GROUND (Initial Survey, 4/00)
SCALE: HORIZ. 1"= 2'
VERT. 1"= 2'
REVISIONS
CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
CONT. NO.
FILE NAME:
SCALE: AS NOTED
DRAWN BY: EAS
DATE:
SHEET NO. 2 OF 2
9/19/2020

Appendix E

2020 Macro-Invertebrate Taxonomic Identifications Results

Order	Family	Taxon	Outfall	Instream
Coleoptera	Elmidae	Optioservus		2
Coleoptera	Elmidae	Stenelmis		6
Diptera	Chironomidae	Diamesa		4
Diptera	Chironomidae	Eukiefferiella		1
Diptera	Chironomidae	Nilotanypus		5
Diptera	Chironomidae	Orthocladius		16
Diptera	Chironomidae	Parametriocnemus		8
Diptera	Chironomidae	Polypedilum		5
Diptera	Chironomidae	Rheocricotopus		2
Diptera	Chironomidae	Rheotanytarsus		1
Diptera	Chironomidae	Thienemanniella		1
Diptera	Chironomidae	Thienemannimyia Group		9
Diptera	Chironomidae	Tvetenia		38
Diptera	Simuliidae	Simulium		6
Diptera	Tipulidae	Antocha		15
Diptera	Tipulidae	Hexatoma		1
Ephemeroptera	Baetidae	Baetis		1
Ephemeroptera	Baetidae	Diphetor		1
Ephemeroptera	Heptageniidae	Maccaffertium		1
Trichoptera	Hydropsychidae	Cheumatopsyche		15
Trichoptera	Hydropsychidae	Hydropsyche		13
Trichoptera	Philopotamidae	Chimarra		6
		Total Individuals	N/A	157
		Total Taxa	N/A	22

Appendix F

Chesapeake Bay and Local TMDL Reductions

Appendix F

Modeling with Mapshed

The MapShed (version 1.3.0; MapShed, 2015) tool developed by Penn State University was utilized by the Bureau of Resource Management to document progress towards meeting the stormwater WLA. This modeling approach allowed for specific local data (streams, topology, and land use) to be used as the basis for TN, TP, and TSS reductions, rather than the broader accounting procedure used by the Chesapeake Bay Watershed Model.

Model Description

MapShed is a customized GIS interface that is used to create input data for the enhanced version of the Generalized Watershed Loading Function (GWLF-E) watershed model. The MapShed tool uses hydrology, land cover, soils, topography, weather, pollutant discharges, and other critical environmental data to develop an input file for the GWLF-E model. The basic process when using MapShed is: 1) select an area of interest, 2) create GWLF-E model input files, 3) run the GWLF-E simulation model, and 4) view the output. The MapShed geospatial evaluator and the GWLF-E models have been used for TMDL studies in Pennsylvania (Betz & Evans, 2015), New York (Cadmus, 2009), and New England (Penn State, 2016).

Chesapeake Bay TMDL baseline loads and required reductions for Carroll County were obtained from MDE and used in conjunction with the 2014 MDE Guidance document entitled: *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* to evaluate Bay restoration progress. Loading rates of TN, TP, and TSS for urban land were obtained from MDE (MDE, 2014) and used to calculate load reductions from BMPs. These loading rates from MDE were used instead of developing watershed-specific loading rates using MapShed because they correspond to the broader accounting procedure used by the Chesapeake Bay Watershed Model.

Delivered load ratios were applied to BMP load reductions calculated using the 2014 MDE Guidance document so that they correspond to the Bay TMDL delivered load allocations and required reductions.

Completed structural and nonstructural projects by watershed, along with the net change in pollutant load reductions, are shown in the following tables. Edge of stream loads versus delivered loads for each watershed are also summarized to show how local WLA's translate into reductions for the Chesapeake Bay TMDL.

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Prettyboy Watershed

SWM Facilities Impervious Treatment – Prettyboy Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Whispering Valley	Retrofit	88.3	20.9	RR	2.12	15.3	319.7700	67%	214.1899	1.69	35.3210	78%	27.6635	0.44	9.1960	84%	7.7383
Small Crossings	Retrofit	26.73	9.07	RR	1.86	15.3	138.7710	67%	92.4176	1.69	15.3283	78%	11.9325	0.44	3.9908	84%	3.3342
Small Crossings	Bio-Retention	1.15	0.51	RR	1.00	15.3	7.8030	60%	4.6623	1.69	0.8619	70%	0.6025	0.44	0.2244	75%	0.1681

SWM Facilities Pervious Treatment – Prettyboy Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Whispering Valley	Retrofit	88.3	67.4	RR	2.12	10.8	727.9200	67%	487.5789	0.43	28.9820	78%	22.6988	0.07	4.7180	84%	3.9701
Small Crossings	Retrofit	26.73	17.66	RR	1.86	10.8	190.7280	67%	127.0195	0.43	7.5938	78%	5.9115	0.07	1.2362	84%	1.0328
Small Crossings	Bio-Retention	1.15	0.64	RR	1.00	10.8	6.9120	60%	4.1299	0.43	0.2752	70%	0.1924	0.07	0.0448	75%	0.0336

Impervious to Pervious – Prettyboy Watershed

Location	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (tons/ac)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Hampstead	0.42	11.7	4.914	13	0.63882	0.68	0.2856	72	0.205632	0.18	0.0756	84	0.063504
Manchester	0.81	11.7	9.477	13	1.23201	0.68	0.5508	72	0.396576	0.18	0.1458	84	0.122472

Stream Buffer Plantings – Prettyboy Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	0.53	10.8	5.7240	66	3.7778	0.43	0.2279	77	0.1755	0.07	0.0371	57	0.0211
Planting 3	0.44	10.8	4.7520	66	3.1363	0.43	0.1892	77	0.1457	0.07	0.0308	57	0.0176
Planting 4	0.35	10.8	3.7800	66	2.4948	0.43	0.1505	77	0.1159	0.07	0.0245	57	0.0140
Planting 5	1.95	10.8	21.0600	66	13.8996	0.43	0.8385	77	0.6456	0.07	0.1365	57	0.0778
Charlotte's Quest	0.52	10.8	5.6160	66	3.7066	0.43	0.2236	77	0.1722	0.07	0.0364	57	0.0207
Manchester Streetscapes*	0.41	10.8	4.4280	66	2.9225	0.43	0.1763	77	0.1358	0.07	0.0287	57	0.0164
Planting 6	2.48	10.8	26.7840	66	17.6774	0.43	1.0664	77	0.8211	0.07	0.1736	57	0.0990
Planting 7	1.77	10.8	19.1160	66	12.6166	0.43	0.7611	77	0.5860	0.07	0.1239	57	0.0706
Planting 8	0.38	10.8	4.1040	66	2.7086	0.43	0.1634	77	0.1258	0.07	0.0266	57	0.0152
Planting 9	0.4	10.8	4.3200	66	2.8512	0.43	0.1720	77	0.1324	0.07	0.0280	57	0.0160
Planting 10	0.41	10.8	4.4280	66	2.9225	0.43	0.1763	77	0.1358	0.07	0.0287	57	0.0164
Planting 11	0.5	10.8	5.4000	66	3.5640	0.43	0.2150	77	0.1656	0.07	0.0350	57	0.0200
Planting 12	0.78	10.8	8.4240	66	5.5598	0.43	0.3354	77	0.2583	0.07	0.0546	57	0.0311

Catch Basin/inlet Cleaning – Prettyboy Watershed

Location	Tons	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	17.98	3.5	62.930	1.4	25.172	420	7551.6	3.776
Manchester	0.442	3.5	1.547	1.4	0.619	420	185.64	0.093

Forest Buffer Easements – Prettyboy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	66.490	2009 -current	11.7	777.9330	45	350.0699	0.68	45.2132	40	18.0853	0.18	11.9682	55	6.5825

Grass Buffer Easements – Prettyboy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	28.500	2009 -current	11.7	333.4500	30	100.03500	0.68	19.3800	40	7.7520	0.18	5.1300	55	2.8215

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Loch Raven Watershed

Catch Basin/inlet Cleaning – Loch Raven Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	11.54	3.5	40.390	1.4	16.156	420	4846.8	2.423

Grass Buffer Easements – Loch Raven Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	5.460	2009 -current	11.7	63.8820	30	19.16460	0.68	3.7128	40	1.4851	0.18	0.9828	55	0.5405

Forest Buffer Easements – Loch Raven Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	0.213	2009 -current	11.7	2.4921	45	1.1214	0.68	0.1448	40	0.0579	0.18	0.0383	55	0.0211

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Lower Monocacy Watershed

Stream Buffer Plantings – Lower Monocacy Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	0.51	10.8	5.5080	66	3.6353	0.43	0.2193	77	0.1689	0.07	0.0357	57	0.0203
Planting 2	0.58	10.8	6.2640	66	4.1342	0.43	0.2494	77	0.1920	0.07	0.0406	57	0.0231
Planting 3	1.2	10.8	12.9600	66	8.5536	0.43	0.5160	77	0.3973	0.07	0.0840	57	0.0479
Planting 4	5.8	10.8	62.6400	66	41.3424	0.43	2.4940	77	1.9204	0.07	0.4060	57	0.2314
Planting 5	0.44	10.8	4.7520	66	3.1363	0.43	0.1892	77	0.1457	0.07	0.0308	57	0.0176
Planting 6	0.43	10.8	4.6440	66	3.0650	0.43	0.1849	77	0.1424	0.07	0.0301	57	0.0172
Planting 7	0.53	10.8	5.7240	66	3.7778	0.43	0.2279	77	0.1755	0.07	0.0371	57	0.0211
Planting 8	1.44	10.8	15.5520	66	10.2643	0.43	0.6192	77	0.4768	0.07	0.1008	57	0.0575
Planting 9	0.28	10.8	3.0240	66	1.9958	0.43	0.1204	77	0.0927	0.07	0.0196	57	0.0112
Planting 10	0.61	10.8	6.5880	66	4.3481	0.43	0.2623	77	0.2020	0.07	0.0427	57	0.0243
Planting 11	0.18	10.8	1.9440	66	1.2830	0.43	0.0774	77	0.0596	0.07	0.0126	57	0.0072
Planting 12	0.22	10.8	2.3760	66	1.5682	0.43	0.0946	77	0.0728	0.07	0.0154	57	0.0088

