# Carroll County Maryland


**LANGDON STORMWATER FACILITY**
County Engineers Association of Maryland | *Project of the Year*
Maryland Quality Initiative | *Project of the Year*


County Engineers Association of Maryland
Medium Project of the Year
Carroll County
for the
Langdon Stormwater Management Facility


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

## 2022 ANNUAL REPORT

**The Americans with Disabilities Act applies to the Carroll County Government and its programs, services, activities, and facilities. Anyone requiring an auxiliary aid or service for effective communication or who has a complaint should contact the Department of Citizen Services at 410.386.3600 or 1.888.302.8978 or MD Relay at 7-1-1/1.800.735.2258 as soon as possible but no later than 72 hours before the scheduled event.**

# *Carroll County*

# NPDES ANNUAL REPORT

## *2022*

**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, 2022, 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 2021 Annual Report Assessment Response

## Appendices

# MDE 2021 Annual Report Assessment Response

On July 18, 2022, the Maryland Department of the Environment (MDE) acknowledged receipt of the Carroll County 2021 Annual Report. The letter acknowledged the work performed by the County and did not have any comments or concerns to be addressed. In review of the letter, the County did, however, find some minor items that should be clarified.

Page 3, Part IV.D.5 – First bullet – In communication with MDE to provide requested data, the County inadvertently confused numbers in our narrative description. The County did not have salt broken out for what was applied as brine versus solid. Therefore, the first bullet in the MDE letter should state:

> *Carroll County applied 17,933 tons of road salt during the winter season. This includes the amount used to make salt brine for pre-treatment. Salt brine application increased from 14,000 gallons in FY20 to 45,275 gallons in FY21.*

Page 3, Part IV.D.5 – Fourth bullet – The letter indicates that the County did not report any quantities of material removed via street sweeping, inlet cleaning, or storm drain cleaning. The County did, however, report 69,620 pounds of material removed via inlet cleaning reported in the AltBMP_Line feature class. Street sweeping weight was not reported because, per guidance, permittees should report either pounds removed or lane miles swept. The County reports lane miles swept.

Page 4, Part IV.E – Restoration Plans – Second bullet – The restoration credit for acres restored is 216 acres through the retrofit of two existing facilities and the construction of one new facility.

# 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:

- Serving as 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/municipal personnel in the design, implementation, and maintenance of the County's NPDES Geographic Information System (GIS) and MDE geodatabase (GDB) 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.

## 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.*

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 was executed with Mt. Airy on May 10, 2022, 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 are 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."

## 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," or an equivalent municipal ordinance, provides Carroll County and municipal co-permittees a practical, effective regulatory tool that provides standards to manage and protect the MS4.

## C. Source Identification

The permit requires identification of sources of pollutants in stormwater and the systems that convey stormwater runoff. Carroll County maintains staff 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.

In 2015, MDE published a geodatabase (GDB) to support reporting of the data required in "Attachment A" of the NPDES permits. Over the last year, MDE has been redesigning portions of the GDB in order to provide a more streamlined schema and to incorporate new fields and domains that capture evolving permit requirements. Carroll County is appreciative of the cooperative approach being taken and has been providing feedback to MDE during the redesign process.

For this annual report, MDE requested that jurisdictions submit their "Attachment A" data in the draft GDB. Carroll County has migrated its data into the new schema, and this effort has generated another round of comments, questions, and suggestions for MDE. The County did have to make some revisions to the GDB shell provided by MDE to allow County data to be entered. Error codes were also entered for certain mandatory fields that could not be populated, (e.g. for older, existing data). **Appendix G** provides the County's latest comments and describes any edits that were made to the schema for this annual report submission.

Carroll County will continue to work with MDE to refine the database design and perform quality assurance reviews of the data. Further opportunities remain for improving the GDB and

its functionality, and the County requests that MDE formalize as many of these identified changes as possible in the next schema draft.

## 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 ArcGIS Pro 10.6.2 software. This GDB has been structured to incorporate the MDE data reporting requirements described in the draft *MDE NPDES MS4 Geodatabase Design and User's Guide* (2022), 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 3,249 active BMPs.

Currently, there are 999 as-built certified and approved structural stormwater management best management practices (BMPs) throughout the County and municipalities, excluding the City of Taneytown. Of these BMPs, there are 66 structural restoration practices. There are also 2,247 non-structural environmental site design 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 36 structural and 11 ESD practices. The City has located and confirmed as-built plans for 32 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 2022 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 883 acres during this 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, 2022, are 3,200. The County has met both the third- and fourth-generation permit requirements and has achieved 10.9% impervious area treatment toward the future requirement of the fifth-generation permit.

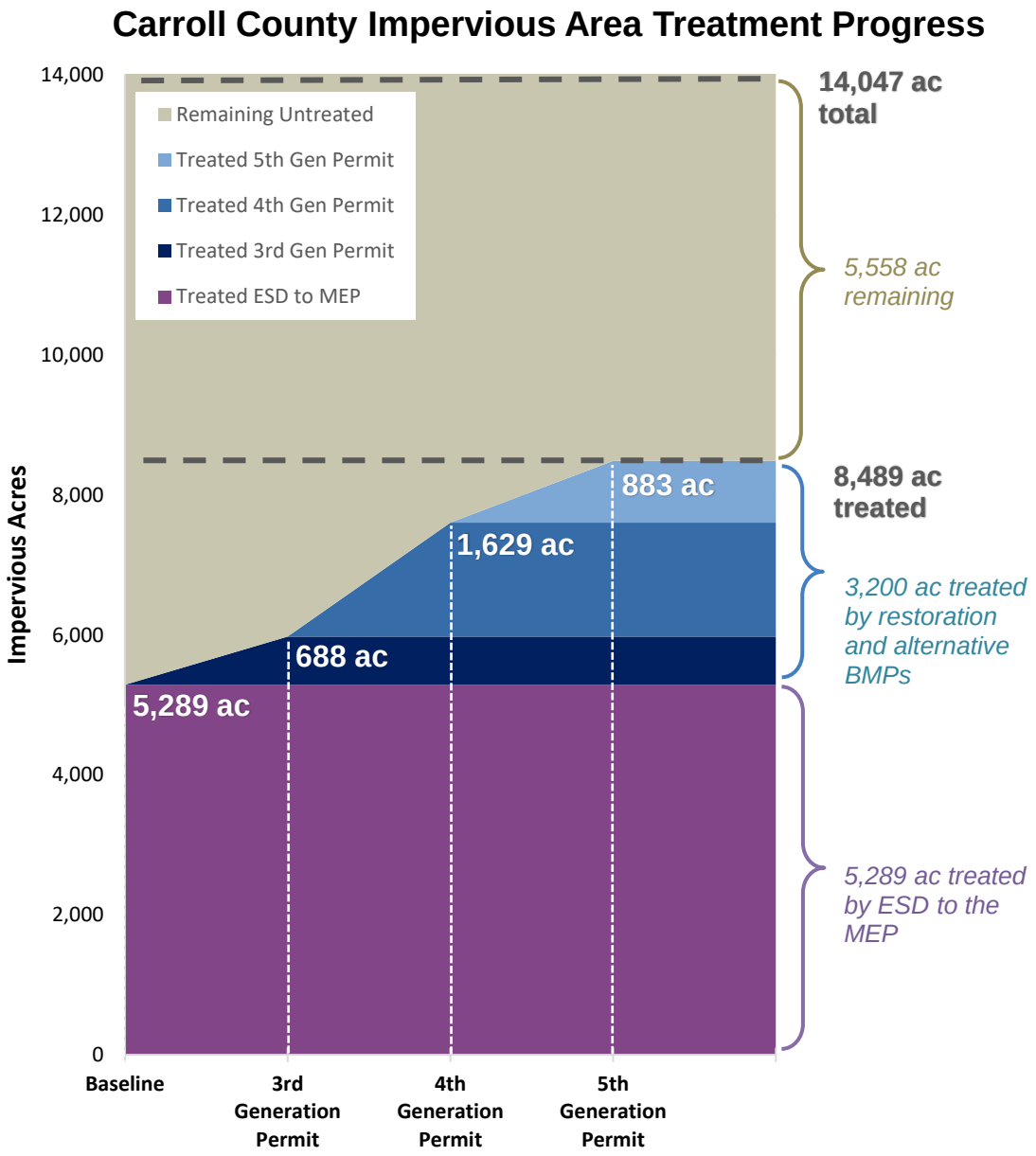



**Figure 1: Carroll County Permit Impervious Surface Analysis**

## 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*

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 that were 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.

This past year, the BRM partnered with the Center for Watershed Protection, who received funding from the Chesapeake Bay Trust's Restoration Research Program to continue evaluating the impact of hydraulic-controlling BMPs on the self-recovery of stream channel stability in urban watersheds. The original restoration research 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. The grant concluded in December of 2020. 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 original study indicate that the downstream channels are on a trajectory towards stabilization. Because bank stability and geomorphic response will take longer to develop than the duration of the original grant, the County has continued monitoring the study sites to provide documentation of a definitive stream channel response. During the next four-year study, a stage discharge relationship will continue to be generated, but the primary focus will be the geomorphic component through annual cross section surveys, pebble counts, and longitudinal profiles.

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. 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 three stormwater management retrofit projects, treating 70 acres of untreated impervious area. An additional four projects

were recently completed or are currently under construction, with the anticipated treatment to be reported in the FY2023 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 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 Management." 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, 2021, to June 30, 2022, consisted of 160 plan reviews, 20 structural as-built approvals, and 238 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, or BRM. The EISD performed 608 inspections this year on 396 individual structural facilities/sites. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. Of those 396 structural facilities, 188 facilities needed corrective action, and 122 were brought into compliance as of June 30, 2022. In cases where violations still existed, 13 facilities were issued Notices of Violation, providing an additional amount of time to resolve issues. At the conclusion of FY2022, there were 1,001 structural stormwater management facilities on the list to be inspected. Of these, 292 will be inspected during FY2023, 299 will be inspected in FY2024, and 410 will be inspected in FY2025.

Currently, there are 2,248 non-structural ESD practices throughout the County. In FY2022, 986 inspections were performed on 850 practices. Of these, 123 ESD practices needed corrective action, and 99 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 347 are planned to be inspected in FY2023, 814 in FY2024, and 1,087 in FY2025.

***City of Taneytown***

Stormwater management structures and infrastructure intended for ownership by the City of Taneytown 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 practices, 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. Upon completion of projects and prior to the release of construction surety, they also complete a review of stormwater as-built drawings, which are certified by the developer's engineer. 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 inspected all of the facilities in the 2022 permit year. 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 2022, 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, 2024.

Statistics related to grading permits and inspections during the reporting timeframe included 133 grading permits issued and 3,816 sediment control inspections performed. All inspections are recorded and field investigations reports sent, regardless of the site conditions. In 18 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 grading permits 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 for the Carroll County Phase I MS4 permit. Carroll County

staff participate in annual IDDE inspector training prior to the outfall screening 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. In addition, at least 8 outfalls (20% of all outfalls) are screened within the Frederick County portion of the Town of Mt. Airy Phase II MS4 permit area by agreement and MDE approval. These outfalls are prioritized to select a combination of major outfalls and new outfalls that have not been screened previously.

During the last permit year, a total of 110 outfalls were screened for illicit discharges. For the Carroll County Phase I MS4 Permit, 102 outfalls were screened. Of these, 58 outfalls were in the County and 44 within co-permittee municipalities. Carroll County MS4 permit outfall screenings were distributed among seven watersheds: Liberty Reservoir (41), Double Pipe Creek (19), South Branch Patapsco River (16), Upper Monocacy River (13), Prettyboy Reservoir (10), Loch Raven Reservoir (2), and the Lower Monocacy River (1). Eight additional municipal outfalls were screened for the Town of Mount Airy Phase II MS4 Permit (Frederick County portion) within the Lower Monocacy River watershed. See outfall screening map in **Appendix C** for location details.

There were 32 outfalls with dry-weather flows, each of which was chemically analyzed using a field screening test for the parameters defined by the permit. No illicit discharges were identified. One outfall presented physical indicators of a possible structural/maintenance issue and was investigated. Additional follow-up screenings and further investigation occurred, confirming the issue had been resolved. 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, 19 outfalls were added to the list of NPDES Study Points. Of these, two outfalls were newly constructed, and four outfalls were identified during data updates and reviews. The remaining 13 new outfalls were from the Frederick County side of Mt. Airy and will be inspected for Phase II requirements. No outfalls were removed from the list of NPDES Study Points during the prior fiscal year.

### *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. 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 110 visual surveys were conducted across six watersheds during the 2022 permit year, a 25% increase from the year before. There were 96 commercial and 14 industrial sites surveyed. A map of visual survey site locations and a summary of visual survey actions are provided in **Appendix C**. No illicit discharges were discovered during the surveys. However, one business was sent an MS4 stormwater pollution prevention educational letter with good housekeeping and best management practice guidance related to their primary industry. Of the 110 sites surveyed this year, 61 will be retained in the inventory for their high pollution potential. The remaining 49 will be removed: one site was found to have an existing NPDES permit with Storm Water Pollution Prevention Plan, and 48 sites had no exposure or 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, 20 IDDE discharge complaints were processed: eight from the Citizen Stormwater Hotline, 10 from trained County and Municipal employees, and two from MDE. Of these complaints, two were determined to be non-illicit discharges, seven were potential illicit discharges, and 11 were confirmed illicit discharges. The illicit events included seven commercial, two institutional, one industrial, and one residential discharge. All 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 County ordinance or an equivalent municipal ordinance by each municipality provides the necessary enforcement authority, either independently or by County. All municipalities work in conjunction with BRM staff with regard to investigation, regulatory guidance, and enforcement.

**Table 2** lists the municipalities, the enforcement authority, and whether they have adopted County Code Chapter 53 or their own equivalent code.

**Table 2**
**Municipal Adoption and Enforcement of Carroll County Code**
**Chapter 53, Environmental Management of Storm Sewer Systems or Municipal Equivalent**

| Municipality | Enforcement Code & 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 agencies and the eight municipalities. This workshop is geared toward permit updates and property management and maintenance implementation and includes: an overview and latest updates for the MS4 and 12SW permits, stormwater pollution prevention good housekeeping/BMPs, spill control and clean-up, IDDE, and related technology sector information. MDE industrial permitting staff participated by providing a brief overview of the 20SW Industrial Stormwater General Permit, including key changes, an issuance timetable, and the renewal process. The agenda for this workshop is provided in Appendix C.

Eight County agencies and eight co-permittee municipalities reported training for their respective staff, which typically includes: general NPDES MS4 permit awareness, stormwater pollution prevention good housekeeping BMPs related to property management and maintenance activities, winter salt management, spill prevention and clean up, and IDDE.

Those responsible for 12SW permitted facilities provide on-site training that reviews their Stormwater Pollution Prevention Plan (SWPPP) requirements, including potential pollutant sources, BMP measures, spill control and clean-up measures, inspections, and record keeping and reporting.

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 receive training coordinated by LRM staff. During the last permit year, a total of 270 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 2022 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 438 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, 28 complaints were received, and three sites were abated by County contractors.

- The program for the County and the municipalities included a combination of trash receptacles along streets and in parks, litter ordinances, street sweeping, trash and recycling collection service, litter collection along roads and in public spaces, 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, festivals, and fairs.

The Carroll County Recycling Office has also developed and implemented a public education and outreach program to reduce littering and increase recycling, actively seeking to divert waste from the landfill. As shown 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 have 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.

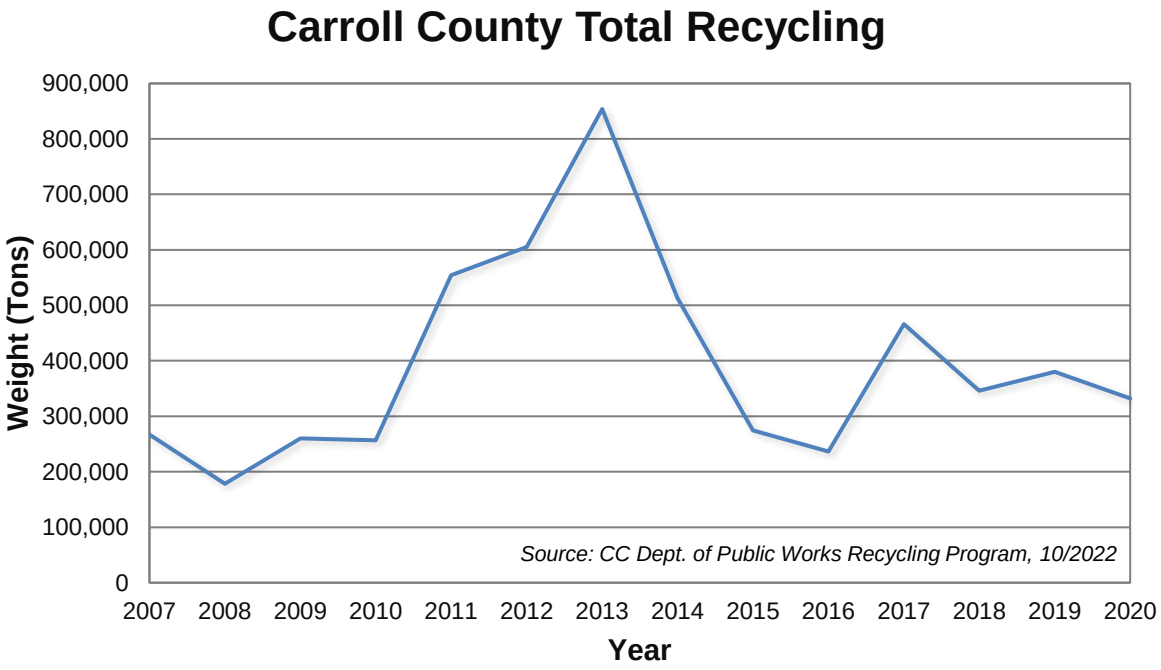



**Figure 2: Total Recycling**

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 bags 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 required 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 Ten-Year 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 or in plastic bags for disposal. 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 each 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 Recycling Office diligently works to inform citizens and promote the theme of "Reduce, Reuse, Recycle, Compost!"

In FY2022, the County hosted several "Reduce, Reuse, Recycle, Compost!" public outreach efforts:

1. Household Hazardous Waste drop-off events took place on October 23, 2021, and April 9, 2022. 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's annual rain barrel and compost bin sale was held on Saturday, April 23, 2022, providing these items to residents at a reduced cost. 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 42% recycling waste diversion rate for 2020 that included a 5% source reduction credit. The lower recycling rate is attributed to the increase in waste versus 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 reactivated as needed.

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 and advertisements on 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 and Waste Diversion Rates," demonstrate the trend in both the recycling weight and rates, respectively, in Carroll County from 2007 to 2020 (2021 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.

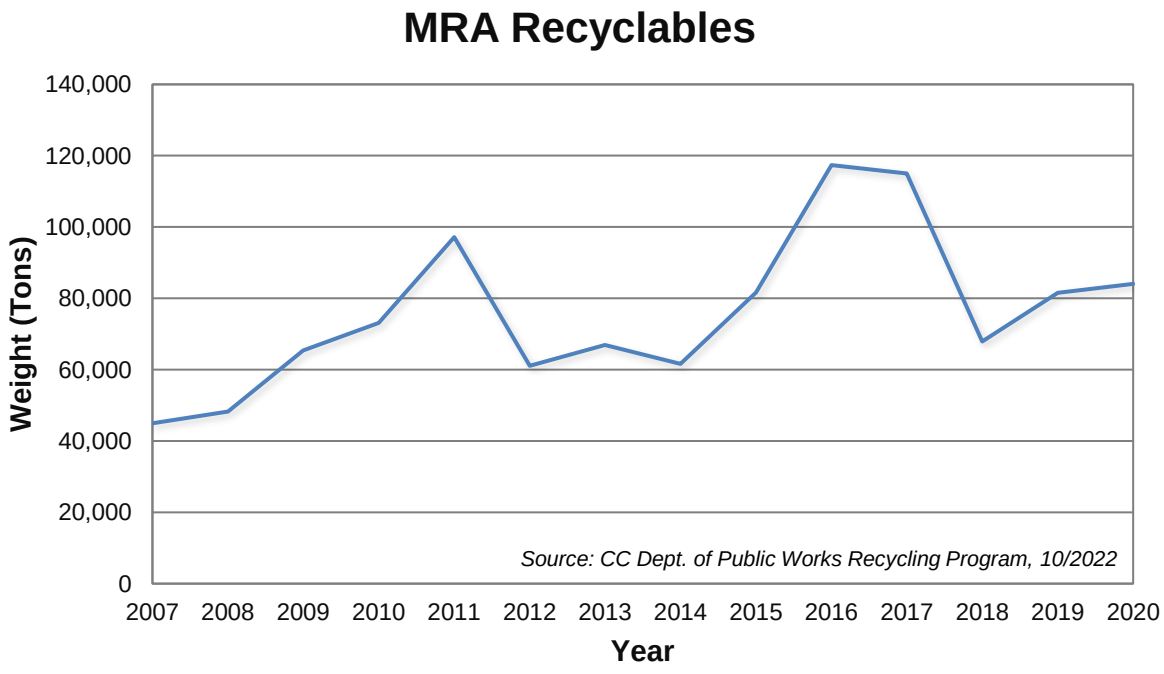



**Figure 3: Carroll County MRA Recyclables**

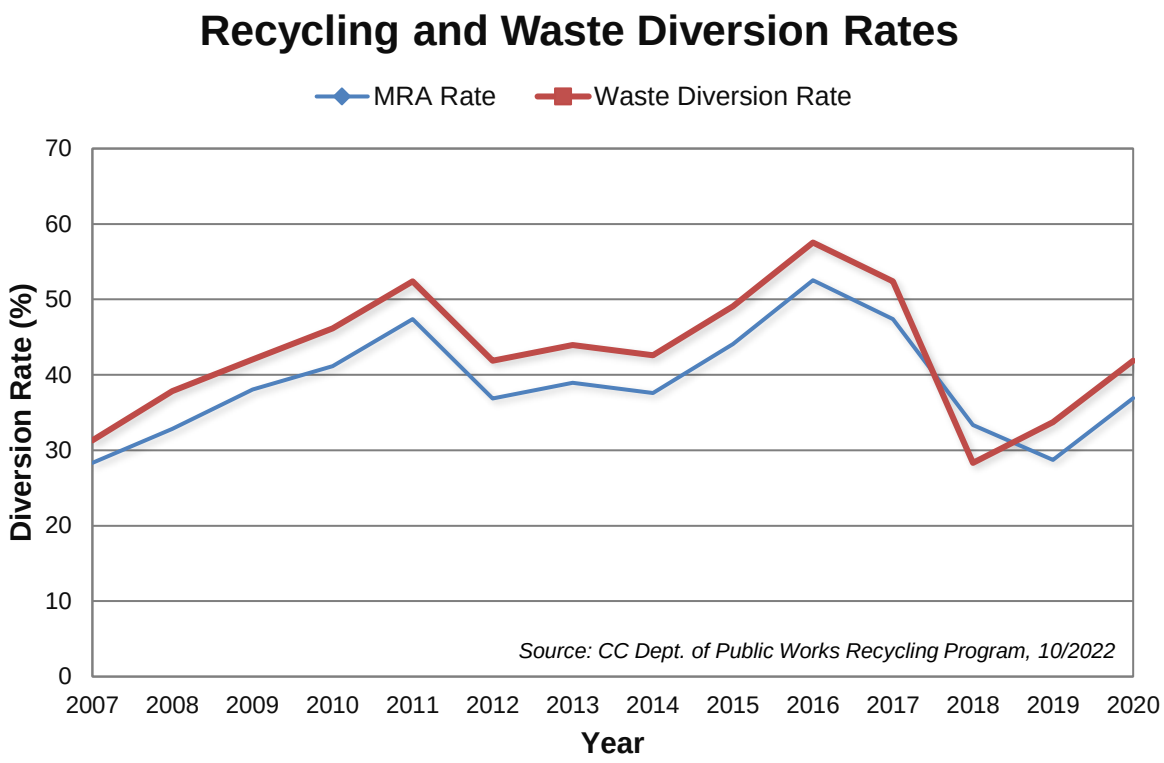



**Figure 4: Carroll County Recycling and Waste Diversion Rates**

## 5. Property Management and Maintenance

The County's Property Management and Maintenance Program seeks to reduce pollutants associated with maintenance activities at County and municipal 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 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 232 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** | 08/02/2022 | Yes | June 30, 2014 | MDE Registration Effective Date 08/11/2014 12SW1755/MDR001755 |
| **County Maintenance Center** | 8/01/2022 | Yes | June 30, 2014 | MDE Registration Effective Date 08/11/2014 12SW1861/MDR001861 |
| **County Northern Municipal Landfill** | 08/10/2022 | Yes | June 30, 2014 | MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660 |
| **County Hoods Mill Landfill (Convenience Drop-off)** | 08/10/2022 | Yes | June 30, 2014 | MDE Registration Effective Date 08/11/2014 12SW0661/MDR000661 |
| **Hampstead Public Works Gill Maintenance Shop** | 08/03/2022 | Yes | June 16, 2014 | MDE Registration: 07/30/14 12SW2213 / MDR002213 |
| **Manchester Public Works Maintenance Shop** | 08/18/2022 | Yes | May 5, 2014 | MDE Registration: 06/04/14 12SW2201/MDR02201 |
| **Mount Airy Public Works Maintenance Shop** | 08/25/2022 | Yes | June 6, 2015 | MDE Registration: 06/24/15 12SW2257/MDR002257 |
| **Mount Airy Public Works WWTP** | 08/25/2022 | Yes | March 30, 2015 | MDE Registration: 04/10/15 12SW2258/MDR002258 |
| **Taneytown Public Works Maintenance Facility** | 08/02/2022 | Yes | June 16, 2014 | MDE Registration: 07/17/14 12SW2263 / MDR001743 |
| **Taneytown Public Works WWTP** | 08/02/2022 | Yes | June 16, 2014 | MDE Registration: 06/26/14 12SW1743 / MDR001743 |
| **Westminster Public Works Streets Maintenance Shop** | 08/11/2022 | Yes | March 31, 2014 | MDE Registration: 06/26/14 12SW2292/MDR002292 |
| **Westminster Public Works WWTP** | 8/11/2022 | Yes | July 3, 2014 | MDE Registration: 08/14/14 12SW2252 / MDR002252 |
| **Westminster Public Works Utilities** | 8/11/2022 | 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 SPCC Plans at several 12SW permitted County facilities during this fourth-generation permit term. AECOM met with appropriate County personnel on-site and reviewed 12SW SWPPPs 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/5 | 07/19/21 | Y | Y | 06/14/22 |
| **County Maintenance Center** | Y | Y | Y/130[1] | 11/19/21<br>6/02/22<br>12/15/21 | Y | Y | 06/27/22 |
| **Northern Municipal Landfill** | Y | Y | Y/11 | 6/30/22 | Y | Y | 11/12/21 |
| **Hoods Mill Landfill (Convenience Drop-Off)** | Y | Y | Y/11[2] | 6/30/22 | Y | Y | 12/03/21 |
| **Hampstead Public Works Gill Maintenance Shop** | Y | Y | Y/7 | 12/16/21 | Y | Y | 12/16/21 |
| **Manchester Public Works Maintenance Shop** | Y | Y | Y/13 | 6/27/22 | Y | Y | 04/26/22 |
| **Mount Airy Public Works Maintenance Shop** | Y | Y | Y/10 | 10/08/21 | Y | Y | 10/15/21 |
| **Mount Airy Public Works WWTP** | Y | Y | Y/3 | 10/08/21 | Y | Y | 04/13/22 |
| **Taneytown Public Works Maintenance Facility** | Y | Y | Y/8 | 6/17/22 | Y | Y | 06/13/22 |
| **Taneytown Public Works WWTP** | Y | Y | Y/3 | 6/11/22 | Y | Y | 06/13/22 |
| **Westminster Public Works Streets Maintenance Shop** | Y | Y | Y/18 | 05/31/22 | Y | Y | 01/20/22 |
| **Westminster Public Works WTTP** | Y | Y | Y/10 | 8/23/22 | Y | Y | 3/16/22 |
| **Westminster Public Works Utilities** | Y | Y | Y/14 | 05/31/22 | Y | Y | 04/07/22 |

*Status reported by jurisdiction/facility.
[1]Training: Maintenance Center/3 Bureaus (Fleet and Warehouse, Roads Operations, Facilities), CC Airport Includes FBO contractor staff
[2] 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 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. CCRA is maintained by DPW Airport Operations and has a 5,100-foot runway, supporting tarmac, and parking lot. The Bureau of Utilities maintains 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.

