Carroll County Maryland

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

2021 ANNUAL REPORT

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Carroll County

NPDES ANNUAL REPORT

2021

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 compliance efforts from December 29, 2019 to June 30, 2021 provided via an administrative extension of the current permit granted by Mr. Raymond Bahr, Maryland Department of Environment, August 6, 2020.

Table of Contents

MDE 2020 Annual Report Assessment Response

Appendices

MDE 2020 Annual Report Assessment Response

The Maryland Department of the Environment acknowledged receipt of the Carroll County 2020 Annual Report on July 1, 2021. The letter acknowledged the work performed by the County and did not have any comments or concerns to be addressed.

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 (MS4s) 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 beyond 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.

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**.

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.

BRM has two dedicated NPDES Compliance Specialists on staff assigned specifically 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. The NPDES Compliance Specialists implement certain aspects of NPDES MS4 program requirements. Key responsibilities for these positions include:

- Technical liaisons to MDE;
- Coordinating, managing, and implementing certain permit requirements in accordance with federal, state, and local laws;
- Coordinating with County/municipal personnel, other government officials, and citizens regarding NPDES compliance issues;
- Conducting and coordinating illicit discharge inspection screenings and routine surveys with County/municipal personnel to discover and eliminate pollutant sources;
- Coordinating 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
- Coordinating development of compliance education, training, and outreach programs.

The County/municipal joint permit eliminates political boundaries as a factor in watershed planning and restoration. 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 provides 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 with various other specific permits (e.g. 12SW) is the responsibility of the individual County agencies or co-permittee 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. This MOA was subsequently updated and re-affirmed on October 7, 2021. Additionally, a separate MOA is being executed with Mt. Airy to address the Frederick County side of Mt. Airy. Carroll County will continue to assist Mt. Airy with administration of permit requirements, including restoration efforts for the April 2018 Phase II permit. All capital expenses related to work on the Frederick County side of Mt. Airy will be funded by the town.

Programs specified in the Phase II general permit (e.g. stormwater management, erosion and sediment control, IDDE, and public education) are implemented in partnership with 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	M	M/C	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 2021 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 recommendations, as the County feels that these changes should be formally made to the GDB 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 smoother data submission.

The permit requires identification of sources of pollutants in stormwater and the systems which convey stormwater 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 GIS Database

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 agency 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 information for the 2,997 active BMPs.

Currently, there are 986 as-built certified and approved structural stormwater management BMPs throughout the County and municipalities, excluding the City of Taneytown. Of these BMPs, there are 61 structural restoration practices. There are also 2,007 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 47 active stormwater BMPs, including 38 structural and 9 ESD practices. The City has located and confirmed as-built plans for 31 facilities, and County staff are assisting the City in acquiring or developing the remaining facility plans.

Appendix B includes a map of all newly as-built structural stormwater facilities for the 2021 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 441 acres during that time period.

Activities associated with treatment efforts taken during each permit term are listed in **Table 10**. Total impervious acres treated as of June 30, 2021 are 2,759. The County has met both the third- and fourth-generation permit requirements and has achieved 5.5% impervious area treatment toward the future requirement of the fifth-generation permit.

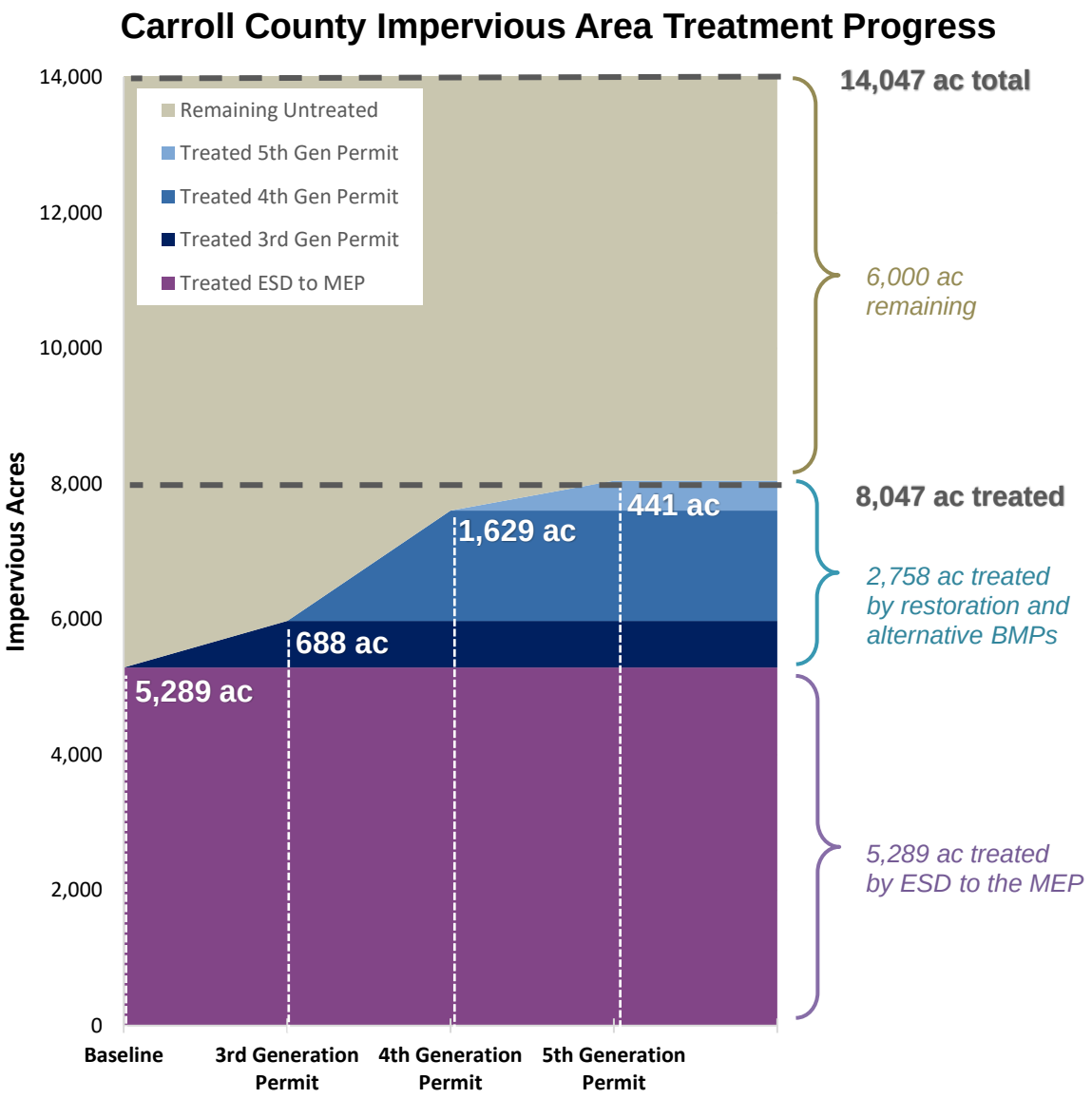


Figure 1: Carroll County Permit Impervious Surface Analysis

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 also conducts internal and grant-funded monitoring programs.

Chesapeake Bay Trust Restoration Research

This past year, the BRM concluded a grant from the Chesapeake Bay Trust's Restoration Research Program, which funded a monitoring project evaluating the impact of hydraulic-controlling BMPs on the self-recovery of stream channel stability in urban watersheds. The grant was awarded to Carroll County in May of 2016 to study the effect of stormwater retrofits on the hydrogeomorphology of downstream channels and associated nutrient and sediment load reductions.

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 extent to which these effects stretch downstream 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 Wasteload Allocation Guidance Document (MDE, 2020), the guidance states that innovative practices can be used to provide jurisdictions additional options for watershed restoration activities. These include practices that are not listed in the Maryland Stormwater Design Manual (MDE, 2000) and without an assigned pollution removal efficiency from MDE or CBP, provided there is

sufficient documentation and monitoring to verify pollutant removal efficiencies acceptable to MDE.

During the four-year pre- and post-restoration paired watershed study, the retrofits performed as designed to reduce the magnitude, duration, and frequency of erosive flows, substantially decreasing the measured runoff curve numbers and simulating a hydrologic regime close to that of the "woods in good condition" performance standard. Therefore, it is likely that these channels will begin to stabilize, show less erosion potential, and reconnect to the floodplain over time.

Data collected during the study indicate that downstream channels are on a trajectory towards stabilization. Because it will take longer than the duration of the grant for bank stability and geomorphic response to develop, the County will continue monitoring the study sites to provide documentation of a definitive stream channel response. The goal is that these long-term monitoring 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 restorations and reconnecting floodplains.

During the last permit year, construction was completed on two stormwater management retrofit projects and one new facility, treating 216 acres of untreated impervious area. An additional three projects were recently completed or are currently under construction, with the anticipated treatment to be reported in the FY2022 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 issues: 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 of the County Code, "Stormwater." 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, 2020 to June 30, 2021 consisted of 207 plan reviews, 15 structural as-built approvals, and 208 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 stormwater facilities 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. This includes both publicly and privately owned facilities. 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 493 inspections this year on 376 individual structural facilities/sites. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. Of those 376 structural facilities, 176 facilities needed corrective action, and 86 were brought into compliance as of June 30, 2021. In cases where violations still existed, 10 facilities were issued Notices of Violation, providing an additional amount of time to resolve issues. At the conclusion of FY2021, there were 990 structural stormwater management facilities on the list to be inspected. Of these, 308 will be inspected during FY2022, 302 will be inspected in FY2023, and 380 will be inspected in FY2024.

Currently, there are 2,007 non-structural ESD practices throughout the County, and 700 inspections were performed in FY2021 on 661 practices. Ninety-one of the practices needed corrective action, and 29 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 814 are planned to be inspected in FY2022, 328 in FY2023, and 865 in FY2024.

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 City 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 processes 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 the last permit year, as all facilities were inspected in FY2019. The 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 of the County Code, "Grading and Sediment Control." In 2020, 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, 2023.

Statistics related to grading permits and inspections during the reporting timeframe included 103 grading permits issued and 4,895 sediment control inspections performed. All inspections are recorded with notices sent regardless of the site conditions. In 10 cases, Stop Work Orders were posted for violations, which in most instances required compliance within 36 hours. Currently, there are no 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 quarterly to MDE.

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 this permit year to municipal ordinances or regulations related to Chapter 53 of the County Code, "Environmental Management of Storm Sewer Systems."

Dry Weather Outfall Screenings

Dry weather field screenings of at least 100 outfalls are conducted annually by EISD inspectors and NPDES Compliance Specialists. Staff participate 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.

During the last permit year, 110 outfalls were screened for illicit discharges. Sixty-nine were in the County, and 41 were within the municipalities. Outfall screenings were distributed among seven watersheds: Prettyboy Reservoir (7), Loch Raven Reservoir (2), Liberty Reservoir (44),

Patapsco River - South Branch (17), Lower Monocacy River (11), Double Pipe Creek (23), and the Upper Monocacy River (6). See outfall screening map in **Appendix C** for location details.

There were 33 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 were conducted at the time of screening to trace potential discharges from the outfalls up the storm drain network. Additional follow-up screenings and further investigation occurred as necessary until discharges were eliminated. A summary of outfall investigations is provided in the table in **Appendix C**. Results of each outfall screening can be found in the geodatabase on the CD in **Appendix B**.

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 to maintain a productive outfall screening program. During the prior fiscal year, 28 outfalls were added to the list of NPDES Study Points. Of these, six outfalls were newly constructed, and 13 outfalls were identified during data updates and reviews. The remaining nine new outfalls were from the Frederick County side of Mt. Airy and inspected for Phase II requirements. Additionally, 15 outfalls were removed from the list of NPDES Study Points during the prior fiscal year. Of these, 10 outfalls were relocated, removed, or converted to another type of structure (e.g. manhole) during a stormwater retrofit. The remaining five study points were determined to be part of a stormwater conveyance (i.e., non-NPDES outfalls) during data updates and reviews.

Visual Surveys

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 inflows 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 identified during the visual survey process.

A total of 88 visual surveys were conducted across four watersheds during the 2021 permit year. 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, four businesses were sent MS4 stormwater pollution prevention educational letters with good housekeeping and best management practice guidance related to their primary industry. Of the 88 sites surveyed this year, 41 will be retained in the inventory for their high pollution potential. The remaining 47 will be removed: one site was found to have an existing NPDES permit with Storm Water Pollution Prevention Plan, and 46 sites had no significant pollutant source potential.

Illicit Discharge Response

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 last permit year, 14 IDDE discharge complaints were processed: six from the Stormwater Hotline, six from trained County and Municipal employees, and two from MDE. Of these complaints, three were determined to be non-illicit discharges, four were potential illicit discharges, and seven were confirmed illicit discharges. The illicit events included three commercial and four residential discharges. All potential and confirmed illicit discharges were successfully eliminated or resolved through voluntary compliance by means of interagency enforcement 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 permit requirements. The adoption of the ordinance by each municipality provides the necessary enforcement authority, either independently 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 Systems

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

Training

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. Due to restrictions on in-person meetings from the Covid-19 pandemic, training was conducted through training packets in lieu of the in-person workshop. Customized digital NPDES Refresher Training packets were prepared and emailed to administrative and supervisory-level personnel in 16 groups (eight County agencies and eight co-permittee municipalities). Instructional information was included for their respective on-site staff trainings. Packet contents varied according to the agencies' operations and/or permitting and typically included: general NPDES MS4 and 12SW permit awareness, stormwater pollution prevention good housekeeping/best management practices (BMPs) related to property management and maintenance activities, spill prevention and clean up, and Illicit Discharge Detection and Elimination. Those responsible for 12SW permitted facilities were provided specific on-site training worksheets with site maps showing locations of potential pollutant sources and BMP measures from their Stormwater Pollution Prevention Plans (SWPPPs). An example training packet is provided in **Appendix C**. The MS4 and 12SW permit updates and anticipated next generation permit requirements, typically provided at the fall training event, were instead provided at Water Resource Coordination Council (WRCC) meetings for municipalities and at a department-level meeting with the Carroll County Department of Public Works.

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 involved with IDDE reporting, investigation, response, or enforcement received training coordinated by LRM staff. During the last permit year, a total of 345 employees received training that covered 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 2021 reporting year, Carroll County implemented several programs to reduce and control litter along roadways, which ultimately reduce litter to County waterways:

- Seventeen 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 613 hours on roadside trash pickup.

- 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 the last permit year, 43 complaints were received, and six 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, and trash guards at storm drain inlets. Public education was provided through newsletters, websites, social media, radio/television, 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. The County was still above the required State-mandated 35% recycling rate until 2018, when there was an upheaval in global recycling markets and waste outpaced the amount of material recycled. The markets went down and have stayed down.

As recycling markets tightened, recovered material is being scrutinized for contamination. In the past, a significant portion (60%) of U.S. recyclables had been exported to China. However, the Chinese government announced a plan to ban all recovered material imports by 2020. China's initiatives imposed stricter quality standards for materials entering its ports and set deadlines for material bans. In April 2020, China softened its approach, deciding to realize the zero import of solid waste more gradually. Then in late 2020, the Chinese Ministry of Ecology and Environment confirmed that a total ban on imported waste would go into effect in 2021. As of January 1, 2021, China no longer buys any solid waste imports from the U.S. or elsewhere. New processing facilities are now being developed in the U.S. The 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.

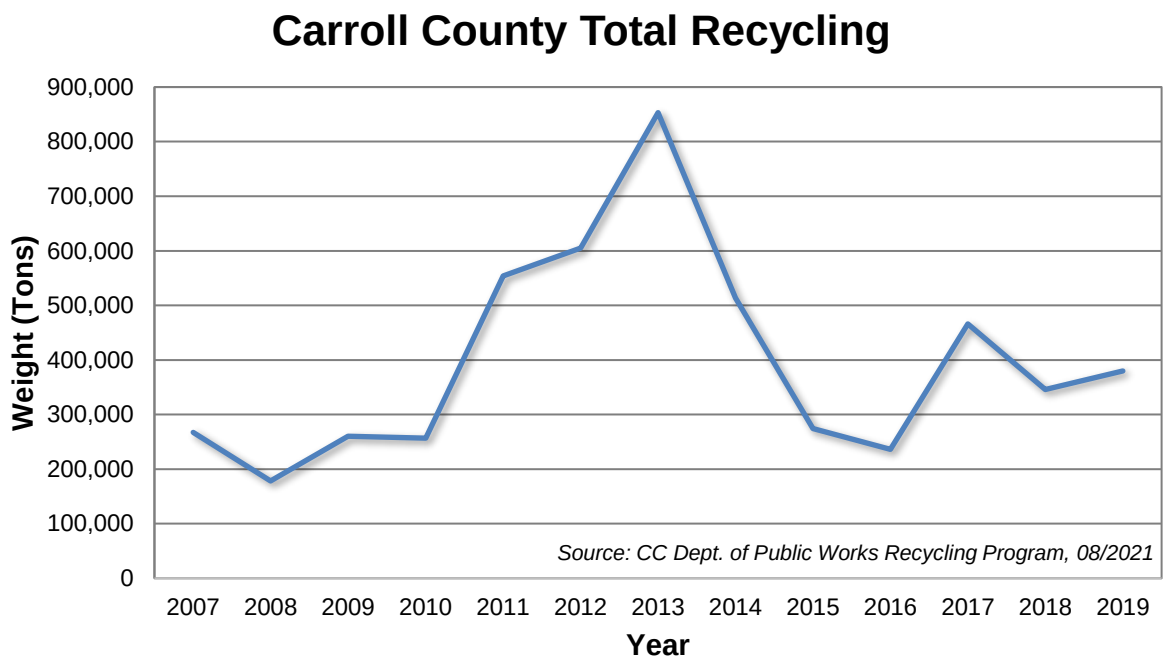


Figure 2: Total Recycling

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. Residents are asked to collect plastic grocery bags and take them to supermarkets or retail outlets with collection receptacles. The bags are then taken directly to processors without the need for sorting of other items, closing the recycling loop quicker.

While pick-up of recyclables within municipalities is provided by each individual municipality, the County's recycling public education and outreach efforts are implemented countywide, including within the municipalities.

Curbside, single-stream recycling was implemented in 2007 and expanded in 2008, making it easy and convenient for residents to participate. Most standard household 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. Carroll's Resource Recovery Park is conveniently located in the center of the County. Currently there is no charge for recycling at the County's drop-off location. The Hoods Mill Landfill was closed for the last quarter of FY2020 due to COVID-19 restrictions and has not reopened due to extenuating circumstances. Changes

to the operation, as required by MDE, would be necessary before reopening and would have a significant impact on the budget.

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 Habitat for Humanity ReStore offers onsite recycling of reusable building materials and other household items.

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 was included in the Carroll County Ten-Year Solid Waste Plan and has been 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. On October 1, 2015, the Board of County Commissioners amended the Solid Waste Management Plan to incorporate this requirement.

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 FY2021, the County hosted several "Reduce, Reuse, Recycle, Compost!" public outreach efforts:

1. One Household Hazardous Waste drop-off event took place on October 10, 2020. Typically at least two events are held each year, but the spring 2021 event was canceled due to COVID-19. The fall event did not include a shredding component to maintain social distancing 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 hosts a rain barrel and compost bin sale each spring to provide these items to residents at a reduced cost. This year's event was held on Saturday, April 21, 2021. Rain barrels and compost bins were pre-ordered for pick up at the County Office Building. Composting information was available for residents as well as a demonstration for reducing waste.

The State-mandated recycling rate is 35% as of December 31, 2015. Through all recycling efforts, the County achieved a 34% recycling waste diversion rate for 2019 that included a 5% source reduction credit. The lower recycling rate is attributed to the increase in waste vs. the availability of recycling markets and fewer businesses reporting recycling. 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 can be reestablished 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 available as well. 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 oil, 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.

When requested, the Recycling staff coordinates 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 have partnered 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 titled "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 receive the maximum credit for waste diversion despite the challenges of the recycling market. 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 2019 (2020 data not yet published). 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**) had been on the rise since 2012 but declined in 2018 and 2019. China's ban on importing mixed paper and mixed plastics remained a problem as recyclers scrambled to find markets. **Figure 4** also includes the waste diversion rate, which reflects the source reduction credit (added to the recycling rate).

Non-MRA recyclables include automobile components, construction/building materials, and other materials. The County's non-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 2017 (see **Figure 2).** The Recycling Office continues to promote waste diversion and to divert waste from the landfill through the recycling program.

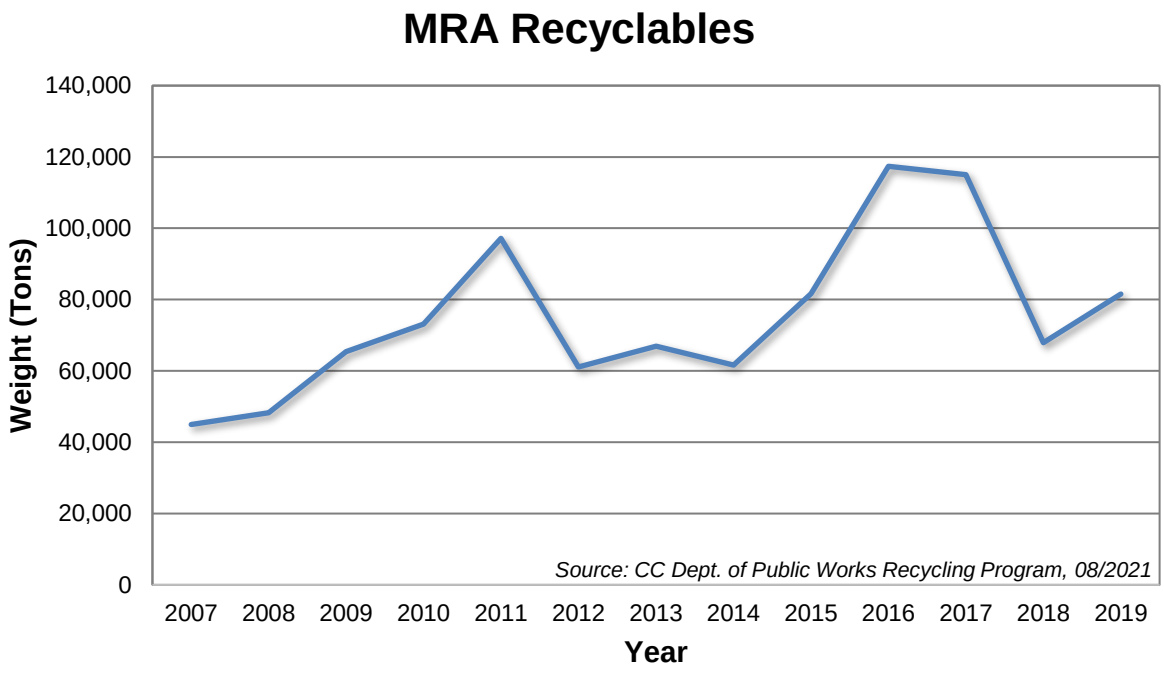


Figure 3: Carroll County MRA Recyclables

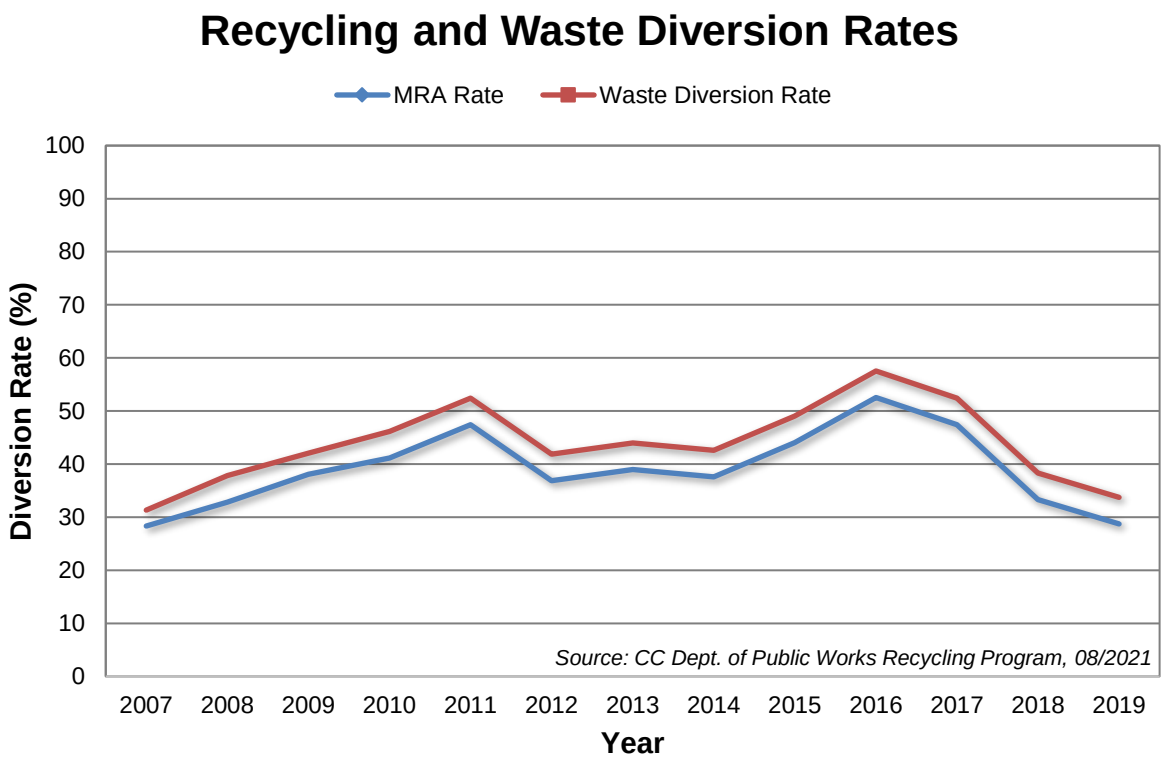


Figure 4: Carroll County Recycling and Waste Diversion Rates

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.

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 271 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 BMPs 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.