Grass Buffer Easements – Lower Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	1.470	2009 -current	11.7	17.1990	30	5.15970	0.68	0.9996	40	0.3998	0.18	0.2646	55	0.1455

Forest Buffer Easements – Lower Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	0.190	2009 -current	11.7	2.2230	45	1.0004	0.68	0.1292	40	0.0517	0.18	0.0342	55	0.0188

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Upper Monocacy Watershed

Stream Buffer Plantings – Upper Monocacy Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	13.19	10.8	142.4520	66	94.0183	0.43	5.6717	77	4.3672	0.07	0.9233	57	0.5263
Planting 2	0.51	10.8	5.5080	66	3.6353	0.43	0.2193	77	0.1689	0.07	0.0357	57	0.0203
Planting 3	0.97	10.8	10.4760	66	6.9142	0.43	0.4171	77	0.3212	0.07	0.0679	57	0.0387
Planting 4	0.85	10.8	9.1800	66	6.0588	0.43	0.3655	77	0.2814	0.07	0.0595	57	0.0339
Planting 5	0.95	10.8	10.2600	66	6.7716	0.43	0.4085	77	0.3145	0.07	0.0665	57	0.0379
Planting 6	7	10.8	75.6000	66	49.8960	0.43	3.0100	77	2.3177	0.07	0.4900	57	0.2793
Planting 7	0.65	10.8	7.0200	66	4.6332	0.43	0.2795	77	0.2152	0.07	0.0455	57	0.0259
Planting 8	2.18	10.8	23.5440	66	15.5390	0.43	0.9374	77	0.7218	0.07	0.1526	57	0.0870
Planting 9	1.9	10.8	20.5200	66	13.5432	0.43	0.8170	77	0.6291	0.07	0.1330	57	0.0758
Total:	**28.2**		**304.5600**		**201.0096**		**12.1260**		**9.3370**		**1.9740**		**1.1252**

Grass Buffer Easements – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2000-2008	15.100	2000-2008	11.7	176.6700	30	53.00100	0.68	10.2680	40	4.1072	0.18	2.7180	55	1.4949
Grass Buffer 2009-Current	13.780	2009 -current	11.7	161.2260	30	48.36780	0.68	9.3704	40	3.7482	0.18	2.4804	55	1.3642
	28.880		**Total:**	**337.8960**		**101.36880**		**19.6384**		**7.8554**		**5.1984**		**2.8591**

Forest Buffer Easements – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2000-2008	0.120	2000-2008	11.7	1.4040	45	0.6318	0.68	0.0816	40	0.0326	0.18	0.0216	55	0.0119
Forest Buffer 2009-Current	11.820	2009 -current	11.7	138.2940	45	62.2323	0.68	8.0376	40	3.2150	0.18	2.1276	55	1.1702
	11.940		**Total:**	**139.6980**		**62.86410**		**8.1192**		**3.2477**		**2.1492**		**1.1821**

Stormwater Facilities Impervious Treatment – Upper Monocacy Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Robert's Mill	Retrofit	303.6	88.48	ST	1.15	15.3	1353.7440	36%	489.9540	1.69	149.5312	57%	85.0424	0.44	38.9312	72%	28.1800

Stormwater Facilities Prvious Treatment – Upper Monocacy Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Robert's Mill	Retrofit	303.6	215.12	ST	1.15	10.8	2323.2960	36%	840.8592	0.43	92.5016	57%	52.6081	0.07	15.0584	72%	10.8999

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Liberty Watershed

Catch Basin/inlet Cleaning – Liberty Reservoir Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	11.16	3.5	39.060	1.4	15.624	420	4687.2	2.344
Manchester	0.012	3.5	0.042	1.4	0.017	420	5.04	0.003
Westminster	1.44	3.5	5.040	1.4	2.016	420	604.8	0.302

Street Sweeping – Liberty Reservoir Watershed

Location	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (tons/ac)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Westminster	5.28	11.7	61.776	4	2.47104	0.68	3.5904	4	0.143616	0.18	0.9504	10	0.09504

Grass Buffer Easements – Liberty Reservoir Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	176.010	2009 -current	11.7	2059.3170	30	617.79510	0.68	119.6868	40	47.8747	0.18	31.6818	55	17.4250

Forest Buffer Easements – Liberty Reservoir Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	296.730	2009 -current	11.7	3471.7410	45	1562.2835	0.68	201.7764	40	80.7106	0.18	53.4114	55	29.3763

Stream Buffer Plantings – Liberty Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	0.14	10.8	1.5120	66	0.9979	0.43	0.0602	77	0.0464	0.07	0.0098	57	0.0056
Planting 2	1.43	10.8	15.4440	66	10.1930	0.43	0.6149	77	0.4735	0.07	0.1001	57	0.0571
Planting 3	1.19	10.8	12.8520	66	8.4823	0.43	0.5117	77	0.3940	0.07	0.0833	57	0.0475
Planting 4	0.6	10.8	6.4800	66	4.2768	0.43	0.2580	77	0.1987	0.07	0.0420	57	0.0239
Planting 5	0.32	10.8	3.4560	66	2.2810	0.43	0.1376	77	0.1060	0.07	0.0224	57	0.0128
Planting 6	0.31	10.8	3.3480	66	2.2097	0.43	0.1333	77	0.1026	0.07	0.0217	57	0.0124
Planting 7	0.3	10.8	3.2400	66	2.1384	0.43	0.1290	77	0.0993	0.07	0.0210	57	0.0120
Planting 8	0.16	10.8	1.7280	66	1.1405	0.43	0.0688	77	0.0530	0.07	0.0112	57	0.0064
Planting 9	1.02	10.8	11.0160	66	7.2706	0.43	0.4386	77	0.3377	0.07	0.0714	57	0.0407
Planting 10	0.84	10.8	9.0720	66	5.9875	0.43	0.3612	77	0.2781	0.07	0.0588	57	0.0335
Planting 11	3.18	10.8	34.3440	66	22.6670	0.43	1.3674	77	1.0529	0.07	0.2226	57	0.1269
Planting 12	2.92	10.8	31.5360	66	20.8138	0.43	1.2556	77	0.9668	0.07	0.2044	57	0.1165
Planting 13	1.15	10.8	12.4200	66	8.1972	0.43	0.4945	77	0.3808	0.07	0.0805	57	0.0459
Planting 14	0.24	10.8	2.5920	66	1.7107	0.43	0.1032	77	0.0795	0.07	0.0168	57	0.0096
Planting 15	0.52	10.8	5.6160	66	3.7066	0.43	0.2236	77	0.1722	0.07	0.0364	57	0.0207
Planting 16	1.41	10.8	15.2280	66	10.0505	0.43	0.6063	77	0.4669	0.07	0.0987	57	0.0563
Planting 17	0.1	10.8	1.0800	66	0.7128	0.43	0.0430	77	0.0331	0.07	0.0070	57	0.0040
Planting 18	4.06	10.8	43.8480	66	28.9397	0.43	1.7458	77	1.3443	0.07	0.2842	57	0.1620
Planting 19	1.22	10.8	13.1760	66	8.6962	0.43	0.5246	77	0.4039	0.07	0.0854	57	0.0487
Planting 20	0.21	10.8	2.2680	66	1.4969	0.43	0.0903	77	0.0695	0.07	0.0147	57	0.0084
Planting 21	0.87	10.8	9.3960	66	6.2014	0.43	0.3741	77	0.2881	0.07	0.0609	57	0.0347
Planting 22	0.1	10.8	1.0800	66	0.7128	0.43	0.0430	77	0.0331	0.07	0.0070	57	0.0040
Planting 23	0.76	10.8	8.2080	66	5.4173	0.43	0.3268	77	0.2516	0.07	0.0532	57	0.0303
Planting 24	0.44	10.8	4.7520	66	3.1363	0.43	0.1892	77	0.1457	0.07	0.0308	57	0.0176
Planting 25	0.38	10.8	4.1040	66	2.7086	0.43	0.1634	77	0.1258	0.07	0.0266	57	0.0152
Planting 26	0.3	10.8	3.2400	66	2.1384	0.43	0.1290	77	0.0993	0.07	0.0210	57	0.0120
Planting 27	0.16	10.8	1.7280	66	1.1405	0.43	0.0688	77	0.0530	0.07	0.0112	57	0.0064
Planting 28	0.2	10.8	2.1600	66	1.4256	0.43	0.0860	77	0.0662	0.07	0.0140	57	0.0080
Planting 29	0.9	10.8	9.7200	66	6.4152	0.43	0.3870	77	0.2980	0.07	0.0630	57	0.0359
Planting 30	0.38	10.8	4.1040	66	2.7086	0.43	0.1634	77	0.1258	0.07	0.0266	57	0.0152
Planting 31	0.11	10.8	1.1880	66	0.7841	0.43	0.0473	77	0.0364	0.07	0.0077	57	0.0044
Planting 32	2.07	10.8	22.3560	66	14.7550	0.43	0.8901	77	0.6854	0.07	0.1449	57	0.0826
Planting 33	0.38	10.8	4.1040	66	2.7086	0.43	0.1634	77	0.1258	0.07	0.0266	57	0.0152
Planting 34	4	10.8	43.2000	66	28.5120	0.43	1.7200	77	1.3244	0.07	0.2800	57	0.1596
Planting 35	1.88	10.8	20.3040	66	13.4006	0.43	0.8084	77	0.6225	0.07	0.1316	57	0.0750
Planting 36	0.54	10.8	5.8320	66	3.8491	0.43	0.2322	77	0.1788	0.07	0.0378	57	0.0215

Stream Restoration – Liberty Watershed

Location	Linear Feet	TN lbs reduced/linear ft	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/linear ft	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/linear ft	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Willow Pond**	1304	0.075	751.100	0.068	73.000	44.88	83000	41.500