In addition to DPW, the Bureau of Parks within the Department of Recreation and Parks maintains facilities for three natural resource-related parks, and 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 receive adequate training in pollution prevention and good house-keeping practices |
|---|---|---|---|---|---|
| **Total MS4** | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | | |
| **Carroll Co.** | ✓ Roads (6) | ✓ (7,8) | ✓ (2,10,11,20) | ✓ (11,12,13,14,15,16,17,19,22) | ✓ (3) |
| | ✓ Solid Waste (4,5,6) | ✓ (3,7,8) | ✓ (2,10,11,18,20) | ✓ (11,12,13,14,15,16) | ✓ (3) |
| | ✓ Utilities (6) | ✓ (8) | ✓ (10, 21) | ✓ (11,12,13) | ✓ (3) |
| | ✓ Facilities (6) | ✓ (7,8,) | ✓ (2,10,11,18,20,21) | ✓ (11,12,13,16,19) | ✓ (3) |
| | ✓ Fleet/Warehouse | ✓ (8,9) | ✓ N/A | ✓ N/A | ✓ (3) |
| | Airport | ✓ (8,9) | ✓ (2,10,11,20,) | ✓ (11,12,19) | ✓ (3) |
| | Parks | ✓ (8) | ✓ (2a,10,18) | ✓ (11,12,19) | ✓ (3) |
| | Farm Museum | ✓ (8) | ✓ (2,10,18,20) | ✓ (11,12,19) | ✓ (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** | ✓ (4,6) | ✓ (3,8) | ✓ (2,10,11,18,20) | ✓ (11,12,19) | ✓ (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) | ✓ (11,12,13, 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, County 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 e.g. research, veg/cycle, BMPs, qualified applicators, 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. During the permit reporting year, approximately 108 lane miles were swept countywide at varying frequencies, totaling 2,972 linear miles of sweeping during FY2022. 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 1,055 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 2022 permit year, overall herbicide usage associated with vegetation management and maintenance activities increased from 197.01 gallons to 226.01 gallons of concentrate. This was an overall 14.7% increase from the previous year reporting under the Carroll County MS4. Herbicide volumes continue to vary as maintenance activities and practices adjust to a post-pandemic transition affected by staffing, etc. 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 117 gallons of herbicide concentrate for a 51% increase. Each spraying application was documented and recorded as required per Maryland Department of Agriculture (MDA) regulations. All staff applicators maintain 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. 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 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 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 is transitioning from use of a 41% glyphosate formulation to a 24.5% glufosinate-based herbicide. Applications are performed by their MDA-licensed and -certified staff. The Bureau's herbicide use was 22 gallons of concentrate (a 79% increase) for weed control during the permit year. The increase was due to buildings and parks being reopened and staffing impacts affecting manual weed control.

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 CCRA facility has gradually reduced the use of herbicides for vegetation management over time. They achieved a 96% reduction this permit year by using crack sealant in tarmac areas. Perimeter fencing received minimal applications this year but is expected to return to normal levels in the next growing season using a narrow width. This program is also managed by MDA-licensed and -certified staff.

The Carroll County Bureau of Utilities reported the implementation of alternative BMPs eliminating herbicide usage this past year. The Carroll County Farm Museum reported a slight increase for the permit year and by qualified applicators. Both report mowing, hand trimming, mulching, and weed pulling as the 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 usage for municipal co-permittee vegetation maintenance programs varies and fluctuates by municipality, with most reporting reductions. The City of Westminster reported a 9% decrease in herbicide usage during the permit year. Herbicide reduction was influenced by the City becoming a "Bee City USA" affiliate and employing alternative vegetation weed management practices. Herbicide usage by the Town of Mt. Airy was reduced, returning to normal usage amounts as anticipated.

All County and 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 MDA in accordance with state law. Contracted MDA-licensed and -certified personnel perform spot spraying along County rights-of-way as well as on private lands 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 jurisdictional boundaries 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 State Highway Administration (SHA) salt management plan and other salt management technical resources.

Road salt usage for the MS4 was 10,325 tons, which corresponds to a 42% decrease from the previous year. The County and municipal co-permittees continue efforts to reduce the use of solid deicers through improved equipment technology, training, implementation of salt management plans and SOPs, improved salt brine quality, and effective decision making by managers and staff. Salt brine manufactured from the solid tons reported was 38,550 gallons, which was applied by County Roads and the City of Westminster.

Carroll County Roads Operations implemented their own Carroll County Salt Management Plan during the permit year. The plan was developed based on their own SOPs, 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 and 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 SOPs 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 DPW hosted a virtual Winter Weather Coordination Meeting for the 2021 to 2022 winter season on Wednesday, October 27, 2021, from 2:00 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 and emergency management), MDSHA, and public works representatives from all co-permittee municipalities, the County, and the State. One meeting segment focused on the goal to reduce winter weather road salt deicers for the improvement of water quality while providing safe, passable road conditions. Another presentation included a review of the implementation of the County's Bureau of Roads Operations Salt Management Plan.

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 delivery, storage, and handling at salt storage locations to its placement on roadways during winter storms and post-storm clean-up 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. Eighty-two County Roads Operations 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-treatment 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. County Facilities has been transitioning and/or modifying equipment that significantly improves targeting deicer applications to sidewalks. County Bureau of Facilities and the Farm Museum maintenance staff's deicer selection for sidewalks and walkways is a product that is more effective at lower temperatures and less corrosive. These actions result in the reduction of deicers in solid form in everyday winter event maintenance practices.

Proper management of snow and ice at CCRA is essential for safe winter operations. This includes aircraft and support equipment movements during servicing, taxiing, and takeoff. Ensuring safe conditions on the tarmac for outside boarding of passengers, flight crews, and maintenance ground personnel activities is crucial. No 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 270 County and municipal 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. Training is provided at 16 County and municipal entities for on-site training. 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 Clean-up 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 270 total co-permittee employees trained under the Carroll County MS4 for the permit year, 253 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, including those within the co-permittee municipalities, can call the non-emergency Stormwater Pollution Prevention Hotline at 410-386-2210. The hotline 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/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 workshop geared toward residents of Carroll's municipalities. The workshop shared information similar to the countywide general homeowner workshop, but tailored the information to residents of the Hampstead and Manchester communities (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 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).

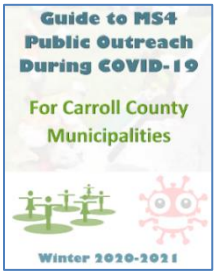
### *Programs and Exhibits*

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. Stream clean-ups and tree plantings are implemented throughout the county and coordinated as a volunteer or outreach event when feasible. A complete listing of specific FY2022 events can be found in **Table 6**. New events and alternative ways to engage residents in activities emerged during the COVID-19 pandemic. The table also lists regularly scheduled events and outreach efforts, even if they were postponed or canceled due to shifting pandemic-associated restrictions.




During the previous permit year, with the continuation of the pandemic, BRM staff developed the *Guide to MS4 Public Outreach During COVID-19 for Carroll County Municipalities.* The document provides municipalities and County staff step-by-step guidance on how to successfully plan a public outreach or involvement event during the pandemic, with considerations and safety measures for minimizing participant exposure, as conditions and venues allow.

**Table 6**
**Carroll County NPDES Phase 1 MS4 Public Outreach Events in FY2022**

| Event | Date(s) | Watershed(s) | Description |
|---|---|---|---|
| **Carroll Co. Roads "Adopt-A-Road" Program** | Multiple/ Year-Round | Multiple | Carroll Co. DPW Road Operations sponsors an Adopt-A-Road program for volunteer groups interested in litter and debris clean-up to keep local roadways and streams clean. Currently, more than 20 roads have been adopted. |
| **Carroll Co. Farm Museum Environmental Site Design Educational Exhibits** | Multiple/ Seasonal | Multiple | Materials and discussion. On-site stormwater education including working bio-filtration ESD BMP with interpretive signs for visitors, school tours, etc. that explain stormwater management, pollution reduction, and water quality. |
| **Keep Sykesville Beautiful Campaign** | Multiple/ Year-Round | South Branch Patapsco River | Local partnerships use the Keep America Beautiful framework for community education and hands-on stewardship to reduce litter, encourage recycling, promote grassroots volunteerism, and make sustainable improvements possible for communities of all sizes. |
| **Union Bridge Little Pipe Creek Park and Green Valley Rd. Litter Pick-up** | Multiple/ Year-Round | Double Pipe Creek | Town of Union Bridge resident volunteers regularly collect litter year-round. |
| **Trash Troopers MD Trash and Litter Pick-up** | Multiple/ Year-Round | Liberty Reservoir | Trash and litter pick-up event in Eldersburg commercial areas. Trash Troopers is a local grassroots group that partners with other community groups dedicated to keeping our communities clean and organizes regular trash clean-up events in southeast Carroll Co. |

| Event | Date(s) | Watershed(s) | Description |
|---|---|---|---|
| **"Helping Hands" Keep Our Parks Green** | Multiple/ Year-Round (March through December) | Multiple | Carroll Co. Recreation and Parks campaign to encourage community involvement and to help keep parks clean. Promotes local stewardship and care of parks through litter pick-up, similar to the Adopt-A-Road program. Volunteers make a seasonal commitment to care for a specific park with litter prevention and regular pick-up events. Currently covers seven parks and is increasing in participation. |
| **Town of Mt. Airy Sustainability Commission Outreach** | Multiple/ Seasonal | Multiple | Hosted environmental educational outreach booth at Main Street Association and Town-sponsored Farmer's Market through growing season. Coordinated with BRM for one outreach booth event. Launched a PSA outreach website and provided information at two additional Town events. |
| **Annual Elementary School Grade Field Trips** | Fall 2021 | Multiple | CANCELED due to pandemic – Interactive water resource educational activities with students learning how to protect and improve water quality in local streams and the Chesapeake Bay. |
| **National Night Out** | August 3, 2021 | Multiple | Materials and direct discussion with attendees in several municipalities by MS4 co-permittees. |
| **Westminster Fallfest** | September 23, 2021 | Multiple | Information booth/materials and direct discussion with attendees. |
| **Hampstead Day of Gratitude** | October 16, 2021 | Multiple | Materials and direct discussion with attendees. |
| **Carroll Arts Council Festival of Wreaths** | October 16, 2021 | Multiple | Recycling materials and direct discussion with attendees. |
| **Carroll Co. Fall Household Hazardous Waste Clean-Up** | October 23, 2021 | Multiple | Hazardous household materials drop off for homeowners, which prevents improper disposal. Paper shredding was also offered for recycling. |
| **Carroll Co. Little Pipe Creek Stream Clean-up** | November 6, 2021 | Double Pipe Creek | Carroll Co. LRM coordinated with the Alliance for the Chesapeake Bay to host a stream clean-up on Little Pipe Creek in Westminster, MD. Approximately 25 volunteers and staff. |
| **America Recycles Day** | November 15, 2021 | Multiple | Recycling materials and direct discussion with attendees. |
| **Hampstead Tree Planting** | November 20, 2021 | Liberty Reservoir | Planted three balled and burlapped trees at Sunnyfield Court, Brandywine Station, with the help of 9 volunteers. Sponsored by Hampstead Tree Commission. |
| **Carroll Co. LRM Launch of *Carroll Environment* Facebook Outreach Page** | January – June, 2022 Multiple Postings (3+ Weekly) | Multiple | Social Media Mission: Carroll Co. LRM is committed to expanding opportunities for the public to learn about and engage in information, projects, and activities that promote environmental stewardship and understanding in Carroll Co. https://www.facebook.com/carrollenvironment/ |
| **Hampstead-Manchester Business & Community Expo** | Spring 2022 | Multiple | CANCELED due to pandemic – Materials and direct discussion with attendees. |

| Event | Date(s) | Watershed(s) | Description |
|---|---|---|---|
| **Carroll Co. Envirothon** | Spring 2022 | Multiple | CANCELED due to pandemic - Partnership with Carroll Co. Soil Conservation District to provide hands-on environmental and natural resource management education to high school students. |
| **McDaniel College and Carroll Community College Annual Clean-Up Day** | Spring 2022 | Double Pipe Creek | CANCELED due to pandemic – Student volunteers annually collect trash and clean out tree pits in designated areas. |
| **City of Westminster Tree Plantings** | April 2022 | Multiple | Planted eight landscape-sized trees and 70 saplings in urban street and riparian areas. |
| **Carroll Co. Spring Household Hazardous Waste Clean-Up** | April 9, 2022 | Multiple | Hazardous household materials drop off for homeowners, which prevents improper disposal. Paper shredding was also offered for recycling. |
| **Town of Mt. Airy Earth Day Green Fair Demo Days at Community Garden** | April 20, 2022 & Multiple Events | 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. |
| **Town of Mt. Airy Recreation and Parks and Sustainability Commission Stream and Park Clean-up Days** | April 22, 2022 | Multiple | Town of Mt. Airy hosted 15 participants at Windy Ridge Park for a stream and park clean-up. |
| **Earth Day Annual Middle School Class Outreach** | April 22, 2022 | Multiple | CANCELED due to pandemic – Outreach event for 6$^{th}$ grade middle school students about water quality improvement through stormwater management restoration, tree planting, aquatic insects, and plants. |
| **Taneytown Parks and Recreation Department Earth Day Park Clean-up** | April 23, 2022 | Upper Monocacy River | Community clean-up crews (75 – 100 participants and staff) collected trash and litter in multiple City parks. |
| **Rain Barrel and Compost Bin Event** | April 23, 2022 | Multiple | Rain barrel and composting event hosted by Carroll Co. provides rain barrels and compost bins to residents at a reduced cost. |
| **Mt. Airy Rotary Club "Let's Talk Trash" Event** | April 23, 2022 | Multiple | Mt. Airy Rotary Club sponsored a community litter clean-up day, collecting 2,780 lbs. of trash. |
| **Sykesville Spring Park Clean-up and Bulk Pickup** | April 23, 2022 | South Branch Patapsco River | Keep Sykesville Beautiful event to pick up litter and debris and provide a drop-off location for bulk items. Approximately 20 participants. |

| Event | Date(s) | Watershed(s) | Description |
|---|---|---|---|
| **Carroll Co. Seniors On the Go Expo** | April 27, 2022 | Multiple | Recycling materials and direct discussion with attendees. |
| **City of Westminster Arbor Day Tree Planting** | April 27, 2022 | Multiple | Community tree planting event at City Park with approximately 50 participants. |
| **New Windsor Town Beautification Day** | April 30, 2022 | Double Pipe Creek | Town staff and resident volunteers cleaned Town parks and walking trails, planted flowers and shrubs, and mulched. Approximately 15-20 participants. |
| **Town of Mt. Airy Recreation and Parks and Sustainability Commission Stream and Park Clean-up Days** | May 20, 2022 | Multiple | Town of Mt. Airy hosted 10 participants at a Rails to Trails (R2T) clean-up event. |
| **Hampstead Day** | May 21, 2022 | Multiple | Booth - materials and direct discussion with attendees. |
| **Maryland Municipal Convention** | June 12-15, 2022 | Regional | Town of Hampstead booth - materials and direct discussion with attendees. |
| **Carroll Co. LRM 50th Anniversary of Hurricane Agnes Floodplain Program Outreach Event** | June 19-24, 2022 | Multiple | Carroll Co. participated as part of a multi-organizational effort in a project commemorating the 50th Anniversary of Hurricane Agnes to "Learn from the Past and Prepare for the Future". This included online presentations of tribute, remembrance, and lessons learned in recovery. It also highlighted flood preparedness, mitigation efforts, and service improvements nationally and at the local level. An outreach event was hosted at a local brewery. |

### *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 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). 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 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, historically 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 starting on Earth Day 2023 for the 2023 award cycle. The presentation of awards for the next permit year will be held in conjunction with the County's second annual Environmental Symposium in fall 2023.

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 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 continues to serve in this role as the State relies on local jurisdictions to assist with implementing its Phase III WIP.

The Mt. 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 Mt. 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. During past 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 were implemented per

jurisdiction when related COVID-19 restrictions were 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 Tuesday 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 2015 Public Outreach Plan objectives that have been implemented thus far. Out of 31 activities/programs, 29 have been implemented.

The plan is in the process of being revised in anticipation of the next generation permit requirements and will be included in the appendices of the first annual report for the fifth-generation permit. The WRCC and staff have discussed possible activities and programs for fifth-generation permit implementation.

## 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.<br>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. |

| Objective | Activity/Program | Page | Implementation |
|---|---|---|---|
| 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 addressed or will address public comments received | 30 | The County received extremely limited feedback from the public related to the six restoration plans. A discussion of the feedback and its applicability to the restoration plans were provided in the County's 2019 annual report. |

| Objective | Activity/Program | Page | Implementation |
|---|---|---|---|
| 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 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-FY22. The events for FY22 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. Static cling window decals are provided to participants. The program aims to assist Partners with voluntary activities related to stormwater pollution prevention. 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 stream 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 there. 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, 2022, after the end of the fourth-generation permit. These 883 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 2023 and 2028 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 531 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.

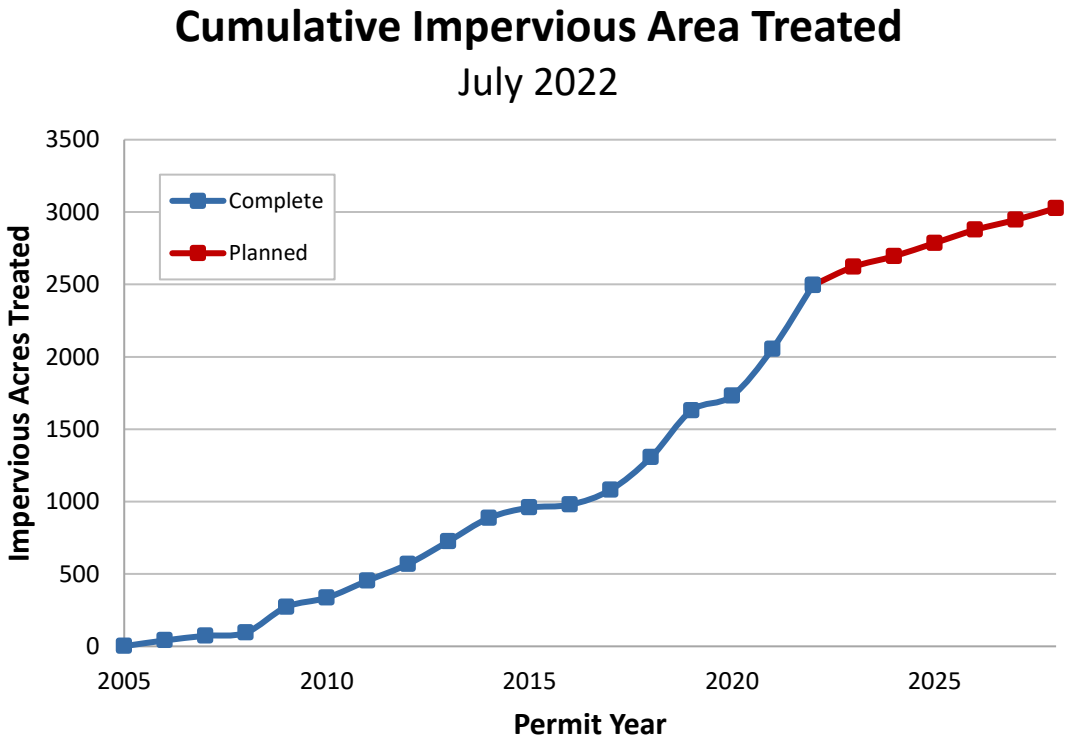



**Figure 5: Impervious Surface Acres Treated: Projects Completed and Planned for Current (4th Generation) and Future (5th Generation) Permits**

## Table 10
## Listing of NPDES Watershed Restoration Efforts
## July 2022

| 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** | | | **1,629.25** | |

| Listing of Watershed Restoration Efforts January 1, 2020 to July 1, 2022 | | | | | |
|---|---|---|---|---|---|
| **Year** | **Project Name** | **Project Type** | **Project Status** | **Impervious Area Credit** | **MDE Watershed** |
| | **Offset Previous Permit Annual Practices** | | | **-17** | |
| 2020 | Benjamins Claim - Jacobs | Retrofit | Complete | 2.05 | S Branch Patapsco River |
| 2020 | Manchester Impervious Removal | Impervious Removal | Complete | 0.22 | Double Pipe Creek |
| 2020 | Roberts Mill | Retrofit | Complete | 91.80 | Upper Monocacy River |
| 2020 | Shiloh Middle | Retrofit | Complete | 19.61 | Liberty Reservoir |

| Year | Project Name | Project Type | Project Status | Impervious Area Credit | MDE Watershed |
|---|---|---|---|---|---|
| 2021 | Greens of Westminster | Retrofit | Complete | 16.41 | Double Pipe Creek |
| 2021 | Langdon (Jantz) | New Construction | Complete | 93.64 | Double Pipe Creek |
| 2021 | Willow Pond Retrofit | Retrofit | Complete | 106.09 | Liberty Reservoir |
| 2021 | Willow Pond SR | Stream Restoration | Complete | 28.20 | Liberty Reservoir |
| 2022 | Mayberry SR | Stream Restoration | Complete | 279.31 | Double Pipe Creek |
| 2022 | Trevanion Terrace Retrofit | Retrofit | Complete | 47.78 | Upper Monocacy River |
| 2022 | Woodsyde One Retrofit | Retrofit | Complete | 21.03 | S Branch Patapsco River |
| 2022 | Woodsyde SR | Stream Restoration | Complete | 59.57 | S Branch Patapsco River |
| 2022 | Woodsyde Two Retrofit | Retrofit | Complete | 1.17 | S Branch Patapsco River |
| 2020-2022 | Tree Plantings | Tree Plantings | Complete | 74.97 | |
| 2020-2022 | Forest Conservation Buffer | Protections | Complete | 17.87 | |
| 2020-2022 | Riparian Conservation Landscaping | Protections | Complete | 8.30 | |
| 2020-2022 | Non-Riparian Conservation Landscaping | Protections | Complete | 7.43 | |
| 2020-2022 | Septic Upgrades | Retrofit | Complete | 7.52 | |
| 2021-2022 | Inlet Cleaning (Increase over last permit) | Inlet Cleaning | Complete | 6.05 | |
| 2021-2022 | Street Sweeping (Increase over last permit) | Street Sweeping | Complete | 10.81 | |
| | **Completed toward next permit** | | | **882.82** | |

| Carroll County Projects in Planning | | | | | |
|---|---|---|---|---|---|
| **Year** | **Project Name** | **Project Type** | **Project Status** | **Impervious Area Credit** | **MDE Watershed** |
| 2023 | Brynwood SR | Stream Restoration | Design | 65.75 | Liberty Reservoir |
| 2023 | Locust Wetland | New Construction | Under Construction | 22.50 | Double Pipe Creek |
| 2023 | North Carroll Library | New Construction | Design | 0.19 | Prettyboy Reservoir |
| 2023 | Patapsco Valley Overlook | Retrofit | Under Construction | 4.14 | S Branch Patapsco River |
| 2023 | St George's Gate Retrofit | Retrofit | Design | 7.50 | Liberty Reservoir |
| 2023 | Stone Manor Retrofit | Retrofit | Under Construction | 8.44 | Liberty Reservoir |
| 2023 | Sun Valley II Retrofit | Retrofit | Design | 5.92 | Double Pipe Creek |
| 2023 | Tree Plantings 2023 | Tree Planting | Planned | 12.50 | |
| 2024 | Century High School Retrofit | Retrofit | Design | 22.53 | Liberty Reservoir |
| 2024 | Hampstead Valley 1 Retrofit | Retrofit | Design | 12.66 | Loch Raven Reservoir |
| 2024 | Hampstead Valley 2 & 3 SR | Stream Restoration | Planned | 13.50 | Loch Raven Reservoir |
| 2024 | Melstone Valley Retrofit | Retrofit | Design | 2.30 | S Branch Patapsco River |
| 2024 | Squires | Retrofit | Planned | 9.18 | Liberty Reservoir |

| Year | Project Name | Project Type | Project Status | Impervious Area Credit | MDE Watershed |
|---|---|---|---|---|---|
| 2024 | Tree Plantings 2024 | Tree Planting | Planned | 12.50 | |
| 2025 | CC Health Dept | New Construction | Design | 6.96 | Double Pipe Creek |
| 2025 | New Windsor Wetland | New Construction | Design | 23.45 | Double Pipe Creek |
| 2025 | Roberts Field Wet Pond Retrofit | Retrofit | Design | 30.81 | Loch Raven Reservoir |
| 2025 | Roberts Field Wet Pond SR | Stream Restoration | Design | 17.50 | Loch Raven Reservoir |
| 2025 | Tree Plantings 2025 | Tree Planting | Planned | 12.50 | |
| 2026 | Hampstead Valley 4 | New Construction | Design | 20.76 | Loch Raven Reservoir |
| 2026 | Hampstead Valley 4 SR | Stream Restoration | Planned | 7.18 | Loch Raven Reservoir |
| 2026 | Manchester East | New Construction | Planned | 36.60 | Prettyboy Reservoir |
| 2026 | Meadow Ridge (2) | Retrofit | Planned | 5.73 | Double Pipe Creek |
| 2026 | Piney Ridge Village | Retrofit | Planned | 8.30 | S Branch Patapsco River |
| 2026 | Tree Plantings 2026 | Tree Planting | Planned | 12.50 | |
| 2027 | Winters Street | Retrofit | Planned | 36.63 | Liberty Reservoir |
| 2027 | Winters Mill HS | Retrofit | Planned | 19.94 | Liberty Reservoir |
| 2027 | Tree Plantings 2027 | Tree Planting | Planned | 12.50 | |
| 2028 | BTR (Black and Decker) | New Construction | Planned | 46.35 | Liberty Reservoir |
| 2028 | Candice Estates | New Construction | Planned | 5.13 | Lower Monocacy River |
| 2028 | North Carroll Farms 4 | Retrofit | Planned | 5.10 | Prettyboy Reservoir |
| 2028 | Windsong Estates | New Construction | Planned | 11.76 | Lower Monocacy River |
| 2028 | Tree Plantings 2028 | Tree Planting | Planned | 12.50 | |
| | **Anticipated impervious treatment** | | | **531.80** | |

## 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 the 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 over $3.5 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, $32 million has been planned for watershed restoration efforts in the Community Investment Program (CIP) for FY2023 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.