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	9/14/2020	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1755/MDR001755
County Maintenance Center	9/14/2020	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1861/MDR001861
County Northern Municipal Landfill	9/17/2020	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660
County Hoods Mill Landfill (Convenience Drop-off)	9/17/2020	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0661/MDR000661
Hampstead Public Works Gill Maintenance Shop	8/19/2020	Yes	June 16, 2014	MDE Registration: 07/30/14 12SW2213 / MDR002213
Manchester Public Works Maintenance Shop	8/20/2020	Yes	May 5, 2014	MDE Registration: 06/04/14 12SW2201/MDR02201
Mount Airy Public Works Maintenance Shop	10/14/2020	Yes	June 6, 2015	MDE Registration: 06/24/15 12SW2257/MDR002257
Mount Airy Public Works WWTP	10/14/2020	Yes	March 30, 2015	MDE Registration: 04/10/15 12SW2258/MDR002258
Taneytown Public Works Maintenance Facility	8/5/2020	Yes	June 16, 2014	MDE Registration: 07/17/14 12SW2263 / MDR001743
Taneytown Public Works WWTP	8/5/2020	Yes	June 16, 2014	MDE Registration: 06/26/14 12SW1743 / MDR001743
Westminster Public Works Streets Maintenance Shop	8/06/2020	Yes	March 31, 2014	MDE Registration: 06/26/14 12SW2292/MDR002292
Westminster Public Works WWTP	8/06/2020	Yes	July 3, 2014	MDE Registration: 08/14/14 12SW2252 / MDR002252
Westminster Public Works Utilities	8/06/2020	Yes	June 17, 2014	MDE Registration: 07/28/14 12SW2455 / MDR002455

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 this fourth-generation 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 Insp. & Visual Grab Samples Performed *Y/N*	SWPPP Annual Comp. Evaluation Performed and Certified *Y/N*	Annual Comp. Evaluation Report Prepared and Posted in SWPPP *Date*
County Regional Airport	Y	Y	Y/7[2]	6/09/21	Y	Y	3/22/21
County Maintenance Center	Y	Y	Y/157[2]	6/09/21 6/23/21 6/23/21	Y[1]	Y	6/09/21
Northern Municipal Landfill	Y	Y	Y/10	6/30/21	Y	Y	11/13/20
Hoods Mill Landfill (Convenience Drop-Off)	Y	Y	Y/10[3]	6/30/21	Y	Y	11/20/20
Hampstead Public Works Gill Maintenance Shop	Y	Y	Y/8	1/13/21	Y	Y	12/22/20
Manchester Public Works Maintenance Shop	Y	Y	Y/13	5/20/21	Y	Y	4/09/21
Mount Airy Public Works Maintenance Shop	Y	Y	Y/11	10/14/20	Y	Y	12/16/20
Mount Airy Public Works WWTP	Y	Y	Y/3	10/14/20	Y	Y	12/17/20
Taneytown Public Works Maintenance Facility	Y	Y	Y/10	6/11/21	Y	Y	7/7/21 (6/18/21 Eval)
Taneytown Public Works WWTP	Y	Y	Y/3	6/11/21	Y	Y	7/7/21 (6/18/21 Eval)
Westminster Public Works Streets Maintenance Shop	Y	Y	Y/21	6/03/21	Y	Y	1/27/21
Westminster Public Works WTTP	Y	Y	Y/13	6/19/21	Y	Y	6/19/21
Westminster Public Works Utilities	Y	Y	Y/15	4/10/21	Y	Y	1/20/21

*Status reported by jurisdiction/facility.
[1] Partial. Self-corrected by facility SWPPP Team.
[2] Training: Maintenance Center/3 Bureaus (Fleet and Warehouse, Roads Operations, Facilities), CC Airport (Includes FBO contractor staff
[3] Training: Same staff as at Northern Landfill

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 this fourth-generation permit term, 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 is used for this purpose. 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)	IPM 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 Co.	✓ Roads (6)	✓ (7,8)	✓ (2,10,11,20, 21)	✓ (11,12,13,14,15,16,17,19,22)	✓ (3)
	✓ Solid Waste (4,5,6)	✓ (7,8)	✓ (2,10,11,18,20)	✓ (11,12,13,14,15,16,22)	✓ (3)
	✓ Utilities (6)	✓ (7,8,9)	✓ (10,18,21)	✓ (11,12)	✓ (3)
	✓ Facilities (6)	✓ (7,8,9)	✓ (2,10,11,18,20)	✓ (11,12,13,16,19)	✓ (3)
	✓ Fleet/Warehouse	✓ (8)	✓ (11,18)	✓ (11,13)	✓ (3)
	Airport	✓ (9)	✓ (2,10,11,20,)	✓ (11,12,19)	✓ (3)
	Parks	✓ (8)	✓ (2a,10,18)	✓ (11,12,14)	✓ (3)
	Farm Museum	✓ (4,8,9)	✓ (2,10,18,20)	✓ (11,12,13,19)	✓ (3)
Hampstead	✓ (3,4,6)	✓ (3,8,9)	✓ (2,10,11,18,20)	✓ (11,12,13,16,17,19)	✓ (3)
Manchester	✓ (4,6)	✓ (3,8,9)	✓ (2,10,11,18,20)	✓ (11,12,13,16,19)	✓ (3)
Mount Airy	✓ (3,6)	✓ (3,8)	✓ (2,10,11,18,20)	✓ (11,12)	✓ (3)
New Windsor	✓ (6)	✓ (7,8)	✓ (2,10,11,18,20)	✓ (11,12,15,16,19)	✓ (3)
Sykesville	✓ (6)	✓ (8,9)	✓ (2,10,11,18,20)	✓ (11,12,19)	✓ (3)
Taneytown	✓ (3,4,6)	✓ (7,8)	✓ (2,10,11,18,20)	✓ (11,12,13,19)	✓ (3)
Union Bridge	✓ (5,6)	✓ (7,8)	✓ (2,10,11,18,20)	✓ (11,12,16,17,19,20)	✓ (3)
Westminster	✓ (3,4,5,6)	✓ (7,8,9)	✓ (2,10,11,18,20)	✓ (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/ technical Information, weather reporting source data, or SHA Salt Management Plan
(12) Visual observations/effective decision making, Supervision/real time road evaluations
(13) Equipment calibration
(14) Salt Brine / Pre-Treatment
(15) Prewet Salt (lower temp activation and less bouncing off road)
(16) Written Salt Management Procedures or Plan
(17) Contractor Training
(18) Weed pulling, mulching
(19) Post event evaluation, salt tracking
(20) Uses one or more herbicide IPM practices: research, time of year, veg cycle, BMPs, follow product label, spot spraying, selective herbicides
(21) Uses or experimenting with one or more herbicide IPM alternative: propane torching, steaming, etc.
(22) Salt Brine Additive (lower temp activation)

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 1,397 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 1,131 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 2021 permit year, overall herbicide usage associated with vegetation management and maintenance activities decreased from a revised 227.56 gallons concentrate to 197.01 gallons. This was an overall 13% decrease from the previous year reporting under the Carroll County MS4. Various on-going programmatic efforts and changes are highlighted 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. Roads Operations discontinued the use of glyphosate (41% formulation), replacing it with glufosinate ammonium (24.5% formulation) during the 2021 permit year. The fully implemented guardrail safety weed control program used 77 gallons of concentrate for a 28% increase. 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 uses standard operating procedures (SOPs) and 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 increased responsibilities during the prior 2020 permit year 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. The Bureau's herbicide use was 3.3 gallons concentrate, or a 90% decrease, for weed control during the permit year. The decrease was due in part to buildings and parks not being fully open from Covid-19, but also due to an intentional change in practice to increase weed trimming and reduce spraying.

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, and by 19% this permit year by increasing mechanical control methods and minimizing application area. This program is also managed by MDA licensed certified staff.

The Carroll County Bureau of Utilities reported the use of alternatives to herbicides. The Carroll County Farm Museum reported using a reduced or diluted mixture for most spot spraying applications and a slight increase for the permit year. Both report mowing, hand trimming, mulching, weed pulling as their primary method of vegetation management and weed control.

All municipal co-permittees reported the use of mechanical methods including mowing, hand trimming, mulching, and weed pulling as their primary practices for vegetation management. Herbicide use for municipal co-permittee vegetation maintenance programs vary and fluctuate by municipality, with most reporting reductions. The City of Westminster reported a 69% decrease in herbicide usage during the permit year. Part of the reduction may be temporary due to limited qualified staffing for herbicide applications during the past year. However, staff reported herbicide reductions may also be influenced in the future on account of the City becoming a "Bee City USA" affiliate. The Town of Mount Airy increased usage due to unanticipated maintenance of multiple athletic field complexes to compensate for the loss of hand and mechanical maintenance generally performed by numerous athletic leagues that were unable to convene during the permit year. Mount Airy anticipates herbicide usage to return to regular use amounts in the future.

All County/Municipal co-permittees reported no fertilizer use for vegetation maintenance for the permit year.

County LRM staff continue 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 the Maryland Department of Agriculture 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 to protect agricultural cropland. Related herbicide usage for this application is reported and regulated through MDA.

A summary of integrated vegetation management practices for MS4 co-permittees 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 increased from 14,000 tons to 45,250 tons (223%) from the previous year due to an active winter season. The County and City of Westminster are reducing the use of solid deicers by increasing their production and effectiveness with the use of improved equipment technology, training, implementation of salt management plans SOPs, improved salt brine quality, and effective decision making by managers and staff. Carroll County is experimenting with the use of "AMP", a liquid additive that lowers the effective temperature of salt brine, has increased road mile applications, and is being tracked and evaluated for effectiveness and improving implementation.

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

The Carroll County Department of Public Works hosted a virtual Winter Weather Coordination Meeting for the 2020-2021 winter season on Tuesday, December 15, 2020 from 1:00 to 3:00 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. Presentations included the County's Bureau of Roads Operations salt management program and a presentation by Mr. Robert George of Morton Salt regarding the latest technical information in commercial bulk deicing.

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. Ninety-two County staff and 25 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, and staff continue daily meetings until the day of the event. On the day of the event, meetings are increased to 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 conditions in real time. 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, "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 applied. 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 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 345 co-permittee 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. In lieu of the workshop this year, digital training packets were sent out to 16 County/Municipal entities for on-site training as described previously. Topics typically included are:

- NPDES MS4 and 12SW Stormwater Permit Overview and Regulatory Update
- Stormwater Pollution Prevention Good Housekeeping Best Management Practices
- Illicit Discharge Detection and Elimination
- Spill Prevention, Control and Cleanup Measures
- Winter Weather Salt Management
- Property Management and Maintenance BMPs

- Staff Reporting Illicit Discharge Investigation Procedures

Permittees ensure their 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 345 total co-permittee employees trained under the Carroll County MS4 for the permit year, 301 were maintenance staff.

The County LRM maintains a guidance document titled, "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, 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

All municipalities host websites that include links to various educational publications, electronic municipal newsletters, relevant Carroll County webpage(s), EPA, and/or MDE websites.

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

LRM hosts a dedicated NPDES webpage titled "Protecting Carroll County Waters (NPDES)" (https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/), which is 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 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 each year since 2014 are available.

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

- *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 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 "Watersheds" on the BRM site) and Stormwater Projects webpages (called "Projects" on the BRM site), 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, "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. The "Protecting Carroll County Waters" website serves 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 Town of Union Bridge worked with County staff to develop a stormwater pollution/litter prevention flyer educating citizens on nine ways they can help keep Little Pipe Creek and its floodplain and park litter free and keep storm drain systems flowing. The flyer was made available at their Town Hall, and through the Town's electronic newsletter for their residents.

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 in the 2020 permit year 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).

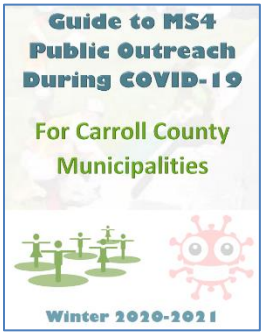
Programs and Exhibits

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 participate in public and commercial outreach efforts during the permit year. Storm drain stenciling and tree planting are implemented throughout the County and coordinated as a volunteer or outreach event when feasible. A complete listing of specific FY2021 events can be found in **Table 6**. New events and alternative ways to engage residents in activities have emerged during the Covid-19 pandemic. The table also lists regularly scheduled events and outreach efforts, even if they were postponed (with future date) or canceled due to the shifting Covid-19 pandemic and associated restrictions.



With the realization the COVID-19 pandemic may continue with fluctuating restrictions affecting our regular annual event schedule, Carroll County Bureau of Resource Management staff developed the *Guide to MS4 Public Outreach During Covid-19 for Carroll County Municipalities* during the winter of the 2021 permit year. The document provides municipalities and County staff step by step guidance on how to successfully plan a public outreach or involvement event with considerations and safety measures to minimize participants exposure during Covid-19 when conditions allow.

Table 6
Carroll County NPDES Phase 1 MS4 Public Outreach Events in FY2021

Event	Date	Watershed(s)	Description
National Night Out	October 6, 2020	Multiple	Materials and direct discussion w/ attendees in several municipalities by MS4 co-permittees
Hampstead Day	May 29, 2021	Multiple	Booth – materials and direct discussion w/ attendees
Maryland Municipal Convention	June 28-30, 2021	Regional	Town of Hampstead Booth – materials and direct discussion w/ attendees
Westminster Fallfest	September 24-27, 2020	Multiple	Materials and direct discussion w/ attendees;
City of Taneytown Bob Flickinger Memorial Tree Grove Tree Planting	May 22, 2021	Multiple	Community memorial tree grove planting and dedication honoring former Mayor and lifelong active community member
Carroll County NPDES MS4 Permit Annual Stormwater Pollution Prevention Compliance Training	Spring 2021	Multiple	Digital training materials distributed to key management, supervisory, and assistant supervisory level personnel and staff responsible for NPDES stormwater permit regulations, requirements, and implementation for County and municipalities
Carroll County Household Hazardous Waste Fall Clean-Up	Spring 2021	Multiple	POSTPONED due to Pandemic to October 23, 2021 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 Day of Gratitude	October 10, 2020	Multiple	Materials and direct discussion w/ attendees
Hampstead Tree Planting	November 21, 2020	Multiple	Planted 5 new willow trees on Willow Street with the help of 14 volunteers (12 adults and 2 youth) sponsored by Hampstead Tree Commission
Annual Elementary School Grade Field Trips	Fall 2020	Multiple	CANCELED due to Pandemic – Interactive water resource educational activities with students learning how to keep and improve water quality in local streams and the Chesapeake Bay.
Sykesville Craft Beer Festival	November 2020	South Branch Patapsco	CANCELED due to Pandemic - Booth - materials and direct discussion w/ attendees
America Recycles Day	November 15, 2020	Multiple	Recycling materials and direct discussion w/ attendees
Carroll Arts Council Festival of Wreaths	November 27 to December 6, 2020	Multiple	Recycling materials and direct discussion w/ attendees
Hampstead-Manchester Business & Community Expo	Spring 2021	Multiple	CANCELED due to Pandemic – Materials and direct discussion w/ attendees
Taneytown Parks & Recreation Department Earth Day Cleanup Event	April 25, 2021	Upper Monocacy River	Clean up crews made up of 30 volunteers and staff collected trash and litter in multiple City park in a successful community effort.
Eldersburg, Maryland Trash Troopers MD Trash/Litter Pickup Events	Winter 2021	Liberty Reservoir	Trash and Litter pickup event in Eldersburg commercial shopping areas around Georgetown Blvd and MD 26. Trash Troopers is a local grass roots group of citizens and Girl Scouts dedicated to keeping our communities clean by organizing regular trash cleanup events in Southeast Carroll.

Event	Date	Watershed(s)	Description
Sykesville Annual Spring Keep America Beautiful Cleanup and Family Plogging Events	March 27 and April 24, 2021	South Branch Patapsco	A "Keep America Beautiful" campaign to reduce litter was developed and implemented by a collaboration of citizen volunteer groups; Downtown Sykesville Connection, Trash Troopers and Immaculate Clean Inc, in cooperation with the Town of Sykesville Parks and Recreation and Public Works to celebrate Earth Day. Activities included park, street and outdoor space litter and debris cleanup, "No Butts About It" challenge, and a first annual "Sykesville Plogging" event (jogging and picking up litter).
Carroll County Seniors on the Go Expo	April 7, 2021	Multiple	POSTPONED due to Pandemic to September 15, 2021 – Recycling materials and direct discussion w/ attendees
Carroll County Household Hazardous Waste Spring Clean-Up	Spring 2021	Multiple	POSTPONED due to Pandemic to October 23, 2021 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 Envirothon (Held Virtually)	April 26-29, 2021	Multiple	Partnership with Carroll County Conservation District. Provides hands-on environmental and natural resource management education to high school students.
Earth Day Annual County Middle School Class Outreach	April 22, 2021	Multiple	CANCELED due to Pandemic – Inform 6th grade students from Middle School about water quality improvement through stormwater management restoration, tree planting, aquatic insects, plants.
Rain Barrel & Composting Event	April 24, 2021	Multiple	County-hosted rain barrel and composting event. Provides rain barrels and composting bins to residents at a reduced cost.
City of Westminster Tree Planting	Fall 2020 Spring 2021	Multiple	Planted 8 landscape sized trees and 70 saplings in urban street and riparian areas.
McDaniel College and Carroll Community College Annual Clean-Up Day	May 2021	Double Pipe Creek	CANCELED due to Pandemic – Student volunteers annually collect trash and tree pits cleaned in designated areas.
Mount Airy Open Space Tree Planting	September 2020	Multiple	Fourteen residents participated in a tree planting on municipal open space.
Mount Airy Weed Warrior Workday	July 17, 2020	Multiple	Windy Ridge Park – Non-native, invasive plant removal workday to reclaim native wildlife habitat.
Mount Airy Make Earth Day Everyday	April 24, 2021	Multiple	Mt Airy Sustainability Commission encourages community members to "Stay Engaged in Your Community Year-Round" in ways they can honor the spirit of Earth Day every day with a variety of engaging activity ideas and resource information.
Union Bridge Keep Little Pipe Creek Watershed Litter Free	April 2021	Double Pipe Creek	Town of Union Bridge distributed electronic flyer encouraging community residents with 9 active ways to help keep storm drain inlets flowing and Little Pipe Creek Park Watershed litter free.

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) 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.

In addition to their website public outreach information, Carroll County Public Works Road Operations has been posting public outreach videos on the County's Facebook social media site entitled *"Keeping Lawn Clippings on Your Lawn"* for road safety and environmental protection (facebook.com/CarrollCountyGovernmentMD/videos/1099263520258841/?__so__=channel_tab&__rv__=all_videos_card). CC Public Works Roads Operations also periodically posts winter weather storm event preparation efforts and emergency snow plowing emergency operations information.

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 Action 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. 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 2021 award winners were recognized in a presentation ceremony at the Westminster Community Pond with EAC members and the Board of County Commissioners on April 21, 2021. 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) (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/environmental-awareness-awards/). Nominations will be accepted in early 2023 for the 2023 award cycle. The presentation of awards for the next permit year will be held in conjunction with the County's Earth Day event, 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 and approved during the permit year and published July 8, 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 an as-needed basis at this time, and all meetings are open to the public. A member of the EAC sits on both councils and 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. NPDES technical and administrative issues are discussed 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 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. With Covid-19 restrictions many municipalities encouraged residents to participate in clean up events and targeted locations as a family or individually when organized group events were unable to be held.

The town/city councils and the municipal planning commissions meet regularly. Discussions related to the expenditure of funds and approval of stormwater projects may take place at these meetings, which are open to the public. Virtual or hybrid meetings have been implemented per jurisdiction when specific Covid-19 restrictions are in place. **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, 29 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 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 by mail, 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 a 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	Materials directed to homeowners and businesses were developed and posted to website: 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

			FY2016 - 2018. It is included on most stormwater educational materials and municipal websites.
Continue to offer opportunities & materials for increased public awareness & access to permit-related, water quality information.	Conduct workshop to educate 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, *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.
	Develop procedure for providing copies of watershed assessments and restoration plans 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 1 to 30, Prettyboy and Loch Raven Watersheds from October 14 to November 14, and Double Pipe Creek and Liberty Watersheds from October 28 to November 28.
	Add summary in each annual report of how County	30	The County received extremely limited feedback from the public related to the six restoration plans. A discussion of

	addressed or will address public comments received		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.
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	Staff review and discussion begun on developing cooperative partnerships with residential HOA groups and grass root trash/litter clean up groups and organizations.

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.

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.

The program will be comprehensively reviewed in the next generation permit term.

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. Due to Covid-19 restrictions for CCPS and the County, this interaction was unable to take place during the permit year but will resume as conditions improve.
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
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 through 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 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 between January 1, 2020 and June 30, 2021, after the end of the fourth-generation permit. These 441 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 2022 and 2027 are shown in red and will address future impervious acre and nutrient reduction requirements anticipated in the fifth-generation permit. To date, these projects reflect approximately 773 acres

of restoration. These acres keep the County moving in a positive direction for addressing both untreated impervious acreage and local and Chesapeake Bay nutrient reduction requirements.

Figure 5 depicts the number of acres restored (blue) and acres in planning and design phases (red) for projects to restore impervious surfaces to the mitigation projects. This graph provides an excellent representation of the level of true watershed restoration accomplished through the County's restoration efforts.

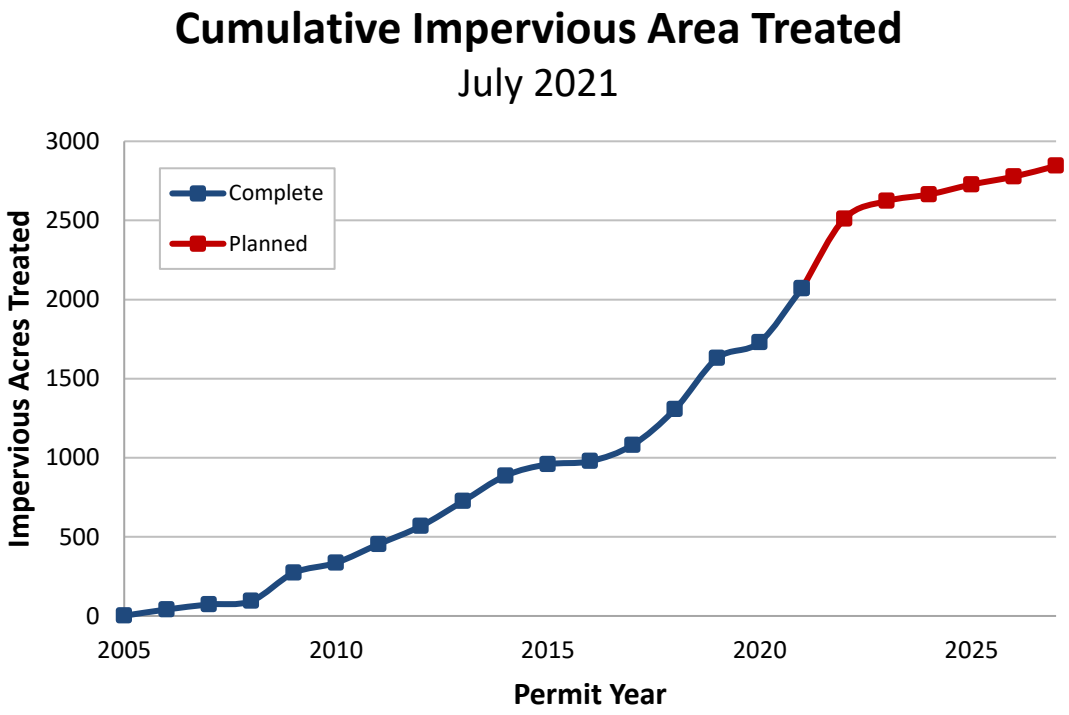


Figure 5: Impervious Surface Acres Treated: Projects Completed and Planned for Current (4th Generation) and Future (5th Generation) Permits

Table 10
Listing of NPDES Watershed Restoration Efforts
July 2021

Carroll County First Permit Requirements					
Year	**Project Name**	**Project Type**	**Project Status**	**Impervious Area Credit**	**MDE Watershed**
1997	Longwell County Park	Stream Restoration	Completed	142.80	Liberty Reservoir
1998	Carroll County Times	Stream Restoration	Completed	0.50	Liberty Reservoir
1999	Piney Run	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
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

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

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
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
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, 2021					
Year	**Project Name**	**Project Type**	**Project Status**	**Impervious Area Credit**	**MDE Watershed**
	Offset Previous Permit Annual Practices			**-17**	
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	Manchester Impervious Removal	Impervious Removal	Completed	0.22	Double Pipe Creek

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2021	Greens of Westminster	Retrofit	Completed	16.41	Double Pipe Creek
2021	Langdon (Jantz)	New Construction	Completed	93.64	Double Pipe Creek
2021	Willow Pond Retrofit	Retrofit	Completed	106.09	Liberty Reservoir
2021	Willow Pond SR	Stream Restoration	Completed	28.20	Liberty Reservoir
2020-2021	Tree Plantings	Tree Plantings	Completed	65.70	
2020-2021	Forest Conservation Buffer	Protections	Completed	7.93	
2020-2021	Riparian Conservation Landscaping	Protections	Completed	3.95	
2020-2021	Non-Riparian Conservation Landscaping	Protections	Completed	2.72	
2020-2021	Septic Upgrades	Retrofit	Completed	5.28	
2021	Inlet Cleaning	Inlet Cleaning	Completed	8.53	
2021	Street Sweeping	Street Sweeping	Completed	6.52	
	Completed toward next permit			**441.64**	

Carroll County Projects in Planning					
Year	**Project Name**	**Project Type**	**Project Status**	**Impervious Area Credit**	**MDE Watershed**
2022	Locust Wetland	New Construction	Design	12.62	Double Pipe Creek
2022	Mayberry SR	Stream Restoration	Under Construction	279.31	Double Pipe Creek
2022	Stone Manor Retrofit	Retrofit	Design	5.82	Liberty Reservoir
2022	Tree Plantings 2022	Tree Planting	Planned	14.16	
2022	Trevanion Terrace Retrofit	Retrofit	Under Construction	46.14	Upper Monocacy River
2022	Woodsyde One Retrofit	Retrofit	Under Construction	21.03	S Branch Patapsco River
2022	Woodsyde Two Retrofit	Retrofit	Under Construction	0.56	S Branch Patapsco River
2022	Woodsyde SR	Stream Restoration	Under Construction	59.57	S Branch Patapsco River
2023	Bevard Square Retrofit	Retrofit	Design	32.71	Liberty Reservoir
2023	Brynwood SR	Stream Restoration	Design	65.75	Liberty Reservoir
2023	North Carroll Library	New Construction	Design	1.29	Prettyboy Reservoir
2023	Tree Plantings 2023	Tree Planting	Planned	12.50	
2024	Hampstead Valley 1 Retrofit	Retrofit	Design	9.97	Loch Raven Reservoir
2024	Hampstead Valley 1 OS	Outfall Stabilization	Planned	7.30	Loch Raven Reservoir
2024	Melstone Valley Retrofit	Retrofit	Design	11.90	S Branch Patapsco River
2024	Tree Plantings 2024	Tree Planting	Planned	12.50	
2025	CC Health Dept	New Construction	Design	6.96	Double Pipe Creek
2025	Hampstead Valley 4	New Construction	Design	20.76	Loch Raven Reservoir
2025	Hampstead Valley 4 OS	Outfall Stabilization	Planned	7.18	Loch Raven Reservoir

Year	Project Name	Project Type	Project Status	Impervious Area Credit	MDE Watershed
2025	New Windsor Wetland	New Construction	Design	15.29	Double Pipe Creek
2025	Tree Plantings 2025	Tree Planting	Planned	12.50	
2026	Century High School Retrofit	Retrofit	Design	12.51	Liberty Reservoir
2026	Hampstead Valley 2 & 3 SR	Stream Restoration	Planned	13.50	Loch Raven Reservoir
2026	St George's Gate Retrofit	Retrofit	Design	5.44	Liberty Reservoir
2026	Tree Plantings 2026	Tree Planting	Planned	12.50	
2026	Sun Valley II Retrofit	Retrofit	Design	5.96	Double Pipe Creek
2027	Roberts Field Wet Pond Retrofit	Retrofit	Design	31.46	Loch Raven Reservoir
2027	Roberts Field Wet Pond SR	Stream Restoration	Planned	24.00	Loch Raven Reservoir
2027	Tree Plantings 2027	Tree Planting	Planned	12.50	
	Anticipated impervious treatment			**773.68**	

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 fall of 2019. Notice of this release was sent to the Carroll County Times on September 26, 2019 and posted on the Carroll County webpage. Hard copies of the plans were made available for review and comment at the BRM, and digital versions were posted on the Bureau's webpage to allow for submission of electronic comments.

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 1 to October 30, Prettyboy and Loch Raven Watersheds were open for public comment from October 14 to November 14, and Double Pipe Creek and Liberty Watersheds were open for public comment from October 28 to November 28.

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 required technical merits and included all 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, along with the current progress toward the fifth-generation permit requirements, 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 all the 8-digit watersheds with approved bacteria TMDLs. The County currently monitors 20 trend sites on a monthly basis across six 8-digit watersheds.

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 the overall stormwater program have more than tripled since 2008, from approximately $334,000 to almost $2.6 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 principal. Additionally, $21.5 million has been planned for watershed restoration efforts in the Community Investment Program (CIP) for FY2022 to FY2027.

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 by the County and each municipality 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 Part IV.F. of the permit, Assessment of Controls, 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, ultimately flowing to Liberty Reservoir. The location of the watershed where monitoring is conducted is shown in **Figure 6**, and the location of the monitoring stations and other watershed features are shown in **Figure 7.** The study area is located near the topographic

divide separating the eastern and western piedmont physiographic provinces. As shown in **Figure 6**, 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.

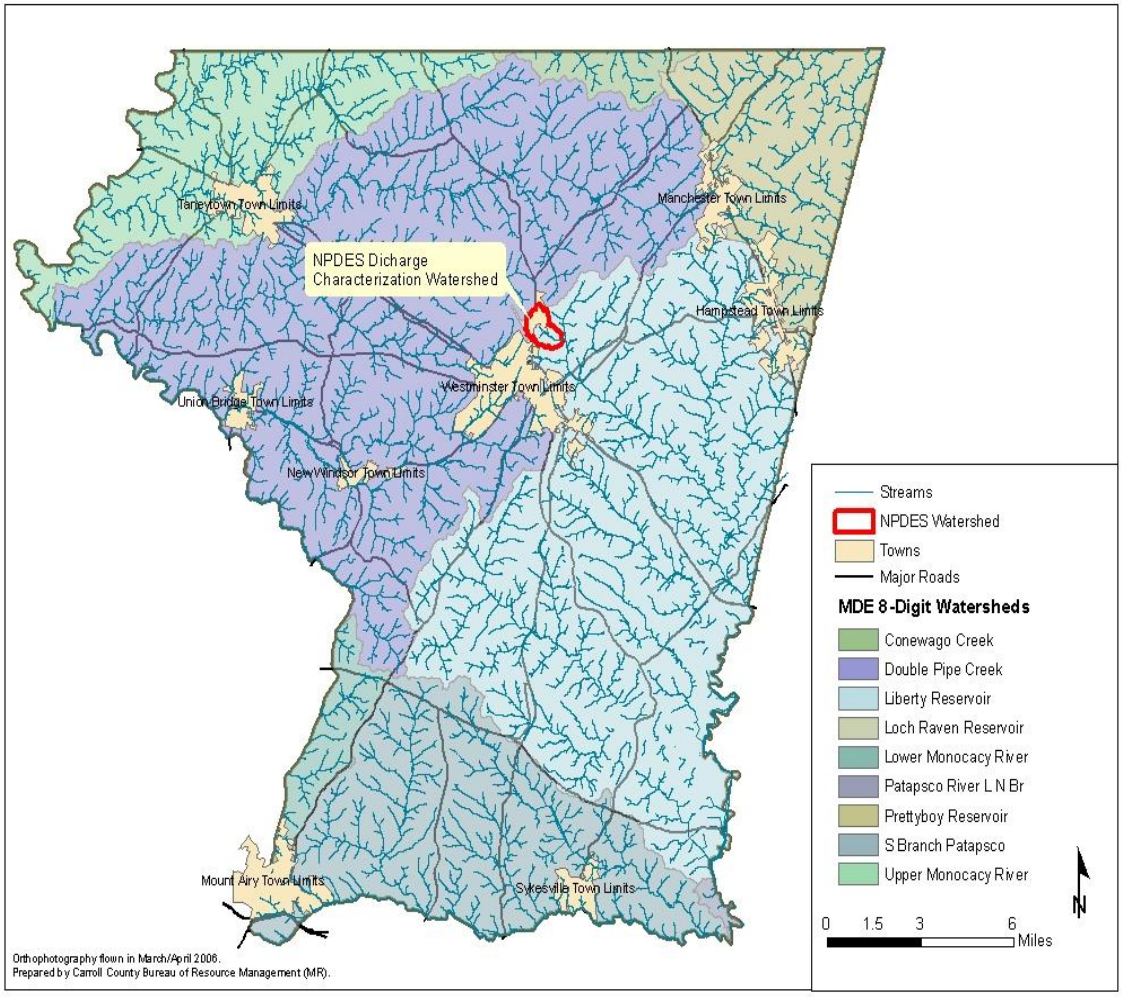


Figure 6: Carroll County NPDES Discharge Characterization Location

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 7,** 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 rate, 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.