Stormwater Facilities Impervious Treatment – Liberty Reservoir Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Hickory Ridge	Retrofit	23.75	4.8	ST	2.50	15.3	73.4400	39%	28.8729	1.69	8.1120	62%	5.0292	0.44	2.1120	79%	1.6645
Bateman SW Pond	Facility	47.25	4.52	RR	2.50	15.3	69.1560	68%	46.8186	1.69	7.6388	79%	6.0203	0.44	1.9888	85%	1.6885
Marriot Wood 1 Facility # 2	Retrofit	7.12	2.04	ST	2.50	15.3	31.2120	39%	12.2710	1.69	3.4476	62%	2.1374	0.44	0.8976	79%	0.7074
Marriot Wood II	Retrofit	7.51	1.38	ST	2.50	15.3	21.1140	39%	8.3010	1.69	2.3322	62%	1.4459	0.44	0.6072	79%	0.4785
Elderwood Village	Retrofit	7.64	2.47	ST	2.50	15.3	37.7910	39%	14.8575	1.69	4.1743	62%	2.5879	0.44	1.0868	79%	0.8565
Westminster Airport Pond	Retrofit	204.84	85	ST	1.40	15.3	1300.5000	38%	489.0375	1.69	143.6500	59%	84.8894	0.44	37.4000	75%	28.1282
Oklahoma II Foothills	Retrofit	23.72	6.06	ST	2.35	15.3	92.7180	39%	36.3301	1.69	10.2414	62%	6.3218	0.44	2.6664	78%	2.0930
Oklahoma Phase I	Retrofit	24.44	7.27	ST	2.50	15.3	111.2310	39%	43.7305	1.69	12.2863	62%	7.6172	0.44	3.1988	79%	2.5210
Edgewood	Retrofit	38	12.12	ST	2.50	15.3	185.4360	39%	72.9042	1.69	20.4828	62%	12.6988	0.44	5.3328	79%	4.2029
Upper Patapsco Phase 1	Facility	24.6	10.1	ST	2.50	15.3	154.5300	39%	60.7535	1.69	17.0690	62%	10.5823	0.44	4.4440	79%	3.5024
Upper Patapsco Phase 2	Facility	101.8	2.98	ST	2.50	15.3	45.5940	39%	17.9253	1.69	5.0362	62%	3.1223	0.44	1.3112	79%	1.0334
Quail Meadowns	Retrofit	111.97	23.25	ST	1.00	15.3	355.7250	35%	124.3259	1.69	39.2925	55%	21.5794	0.44	10.2300	70%	7.1508
Heritage Heights	Retrofit	21.38	4.1	ST	1.00	15.3	62.7300	35%	21.9241	1.69	6.9290	55%	3.8054	0.44	1.8040	70%	1.2610
Westminster High School	Retrofit	117.25	32.59	ST	2.50	15.3	498.6270	39%	196.0352	1.69	55.0771	62%	34.1463	0.44	14.3396	79%	11.3013
Westminster Comm. Pond	Facility	250.22	63.89	ST	2.50	15.3	977.5170	39%	384.3108	1.69	107.9741	62%	66.9409	0.44	28.1116	79%	22.1553
Diamond Hills Section 5	Retrofit	51.8	12.94	ST	2.03	15.3	197.9820	39%	77.3732	1.69	21.8686	61%	13.4445	0.44	5.6936	78%	4.4534
Wilda Drive	Facility	6.75	1.6	ST	1.07	15.3	24.4800	36%	8.7093	1.69	2.7040	56%	1.5117	0.44	0.7040	71%	0.5009
Collins Estates	Retrofit	16.34	3.18	ST	1.87	15.3	48.6540	39%	18.9371	1.69	5.3742	61%	3.2891	0.44	1.3992	78%	1.0896
High Point	Retrofit	4.7	0.91	RR	1.00	15.3	13.9230	60%	8.3190	1.69	1.5379	70%	1.0750	0.44	0.4004	75%	0.2999
Willow Pond	Retrofit	601	72.75	ST	2.50	15.3	1113.0750	39%	437.6054	1.69	122.9475	62%	76.2240	0.44	32.0100	79%	25.2277
Finksburg Industrial Park	Retrofit	67.8	22.12	ST	1.04	15.3	338.4360	35%	119.5339	1.69	37.3828	56%	20.7477	0.44	9.7328	71%	6.8751
Elderwood/ Village Parcel	Retrofit	144	61	ST	1.01	15.3	933.3000	35%	327.0777	1.69	103.0900	55%	56.7714	0.44	26.8400	70%	18.8123
Oklahoma 4	Retrofit	56.93	14.52	RR	2.50	15.3	222.1560	68%	150.3996	1.69	24.5388	79%	19.3395	0.44	6.3888	85%	5.4240
Miller/Watts	Retrofit	39.65	25.63	ST	2.50	15.3	392.1390	39%	154.1694	1.69	43.3147	62%	26.8539	0.44	11.2772	79%	8.8878
Central MD (Wet)	Retrofit	92.72	25.83	ST	2.50	15.3	395.1990	39%	155.3725	1.69	43.6527	62%	27.0634	0.44	11.3652	79%	8.9571
Randomhouse	Retrofit	41.8	16.38	ST	2.50	16.3	266.9940	39%	104.9687	2.69	44.0622	62%	27.3173	1.44	23.5872	79%	18.5895
Central MD (Dry)	Retrofit	61.89	29.19	RR	2.50	15.3	446.6070	68%	302.3529	1.69	49.3311	79%	38.8788	0.44	12.8436	85%	10.9040
Eldersburg Business Center	Retrofit	97.98	52.7	ST	2.34	15.3	806.3100	39%	315.9077	1.69	89.0630	62%	54.9680	0.44	23.1880	78%	18.1993
Feeser Property	Facility	4.38	1.72	RR	1.00	15.3	26.3160	60%	15.7238	1.69	2.9068	70%	2.0319	0.44	0.7568	75%	0.5669
Shiloh Middle	Retrofit	83.83	25.64	RR	1.81	15.3	392.2920	66%	260.7220	1.69	43.3316	78%	33.6614	0.44	11.2816	83%	9.4043
Aspen Run	Retrofit	14.4	1.7	RR	1.37	15.3	26.0100	64%	16.6659	1.69	2.8730	75%	2.1529	0.44	0.7480	80%	0.6009

Stormwater Facilities Pervious Treatment – Liberty Reservoir Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Hickory Ridge	Retrofit	23.75	18.95	ST	2.50	10.8	204.6600	39%	80.4621	0.43	8.1485	62%	5.0518	0.07	1.3265	79%	1.0454
Bateman SW Pond	Facility	47.25	42.73	RR	2.50	10.8	461.4840	68%	312.4247	0.43	18.3739	79%	14.4808	0.07	2.9911	85%	2.5394
Marriot Wood 1 Facility # 2	Retrofit	7.12	5.08	ST	2.50	10.8	54.8640	39%	21.5698	0.43	2.1844	62%	1.3543	0.07	0.3556	79%	0.2803
Marriot Wood II	Retrofit	7.51	6.13	ST	2.50	10.8	66.2040	39%	26.0281	0.43	2.6359	62%	1.6342	0.07	0.4291	79%	0.3382
Elderwood Village	Retrofit	7.64	5.17	ST	2.50	10.8	55.8360	39%	21.9519	0.43	2.2231	62%	1.3783	0.07	0.3619	79%	0.2852
Westminster Airport Pond	Retrofit	204.84	119.84	ST	1.40	10.8	1294.2720	38%	486.6955	0.43	51.5312	59%	30.4521	0.07	8.3888	75%	6.3091
Oklahoma II Foothills	Retrofit	23.72	17.66	ST	2.35	10.8	190.7280	39%	74.7337	0.43	7.5938	62%	4.6875	0.07	1.2362	78%	0.9704
Oklahoma Phase I	Retrofit	24.44	17.17	ST	2.50	10.8	185.4360	39%	72.9042	0.43	7.3831	62%	4.5773	0.07	1.2019	79%	0.9472
Edgewood	Retrofit	38	25.88	ST	2.50	10.8	279.5040	39%	109.8870	0.43	11.1284	62%	6.8993	0.07	1.8116	79%	1.4278
Upper Patapsco Phase 1	Facility	24.6	14.5	ST	2.50	10.8	156.6000	39%	61.5673	0.43	6.2350	62%	3.8655	0.07	1.0150	79%	0.7999
Upper Patapsco Phase 2	Facility	101.8	98.82	ST	2.50	10.8	1067.2560	39%	419.5917	0.43	42.4926	62%	26.3442	0.07	6.9174	79%	5.4517
Quail Meadowns	Retrofit	111.97	88.72	ST	1.00	10.8	958.1760	35%	334.8825	0.43	38.1496	55%	20.9518	0.07	6.2104	70%	4.3411
Heritage Heights	Retrofit	21.38	17.28	ST	1.00	10.8	186.6240	35%	65.2251	0.43	7.4304	55%	4.0808	0.07	1.2096	70%	0.8455
Westminster High School	Retrofit	117.25	84.66	ST	2.50	10.8	914.3280	39%	359.4681	0.43	36.4038	62%	22.5693	0.07	5.9262	79%	4.6705
Westminster Comm. Pond	Facility	250.22	186.33	ST	2.50	10.8	2012.3640	39%	791.1609	0.43	80.1219	62%	49.6733	0.07	13.0431	79%	10.2795
Diamond Hills Section 5	Retrofit	51.8	38.86	ST	2.03	10.8	419.6880	39%	164.0180	0.43	16.7098	61%	10.2730	0.07	2.7202	78%	2.1277
Wilda Drive	Facility	6.75	5.15	ST	1.07	10.8	55.6200	36%	19.7880	0.43	2.2145	56%	1.2380	0.07	0.3605	71%	0.2565
Collins Estates	Retrofit	16.34	13.16	ST	1.87	10.8	142.1280	39%	55.3190	0.43	5.6588	61%	3.4633	0.07	0.9212	78%	0.7174
High Point	Retrofit	4.7	3.79	RR	1.00	10.8	40.9320	60%	24.4569	0.43	1.6297	70%	1.1392	0.07	0.2653	75%	0.1987
Willow Pond	Retrofit	601	528.25	ST	2.50	10.8	5705.1000	39%	2242.9601	0.43	227.1475	62%	140.8251	0.07	36.9775	79%	29.1427
Finksburg Industrial Park	Retrofit	67.8	45.68	ST	1.04	10.8	493.3440	35%	174.2466	0.43	19.6424	56%	10.9016	0.07	3.1976	71%	2.2587
Elderwood/ Village Parcel	Retrofit	144	83	ST	1.01	10.8	896.4000	35%	314.1460	0.43	35.6900	55%	19.6544	0.07	5.8100	70%	4.0723
Oklahoma 4	Retrofit	56.93	42.41	RR	2.50	11.8	500.4380	68%	338.7965	1.43	60.6463	79%	47.7965	1.07	45.3787	85%	38.5257
Miller/Watts	Retrofit	39.65	14.02	ST	2.50	10.8	151.4160	39%	59.5292	0.43	6.0286	62%	3.7376	0.07	0.9814	79%	0.7735
Central MD (Wet)	Retrofit	92.72	66.89	ST	2.50	10.8	722.4120	39%	284.0163	0.43	28.7627	62%	17.8321	0.07	4.6823	79%	3.6902
Randomhouse	Retrofit	41.8	25.42	RR	2.50	10.8	274.5360	39%	107.9338	0.43	10.9306	62%	6.7767	0.07	1.7794	79%	1.4024
Central MD (Dry)	Retrofit	61.89	32.7	RR	2.50	10.8	353.1600	68%	239.0893	0.43	14.0610	79%	11.0817	0.07	2.2890	85%	1.9433
Eldersburg Business Center	Retrofit	97.98	45.28	ST	2.34	10.8	489.0240	39%	191.5969	0.43	19.4704	62%	12.0168	0.07	3.1696	78%	2.4877
Feeser Property	Facility	4.38	2.66	RR	1.00	10.8	28.7280	60%	17.1650	0.43	1.1438	70%	0.7995	0.07	0.1862	75%	0.1395
Shiloh Middle	Retrofit	83.83	58.19	RR	1.81	10.8	628.4520	66%	417.6768	0.43	25.0217	78%	19.4377	0.07	4.0733	83%	3.3955
Aspen Run	Retrofit	14.4	12.7	RR	1.37	10.8	137.1600	64%	87.8854	0.43	5.4610	75%	4.0922	0.07	0.8890	80%	0.7142