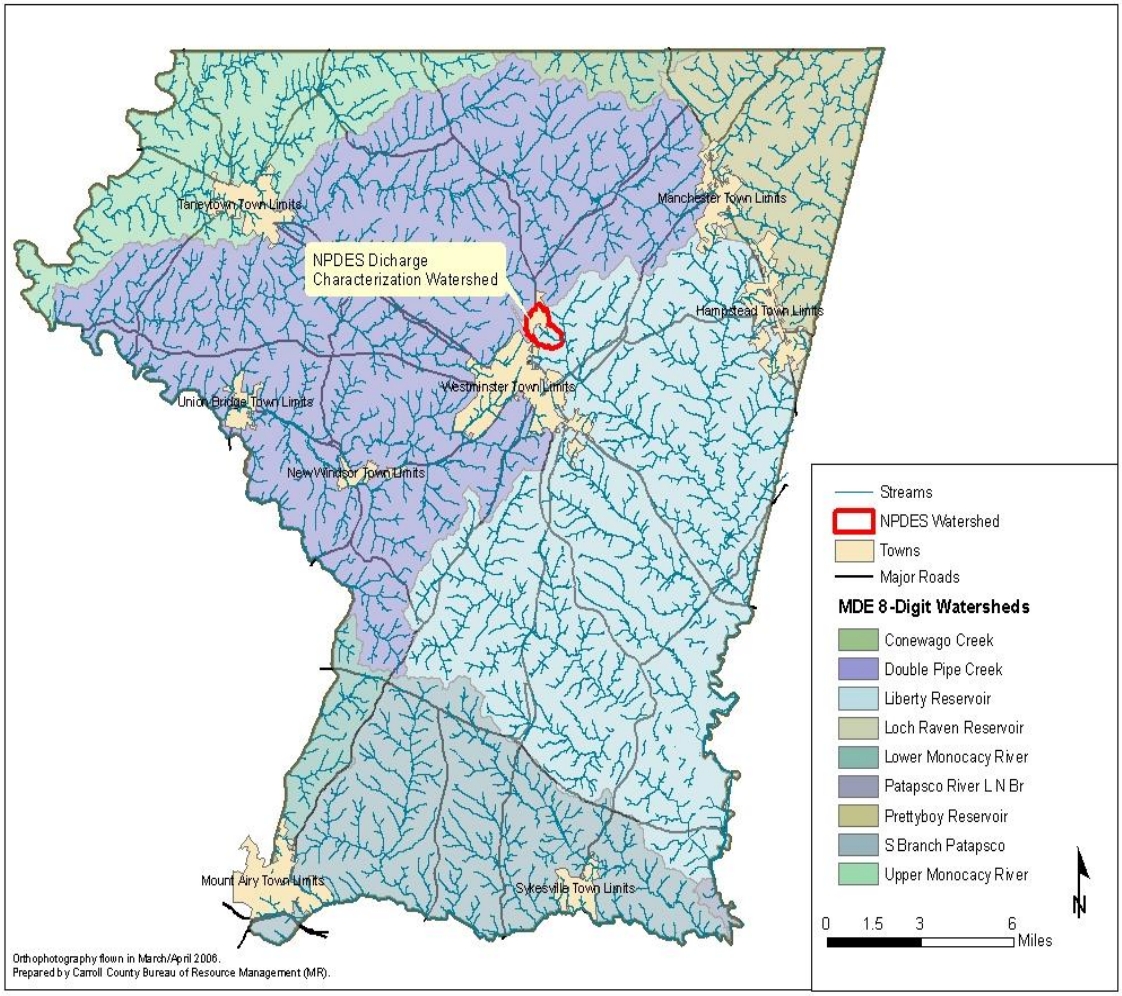



**Figure 6: Carroll County NPDES Discharge Characterization Location**

### *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.

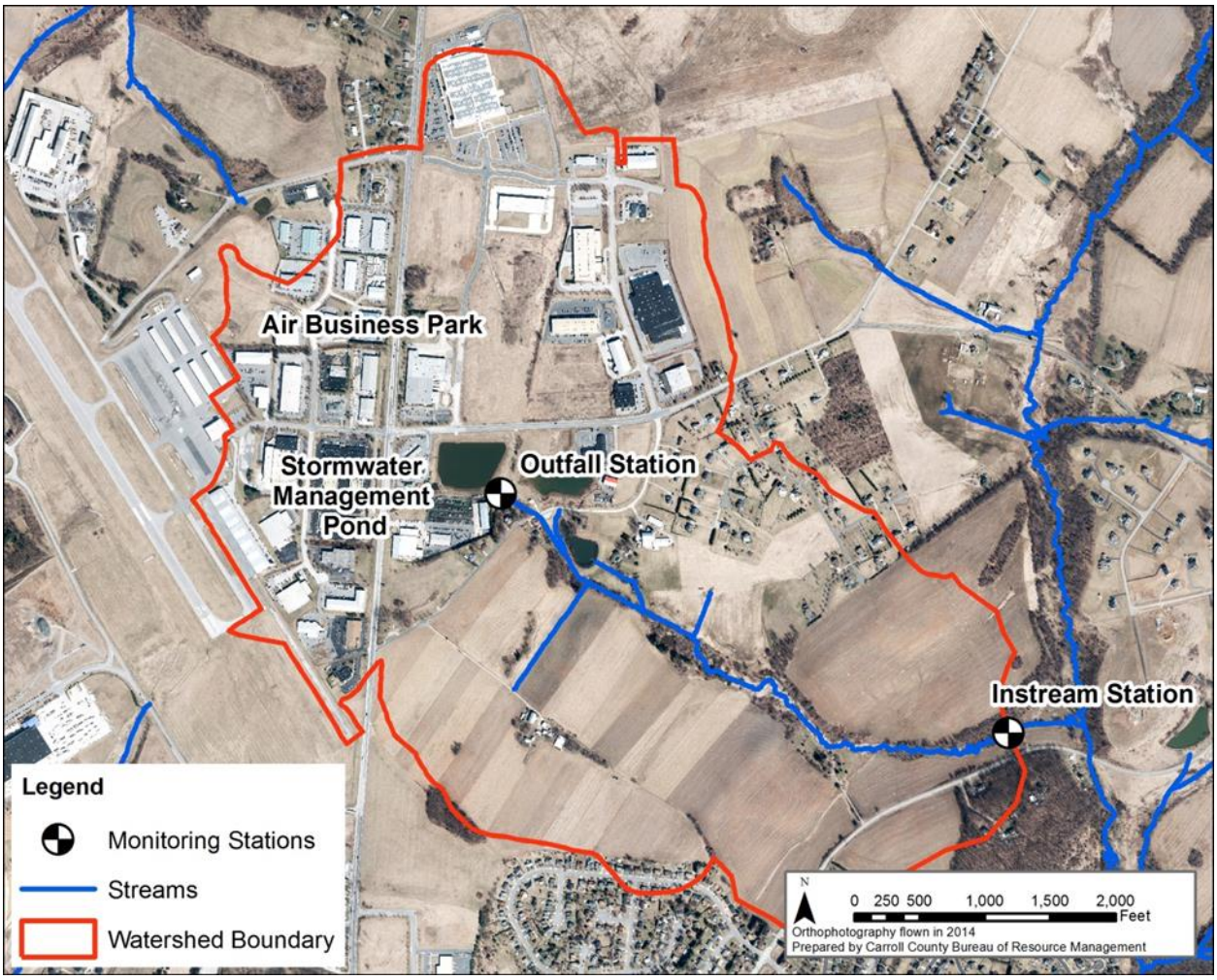



**Figure 7: NPDES Discharge Characterization Watershed**

## 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 2022 reporting period, collection efforts at the instream station were impaired by periodic equipment malfunction. These issues account for the losses in hydrological data, primarily during Summer 2021 and Spring 2022. About 30% of the instream data is missing for the reporting period. Missing data were able to be estimated during these periods.

***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 2022, 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.

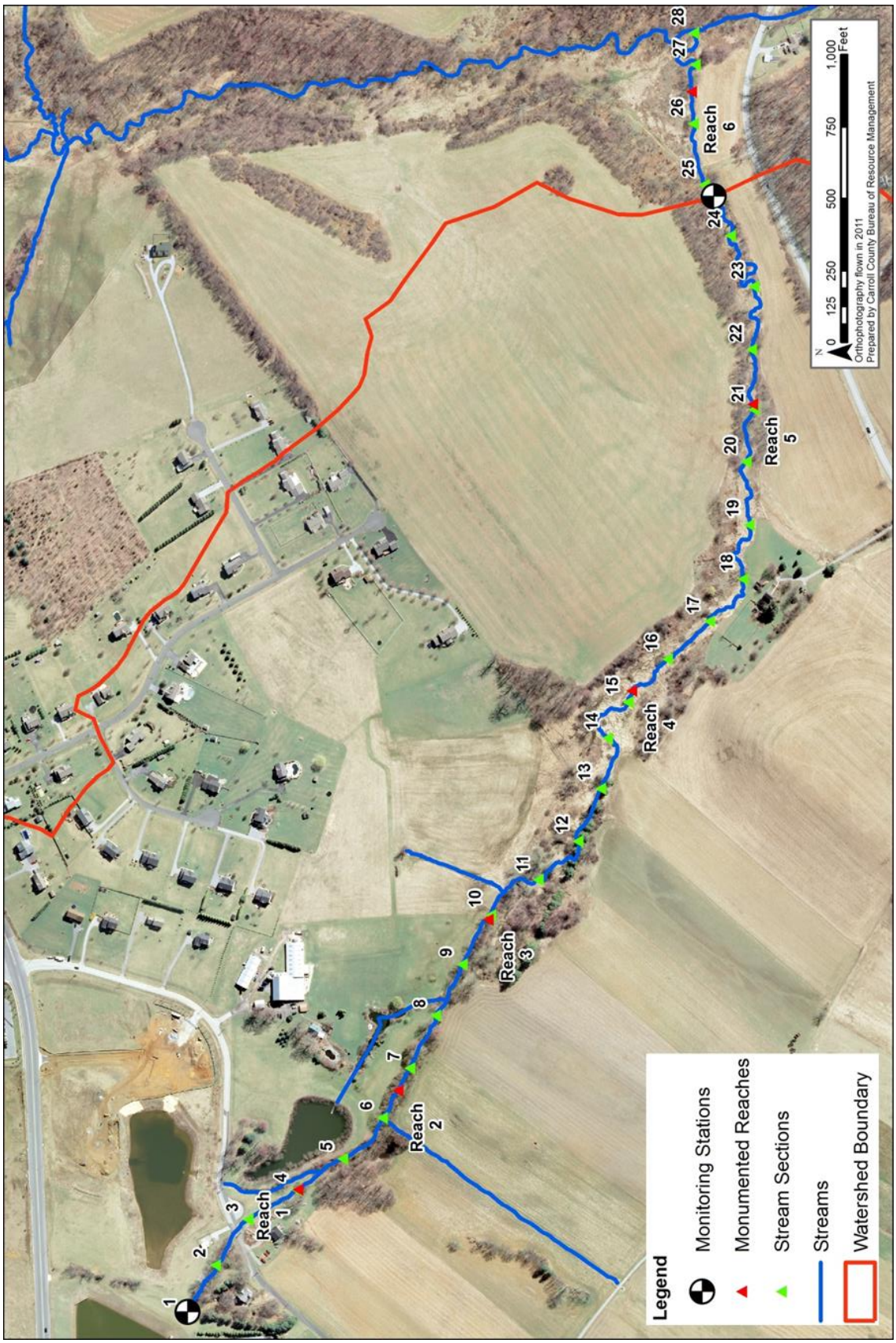



**Figure 8: Physical Data Collection Stations**

### *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, Maryland, for laboratory analyses. The sampling program consists of a first flush component for total petroleum hydrocarbons, bacteriological constituents, and physical parameters, as well as chemical parameters collected during each of the three storm limbs. **Table 11** lists the required parameters for laboratory analysis, the laboratory method, and the corresponding method reporting limit.

**Table 11**
**Laboratory Methods and Detection Limits for Parameters Tested**

| Parameter Tested | Method | Reporting Limit |
|---|---|---|
| ***First Flush 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 sixth 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 ten total sampling events are reported, eight of which were storm events. Temperature and pH measurements were not recorded for several events due to equipment malfunction and have been populated with "N/A" in the table below.

**Table 12**
**2022 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) |
| 2021-04 | 9/1/21 | Storm | 7.85 | 77.5 | 7.63 | 71.4 |
| 2021-05 | 9/22/21 | Storm | 9.02 | 74.2 | 7.74 | 66 |
| 2021-06 | 10/21/21 | Base Flow | 7.94 | 60.1 | 7.61 | 54 |
| 2021-07 | 12/16/21 | Base Flow | 8.03 | 42.7 | 7.67 | 44.9 |
| 2021-08 | 12/18/21 | Storm | N/A | N/A | N/A | N/A |
| 2021-09 | 12/30/21 | Storm | N/A | N/A | N/A | N/A |
| 2022-01 | 2/3/22 | Storm | 8.7 | 44 | 7.82 | 43.5 |
| 2022-02 | 3/7/22 | Storm | N/A | N/A | N/A | N/A |
| 2022-03 | 4/5/22 | Storm | N/A | N/A | N/A | N/A |
| 2022-04 | 6/22/22 | Storm | N/A | N/A | N/A | N/A |

***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 EcoAnalysts, Inc, 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.**

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.

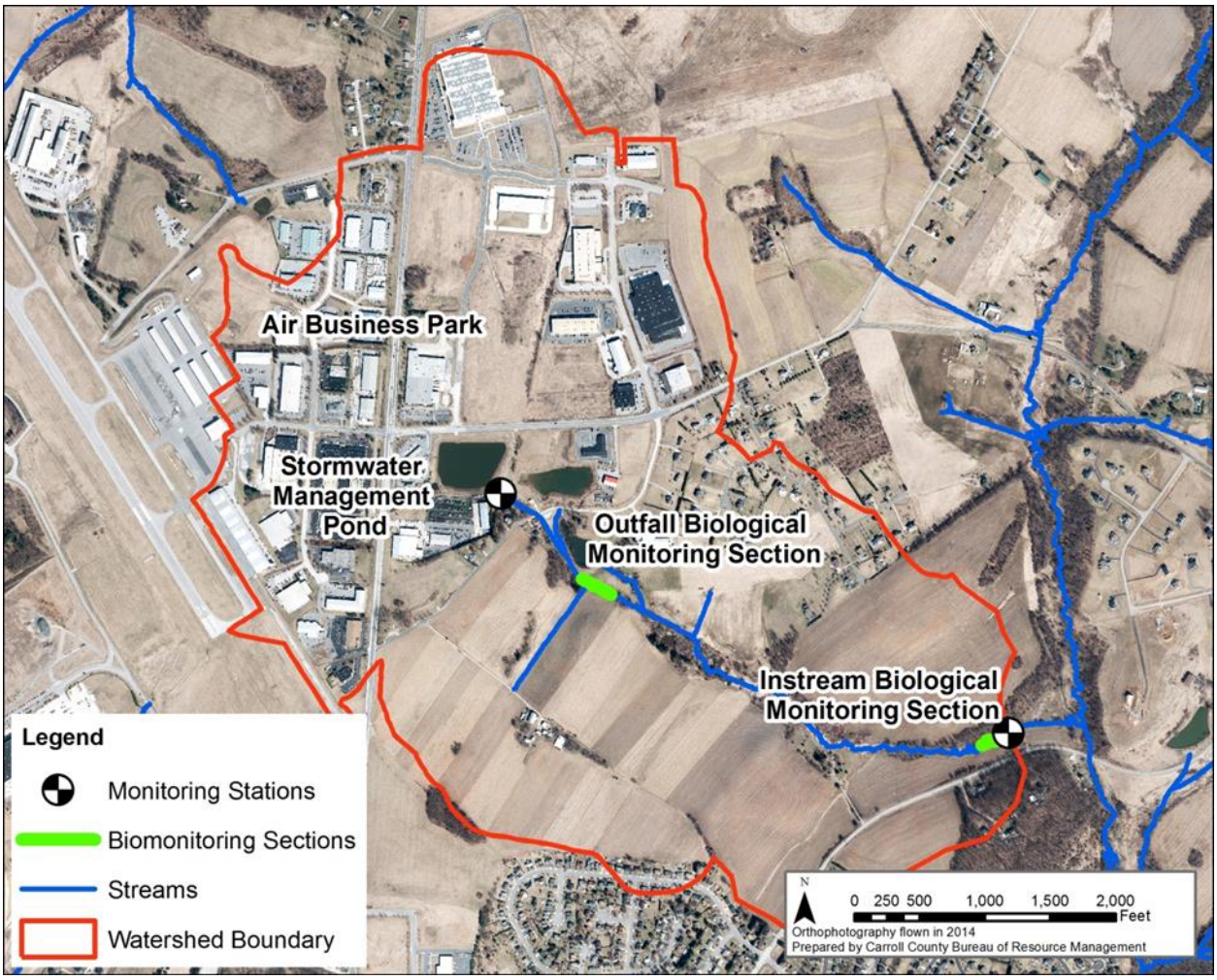



**Figure 9: Biological Monitoring Station Locations**

**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 – 10 | <5 |
| Number of Ephemeroptera | ≥4 | 2 – 3 | <2 |
| % Intolerant Urban (Tolerance Values 0-3) | ≥51 | 12 – 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. |

## 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** | >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 & gravel/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 and 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, and 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 of gravel, cobble, and boulder particles that are surrounded by fine 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 2022 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 43.69 inches, a 0.29-inch surplus from the mean yearly total. Relative to mean monthly precipitation totals, September 2021 was the wettest month, with a surplus of 5.4 inches, while December 2021 was the driest month, with a deficit of 2.91 inches. This reporting year was the tenth driest year for total precipitation since reporting began at this station in 2000.

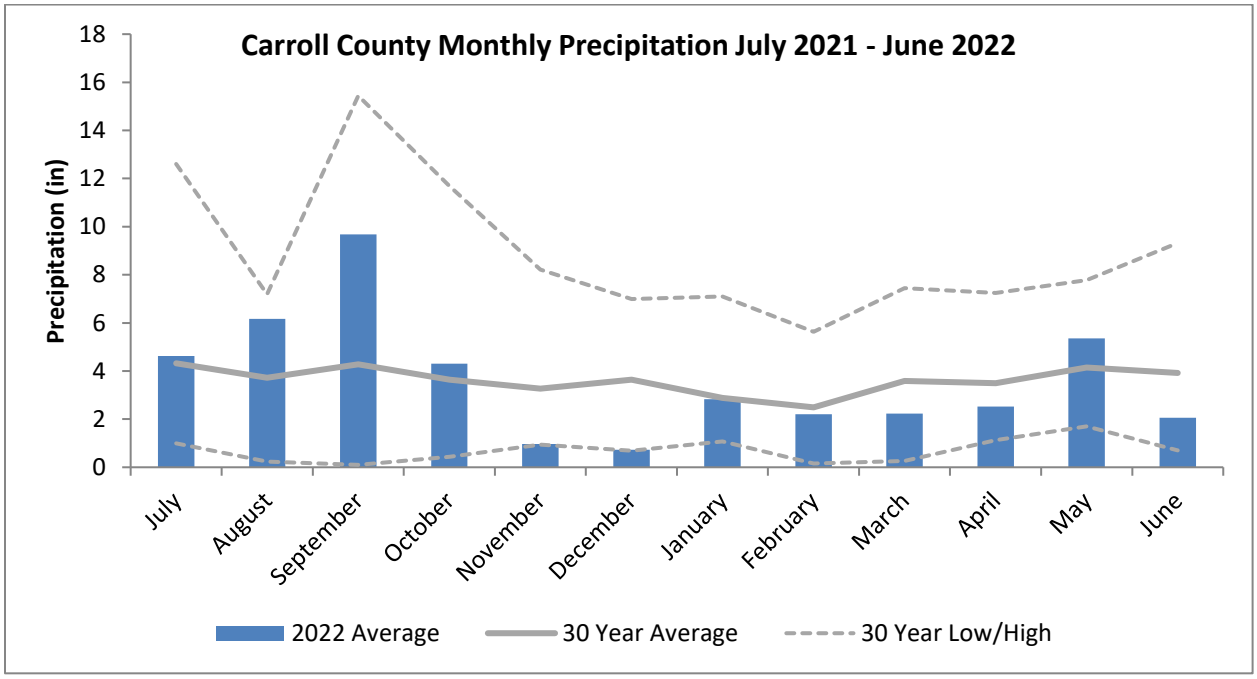



**Figure 10: Monthly Precipitation Summary for the 2022 Reporting Period**

Monthly temperature data for the 2022 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 57.9°F, which was 4.0°F warmer than the 30-year annual average. One month was cooler than average, which was 0.8°F cooler than normal. Eleven months were warmer than or equal to average temperatures, with a mean of 4.4°F warmer than normal. October 2021 and December 2021 were the warmest relative to each month's respective average temperatures with a 7.8°F and 9.6°F increase 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 7.4°F above average.

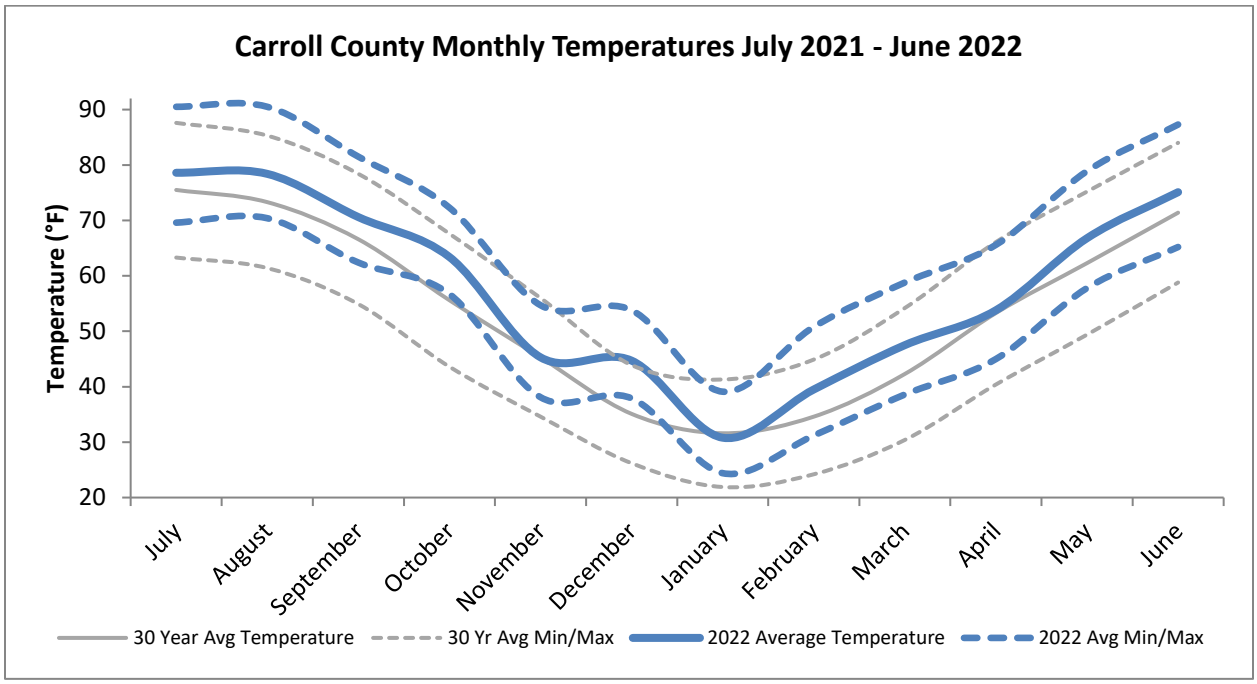



**Figure 11: Monthly Temperature Summary for the 2022 Reporting Period**

***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 surplus of 0.29 inches of precipitation was observed during this reporting period relative to the average year. The reporting period had several moderate to large storm events and a typical frequency of smaller storm events, particularly in the wetter periods during summer and early autumn 2021. 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. Due to periodic equipment failures, stage heights and discharges for some periods were estimated using visually observed data; a significant portion of total data were estimated at the instream station during Spring 2022.

Typical stage heights at the outfall monitoring station were approximately 0.09 feet, or 43 gpm. Peak discharge occurred on September 1, 2021, when a stage height of 1.35 feet was recorded. The resulting discharge was 11,852 gpm. During this storm event 3.64 inches of precipitation fell over 18.5 hours. Only three other storm events with a discharge greater than 1,000 gpm occurred during the reporting period. These occurred on September 23, 2021, October 29, 2021, and May 7, 2022, where respective peak discharges of 3,470 gpm, 1,195 gpm, and 1,911 gpm were observed.

Typical stage heights observed for the instream monitoring station were approximately 0.31 feet, or 367 gpm. Peak discharge at this monitoring station occurred during the storm event on September 23, 2021. During this storm, 1.8 inches of precipitation fell over 7.25 hours.

Additionally, discharge was already elevated at the instream station from a storm event the previous day where 0.91 inches of precipitation was observed. Peak observed stage height was 1.95 feet and peak discharge was 28,838 gpm. Peak observed discharge for most storm events at the instream station were less than 4,000 gpm; only four other storm events had peak discharge measurements greater than 4,000 gpm, ranging from 6,014 to 16,795 gpm at peak discharge.

Total, seasonal, and categorical discharges for each monitoring station can be found in **Table 16**. 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 higher percentage of the total discharge at the instream station because of the slight precipitation surplus. While outfall contribution was observed to be relatively low for this reporting period, it was highest (23%) during summer 2021, the wettest season.

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 2022 Reporting Year**

| | Instream | Outfall | Difference | Outfall Contribution (%) |
|---|---|---|---|---|
| **Total (gal)** | 295,506,015 | 53,120,970 | 242,385,045 | 18% |
| **Avg Stage (ft)** | 0.33 | 0.11 | 0.22 | - |
| **Median Stage (ft)** | 0.31 | 0.09 | 0.22 | - |
| **Avg Q (gpm)** | 562 | 101 | 461 | 18% |
| **Median Q (gpm)** | 367 | 43 | 324 | 12% |
| **Summer Q (gal)** | 95,679,777 | 21,957,962 | 73,721,815 | 23% |
| **Autumn Q (gal)** | 51,016,397 | 8,881,257 | 42,135,139 | 17% |
| **Winter Q (gal)** | 77,246,968 | 9,462,107 | 67,784,861 | 12% |
| **Spring Q (gal)** | 71,562,874 | 12,819,644 | 58,743,230 | 18% |
| **Dry (<700 gpm)** | 146,095,347 | 21,506,573 | 124,588,774 | 21% |
| **Wet (>700 gpm)** | 149,410,668 | 31,614,397 | 117,796,271 | 18% |

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 2022 (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 2022 was 11,852 gpm. The 2022 maximum was the result of a storm event where 3.64 inches of precipitation was observed over 18.5 hours. The next highest peak discharge for any other storm event was 3,470 gpm. In many reporting years, the maximum recorded discharge at the outfall station is less than 2,000 gpm. During this reporting period, 85% of all discharge measurements were below or equal to 100 gpm, similar to most post-retrofit years. This contrasts with the pre-retrofit measurements where only 23% of measurements were below 100 gpm. In 2007, 10% of all measurements were greater than 2,000 gpm, which was greater in magnitude than most of the highest discharges from post-retrofit years.