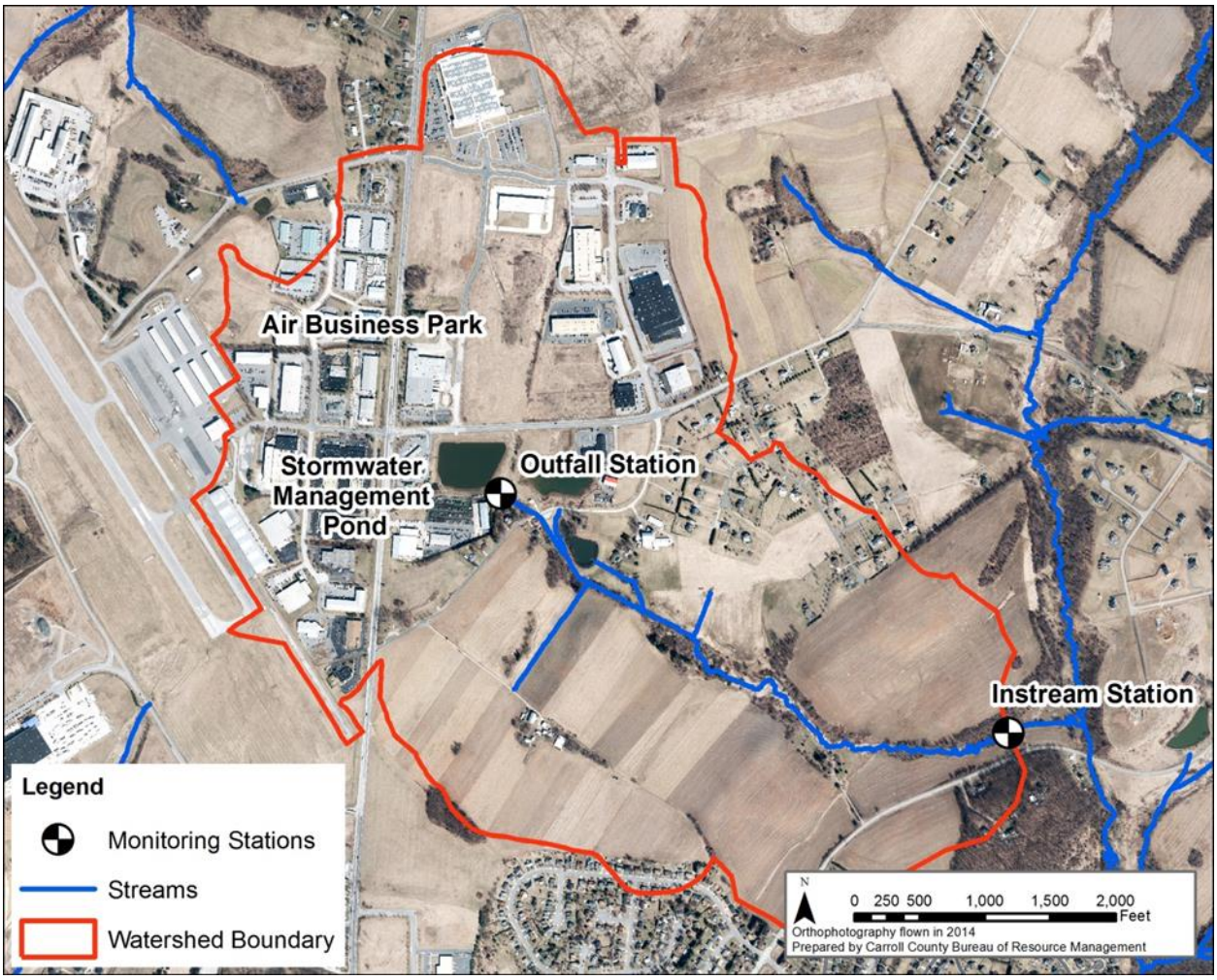


Figure 7: NPDES Discharge Characterization Watershed

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, which was operated and maintained by County staff. This is the second 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 7**) are equipped with instrumentation to collect continuous stream discharge data. The outfall station has dedicated electric power. From July through December 2020, it was equipped with an ISCO model 4250 flow meter and a model 3700 portable sampler. Due to consistent malfunctions and inaccurate measurements, likely from power surges, the ISCO model 4250 flow meter was replaced with an ISCO model 4230 bubble-type flow meter. In March 2021, the air system failed on the ISCO model 4230 bubble-type flow meter located at the outfall station and was replaced with an Onset HOBO Water Level Data Logger. 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.

From July through December 2020, hydrologic data collection at the outfall station consisted 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. In December 2020, a permanent malfunction occurred with the ISCO 4250 flow meter and sensor. From December 2020 through March 2021, the hydrologic data collection at the outfall station consisted of a sensor carrier (with attached bubble line) attached to the mounting ring within the outfall pipe. The bubbler records hydrologic data by converting the hydrostatic pressure required to maintain the bubble rate to stream stage and then using Manning's equation to convert stage to discharge. In March 2021, the ISCO 4230 bubble meter also encountered a permanent malfunction with the air system. During June 2021, an Onset Hobo Water Level Data Logger was placed in the outfall pipe apron to collect outfall hydrologic data. A bivariate relationship was observed between the outfall pipe apron and the stage height within the outfall pipe. This relationship was used to record continuous stage height and Manning's equation was used 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 2021 reporting period, collection efforts at the outfall station were impaired by equipment malfunction and power surges. These issues account for the losses in hydrological data from December 2020 through June 2021. About 30% of the outfall data is missing for the winter season and 70% is missing for the spring season. Some missing data were able to be estimated during these periods. Estimated values for both stations in subsequent tables and graphs contain a greater-than (>) symbol for measurements taken during winter and spring 2021, 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 8**.

During the spring of 2021, 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.

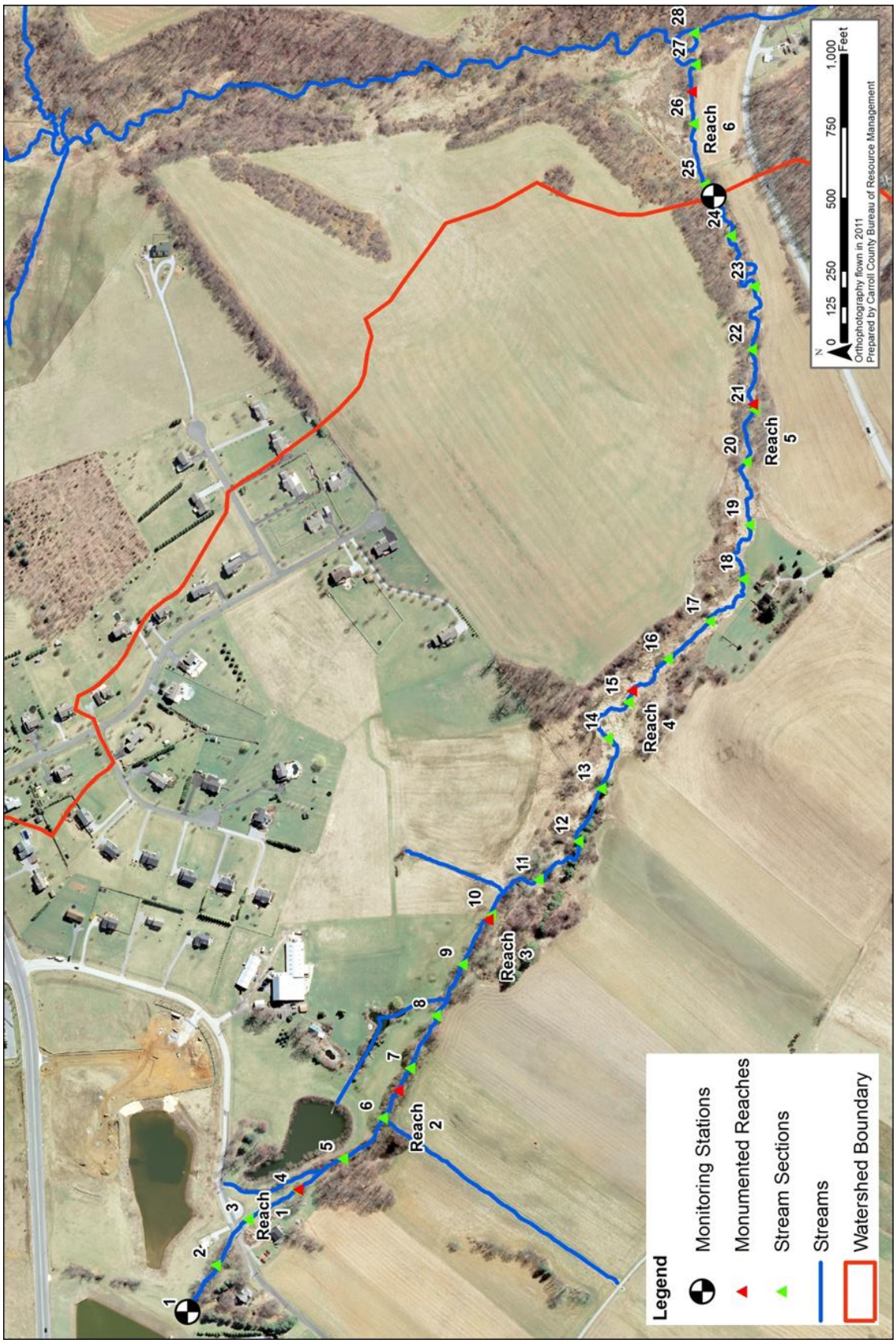


Figure 8: Physical Data Collection Stations

Chemical

Chemical assessments take place throughout the year at the outfall and instream monitoring stations (**Figure 7**). Carroll County staff collect all storm and baseflow chemical samples and continue to contract with Martel Laboratories, Inc. in Baltimore, MD, 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 Samples		
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 Labs 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 Access database and NPDES geodatabase.

The event dates for this reporting year are shown in **Table 12.** Please note that 13 total sampling events are reported, seven of which were storm events. Temperature and pH measurements were not recorded for the storm event on March 18, 2021 and have been populated with "N/A" in the table below.

Table 12
2021 NPDES Discharge Characterization Sampling Events

Event	Date	Event Type	Outfall Physical Water Data		Instream Physical Water Data	
			pH	Water Temp (F)	pH	Water Temp (F)
2020-10	7/16/20	Base Flow	7.77	80	7.65	66
2020-11	8/3/20	Storm	7.85	76	7.6	74
2020-12	8/26/20	Base Flow	6.92	78	6.53	71
2020-13	9/18/20	Base Flow	8.8	68	7.66	59
2020-14	9/29/20	Storm	7.84	66	7.84	62
2020-15	10/22/20	Base Flow	7.15	62	6.85	59
2020-16	10/29/20	Storm	8.4	56	7.78	54
2020-17	11/11/20	Storm	7.78	57	7.8	55
2020-18	11/19/20	Base Flow	7.38	44	7.14	41
2020-19	12/10/20	Base Flow	8.4	39	8.13	42
2021-01	3/18/21	Storm	N/A	N/A	N/A	N/A
2021-02	3/24/21	Storm	6.96	54	7.4	55
2021-03	6/22/21	Storm	8.3	60	8.35	72

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 9,** 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.**

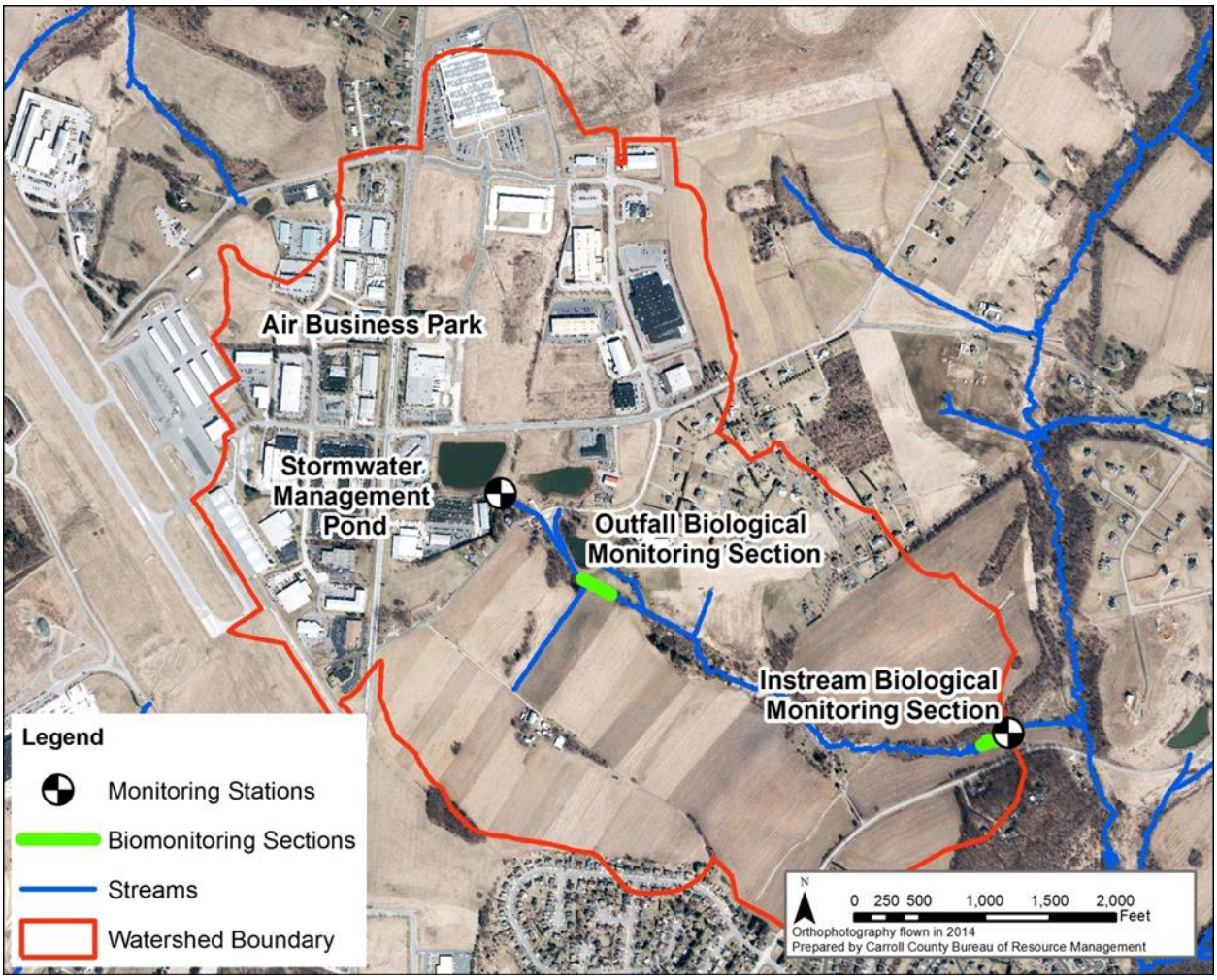


Figure 9: Biological Monitoring Station Locations

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 2021 reporting year are summarized in **Figure 10**. The 30-year monthly precipitation average and high/low extremes are also included. The total precipitation for the reporting period was 37.39 inches, a 6.01-inch deficit from the mean yearly total. Relative to mean monthly precipitation totals, June 2021 was the wettest month, with a surplus of 2.75 inches, while September 2020 was the driest month, with a deficit of 2.1 inches. This reporting year was the fifth driest year for total precipitation since reporting began at this station in 2000.

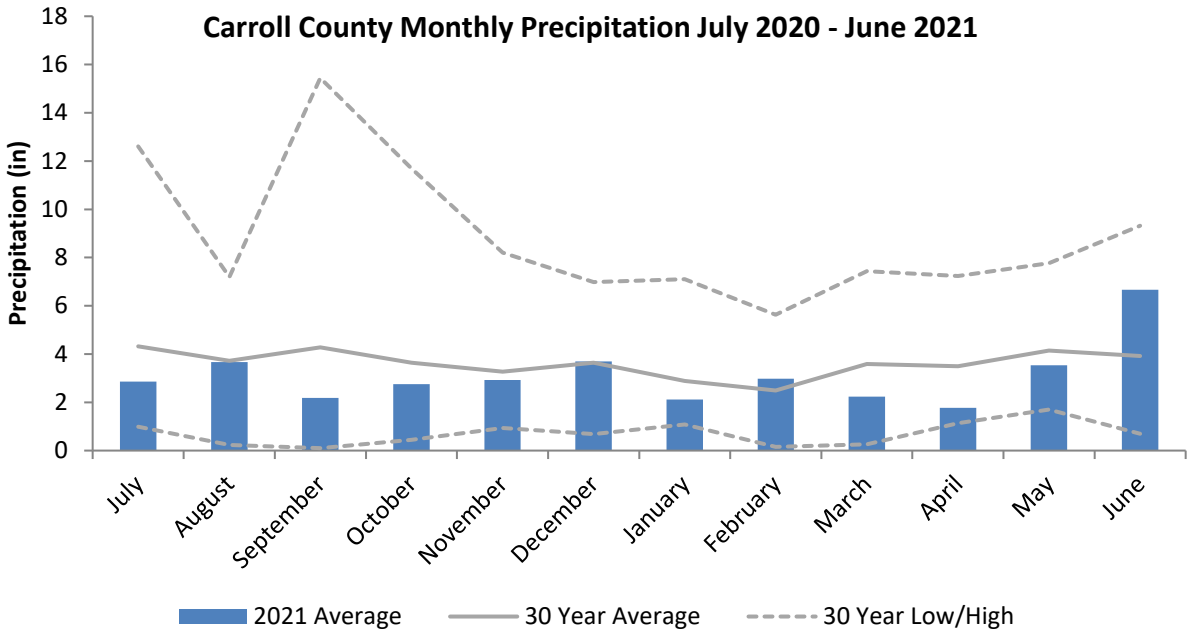


Figure 10: Monthly Precipitation Summary for the 2021 Reporting Period

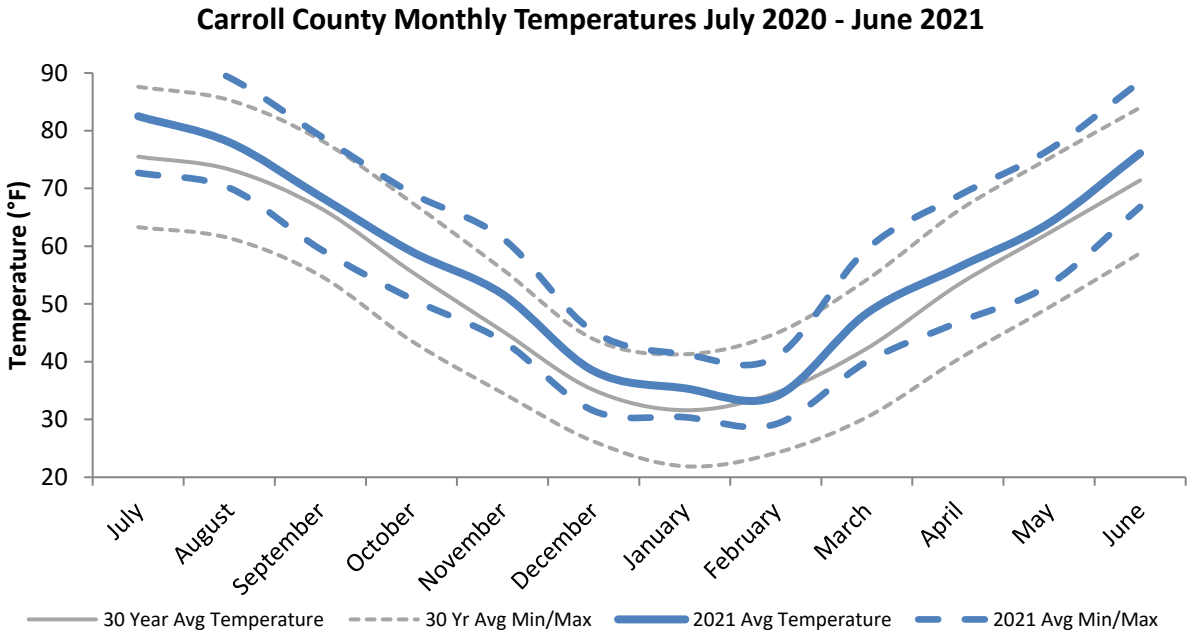


Figure 11: Monthly Temperature Summary for the 2021 Reporting Period

Monthly temperature data for the 2021 reporting year are summarized in **Figure 11**. 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 57.7°F, which was 3.8°F warmer than the 30-year annual average. One month was cooler than average, which was 0.6°F cooler than normal. Eleven months were warmer than average, with a mean of 4.2°F warmer than normal. July 2020, November 2020, and March 2021 were significantly warmer than average with a 7.0°F, 6.4°F, and 6.1°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 7.1°F above average.

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 12 and 13**, respectively. A deficit of 6.01 inches of precipitation was observed during this reporting period relative to the average year. The reporting period had several moderate storm events and a typical frequency of smaller storm events, particularly in the wetter periods during fall 2020. 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 equipment malfunction/failure, limited discharge data were recorded for the outfall station during the winter and spring 2021. Recorded discharge data are available for 75% of the year for the outfall station. Many outfall data that were recorded during summer 2020 had to be estimated because of equipment malfunctions due to power surges. Most hydrologic data were recorded for fall 2020 for both stations.

Typical stage heights at the outfall monitoring station were approximately 0.1 feet, or 57 gpm. Peak discharge occurred on June 10, 2021 when a stage height of 2.92 feet was recorded. The resulting discharge was 41,000 gpm. During this storm event 3.09 inches of precipitation fell over 3.5 hours with the 85% of total measured precipitation falling over the first hour of the event. Only two other storm events with a discharge greater than 1,000 gpm occurred during the reporting period.

Typical stage heights observed for the instream monitoring station were approximately 0.31 feet, or 289 gpm. Peak discharge at this monitoring station occurred during the same storm event as the outfall station. Peak observed stage height was 3.6 feet and peak discharge was 98,000 gpm. Peak observed discharge for most storm events at the instream station were less than 4,000 gpm; only three storm events had peak discharge measurements greater than 4,000 gpm, ranging from 7,000 to 7,500 gpm at peak discharge.

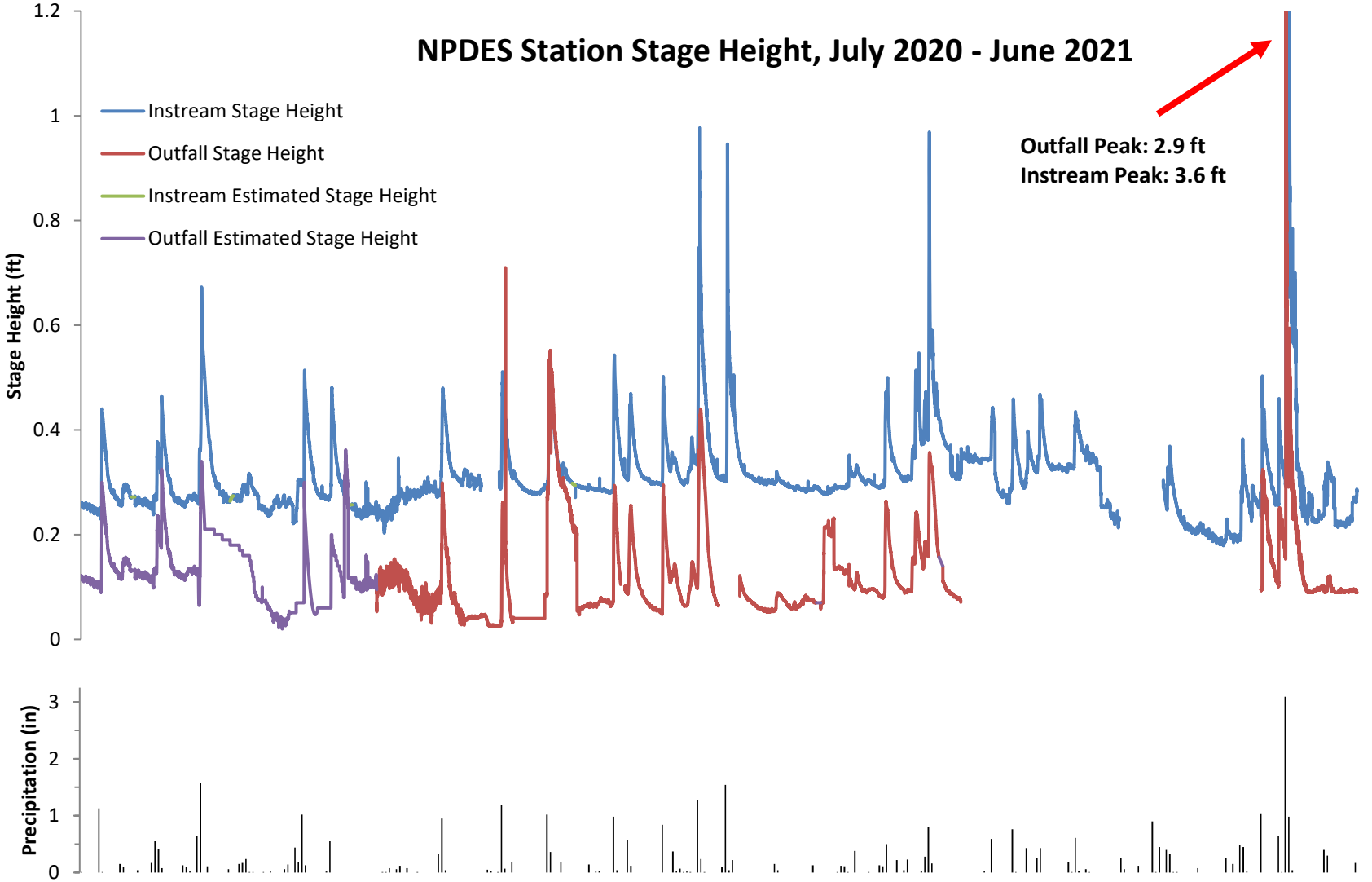


Figure 12: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2021 Reporting Year

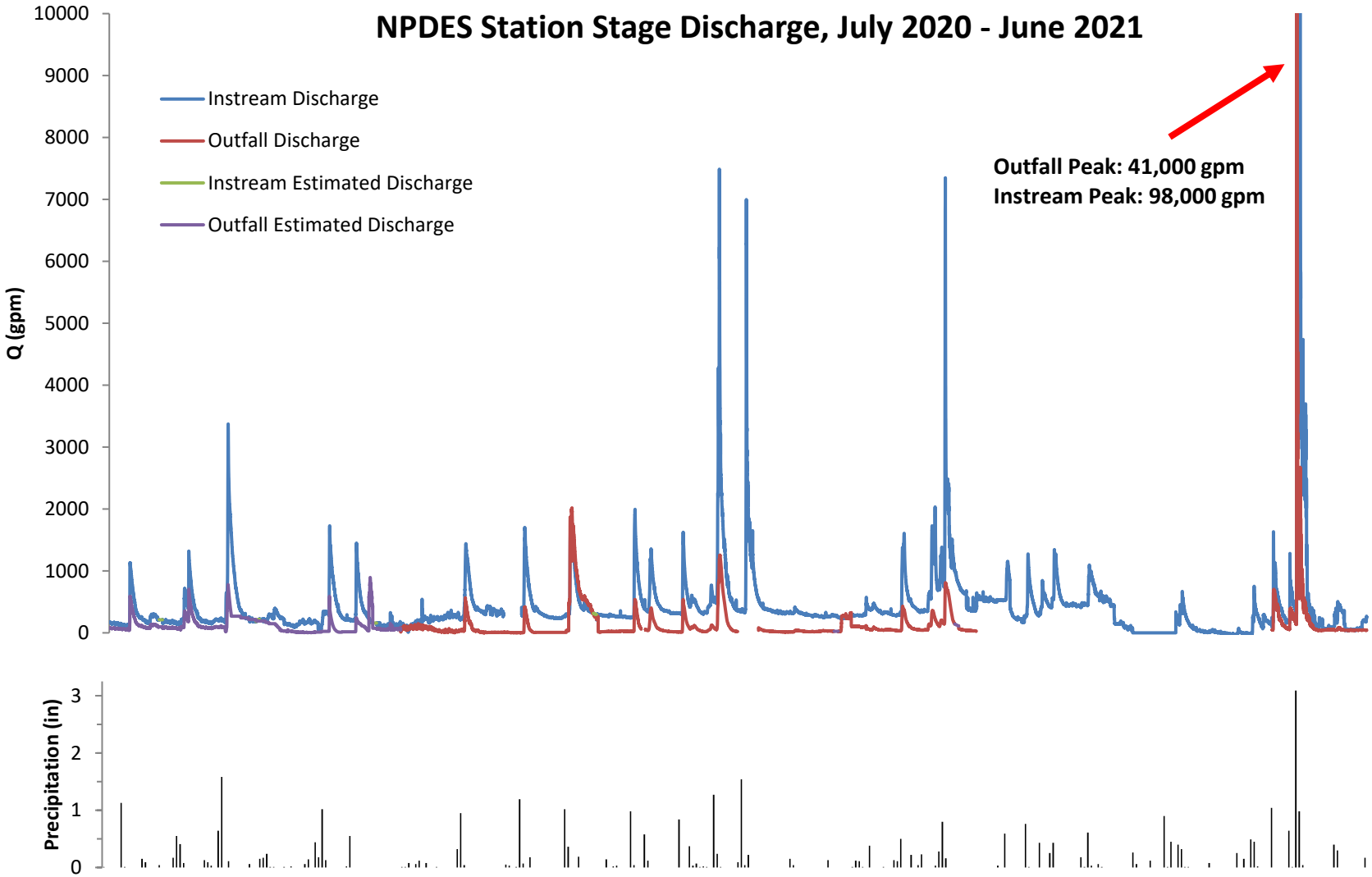


Figure 13: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2021 Reporting Year

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 one season with a complete (and not estimated) data set, fall 2020, outfall contributions were roughly 29% of the total instream discharge. The highest frequency of storm events, and two of the four largest storm events, were observed during fall 2020.