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Double Pipe Creek Watershed

Stormwater Facilities Impervious Treatment – Double Pipe Creek Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Sunnyside	Facility	30.2	2.69	ST	1.91	15.3	41.1570	39%	16.0402	1.69	4.5461	61%	2.7862	0.44	1.1836	78%	0.9230
Friendship Overlook	Retrofit	82.01	15.88	ST	1.68	15.3	242.9640	39%	93.6804	1.69	26.8372	61%	16.2656	0.44	6.9872	77%	5.3891
CC Farm Museum	Facility	6.44	0.45	RR	1.40	15.3	6.8850	64%	4.4280	1.69	0.7605	75%	0.5720	0.44	0.1980	81%	0.1597
Farm Museum 1	Facility	11.61	2.3	RR	1.44	15.3	35.1900	65%	22.7374	1.69	3.8870	76%	2.9367	0.44	1.0120	81%	0.8198
Farm Museum 2	Facility	0.09	0.05	RR	1.00	15.3	0.7650	60%	0.4571	1.69	0.0845	70%	0.0591	0.44	0.0220	75%	0.0165
Farm Museum 3	Facility	0.79	0.06	RR	1.00	15.3	0.9180	60%	0.5485	1.69	0.1014	70%	0.0709	0.44	0.0264	75%	0.0198
Farm Museum 4	Facility	0.03	0.03	RR	1.00	15.3	0.4590	60%	0.2743	1.69	0.0507	70%	0.0354	0.44	0.0132	75%	0.0099
Farm Museum 5	Facility	0.01	0.01	RR	1.00	15.3	0.1530	60%	0.0914	1.69	0.0169	70%	0.0118	0.44	0.0044	75%	0.0033
CC Maintenance	Retrofit	45.49	25.05	ST	2.50	15.3	383.2650	39%	150.6806	1.69	42.3345	62%	26.2462	0.44	11.0220	79%	8.6866
Blue Ridge Manor	Retrofit	36.28	9.26	RR	1.86	15.3	141.6780	67%	94.3535	1.69	15.6494	78%	12.1825	0.44	4.0744	84%	3.4041
Exceptional Center	Retrofit	46.5	14.7	ST	1.51	15.3	224.9100	38%	85.5642	1.69	24.8430	60%	14.8537	0.44	6.4680	76%	4.9216
Langdon	Facility	194	92.1	ST	1.00	15.3	1409.1300	35%	492.4909	1.69	155.6490	55%	85.4824	0.44	40.5240	70%	28.3263
Elmer Wolfe	Facility	9.78	4.26	ST	1.55	15.3	65.1780	38%	24.8862	1.69	7.1994	60%	4.3203	0.44	1.8744	76%	1.4315
Greens of Westminster Sec6 # 2	Retrofit	38.31	12.56	RR	2.23	15.3	192.1680	67%	128.8801	1.69	21.2264	78%	16.6414	0.44	5.5264	84%	4.6580

Stormwater Facilities Pervious Treatment – Double Pipe Creek Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Sunnyside	Facility	30.2	27.51	ST	1.91	10.8	297.1080	39%	115.7926	0.43	11.8293	61%	7.2500	0.07	1.9257	78%	1.5017
Friendship Overlook	Retrofit	82.01	66.13	ST	1.68	10.8	714.2040	39%	275.3779	0.43	28.4359	61%	17.2345	0.07	4.6291	77%	3.5704
Farm Museum	Facility	6.44	5.99	RR	1.40	10.8	64.6920	64%	41.6061	0.43	2.5757	75%	1.9372	0.07	0.4193	81%	0.3381
Farm Museum 1	Facility	11.61	9.31	RR	1.44	10.8	100.5480	65%	64.9674	0.43	4.0033	76%	3.0246	0.07	0.6517	81%	0.5279
Farm Museum 2	Facility	0.09	0.04	RR	1.00	10.8	0.4320	60%	0.2581	0.43	0.0172	70%	0.0120	0.07	0.0028	75%	0.0021
Farm Museum 3	Facility	0.79	0.73	RR	1.00	10.8	7.8840	60%	4.7107	0.43	0.3139	70%	0.2194	0.07	0.0511	75%	0.0383
Farm Museum 4	Facility	0.03	0	RR	1.00	10.8	0.0000	60%	0.0000	0.43	0.0000	70%	0.0000	0.07	0.0000	75%	0.0000
Farm Museum 5	Facility	0.01	0	RR	1.00	10.8	0.0000	60%	0.0000	0.43	0.0000	70%	0.0000	0.07	0.0000	75%	0.0000
CC Maintenance	Retrofit	45.49	20.44	ST	2.50	10.8	220.7520	39%	86.7886	0.43	8.7892	62%	5.4491	0.07	1.4308	79%	1.1276
Blue Ridge Manor	Retrofit	36.28	27.02	RR	1.86	10.8	291.8160	67%	194.3412	0.43	11.6186	78%	9.0447	0.07	1.8914	84%	1.5802
Exceptional Center	Retrofit	46.5	31.8	ST	1.51	10.8	343.4400	38%	130.6575	0.43	13.6740	60%	8.1757	0.07	2.2260	76%	1.6938
Langdon	Facility	194	101.9	ST	1.00	10.8	1100.5200	35%	384.6317	0.43	43.8170	55%	24.0643	0.07	7.1330	70%	4.9860
Elmer Wolfe	Facility	9.78	5.52	ST	1.55	10.8	59.6160	38%	22.7625	0.43	2.3736	60%	1.4244	0.07	0.3864	76%	0.2951
Greens of Westminster Sec6 # 2	Retrofit	38.31	25.75	RR	2.23	10.8	278.1000	67%	186.5116	0.43	11.0725	78%	8.6808	0.07	1.8025	84%	1.5193

Catch Basin/Inlet Cleaning – Double Pipe Creek Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Manchester	2.91	3.5	10.185	1.4	4.074	420	1222.2	0.611
New Windsor		3.5	0.000	1.4	0.000	420	0	0.000
Union Bridge	0.85	3.5	2.975	1.4	1.190	420	357	0.179
County		3.5	0.000	1.4	0.000	420	0	0.000
Westminster	3.42	3.5	11.970	1.4	4.788	420	1436.4	0.718

Street Sweeping – Double Pipe Creek Watershed

Location	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (tons/ac)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Westminster	7.62	11.7	89.154	4	3.56616	0.68	5.1816	4	0.207264	0.18	1.3716	10	0.13716

Impervious to Pervious – Double Pipe Creek Watershed

Location	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (tons/ac)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Manchester Skatepark	0.13	11.7	1.521	13	0.19773	0.68	0.0884	72	0.063648	0.18	0.0234	84	0.019656