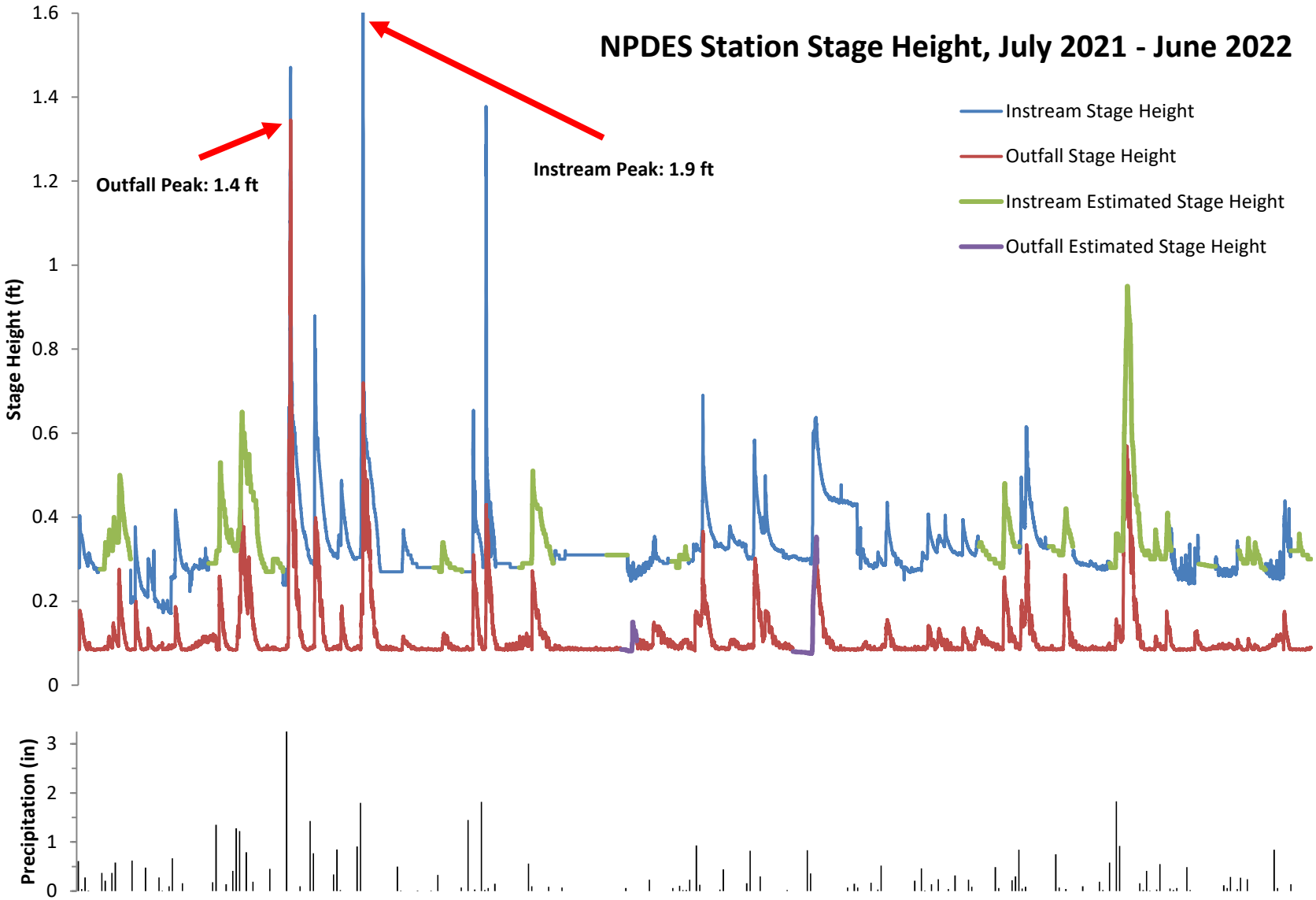



**Figure 12: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2022 Reporting Year**

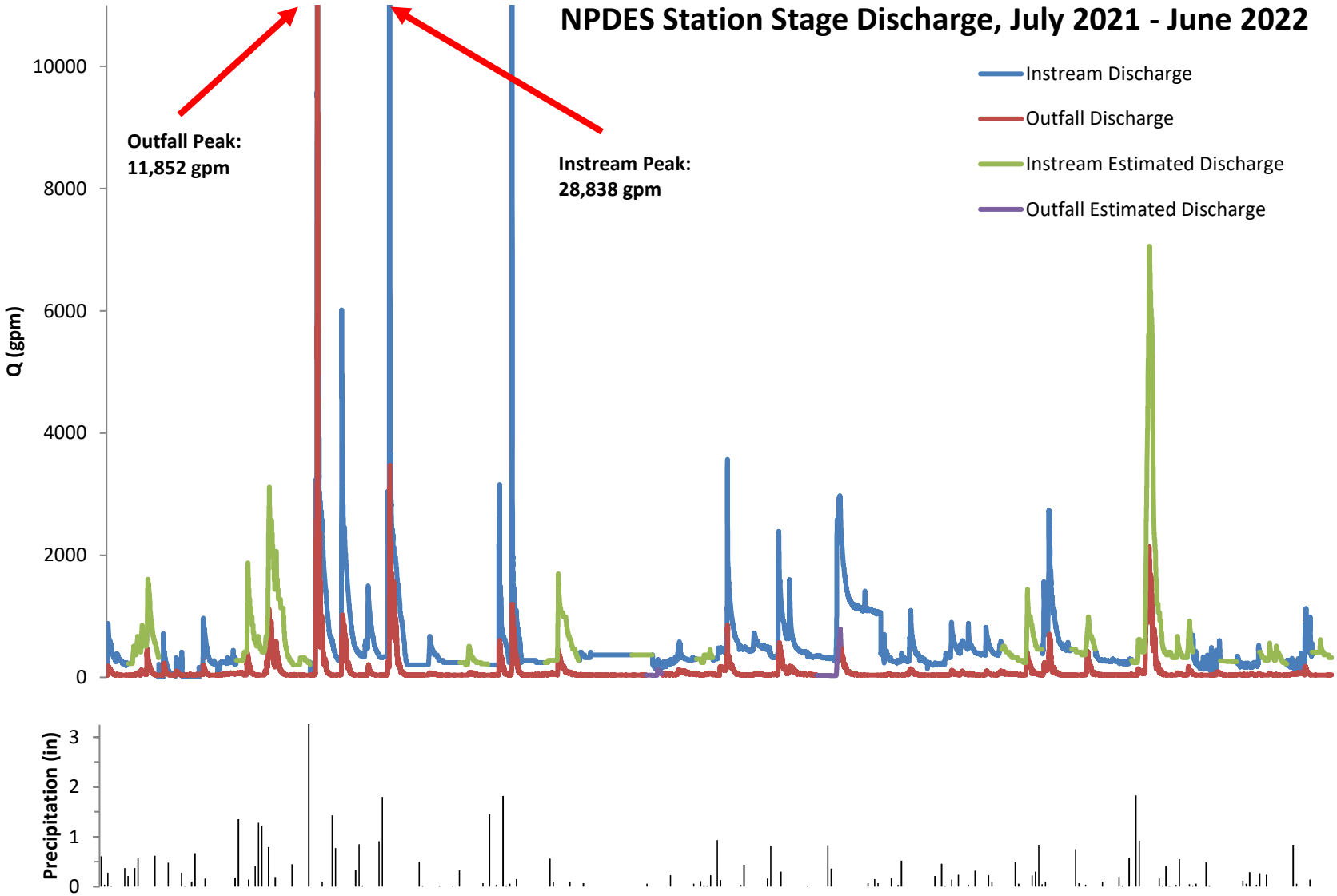



**Figure 13: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2022 Reporting Year**

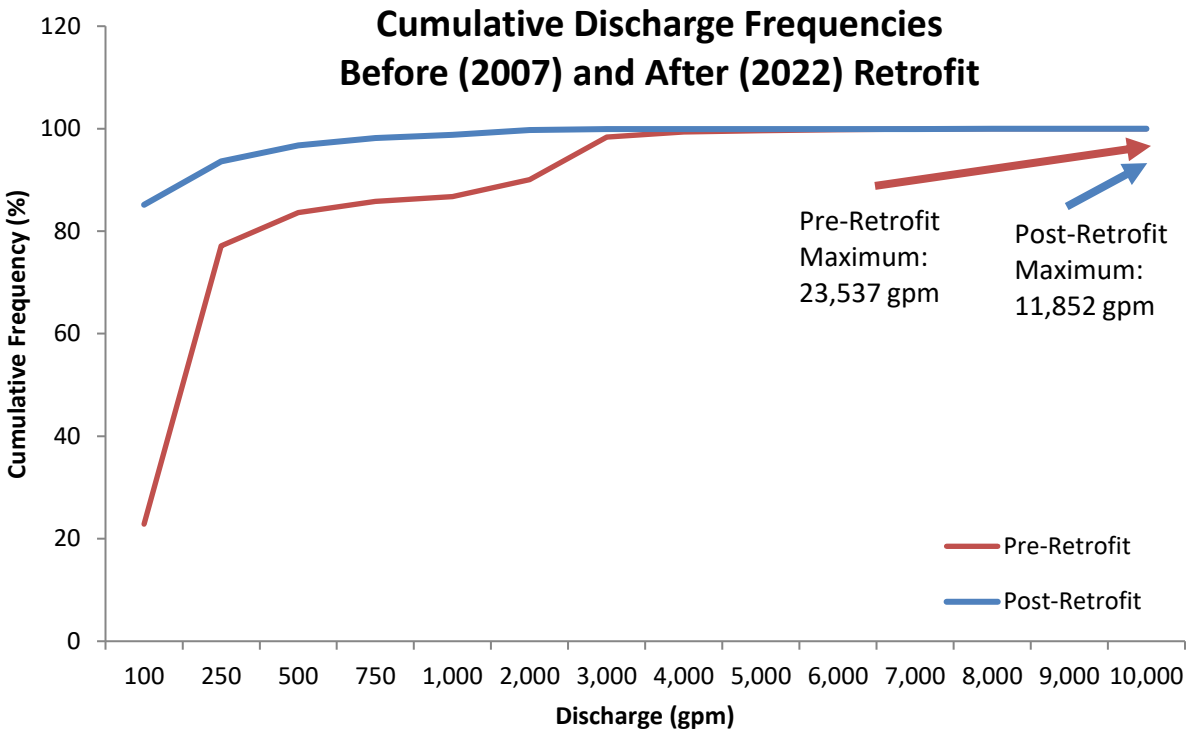



**Figure 14: Outfall Discharge Frequencies for FY2007 and FY2022**

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 0.46 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 12% contribution, peaking at 16%. 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.

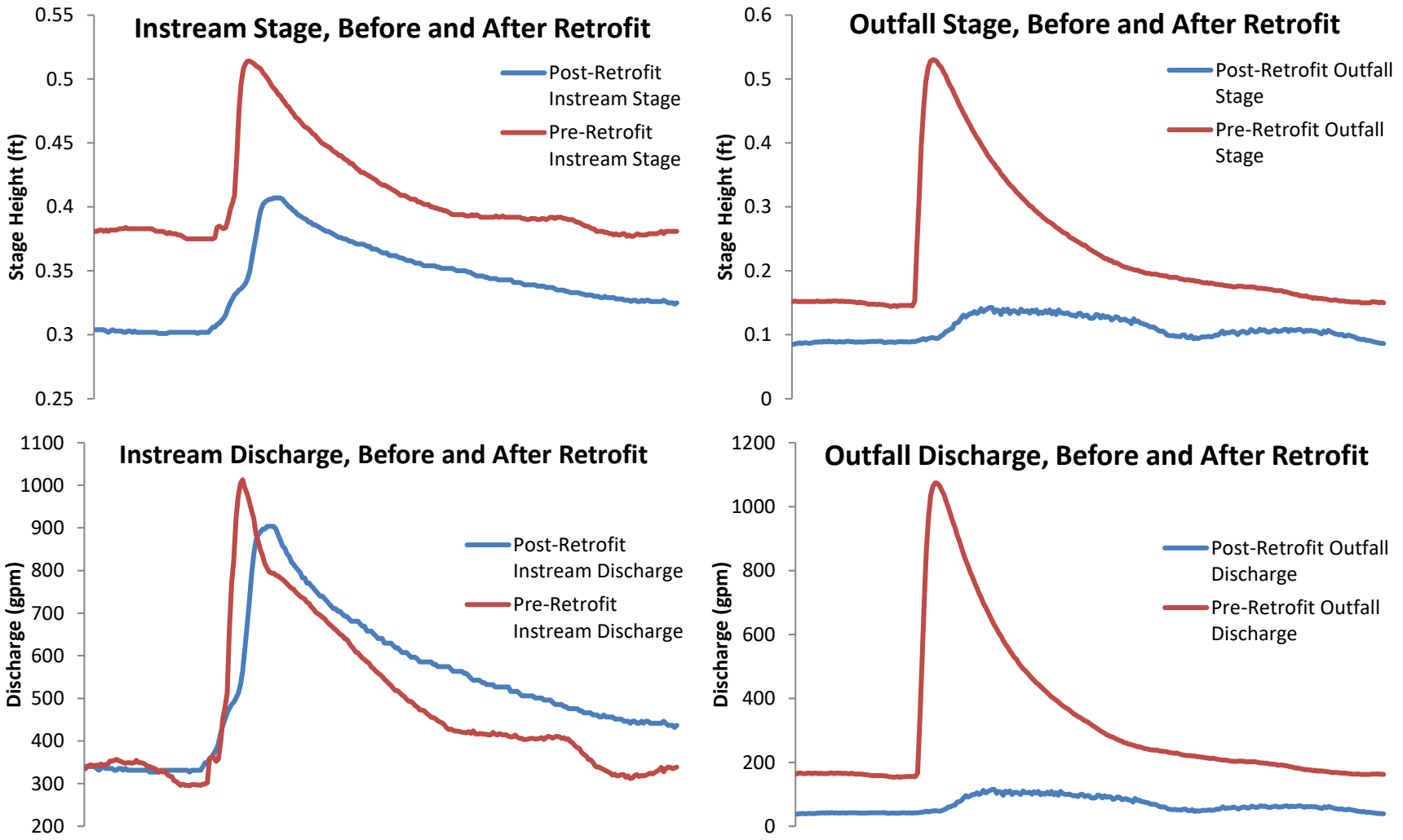



**Figure 15: Characteristics of Analogous Storms Pre-Retrofit (7/23/2006, 0.39") and Post-Retrofit (3/9/2022, 0.46")**

***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. The channel morphology remains largely unchanged relative to the previous few years. 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. During the 2022 reporting period, an incision of approximately one foot was once again observed, however, the 2022 thalweg is two feet east of the 2020 thalweg. 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, relative to previous years, 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 three previous reporting periods, in which it experienced minor incision. The channel shape remains relatively unchanged from the previous year, apart from the additional minor incision along the western bank, causing some widening of the channel bottom. The thalweg is now at the approximate elevation of the original survey.

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, however, the channel width increased about a half foot along the west bank.

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. There was

some very minor incision along the stream bottom, but this cross-section remains largely unchanged from the previous year. 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 2022 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 2022, 2021, 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 two sections 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, however, a slight change in gradient was observed over the past year within the first three stations. The gradient in the first third 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 1.47%. 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, mild aggradation occurred in the upper third of the stream segment, below the outfall station. 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 20-26. 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 – 2022

| Station | Distance (ft) | 2004 | | 2006 | | 2008 | | 2010 | | 2018 | | 2021 | | 2022 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Elev | Slope | Elev | Slope | Elev | Elev | Elev | Slope | Elev | Slope | Elev | Slope | Elev | Slope |
| **1** | 0 | 730.89 | N/A | 730.68 | | 730.89 | | | | | | | | | |
| **2** | 201 | 727.9 | 1.49% | 727.83 | 1.42% | 728.01 | 728.16 | 728.16 | 1.43% | 728.12 | | 728.18 | | 728.2 | |
| **3** | 394 | 724.2 | 1.92% | 724.26 | 1.85% | 724.56 | 724.38 | 724.38 | 1.78% | 724.99 | 1.62% | 725.06 | 1.62% | 725.73 | 1.28% |
| **4** | 592 | 721.51 | 1.36% | 721.3 | 1.50% | 721.49 | 722.17 | 722.17 | 1.27% | 721.86 | 1.58% | 721.9 | 1.60% | 722.34 | 1.71% |
| **5** | 786 | 717.75 | 1.93% | 717.77 | 1.81% | 717.81 | 718.29 | 718.29 | 2.20% | 718.15 | 1.91% | 718.39 | 1.80% | 717.41 | 2.53% |
| **6** | 988 | 715.82 | 0.96% | 716.27 | 0.74% | 716.61 | 716.46 | 716.46 | 0.52% | 716.16 | 0.99% | 716.44 | 0.97% | 716.17 | 0.61% |
| **7** | 1184 | 715.49 | 0.17% | 715.6 | 0.34% | 715.7 | 716.26 | 716.26 | 0.59% | 715.75 | 0.21% | 716.31 | 0.07% | 716.3 | -0.07% |
| **8** | 1388 | 714.42 | 0.52% | 714.3 | 0.64% | 714.24 | 714.57 | 714.57 | 0.64% | 714.38 | 0.67% | 714.52 | 0.88% | 714.39 | 0.94% |
| **9** | 1589 | 712.74 | 0.84% | 712.83 | 0.73% | 712.78 | 713.12 | 713.12 | 0.74% | 713.02 | 0.68% | 713.05 | 0.73% | 713.22 | 0.58% |
| **10** | 1787 | 711.22 | 0.77% | 711.2 | 0.82% | 711.66 | 711.45 | 711.45 | 0.61% | 711.24 | 0.90% | 711.31 | 0.88% | 711.34 | 0.95% |
| **11** | 1986 | 709.61 | 0.81% | 709.58 | 0.82% | 710.06 | 710.08 | 710.08 | 0.84% | 709.89 | 0.68% | 709.95 | 0.68% | 710.02 | 0.66% |
| **12** | 2189 | 709.48 | 0.06% | 709.02 | 0.28% | 709.58 | 709.54 | 709.54 | 0.38% | 709.41 | 0.24% | 709.53 | 0.21% | 709.45 | 0.28% |
| **13** | 2386 | 709.45 | 0.02% | 709.81 | -0.40% | 709.04 | 708.89 | 708.89 | 0.35% | 708.7 | 0.36% | 708.97 | 0.28% | 708.92 | 0.27% |
| **14** | 2564 | 707.74 | 0.97% | 707.94 | 1.06% | 707.88 | 708.46 | 708.46 | 0.16% | 708.4 | 0.17% | 708.37 | 0.34% | 708.18 | 0.42% |
| **15** | 2707 | 706.81 | 0.65% | 707.07 | 0.61% | 707.06 | 706.88 | 706.88 | 0.80% | 707.26 | 0.79% | 706.92 | 1.01% | 706.81 | 0.95% |
| **16** | 2910 | 705.18 | 0.80% | 705.2 | 0.92% | 705.55 | 705.40 | 705.40 | 0.78% | 705.42 | 0.91% | 705.32 | 0.79% | 705.28 | 0.75% |
| **17** | 3106 | 704.18 | 0.51% | 704.37 | 0.43% | 704.48 | 704.43 | 704.43 | 0.34% | 704.49 | 0.48% | 704.41 | 0.47% | 704.35 | 0.48% |
| **18** | 3298 | 702.94 | 0.64% | 703.16 | 0.63% | 703.27 | 703.41 | 703.41 | 0.60% | 703.57 | 0.48% | 703.3 | 0.58% | 703.35 | 0.52% |
| **19** | 3490 | 701.69 | 0.65% | 701.48 | 0.88% | 701.48 | 701.77 | 701.77 | 0.97% | 701.83 | 0.91% | 701.89 | 0.74% | 701.76 | 0.83% |
| **20** | 3704 | 698.99 | 1.26% | 698.92 | 1.19% | 698.92 | 698.81 | 698.81 | 1.33% | 699.16 | 1.25% | 698.83 | 1.43% | 698.62 | 1.47% |
| **21** | 3896 | 697.95 | 0.54% | 697.83 | 0.57% | 697.69 | 697.84 | 697.84 | 0.61% | 697.78 | 0.72% | 697.88 | 0.50% | 697.75 | 0.45% |
| **22** | 4100 | 694.62 | 1.63% | 694.9 | 1.43% | 694.78 | 695.68 | 695.68 | 1.48% | 695.79 | 0.97% | 695.59 | 1.12% | 695.42 | 1.14% |
| **23** | 4320 | 693.42 | 0.54% | 693.44 | 0.66% | 693.73 | 693.77 | 693.77 | 0.36% | 694.22 | 0.71% | 693.94 | 0.75% | 693.72 | 0.77% |
| **24** | 4511 | 691.12 | 1.21% | 691.05 | 1.25% | 691.1 | 690.97 | 690.97 | 1.43% | 691.24 | 1.56% | 691 | 1.54% | 690.94 | 1.46% |
| **25** | 4717 | 689.65 | 0.71% | 689.52 | 0.74% | 689.41 | 689.50 | 689.50 | 0.88% | 689.57 | 0.81% | 689.46 | 0.75% | 689.21 | 0.84% |
| **26** | 4933 | 687.59 | 0.96% | 687.71 | 0.84% | 687.59 | 687.60 | 687.60 | 0.91% | 687.55 | 0.94% | 687.42 | 0.95% | 687.16 | 0.95% |
| **27** | 5137 | 685.82 | 0.87% | 685.53 | 1.07% | 685.45 | 686.19 | 686.19 | 0.95% | 685.78 | 0.87% | 686.24 | 0.58% | 686.24 | 0.45% |
| **28** | 5248 | 682.83 | 2.68% | 682.71 | 2.53% | 682.7 | 683.08 | 683.08 | 2.37% | 683.37 | 2.16% | 683.36 | 2.59% | 682.84 | 3.05% |

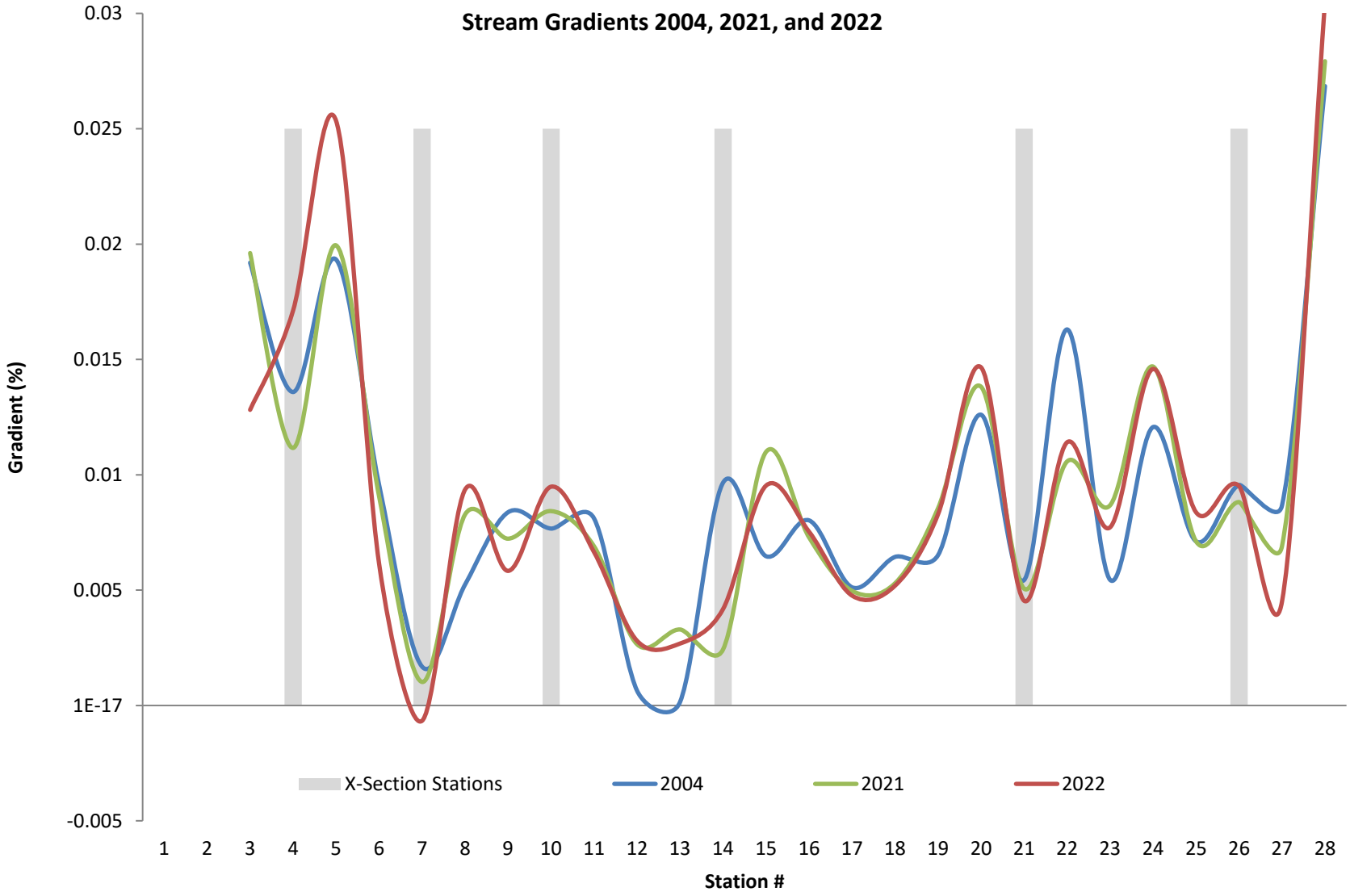



**Figure 16: Stream Gradient Change from 2004 – 2022**

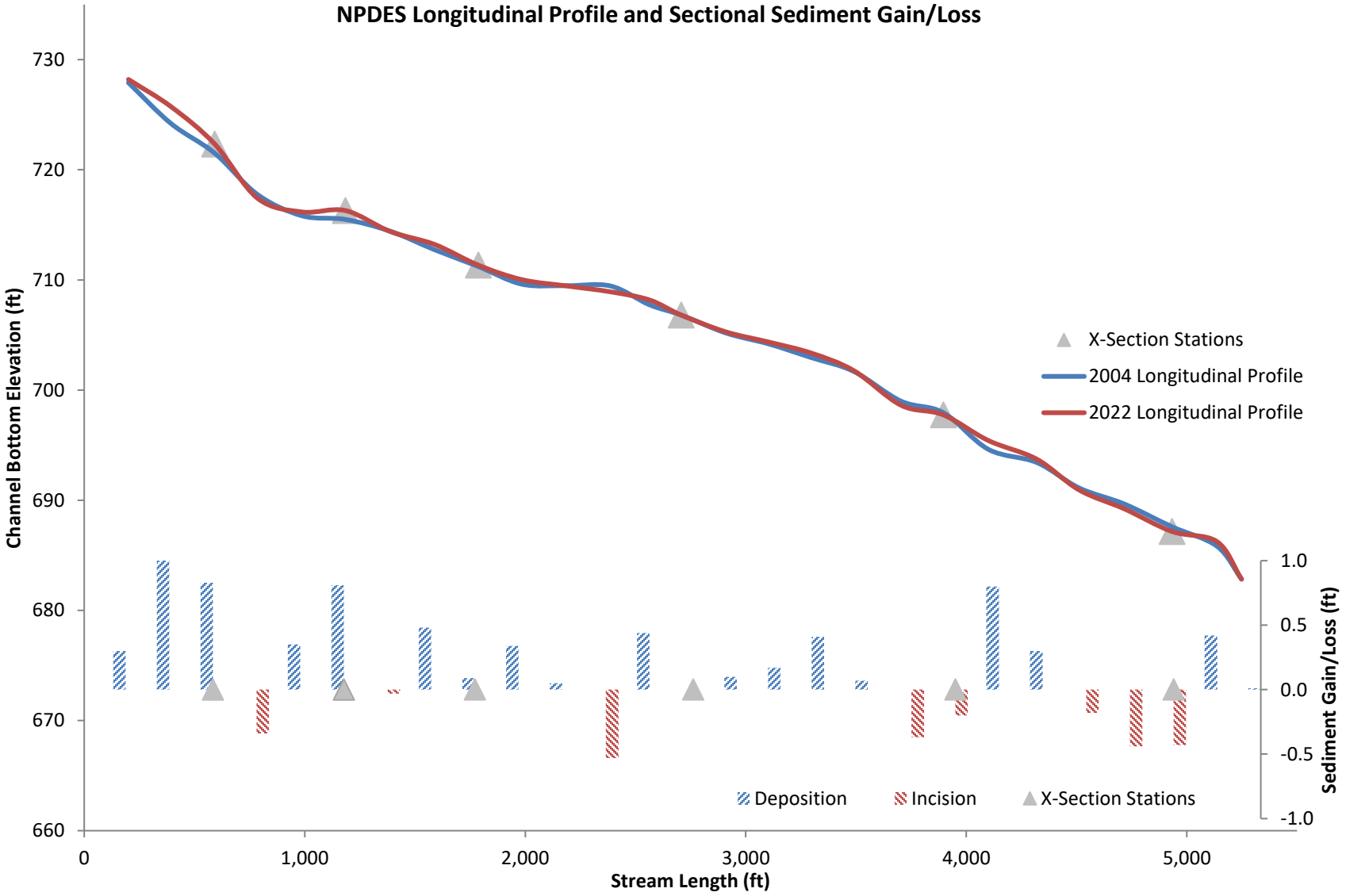



**Figure 17: Comparison of Longitudinal Profile and Sectional Deposition/Incision, 2004 and 2022**

***Chemical***

Physical Water Data

Physical water analysis results for both monitoring stations are displayed in **Table 18**. Overall, the outfall station water samples typically had higher temperature, conductivity, and pH values, as in previous years. Temperature and pH data are limited due to equipment malfunctions.