Please note that stage heights and discharges from both stations were periodically estimated. These data were lost due to equipment failures. 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 2021 Reporting Year

	Instream	Outfall	Difference	Outfall Contribution (%)
Total (gal)	229,679,253	>53,206,148	<176,473,105	N/A
Avg Stage (ft)	0.31	0.12	0.19	-
Median Stage (ft)	0.29	0.10	0.19	-
Avg Q (gpm)	443	136	307	31 %
Median Q (gpm)	289	55	235	19 %
Summer Q (gal)	38,800,708	15,439,505	23,361,203	40%
Autumn Q (gal)	62,161,830	18,249,255	43,912,575	29%
Winter Q (gal)	68,836,967	>8,422,336	<60,414,631	N/A
Spring Q (gal)	59,879,749	>11,095,053	<48,784,696	N/A
Dry (<700 gpm)	126,157,438	>27,154,662	<99,002,776	N/A
Wet (>700 gpm)	103,521,815	>26,016,464	<77,505,351	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 2021 (post-retrofit) reporting years (**Figure 14)**. 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 2021 was 40,961 gpm. The 2021 value is highly speculative as the bivariate relationship between the outfall pipe and outfall apron can only be estimated at the recorded stage height at the outfall apron. Additionally, only one other measurement above 20,000 gpm was observed with only a handful observed above 10,000 gpm. These elevated discharge measurements occurred during an intense storm event where 3.09 inches of precipitation was observed over 3.5 hours; most of this precipitation was observed in the first hour of the event. In contrast, during the previous reporting period, the maximum recorded discharge at the outfall station was 1,432 gpm. During this reporting period, 73% of all discharge measurements were below or equal to 100 gpm, similar to most years post-retrofit. 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 75% of the yearly discharge measurements were recorded due to the previously stated equipment problems at the outfall station.

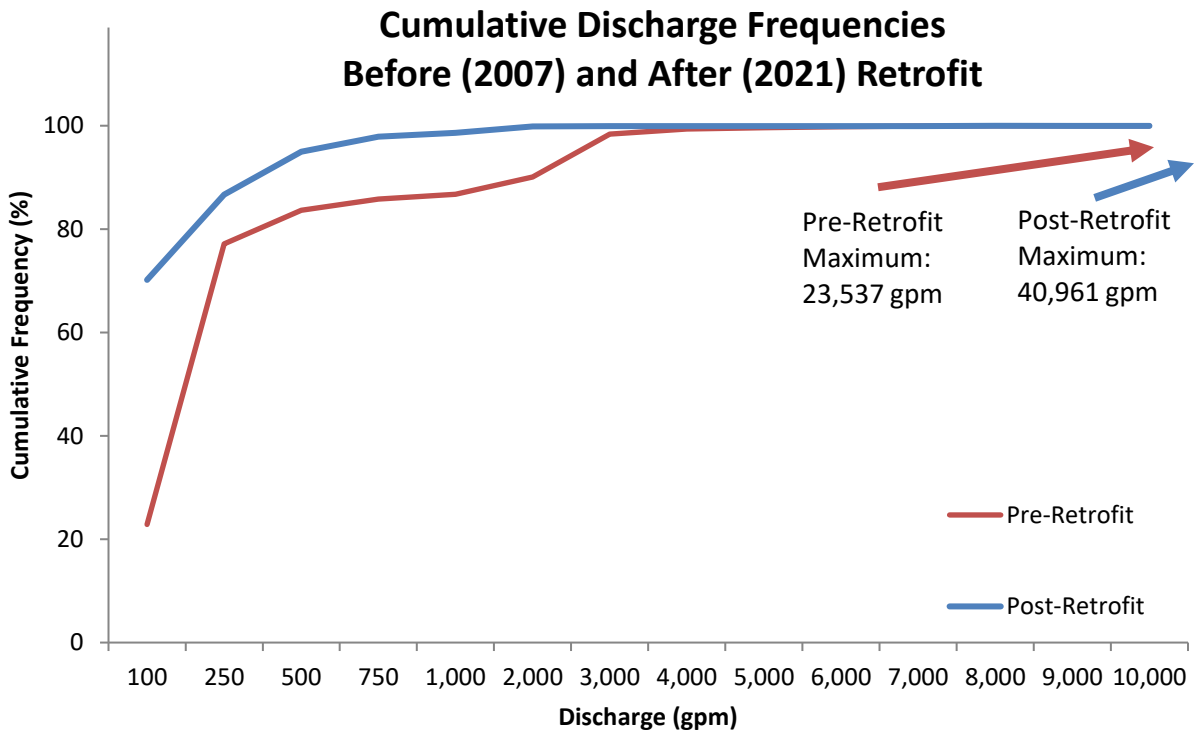


Figure 14: Outfall Discharge Frequencies for FY2007 and FY2021

An examination of individual events on the hydrograph demonstrates the distinct mechanisms driving changes in cumulative frequencies. **Figure 15** represents two analogous storm events, one before and one after the stormwater retrofit, and a hydrological comparison therein. This figure contains hydrographs before and after retrofit for instream and outfall stage heights and discharges. The pre-retrofit event had 0.39 inches of precipitation observed, while the post-retrofit event had 0.38 inches of precipitation observed. The ascending limb for the post-retrofit outfall station 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 15% contribution, peaking at 20%. This was slightly less than the overall discharge and separated stormflow for the reporting period, however this was a very small storm event. 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.

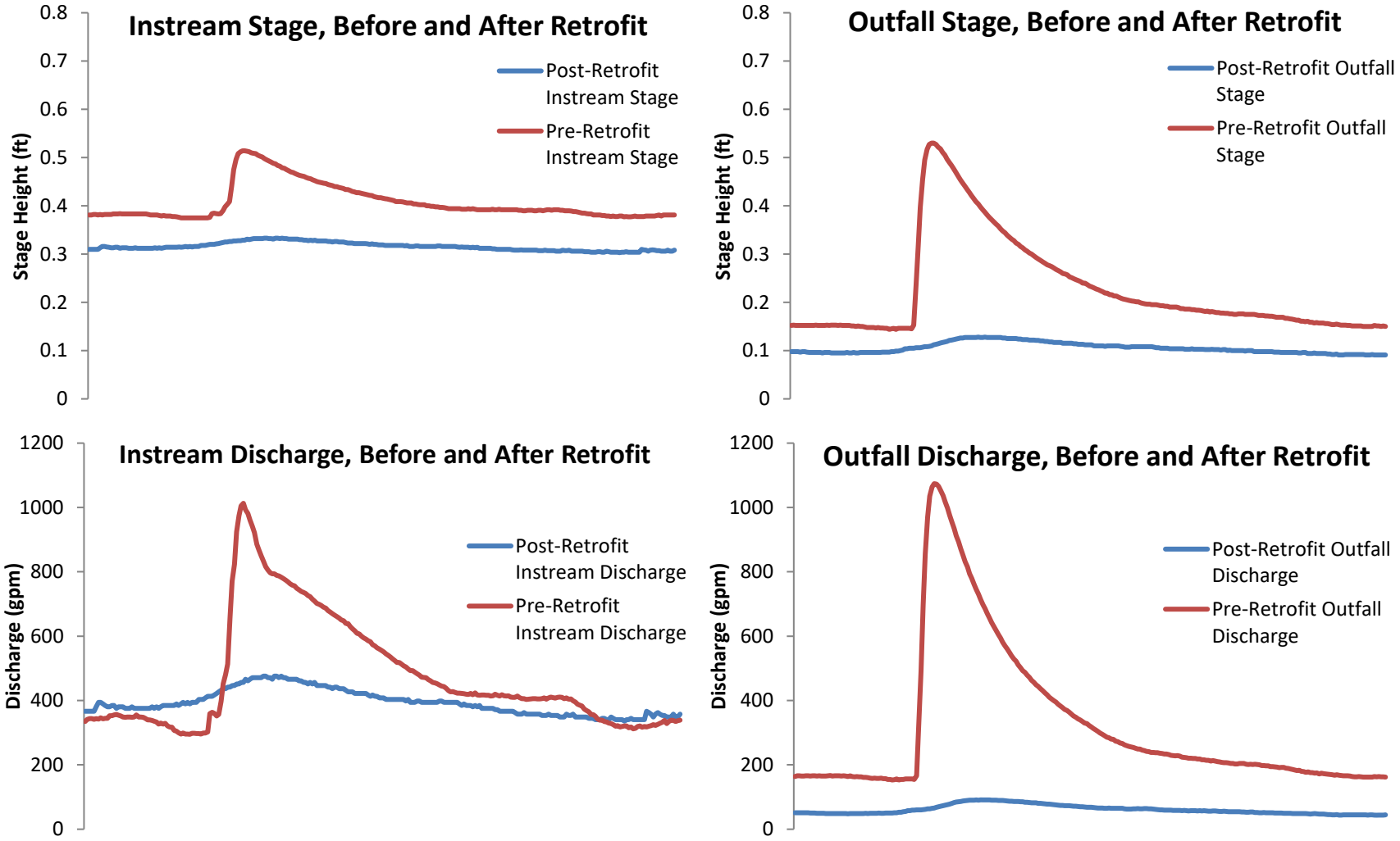


Figure 15: Characteristics of Analogous Storms Pre-Retrofit (7/23/2006, 0.39") and Post-Retrofit (2/7/2021, 0.38")

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. Apart from the thalweg migrating approximately one foot west from the previous reporting year, the channel morphology remains largely unchanged. 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. Slight additional aggradation occurred during the 2021 reporting period along the channel bottom. The only additional change in channel morphology was that some minor erosion was observed along the western bank at this location.

Cross-section three is still generally unchanged since 2000, with only minor shifts in stream channel shape. The eastern bank has continued to slowly erode and migrate west over time but remains at the same location as the previous reporting period. Additionally, some minor scouring occurred along the bottom of the western stream bank during this 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 two previous reporting periods, in which it experienced minor incision. The channel shape remains relatively unchanged from the previous year, apart from the minor incision along the western bank, causing some widening of the channel bottom.

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, the channel morphology remains unchanged relative to the previous reporting period.

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 generally remained the same over the past several years. The channel widened very slightly during this reporting year. Additionally, there was some minor incision along the channel bottom across this reach. 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 2021 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 16 displays stream gradients from the 2021, 2020, 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, though less than the previous year, over the second third of the stream profile and ranges from 0.27% to 1.10%. 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 2021 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 17 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, gradation remains largely unchanged. In recent years, deposition increased in the first 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. In the lower third of the stream channel, slight incision was observed in stations 23-25, while slight deposition was observed in stations 26-28. Overall, there was no major sediment loss or gain over the previous year; only one 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 – 2021

Station	Distance (ft)	2004		2006		2008		2010		2018		2020		2021	
		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		728.18		728.16	
3	394	724.2	1.92%	724.26	1.85%	724.56	1.79%	724.58	1.78%	724.99	1.62%	725.06	1.62%	724.38	1.96%
4	592	721.51	1.36%	721.3	1.50%	721.49	1.55%	722.06	1.27%	721.86	1.58%	721.9	1.60%	722.17	1.12%
5	786	717.75	1.93%	717.77	1.81%	717.81	1.89%	717.78	2.20%	718.15	1.91%	718.39	1.80%	718.29	1.99%
6	988	715.82	0.96%	716.27	0.74%	716.61	0.59%	716.73	0.52%	716.16	0.99%	716.44	0.97%	716.46	0.91%
7	1184	715.49	0.17%	715.6	0.34%	715.7	0.46%	715.58	0.59%	715.75	0.21%	716.31	0.07%	716.26	0.10%
8	1388	714.42	0.52%	714.3	0.64%	714.24	0.72%	714.28	0.64%	714.38	0.67%	714.52	0.88%	714.57	0.83%
9	1589	712.74	0.84%	712.83	0.73%	712.78	0.73%	712.8	0.74%	713.02	0.68%	713.05	0.73%	713.12	0.72%
10	1787	711.22	0.77%	711.2	0.82%	711.66	0.57%	711.59	0.61%	711.24	0.90%	711.31	0.88%	711.45	0.84%
11	1986	709.61	0.81%	709.58	0.82%	710.06	0.81%	709.93	0.84%	709.89	0.68%	709.95	0.68%	710.08	0.69%
12	2189	709.48	0.06%	709.02	0.28%	709.58	0.24%	709.16	0.38%	709.41	0.24%	709.53	0.21%	709.54	0.27%
13	2386	709.45	0.02%	709.81	-0.40%	709.04	0.27%	708.46	0.35%	708.7	0.36%	708.97	0.28%	708.89	0.33%
14	2564	707.74	0.97%	707.94	1.06%	707.88	0.66%	708.17	0.16%	708.4	0.17%	708.37	0.34%	708.46	0.24%
15	2707	706.81	0.65%	707.07	0.61%	707.06	0.57%	707.02	0.80%	707.26	0.79%	706.92	1.01%	706.88	1.10%
16	2910	705.18	0.80%	705.2	0.92%	705.55	0.74%	705.44	0.78%	705.42	0.91%	705.32	0.79%	705.40	0.73%
17	3106	704.18	0.51%	704.37	0.43%	704.48	0.55%	704.78	0.34%	704.49	0.48%	704.41	0.47%	704.43	0.50%
18	3298	702.94	0.64%	703.16	0.63%	703.27	0.63%	703.62	0.60%	703.57	0.48%	703.3	0.58%	703.41	0.53%
19	3490	701.69	0.65%	701.48	0.88%	701.48	0.93%	701.75	0.97%	701.83	0.91%	701.89	0.74%	701.77	0.85%
20	3704	698.99	1.26%	698.92	1.19%	698.92	1.19%	698.9	1.33%	699.16	1.25%	698.83	1.43%	698.81	1.38%
21	3896	697.95	0.54%	697.83	0.57%	697.69	0.64%	697.73	0.61%	697.78	0.72%	697.88	0.50%	697.84	0.51%
22	4100	694.62	1.63%	694.9	1.43%	694.78	1.42%	694.7	1.48%	695.79	0.97%	695.59	1.12%	695.68	1.06%
23	4320	693.42	0.54%	693.44	0.66%	693.73	0.48%	693.9	0.36%	694.22	0.71%	693.94	0.75%	693.77	0.87%
24	4511	691.12	1.21%	691.05	1.25%	691.1	1.38%	691.17	1.43%	691.24	1.56%	691	1.54%	690.97	1.47%
25	4717	689.65	0.71%	689.52	0.74%	689.41	0.82%	689.35	0.88%	689.57	0.81%	689.46	0.75%	689.50	0.71%
26	4933	687.59	0.96%	687.71	0.84%	687.59	0.84%	687.38	0.91%	687.55	0.94%	687.42	0.95%	687.60	0.88%
27	5137	685.82	0.87%	685.53	1.07%	685.45	1.05%	685.44	0.95%	685.78	0.87%	686.24	0.58%	686.19	0.69%
28	5248	682.83	2.68%	682.71	2.53%	682.7	2.47%	682.8	2.37%	683.37	2.16%	683.36	2.59%	683.08	2.79%

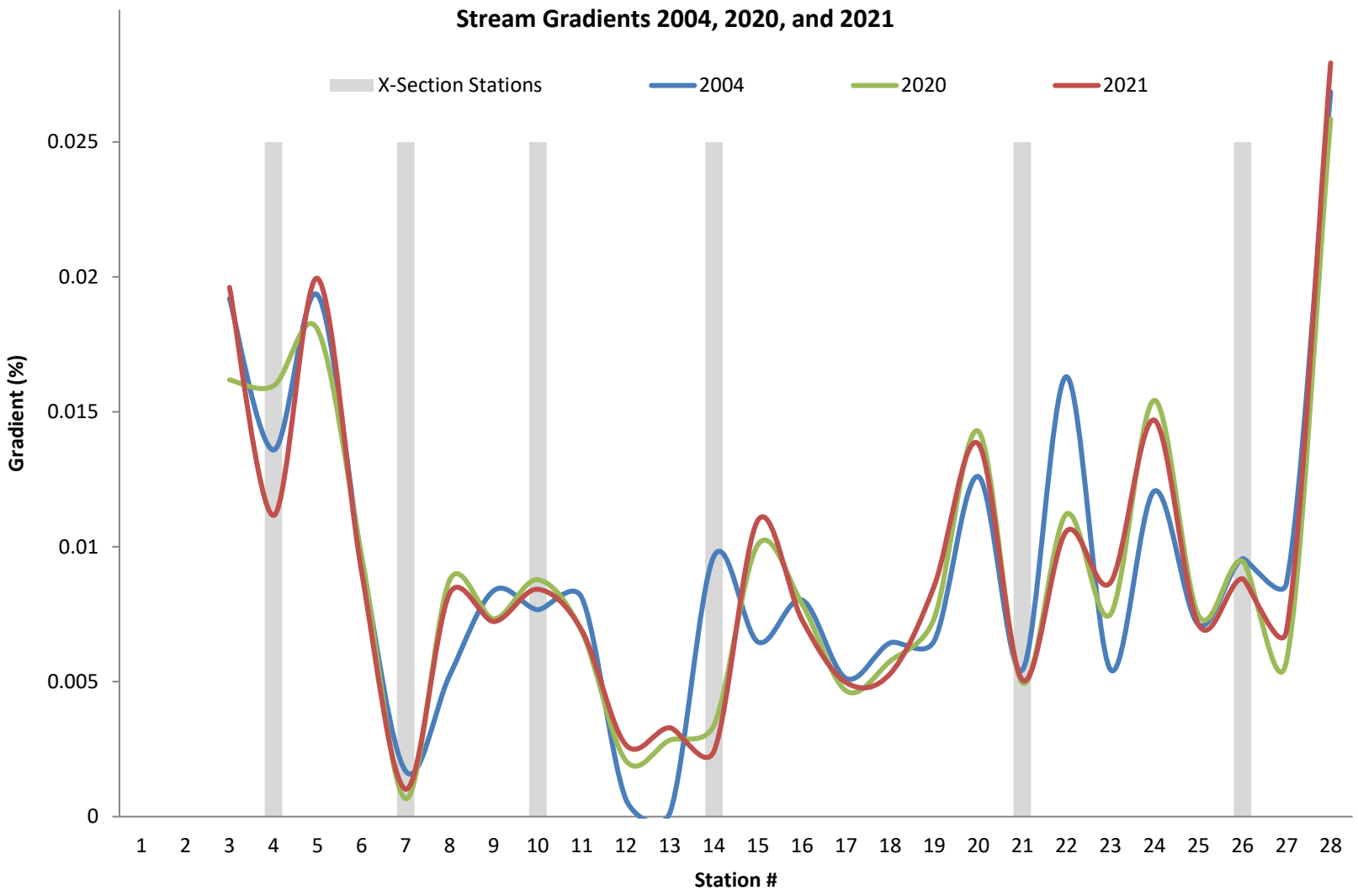


Figure 16: Stream Gradient Change from 2004 – 2021

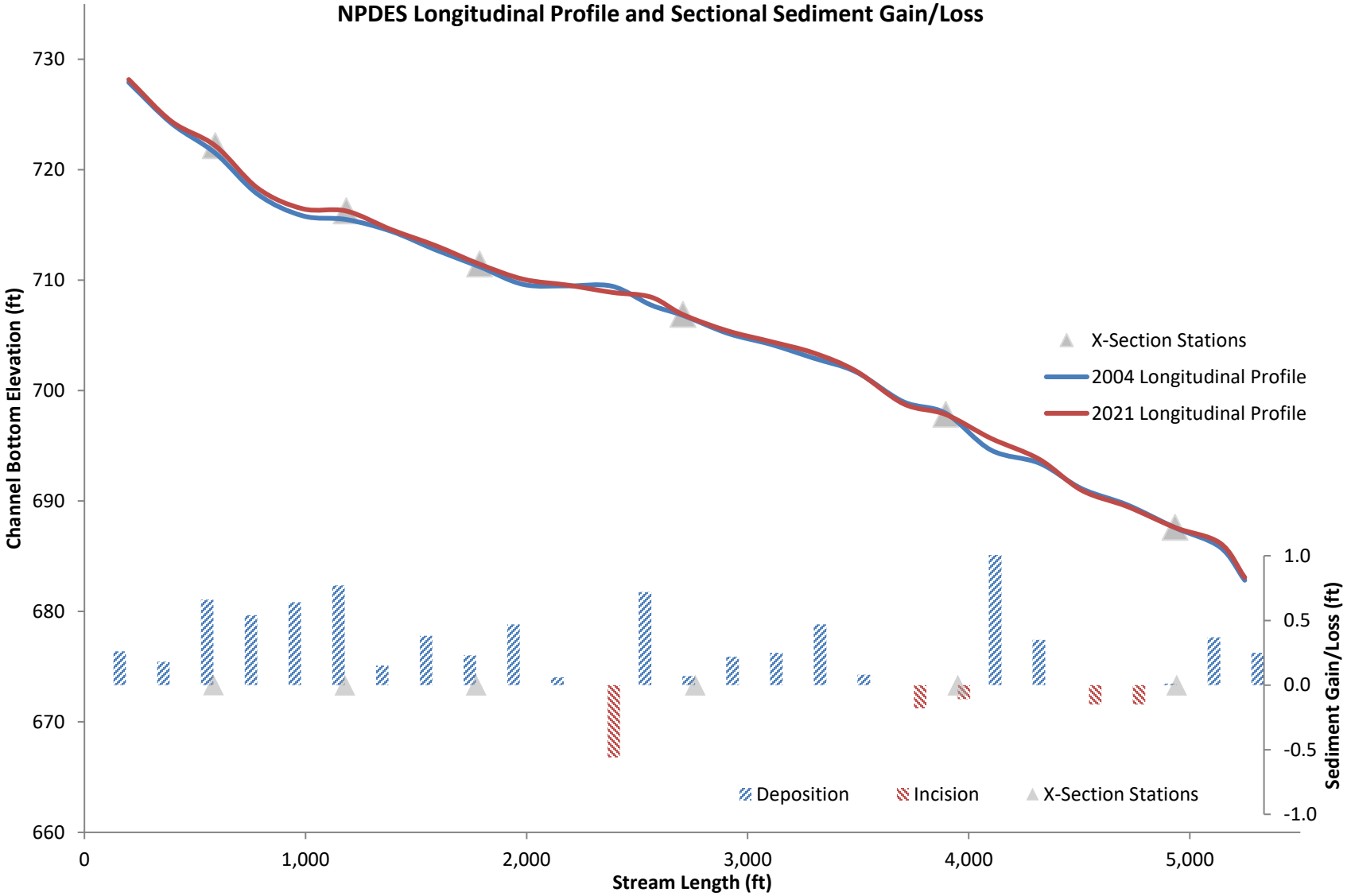


Figure 17: Comparison of Longitudinal Profile and Sectional Deposition/Incision, 2004 and 2021

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 fall, as in previous years.

On average, temperatures at the outfall station were 4% warmer than those at the instream station. Temperature differences ranged from -12°F during storm sampling in June 2021 to 14°F during July 2020. 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 2021 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)
2020-10	7/16/20	Base Flow	7.77	80	370	7.65	66	360
2020-11	8/3/20	Storm	7.85	76	280	7.6	74	270
2020-12	8/26/20	Base Flow	6.92	78	250	6.53	71	290
2020-13	9/18/20	Base Flow	8.8	68	340	7.66	59	240
2020-14	9/29/20	Storm	7.84	66	220	7.84	62	290
2020-15	10/22/20	Base Flow	7.15	62	250	6.85	59	290
2020-16	10/29/20	Storm	8.4	56	240	7.78	54	290
2020-17	11/11/20	Storm	7.78	57	250	7.8	55	280
2020-18	11/19/20	Base Flow	7.38	44	300	7.14	41	280
2020-19	12/10/20	Base Flow	8.4	39	250	8.13	42	260
2021-01	3/18/21	Storm	N/A	N/A	1400	N/A	N/A	440
2021-02	3/24/21	Storm	6.96	54	1200	7.4	55	500
2021-03	6/22/21	Storm	8.3	60	230	8.35	72	320

Conductance was greater at the outfall station by a mean of 36%. Conductance ranged from 230 µmhos/cm to 1,400 µmhos/cm. Both stations displayed trends of elevated conductivities in the winter and spring and decreasing conductivity levels throughout the summer and fall 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 7.8 while at the instream station, an average pH of 7.6 was observed. The pH values ranged from 6.5 to 8.4. 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 13 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 2021 Reporting Year

Event Mean Concentration		Instream Station			Outfall Station			Significance
Analyte	Units	Mean	Min	Max	Mean	Min	Max	p-value
BOD	mg/L	6.83	2.00	51.93	5.47	2.00	21.00	0.739
TKN	mg/L	0.66	0.50	1.91	0.87	0.50	1.90	0.263
NO_2/NO_3	mg/L	3.67	0.74	5.60	0.27	0.05	1.70	$1.2x10^{-5}$
Phosphorus	mg/L	0.14	0.02	0.41	0.12	0.05	0.25	0.663
TSS	mg/L	105.3	1.00	519.1	25.92	8.00	97.57	0.071
Copper	µg/L	4.02	2.00	17.10	2.64	2.00	6.73	0.272
Lead	µg/L	2.72	2.00	9.42	2.00	2.00	2.00	0.223
Zinc	µg/L	23.38	20.00	57.26	25.17	20.00	85.60	0.771
TPH	mg/L	5.00	5.00	5.00	5.15	5.00	6.00	0.165

Figures 18 and 19 present annual mean EMC values for eight analytes from reporting years 2001 through 2021. 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 2021 (before and after retrofit) was nitrate/nitrite. The pre- and post-retrofit graph reinforces this difference. During the post-retrofit period, observed EMCs for the outfall station were significantly lower compared to both pre-retrofit outfall and post-retrofit instream EMCs. Though not all mean EMC values were significantly different for the three metals at the instream station, EMC values for copper and lead decreased at the outfall station after the retrofit, though this is difficult to assess, given that much of the metals laboratory results are left censored. This is not unexpected, given the increased residence within the stormwater facility. Please note that a single outlying measurement in July 2014 caused a large increase in average zinc for that reporting year.