Buffer Plantings – Double Pipe Creek Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	4.13	10.8	44.6040	66	29.4386	0.43	1.7759	77	1.3674	0.07	0.2891	57	0.1648
Planting 2	10.85	10.8	117.1800	66	77.3388	0.43	4.6655	77	3.5924	0.07	0.7595	57	0.4329
Planting 3	0.2	10.8	2.1600	66	1.4256	0.43	0.0860	77	0.0662	0.07	0.0140	57	0.0080
Planting 4	1.4	10.8	15.1200	66	9.9792	0.43	0.6020	77	0.4635	0.07	0.0980	57	0.0559
Planting 5	0.5	10.8	5.4000	66	3.5640	0.43	0.2150	77	0.1656	0.07	0.0350	57	0.0200
Planting 6	0.3	10.8	3.2400	66	2.1384	0.43	0.1290	77	0.0993	0.07	0.0210	57	0.0120
Planting 7	0.65	10.8	7.0200	66	4.6332	0.43	0.2795	77	0.2152	0.07	0.0455	57	0.0259
Planting 8	2.3	10.8	24.8400	66	16.3944	0.43	0.9890	77	0.7615	0.07	0.1610	57	0.0918
Planting 9	0.4	10.8	4.3200	66	2.8512	0.43	0.1720	77	0.1324	0.07	0.0280	57	0.0160
Planting 10	2.25	10.8	24.3000	66	16.0380	0.43	0.9675	77	0.7450	0.07	0.1575	57	0.0898
Planting 11	0.2	10.8	2.1600	66	1.4256	0.43	0.0860	77	0.0662	0.07	0.0140	57	0.0080
Planting 12	0.62	10.8	6.6960	66	4.4194	0.43	0.2666	77	0.2053	0.07	0.0434	57	0.0247
Planting 13	1.8	10.8	19.4400	66	12.8304	0.43	0.7740	77	0.5960	0.07	0.1260	57	0.0718
Planting 14	0.9	10.8	9.7200	66	6.4152	0.43	0.3870	77	0.2980	0.07	0.0630	57	0.0359
Planting 15	0.26	10.8	2.8080	66	1.8533	0.43	0.1118	77	0.0861	0.07	0.0182	57	0.0104
Planting 16	3	10.8	32.4000	66	21.3840	0.43	1.2900	77	0.9933	0.07	0.2100	57	0.1197
Planting 17	9	10.8	97.2000	66	64.1520	0.43	3.8700	77	2.9799	0.07	0.6300	57	0.3591
Planting 18	0.13	10.8	1.4040	66	0.9266	0.43	0.0559	77	0.0430	0.07	0.0091	57	0.0052
Planting 19	0.6	10.8	6.4800	66	4.2768	0.43	0.2580	77	0.1987	0.07	0.0420	57	0.0239
Planting 20	0.2	10.8	2.1600	66	1.4256	0.43	0.0860	77	0.0662	0.07	0.0140	57	0.0080
Planting 21	1.25	10.8	13.5000	66	8.9100	0.43	0.5375	77	0.4139	0.07	0.0875	57	0.0499
Planting 22	0.45	10.8	4.8600	66	3.2076	0.43	0.1935	77	0.1490	0.07	0.0315	57	0.0180
Planting 23	2.2	10.8	23.7600	66	15.6816	0.43	0.9460	77	0.7284	0.07	0.1540	57	0.0878
Planting 24	1.62	10.8	17.4960	66	11.5474	0.43	0.6966	77	0.5364	0.07	0.1134	57	0.0646
Planting 25	4.26	10.8	46.0080	66	30.3653	0.43	1.8318	77	1.4105	0.07	0.2982	57	0.1700
Planting 26	1.8	10.8	19.4400	66	12.8304	0.43	0.7740	77	0.5960	0.07	0.1260	57	0.0718
Planting 27	2.05	10.8	22.1400	66	14.6124	0.43	0.8815	77	0.6788	0.07	0.1435	57	0.0818
Planting 28	0.59	10.8	6.3720	66	4.2055	0.43	0.2537	77	0.1953	0.07	0.0413	57	0.0235
Planting 29	0.44	10.8	4.7520	66	3.1363	0.43	0.1892	77	0.1457	0.07	0.0308	57	0.0176
Planting 30	0.17	10.8	1.8360	66	1.2118	0.43	0.0731	77	0.0563	0.07	0.0119	57	0.0068
Planting 31	0.22	10.8	2.3760	66	1.5682	0.43	0.0946	77	0.0728	0.07	0.0154	57	0.0088

Grass Buffer Protection Easements – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2000-2008	68.700	2000-2008	11.7	803.7900	30	241.13700	0.68	46.7160	40	18.6864	0.18	12.3660	55	6.8013
Grass Buffer 2009-Current	97.510	2009 -current	11.7	1140.8670	30	342.26010	0.68	66.3068	40	26.5227	0.18	17.5518	55	9.6535

Forest Buffer Protection Easements – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2000-2008	58.180	2000-2008	11.7	680.7060	45	306.3177	0.68	39.5624	40	15.8250	0.18	10.4724	55	5.7598
Forest Buffer 2009-Current	48.440	2009 -current	11.7	566.7480	45	255.0366	0.68	32.9392	40	13.1757	0.18	8.7192	55	4.7956

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

South Branch Patapsco Watershed

Buffer Plantings – South Branch Patapsco Watershed

Project	Acres	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Planting 1	4.9	10.8	52.9200	66	34.9272	0.43	2.1070	77	1.6224	0.07	0.3430	57	0.1955
Planting 2	3.45	10.8	37.2600	66	24.5916	0.43	1.4835	77	1.1423	0.07	0.2415	57	0.1377
Planting 3	0.16	10.8	1.7280	66	1.1405	0.43	0.0688	77	0.0530	0.07	0.0112	57	0.0064
Planting 4	3.2	10.8	34.5600	66	22.8096	0.43	1.3760	77	1.0595	0.07	0.2240	57	0.1277
Planting 5	0.3	10.8	3.2400	66	2.1384	0.43	0.1290	77	0.0993	0.07	0.0210	57	0.0120
Planting 6	3	10.8	32.4000	66	21.3840	0.43	1.2900	77	0.9933	0.07	0.2100	57	0.1197
Planting 7	0.23	10.8	2.4840	66	1.6394	0.43	0.0989	77	0.0762	0.07	0.0161	57	0.0092
Planting 8	0.13	10.8	1.4040	66	0.9266	0.43	0.0559	77	0.0430	0.07	0.0091	57	0.0052
Planting 9	0.13	10.8	1.4040	66	0.9266	0.43	0.0559	77	0.0430	0.07	0.0091	57	0.0052

Grass Buffer Protection Easements – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 1995-2008	107.920	1995-2008	11.7	1262.6640	30	378.79920	0.68	73.3856	40	29.3542	0.18	19.4256	55	10.6841
Grass Buffer 2009-Current	85.480	2009 -current	11.7	1000.1160	30	300.03480	0.68	58.1264	40	23.2506	0.18	15.3864	55	8.4625

Forest Buffer Protection Easements – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 1995-2008	149.510	1995-2008	11.7	1749.2670	45	787.1702	0.68	101.6668	40	40.6667	0.18	26.9118	55	14.8015
Forest Buffer 2009-Current	97.960	2009 -current	11.7	1146.1320	45	515.7594	0.68	66.6128	40	26.6451	0.18	17.6328	55	9.6980

Stormwater Facilities Impervious Treatment – South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Arthurs Ridge	Retrofit	51.17	5.14	ST	2.13	15.3	78.6420	39%	30.7707	1.69	8.6866	62%	5.3487	0.44	2.2616	78%	1.7715
South Carroll High-Fine Arts	New construction	24.22	12.94	RR	1.00	15.3	197.9820	60%	118.2942	1.69	21.8686	70%	15.2862	0.44	5.6936	75%	4.2651
Brimfield	Retrofit	34.69	9.15	RR	2.50	15.3	139.9950	68%	94.7766	1.69	15.4635	79%	12.1871	0.44	4.0260	85%	3.4180
Harvest Farms 1A	Retrofit	43.8	15.47	ST	2.50	15.3	236.6910	39%	93.0551	1.69	26.1443	62%	16.2087	0.44	6.8068	79%	5.3646
Parrish Park	Retrofit	94.23	18.2	ST	1.00	15.3	278.4600	35%	97.3218	1.69	30.7580	55%	16.8923	0.44	8.0080	70%	5.5976
Clipper Hills Gardenia	Retrofit	33.19	11.08	ST	2.50	15.3	169.5240	39%	66.6484	1.69	18.7252	62%	11.6091	0.44	4.8752	79%	3.8422
Clipper hills Hilltop	Retrofit	80.17	18.54	ST	2.50	15.3	283.6620	39%	111.5217	1.69	31.3326	62%	19.4253	0.44	8.1576	79%	6.4292
Carroltowne 2B	Retrofit	34.61	10.38	ST	2.50	15.3	158.8140	39%	62.4377	1.69	17.5422	62%	10.8757	0.44	4.5672	79%	3.5995
Carroltowne 2A	Retrofit	87.73	34.43	ST	2.49	15.3	526.7790	39%	207.0259	1.69	58.1867	62%	36.0580	0.44	15.1492	79%	11.9343
Benjamins Claim	Retrofit	47.1	15.78	ST	2.21	15.3	241.4340	39%	94.5156	1.69	26.6682	62%	16.4347	0.44	6.9432	78%	5.4426
Eldersburg Estates 3-5	Retrofit	34.91	8.16	ST	2.50	15.3	124.8480	39%	49.0840	1.69	13.7904	62%	8.5497	0.44	3.5904	79%	2.8297
Braddock Manor West	Retrofit	49.3	7.65	ST	2.50	15.3	117.0450	39%	46.0162	1.69	12.9285	62%	8.0153	0.44	3.3660	79%	2.6528
Benjamins Claim Basin B	Retrofit	1.33	0.55	ST	1.04	15.3	8.4150	35%	2.9721	1.69	0.9295	56%	0.5159	0.44	0.2420	71%	0.1709
Hawks Ridge	Retrofit	63.48	19.8	ST	2.07	15.3	302.9400	39%	118.4601	1.69	33.4620	62%	20.5866	0.44	8.7120	78%	6.8188
Merridale Gardens	Retrofit	81	23.81	RR	1.77	15.3	364.2930	66%	241.6521	1.69	40.2389	78%	31.1985	0.44	10.4764	83%	8.7152
Shannon Run	Retrofit	213.5	34.1	ST	2.50	15.3	521.7300	39%	205.1181	1.69	57.6290	62%	35.7284	0.44	15.0040	79%	11.8249
Winfield Fire Dept.	Facility	0.22	0.22	RR	1.14	15.3	3.3660	62%	2.0784	1.69	0.3718	72%	0.2686	0.44	0.0968	77%	0.0749
Benjamins claim - Jacobs	Retrofit	7.86	2.11	RR	0.97	15.3	32.2830	59%	19.1258	1.69	3.5659	69%	2.4713	0.44	0.9284	74%	0.6895