On average, temperatures at the outfall station were 6% warmer than those at the instream station. Temperature differences ranged from -2°F during storm sampling in December 2021 to 8°F during September 2021. 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 2022 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) |
| 2021-04 | 9/1/21 | Storm | 7.85 | 77.5 | 260 | 7.63 | 71.4 | 360 |
| 2021-05 | 9/22/21 | Storm | 9.02 | 74.2 | 290 | 7.74 | 66 | 410 |
| 2021-06 | 10/21/21 | Base Flow | 7.94 | 60.1 | 320 | 7.61 | 54 | 370 |
| 2021-07 | 12/16/21 | Base Flow | 8.03 | 42.7 | 350 | 7.67 | 44.9 | 320 |
| 2021-08 | 12/18/21 | Storm | N/A | N/A | 400 | N/A | N/A | 310 |
| 2021-09 | 12/30/21 | Storm | N/A | N/A | 440 | N/A | N/A | 310 |
| 2022-01 | 2/3/22 | Storm | 8.7 | 44 | 1,500 | 7.82 | 43.5 | N/A |
| 2022-02 | 3/7/22 | Storm | N/A | N/A | 1,600 | N/A | N/A | 590 |
| 2022-03 | 4/5/22 | Storm | N/A | N/A | N/A | N/A | N/A | 410 |
| 2022-04 | 6/22/22 | Storm | N/A | N/A | 480 | N/A | N/A | 370 |

Conductance was greater at the outfall station by a mean of 26%. Conductance ranged from 260 µmhos/cm to 1,600 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 8.3 while at the instream station, an average pH of 7.7 was observed. The pH values ranged from 7.61 to 9.02. 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 10 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 2022 Reporting Year**

| Event Mean Concentration | | Instream Station | | | Outfall Station | | | Significance |
|---|---|---|---|---|---|---|---|---|
| Analyte | Units | Mean | Min | Max | Mean | Min | Max | p-value |
| **BOD** | mg/L | 4.71 | 2.00 | 11.45 | 3.46 | 2.00 | 6.15 | 0.478 |
| **TKN** | mg/L | 0.95 | 0.50 | 2.42 | 0.63 | 0.50 | 1.02 | 0.064 |
| **$NO_2/NO_3$** | mg/L | 3.31 | 0.54 | 5.90 | 0.25 | 0.09 | 0.45 | 0.002 |
| **Phosphorus** | mg/L | 0.18 | 0.01 | 0.55 | 0.06 | 0.01 | 0.14 | 0.127 |
| **TSS** | mg/L | 141.0 | 1.00 | 460.67 | 9.15 | 1.00 | 26.55 | 0.096 |
| **Copper** | µg/L | 5.22 | 2.00 | 15.35 | 11.64 | 2.00 | 86.54 | 0.443 |
| **Lead** | µg/L | 3.62 | 2.00 | 8.96 | 2.02 | 2.00 | 2.70 | 0.198 |
| **Zinc** | µg/L | 26.69 | 20.00 | 63.40 | 21.45 | 20.00 | 27.98 | 0.625 |
| **TPH** | mg/L | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 1.000 |

**Figures 18 and 19** present annual mean EMC values for eight analytes from reporting years 2001 through 2022. 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 2022 (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. Additionally, a single outlying measurement in June 2022 caused a large increase in average copper for this reporting year.

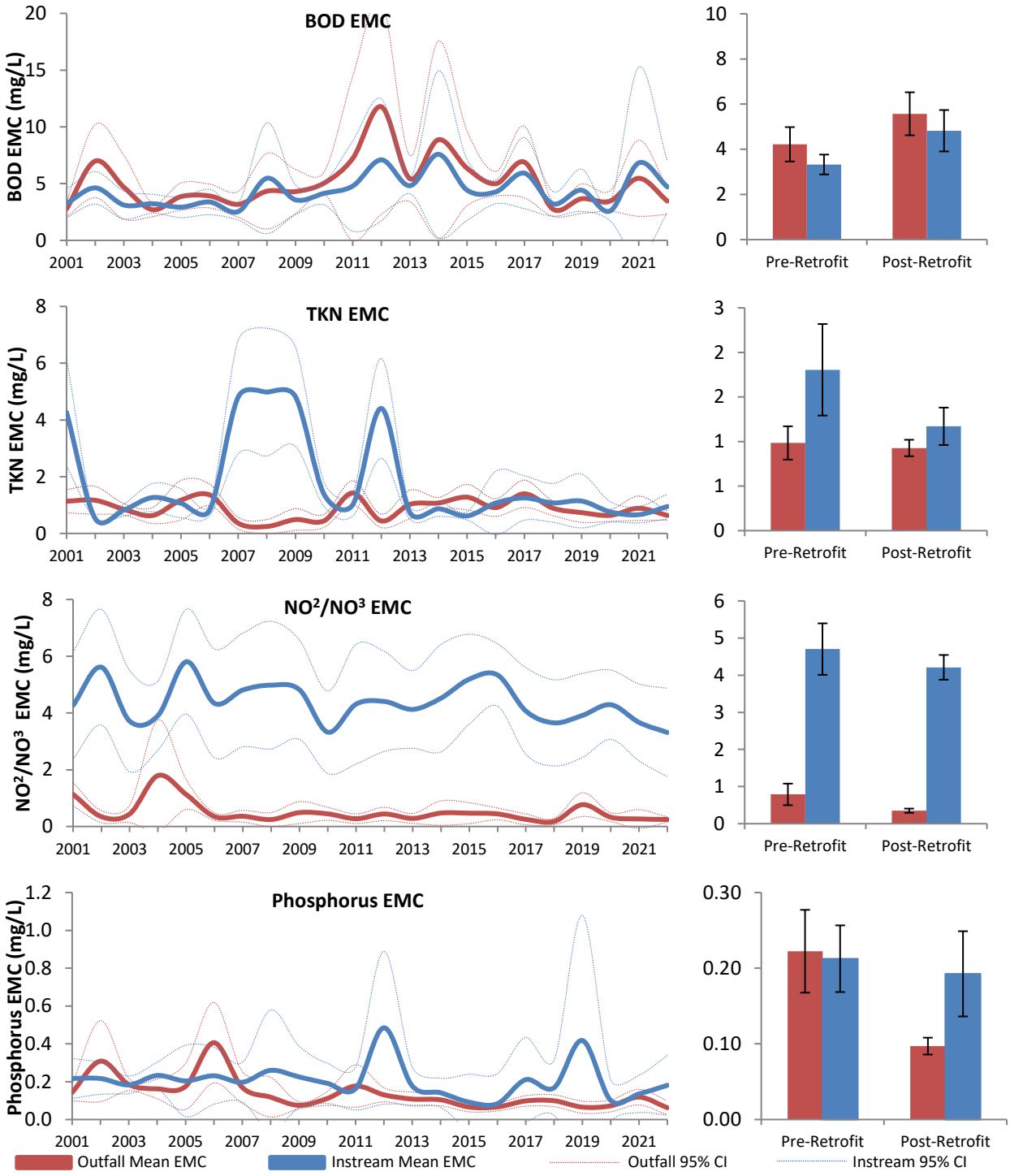



**Figure 18: EMC Values from 2001 – 2022 for BOD, TKN, $NO_2/NO_3$, and Phosphorus**

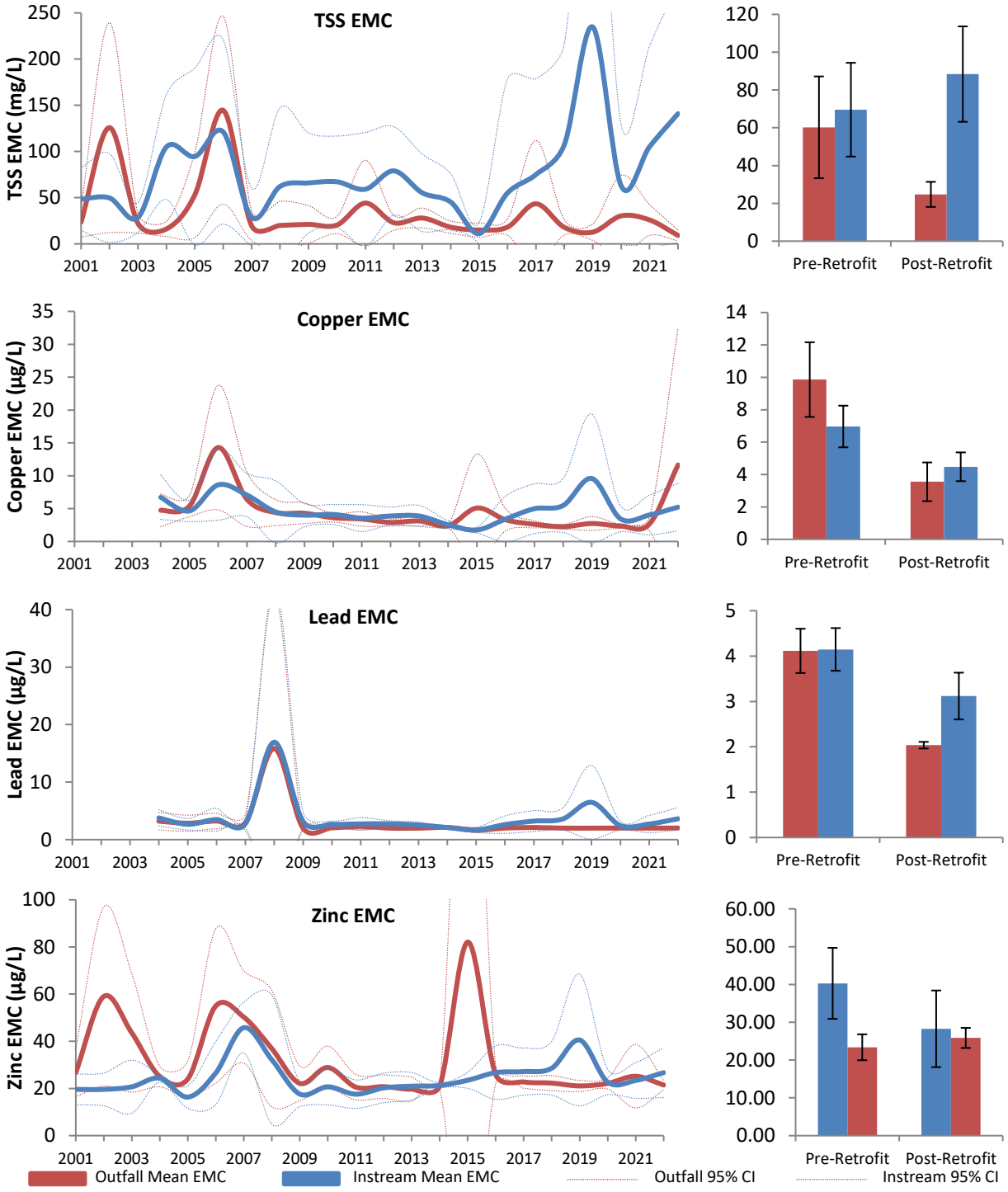



**Figure 19: EMC Values from 2001 – 2022 for TSS, Copper, Lead, and Zinc**

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. In the table below, less-than (<) symbols are used to represent maximum potential loadings for total petroleum hydrocarbon (TPH) as all data were left censored. 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 year, BOD, nitrate-nitrite, copper, lead, and zinc loadings at both stations were typical of a post-retrofit year with average annual precipitation. TKN loadings were slightly lower at the outfall station during baseflow, while the TKN baseflow loading at the instream station was slightly higher than a typical year. While the total phosphorous loading at the instream was that of a typical post-retrofit year, the loading at the outfall station were only about 50% of a typical year. Similar to the observed total phosphorous loadings, base and storm flow loadings for TSS were only approximately a third of what is normally observed in a typical post-retrofit 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, all TPH samples were below the reporting limit of 5 mg/L, so any variation with TPH loading can only be attributed to differences in discharge.

**Table 19**
**Annual Pollutant Loads for the 2022 Reporting Year**

| Annual Pollutant Loading (lbs/yr) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loc. | Type | BOD | TKN | $NO_2/NO_3$ | TP | TSS | Copper | Lead | Zinc | TPH |
| Instream | Base | 3,048 | 610 | 6,949 | 18 | 1,219 | 2.4 | 2.4 | 24.4 | <6,096 |
| | Storm | 6,565 | 1,325 | 3,385 | 277 | 219,391 | 7.5 | 5.0 | 35.4 | <6,234 |
| | *Total* | 9,613 | 1,934 | 10,335 | 296 | 220,610 | 10.0 | 7.5 | 59.7 | <12,330 |
| Outfall | Base | 627 | 90 | 62 | 7 | 807 | 0.4 | 0.4 | 3.6 | <896 |
| | Storm | 911 | 177 | 58 | 18 | 2,764 | 3.8 | 0.5 | 6.9 | <1,319 |
| | *Total* | 1,538 | 267 | 120 | 25 | 3,570 | 4.2 | 0.9 | 10.5 | <2,215 |

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 largest loadings for most analytes were observed in summer 2021. This is expected as the summer 2021 season had the largest observed total discharge for both stations during the reporting period. At the instream station, TKN and zinc loadings during spring 2022 were slightly higher than summer 2021. Unexpectedly, the summer 2021 nitrate-nitrite loading was the lowest of all four seasons during this reporting year. This can be attributed to the uncharacteristically low observed EMC values for both storm events during that season. At the outfall station, the largest seasonal loadings were in summer 2021 for all analytes except nitrate-nitrite and copper. Nitrate-nitrite loadings for autumn 2021 were three pounds higher than those observed in summer 2021. For copper, spring 2022 had the largest observed loading. A single outlying storm event had an elevated EMC during that season. Seasonal loadings, while fairly typical, were spready bimodally with generally the lowest loadings occurring in autumn 2021 and winter 2022; autumn 2021 accounted for the smallest loadings with only around 10% of the total yearly loading being observed during this period for most analytes. No samples were observed above detection limits for TPH during this reporting period. 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.

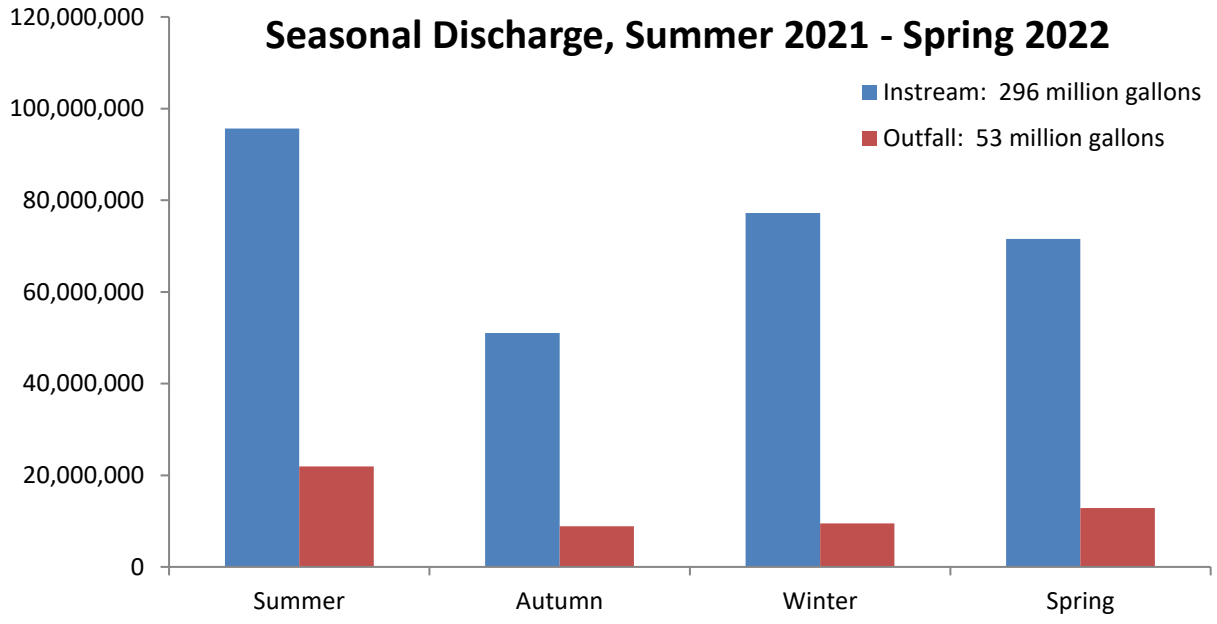



**Figure 20: Seasonal Discharge for the 2022 Reporting Year**

**Table 20**
**Seasonal Pollutant Loads for the 2021 – 2022 Reporting Year**

| Seasonal Pollutant Loading (lbs) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loc. | Season | BOD | TKN | $NO_2/NO_3$ | TP | TSS | Copper | Lead | Zinc | TPH |
| Instream | Summer | 6,667 | 862 | 439 | 323 | 273,225 | 7.1 | 5.6 | 24.7 | <3,992 |
| | Autumn | 1,026 | 213 | 2,261 | 6 | 2,821 | 0.9 | 0.9 | 8.5 | <2,129 |
| | Winter | 1,947 | 580 | 2,140 | 42 | 19,478 | 2.0 | 1.3 | 12.9 | <3,223 |
| | Spring | 4,401 | 1,057 | 1,236 | 242 | 190,608 | 6.0 | 3.1 | 25.4 | <2,986 |
| | *Total* | 14,042 | 2,712 | 6,076 | 614 | 486,131 | 16.0 | 10.8 | 71.5 | <12,330 |
| Outfall | Summer | 956 | 111 | 22 | 24 | 3,482 | 0.5 | 0.4 | 4.5 | <916 |
| | Autumn | 207 | 37 | 25 | 2 | 304 | 0.1 | 0.1 | 1.5 | <369 |
| | Winter | 169 | 58 | 20 | 3 | 484 | 0.2 | 0.2 | 2.8 | <395 |
| | Spring | 560 | 109 | 15 | 13 | 1,670 | 9.3 | 0.2 | 2.5 | <535 |
| | *Total* | 1,892 | 315 | 81 | 41 | 5,940 | 10.1 | 0.9 | 11.2 | <2,215 |

***Biological***

A complete list of taxa found at the instream station, 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 instream 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 instream monitoring station is summarized by **Table 21.** Unlike previous years, the outfall station was not sampled for biological health. The instream station for the 2022 reporting year received a stream health rating of fair and an IBI score of 3.00.

**Table 21**
**Instream Station IBI Score for the 2022 Reporting Year**

| Metric | Result | Score |
|---|---|---|
| **Number of Taxa** | 21 | 3 |
| **Number of EPT** | 6 | 3 |
| **Number Ephemeroptera** | 2 | 3 |
| **% Intolerant Urban** | 11 | 1 |
| **% Chironomidae** | 26 | 3 |
| **% Clingers** | 82 | 5 |
| | ***Total Score*** | **18** |
| | ***IBI Score*** | **3.00** |
| | ***Narrative Rating*** | **Fair** |

**Figure 21** presents these scores annually from 2001 through 2022. The trends of both stations appear to be correlative throughout this time period. On average, the score for the instream station remains 0.8 higher than that of the outfall station. The average score for the outfall

station in a typical year 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 had increased over the previous two years but decreased slightly this year. Two metrics decreased from the previous year. The total number of taxa identified dropped from 26 to 21, decreasing the score from a 5 to a 3 for that metric. Additionally, the percentage of intolerant taxa decreased from 15% to 11%, decreasing the score from a 3 to a 1. The only metric that increased this year was percent clingers, which increased from 55% to 82%. Both stations appear to still be relatively intolerable for sensitive species.

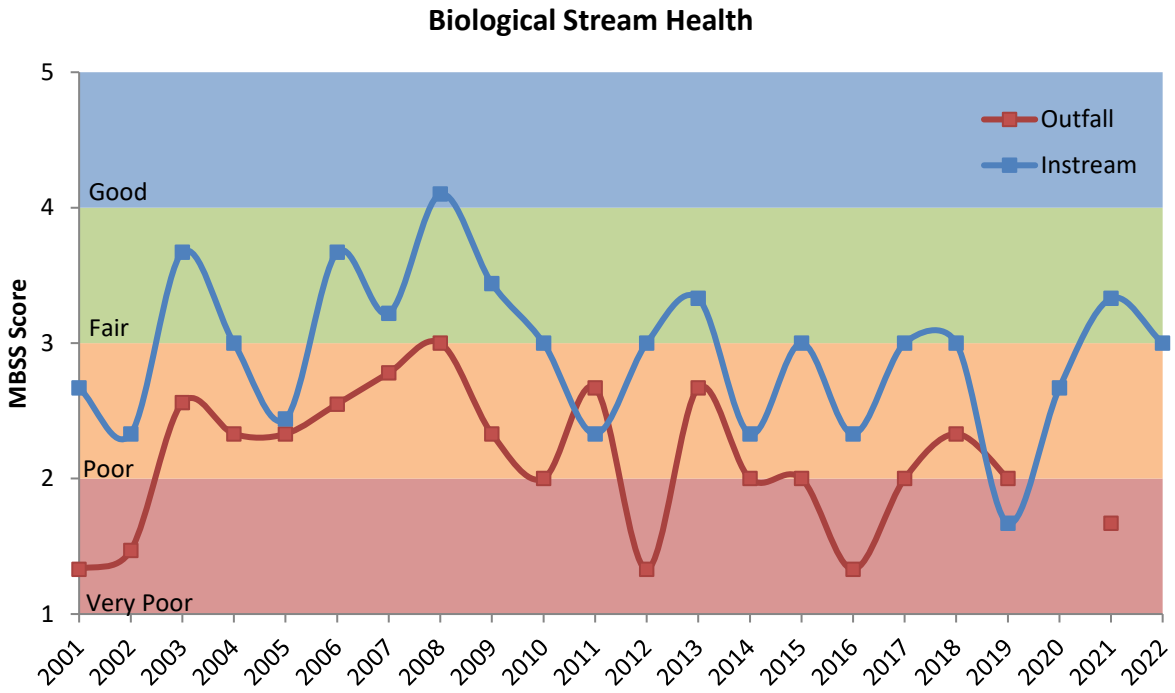



**Figure 21: Macro-Invertebrate IBI Analysis 2001 – 2022**

The biological habitat assessment results for the instream station are summarized in **Table 22**. 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 has been higher than at the outfall station in the past. From 1998 through 2022 (excluding 2001), as shown in **Figure 22**, the mean habitat scores of the instream station and outfall station were 94 and 69, respectively. For the 2022 reporting year, the instream station scored 2 points below average. The weakest parameters for the instream station were velocity/depth diversity, pool/glide/eddy quality, and riffle/run quality, resulting in marginal scoring for this year. For this reporting year, more trash was observed at the instream station than in recent years, resulting in a sub-optimal score. 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 22**
**Spring 2022 Habitat Assessment Results**

| Parameter | Outfall | Category | In-stream | Category |
|---|---|---|---|---|
| **Instream Habitat** | N/A | N/A | 11 | sub-optimal |
| **Epifaunal Substrate** | N/A | N/A | 12 | sub-optimal |
| **Velocity/Depth Diversity** | N/A | N/A | 10 | marginal |
| **Pool/Glide/Eddy Quality** | N/A | N/A | 10 | marginal |
| **Riffle/Run Quality** | N/A | N/A | 10 | marginal |
| **Embeddedness** | N/A | N/A | 13 | sub-optimal |
| **Shading** | N/A | N/A | 12 | sub-optimal |
| **Trash Rating** | N/A | N/A | 14 | sub-optimal |
| ***Total Score (max. of 160)*** | **N/A** | N/A | **92** | |
| ***Score (percent)*** | **N/A** | N/A | **58%** | |

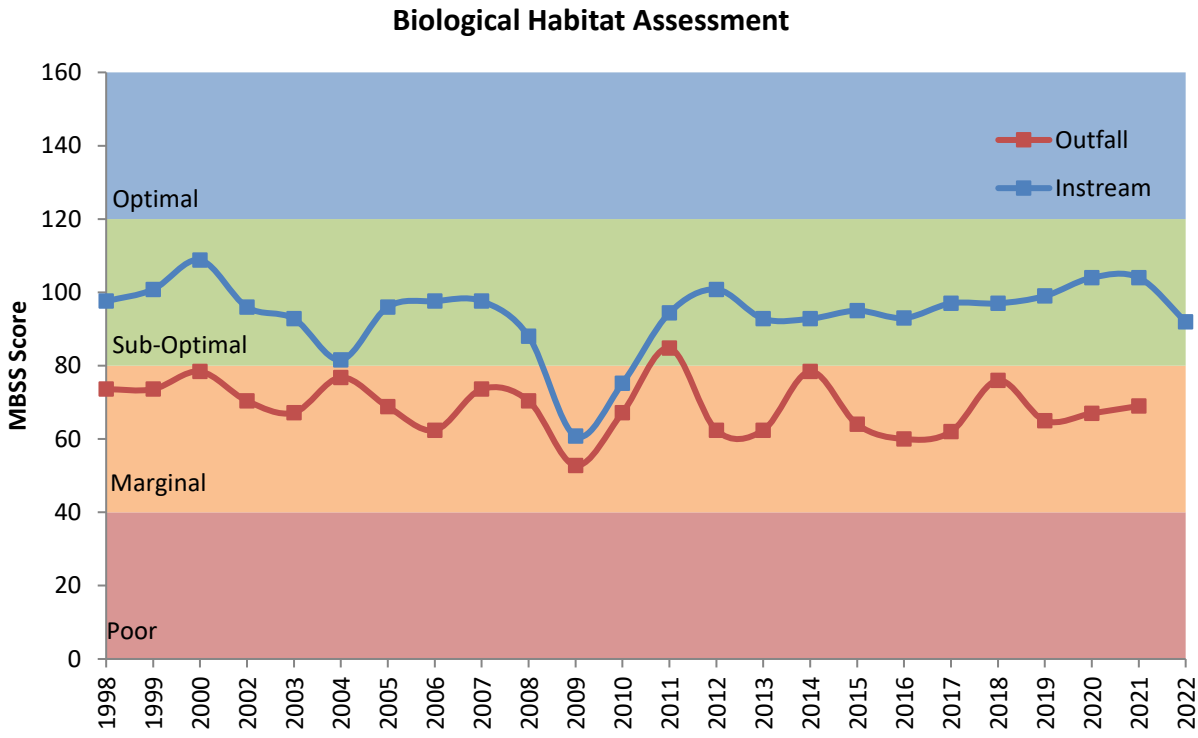



**Figure 22: Comparison of NPDES Station Habitat 1998 – 2022 (Excluding 2001)**

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.