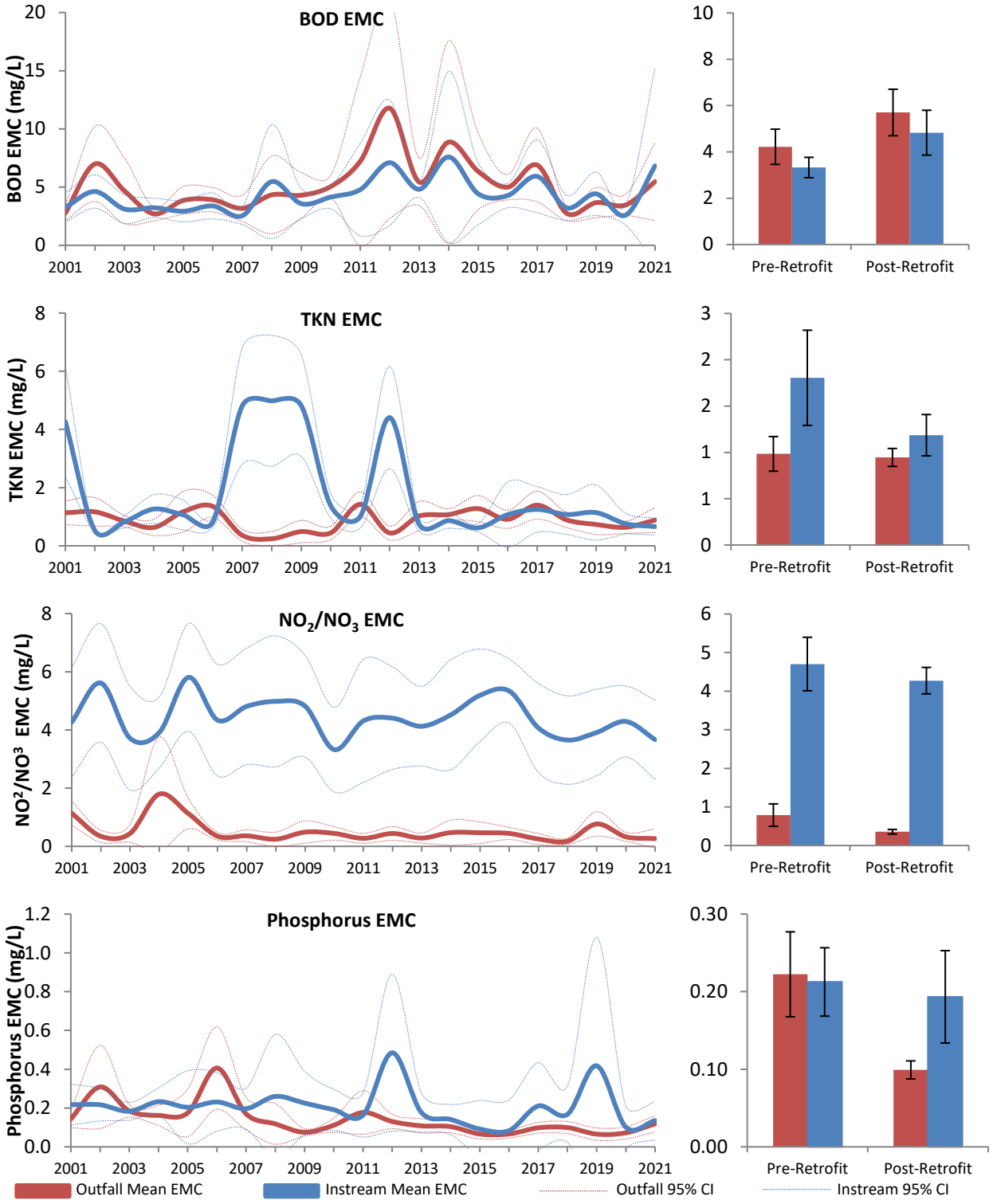


Figure 18: EMC Values from 2001 – 2021 for BOD, TKN, NO_2/NO_3, and Phosphorus

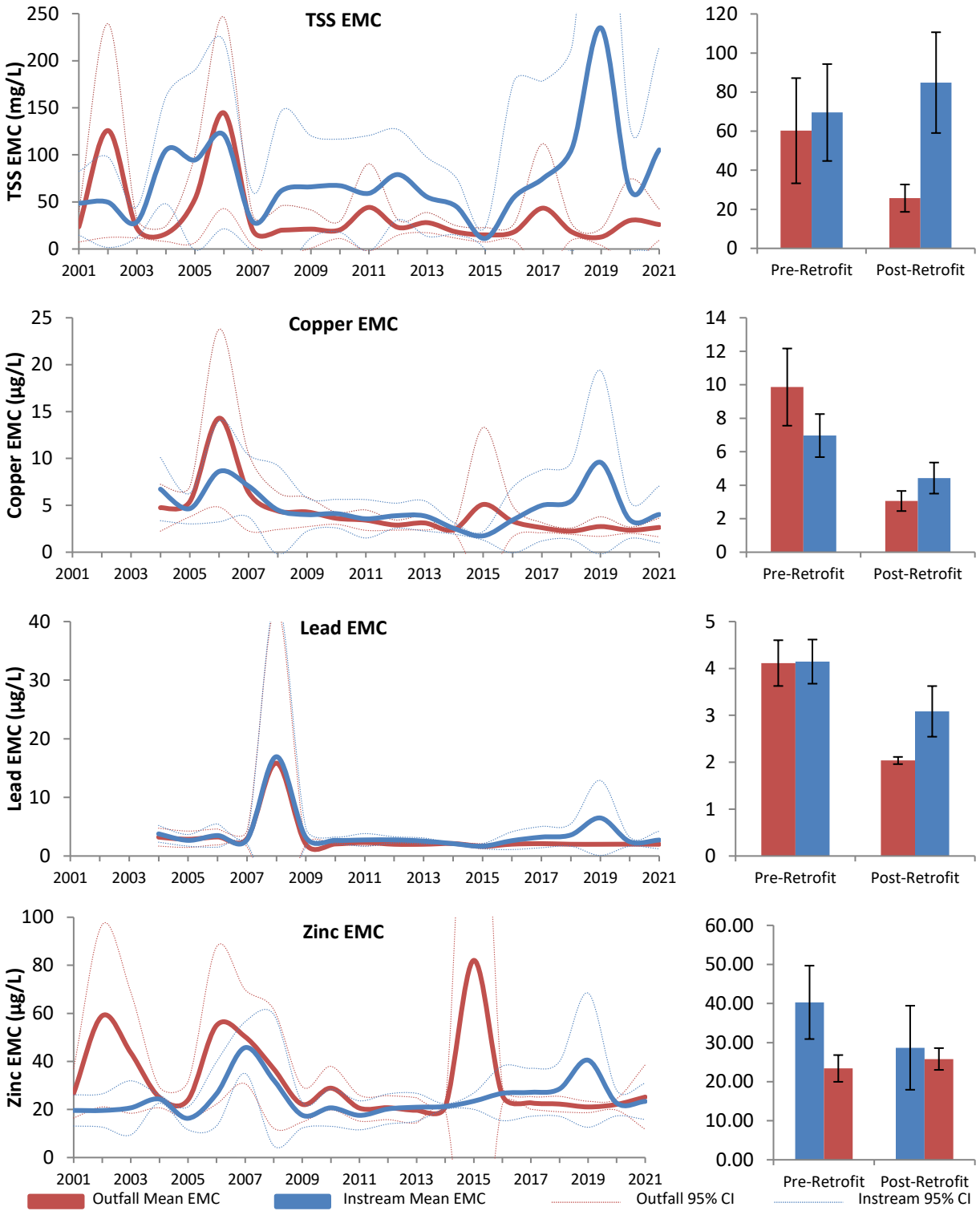


Figure 19: EMC Values from 2001 – 2021 for TSS, Copper, Lead, and Zinc

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 slightly higher for all analytes at the outfall station and all analytes except TKN and zinc at the instream station. Baseflow loadings were typical of the average year and all analytes showed similar loadings to the previous year. 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 the reporting limit of 5 mg/L.

Table 19
Annual Pollutant Loads for the 2021 Reporting Year

Annual Pollutant Loading (lbs/yr)										
Loc.	Type	BOD	TKN	NO_2/NO_3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Base	2,457	526	5,334	32	4,562	2.1	2.1	21.1	5,264
	Storm	9,230	691	2,131	195	165,692	5.0	2.9	22.7	4,320
	Total	11,687	1,218	7,466	227	170,254	7.1	5.0	43.8	9,584
Outfall	Base	>1,473	>219	>85	>26	>4,306	>0.5	>0.5	>7.0	>1,171
	Storm	>997	>177	>38	>27	>6,916	>0.6	>0.4	>4.4	>1,117
	Total	>2,470	>396	>123	>52	>11,222	>1.2	>0.9	>11.4	>2,287

Seasonal Pollutant Loads

Seasonal discharge for each monitoring station is provided in **Figure 20.** 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 20** 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.

The largest loadings for all analytes were observed in winter 2021 for the instream station and fall 2020 for the outfall station. This is expected, as the winter 2021 and fall 2020 seasons had the greatest total discharge for each of the respective stations during the reporting period. Seasonal loadings were very typical with analyte loads spread fairly evenly throughout the year; summer 2020 accounted for the smallest loadings with only 17% of the total yearly loading being observed during this period. Elevated (above detection) instantaneous TPH measurements were only observed in 2 samples at the outfall station during summer 2020; Though fewer than the past few years, this is still unusual considering only very sporadic elevated measurements have been observed since 2000. 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/reporting limit concentrations were used instead of zero values with samples below detection. Therefore, actual loadings are likely less than values provided below.

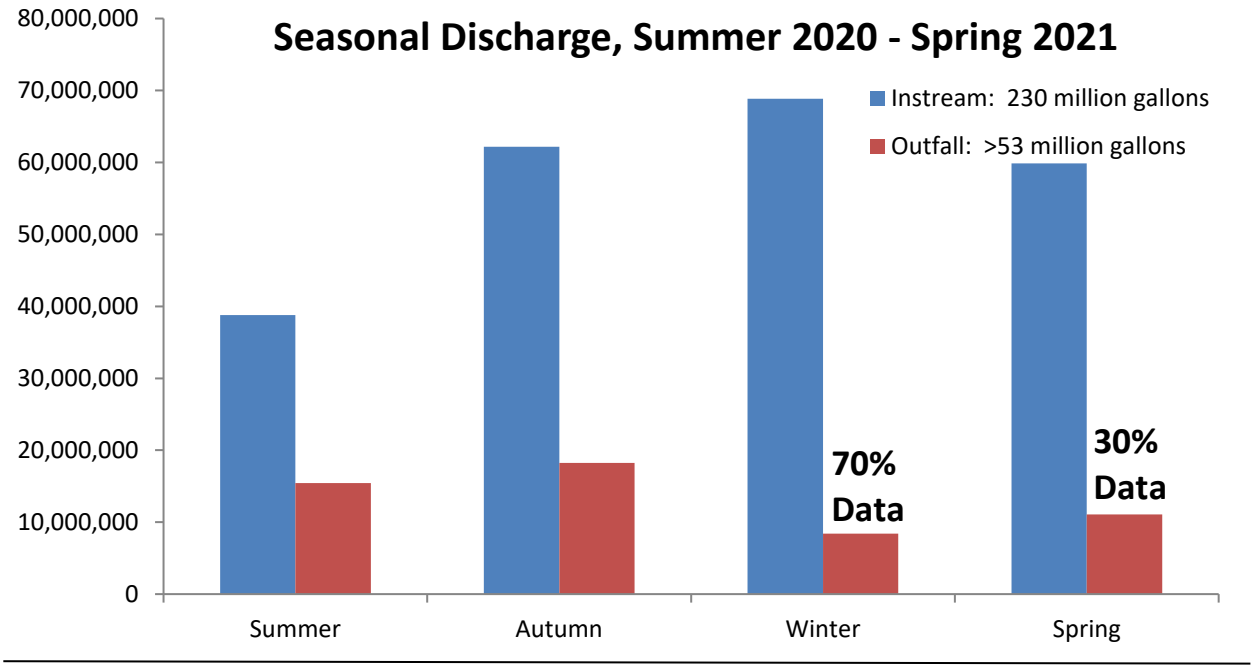


Figure 20: Seasonal Discharge for the 2021 Reporting Year

Table 20
Seasonal Pollutant Loads for the 2018 – 2021 Reporting Year

Seasonal Pollutant Loading (lbs)										
Loc.	Season	BOD	TKN	NO_2/NO_3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Summer	2,212	214	1,188	45	34,097	1.3	0.9	7.6	1,619
	Autumn	3,543	342	1,904	73	54,626	2.1	1.4	12.1	2,594
	Winter	3,924	379	2,108	80	60,492	2.3	1.6	13.4	2,872
	Spring	3,413	330	1,834	70	52,621	2.0	1.4	11.7	2,499
	Total	13,091	1,265	7,035	268	201,835	7.7	5.2	44.8	9,584
Outfall	Summer	705	112	35	15	3,340	0.3	0.3	3.2	664
	Autumn	833	132	41	18	3,948	0.4	0.3	3.8	784
	Winter	>384	>61	>19	>8	>1,822	>0.2	>0.1	>1.8	>362
	Spring	>506	>81	>25	>11	>2,400	>0.2	>0.2	>2.3	>477
	Total	>2,429	>386	>120	>53	>11,509	>1.2	>0.9	>11.2	>2,287

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. The outfall station for the 2021 reporting year received a stream health rating of very poor and an IBI score of 1.67. The instream station for the 2021 reporting year received a stream health rating of fair and an IBI score of 3.33.

Table 21
Outfall Station IBI Score for the 2021 Reporting Year

Metric	Result	Score
Number of Taxa	21	3
Number of EPT	3	1
Number Ephemeroptera	0	1
% Intolerant Urban	2	1
% Chironomidae	81	1
% Clingers	33	1
	Total Score	**10**
	IBI Score	**1.67**
	Narrative Rating	**Very Poor**

Table 22
Instream Station IBI Score for the 2021 Reporting Year

Metric	Result	Score
Number of Taxa	26	5
Number of EPT	7	3
Number Ephemeroptera	3	3
% Intolerant Urban	15	3
% Chironomidae	47	3
% Clingers	55	3
	Total Score	**20**
	IBI Score	**3.33**
	Narrative Rating	**Fair**

Figure 21 presents these scores annually from 2001 through 2021. The trends of both stations appear to be correlative throughout this time period; this year however, the stations displayed a negative correlation. On average, the score for the instream station remains 0.8 higher than that of the outfall station. For this reporting year, the score of the instream station was 1.66 higher than the outfall station. The average score for the outfall station is 2.1, 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. 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 has increased over the previous two years. Almost all metrics used to score the instream station improved from the previous year. The only metric that did not improve, number of EPT, remained the same as the previous year. Increases in intolerant and total taxa validate the increased score for this reporting period. Both stations appear to still be relatively intolerable for sensitive species.

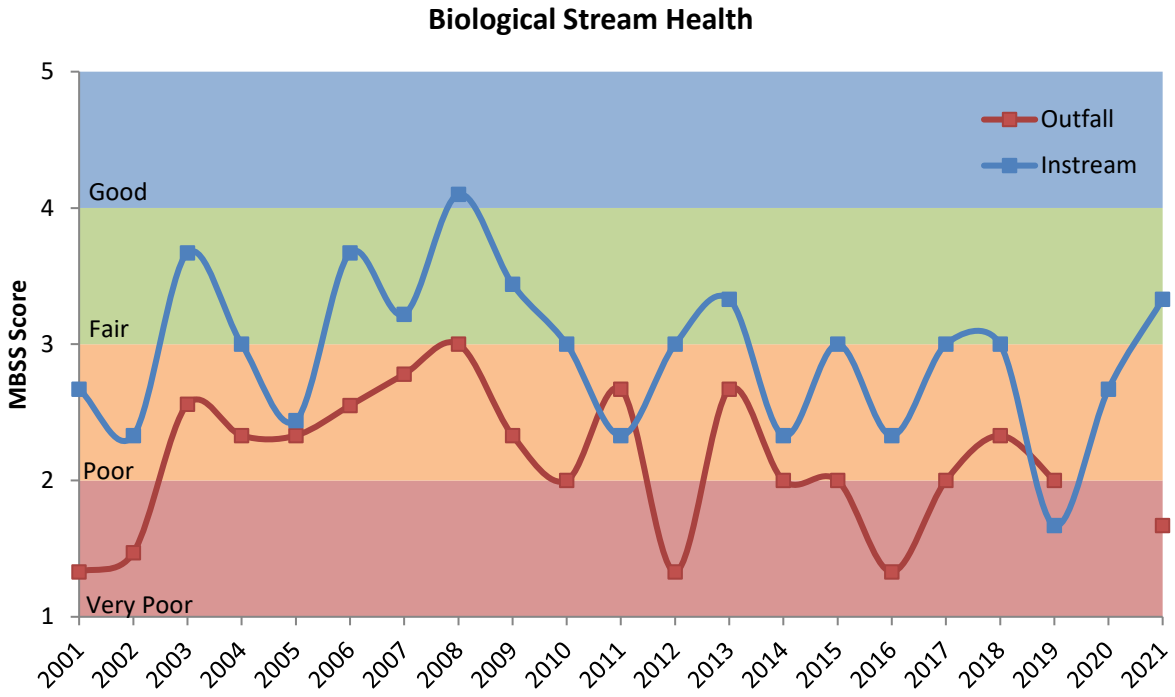


Figure 21: Macro-Invertebrate IBI Analysis 2001 – 2021

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 69, respectively. From 1998 through 2021 (excluding 2001), as shown in **Figure 22**, the mean habitat scores of the instream station and outfall station were 94 and 69, respectively. The 2021 reporting year was a fairly typical year for both stations; the instream station scored 10 points higher than average, but the outfall station scored the average rating. The weakest parameters for both stations are embeddedness, particularly for the outfall station, at which almost the complete stream segment was embedded with silt. Over the last several years for both stations, improvements in the shading and trash ratings have offset the decreasing habitat and embeddedness scores resulting in relatively stable overall habitat scores.

Table 23
Spring 2021 Habitat Assessment Results

Parameter	Outfall	Category	In-stream	Category
Instream Habitat	7	marginal	13	sub-optimal
Epifaunal Substrate	6	marginal	13	sub-optimal
Velocity/Depth Diversity	6	marginal	13	sub-optimal
Pool/Glide/Eddy Quality	7	marginal	12	marginal
Riffle/Run Quality	6	marginal	12	sub-optimal
Embeddedness	1	poor	8	marginal
Shading	18	optimal	14	sub-optimal
Trash Rating	18	optimal	19	optimal
Total Score (max. of 160)	**69**		**104**	
Score (percent)	**43%**		**65%**	

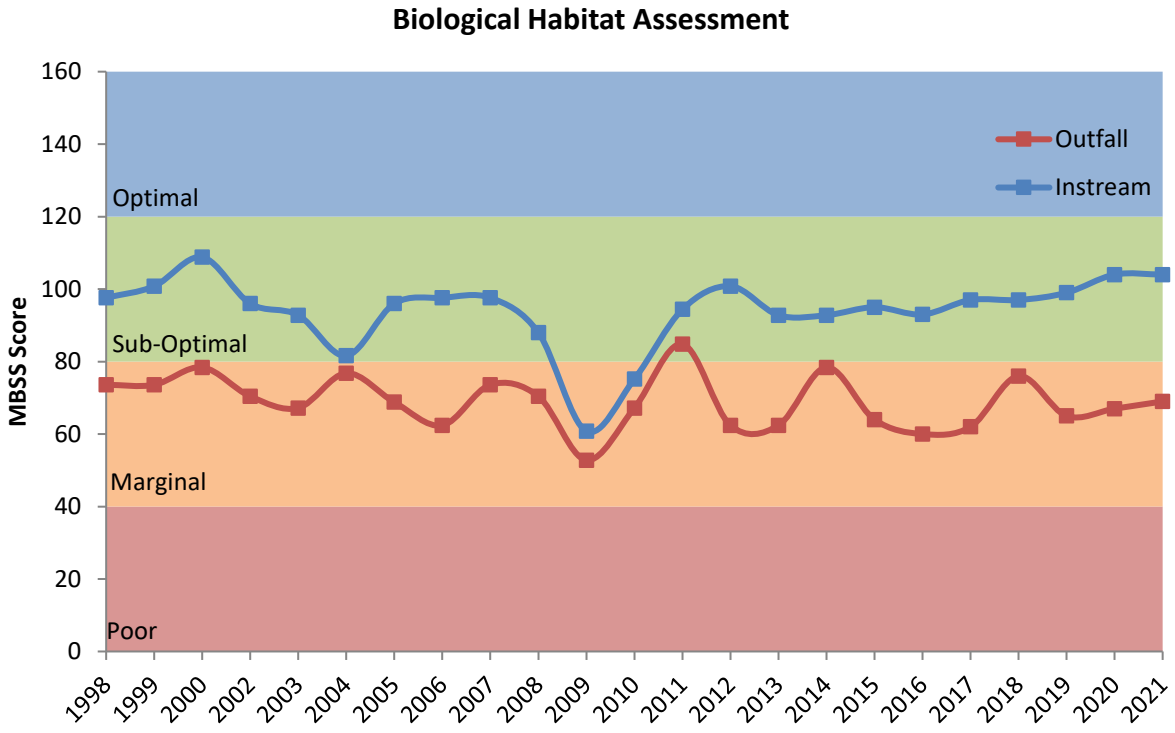


Figure 22: Comparison of NPDES Station Habitat 1998 – 2021 (Excluding 2001)

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 23 and 24**, 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.

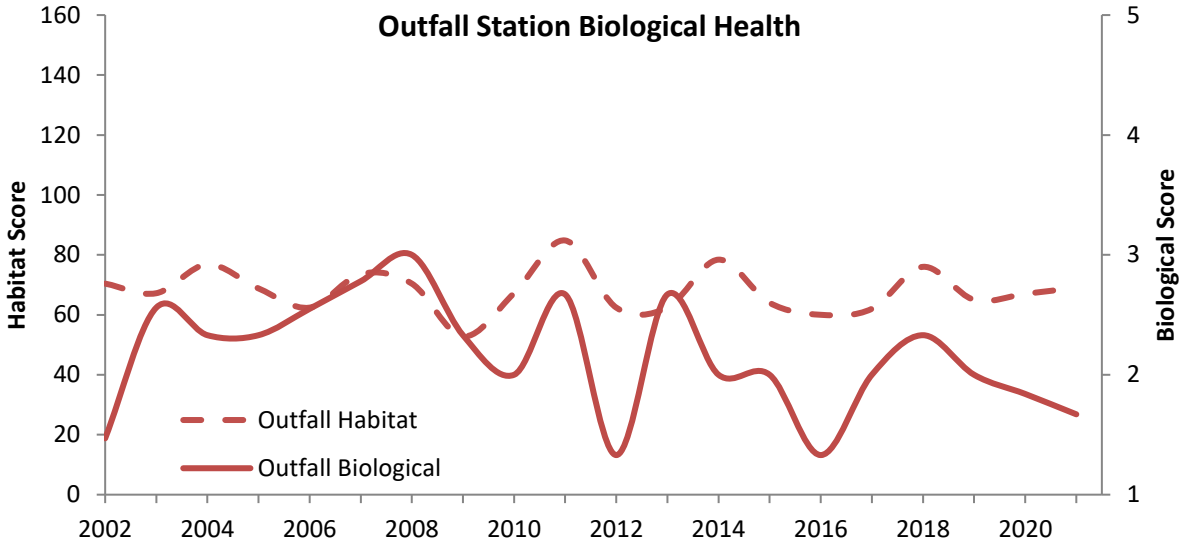


Figure 23: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2021

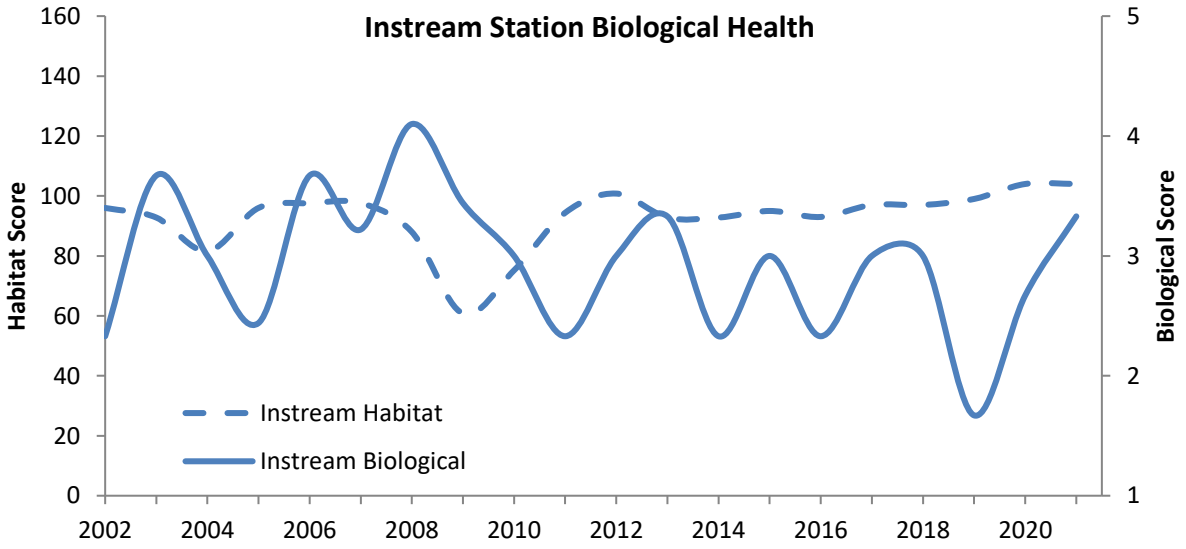


Figure 24: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2021

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	$1,169,829.10
Operation and Maintenance - Mowing, Gasoline, Repairs/Parts	$126,202.12
Public Education and Outreach	$2,892.56
Lab Testing/Supplies, Contract Services, Small Equipment, Conferences	$19,155.16
Debt Service Interest	$536,952.50
Total Operating Expenditures for FY2021	**$1,855,031.44**

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)	$6,973,924.29
Stormwater Facility Renovations	$87,739.00
Total Capital Expenditures for FY2021	**$7,061,663.29**

Cumulative capital expenditures for the program since 2005 can be found in **Table 26**. The approved FY2022-2027 CIP estimates of program funds can be found in **Tables 27 and 28**. It is important to note that the funding beyond FY2023 is subject to future budget review and approval processes. Therefore, no guarantee is made to future appropriations beyond FY2023.

Approved Community Investment Plan 2022 – 2027

Table 26
Total NPDES MS4 Capital Expenditures
Carroll County, Maryland
July 15, 2005 through June 30, 2021

Permit Year	Capital Expenditures
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	$4,576,024.22
7/1/17 to 6/30/18	$2,458,250.84
7/1/18 to 6/30/19	$4,911,221.68
7/1/19 to 6/30/20	$10,167,596.72
7/1/20 to 6/30/21	$6,973,924.29
Total permit expenditures, to date	**$44,469,750.22**
Grants received	**$16,695,343.96**
Actual County expenditures	**$27,774,406.26**

Table 27
Watershed Assessment and Improvement (NPDES)

Program Elements	FY 22	FY 23	FY 24	FY 25	FY 26	FY27	Prior Allocation	Balance to Complete	*Total Cost*
Engineering & Design	140,000	970,000	125,000	495,000	325,000	225,000			**2,280,000**
Land Acquisition									**0**
Site Work									**0**
Construction	3,266,527	2,498,407	3,473,407	3,062,010	3,365,010	3,599,500			**19,264,861**
Equipment & Furnishings									**0**
Other									**0**
Total	**3,406,527**	**3,468,407**	**3,598,407**	**3,557,010**	**3,690,010**	**3,824,500**	**0**	**0**	**21,544,861**

The Stormwater Management Facility Renovation Program CIP (**Table 28)** has renovated 35 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 $1,310,000.00 has been spent on this renovation effort.

Table 28
Stormwater Management Facility Renovations

Program Elements	FY 22	FY 23	FY 24	FY 25	FY 26	FY27	Prior Allocation	Balance to Complete	*Total Cost*
Engineering & Design	35,000				10,000				**45,000**
Land Acquisition									**0**
Site Work									**0**
Construction	265,000	300,000	300,000	300,000	290,000	300,000			**1,755,000**
Equipment & Furnishings									**0**
Other									**0**
Total	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**0**	**0**	**1,800,000**

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
2016-2026

Year	Project Name	MDE 8-Digit Watershed
	Completed Projects	
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

Year	Project Name	MDE 8-Digit Watershed
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
2021	Sumners Hollow Pond 1	Liberty Reservoir
2021	Ralph Street Extension	Liberty Reservoir
2021	Wilmot	Liberty Reservoir
2021	Carrollyn Manor Section 7	Double Pipe Creek
2021	Clipper Hills Gardenia	South Branch Patapsco
Planned Projects		
2022	Stone Manor	Liberty Reservoir
2023	St. Georges Gate	Liberty Reservoir
2024	Meadow Ridge ED Pond 1	Double Pipe Creek
2024	Meadow Ridge ED Pond 2	Double Pipe Creek
2024	Meadow Ridge ED Pond 3	Double Pipe Creek
2024	Patapsco Valley Overlook	South Branch Patapsco
2024	Stoffle Park	Liberty Reservoir
2025	Bark Hill Park	Double Pipe Creek
2025	Edgewood Sec. 7	Liberty Reservoir
2025	Safe Haven	Double Pipe Creek
2025	Tira Estates	Liberty Reservoir
2025	Piney Ridge Village 5/6	South Branch Patapsco
2025	Piney Ridge Village 5/6	South Branch Patapsco
2025	Piney Ridge Village 5/6	South Branch Patapsco
2026	Bradford Knoll	Liberty Reservoir
2026	Pine Brook Farm Sec 1	South Branch Patapsco
2026	Gold Pond Overlook	South Branch Patapsco
2026	Flower Valley	South Branch Patapsco
2026	Johanna's Joy 2	Double Pipe Creek

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.