Stormwater Facilities Pervious Treatment – South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Arthurs Ridge	Retrofit	51.17	46.03	ST	2.13	10.8	497.1240	39%	194.5127	0.43	19.7929	62%	12.1873	0.07	3.2221	78%	2.5238
South Carroll High-Fine Arts	New construction	24.22	11.28	RR	1.00	10.8	121.8240	60%	72.7898	0.43	4.8504	70%	3.3904	0.07	0.7896	75%	0.5915
Brimfield	Retrofit	34.69	25.54	RR	2.50	10.8	275.8320	68%	186.7383	0.43	10.9822	79%	8.6553	0.07	1.7878	85%	1.5178
Harvest Farms 1A	Retrofit	43.8	28.33	ST	2.50	10.8	305.9640	39%	120.2897	0.43	12.1819	62%	7.5524	0.07	1.9831	79%	1.5629
Parrish Park	Retrofit	94.23	76.03	ST	1.00	10.8	821.1240	35%	286.9828	0.43	32.6929	55%	17.9549	0.07	5.3221	70%	3.7201
Clipper Hills Gardenia	Retrofit	33.19	22.11	ST	2.50	10.8	238.7880	39%	93.8795	0.43	9.5073	62%	5.8943	0.07	1.5477	79%	1.2198
Clipper hills Hilltop	Retrofit	80.17	61.63	ST	2.50	10.8	665.6040	39%	261.6822	0.43	26.5009	62%	16.4298	0.07	4.3141	79%	3.4000
Carroltowne 2B	Retrofit	34.61	24.23	ST	2.50	10.8	261.6840	39%	102.8811	0.43	10.4189	62%	6.4594	0.07	1.6961	79%	1.3367
Carroltowne 2A	Retrofit	87.73	53.3	ST	2.49	10.8	575.6400	39%	226.2284	0.43	22.9190	62%	14.2028	0.07	3.7310	79%	2.9392
Benjamins Claim	Retrofit	47.1	31.32	ST	2.21	10.8	338.2560	39%	132.4190	0.43	13.4676	62%	8.2996	0.07	2.1924	78%	1.7186
Eldersburg Estates 3-5	Retrofit	34.91	26.75	ST	2.50	10.8	288.9000	39%	113.5810	0.43	11.5025	62%	7.1312	0.07	1.8725	79%	1.4758
Braddock Manor West	Retrofit	49.3	41.65	ST	2.50	10.8	449.8200	39%	176.8467	0.43	17.9095	62%	11.1034	0.07	2.9155	79%	2.2978
Benjamins Claim Basin B	Retrofit	1.33	0.78	ST	1.04	10.8	8.4240	35%	2.9753	0.43	0.3354	56%	0.1861	0.07	0.0546	71%	0.0386
Hawks Ridge	Retrofit	63.48	43.68	ST	2.07	10.8	471.7440	39%	184.4683	0.43	18.7824	62%	11.5554	0.07	3.0576	78%	2.3932
Merridale Gardens	Retrofit	81	57.19	RR	1.77	10.8	617.6520	66%	409.7167	0.43	24.5917	78%	19.0667	0.07	4.0033	83%	3.3303
Shannon Run	Retrofit	213.5	179.4	ST	2.50	10.8	1937.5200	39%	761.7360	0.43	77.1420	62%	47.8259	0.07	12.5580	79%	9.8972
Winfield Fire Dept.	Facility	0.22	0	RR	1.14	10.8	0.0000	62%	0.0000	0.43	0.0000	72%	0.0000	0.07	0.0000	77%	0.0000
Benjamins claim - Jacobs	Retrofit	7.86	5.75	RR	0.97	10.8	62.1000	59%	36.7907	0.43	2.4725	69%	1.7135	0.07	0.4025	74%	0.2989

Carroll County Chesapeake Bay TMDL - River Segments

Chesapeake Bay River Segments – Combined Phase I and Phase II Baseline & Percent Reductions

Delivered Pounds/Year

Total Phosphorus (TP)				
Chesapeake Bay River Segment	Jurisdiction	2009 Delivered Baseline (lbs.)	% Reduction	Reduction (lbs.)
Potomac	Phase I	5,562.64	23.10%	1,284.97
	Phase II	4,538.35	20.80%	943.98
	Total:	**10,100.99**	**22.07%**	**2,228.95**
Gunpowder	Phase I	127.37	15.70%	20.00
	Phase II	187.99	18.20%	34.21
	Total:	**315.36**	**17.19%**	**54.21**
Patapsco	Phase I	1,333.77	36.10%	481.49
	Phase II	418.75	32.60%	136.51
	Total:	**1,752.52**	**35.26%**	**618.00**

Total Nitrogen (TN)				
Chesapeake Bay River Segment	Jurisdiction	2009 Delivered Baseline (lbs.)	% Reduction	Reduction (lbs.)
Potomac	Phase I	63,897.34	9.50%	6,070.25
	Phase II	46,764.12	8.90%	4,162.01
	Total:	**110,661.46**	**9.25%**	**10,232.26**
Gunpowder	Phase I	1,925.08	9.90%	190.58
	Phase II	2,085.67	9.30%	193.97
	Total:	**4,010.75**	**9.59%**	**384.55**
Patapsco	Phase I	12,755.34	14.00%	1,785.75
	Phase II	3,283.40	13.00%	426.84
	Total:	**16,038.74**	**13.79%**	**2,212.59**

Chesapeake Bay TMDL
Restoration Progress – Nitrogen

Potomac River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Lower Monocacy Watershed	34.51	<1%	307.19	**3.34%**
Upper Monocacy Watershed	492.73	4.82%	392.34	**8.65%**
Double Pipe Creek Watershed	909.97	8.89%	1,833.05	**26.81%**
Total	**1,437.21**	**13.71%**	**2,532.58**	**38.80%**

Gunpowder River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Loch Raven Reservoir Watershed	9.65	2.51%	68.39	**20.29%**
Prettyboy Reservoir Watershed	76.31	19.84%	49.08	**32.61%**
Total	**85.96**	**22.35%**	**117.47**	**52.90%**

Patapsco River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	654.68	29.59%	310.70	**43.63%**
Total	**654.68**	**29.59%**	**310.70**	**43.63%**

Chesapeake Bay TMDL
Restoration Progress – Phosphorus

Potomac River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Lower Monocacy Watershed	2.11	<1%	31.83	**1.5%**
Upper Monocacy Watershed	72.36	3.25%	47.09	**5.36%**
Double Pipe Creek Watershed	158.45	7.11%	312.17	**21.11%**
Total	**232.92**	**10.36%**	**391.09**	**27.97%**

Gunpowder River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Loch Raven Reservoir Watershed	6.37	11.75%	31.32	**69.53%**
Prettyboy Reservoir Watershed	10.00	18.45%	7.26	**31.84%**
Total	**16.37**	**30.20%**	**38.58**	**101.37%**

Patapsco River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2020 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2020	Reduction from Planned BMPs Implemented 2021-2026 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2026**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	141.02	22.82%	97.50	**38.59%**
Total	**141.02**	**22.82%**	**97.50**	**38.59%**

Appendix G

Discrepancies Between Documentation and the Geodatabase Design

Appendix G

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 the data to 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. Many 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 MDE address not only these enumerated issues, but also follow up with other schema issues and make changes to the geodatabase before finalization of the next permit.

Below, each associated table and feature class contained within MDE's geodatabase is listed, and any issues or errors found during the submission process have been described.

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

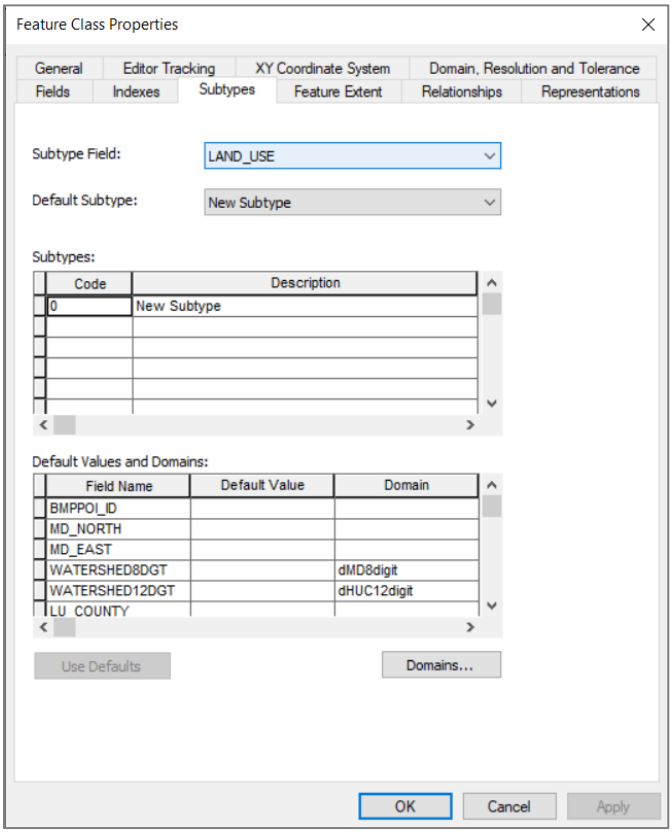
It is required that a construction year be provided for each outfall in this feature class. Some of the outfalls that are contained in this feature class pre-date records being kept. If the year of construction is known, then that attribute is populated, otherwise the year is estimated from nearby property as-built years when possible. Any unknown built years are populated with 9999 to meet the requirement of providing a value while 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. OutfallDrainageArea, Feature Class

No issues found at this time.

4. BMPPOI, Feature Class

The LAND_USE field contains a subtype called “New Subtype” that prevents data from displaying for this attribute. While the County’s data has been loaded and is stored in the table as required, it does not display due to the presence of the subtype. Removing the subtype allows data to display correctly. An image of the table’s properties is provided to illustrate the issue. The subtype should be deleted from the geodatabase schema.



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 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.

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 but does not 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 requires 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.

In June 2020, MDE published the draft guidance document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for National Pollutant Discharge Elimination System Stormwater Permits.* MS4 jurisdictions were directed that new permits should follow this new guidance document. Section V.3, "Alternative Best Management Practices – Land Cover Conversion BMPs," describes newly created alternative BMPs. Carroll County has included three of these new BMP types in the 2020 geodatabase submission. The domains in the existing geodatabase, however, do not include coded values for these new BMPs. In order to provide accurate data, the dAltBMPPoly domain was edited to include three additional values: FCB (Forest Conservation Buffer), RCL (Riparian Conservation Landscaping), and NCL (Non-Riparian Conservation Landscaping). The geodatabase domains should be edited to include these and all new BMPs described in the updated accounting document.