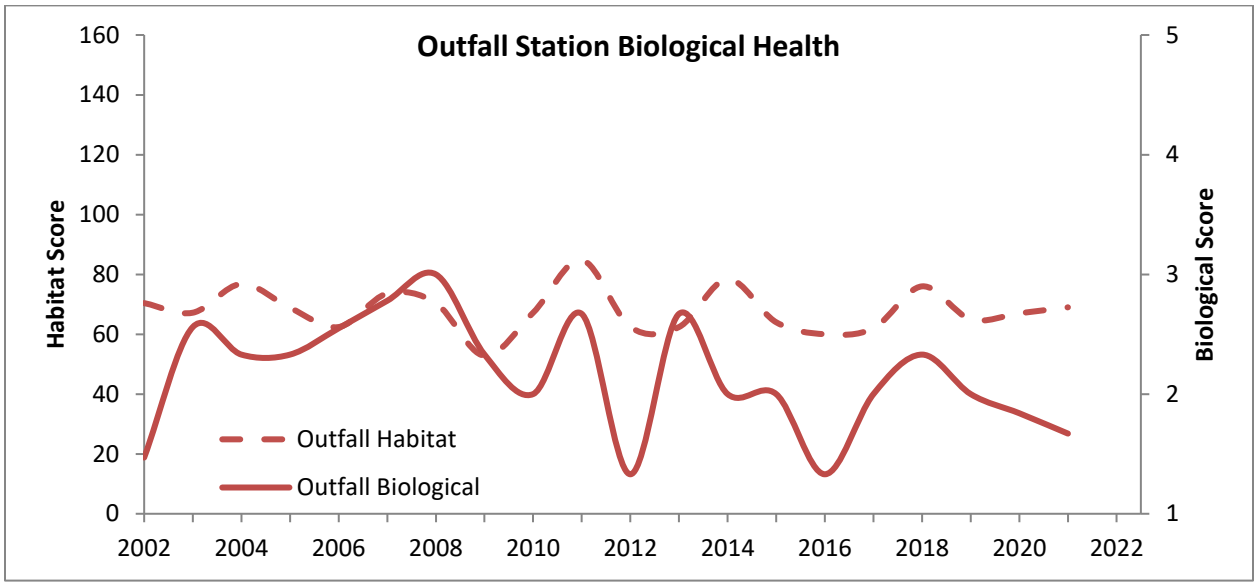



**Figure 23: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2022**

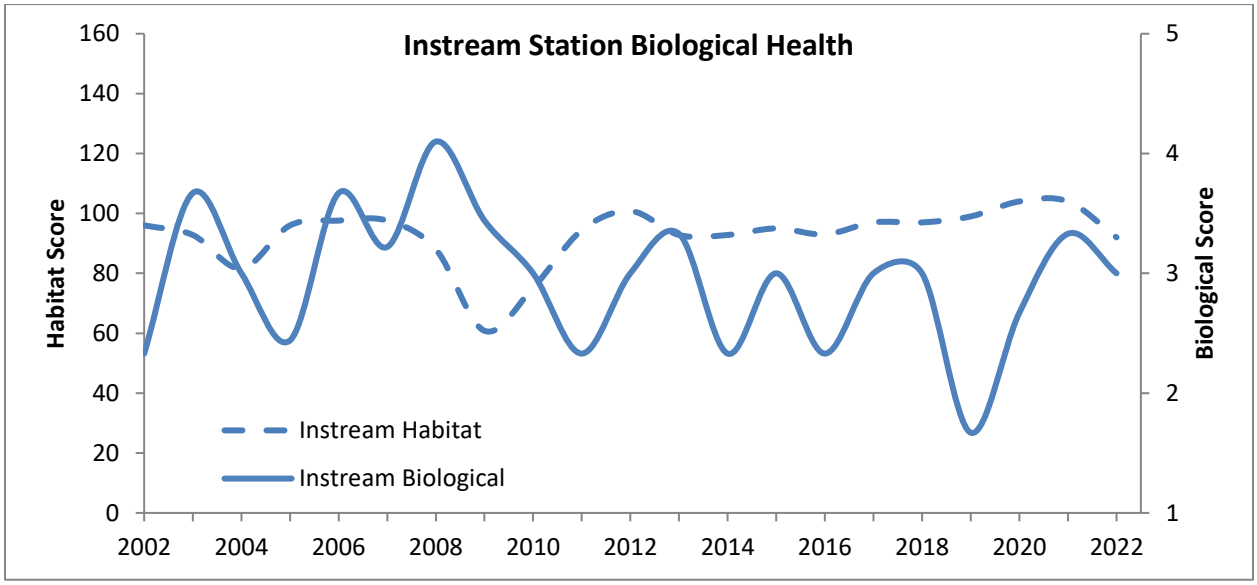



**Figure 24: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2022**

# G. Program Funding

## 1. Operational Expenses

**Table 23** 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 23**
**Operating Expenses**

| Operating Program Elements | Expenditures |
|---|---|
| Administration - Salaries and Benefits | $1,137,194.02 |
| Operation and Maintenance - Mowing, Gasoline, Repairs/Parts | $136,115.42 |
| Public Education and Outreach | $932.52 |
| Lab Testing/Supplies, Contract Services, Small Equipment, Conferences | $16,149.68 |
| Debt Service Interest | $634,585.31 |
| ***Total Operating Expenditures for FY2022*** | **$1,924,976.95** |

## 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 24**) in this program are principally associated with the permit's Watershed Assessment and Restoration requirements.

**Table 24**
**Capital Expenses**

| Capital Programs | Expenditures |
|---|---|
| Watershed Assessment and Improvement (NPDES) | $3,824,918.63 |
| Stormwater Facility Renovations | $364,265.28 |
| ***Total Capital Expenditures for FY2022*** | **$4,189,183.91** |

Cumulative capital expenditures for the program since 2005 can be found in **Table 25**. The approved FY2023-2028 CIP estimates of program funds can be found in **Tables 26 and 27**. 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 2023 – 2028

### Table 25
### Total NPDES MS4 Capital Expenditures
### Carroll County, Maryland
### July 15, 2005 through June 30, 2022

| 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 |
| 7/1/21 to 6/30/22 | $4,189,183.91 |
| ***Total permit expenditures, to date*** | **$48,658,934.55** |
| ***Grants received*** | **$16,690,002.26** |
| ***Actual County expenditures*** | **$31,968,932.29** |

### Table 26
### Watershed Assessment and Improvement (NPDES)

| Program Elements | FY 23 | FY 24 | FY 25 | FY 26 | FY 27 | FY28 | Prior Allo-cation | Balance to Com-plete | *Total Cost* |
|---|---|---|---|---|---|---|---|---|---|
| **Engineering & Design** | 550,000 | 600,000 | 400,000 | 550,000 | 500,000 | 200,000 | | | **2,800,000** |
| **Land Acquisition** | | | | | | | | | **0** |
| **Site Work** | | | | | | | | | **0** |
| **Construction** | 3,023,080 | 2,998,407 | 3,157,010 | 3,140,010 | 3,324,500 | 3,760,720 | | | **19,403,727** |
| **Equipment & Furnishings** | | | | | | | | | **0** |
| **Other** | | | | | | | | | **0** |
| ***Total*** | **3,573,080** | **3,598,407** | **3,557,010** | **3,690,010** | **3,824,500** | **3,960,720** | **0** | **0** | **22,203,727** |

The Stormwater Management Facility Renovation Program CIP (**Table 27)** has renovated 48 of the 234 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 $1,380,000 has been spent on this renovation effort.

**Table 27**
**Stormwater Management Facility Renovations**

| Program Elements | FY 23 | FY 24 | FY 25 | FY 26 | FY 27 | FY28 | Prior Allocation | Balance to Complete | *Total Cost* |
|---|---|---|---|---|---|---|---|---|---|
| **Engineering & Design** | | | | 10,000 | | | | | **10,000** |
| **Land Acquisition** | | | | | | | | | **0** |
| **Site Work** | | | | | | | | | **0** |
| **Construction** | 449,138 | 300,000 | 300,000 | 290,000 | 300,000 | 300,000 | | | **1,939,138** |
| **Equipment & Furnishings** | | | | | | | | | **0** |
| **Other** | | | | | | | | | **0** |
| ***Total*** | **449,138** | **300,000** | **300,000** | **300,000** | **300,000** | **300,000** | **0** | **0** | **1,949,138** |

**Table 28** provides a project list and the status of the individual projects in the approved capital budget for the Stormwater Management Facility Renovation Program.

**Table 28**
**Stormwater Management Facility Renovation Program**
**2016-2028**

| *Completed Projects* | | |
|---|---|---|
| **Year** | **Project Name** | **MDE 8-Digit Watershed** |
| 2016 | Carroll Highlands | Liberty Reservoir |
| 2016 | Grand Valley Farms Sec. 2 | Double Pipe Creek |
| 2016 | Jenna Estates Sec. 2 Ph. 1 Pond 1 | South Branch Patapsco |
| 2016 | Oklahoma Phase 1 Pond #2 | Liberty Reservoir |
| 2016 | Poole Meadows | Liberty Reservoir |
| 2016 | Washington Square | Liberty Reservoir |
| 2017 | Carmae Acres | South Branch Patapsco |
| 2017 | Carrollyn Manor Section 6 | Double Pipe Creek |
| 2017 | Eldersburg Estates Sec. 1 | South Branch Patapsco |
| 2017 | Grand View Resub. Lot 38 | South Branch Patapsco |
| 2017 | Kalten Acres Sec. 1 | Double Pipe Creek |
| 2017 | O'Brecht Estates | South Branch Patapsco |
| 2017 | Oklahoma Sweetwater | Liberty Reservoir |
| 2017 | Sun Valley Waterloo Section | Liberty Reservoir |

| Year | Project Name | MDE 8-Digit Watershed |
|---|---|---|
| 2018 | C. C. Commerce Center | Liberty Reservoir |
| 2018 | Carroll Woods Est. Sec. 7 | Lower Monocacy River |
| 2018 | Exceptional Center | Double Pipe Creek |
| 2018 | Larash Manor | Liberty Reservoir |
| 2018 | Matthews Meadows Sec. 2 | Liberty Reservoir |
| 2018 | Piney Ridge Village 7 | South Branch Patapsco |
| 2018 | Squires Subdivision | Liberty Reservoir |
| 2018 | Stafford Estates | Liberty Reservoir |
| 2018 | Wilmot Manor | 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 | Benjamins Claim – Jacobs | South Branch Patapsco |
| 2020 | Bluebird Hills | Prettyboy Reservoir |
| 2020 | Sumners Hollow Pond 2 | Liberty Reservoir |
| 2020 | Tydings Acres | South Branch Patapsco |
| 2021 | Carrollyn Manor Section 7 | Double Pipe Creek |
| 2021 | Clipper Hills Gardenia | South Branch Patapsco |
| 2021 | Ralph Street Extension | Liberty Reservoir |
| 2021 | Sumners Hollow Pond 1 | Liberty Reservoir |
| 2021 | Wilmot | Liberty Reservoir |
| 2022 | Bark Hill Park | Double Pipe Creek |
| 2022 | Maintenance Center Iron | Double Pipe Creek |
| 2022 | Meadow Ridge ED Pond 1 | Double Pipe Creek |
| 2022 | Meadow Ridge ED Pond 2 | Double Pipe Creek |
| 2022 | Underground Facilities (8) | Multiple |
| ***Planned Projects*** | | |
| 2023 | North Carroll Library | Prettyboy Reservoir |
| 2023 | Patapsco Valley Overlook | South Branch Patapsco |
| 2024 | Flower Valley | South Branch Patapsco |
| 2024 | Flower Valley | South Branch Patapsco |
| 2024 | Fox Ridge Hunt | Liberty Reservoir |
| 2024 | Friendship Overlook | Double Pipe Creek |
| 2024 | Golden Pond Overlook | South Branch Patapsco |
| 2024 | Pine Brook Farm Sec. 1 | South Branch Patapsco |
| 2024 | Pine Brook Farm Sec. 1 | South Branch Patapsco |
| 2024 | Piney Ridge Village 5/6 | South Branch Patapsco |
| 2024 | Piney Ridge Village 5/6 | South Branch Patapsco |

| Year | Project Name | MDE 8-Digit Watershed |
|---|---|---|
| 2024 | Piney Ridge Village 5/6 | South Branch Patapsco |
| 2024 | Safe Haven | Double Pipe Creek |
| 2025 | Farm Museum Pond | Double Pipe Creek |
| 2025 | Stone Manor 2 #1 | Liberty Reservoir |
| 2025 | Stone Manor 2 #2 | Liberty Reservoir |
| 2025 | Stone Manor 2 #3 | Liberty Reservoir |
| 2025 | Stone Manor 2 #5 | Liberty Reservoir |
| 2025 | Stone Manor 2 #6 | Liberty Reservoir |
| 2025 | The Farms Spencers Choice #1 | Prettyboy Reservoir |
| 2025 | The Farms Spencers Choice #2 | Prettyboy Reservoir |
| 2026 | Bradford Knoll | Liberty Reservoir |
| 2026 | Carroll Co. Multi. Parking | Liberty Reservoir |
| 2026 | Kirkner Estates | Liberty Reservoir |
| 2026 | Sherlock Holmes Sec. 3B | Liberty Reservoir |
| 2026 | Squire Village | Liberty Reservoir |
| 2026 | Windemere Estates #1 | Liberty Reservoir |
| 2026 | Windemere Estates Pond #2 | Liberty Reservoir |
| 2027 | Hoods Mill Borrow Area | South Branch Patapsco |
| 2027 | Jenna Estates Sec. 2 Ph. 2 #1 | South Branch Patapsco |
| 2027 | Jenna Estates Sec. 2 Ph. 2 #2 | South Branch Patapsco |
| 2027 | Jenna Estates Sec. 2 Ph. 3 #1 | South Branch Patapsco |
| 2027 | Jenna Estates Sec. 2 Ph. 3 #2 | South Branch Patapsco |
| 2027 | Sun Valley Waterloo Section | Liberty Reservoir |
| 2028 | Avonshire Woods #1 | South Branch Patapsco |
| 2028 | Avonshire Woods #2 | South Branch Patapsco |
| 2028 | Avonshire Woods #3 | South Branch Patapsco |
| 2028 | Eldersburg Library | South Branch Patapsco |
| 2028 | Pine Brook Farms Sec. 2 "A" | South Branch Patapsco |
| 2028 | Pine Brook Farms Sec. 2 "B" | South Branch Patapsco |
| 2028 | Stoney Valley | 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. 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.

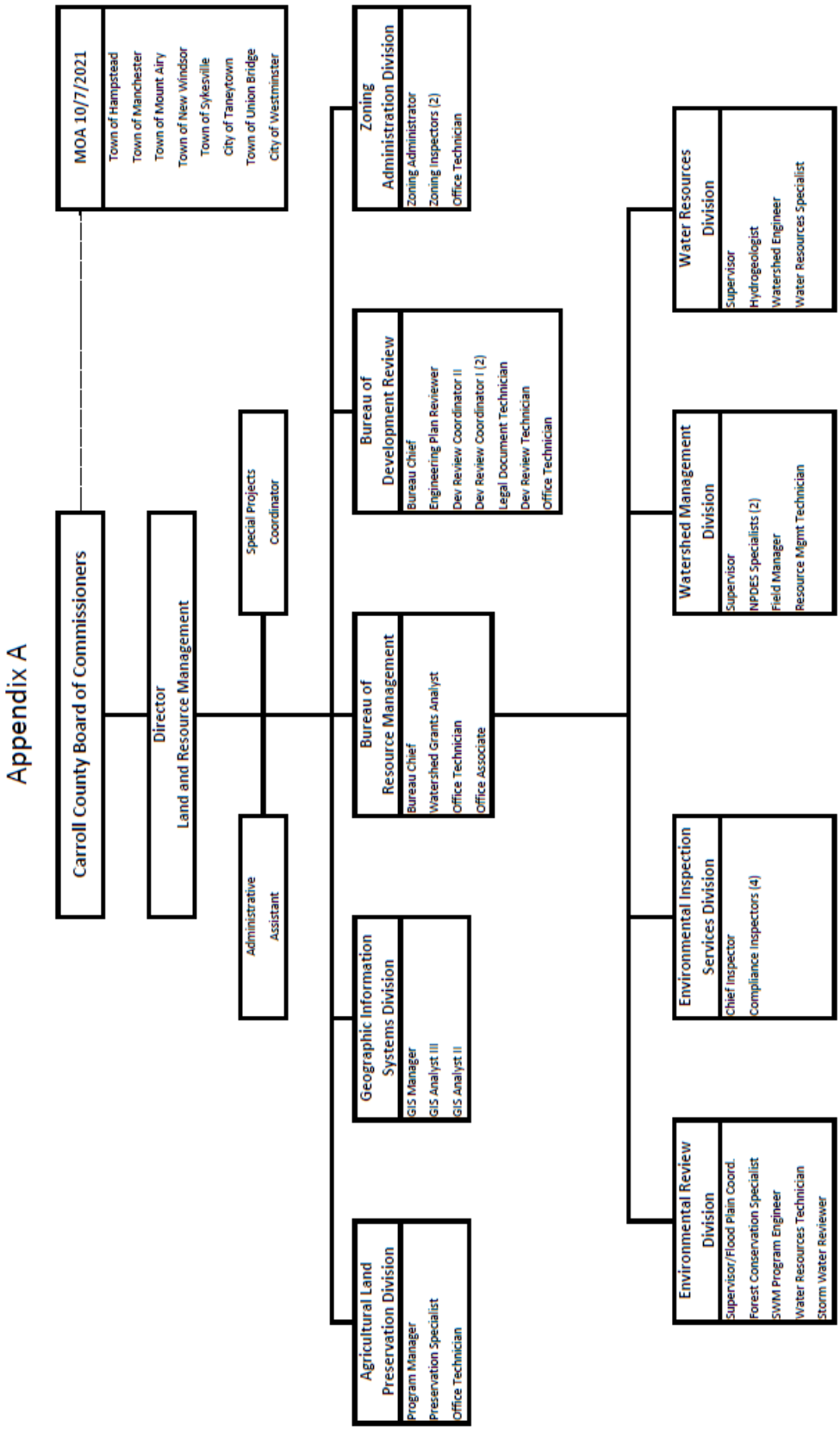
County staff also participate in various other water quality protection and improvement organizations throughout the Chesapeake Bay region. The County is an active member of the Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to engage in issues of common concern regarding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

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

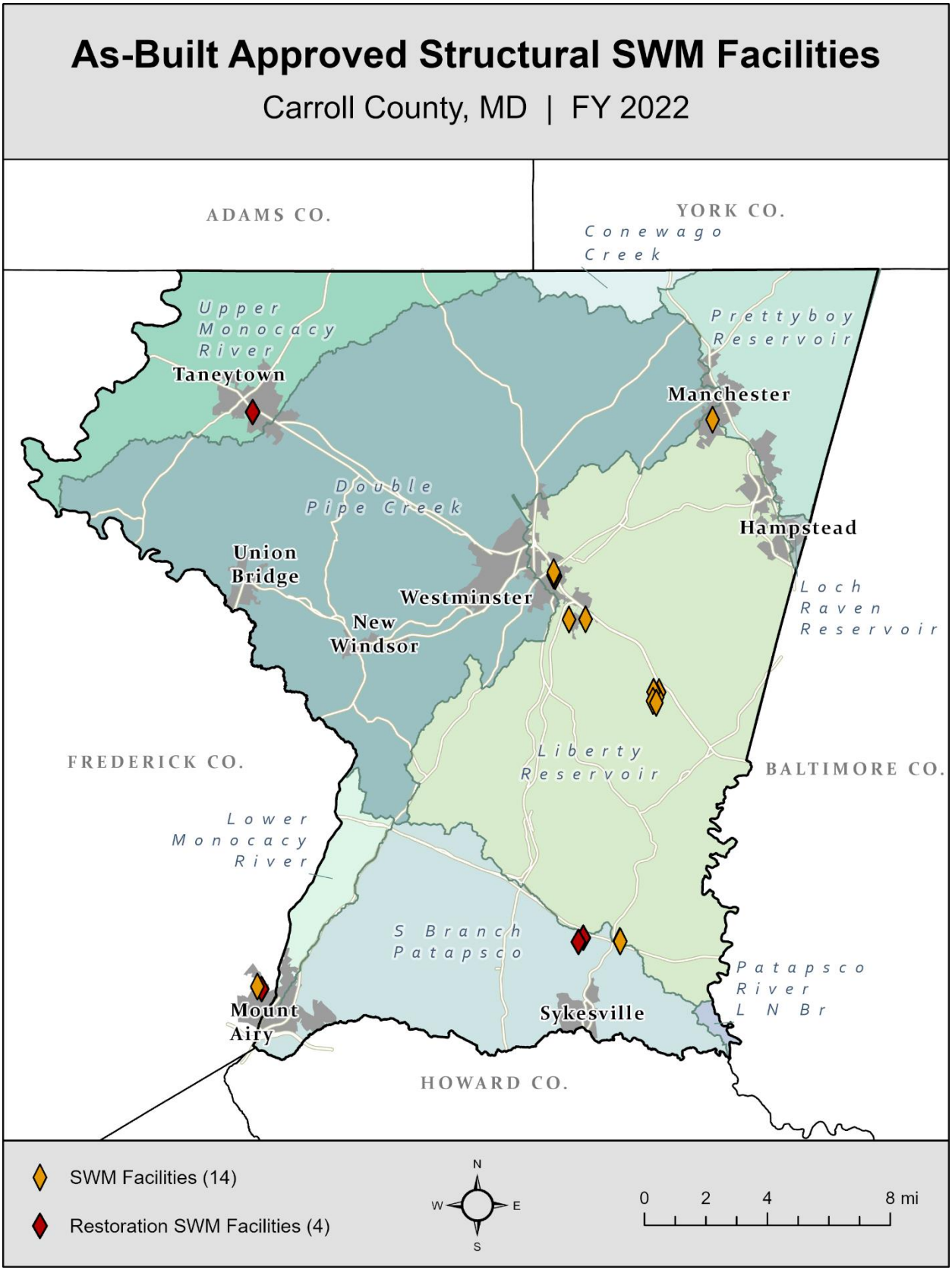

Carroll County Board of Commissioners
MOA 10/7/2021
Town of Hampstead
Town of Manchester
Town of Mount Airy
Town of New Windsor
Town of Sykesville
City of Taneytown
Town of Union Bridge
City of Westminster
Director
Land and Resource Management
Special Projects Coordinator
Administrative Assistant
Zoning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

# Appendix B

## Carroll County 2022 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
## 2022 As-Built Approved SWM Facilities Map


As-Built Approved Structural SWM Facilities
Carroll County, MD | FY 2022
ADAMS CO.
YORK CO.
Conewago Creek
Upper Monocacy River
Taneytown
Prettyboy Reservoir
Manchester
Double Pipe Creek
Hampstead
Union Bridge
Westminster
New Windsor
Loch Raven Reservoir
FREDERICK CO.
Liberty Reservoir
BALTIMORE CO.
Lower Monocacy River
S Branch Patapsco
Patapsco River L N Br
Mount Airy
Sykesville
HOWARD CO.
SWM Facilities (14)
Restoration SWM Facilities (4)
N
W
E
S
0
2
4
8 mi

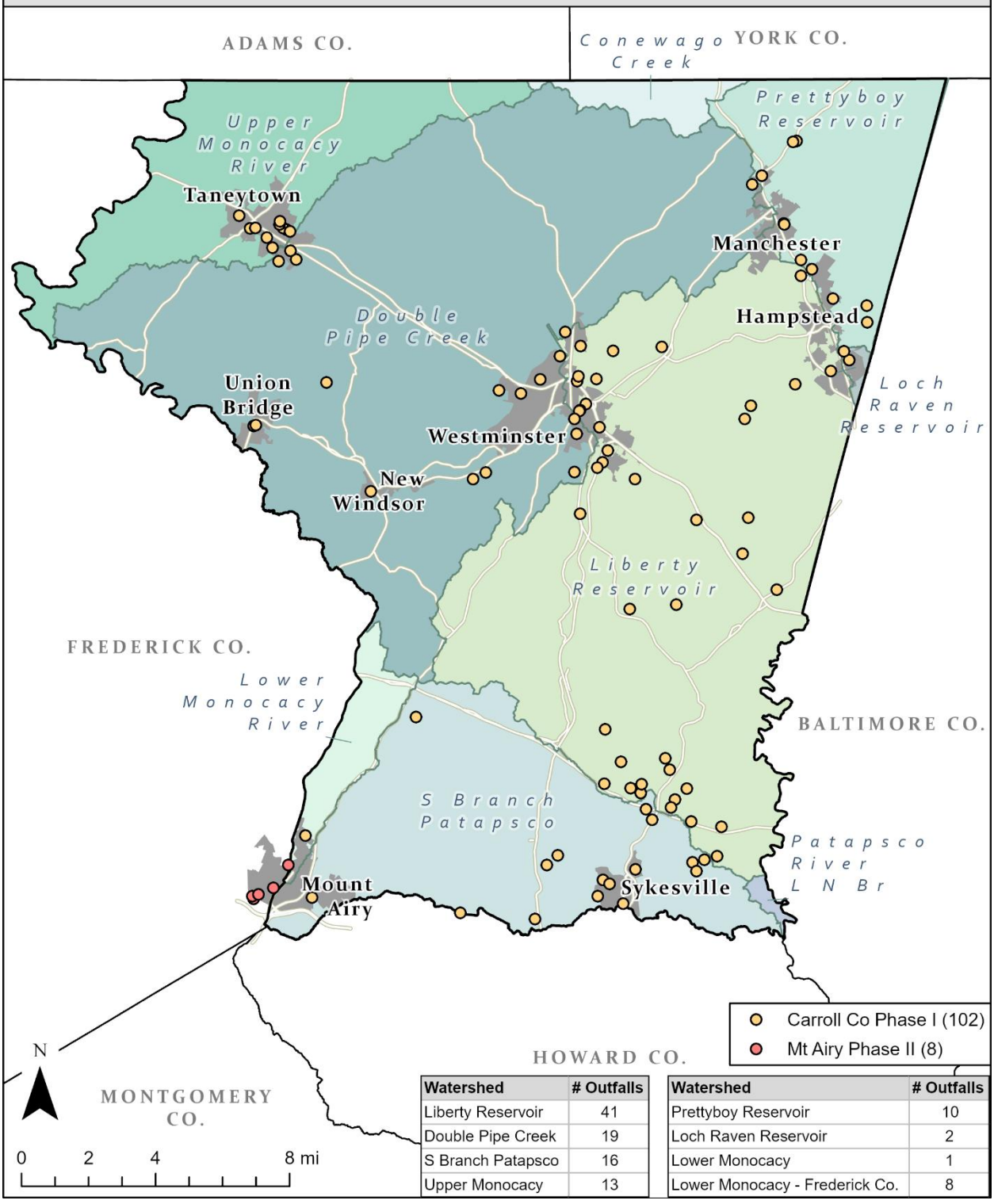
# Appendix C

## Illicit Discharge Detection and Elimination (IDDE)

- **2022 Outfall Location Map**
- **2022 Illicit Discharge Outfall Screening Actions Taken**
- **2022 Commercial/Industrial Visual Survey Location Map**
- **2022 Commercial/Industrial Visual Survey Summary**
- **2022 Illicit Discharge Incident Report Summary**
- **2022 NPDES Annual Manager/Supervisory Level Stormwater Pollution Prevention Training Agenda**