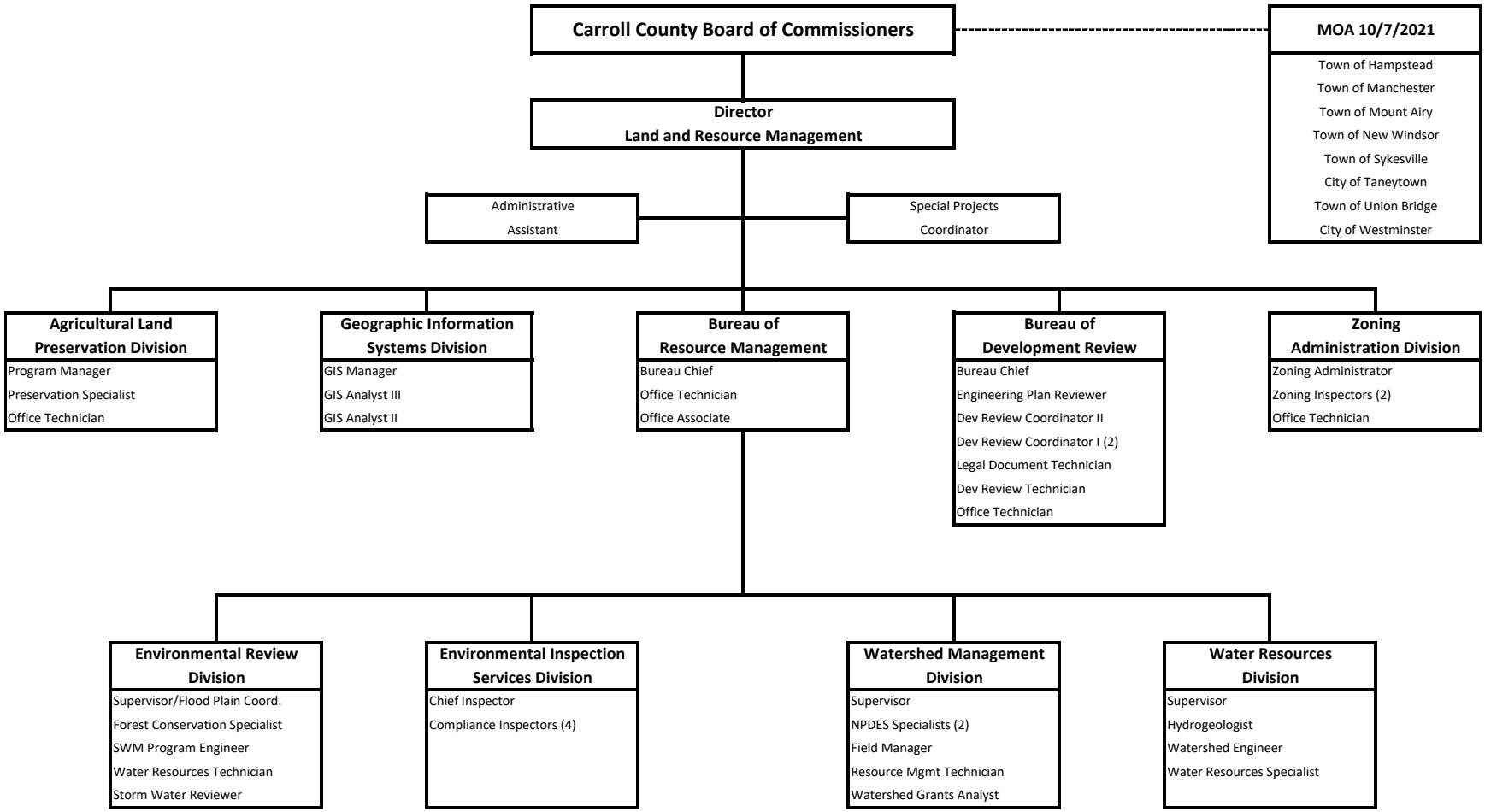
County staff also participate in various other water quality protection and improvement organizations throughout the Chesapeake Bay region. The County is an active member of the Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to engage in issues of common concern regarding 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

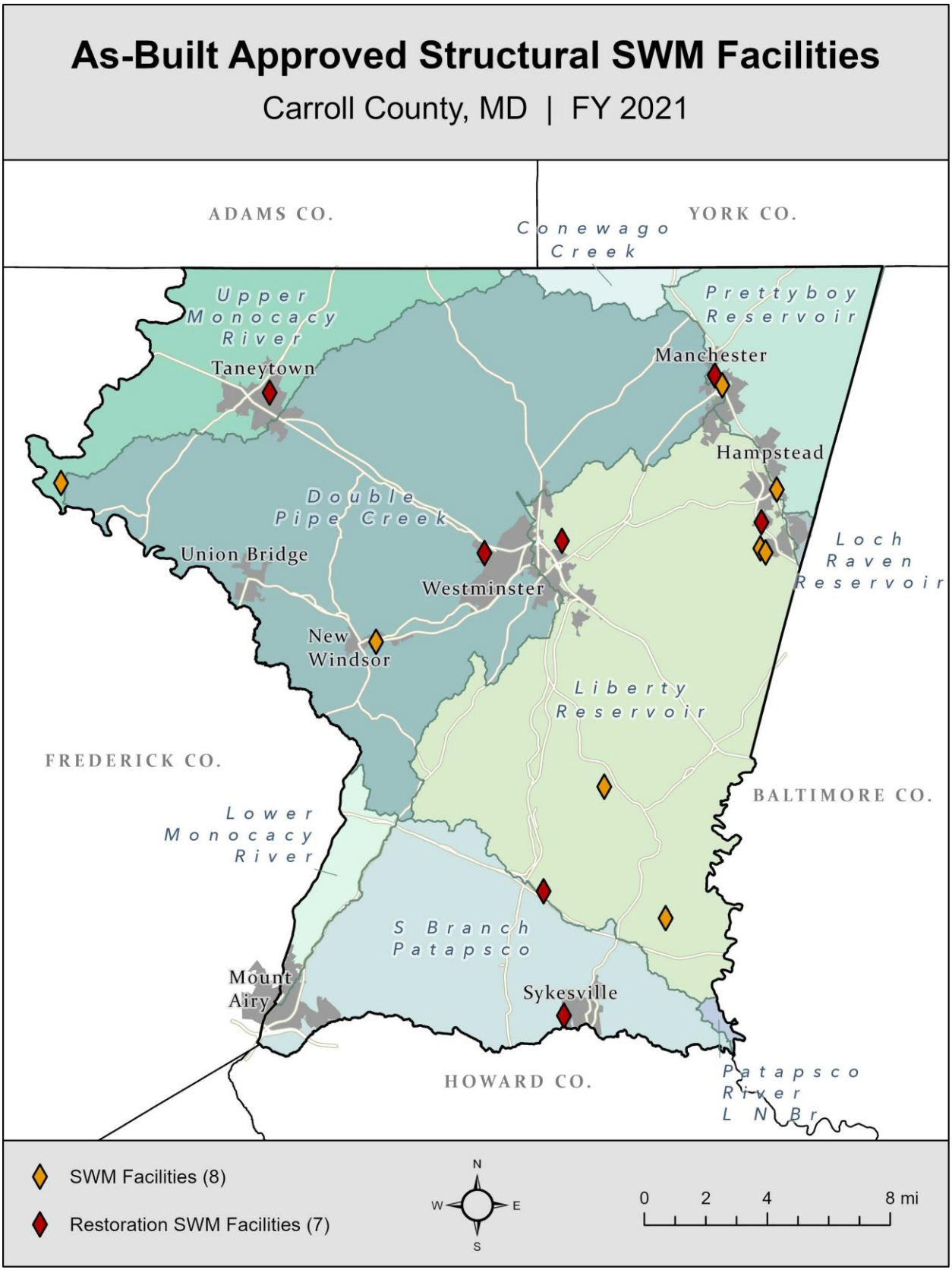

Carroll County Board of Commissioners
MOA 10/7/2021
Town of Hampstead
Town of Manchester
Town of Mount Airy
Town of New Windsor
Town of Sykesville
City of Taneytown
Town of Union Bridge
City of Westminster
Director
Land and Resource Management
Administrative Assistant
Special Projects Coordinator
Agricultural Land Preservation Division
Program Manager
Preservation Specialist
Office Technician
Geographic Information Systems Division
GIS Manager
GIS Analyst III
GIS Analyst II
Bureau of Resource Management
Bureau Chief
Office Technician
Office Associate
Bureau of Development Review
Bureau Chief
Engineering Plan Reviewer
Dev Review Coordinator II
Dev Review Coordinator I (2)
Legal Document Technician
Dev Review Technician
Office Technician
Zoning Administration Division
Zoning Administrator
Zoning Inspectors (2)
Office Technician
Environmental Review Division
Supervisor/Flood Plain Coord.
Forest Conservation Specialist
SWM Program Engineer
Water Resources Technician
Storm Water Reviewer
Environmental Inspection Services Division
Chief Inspector
Compliance Inspectors (4)
Watershed Management Division
Supervisor
NPDES Specialists (2)
Field Manager
Resource Mgmt Technician
Watershed Grants Analyst
Water Resources Division
Supervisor
Hydrogeologist
Watershed Engineer
Water Resources Specialist

Appendix B

Carroll County 2021 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**

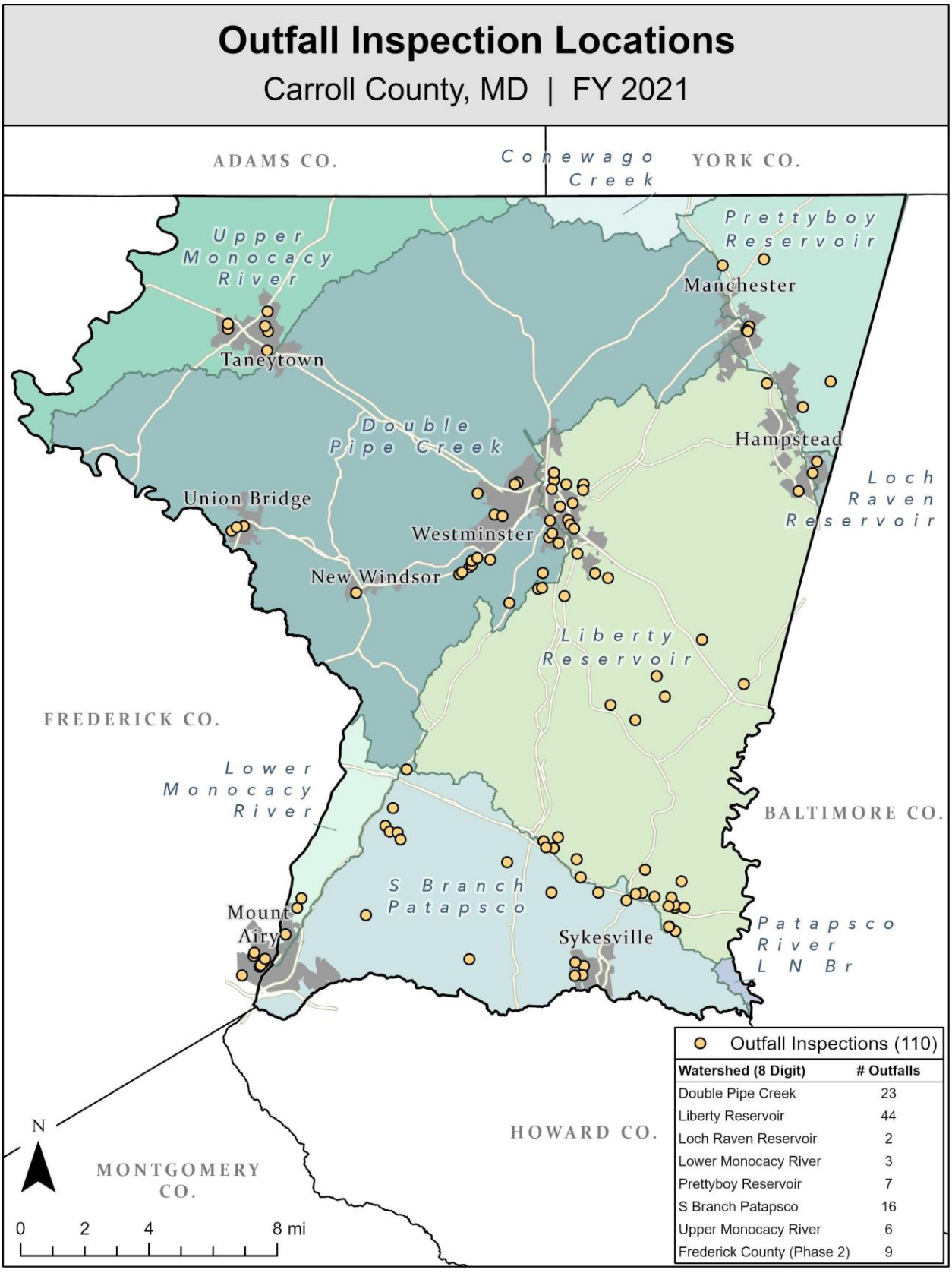
Carroll County, Maryland
2021 As-Built Approved SWM Facilities Map


As-Built Approved Structural SWM Facilities
Carroll County, MD | FY 2021
ADAMS CO.
YORK CO.
Conewago Creek
Upper Monocacy River
Prettyboy Reservoir
Taneytown
Manchester
Hampstead
Double Pipe Creek
Union Bridge
Westminster
Loch Raven Reservoir
New Windsor
Liberty Reservoir
FREDERICK CO.
BALTIMORE CO.
Lower Monocacy River
S Branch Patapsco
Mount Airy
Sykesville
HOWARD CO.
Patapsco River L N Br
SWM Facilities (8)
Restoration SWM Facilities (7)
N
W
E
S
0
2
4
8 mi

Appendix C

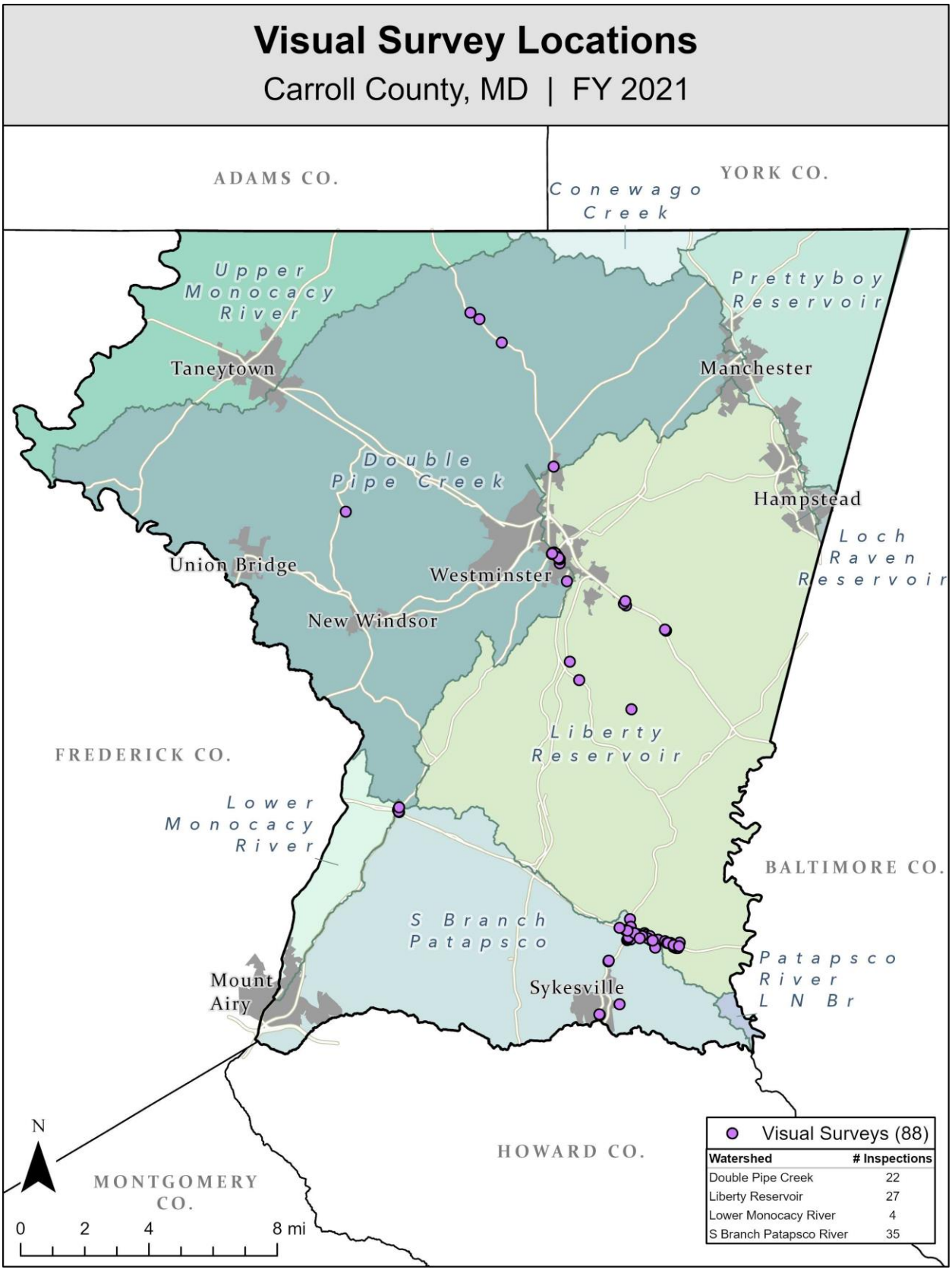
Illicit Discharge Detection and Elimination (IDDE)

- **2021 Outfall Location Map**
- **2021 Illicit Discharge Outfall Screening Actions Taken**
- **2021 Commercial/Industrial Visual Survey Location Map**
- **2021 Commercial/Industrial Visual Survey Summary**
- **2021 Illicit Discharge Incident Report Summary**
- **2021 NPDES MS4 Permit Stormwater Pollution Prevention Annual Training Packet Example**


Outfall Inspection Locations
Carroll County, MD | FY 2021
ADAMS CO.
Conewago Creek
YORK CO.
Upper Monocacy River
Prettyboy Reservoir
Manchester
Taneytown
Double Pipe Creek
Hampstead
Loch Raven Reservoir
Union Bridge
Westminster
New Windsor
Liberty Reservoir
FREDERICK CO.
Lower Monocacy River
BALTIMORE CO.
S Branch Patapsco
Mount Airy
Sykesville
Patapsco River L N Br
HOWARD CO.
MONTGOMERY CO.
N
0 2 4 8 mi
Outfall Inspections (110)
Watershed (8 Digit) # Outfalls
Double Pipe Creek 23
Liberty Reservoir 44
Loch Raven Reservoir 2
Lower Monocacy River 3
Prettyboy Reservoir 7
S Branch Patapsco 16
Upper Monocacy River 6
Frederick County (Phase 2) 9

Appendix C
IDDE Program
2021 Illicit Discharge Outfall Screening Actions Taken
July 1, 2020 – June 30, 2021

Outfall/NPDES Study Point	Action Taken
CR15OUT000253 **Local ID: H001**	Suspicious physical indicator observed at this commercial storm drain outfall with trickle flow included brown foam. No chem test indicator hits. Town of Hampstead DPW and County staff traced up storm drain system at commercial shopping center for potential sources. Located distinct liquid stain pattern on pavement from storm drain inlet to corner of dumpster and apparent dumping stains at inlet directly outside a back door of restaurant. Outfall screening result turned over to Carroll County Bureau of Resource Management Environmental Inspection Services Division (EISD) for Pollutant Discharge investigation and enforcement in coordination with Town of Hampstead. Issue Resolved/Source Eliminated. (See 2021 IDDE Incident Report Summary Table below Case No. PD-21-0004)
CR15OUT000245 **Local ID: M006**	No flow but physical indicator of discarded ashes observed around and below the outfall by County and Manchester DPW staff. Spoke with responsible tenant regarding violation, corrective actions including cleanup outfall easement edge. Town DPW to clean up below outfall. Processed as Pollutant Discharge investigation by County EISD in cooperation with Town of Manchester. (See 2021 IDDE Incident Report Summary Table below, Case No. PD-21-0005) Issue Resolved/Source Eliminated.
CR15OUT000234 **Local ID: MA038** **(Frederick County Phase II)**	No flow. This SWM outfall for Twin Ridge Section One (under active retrofit construction permit GR-20-0024) had light sediment film on rip rap observed by NPDES Compliance Specialist and Carroll County Bureau of Resource Management EISD Inspector in cooperation w/Town of Mount Airy. Processed and investigated under GR-20-0024 grading permit with SWM retrofit contractor notified with required correct measures in BMP pumping/filter bag practice. EISD Inspector to continue monitoring w/enforcement as needed. Issue Resolved/Source Eliminated.


Visual Survey Locations
Carroll County, MD | FY 2021
ADAMS CO.
YORK CO.
Conewago Creek
Upper Monocacy River
Prettyboy Reservoir
Taneytown
Manchester
Double Pipe Creek
Hampstead
Loch Raven Reservoir
Union Bridge
Westminster
New Windsor
Liberty Reservoir
FREDERICK CO.
Lower Monocacy River
BALTIMORE CO.
S Branch Patapsco
Patapsco River L N Br
Mount Airy
Sykesville
HOWARD CO.
MONTGOMERY CO.
N
0 2 4 8 mi
Visual Surveys (88)
Watershed # Inspections
Double Pipe Creek 22
Liberty Reservoir 27
Lower Monocacy River 4
S Branch Patapsco River 35

Appendix C
IDDE Program
2021 Commercial Industrial Visual Survey Summary
Visual Survey Areas Requiring Follow-up Actions
Processed from July 1, 2020 – June 30, 2021

This table presents the **4** of 88 Commercial/Industrial Visual Surveys recommended for follow-up.
No Illicit Discharges Observed / Potential Pollutant Sources / Activity

Visual Survey & Unique ID #	Date	Land Use	Activity/ Location/ Watershed	Potential Significant Pollutant Source	Follow-Up Action/Status
VS-21-0001 0705041104	10/23/20	C	Liberty Road Eldersburg MD	Restaurant Fats/Grease Receptable and Equipment Washing	Provide Stormwater Pollution Prevention Best Management Practices for Businesses Letter w/ County Restaurant BMP guidance document
VS-21-0002 0704023013	12/02/20	C	Baltimore Blvd Westminster MD	Automotive Performance and Collision Repair Shops w/outdoor vehicle parking lot	Provide Stormwater Pollution Prevention Best Management Practices for Automotive Industry Letter w/ County Automotive BMP guidance document
VS-21-0003 0705001528	12/02/20	C	Liberty Road Eldersburg MD	Automotive Sales and Repair Shop w/outdoor equipment and vehicle parking lot	Provide Stormwater Pollution Prevention Best Management Practices for Automotive Industry Letter w/ County Automotive BMP guidance document
VS-21-0004 0705018374	12/04/20	C	Liberty Road Eldersburg MD	Landscape Supply Yard w/loading and unloading area	Provide Stormwater Pollution Prevention Best Management Practices for Businesses Letter w/ County General Business BMP guidance document

Appendix C
IDDE Program
2021 Illicit Discharge Incident Report Summary
Illicit Discharge Complaints Processed from July 1, 2020 – June 30, 2021

Case #	Complaint & Date	Action Taken	Status	Jurisdiction/ Location
PD-20-0009	Citizen reported automotive repair business pressure washing tow truck undercarriage outdoors onto gravel lot/ground. Reported: 07/29/2020	NPDES Compliance Specialist and City of Taneytown Public Works staff investigated discharge. Determined no storm drain system or stream near business activity. Met w/ business owner and made aware of the illicit activity. Owner noted they were currently in process w/ City to connect a wash bay drain to City sanitary system w/ pretreatment if needed. Confirmed by City. Provided Automotive Good Housekeeping BMP info. Informed owner a Groundwater Discharge or Vehicle Washing Permit required from MDE if practice were to continue without sanitary connection.	Illicit Discharge Case Closed: 08/06/2020	York St., City of Taneytown, MD
PD-20-0010	Citizen complaint to EPA/MDE to County and Town of Mt Airy regarding a motorcycle repair shop allegedly discharging paint into municipal water systems. Reported: 08/21/2020	NPDES Compliance Specialist coordinated and provided guidance to Town of Mt Airy Code Enforcement, who performed investigation noting garage shop floor drain but no physical indicator evidence of paint observed. No discharge evidence observed in MS4 or outfall. Business owner, as required, confirmed through licensed plumber the floor drain discharge connection. A pipe discharging outside onto ground (no pollutant observed) was capped and certified by plumber and floor drain sealed. Business provided w/ Automotive Good Housekeeping BMP info and is employing dry cleanup measures. EPA/MDE notified.	Potential Illicit Discharge Case Closed: 09/24/2020	Prospect Rd., Town of Mt. Airy, MD (Frederick Co.) (Phase II MS4 Permit) MOA
PD-20-0011	City of Westminster Public Works Streets Department staff reported white-tinted stormwater flow along concrete gutter pan on Emerald Ave to storm drain inlet at Railroad Ave at	NPDES Compliance coordinated w/ City of Westminster Streets Department Public Works staff for investigation. White cloudy discharge was traced to a freshly painted metal roof commercial building on Locust St. Absorbent pads and rolls placed to catch and filter remaining flow until end of precipitation w/ clean-up performed on public streets by DPW and on-site by the business owner. Materials disposed of per reviewed MSDS label, as required by enforcement investigator. No white residual discharge observed at MS4 dry swale	Illicit Discharge Case Closed: 09/01/2020	Locust St., City of Westminster, MD

	end of a pop-up rain event. Reported: 08/31/2020	stormwater BMP or down gradient where stream channel forms. City DPW staff monitored cleanup until complete on 9/01/20.		
PD-20-0012	Citizen observed and reported paint dumping at street inlet on November 25th through Town of Mount Airy Code Enforcement on 12/01/20. Reported: 12/01/2020	NPDES Compliance Specialist coordinated investigation by County EISD Inspector assigned to Mt Airy area and familiar w/ storm drain system in the subdivision. Paint dumping stains confirmed on concrete part of inlet structure. No residual materials observed at the pipe entering SWM facility. A resident's contractor performing home improvements was determined to be the source. Resident and contractor were contacted by Town of Mt Airy Code Enforcement to immediately cease and desist, followed by enforcement letter w/ corrective actions to be taken that were met w/ copy to HOA. Homeowner BMP brochure mailed to resident and to community HOA.	Illicit Discharge Case Closed: 12/18/2020	North Towne Ct. Town of Mt. Airy, MD
PD-20-0013	MDE Compliance received complaint referral from CC Health Dept regarding commercial business's possible use of caustic cleaning chemicals & cleaning outdoors bypassing oil water separator discharging to ground. Reported: 12/16/2020	NPDES Compliance Specialist, at the request of MDE Water and Science Administration's Compliance Program, participated in an on-site investigation along w/ MDE's Hazardous Waste Inspector on 1/13/21. MDE did not cite any regulatory violations but did make observations of exposed potential pollutant material sources and activities. MDE Compliance recommended, in writing, six corrective measures to prevent potential groundwater contamination in and around the site, including the infiltration SWM BMP facility. Business owner implemented corrective measures per written communication w/ MDE.	Potential Illicit Discharge Case Closed: 01/13/21	Liberty Rd., Eldersburg, MD Carroll County
PD-21-0001	City of Westminster Municipal Staff reported vehicle accident in SWM Facility with leaking automotive fluids. Reported: 02/10/2021	NPDES Compliance Specialist provided City of Westminster police officer w/ MDE emergency contact phone number. MDE Emergency determined they would not respond since there was no apparent catastrophic failure to the fuel system. NPDES Compliance Specialist and County EISD Chief investigated on-site and made request to police officer for Hazmat to respond to check vehicle and to absorb auto fluids observed on surface water, which they did w/ absorbent pads and socks w/ pole extension. They filled out an MDE Oil Spill reporting form.	Illicit Discharge Case Closed: 02/10/2021	Magna Way, City of Westminster, MD

PD-21-0002	Citizen reported possible oil and antifreeze dumping at business and residence. Reported: 02/23/2021	NPDES Compliance Specialist investigated and determined business operation inactive. Potential Pollutant notification letter sent with educational Good Housekeeping BMP brochure for automotive business.	Potential Illicit Discharge Case Closed: 02/23/2021	Baltimore Blvd., Reese, MD Carroll County
PD-21-0003	Citizen reported brown foam and odor in small stream passing through property. Reported: 03/23/21	County BRM/EISD, Watershed Manager, and NPDES Compliance Specialist performed multiple on-site investigations. Observations did not confirm odor but saw slight brown foam and noted the stream dammed up w/ stone creating stagnant pool in low flow. Potential pollutant sources upstream evaluated and eliminated. Some organic debris in upstream channel. Aquatic life confirmed on rocks and in stream (insects and tadpoles). Water sample taken results post-investigation did not indicate abnormal levels for bacteria, etc. Brown foam believed to be natural organic decay source.	Non-Illicit Discharge Case Closed: 03/03/21	Buffalo Rd., Mt. Airy, MD Carroll County
PD-21-0004	County/Municipal staff performing IDDE dry weather outfall screening observed physical indicators of brown greasy foam at commercial shopping center storm drain outfall. Outfall # H001 Reported: 03/23/21	NPDES Compliance Specialist and Town of Hampstead Public Works staff tracked up storm drain system and observed stain pattern from commercial dumpster on parking lot pavement draining toward storm drain inlet. Additional observation of apparent dumping stains at inlet directly behind back door of restaurant. Enforcement letter w/ corrective actions required to be taken by commercial property management company sent w/ Good Housekeeping BMP for Business Owners and GH BMP for Restaurants brochures. Newly contracted property management company contacted County to review corrective actions and confirmed new dumpster replacement & meeting w/ restaurant owner. Follow up inspection of outfall by EISD confirmed normal.	Illicit Discharge Case Closed: 07/15/21	Hanover Pike, Town of Hampstead, MD
PD-21-0005	County/Municipal staff performing IDDE dry weather outfall screening observed dumping of ashes in/around outfall. Outfall # M006 Reported: 03/31/21	NPDES Compliance Specialist and Town of Manchester Public Works staff met with nearby residential property owner, who confirmed dumping by a family member. Reviewed code violation and corrective measures discontinuing activity and clean up measures. Manchester DPW to clean up in outfall and confirm property owner clean up ashes at property line near outfall area. Town of Manchester Public Works confirmed cleanup completed.	Illicit Discharge Case Closed: 05/04/21	Grafton St., Town of Manchester, MD

PD-21-0006	CC Roads Operations staff reported an unpleasant wet area on ground while mowing. Reported: 05/12/21	EISD Inspector performed initial investigation noting gray substance on west side of road and cloudy water at outfall on east side of road. CC Bureau of Utilities was contacted confirming clogged sanitary sewer lines and backup consisting of mix of sewage and fatty oils/grease with two commercial businesses on the system. CC Bureau of Utilities cleared the clogged lines and notified MDE and contacted CC Health Department for follow-up w/ businesses regarding sanitary practice issues.	Illicit Discharge Case Closed: 05/18/21	Oklahoma Rd., Eldersburg, MD Carroll County
PD-21-0007	Citizen reported observing truck auto fluids and soap suds discharging in stormwater runoff from adjoining commercial property onto their residential property. Reported: 05/17/21	EISD Inspector and NPDES Compliance Specialist investigated site and found stormwater runoff drainage patterns but no residual pollutant materials described by complainant. Adjoining business has large trucks and cranes near property line separated by fence. Sent letter to commercial business notifying the County received a complaint and provided brochure with Good Housekeeping BMP information for Businesses and encouraged the business to implement if applicable to their activities.	Non-Illicit Discharge Case Closed: 06/01/21	Mexico Manor Rd., Westminster, MD Carroll County
PD-21-0008	Hampstead DPW staff reported residential oil spill from vehicle maintenance on concrete driveway with oil drip pan, containers etc. Reported: 05/25/21	NPDES Compliance Specialist investigated and observed approximate 4’ x 12’ oil spill area from apparent vehicle maintenance activity. Driveway slopes toward public road. Met with homeowner and requested clean-up corrective actions taken before next rainfall using dry clean-up measures. Follow-up inspection by Town of Hampstead DPW confirmed site properly cleaned-up.	Potential Illicit Discharge Case Closed: 06/09/21	Hillcrest St., Hampstead, MD Carroll County
PD-21-0009	Citizen reported toxic material dripping from fuel island roof onto vehicle during and after rain. Reported: 06/25/21	NPDES Compliance staff investigated during dry weather conditions and during rain event. No staining of fuel island ceiling observed or unusual material or stain on pavement. Clear/normal stormwater discharge flowing from downspout onto pavement.	Non-Illicit Discharge Case Closed: 08/20/21	Hanover Pike, Hampstead, MD Carroll County

Employee Digital Training Packet (Example)

2021 Carroll County NPDES Stormwater Pollution Prevention Training

With Covid 19 interrupting regular operational program and staff schedules we are recommending the following Stormwater Pollution Prevention training material for your staff to satisfy the MS4 & 12SW permit training requirements by June 30, 2021.