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

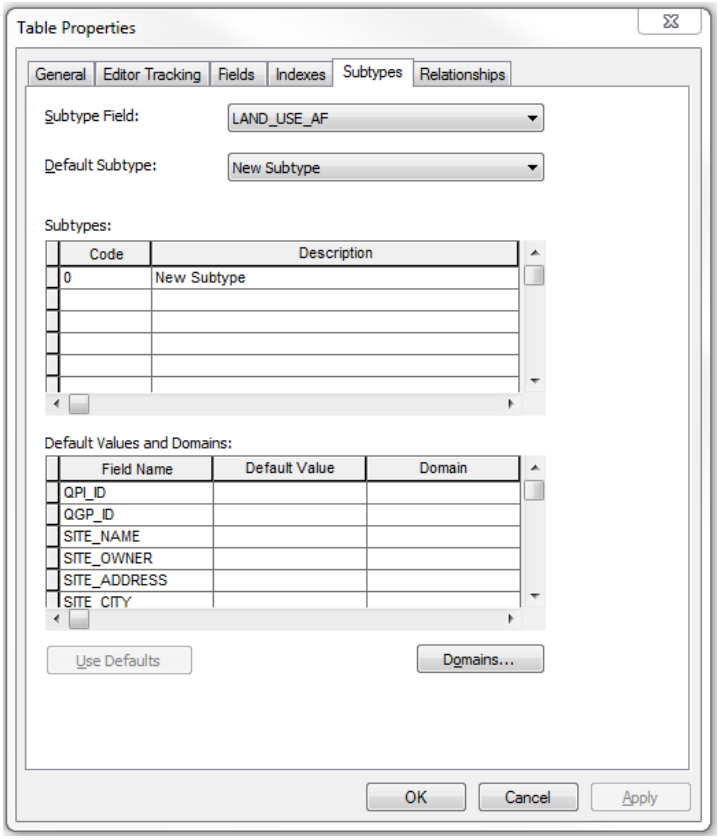
The PERMIT_NUM field is noted in the user's guide as being a mandatory data point. However, the schema in the geodatabase allows for null values. Every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

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.

The LAND_USE_AF field contains a subtype called "New Subtype" that prevents data from displaying for this attribute. While the County's data has been loaded and is stored in the table as required, it does not display due to the presence of the subtype. Removing the subtype allows data to display correctly. An image of the table's properties is provided to illustrate the issue. The subtype should be deleted from the geodatabase schema.



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. BiologicalMonitoring, 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.

Appendix H

Town of Mt. Airy Phase II Permit Requirements

APPENDIX H

Supplemental Reporting: Town of Mount Airy (Frederick County Side)

National Pollutant Discharge Elimination System
General Permit for Discharges from Small Municipal Separate Storm Sewer Systems
General Discharge Permit No. 13-IM-5550 General NPDES No. MDR055500

Permit Area: Town of Mt. Airy (Frederick County Side)
Effective Date: October 31, 2018
Expiration Date: October 30, 2023

Purpose and Background:

The purpose of this appendix is to provide or highlight supplemental information as needed to document or clarify progress specific to the Phase II MS4 permit issued to the Town of Mount Airy for its jurisdictional area situated within Frederick County.

As in past years, Carroll County Phase I MS4 Annual Report contains requisite program reporting for the County and eight municipal Phase I co-permittees, including the Town of Mount Airy and its Frederick County side. Program information will continue to be reported in the content of Carroll County's Annual Reports and associated Geodatabase. The Maryland Department of the Environment (MDE) affirmed by discussion and correspondence (enclosed) that "under the conditions of the MS4 general permit, any permittee may enter into an agreement with another State, federal, or municipal partner to satisfy one or more of the permit obligations". A December 2014 Memorandum of Agreement between Carroll County and the eight (8) municipalities (including Mt. Airy) includes provisions for Carroll County to perform numerous programs or work in coordination with each municipality in meeting permit requirements. Minimum Control Measure requirements for Mount Airy (Frederick County Area) have and are already being met through the existing partnership with Carroll County as clarified by an MDE October 17, 2019 letter, October 24, 2019 email and affirmed by September 9, 2020 email (enclosed).

Impervious Acreage Baseline:

The chart below breaks down the impervious acreage for the Frederick County side of Mt. Airy: the total amount, amount currently treated by stormwater management, remaining untreated impervious acreage, 20% of the remaining untreated acreage, and the projects currently in the design phase to cover the restoration requirement of the permit.

	Frederick County Side of Mt. Airy		
	Area		**Acres**
	Total Impervious Area		197
-	Treated Impervious Acres (IA)		66
	Untreated IA		***131***
	Restoration Requirement = 20% of Untreated IA		***26***
	Projects to Date		
		Twin Ridge	21.67
		East/West Pond	48.55
		Total Planned IA	***70.22***

Restoration Planning and Implementation:

The Town of Mt. Airy has been working closely with the Bureau of Resource Management on restoration efforts at two locations. In the fall of 2016, the Town identified the Twin Ridge stormwater management facility as a site they would be interested in retrofitting. Numerous maintenance issues had been identified through maintenance inspections, and this was one of the Town's oldest facilities with a large amount of untreated impervious acreage. The project was put out to bid for construction in January 2020. At this time, the project is actively under construction and is anticipated to be complete and will be reported in FY2021.

In December 2017, a Request for Proposal was issued for the Woodville Branch watershed Study. The purpose of this study was to determine the most cost-effective way to improve treatment of impervious area in the watershed. From that study, it was determined that the East/West pond (new construction) would be the second restoration project in the Phase II area. The facility has been designed and was put out to bid for construction in July 2020. The project received grant funds from the MDE Bay Restoration Fund and will start construction in December 2020. The project is anticipated to be complete for reporting in FY2021.

The chart below provides summary information for restoration projects relating to the Phase II permit requirements.

Mt. Airy Projects - NPDES Phase II (Frederick County)

Year	Project Name	Project Type	Project Status	Budget	Impervious Area Credit	MDE Watershed
2020	Twin Ridge	Retrofit	Construction	$802,690.00	21.67	Lower Monocacy
2021	East West Pond	New Construction	Design	$1,070,193.18	48.55	Lower Monocacy

Minimum Control Measures (MCM):

The Town of Mount Airy included Phase II Minimum Control Measure (MCM) activities in the reporting to Carroll County for incorporation into the County's 2020 Phase I MS4 Annual Report. Report discussion covering Part IV. Minimum Control Measures A. through F. can primarily be found in the correlating sections of the main report with additional comments as noted in the table below.

MCM Cross Reference Table

Phase II Minimum Control Measure (MCM)	CC Phase I MS4 Report Section Part IV. Standard Permit Conditions D. Management Programs	Comment
A. Public Education and Outreach	6. Public Education, 5. PMM (Staff Training)	
B. Public Involvement and Participation	6. Public Education, 4. Litter and Floatables	Town of Mt Airy Recertified as Sustainable Community by Sustainable Maryland (See Town Website)
C. Illicit Discharge Detection and Elimination (IDDE)	3. Illicit Discharge Detection and Elimination (IDDE)	IDDE Manual on CD Outfall screening increased to include 7 or 20% of outfalls at the time of screening on Frederick Co side.
D. Construction Site Stormwater Runoff Control	2. Erosion and Sediment Control	Delegated to County
E. Post Construction Stormwater Management	1. Stormwater Management	Delegated to County
F. Pollution Prevention and Good Housekeeping	5. Property Management and Maintenance	12SW Permitted: Mount Airy Public Works Main. Shop. Annual Site Compliance Evaluation Report and SWPPP on CD. (See 12SW &PMM Tables) Municipal Property Management and Maintenance / Stormwater Pollution Prevention BMP Guidance Manual on CD

Correspondence Related to Mt. Airy Phase II MS4 Permit

Edwards, Glenn

From: Deborah Cappuccitti -MDE- <deborah.cappuccitti@maryland.gov>
Sent: Monday, September 14, 2020 3:49 PM
To: Edwards, Glenn
Cc: Heyn, Chris; publicworks@mountairymd.gov; David Warrington; Devilbiss, Thomas S.; Michelle L Crawford -MDE-; Pat Depkin -MDE-; Nora Howard -MDE-; Stewart Comstock -MDE-
Subject: Re: FW: Phase II MS4 General Permit Announcements

Hi Glenn,

You are correct. A long as Carroll County continues reporting for the Town then it is acceptable to provide this information when the County submits your annual report. We will offer confirmation in our review.

In the meantime, I am not sure if you received this email directly or not? Gail was our primary POC on the County's end. Let us know if you would like to add anyone to our PII contact information regarding this coordinated effort between the Town and the County?

Let us know if you need anything additional.

Debbie

On Mon, Sep 14, 2020 at 3:34 PM Edwards, Glenn <gedwards@carrollcountymd.gov> wrote:

> Hi Debbie,
>
> Please find attached MDE Review Letter and Final Review (Attachment 1) for Carroll County's 2019 Phase I MS4 Annual Report documenting Mt Airy's Phase II (Frederick County side) requirements have been met (see page 10/11 - CR 2019 AR Review final 07302020 pdf) by current MOU agreement. Per our understanding the October 31, 2020 Phase II Submission does not pertain to Mt Airy at this time.
>
> Please confirm,
>
> Thanks,
>
> Glenn

Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

October 17, 2019

Mr. David Warrington
Town Administrator
Town of Mt. Airy
110 S. Main Street
P.O. Box 50
Mt. Airy, MD 21771

Mr. Thomas Devilbiss, Director
Department of Land & Resource Management
225 N Center Street
Westminister, MD 21157

Attention:

The Maryland Department of the Environment, Water and Science Administration (Department) has received a joint letter from the Town of Mt. Airy and Carroll County on October 15, 2019. The Town and the County are requesting that reporting requirements for the National Pollutant Discharge Elimination System (NPDES) General Permit No. 13-IM-5500 for Discharges from Small Municipal Separate Storm Sewer Systems (MS4) be met through the Carroll County MS4 annual report submissions. The Department has determined that the request is consistent with the provisions in the general permit and with past conversations.

Under the conditions of the MS4 general permit, any permittee may enter into an agreement with another State, federal, or municipal partner to satisfy one or more of the permit obligations. The County has included reporting for numerous required programs in the Frederick side of Mt. Airy as part of the Carroll County Annual Report for many years. The joint request by the Town and the County will continue this effort and include the impervious area restoration reporting for the Frederick side of the Town as an Appendix in the County's report.