# Outfall Inspection Locations

Carroll County, MD | FY 2022

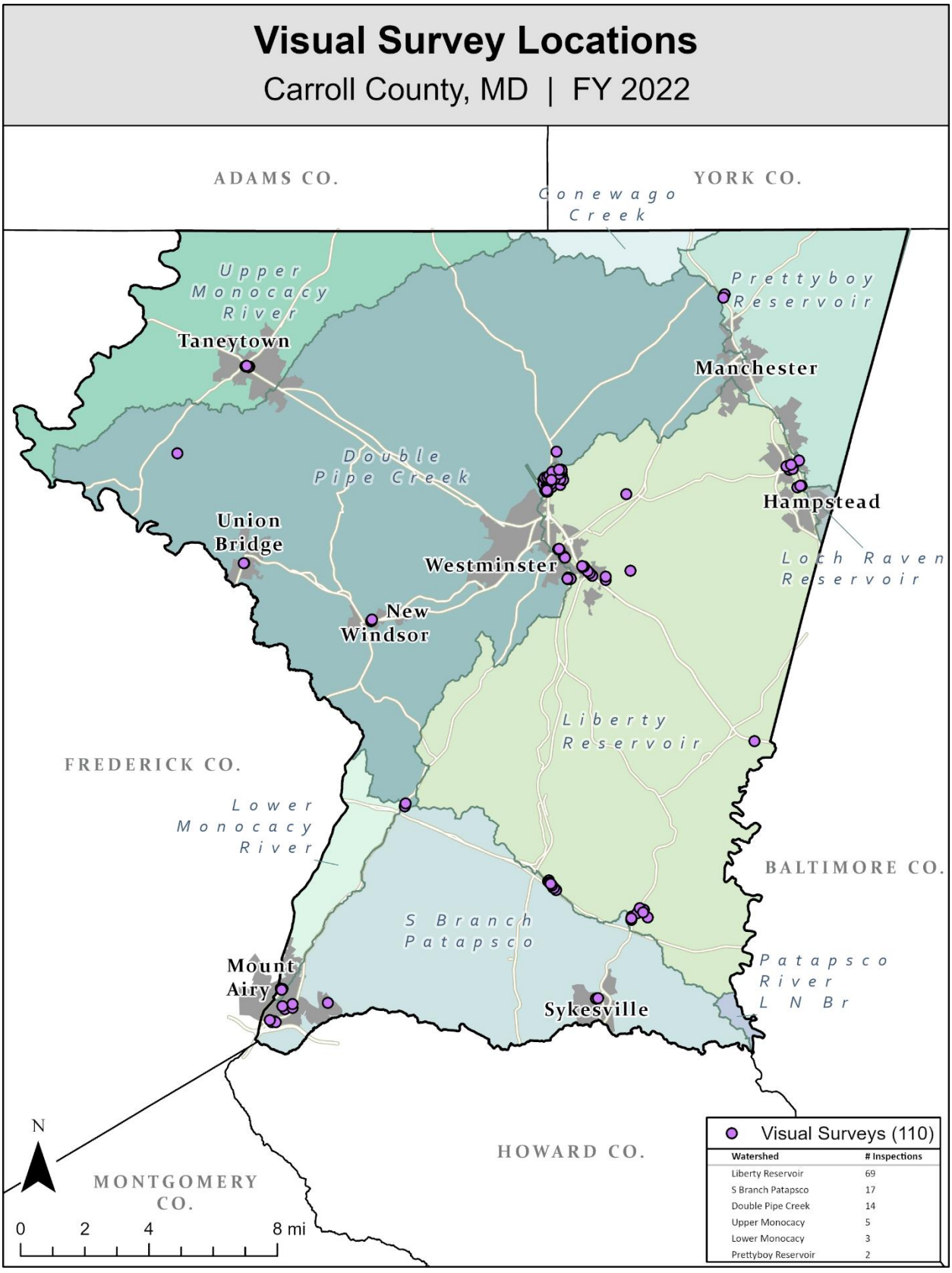



| Watershed | # Outfalls |
|---|---|
| Liberty Reservoir | 41 |
| Double Pipe Creek | 19 |
| S Branch Patapsco | 16 |
| Upper Monocacy | 13 |

| Watershed | # Outfalls |
|---|---|
| Prettyboy Reservoir | 10 |
| Loch Raven Reservoir | 2 |
| Lower Monocacy | 1 |
| Lower Monocacy - Frederick Co. | 8 |

# Appendix C
## *IDDE Program*
## 2022 Illicit Discharge Outfall Screening Actions Taken
**July 1, 2021 – June 30, 2022**

| Outfall/NPDES Study Point | Action Taken |
|---|---|
| **CR15OUT000248**<br><br>**Local ID: UB003** | Maintenance Investigation: Some light gray gravel fines were observed at the outfall and in pipe having no flow, with concern for pipe condition. Checked nearest inlet, and gravel was determined to be from an MDE 12SW-permitted business. Town met with business regarding their activity and discussed implementation of BMPs for pollution prevention and protection of both their private storm drain system and the MS4 (inlet, pipe, and outfall area). Follow-up monitoring confirmed that the issue was resolved. |


Visual Survey Locations
Carroll County, MD | FY 2022
ADAMS CO.
YORK CO.
Conewago Creek
Upper Monocacy River
Prettyboy Reservoir
Taneytown
Manchester
Double Pipe Creek
Hampstead
Union Bridge
Westminster
Loch Raven Reservoir
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 (110)
Watershed # Inspections
Liberty Reservoir 69
S Branch Patapsco 17
Double Pipe Creek 14
Upper Monocacy 5
Lower Monocacy 3
Prettyboy Reservoir 2

# Appendix C
## *IDDE Program*
## 2022 Commercial Industrial Visual Survey Summary
### Visual Survey Areas Requiring Follow-up Actions
### Processed from July 1, 2021 – June 30, 2022

This table presents the **1** of **110** 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-22-0001**<br><br>0707111649 | 03/28/22 | C | Airport Dr. Westminster, MD | Machining and Metal Fabrication Shop - Outdoor Material Storage | Provided letter on stormwater pollution prevention BMPs for businesses, with attached guidance document on good housekeeping BMPs for outdoor material storage. |

# Appendix C
## *IDDE Program*
## 2022 Illicit Discharge Incident Report Summary
### Illicit Discharge Complaints Processed from July 1, 2021 – June 30, 2022

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-21-0010** | Citizen/HOA representative reported algae, brown sludge, and possible sewer leak on surface of stormwater BMP<br><br>Reported: 07/29/21 | CC EISD inspector investigated. CC Bureau of Utilities inspected and determined no public sanitary sewage leaks. The site has had a significant Canada geese population at the pond for multiple years. BRM staff performed assessment, including analytical lab sampling at outfall discharge, and determined the concern within the pond was most likely attributed to high numbers of resident geese. | Non-Illicit Discharge<br><br>Case Closed: 08/05/21 | Fox Sedge Ct. Eldersburg, MD (County) |
| **PD-21-0011** | Town of Hampstead DPW staff reported restaurant fats and grease receptacle overflow, with spilling/dumping at stormwater BMP<br><br>Reported: 07/02/21 | CC EISD performed SWM/BMP inspection, including the fats/grease discharge entering the storm drain. Violation was cited. Required on-site meeting with owner/property management staff and representative from restaurant. Required corrective measures: inlet clean-up, soil removal and replacement, grass stabilization of BMP facility slope, grease receptacle clean-up, and restaurant implementation of Good Housekeeping BMPs. Case was not closed until all additional SWM/BMP deficiencies under cited SWM ordinance were corrected. | Illicit Discharge Eliminated<br><br>Case Closed: 03/09/22 | S. Main St. Hampstead, MD (Town of Hampstead) |
| **PD-21-0012** | Carroll Co. BRM/EISD staff reported observing paint dumping and rinsing of sprayers on ground by employee of commercial business in industrial subdivision in general vicinity of storm drain inlet.<br><br>Reported: 07/16/21 | EISD staff required the business to immediately stop activity and move all equipment and clean-up inside, contained and with proper disposal. Confirmed that the paint involved was white latex and that only water was used during the clean-up. Violation was cited with a letter, which included corrective measures (discontinue activity and clean outside dumping area) and a brochure on Stormwater Pollution Prevention Good Housekeeping BMPs for Businesses. Corrective measures were completed. | Illicit Discharge Eliminated<br><br>Case Closed: 09/14/21 | Wedekind Dr. Woodbine, MD (County) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-21-0013** | Citizen reported possible septic liquid draining into storm drain inlet on public road and through culvert pipe, discharging to grass swale in yard area between houses.<br><br>Reported: 07/26/21 | Trained CC Roads staff investigated with BRM staff confirming discharge from rear yard of a residence. Referred to Carroll County Health Department (CCHD), who investigated and determined no septic discharge/no flow. BRM staff continued monitoring and were notified of the return of flow with septic odor to inlet from recently installed PVC pipe at the previous location. BRM staff met with property owner, cited violation, and worked with property owner to immediately discontinue the discharge, pump the septic system, and remove PVC pipe near storm drain inlet. CCHD was notified. Corrective actions were completed and monitored, and the discharge was eliminated. | Illicit Discharge Eliminated<br><br>Inconclusive with Monitoring Case Closed: 09/14/21<br><br>Re-Opened: 05/17/22<br><br>Eliminated Case Closed: 05/24/22 | Old Taneytown Rd. Frizzelburg, MD (County) |
| **PD-21-0014** | Citizen reported septic system being pumped into storm drain when septic system is full.<br><br>Reported: 10/07/21 | BRM staff investigation found no evidence in storm drain system at apparent unoccupied property in rural area fronting road. Referral to CCHD confirming follow-up with investigation. | Potential Illicit Discharge<br><br>Case Closed: 10/19/21 | Old Hanover Rd. Westminster, MD (County) |
| **PD-21-0015** | County BRM Staff reported hydraulic line failure and fluid spill from trash hauler truck along County facility driveway and storm drain inlet.<br><br>Reported: 10/12/21 | County staff confirmed spill with some material in inlet. Inlets immediately cleaned by CC Bureau of Facilities contractor and absorbent applied using dry clean-up measures along driveway with proper disposal same day. | Illicit Discharge Eliminated<br><br>Case Closed: 10/12/21 | N. Center St. Westminster, MD (City of Westminster) |
| **PD-21-0016** | Citizen reported truck with pipe discharging gray water at edge of woods near stream.<br><br>Reported: 11/03/21 | BRM staff investigated and determined County-contracted culvert vacuum jetting truck had discharged some of load at edge of woods near culvert. Not into stream. Material determined to be non-pollutant. Notified County Engineering and had contractor cease activity immediately and follow BMP proper disposal practices. | Potential Illicit Discharge<br><br>Case Closed: 11/04/21 | Gorsuch Rd. Westminster, MD (County) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-21-0017** | Citizen reported concern regarding possible environmental contaminants in future stormwater runoff from business building firefighting activity during a fire that had just occurred.<br><br>Reported: 11/07/21 | BRM staff investigated. Firefighting activity flows pushed through the building rear door opening and were limited to a gravel lot with small puddles (no sheen). Pleasant Valley Fire Co. verified that no hazardous materials were involved in the fire suppression. No surface flow residual discharges reached vegetation downslope near wet bottom area. Closed/capped non-leaking machine fluid totes and containers were removed from the building temporarily due to fire, with guidance to place under roof or cover with tarp before next rainfall. No further actions were deemed necessary. | Non-Illicit Discharge<br><br>Case Closed: 11/07/21 | Old Taneytown Rd. Westminster, MD (County) |
| **PD-22-0001** | Citizen reported to CC DPW an observation of brown foam and stream discoloration with concern for potential upstream sanitary sewer issue.<br><br>Reported: 02/15/22 | CC DPW investigated, checking WWTP plant operations permitted discharge, and confirmed that there were no public sanitary sewer leaks or overflows. BRM screened for physical and chemical indicators upstream, from the reported observation location to the CC WWTP permitted outfall location at 626 Hanover Pike at the lower pond outfall structure, with negative results. A nearby separate private storm drain pipe outfall discharge from the pond at 500 Hanover Pike was observed to have clear flow with occasional bubbles and a small amount of tan foam at the outfall retaining wall. Field chemical tests were not above trigger levels, and foam was attributed to natural organic decomposition from upper pond, which has a history of significantly high populations of waterfowl. The file was closed but staff continued visual monitoring.<br><br>Case re-opened 6/1/22 due to increase in discharge and foam from 500 Hanover Pike storm drain pipe outfall. Analytical lab chemical testing and continued monitoring are in progress. | Potential Illicit Discharge<br><br>Case Closed: 02/23/22<br><br>Re-Opened: 06/01/22 On-going Investigation In-Progress | Hanover Pke. Hampstead, MD (County and Town of Hampstead) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-22-0002** | CC EISD staff performing tri-annual SWM BMP inspection reported observed material floating on pond surface.<br><br>Reported: 03/07/22 | CC EISD and BRM staff determined there was a fats and grease discharge from grocery store to a storm drain inlet, reaching a SWM BMP with no discharge exiting the facility. Grocery store grease back-up issue and poor outdoor grease management at dumper and recycle bin. Private septic system cleanout seep/overflow also observed on parking lot. Processed through SWM ordinance. Required professional environmental clean-up of SWM pond surface and storm drain inlets/pipes. Also required inspection of septic system and servicing of septic tank. Met with grocery store and all on-site restaurants to review BMPs including fats and grease recycle bin management and proper disposal of wash water. | Illicit Discharge Eliminated<br><br>Case Closed: 05/11/22 | Gamber Rd. Finksburg, MD (County) |
| **PD-22-0003** | BRM staff reported white cloudy flow in stream from storm drain pipe outfall.<br><br>Reported: 04/01/22 | BRM staff investigated and determined the flow was coming from an old illicit connection from County building utility sink floor drain, which painting contractor had just used. Reviewed with CC DPW staff. Water was turned off to sink and no use signs were temporarily posted. Floor drain was sealed and utility sink removed. CC DPW staff checked all other drains to confirm discharges all go to sanitary system. Re-inspected upon completion. | Illicit Discharge Eliminated<br><br>Case Closed: 04/28/22 | N. Center St. Westminster, MD (City of Westminster) |
| **PD-22-0004** | CCHD forwarded citizen complaint and investigation information regarding automotive work, auto fluids spills, and dumping at residential driveway.<br><br>Reported: 04/04/22 | BRM staff investigated site and found brownish automotive fluid stain on asphalt driveway where vehicles are parked and worked on. No activity at time of inspection. Letter sent with homeowner BMPs, including instructions for drain pan use, dry clean-up measures, proper disposal, and recycling. Site monitored. Follow-up inspections found no new spills or open containers. | Potential Illicit Discharge<br><br>Case Closed: 05/09/22 | Upper Beckleysville Rd. Hampstead, MD (County) |
| **PD-22-0005** | CC EISD staff reported exposed salt piles stored on active grading site.<br><br>Reported: 04/07/22 | CC EISD and BRM staff reviewed with property owner and sent enforcement letter with guidance to properly store salt piles. Grading permit enforcement communication sent to property owner to remove salt piles. Property owner removed salt piles 06/14/22. | Potential Illicit Discharge<br><br>Case Closed: 06/14/22 | Woodbine Rd. Woodbine, MD (County) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-22-0006** | CC EISD staff reported fats and grease spill at dumpster and on bank of SWM BMP facility.<br><br>Reported: 04/25/22 | CC EISD and BRM investigated and confirmed improper grease management at trash dumpster, with spillage onto pavement toward SWM facility and dumping on bank of SWM facility. Reviewed corrective clean-up measures, proper fats and grease management, and SWM repair requirements with restaurant and property owner, followed by enforcement letters. All measures were corrected. | Illicit Discharge<br><br>Case Closed: 08/30/22 | Hanover Pke. Hampstead, MD (County) |
| **PD-22-0007** | Citizen reported to Town of Hampstead DPW gray water coming from residential property on west side of railroad tracks through the railroad culvert, leaving puddles with septic odor in low swale of agricultural field.<br><br>Reported: 04/29/22 | CC EISD investigated with Town of Hampstead DPW staff and confirmed gray water with septic odor in agricultural drainage swale. PVC pipe at rear residential property that discharges along ditch on west side of RR track to culvert had no flow at time of site visit. Referral to CCHD, who noted no failing septic observed on yard surface and no flow at PVC pipe at time of investigation. Noted significant amount stormwater flowing in ditch along RR tracks from rear of adjoining automotive business into the RR culvert to the agricultural swale. BRM follow-up monitoring with analytical chemical testing and investigation is in progress for both potential sites. | Potential Illicit Discharge<br><br>Case Open: On-going Investigation In-Progress | Hanover Pke. Hampstead, MD (County) |
| **PD-22-0008** | MDE Water Quality Division reported a gray-colored water discharging from an industrial property storm drain pipe to the N. Branch Patapsco River above MD 91 bridge crossing.<br><br>Reported 05/26/22 | Facility has an active MDE Mineral Mining permit. Reviewed with MDE Compliance, who followed up with investigation and enforcement of multiple corrective measures per the Mineral Mining permit, eliminating the discharge issue upon completion. MDE to continue monitoring. | Illicit Discharge Eliminated<br><br>Case Closed: 06/22/22 | Emory Rd. Finksburg, MD (County) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-22-0009** | Town of Mt. Airy municipal staff reported restaurant grease discharge to street.<br><br>Reported 06/01/22 | BRM and Town of Mt. Airy Code Enforcement Officer investigated and determined that, on the day before, the restaurant's hood and vent cleaning vendor discharged cleaning wastewater from back of restaurant onto parking lot, which flowed onto the street to the edge of a storm drain inlet. Material on parking lot and road was dry and slightly tacky at time of investigation. Discharge did not enter storm drain system, and the outfall was checked. Dry clean-up measures were used where applicable. MD SHA was alerted to inspect and apply absorbent as necessary for road safety. Reviewed municipal code violations and responsibility with the restaurant owner and vendor. Mt. Airy code enforcement action was taken with corrective measures completed. Restaurant Good Housekeeping BMP guidance was also provided. | Illicit Discharge Eliminated<br><br>Case Closed: 06/09/22 | S. Main St., Mt. Airy, MD (County) |
| **PD-22-0010** | CC Roads staff reported flow with septic odor running overland toward storm drain inlet.<br><br>Reported: 06/10/22 | CC EISD inspection noted no septic odor in inlet or connected outfall. Flow likely to be from spring in lower yard to inlet. Stormwater from residential properties settles in low area 30' downslope of inlet. Septic odor was noted. Low area is distance from residential septic areas. No evidence of failing septic in yards. Observed downspouts from 2nd nearest residence in direction of septic tank area (green caps) area. BRM will continue to monitor. | Potential Illicit Discharge<br><br>Case Open: Monitoring in Progress. | Sean Circle, Woodbine, MD (County) |
| **PD-22-0011** | MDE reported 55-gallon storage drums at restaurant leaking grease onto parking lot.<br><br>Reported: 06/17/22 | CCHD confirmed they would investigate. Fats and grease drums had overflowed onto pavement, which had been cleaned up prior to inspection. Fats and grease recycling company had emptied the units. There was no discharge to storm drain inlets. | Illicit Discharge Eliminated<br><br>Case Closed: 06/23/22 | Jermor Ln. (South) Westminster, MD (City of Westminster) |

| Case # | Complaint & Date | Action Taken | Status | Jurisdiction/ Location |
|---|---|---|---|---|
| **PD-22-0012** | BRM staff reported poorly maintained fats and grease receptacle overflow to pavement.<br><br>Reported: 06/17/22 | BRM and City of Westminster DPW staff found poorly maintained fats and grease receptacle with lid open, dried grease on pavement, and 5-gallon surplus open grease bucket in a commercial shopping center. Dried grease stain patterns observed in direction of yard and parking lot inlets. Met with property management company and restaurant owner to discuss and review violation and corrective measures. At meeting, also observed a recent wastewater flow in yard inlet from restaurant at an adjacent commercial shopping center. Enforcement letters sent by the City of Westminster, noting violations and corrective measures, which were completed. | Illicit Discharge Eliminated<br><br>Case Closed: 09/15/22 | Jermor Ln. (North) Westminster, MD (City of Westminster) |

## 2021 NPDES MS4 Permit Annual Training

# *Stormwater Pollution Prevention Workshop*

***(Manager/Supervisory Level)***

## Carroll County and Incorporated Municipalities

Phase I Municipal Separate Storm Sewer System (MS4) Permit Co-Permittees,
Phase II Permittee, and 12-SW Industrial Stormwater General Permit Holders

**Friday, November 19, 2021**

Carroll County Public Safety Training Center - 50 Kate Wagner Road, Westminster, MD

## AGENDA

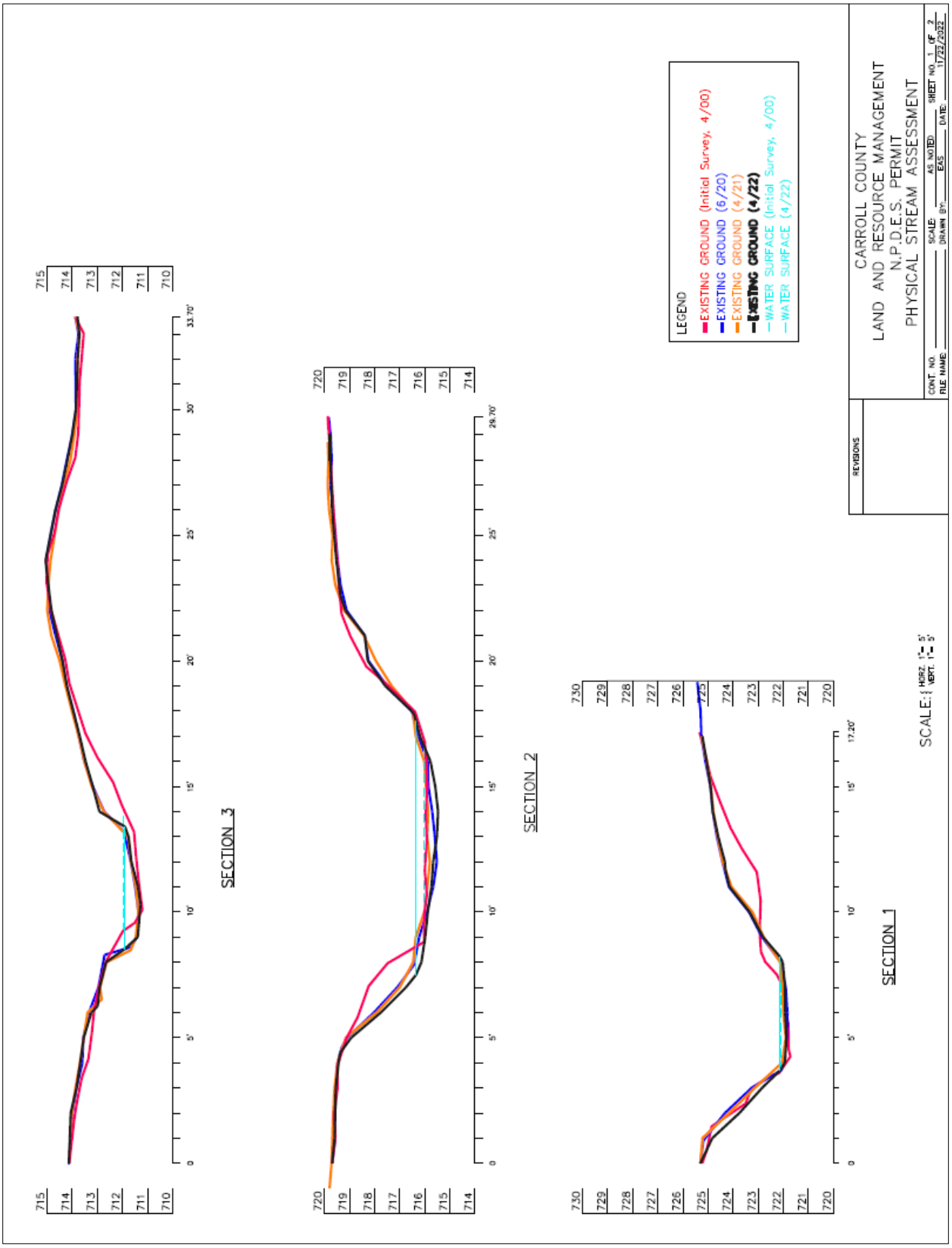
| | | |
|---|---|---|
| 9:30 - 9:50 am | **Welcome, NPDES MS4 Permit Overview & Update**<br>▪ NPDES & MS4 Permit Overview<br>▪ Video: Introduction to MS4 Stormwater Pollution Prevention for Municipal Crews<br>▪ Proposed 5th Generation MS4 Permit (Renewal and Timetable Update)<br>▪ Key Changes in "Property Management and Maintenance" | **Christopher Heyn**<br>Director<br>Dept. Land & Resource Management<br>Carroll County Government |
| 9:50 - 10:00 am | **Good Housekeeping Best Management Practices (BMPs)**<br>▪ Video: "Good Housekeeping & Pollution Prevention \| Materials Storage, Handling, and Clean-up"<br>▪ MS4/12SW Training Requirements<br>▪ Technical Resources & Support | **Claire Hirt**<br>NPDES Compliance Specialist<br>Dept. of Land & Resource Management<br>Carroll County Government |
| 10:00 - 10:15 am | **Staff Reported Illicit Discharge Investigation Procedures**<br>▪ Recognizing and Reporting Illicit Discharges and Connections<br>▪ SOP, Reporting, Code Enforcement Responsibilities<br>▪ 2021 IDDE Investigations | **Glenn Edwards**<br>NPDES Compliance Specialist<br>Dept. of Land & Resource Management<br>Carroll County Government |
| | **Break** (10) | |
| 10:25 - 11:00 am | **20-SW General Permit for Discharges of Stormwater Associated with Industrial Activity**<br>▪ Proposed Permit - Tentative Determination (Renewal & Timetable)<br>▪ Key Changes in Industrial Sectors for Municipal Operations<br>▪ Stormwater Pollution Prevention Plan Compliance Inspections | **Paul Hlavinka**<br>Chief<br>Industrial Stormwater Permits Division<br>Water and Science Administration<br>MD Department of the Environment |
| 11:00 - 11:25 am | **Industry Sector Technology: Centralized Wastewater Treatment: Non-hazardous Industrial Streams**<br>▪ Solutions and services for oily wastewater, etc. | **Bill Gereny**<br>Vice President, Subsurface Technologies<br>**Eric Harris**<br>Plant Manager, Valicor |
| 11:25 am | **Wrap Up** | **Christopher Heyn**<br>Director, Land & Resource Management<br>Carroll County Government |