Suggested 1 Hour Training Agenda

1) **Fill out a Training record** for all to sign and document what you cover. If all can't be present at one time, they can do this individually. Be sure they sign your training record w/actual training date if other than group.
2) **Watch these 2 videos** posted on YouTube available to the public by the Virginia DOT. They are geared more to public works road and facility operations that will cover the basics to meet the annual training requirement. They are well done and only 7 minutes each. While this is VDOT, the material is generally applicable to our area's NPDES permits and conditions. Where you hear VDOT just think Carroll County Public Works Operations.

   VDOT Good Housekeeping and Pollution Prevention Training
   https://www.youtube.com/watch?v=UMjwckifRz8

   VDOT Illicit Discharge Detection and Elimination Training
   https://www.youtube.com/watch?v=mDAd4C_iI38
3) **Maintenance Facility - NPDES Stormwater Pollution Prevention Training Worksheet (11 x 17)**
   a. Have employee/staff members read first page.
   b. If doing as a group point out from the NPDES Stormwater Permits Chart, the two permits circled in red they need to know about.
      i. Municipal Separate Storm Sewer System Permit (The County is responsible for what enters it's storm drain system and what is discharged from it into waterways).
      ii. 12SW Industrial Stormwater Permit and Stormwater Pollution Prevention Plan for the Maintenance Facility
   c. Review the inside Site Map and Items listed at bottom.
   d. Review Pollution Prevention Good Housekeeping BMPs on the back.
4) **Ask for questions.** Print one for each employee or post one front and back in the maintenance facility for employees to review rather than print multiples.

Please contact us if you have any questions. Assistance with training as needed upon availability.

STORM/WATER POLLUTION PREVENTION AND EVERYDAY BEST MANAGEMENT PRACTICES (BMP'S)

Good Housekeeping Best Management Practices or "BMP's, have been determined to be effective means in preventing substances chemicals, oils, vehicle wash wastewater from coming into contact with stormwater runoff. This fact sheet is designed to help public works employees understand and implement proper work practices that protect water quality at your facility.

Here is how you can protect water quality:

BMP # 1: Good Housekeeping
- ✓ Keep your work area neat and orderly – do not let scrap or waste accumulate
- ✓ Keep unused containers closed tightly
- ✓ Use a drip pan temporarily – clean up drips and spills immediately

BMP # 2: Outdoor Materials Storage
- ✓ Store materials out of rainfall – keep lids on all containers and label them correctly
- ✓ Avoid loading/unloading during poor weather or load/unload under a roof
- ✓ Check on-site storage tank for accuracy and valves for leaks.

BMP #3: Spill Response
- ✓ Protect Storm Drain Inlets
- ✓ NEVER hose or wash down a spill into the street, ditch or storm drain inlet
- ✓ Use a "dry" clean-up method like sweeping or spreading an absorbent
- ✓ Protect storm drains – place an absorbent or pig tail/absorbent sock between the spill and drain
- ✓ Dispose of clean-up wastes properly. Contact supervising staff or safety officer if hazardous

BMP #4: Vehicle & Equipment Fueling and Repair
- ✓ Know where the Emergency shut off is and spill kit is located at the fueling station
- ✓ Stay with vehicles while fueling – avoid overfilling or "topping off"
- ✓ Use dry clean up measures absorbents for small spills
- ✓ Move leaking vehicles and equipment indoors
- ✓ Use a drip pan to catch temporary leaks until they can be fixed
- ✓ Remember - Safety First then respond

BMP #6: Waste Management
- ✓ NEVER use storm drain inlets for waste disposal
- ✓ Close the lid or place a cover on all waste containers

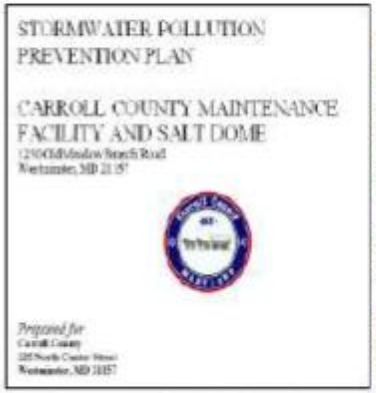
BMP #7: Vehicle and Equipment Washing
- ✓ Wash all vehicles and equipment in designated wash bays
- ✓ Vehicle/equipment wastewater discharges are prohibited from entering the storm drain system or running onto the ground under the current permit and considered an illicit discharge

BMP #8: Roads/Salt Operation/Salt Dome
- ✓ Roads Staff: Know/Review and follow Salt Management BMPs posted nearby in the operations shed

12SW Permitted Facility/SWPPP Employee Training
Carroll County Maintenance Facility

INTRODUCTION AND NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES)
Since the passage of the Clean Water Act in 1972, the quality of our Nation's waters has improved dramatically. However, despite this progress, degraded water bodies such as streams, rivers and reservoirs in Carroll County and the Chesapeake Bay region still exist with leading sources attributed to polluted stormwater runoff. As a result the EPA has developed a permitting program for clean water called the National Pollution Discharge Elimination System, or **NPDES**. EPA has authorized the Maryland Department of the Environment (MDE) to administer numerous types of discharge permits. Two stormwater discharge permits circled in red directly affect Carroll County Government Operations, your work for which training is a mandatory requirement.

In Maryland, governmental public works facilities with certain industrial like activities are required to have their stormwater discharges permitted under the NPDES General Permit For Discharges of Stormwater Associated With Industrial Activity - Maryland General Permit No. 12-SW. The Carroll County Maintenance Facility has an active permit and requires on-site permit implementation subject to inspection and enforcement by both MDE and EPA.


STORMWATER POLLUTION PREVENTION PLAN

CARROLL COUNTY MAINTENANCE FACILITY AND SALT DOME

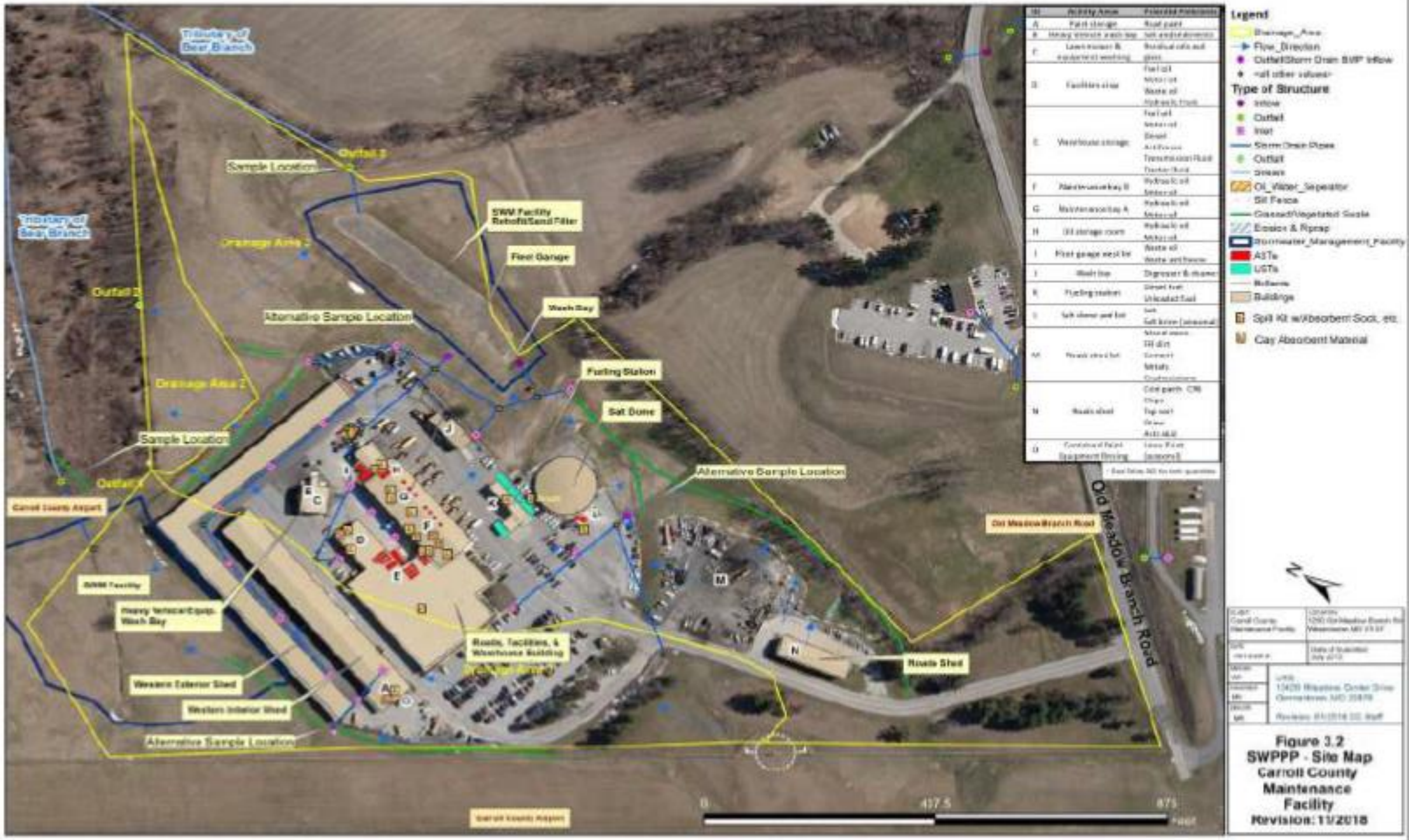
2150 Old Window Branch Road
Westminster, MD 21157

Prepared for
Carroll County
225 North Center Street
Westminster, MD 21157

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)
Pollution spread by contaminated stormwater is a real problem. When stormwater flows across your facility's paved areas, it can pick up debris such as oil leaks/spills, hydraulic line fluids, surplus salt, dirt/grass off equipment and other materials. Uncontrolled, stormwater runoff pollutants can contaminate on-site stormwater management facilities discharging to local waterways or infiltrate into the groundwater well supply.

As required by the 12SW permit, a comprehensive Stormwater Pollution Prevention Plan, or SWPPP was developed specifically for Maintenance Facility's operations with input from staff and experienced environmental consultants.

This training guidance document contains a site map of potential pollutant sources identified in the SWPPP and many opportunities to help prevent stormwater pollution through everyday Good Housekeeping/Best Management Practices (BMPs). You may think this process doesn't apply to your specific job function; however, all employees need to understand the overall scope of this facility's **Stormwater Pollution Prevention Plan (SWPPP)** and the important role each person plays in its success.

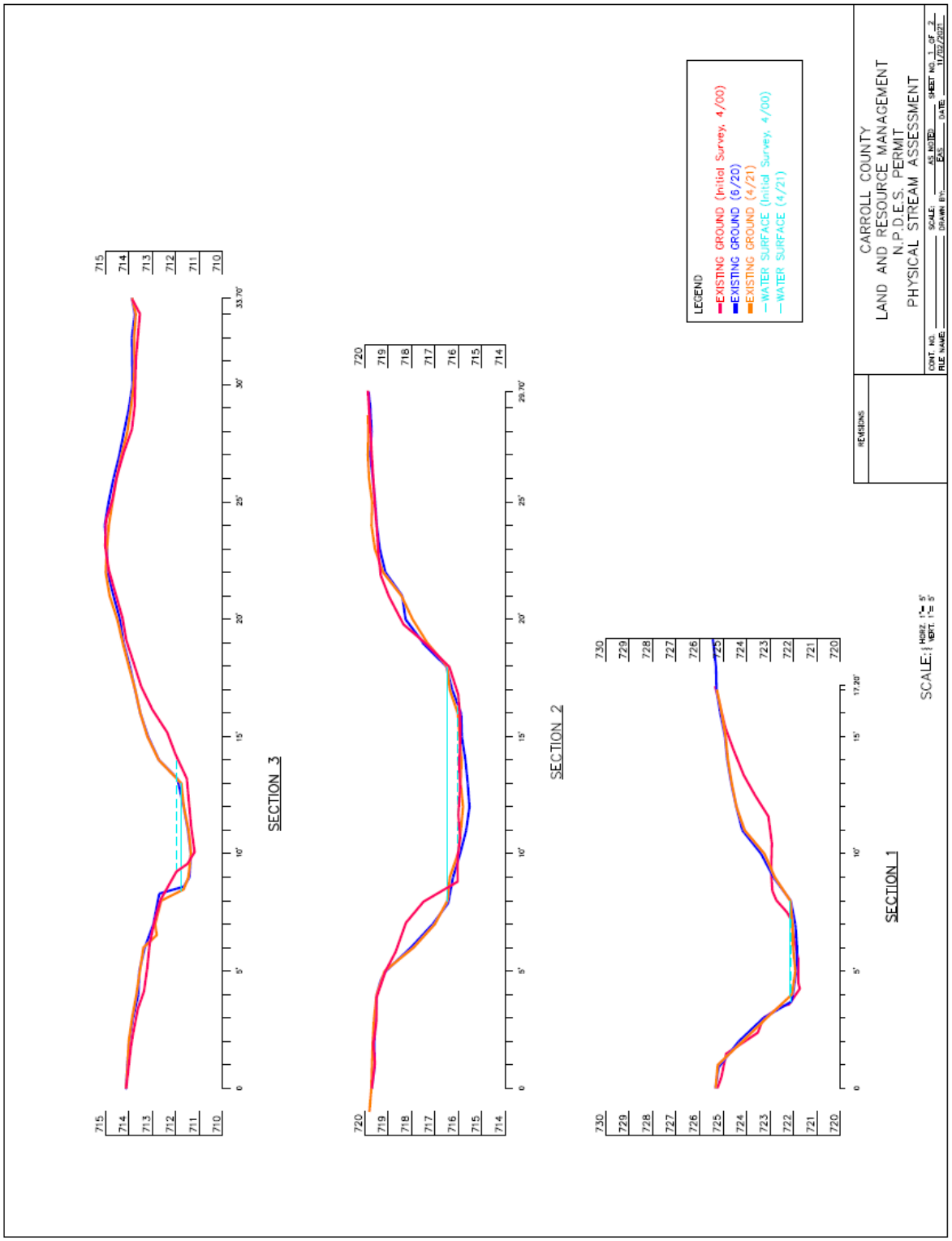


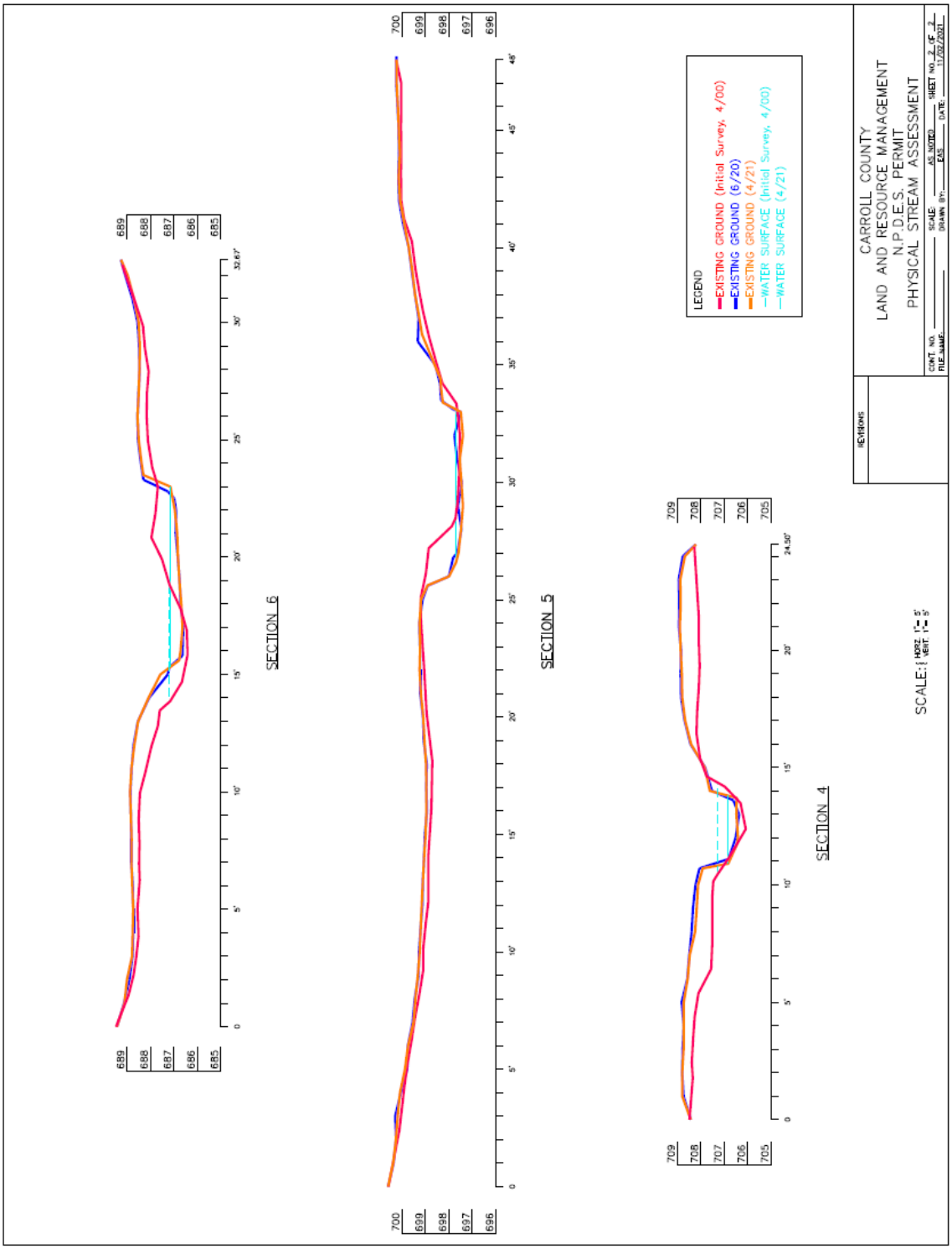
IDENTIFY ON SITE MAP (Initial when completed): ____ Review Activity Area Locations and Associated Potential Pollutants Locations. ____ Note where the storm drain system: inlets, storm drain pipes, outfall/bmp inflow discharge points (alternative water quality sampling locations), Stormwater Facilities (2), and Outfalls #1 and #3 discharging to stream locations. ____ Note Storm Drain Inlets near your work area(s). ____ Note spill kit locations.

Appendix D

Monumented Cross Sections

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


LEGEND
EXISTING GROUND (Initial Survey, 4/00)
EXISTING GROUND (6/20)
EXISTING GROUND (4/21)
WATER SURFACE (Initial Survey, 4/00)
WATER SURFACE (4/21)
CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
SECTION 1
SECTION 2
SECTION 3
SCALE: 1 HORZ. 1"= 5'
1 VERT. 1"= 5'


SECTION 6
SECTION 5
SECTION 4
LEGEND
EXISTING GROUND (Initial Survey, 4/00)
EXISTING GROUND (6/20)
EXISTING GROUND (4/21)
WATER SURFACE (Initial Survey, 4/00)
WATER SURFACE (4/21)
CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
SCALE: HORZ 1"= 5'
VERT 1"= 5'

Appendix E

Macro-Invertebrate Taxonomic Identifications Results

Order	Family	Taxon	Outfall	Instream
Basommatophora	Physidae	Physa		1
Coleoptera	Dytiscidae	Agabus	2	
Coleoptera	Elmidae	Optioservus		13
Coleoptera	Elmidae	Stenelmis	11	11
Coleoptera	Hydrophilidae	Cymbiodyta	1	
Coleoptera	Scirtidae	SCIRTIDAE	1	
Diptera	Chironomidae	Cricotopus	1	2
Diptera	Chironomidae	Diamesa	13	3
Diptera	Chironomidae	DIAMESINAE	4	
Diptera	Chironomidae	Eukiefferiella	1	2
Diptera	Chironomidae	Micropsectra	2	6
Diptera	Chironomidae	Orthocladiinae	1	2
Diptera	Chironomidae	Orthocladius	8	11
Diptera	Chironomidae	Parametriocnemus	3	6
Diptera	Chironomidae	Polypedilum	16	4
Diptera	Chironomidae	Potthastia		1
Diptera	Chironomidae	Rheocricotopus		4
Diptera	Chironomidae	Rheotanytarsus	1	
Diptera	Chironomidae	Tanytarsus	4	
Diptera	Chironomidae	Thienemanniella	1	
Diptera	Chironomidae	Thienemannimyia Group	45	12
Diptera	Chironomidae	Tvetenia		14
Diptera	Simuliidae	Simulium	1	
Diptera	Tabanidae	Chrysops		1
Diptera	Tipulidae	Antocha		5
Ephemeroptera	Baetidae	Acerpenna		1
Ephemeroptera	Baetidae	Diphetor		4
Ephemeroptera	Heptageniidae	Stenonema		3
Haplotaxida	Naididae	NAIDIDAE		2
Trichoptera	Hydropsychidae	Cheumatopsyche	1	7
Trichoptera	Hydropsychidae	Hydropsyche	5	17
Trichoptera	Leptoceridae	LEPTOCERIDAE	1	
Trichoptera	Philopotamidae	Chimarra		3
Trichoptera	Uenoidae	Neophylax		8
Tubificida	Tubificidae	TUBIFICIDAE		1
		Total Individuals	N/A	157
		Total Taxa	N/A	22

Appendix F

Chesapeake Bay Edge of Stream (EOS) 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, *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 Treatment (2014) – Prettyboy Watershed

Project	Project Type	Drainage Area (Ac.)	Impervious Area (Ac.)	Pervious Area (Ac.)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (Tons)
Whispering Valley	Retrofit	88.3	20.9	67.4	RR	2.12	1,047.69	67%	701.77	64.30	78%	50.36	13.91	84%	11.71
Small Crossings	Retrofit	26.73	9.07	17.66	RR	1.86	329.50	67%	219.44	22.92	78%	17.84	5.23	84%	4.37
Small Crossings	Bio-Retention	1.15	0.51	0.64	RR	1	14.72	60%	8.79	1.14	70%	0.79	0.27	75%	0.20

Impervious to Pervious (2014) – 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

Forest Buffer Easements (2014) – Prettyboy Watershed

Easement Type	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	42.580	2009 -current	498.1860	45	224.1837	28.9544	40	11.5818	7.6644	55	4.2154

Grass Buffer Easements (2014) – Prettyboy Watershed

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

Stream Buffer Plantings (2014) – 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 (2020) – Prettyboy Watershed

Location	Tons	Material Removed	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	5.92	inorganic	3.78	22.378	0.84	4.973	1400	8288	4.144
Manchester	0.2	inorganic	3.78	0.756	0.84	0.168	1400	280	0.140

Street Sweeping (2020) – Prettyboy Watershed

Location	Lane Miles	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Hampstead		1pass/week	0	3%	0	0	8%	0	0	16%	0
		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	2.54	1pass/4weeks	92.5322	1%	0.925322	17.5006	3%	0.525018	25.4762	6%	1.528572
Manchester		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	2.83	1pass/4weeks	103.0969	1%	1.030969	19.4987	3%	0.584961	28.3849	6%	1.703094

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Loch Raven Watershed

Grass Buffer Easements (2014) – Loch Raven Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	2.480	2009 -current	29.0160	30	8.70480	1.6864	40	0.6746	0.4464	55	0.2455

Forest Buffer Easements (2014) – Loch Raven Watershed

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

Catch Basin/inlet Cleaning (2020) – Loch Raven Watershed

Location	Tons	Material Removed	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		organic	4.44	0.000	0.48	0.000	400	0	0.000
Hampstead	10.66	Inorganic	3.78	40.295	0.84	8.954	1400	14924	7.462

Street Sweeping (2020) – Loch Raven Watershed

Location	Lane Miles	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Hampstead		1pass/week	0	3%	0	0	8%	0	0	16%	0
		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	6.57	1pass/4weeks	239.3451	1%	2.393451	45.2673	3%	1.358019	65.8971	6%	3.953826

Tree Plantings Upland (2020) – Loch Raven Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Hampstead WWTP (2020)	2.56	11.12	28.4672	1.78	4.5568	2805	7180.8000

Tree Plantings Riparian (2020) – Loch Raven Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	Total Loads (Lbs.)	TSS Pollutant Loads Reduced (Lbs.)
Hampstead WWTP (2020)	3.21	35.6952	114.5816	46.0314	5.7138	18.3413	7.9929	9,004.05	28,903.00	14,159.31

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Lower Monocacy Watershed

Stream Buffer Plantings (2014) – 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 (2014) – Lower Monocacy Watershed

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

Forest Buffer Easements (2014) – Lower Monocacy Watershed

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

Street Sweeping (2020) – Lower Monocacy Watershed

Location	Lane Mile Acreage	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Mount Airy		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	4.81	1pass/4weeks	175.2283	0%	0	33.1409	0%	0	48.2443	0%	0

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Upper Monocacy Watershed

Stream Buffer Plantings (2014) – 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 (2014) – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	13.780	2009 -current	161.2260	30	48.36780	9.3704	40	3.7482	2.4804	55	1.3642

Forest Buffer Easements (2014) – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	11.820	2009 -current	138.2940	45	62.2323	8.0376	40	3.2150	2.1276	55	1.1702

Stormwater Facilities Treatment (2014) – Upper Monocacy Watershed

Project	Project Type	Drainage Area (Ac.)	Impervious Area (Ac.)	Pervious Area (Ac.)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (Tons)
Robert's Mill	Retrofit	303.6	88.48	215.12	ST	1.15	3677.04	36%	1,330.81	242.03	57%	137.65	53.99	72%	39.08

Street Sweeping (2020) – Upper Monocacy Watershed

Location	Lane Mile Acreage	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Taneytown		1pass/week	0	3%	0	0	8%	0	0	16%	0
		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	2.28	1pass/4weeks	83.0604	1%	0.830604	15.7092	3%	0.471276	22.8684	6%	1.372104

Conservation Easements (2020) – Upper Monocacy Watershed

Easement BMP	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Riparian Conservation Landscaping	0.170	0.8895	1.1457	0.0883	0.1256	0.00	0.00
Non-Riparian Conservation Landscaping	1.450	19.4735	7.5980	3.0450	0.7540	5,150.40	0.00
Forest Conservation Buffer	0.260	3.3488	2.7482	0.3692	0.2860	835.12	640.90

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Liberty Watershed

Stream Restoration (2014) – Liberty Watershed

**Actual numbers used in lieu of planning rate

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

Grass Buffer Easements (2014) – Liberty Reservoir Watershed

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

Forest Buffer Easements (2014) – Liberty Reservoir Watershed

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

Stream Buffer Plantings (2014) – Liberty Watershed

Project	Acres	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency(%)	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency(%)	TSS Pollutant Loads Reduced (Tons)
Planting 1	0.14	1.5120	66	0.9979	0.0602	77	0.0464	0.0098	57	0.0056
Planting 2	1.43	15.4440	66	10.1930	0.6149	77	0.4735	0.1001	57	0.0571
Planting 3	1.19	12.8520	66	8.4823	0.5117	77	0.3940	0.0833	57	0.0475
Planting 4	0.6	6.4800	66	4.2768	0.2580	77	0.1987	0.0420	57	0.0239
Planting 5	0.32	3.4560	66	2.2810	0.1376	77	0.1060	0.0224	57	0.0128
Planting 6	0.31	3.3480	66	2.2097	0.1333	77	0.1026	0.0217	57	0.0124
Planting 7	0.3	3.2400	66	2.1384	0.1290	77	0.0993	0.0210	57	0.0120
Planting 8	0.16	1.7280	66	1.1405	0.0688	77	0.0530	0.0112	57	0.0064
Planting 9	1.02	11.0160	66	7.2706	0.4386	77	0.3377	0.0714	57	0.0407
Planting 10	0.84	9.0720	66	5.9875	0.3612	77	0.2781	0.0588	57	0.0335
Planting 11	3.18	34.3440	66	22.6670	1.3674	77	1.0529	0.2226	57	0.1269
Planting 12	2.92	31.5360	66	20.8138	1.2556	77	0.9668	0.2044	57	0.1165
Planting 13	1.15	12.4200	66	8.1972	0.4945	77	0.3808	0.0805	57	0.0459
Planting 14	0.24	2.5920	66	1.7107	0.1032	77	0.0795	0.0168	57	0.0096
Planting 15	0.52	5.6160	66	3.7066	0.2236	77	0.1722	0.0364	57	0.0207
Planting 16	1.41	15.2280	66	10.0505	0.6063	77	0.4669	0.0987	57	0.0563
Planting 17	0.1	1.0800	66	0.7128	0.0430	77	0.0331	0.0070	57	0.0040
Planting 18	4.06	43.8480	66	28.9397	1.7458	77	1.3443	0.2842	57	0.1620
Planting 19	1.22	13.1760	66	8.6962	0.5246	77	0.4039	0.0854	57	0.0487
Planting 20	0.21	2.2680	66	1.4969	0.0903	77	0.0695	0.0147	57	0.0084
Planting 21	0.87	9.3960	66	6.2014	0.3741	77	0.2881	0.0609	57	0.0347
Planting 22	0.1	1.0800	66	0.7128	0.0430	77	0.0331	0.0070	57	0.0040
Planting 23	0.76	8.2080	66	5.4173	0.3268	77	0.2516	0.0532	57	0.0303
Planting 24	0.44	4.7520	66	3.1363	0.1892	77	0.1457	0.0308	57	0.0176
Planting 25	0.38	4.1040	66	2.7086	0.1634	77	0.1258	0.0266	57	0.0152
Planting 26	0.3	3.2400	66	2.1384	0.1290	77	0.0993	0.0210	57	0.0120