The Department recognizes the significant effort necessary to implement a stormwater program and commends both the Town of Mt. Airy and Carroll County for its partnership to efficiently and effectively meet permit requirements. If you have any questions on this correspondence, please contact me at Deborah.Cappuccitti@Maryland.gov or 410-537-3533.

Sincerely,

Deborah J. Cappuccitti
Senior Regulatory Compliance Engineer
Water and Science Administration

Attachment

1800 Washington Boulevard | Baltimore, MD 21230 | 1-800-633-6101 | 410-537-3000 | TTY Users 1-800-735-2258
www.mde.maryland.gov

Mount Airy Phase II
MDE EMAIL October 24, 2019 - Follow Up to October 17, 2019 Letter

From: Engles, Gale J.
Sent: Thursday, October 24, 2019 9:21 PM
To: Edwards, Glenn <gedwards@carrollcountymd.gov>; O'Meara, Janet L. <jomeara@carrollcountymd.gov>
Subject: Fwd: [External E-mail] Fwd: NPDES Phase II MS4 Compliance

FYI

Gale

Sent from my iPhone

Begin forwarded message:

From: Deborah Cappuccitti -MDE- <deborah.cappuccitti@maryland.gov>
Date: October 24, 2019 at 10:51:40 AM EDT
To: David Warrington <dwarrington@mountairymd.gov>, "Engles, Gale J." <gengles@carrollcountymd.gov>
Cc: Michelle L Crawford -MDE- <michelle.crawford1@maryland.gov>, Stewart Comstock -MDE- <stewart.comstock@maryland.gov>
Subject: [External E-mail] Fwd: NPDES Phase II MS4 Compliance

Hi David,

I am responding to your request to Ray Bahr regarding information on developing minimum control measures for the Town of Mt. Airy under the Phase II general permit.

The letter I forwarded to yourself and Gale Engles on Monday (also attached) indicates that Carroll County has already been reporting on the required programs for the Town. Therefore, I wanted to clarify that the minimum control measure requirements in the permit are already being met through your partnership with the County and reported in their annual reports. This has been the case for several years now. The recent joint letter from the Town and County basicly will allow the County to expand on that reporting to include documentation associated with the impervious area restoration requirement. I hope that clarifies that in general - the County is already meeting the Towns requirements for the MCMs through your existing partnership.

If you feel you need additional information, please let us know.

Debbie

Town of Mt. Airy
110 S Main Street
P.O. Box 50
Mt. Airy, MD 21771

Department of Land &
Resource Management
225 N Center Street
Westminster, MD 21157

October 15, 2019

Maryland Department of the Environment
Attn: Deborah Cappuccitti
Senior Regulatory Compliance Engineer
Water and Science Administration
1800 Washington Blvd.
Baltimore, Maryland 21230

Re: Phase II Frederick County Side of Mt. Airy
Reporting Mechanism

Dear Ms. Cappuccitti:

During the July 3, 2019 meeting with Carroll County staff and yourself, discussions relating to annual reporting associated with the Phase II Frederick County side of Mt. Airy took place. We are writing this letter to provide you with our intentions on how we will be addressing Part VI.C. of the NPDES General Permit for Discharges from Small Municipal Separate Storm Sewer Systems requirement.

In December of 2014, the Town of Mt. Airy, Carroll County and the seven (7) other municipalities within the County entered into a Memorandum of Agreement (MOA) relating to the NPDES MS4 Phase I requirements covering the portion of the town which is located within Carroll County. Concurrent with the issuance of the next generation permit, a new MOA will be executed with a section included pertaining to the Frederick County side of Mt. Airy and how restoration efforts will be handled. In Carroll County's 2019 Annual Report, there will be an Appendix added to specifically address the various sections of the NPDES Phase II permit not currently being addressed in the document itself.

Numerous programs specified in the general permit are currently being performed by Carroll County (i.e. stormwater management, sediment control (inspection and enforcement), IDDE inspections, public information and education, etc.) and have and will continue to be reported in Carroll County's Annual Reports. Impervious acreage baseline, restoration planning and implementation, BMP tracking and maintenance will be included in the new Appendix. Engineering and construction costs associated with the Phase II requirement will be handled through the Town's Annual Capital Improvements Budget.

Thank you for working with us on our reporting requirements and please feel free to contact Gale Engles (Carroll County) with any questions or if you need additional information.

Sincerely:

David Warrington
Town Administrator
Town of Mt. Airy

Thomas S. Devilbiss, Director
Department of Land and Resource Management
Carroll County

cc: Gale Engles, Bureau Chief
Resource Management

Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

November 29, 2018

Ms. Monika Weierbach, Town Administrator
Town of Mount Airy
P.O. Box 50, 110 South Main Street
Mount Airy, MD 21771

RE: Notice of Intent Approval letter

Dear Town Administrator Weierbach:

The Maryland Department of the Environment (Department), Water and Science Administration has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (General Discharge Permit No. 13-IM-5500, General NPDES No. MDR055501). The legal framework for permit requirements is provided in the federal Clean Water Act (CWA), Title 40 of the Code of Federal Regulations (CFR) § 122 pertaining to NPDES MS4 programs. Regulated MS4 operators identified in the general permit were required to seek authorization to discharge stormwater by submitting a Notice of Intent (NOI) to the Department by October 31, 2018.

This is to confirm that the Department has received a completed NOI from the Town of Mount Airy (the Town) in accordance with permit requirements. The Town is required to comply with the conditions of the general permit until it expires, which is in five years unless administratively continued by the Department. Submission of annual progress reports may be achieved through the existing partnership with Carroll County. Otherwise, the Town will be responsible for reporting compliance with permit conditions for activities located within the jurisdictional boundary inside Frederick County.

Thank you for your cooperation in submitting your NOI. The Department looks forward to working with you to achieve compliance with the permit and contribute to efforts to improve local water quality and restore the Chesapeake Bay. If you have any questions, please contact me at 410-537-3550 or Ms. Deborah Cappuccitti at deborah.cappuccitti@maryland.gov.

Regards,

Stewart R. Comstock, P.E.
Program Review Division Chief
Sediment, Stormwater, & Dam Safety Program, WSA

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Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

April 27, 2018

Ms. Monika Weierbach, Town Administrator
Town of Mount Airy
PO Box 50
Mount Airy, MD 21771

RE: Designation Letter

Dear Ms. Weierbach:

The Maryland Department of the Environment (the Department), Water and Science Administration has reached a Final Determination to issue a National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (General Discharge Permit No. 13-IM-5500, General NPDES No. MDR055500). The legal framework for permit requirements is provided in the federal Clean Water Act (CWA), Title 40 of the Code of Federal Regulations (CFR) § 122 pertaining to NPDES MS4 programs, and numerous guidelines of the United States (U.S.) Environmental Protection Agency (EPA). MS4 owners or operators required to obtain coverage under this MS4 general permit are those located within urbanized areas or other MS4s designated by the Department under authority of the CWA and CFR.

You are receiving this letter because all or part of the Town of Mount Airy (the Town) has been identified as being located within an urbanized area according to the 2010 U.S. Census. Your MS4 within the urbanized area will come under the purview of the CWA's stormwater permitting requirements in accordance with 40 CFR § 122.32(a)(1). As stated in the Federal Register (Vol. 64, No. 235, 68750), in situations where an incorporated place or a town is not all in an urbanized area, it makes sense to develop a stormwater program for the whole area.

The MS4 general permit will become effective on October 31, 2018. As an owner or operator of a designated MS4 to be regulated under this general permit, the Town must submit a Notice of Intent (NOI) to the Department by the effective date. An NOI serves as notification that the Town intends to comply with the terms and conditions of this general permit. Conditions of the general permit are effective for a five-year term unless administratively continued by the Department.

The MS4 general permit requires implementation of stormwater management programs and restoration actions to control the discharge of pollutants from regulated MS4s. Compliance with the general permit will reduce stormwater pollutants to local waterways and the Chesapeake Bay. Furthermore, pollution reductions from the Town are necessary to comply with the assumptions and requirements of the Chesapeake Bay Total Maximum Daily Load. Restoration requirements are based on untreated impervious areas located within the Town's urbanized area. The general permit,

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however, allows flexibility to implement restoration projects and management programs across the entire incorporated area of the Town.

The Department has complied with public participation requirements established under Maryland's Administrative Procedures Act in order to reach this Final Determination. The Department has met with numerous stakeholders, held a public hearing, and accepted public comments from December 22, 2016, through March 30, 2017. The Final Determination, MS4 general permit, and the comments submitted during the public comment period may be found on the Department's website at: www.mde.maryland.gov/programs/Water/StormwaterManagementProgram. Additional resources related to stormwater program implementation and restoration planning may also be found on the website.

Thank you for your cooperation in reviewing this MS4 general permit and planning activities that will result in full program implementation by the end of the permit term. Compliance with the general permit will support Maryland's broader goals of improving local water quality and contribute to long standing efforts to restore the Chesapeake Bay. The Department looks forward to working with you to achieve these goals. If you have any questions, please contact me at 410-537-3567 or Ms. Jennifer Smith at 410-537-3543 or jenniferm.smith@maryland.gov.

Regards,

D. Lee Currey
Director, Water and Science Administration

Pollution Prevention Good Housekeeping and IDDE Guidance and Procedures for Mt. Airy Phase II MS4 Permit

CARROLL COUNTY MS4 PROPERTY MANAGEMENT AND MAINTENANCE RESOURCE GUIDE

Municipal Stormwater Pollution Prevention Guidance for MS4 Co-Permittee Personnel

Carroll County Department of Land and Resource Management

March 20, 2017

CC MS4 PROPERTY MANAGEMENT AND MAINTENANCE RESOURCE GUIDE

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CARROLL COUNTY MS4 POLLUTION PREVENTION MAINTENANCE BMP GUIDANCE MANUAL

A Guidance Manual
For Carroll County Government
and Municipalities of
Carroll County, Maryland

Carroll County Department of Land and Resource Management

Revision: November 17, 2016

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For Carroll County Government
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Carroll County Department of Land and Resource Management

Revision: November 10, 2016

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