Planting 27	0.16	1.7280	66	1.1405	0.0688	77	0.0530	0.0112	57	0.0064
Planting 28	0.2	2.1600	66	1.4256	0.0860	77	0.0662	0.0140	57	0.0080
Planting 29	0.9	9.7200	66	6.4152	0.3870	77	0.2980	0.0630	57	0.0359
Planting 30	0.38	4.1040	66	2.7086	0.1634	77	0.1258	0.0266	57	0.0152
Planting 31	0.11	1.1880	66	0.7841	0.0473	77	0.0364	0.0077	57	0.0044
Planting 32	2.07	22.3560	66	14.7550	0.8901	77	0.6854	0.1449	57	0.0826
Planting 33	0.38	4.1040	66	2.7086	0.1634	77	0.1258	0.0266	57	0.0152
Planting 34	4	43.2000	66	28.5120	1.7200	77	1.3244	0.2800	57	0.1596
Planting 35	1.88	20.3040	66	13.4006	0.8084	77	0.6225	0.1316	57	0.0750
Planting 36	0.54	5.8320	66	3.8491	0.2322	77	0.1788	0.0378	57	0.0215

Stormwater Facilities Treatment (2014) – Liberty Reservoir Watershed

Project	Project Type	Drainage Area (Ac.)	Impervious Area (Ac.)	Pervious Area (Ac.)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (lbs.)
Hickory Ridge	Retrofit	23.75	4.8	18.95	ST	2.50	278.10	39%	109.34	16.26	62%	10.08	3.44	79%	5,419.89
Bateman SW Pond	Facility	47.25	4.52	42.73	RR	2.50	530.64	68%	359.24	26.01	79%	20.50	4.98	85%	8,455.68
Marriot Wood 1 Facility #2	Retrofit	7.12	2.04	5.08	ST	2.5	86.08	39%	33.84	5.63	62%	3.49	1.25	79%	1,975.34
Marriot Wood II	Retrofit	7.51	1.38	6.13	ST	2.5	87.32	39%	34.33	4.97	62%	3.08	1.04	79%	1,633.45
Elderwood Village	Retrofit	7.64	2.47	5.17	ST	2.5	93.63	39%	36.81	6.40	62%	3.97	1.45	79%	2,283.50
Westminster Airport Pond	Retrofit	204.84	85	119.84	ST	1.4	2,594.77	38%	975.73	195.18	59%	115.34	45.79	75%	68,874.58
Oklahoma II Foothills	Retrofit	23.72	6.06	17.66	ST	2.35	283.45	39%	111.06	17.84	62%	11.01	3.90	78%	6,126.83
Oklahoma Phase I	Retrofit	24.44	7.27	17.17	ST	2.5	296.67	39%	116.63	19.67	62%	12.19	4.40	79%	6,936.55
Edgewood	Retrofit	38	12.12	25.88	ST	2.5	464.94	39%	182.79	31.61	62%	19.60	7.14	79%	11,261.27
Upper Patapsco Phase 1	Facility	24.6	10.1	14.5	ST	2.5	311.13	39%	122.32	23.30	62%	14.45	5.46	79%	8,604.68
Upper Patapsco Phase 2	Facility	101.8	2.98	98.82	ST	2.5	1,112.85	39%	437.52	47.53	62%	29.47	8.23	79%	12,970.23
Quail Meadowns	Retrofit	111.97	23.25	88.72	ST	1	1,313.90	35%	459.21	77.44	55%	42.53	16.44	70%	22,983.68
Heritage Heights	Retrofit	21.38	4.1	17.28	ST	1	249.35	35%	87.15	14.36	55%	7.89	3.01	70%	4,213.01
Westminster High School	Retrofit	117.25	32.59	84.66	ST	2.5	1,412.96	39%	555.50	91.48	62%	56.72	20.27	79%	31,943.71
Westminster Comm. Pond	Facility	250.22	63.89	186.33	ST	2.5	2,989.88	39%	1,175.47	188.10	62%	116.61	41.15	79%	64,869.58
Diamond Hills Section 5	Retrofit	51.8	12.94	38.86	ST	2.03	617.67	39%	241.39	38.58	61%	23.72	8.41	78%	13,162.02
Wilda Drive	Facility	6.75	1.6	5.15	ST	1.07	80.10	36%	28.50	4.92	56%	2.75	1.06	71%	1,514.86
Collins Estates	Retrofit	16.34	3.18	13.16	ST	1.87	190.78	39%	74.26	11.03	61%	6.75	2.32	78%	3,614.06
High Point	Retrofit	4.7	0.91	3.79	RR	1	54.86	60%	32.78	3.17	70%	2.21	0.67	75%	997.35
Finksburg Industrial Park	Retrofit	67.8	22.12	45.68	ST	1.04	831.78	35%	293.78	57.03	56%	31.65	12.93	71%	18,267.71
Elderwood/ Village #2	Retrofit	144	61	83	ST	1.01	1,829.70	35%	641.22	138.78	55%	76.43	32.65	70%	45,769.09
Oklahoma 4	Retrofit	56.93	14.52	42.41	RR	2.5	722.59	68%	489.20	85.19	79%	67.14	51.77	85%	87,899.27
Miller/Watts	Retrofit	39.65	25.63	14.02	ST	2.5	543.56	39%	213.70	49.34	62%	30.59	12.26	79%	19,322.47
Central MD (Wet)	Retrofit	92.72	25.83	66.89	ST	2.5	1,117.61	39%	439.39	72.42	62%	44.90	16.05	79%	25,294.67
Randomhouse	Retrofit	41.8	16.38	25.42	ST	2.5	541.53	39%	212.90	54.99	62%	34.09	25.37	79%	39,983.79
Central MD (Dry)	Retrofit	61.89	29.19	32.7	RR	2.5	799.77	68%	541.44	63.39	79%	49.96	15.13	85%	25,694.59
Eldersburg Business Center	Retrofit	97.98	52.7	45.28	ST	2.34	1,295.33	39%	507.50	108.53	62%	66.98	26.36	78%	41,373.95
Feeser Property	Facility	4.38	1.72	2.66	RR	1	55.04	60%	32.89	4.05	70%	2.83	0.94	75%	1,412.80
Shiloh Middle	Retrofit	83.83	25.64	58.19	RR	1.81	1,020.74	66%	678.40	68.35	78%	53.10	15.35	83%	25,599.63
Aspen Run	Retrofit	14.4	1.7	12.7	RR	1.37	163.17	64%	104.55	8.33	75%	6.25	1.64	80%	2,630.18

Stormwater Facilities Treatment (2020) – Liberty Reservoir Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Pervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (lbs)
Willow Pond	Retrofit	349.61	77.17	272.44	ST	2.50	3,804.78	39%	1,495.78	627.24	62%	388.85	1,646,262.69	79%	1,297,381.54

Conservation Easements (2020) – Liberty Reservoir Watershed

Easement BMP	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Riparian Conservation Landscaping	4.600	24.104	31.51	2.392	4.025	0.00	0.00
Non-Riparian Conservation Landscapi	5.550	74.5365	29.082	11.655	2.886	19,713.60	0.00
Forest Conservation Buffer	9.210	118.6248	97.3497	13.0782	10.131	29,582.52	22,702.65

Street Sweeping (2020) – Liberty Reservoir Watershed

Location	Lane Mile Acreage	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Westminster	6.12	1pass/week	222.9516	3%	6.688548	42.1668	8%	3.373344	61.3836	16%	9.821376
		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	0.91	1pass/4weeks	33.1513	1%	0.331513	6.2699	3%	0.188097	9.1273	6%	0.547638
Hampstead		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	6.37	1pass/4weeks	232.0591	1%	2.320591	43.8893	3%	1.316679	63.8911	6%	3.833466

Catch Basin/inlet Cleaning (2020) – Liberty Reservoir Watershed

Location	Tons	Material Removed	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		Inorganic	3.78	0.000	0.84	0.000	1400	0	0.000
Hampstead	17.44	Inorganic	3.78	65.923	0.84	14.650	1400	24416	12.208
Westminster			3.78	0.000	0.84	0.000	1400	0	0.000

Tree Plantings Upland (2020) – Liberty Reservoir Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Cornias	9.11	11.12	101.3032	1.78	16.2158	2,805	25,553.5500
Shugars	0.86	11.12	9.5632	1.78	1.5308	2,805	2,412.3000

Tree Plantings Riparian (2020) – Liberty Reservoir Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	Total Loads (Lbs.)	TSS Pollutant Loads Reduced (Lbs.)
Cornias	5.84	64.9408	379.2543	83.7456	10.3952	60.7080	14.5416	16,381.20	95,666.21	25,760.24
Shugars	2.14	23.7968	50.9252	30.6876	3.8092	8.1517	5.3286	6,002.70	12,845.78	9,439.54

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Double Pipe Creek Watershed

Stormwater Facilities Treatment (2014) – Double Pipe Creek Watershed

Project	Project Type	Drainage Area (Ac.)	Impervious Area (Ac.)	Pervious Area (Ac.)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (Tons)
Sunnyside	Facility	30.2	2.69	27.51	ST	1.91	338.27	39%	131.83	16.38	61%	10.04	3.11	78%	2.42
Friendship Overlook	Retrofit	82.01	15.88	66.13	ST	1.68	957.17	39%	369.06	55.27	61%	33.50	11.62	77%	8.96
CC Farm Museum	Facility	6.44	0.45	5.99	RR	1.4	71.58	64%	46.03	3.34	75%	2.51	0.62	81%	0.50
Farm Museum 1	Facility	11.61	2.3	9.31	RR	1.44	135.74	65%	87.70	7.89	76%	5.96	1.66	81%	1.35
Farm Museum 2	Facility	0.09	0.05	0.04	RR	1	1.20	60%	0.72	0.10	70%	0.07	0.02	75%	0.02
Farm Museum 3	Facility	0.79	0.06	0.73	RR	1	8.80	60%	5.26	0.42	70%	0.29	0.08	75%	0.06
Farm Museum 4	Facility	0.03	0.03	0	RR	1	0.46	60%	0.27	0.05	70%	0.04	0.01	75%	0.01
Farm Museum 5	Facility	0.01	0.01	0	RR	1	0.15	60%	0.09	0.02	70%	0.01	0.00	75%	0.00
CC Maintenanc	Retrofit	45.49	25.05	20.44	ST	2.5	604.02	39%	237.47	51.12	62%	31.70	12.45	79%	9.81
Blue Ridge Manor	Retrofit	36.28	9.26	27.02	RR	1.86	433.49	67%	288.69	27.27	78%	21.23	5.97	84%	4.98
Exceptional Center	Retrofit	46.5	14.7	31.8	ST	1.51	568.35	38%	216.22	38.52	60%	23.03	8.69	76%	6.62
Elmer Wolfe	Facility	9.78	4.26	5.52	ST	1.55	124.79	38%	47.65	9.57	60%	5.74	2.26	76%	1.73

Grass Buffer Protection Easements (2014) – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	97.510	2009 -current	1140.8670	30	342.26010	66.3068	40	26.5227	17.5518	55	9.6535

Forest Buffer Protection Easements (2014) – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	48.440	2009 -current	566.7480	45	255.0366	32.9392	40	13.1757	8.7192	55	4.7956

Tree Plantings (2014) – Double Pipe Creek Watershed

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

Impervious to Pervious (2014) – Double Pipe Creek Watershed

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

Conservation Easements (2020) – Double Pipe Creek Watershed

Easement BMP	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Riparian Conservation Landscaping	1.580	8.2792	10.823	0.8216	1.3825	0.00	0.00
Non-Riparian Conservation Landscaping	0.310	4.1633	1.6244	0.651	0.1612	1,101.12	0.00
Forest Conservation Buffer	5.310	68.3928	56.1267	7.5402	5.841	17,055.72	13,089.15

Street Sweeping (2020) – Double Pipe Creek Watershed

Location	Lane Miles	Frequency	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	12.32	1pass/week	36.43	448.8176	3%	13.464528	6.89	84.8848	8%	6.790784	10.03	123.5696	16%	19.771136
		1pass/2weeks	36.43	0	2%	0	6.89	0	5%	0	10.03	0	11%	0
	1.15	1pass/4weeks	36.43	41.8945	1%	0.418945	6.89	7.9235	3%	0.237705	10.03	11.5345	6%	0.69207
Taneytown		1pass/2weeks	36.43	0	2%	0	6.89	0	5%	0	10.03	0	11%	0
	0.16	1pass/4weeks	36.43	5.8288	1%	0.058288	6.89	1.1024	3%	0.033072	10.03	1.6048	6%	0.096288
Union Bridge	0.43	1pass/week	36.43	15.6649	3%	0.469947	6.89	2.9627	8%	0.237016	10.03	4.3129	16%	0.690064
		1pass/4weeks	36.43	0	1%	0	6.89	0	3%	0	10.03	0	6%	0
Manchester		1pass/2weeks	36.43	0	2%	0	6.89	0	5%	0	10.03	0	11%	0
	1.07	1pass/4weeks	36.43	38.9801	1%	0.389801	6.89	7.3723	3%	0.221169	10.03	10.7321	6%	0.643926

Catch Basin/Inlet Cleaning (2020) – Double Pipe Creek Watershed

Location	Tons	Material Removed	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	0.19	Inorganic	3.78	0.718	0.84	0.160	1400	266	0.133
New Windsor			3.78	0.000	0.84	0.000	1400	0	0.000
Union Bridge	0.4	Inorganic	3.78	1.512	0.84	0.336	1400	560	0.280
Westminster		Inorganic	3.78	0.000	0.84	0.000	1400	0	0.000
County			3.78	0.000	0.84	0.000	1400	0	0.000

Tree Plantings Upland (2020) – Double Pipe Creek Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Lindsell	0.31	11.12	3.4472	1.78	0.5518	2805	869.5500

Tree Plantings Riparian (2020) – Double Pipe Creek Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	Total Loads (lbs)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	Total Loads (Lbs.)	TSS Pollutant Loads Reduced (Lbs.)
Lindsell	0.09	1.0008	0.0901	1.2906	0.1602	0.0144	0.2241	252.45	22.72	396.99

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

South Branch Patapsco Watershed

Tree Plantings (2014) – South Branch Patapsco Watershed

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

Grass Buffer Protection Easements (2014) – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	83.630	2009 -current	978.4710	30	293.54130	56.8684	40	22.7474	15.0534	55	8.2794

Forest Buffer Protection Easements (2014) – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	97.860	2009 -current	1144.9620	45	515.2329	66.5448	40	26.6179	17.6148	55	9.6881

Stormwater Facilities Treatment (2014) – South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac.)	Impervious Area (Ac.)	Pervious Area (Ac.)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	TP BMP Efficiency (%)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	TSS BMP Efficiency (%)	TSS Pollutant Loads Reduced (Tons)
Arthurs Ridge	Retrofit	51.17	5.14	46.03	ST	2.13	575.77	39%	225.28	28.48	62%	17.54	5.48	78%	4.30
South Carroll High-Fine Arts	New constructio	24.22	12.94	11.28	RR	1.00	319.81	60%	191.08	26.72	70%	18.68	6.48	75%	4.86
Brimfield	Retrofit	34.69	9.15	25.54	RR	2.5	415.83	68%	281.51	26.45	79%	20.84	5.81	85%	4.94
Harvest Farms 1A	Retrofit	43.8	15.47	28.33	ST	2.5	542.66	39%	213.34	38.33	62%	23.76	8.79	79%	6.93
Parrish Park	Retrofit	94.23	18.2	76.03	ST	1	1,099.58	35%	384.30	63.45	55%	34.85	13.33	70%	9.32
Clipper Hills Gardenia	Retrofit	33.19	11.08	22.11	ST	2.5	408.31	39%	160.53	28.23	62%	17.50	6.42	79%	5.06
Clipper hills Hilltop	Retrofit	80.17	18.54	61.63	ST	2.5	949.27	39%	373.20	57.83	62%	35.86	12.47	79%	9.83
Carroltowne 2B	Retrofit	34.61	10.38	24.23	ST	2.5	420.50	39%	165.32	27.96	62%	17.34	6.26	79%	4.94
Carroltowne 2A	Retrofit	87.73	34.43	53.3	ST	2.49	1,102.42	39%	433.25	81.11	62%	50.26	18.88	79%	14.87
Benjamins Claim	Retrofit	47.1	15.78	31.32	ST	2.21	579.69	39%	226.93	40.14	62%	24.73	9.14	78%	7.16
Eldersburg Estates 3-5	Retrofit	34.91	8.16	26.75	ST	2.5	413.75	39%	162.67	25.29	62%	15.68	5.46	79%	4.31
Braddock Manor West	Retrofit	49.3	7.65	41.65	ST	2.5	566.87	39%	222.86	30.84	62%	19.12	6.28	79%	4.95
Benjamins Claim Basin B	Retrofit	1.33	0.55	0.78	ST	1.04	16.84	35%	5.95	1.26	56%	0.70	0.30	71%	0.21
Hawks Ridge	Retrofit	63.48	19.8	43.68	ST	2.07	774.68	39%	302.93	52.24	62%	32.14	11.77	78%	9.21
Merridale Gardens	Retrofit	81	23.81	57.19	RR	1.77	981.95	66%	651.37	64.83	78%	50.27	14.48	83%	12.05
Shannon Run	Retrofit	213.5	34.1	179.4	ST	2.5	2,459.25	39%	966.85	134.77	62%	83.55	27.56	79%	21.72
Winfield Fire Dept.	Facility	0.22	0.22	0	RR	1.14	3.37	62%	2.08	0.37	72%	0.27	0.10	77%	0.07
Benjamins claim - Jacobs	Retrofit	7.86	2.11	5.75	RR	0.97	94.38	59%	55.92	6.04	69%	4.18	1.33	74%	0.99

Stormwater Facilities Treatment (2020) – South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Pervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Load	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs.)	TP Pollutant Load	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs.)	TSS Pollutant Load	TSS BMP Efficiency	TSS Pollutant Loads Reduced (lbs.)
Woodyside Estates Small	Retrofit	9.28	2.11	7.17	RR	0.44	101.75	41%	42.20	16.71	48%	8.08	44,021.07	52%	22,800.28
Woodyside Estates Large	Retrofit	63.79	14.02	49.77	RR	3.00	693.48	69%	475.66	114.39	79%	90.59	300,060.90	86%	257,482.26

Street Sweeping (2020) – South Branch Patapsco Watershed

Location	Lane Mile Acreage	Frequency	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Mount Airy		1pass/2weeks	0	2%	0	0	5%	0	0	11%	0
	5.97	1pass/4weeks	217.4871	0%	0	41.1333	0%	0	59.8791	0%	0

Tree Plantings Upland (2020) – South Branch Patapsco Watershed

Project	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Gillis Falls	12.94	11.12	143.8928	1.78	23.0332	2,805	36,296.7000
King Property	0.7	11.12	7.7840	1.78	1.2460	2,805	1,963.5000
Shannon Run	0.46	11.12	5.1152	1.78	0.8188	2,805	1,290.3000

Tree Plantings Riparian (2020) – South Branch Patapsco Watershed

Project	Acres	TN Pollutant Load (lbs/yr)	Total Loads (lbs)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/yr)	Total Loads (lbs)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/yr)	Total Loads (Lbs.)	TSS Pollutant Loads Reduced (Lbs.)
Gillis Falls	10.22	113.6464	1161.4662	146.5548	18.1916	185.9182	25.4478	28,667.10	292,977.76	45,080.42
King Property	1.79	19.9048	35.6296	25.6686	3.1862	5.7033	4.4571	5,020.95	8,987.50	7,895.69
Shannon Run	0.75	8.34	6.2550	10.7550	1.335	1.0013	1.8675	2,103.75	1,577.81	3,308.25

Conservation Easements (2020) – South Branch Patapsco Watershed

Easement BMP	Acres	TN Pollutant Load (lbs/acre/yr)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load (lbs/acre/yr)	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load (lbs/acre/yr)	TSS Pollutant Loads Reduced (Lbs.)
Riparian Conservation Landscaping	1.550	8.122	10.6175	0.806	1.35625	0.00	0.00
Non-Riparian Conservation Landscapi	0.040	0.5372	0.2096	0.084	0.0208	142.08	0.00
Forest Conservation Buffer	2.450	31.556	25.8965	3.479	2.695	7,869.40	6,039.25

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 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Lower Monocacy Watershed	34.51	<1%	307.19	**3.34%**
Upper Monocacy Watershed	496.43	4.85%	214.97	**6.95%**
Double Pipe Creek Watershed	951.24	9.30%	1,937.43	**28.23%**
Total	**1,482.18**	**14.15%**	**2,459.59**	**38.52%**

Gunpowder River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Loch Raven Reservoir Watershed	20.32	5.28%	185.38	**53.49%**
Prettyboy Reservoir Watershed	68.05	17.70%	57.98	**32.77%**
Total	**88.37**	**22.98%**	**243.36**	**86.26%**

Patapsco River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	752.29	34.00%	248.89	**45.25%**
Total	**752.29**	**34.00%**	**248.89**	**45.25%**

Chesapeake Bay TMDL
Restoration Progress – Phosphorus

Potomac River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Lower Monocacy Watershed	2.11	<1%	31.83	**1.5%**
Upper Monocacy Watershed	73.14	3.28%	85.81	**7.13%**
Double Pipe Creek Watershed	231.22	10.37%	374.52	**27.18%**
Total	**306.47**	**13.65%**	**492.16**	**35.81%**

Gunpowder River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Loch Raven Reservoir Watershed	8.49	15.66%	87.95	**176%**
Prettyboy Reservoir Watershed	7.92	14.61%	7.60	**28.63%**
Total	**16.41**	**30.27%**	**95.55**	**204.63%**

Patapsco River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2021 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2021	Reduction from Planned BMPs (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	183.97	29.77%	109.64	**47.51%**
Total	**183.97**	**29.77%**	**109.64**	**47.51%**

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

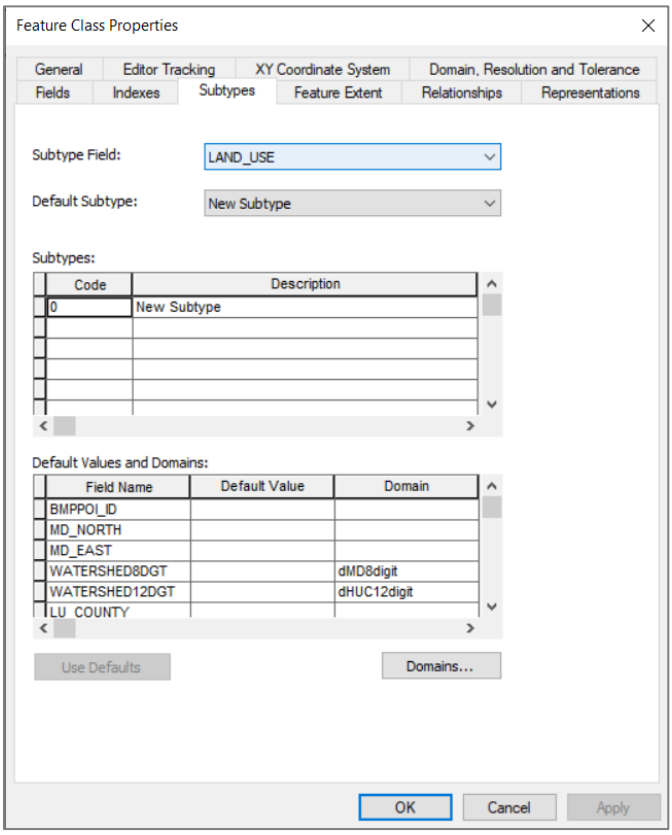
It is required that a construction year be provided for each outfall in this feature class. Some of the outfalls that are contained in this feature class pre-date records being kept. If the year of construction is known, then that attribute is populated, otherwise the year is estimated from nearby property 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 four of these new BMP types in the 2021 geodatabase submission. As directed in the guidance document, the AltBMP_Type = "OTH" and the new coded value is included in the GENERAL_COMMENTS field. 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

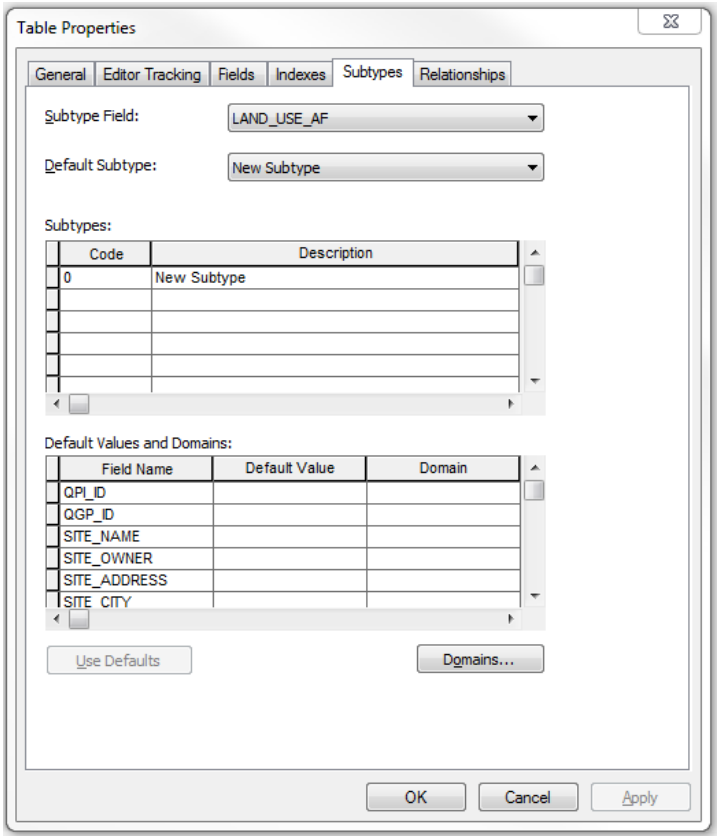
The PERMIT_NUM field is noted in the user's guide as being a mandatory data point. However, the schema in the geodatabase allows for null values. Every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

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 that 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 (Complete)	25.20
	East/West Pond (Under Construction)	50.55
	Total Planned IA	***75.75***

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. Construction is now complete and the facility has been as-built approved.

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 project received grant funds from the MDE Bay Restoration Fund. It was designed and put out to bid for construction in July 2020 and is currently under construction. The facility is anticipated to be complete for reporting in FY2022.

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
2021	Twin Ridge	Retrofit	Complete	$802,690.00	25.20	Lower Monocacy
2022	East West Pond	New Construction	Construction	$1,070,193.18	50.55	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 2021 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.D Standard Permit Conditions - Management Programs	Comment
A. Public Education and Outreach	6. Public Education, 5. PMM (Staff Training) (Narrative and Tables)	Sustainable Mount Airy Commission Charter: To encourage, teach, and promote the activities, duties, and other needed actions to achieve the Maryland Sustainable Certification and increase the benefits to our Town, our environment, and our residents by ensuring "Green" sustainable activities as part of our daily lives. (See Mt Airy website)
B. Public Involvement and Participation	6. Public Education, 4. Litter and Floatables. (Narrative and Tables)	Town of Mt Airy Certified Sustainable Community encouraging residents' active participation through new "Year-Round" Earth Day Outreach Campaign (See Mt Airy Website).
C. Illicit Discharge Detection and Elimination (IDDE)	3. Illicit Discharge Detection and Elimination (IDDE) (Narrative and Appendix C)	IDDE Manual on CD. Nine or >20% of Mt Airy Frederick County Phase II NPDES outfalls screened. Citizen complaint mechanism on Mt Airy website)
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 (Narrative and Tables)	12SW Permitted: Mount Airy Public Works Main. Shop. Annual Site Compliance Evaluation Report and SWPPP on CD. 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

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

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

CONTENTS

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

CONTENTS

ILLICIT DISCHARGE DETECTION AND ELIMINATION MANUAL

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

Carroll County Department of Land and Resource Management

Revision: November 10, 2016

CONTENTS