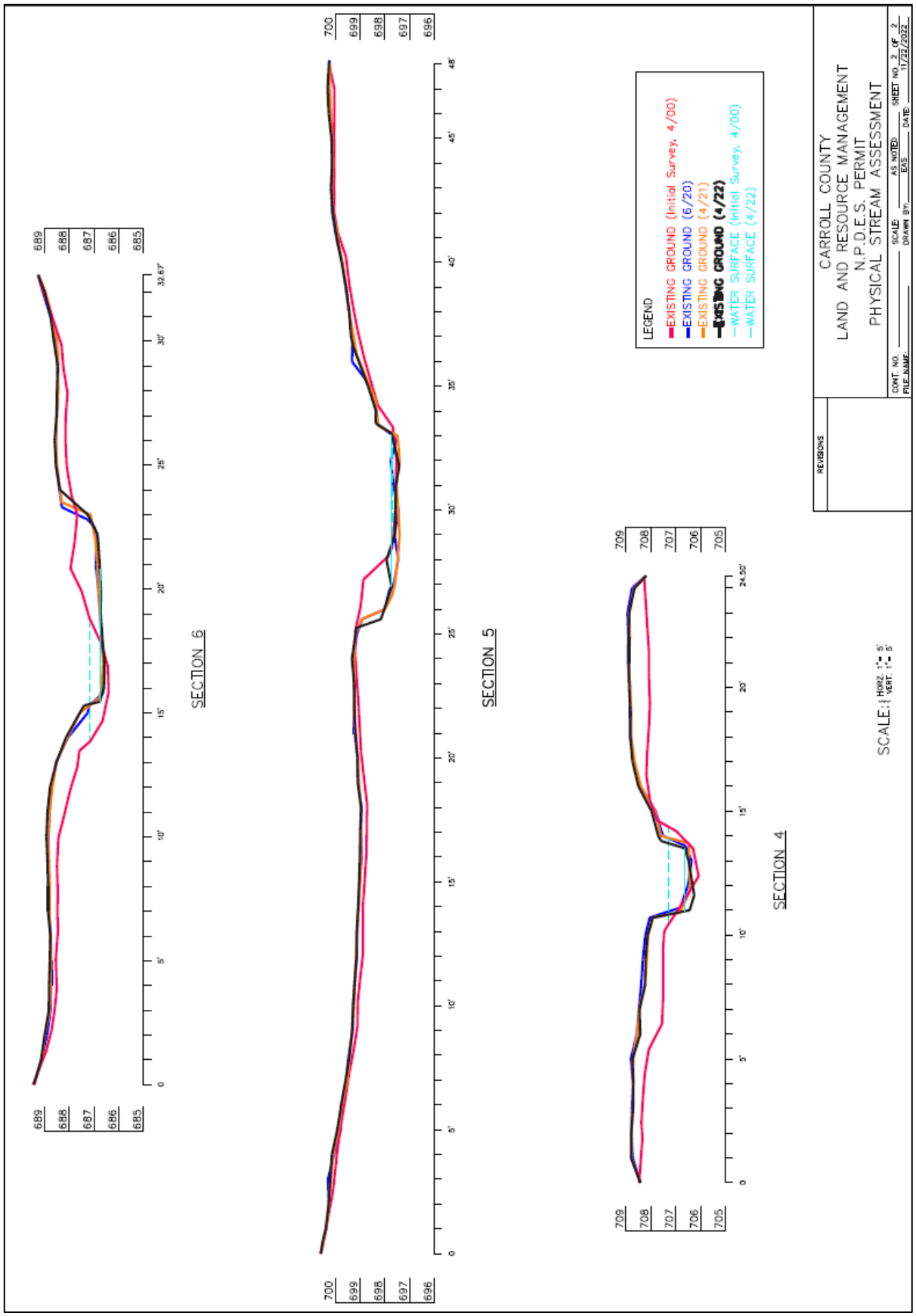
**Notes:**

# Appendix D

## Monumented Cross Sections

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


CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
LEGEND
EXISTING GROUND (Initial Survey, 4/00)
EXISTING GROUND (6/20)
EXISTING GROUND (4/21)
EXISTING GROUND (4/22)
WATER SURFACE (Initial Survey, 4/00)
WATER SURFACE (4/22)
SECTION 3
SECTION 2
SECTION 1
SCALE: HORZ. 1"= 5'
VERT. 1"= 5'


CARROLL COUNTY
LAND AND RESOURCE MANAGEMENT
N.P.D.E.S. PERMIT
PHYSICAL STREAM ASSESSMENT
REVISIONS
LEGEND
EXISTING GROUND (Initial Survey, 4/00)
EXISTING GROUND (6/20)
EXISTING GROUND (4/21)
EXISTING GROUND (4/22)
WATER SURFACE (Initial Survey, 4/00)
WATER SURFACE (4/22)
SECTION 6
SECTION 5
SECTION 4
SCALE: 1" HORZ. 1"= 5'
VERT. 1"= 5'

# Appendix E

## Macro-Invertebrate Taxonomic Identifications Results

| Order | Family | Taxon | Outfall | Instream |
|---|---|---|---|---|
| **Basommatophora** | Physidae | Physa | | 1 |
| **Coleoptera** | Elmidae | Optioservus | | 3 |
| **Coleoptera** | Elmidae | Stenelmis | | 3 |
| **Diptera** | Chironomidae | Cricotopus/ Orthocladius | | 1 |
| **Diptera** | Chironomidae | Microtendipes | | 1 |
| **Diptera** | Chironomidae | Parametriocnemus | | 3 |
| **Diptera** | Chironomidae | Polypedilum | | 8 |
| **Diptera** | Chironomidae | Rheocricotopus | | 1 |
| **Diptera** | Chironomidae | Tanytarsus | | 2 |
| **Diptera** | Chironomidae | Thienemannimyia Group | | 13 |
| **Diptera** | Chironomidae | Tvetenia | | 2 |
| **Diptera** | Simuliidae | Prosimulium | | 4 |
| **Diptera** | Simuliidae | Simulium | | 2 |
| **Diptera** | Tipulidae | Antocha | | 3 |
| **Diptera** | Tipulidae | Tipula | | 1 |
| **Ephemeroptera** | Ephemerellidae | EPHEMERELLIDAE | | 1 |
| **Ephemeroptera** | Heptageniidae | Maccaffertium | | 5 |
| **Trichoptera** | Hydropsychidae | Cheumatopsyche | | 23 |
| **Trichoptera** | Hydropsychidae | Hydropsyche | | 33 |
| **Trichoptera** | Philopotamidae | Chimarra | | 3 |
| **Trichoptera** | Thremmatidae | Neophylax | | 8 |
| | | **Total Individuals** | N/A | 121 |
| | | **Total Taxa** | N/A | 21 |

# 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 WLAs 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 per ton | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per ton | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per ton | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 8.44 | Organic | 4.44 | 37.47 | 0.48 | 4.05 | 400 | 3376 | 1.688 |
| Manchester | 0.17 | Organic | 4.44 | 0.75 | 0.48 | 0.08 | 400 | 68 | 0.034 |

**Street Sweeping (2020) – Prettyboy Watershed**

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 5 | Spring & Fall 1 pass/1-2 weeks else monthly | Vacuum | 0.73 | 3.65 | 0.34 | 1.70 | 2005 | 10025 | 5.01 |
| Manchester | 5.4 | 1 pass/4 weeks | Vacuum | 0.36 | 1.94 | 0.21 | 1.13 | 1203 | 6496 | 3.25 |

# 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 per ton | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per ton | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per ton | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 6.85 | Organic | 4.44 | 30.41 | 0.48 | 3.29 | 400 | 2740 | 1.37 |

## Street Sweeping (2020) – Loch Raven Watershed

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 11.4 | Spring & Fall 1 pass/1-2 weeks else monthly | Vacuum | 0.73 | 8.32 | 0.34 | 3.88 | 2005 | 22857 | 11.43 |

## 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 Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mount Airy | 9.4 | 1 pass/4 weeks | Mechanical | 0 | 0 | 0 | 0 | 20 | 188 | 0.09 |

# 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 |

## Stormwater Facilities Treatment (2020) – 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 (lbs) | TSS Pollutant Loads Reduced (Tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trevanion Terrace | Retrofit | 171.93 | 43 | 128.93 | ST | 1.44 | 1932.78 | 38% | 730.42 | 313.37 | 59% | 186.11 | 836090.96 | 76% | 631960 | 316.0 |

## Street Sweeping (2020) – Upper Monocacy Watershed

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Taneytown | 5.8 | 1 pass/4 weeks | Vacuum | 0.36 | 2.09 | 0.21 | 1.22 | 1203 | 6977 | 3.49 |

## 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 Reduction lbs/Acre | TN Pollutant Loads Reduced (lbs) | TP Reduction lbs/Acre | TP Pollutant Loads Reduced (lbs) | TSS Reduction lbs/Acre | TSS Pollutant Loads Reduced (Lbs.) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Riparian Conservation Landscaping | 7.550 | 6.75 | 50.9625 | 0.74 | 5.587 | 0.00 | 0.00 | 0.00 |
| Non-Riparian Conservation Landscaping | 8.200 | 5.24 | 42.968 | 0.53 | 4.346 | 0.00 | 0.00 | 0.00 |
| Forest Conservation Buffer | 11.330 | 10.57 | 119.7581 | 1.1 | 12.463 | 2,465.00 | 27,928.45 | 13.96 |

## Street Sweeping (2020) – Liberty Reservoir Watershed

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 12.7 | Spring & Fall 1 pass/1-2 weeks else monthly | Vacuum | 0.73 | 9.27 | 0.34 | 4.32 | 2005 | 25464 | 12.73 |
| Westminster | 2.9 | 1 pass/4 weeks | Vacuum | 0.36 | 1.04 | 0.21 | 0.61 | 1203 | 3489 | 1.74 |
| Westminster | 11.6 | 1 pass/week | Vacuum | 1.09 | 12.64 | 0.55 | 6.38 | 3209 | 37224 | 18.61 |

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

| Location | Tons | Material Removed | TN lbs reduced per ton | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per ton | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per ton | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|
| Hampstead | 3.62 | Organic | 4.44 | 16.07 | 0.48 | 1.74 | 400 | 1448 | 0.724 |
| Manchester | 0.018 | Organic | 4.44 | 0.08 | 0.48 | 0.01 | 400 | 7.2 | 0.0036 |

## 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.) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Cornias | 9.11 | 11.12 | 101.3032 | 1.78 | 16.2158 | 2,805 | 25,553.5500 | 12.7768 |
| Shugars | 0.86 | 11.12 | 9.5632 | 1.78 | 1.5308 | 2,805 | 2,412.3000 | 1.2062 |
| Commerce Center | 5.1 | 11.12 | 56.7120 | 1.78 | 9.0780 | 2,805 | 14,305.5000 | 7.1528 |

## Tree Plantings Riparian (2020) – Liberty Reservoir Watershed

| Project | Acres | TN Pollutant Load Reduced/Acre | TN Pollutant Loads Reduced (lbs) | TP Pollutant Load Reduced/Acre | TP Pollutant Loads Reduced (lbs) | TSS Pollutant Load Reduced/Acre (lbs.) | TSS Pollutant Load Reduced Lbs. | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Cornias | 5.84 | 14.3 | 83.5120 | 2.5 | 14.6000 | 4,411 | 25,760.24 | 12.88 |
| Shugars | 2.14 | 14.3 | 30.6020 | 2.5 | 5.3500 | 4,411 | 9,439.54 | 4.72 |
| Commerce Center | 0.85 | 14.3 | 12.1550 | 2.5 | 2.1250 | 4,411 | 3,749.35 | 1.87 |

# 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 Reduction lbs/Acre | TN Pollutant Loads Reduced (lbs) | TP Reduction lbs/Acre | TP Pollutant Loads Reduced (lbs) | TSS Reduction lbs/Acre | TSS Pollutant Loads Reduced (Lbs.) | SS Pollutant Load Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Riparian Conservation Landscaping | 2.680 | 6.75 | 18.09 | 0.74 | 1.9832 | 0.00 | 0.00 | 0.00 |
| Non-Riparian Conservation Landscaping | 10.290 | 5.24 | 53.9196 | 0.53 | 5.4537 | 0.00 | 0.00 | 0.00 |
| Forest Conservation Buffer | 10.250 | 10.57 | 108.3425 | 1.1 | 11.275 | 2,465.00 | 25,266.25 | 12.63 |

### Street Sweeping (2020) – Double Pipe Creek Watershed

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Manchester | 2.1 | 1 pass/4 weeks | Vacuum | 0.36 | 0.76 | 0.21 | 0.44 | 1203 | 2526 | 1.26 |
| Union Bridge | 0.9 | 1 pass/week | Vacuum | 1.09 | 0.98 | 0.55 | 0.50 | 3209 | 2888 | 1.44 |
| Westminster | 3.37 | 1 pass/4 weeks | Vacuum | 0.36 | 1.21 | 0.21 | 0.71 | 1203 | 4054 | 2.03 |
| Westminster | 26.1 | 1 pass/week | Vacuum | 1.09 | 28.45 | 0.55 | 14.36 | 3209 | 83755 | 41.88 |

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

| Location | Tons | Material Removed | TN lbs reduced per ton | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per ton | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per ton | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|
| Manchester | 0.04 | Organic | 4.44 | 0.18 | 0.48 | 0.02 | 400 | 16 | 0.008 |
| Union Bridge | 0.34 | Organic | 4.44 | 1.51 | 0.48 | 0.16 | 400 | 136 | 0.068 |
| Westminster | 0.48 | Organic | 4.44 | 2.13 | 0.48 | 0.23 | 400 | 192 | 0.096 |

### 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.) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Lindsell | 0.31 | 11.12 | 3.4472 | 1.78 | 0.5518 | 2805 | 869.5500 | 0.4348 |
| Bradford | 1.03 | 11.12 | 11.4536 | 1.78 | 1.8334 | 2805 | 2889.1500 | 1.4446 |

### Tree Plantings Riparian (2020) – Double Pipe Creek Watershed

| Project | Acres | TN Pollutant Load Reduced/Acre | TN Pollutant Loads Reduced (lbs) | TP Pollutant Load Reduced/Acre | TP Pollutant Loads Reduced (lbs) | TSS Pollutant Load Reduced/Acre (lbs.) | TSS Pollutant Load Reduced Lbs. | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Lindsell | 0.09 | 14.3 | 1.2870 | 2.5 | 0.2250 | 4,411 | 396.99 | 0.20 |
| Bradford | 1.59 | 14.3 | 22.7370 | 2.5 | 3.9750 | 4,411 | 7,013.49 | 3.51 |
| **Total:** | **0.09** | | **1.2870** | | **0.2250** | | **396.9900** | **0.1985** |

### Stream Restoration (2020) – Double Pipe Creek Watershed

| Location | Linear Feet | TN lbs reduced/linear ft | TN Pollutant Loads Reduced (lbs) | TP lbs reduced/linear ft | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced/linear ft | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Mayberry | 5497 | 1.23 | 6738.54 | 0.11 | 605.97 | 283.21 | 1556780 | 778.4 |

# 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 (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) | TSS Pollutant Loads Reduced (Tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Woodsyde One | Retrofit | 63.79 | 14.02 | 49.77 | RR | 3 | 693.48 | 69% | 475.66 | 114.39 | 79% | 90.59 | 300060.90 | 86% | 257482 | 128.7 |
| Woodsyde Two | Retrofit | 9.28 | 2.11 | 7.17 | RR | 0.73 | 101.75 | 54% | 41.57 | 16.71 | 63% | 7.06 | 44021.07 | 67% | 18279 | 9.1 |

## Street Sweeping (2020) – South Branch Patapsco Watershed

| Location | Lane Miles | Frequency | Method | TN lbs reduced per lane mile | TN Pollutant Loads Reduced (lbs) | TP lbs reduced per lane mile | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced per lane mile | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mount Airy | 11.7 | 1 pass/4 weeks | Mechanical | 0 | 0 | 0 | 0 | 20 | 234 | 0.12 |

### 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 Reduction lbs/Acre | TN Pollutant Loads Reduced (lbs) | TP Reduction lbs/Acre | TP Pollutant Loads Reduced (lbs) | TSS Reduction lbs/Acre | TSS Pollutant Loads Reduced (Lbs.) | SS Pollutant Load Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Riparian Conservation Landscaping | 1.690 | 6.75 | 11.4075 | 0.74 | 1.2506 | 0.00 | 0.00 | 0.00 |
| Non-Riparian Conservation Landscaping | 0.150 | 5.24 | 0.786 | 0.53 | 0.0795 | 0.00 | 0.00 | 0.00 |
| Forest Conservation Buffer | 4.860 | 10.57 | 51.3702 | 1.1 | 5.346 | 2,465.00 | 11,979.90 | 5.99 |

### Stream Restorations (2020) – South Branch Patapsco Watershed

| Location | Linear Feet | TN lbs reduced/linear ft | TN Pollutant Loads Reduced (lbs) | TP lbs reduced/linear ft | TP Pollutant Loads Reduced (lbs) | TSS lbs reduced/linear ft | TSS Pollutant Loads Reduced (lbs) | TSS Pollutant Loads Reduced (tons) |
|---|---|---|---|---|---|---|---|---|
| Woodsyde | 1874 | 0.13 | 729 | 0.04 | 207 | 66.71 | 366692 | 183.3 |

# 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 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Lower Monocacy Watershed | 34.32 | <1% | 229.21 | **2.58%** |
| Upper Monocacy Watershed | 713.14 | 6.97% | 0.00 | **6.97%** |
| Double Pipe Creek Watershed | 2,672.89 | 26.12% | 229.85 | **28.37%** |
| **Total** | **3,420.35** | **33.43%** | **459.06** | **37.91%** |

### Gunpowder River Segment

| 8-Digit Watershed | Total Nitrogen (TN) | | | |
|---|---|---|---|---|
| | Reduction from BMPs Implemented 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Loch Raven Reservoir Watershed | 19.58 | 5.09% | 200.80 | **57.31%** |
| Prettyboy Reservoir Watershed | 67.99 | 17.70% | 59.18 | **33.07%** |
| **Total** | **88.57** | **22.79%** | **259.98** | **90.64%** |

### Patapsco River Segment

| 8-Digit Watershed | Total Nitrogen (TN) | | | |
|---|---|---|---|---|
| | Reduction from BMPs Implemented 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Liberty Reservoir Watershed | 0 | 0% | 0 | **0%** |
| South Branch Patapsco Watershed | 827.37 | 37.39% | 104.22 | **42.10%** |
| **Total** | **827.37** | **37.39%** | **104.22** | **42.10%** |

# Chesapeake Bay TMDL
# Restoration Progress – Phosphorus

## Potomac River Segment

| 8-Digit Watershed | Total Phosphorus (TP) | | | |
|---|---|---|---|---|
| | Reduction from BMPs Implemented 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Lower Monocacy Watershed | 2.03 | <1% | 74.13 | **3.42%** |
| Upper Monocacy Watershed | 159.72 | 7.17% | 0.00 | **7.17%** |
| Double Pipe Creek Watershed | 521.73 | 23.41% | 78.48 | **26.93%** |
| **Total** | **683.48** | **30.66%** | **152.61** | **37.51%** |

## Gunpowder River Segment

| 8-Digit Watershed | Total Phosphorus (TP) | | | |
|---|---|---|---|---|
| | Reduction from BMPs Implemented 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Loch Raven Reservoir Watershed | 7.26 | 13.39% | 118.26 | **231.5%** |
| Prettyboy Reservoir Watershed | 7.48 | 13.80% | 19.97 | **50.64%** |
| **Total** | **14.74** | **27.19%** | **138.23** | **282.18%** |

## Patapsco River Segment

| 8-Digit Watershed | Total Phosphorus (TP) | | | |
|---|---|---|---|---|
| | Reduction from BMPs Implemented 2009-2022 (lbs.) | % Bay TMDL Reduced by BMPs 2009-2022 | Reduction from Planned BMPs (lbs.) | **% Bay TMDL Reduced by Implemented and Planned BMPs** |
| Liberty Reservoir Watershed | 0 | 0% | 0 | **0%** |
| South Branch Patapsco Watershed | 234.36 | 37.92% | 49.99 | **46.01%** |
| **Total** | **234.36** | **37.92%** | **49.99** | **46.01%** |

# Appendix G

## Comments on MDE Geodatabase Design and Documentation

# 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.

The following comments, questions, and suggestions were generated during the data migration into the new draft GDB from MDE. For any comments that MDE previously responded to but still need to be incorporated into future edits to the schema and/or guidance documents, we included both our recommendation and MDE's response in order to help consolidate these potential edits together into one document.

## General Notes

- **Geodatabase edits**
  - We made three edits to the GDB to allow for our data to load into the new format:
    - Edited BMP_Status domain to include "Proposed" (code "PROP") to account for RestBMPs that have an IMPL_STATUS of Planned
    - On BMP_DA, made the BMP_ID field nullable. We are storing the ID for the DA in the BMP feature class to allow for many:1 relationship between BMPs and DAs.
    - On LocalTMDLProgress, changed POLLUTANT to a length of 7 to accommodate the "ECOLIY" coded domain value.
- **Error Codes**
  - In general, we tried to use the provided error codes (-ZZZZ for string; -9999 for numeric), but there were a couple places where we had to adjust.
    - For year fields where a value could not be populated but was mandatory, we used -ZZZ since the field is limited to four characters.
    - For date fields where a value could not be populated but was mandatory, we used 01/01/9999 since the field must be in date format.
    - Still recommend adding an error code into certain domains explicitly
- **Reporting_Year field**
  - The Reporting_Year field has been removed across most feature classes and tables. In previous comments, we had asked how MDE will identify what new records are being submitted each year. MDE commented that they will use the Built_Date to inform when BMPs are completed. There are two scenarios that

MDE may want to consider related to this field:

- Infrequently, we come across older BMPs that are missing from the geodatabase (e.g. a drywell that was built previously but was never added). It would be a new BMP to report in the current permit year, but the built date would not show that it's a new BMP. We're not sure if this would impact anything related to Bay modeling or TMDLs but wanted to raise it as a possible complication of removing the Reporting_Year field.

- For other feature classes and tables that do not have a Built_Date field (e.g. Chemical_Application table), the Reporting_Year field was the one that identified which records were from each year. Carroll County has historically sent all of our records with the annual report. Without the Reporting_Year field, there isn't a field that identifies our current year records. Does MDE just want the current year records, or should we continue sending all records? If sending all records, we recommend adding the Reporting_Year field back in to help keep everything clear.

- **Aliases for various fields**
  - In a number of fields, there is an issue with the Alias that should be fixed in the next round of edits to the GDB shell. The issue was noticed during the data migration process when copying certain tables out of ArcGIS Pro and pasting them into Excel for editing. In each of the fields below, there is a line break of some sort in the Alias that doesn't allow the table to be posted in a single horizontal row, but instead splits it into a second row of fields:

    - Stream Restoration Protocols table: TN_REDUCTION_P3

    - Quarterly Grading Permit feature class: Lat and Long, Site Name, Address, City, State, Zip, Owner, Owner Address, Owner City, Owner State, Owner Zip, and Watershed 8-Digit

    - Chemical Monitoring table: PO4_EMC

  - There may be others; this is what we came across so far. To fix, open the fields view of the table. Double click on the Alias for that field. Press enter. A green bar should appear on that row. Click save.

- **General Understanding of Data Use**
  - As requested in previous comments, it would be helpful to learn more about how data migrates from the MDE GDB into the Bay modeling (e.g. which fields are used as model inputs). This would allow us to verify that we are recording and reporting data in line with how it will be used in modeling efforts.
    - *MDE responded that they would be willing to provide a short presentation on this topic during a future meeting.*

## Tables and Feature Classes

**PermitInfo**

- WEB_ADDRESS – increase field size to 255.

- FEDERAL_NUM – Our number is only 9 digits. Please change description from "10 digit federal permit number" to "Federal permit number" and remove data validation check, which says "Must be 10 digits."
    - *MDE responded that they will address in the next revision and after other permittees provide comments*

**BMP**

- PE_PRE_CONV:
    - We have a few larger restoration practices that replaced more than one existing BMP. In one case so far, the PE was different for each of those original facilities. In order to populate this field, we summed the total original WQv and divided by the total IA to the new RestBMP to calculate an original PE. Please let us know if this approach is acceptable.

    - Sometimes during a retrofit, we will change the DA in order to treat more impervious than the original facility treated. In this case, would MDE like us to populate this field with the original facility PE, or should we calculate a pre-conversion PE using the original WQv and the final IA to the new facility?

    - As a general note, it would be helpful to learn more about how MDE intends to use this field so we can make sure we enter the correct values.

- BMP_ID field:
    - Per guidance from MDE, when we brought the RestBMPs into the BMP feature class, we retained their existing RestBMPIDs.

    - MDE also commented that restoration and redevelopment projects should continue being given the "RST" code. However, we recommend using the "BMP" code for all practices going forward in to keep the naming method consistent for the unique ID field.

    - Whichever method is selected, please update the geodatabase guidance manual to reflect this in the next revision.

- Use of Impl_Status and BMP_Status fields:
    - For planned RestBMP projects (i.e. Impl_Status = Planned), BMP_Status is a mandatory field. The options now are Active or Removed, and the Proposed value was deleted from the dBMPStatus domain. Please add Proposed back into the domain to accurately describe these planned restoration projects. As noted above, we edited this domain in the shell GDB.

- Per comments from MDE, if a restoration/redevelopment BMP is completed but then removed at a later date (or no longer functioning and creditable), we will code it as Impl_Status=Complete and BMP_Status = Removed. Please verify this approach to make sure these practices would not be included in Bay modeling and/or credit verification (i.e. MDE looks at both fields).

- IMPL_COMP_YR is a mandatory field. In the past, this field has always been associated with impervious restoration crediting. Recommend making conditional on it being a restoration or redevelopment. If mandatory for new development as well, what is the purpose of the field?

**BMPDrainageArea**

- Remove BMP_ID field from BMPDrainageArea. As noted in *MDE Responses* document, this will be stored in the BMP layer to allow for many:1 for BMP:DA relationship. Update description to match.
    - *MDE responded that they will give other permittees a chance to provide comments before making this change.*

**BMPInspections**

- BMPInsp_ID field:
    - Per MDE guidance, when the existing RestBMP inspections were migrated to the BMPInspections table, we retained their old "RIN" inspection IDs.

    - MDE also commented that restoration and redevelopment projects should continue being given the "RIN" code for future inspection records. However, we recommend using the "BIN" code for all inspections going forward to keep the naming method consistent for the unique ID field.

    - Whichever method is selected, please update the geodatabase guidance manual to reflect this in the next revision.

**AltBMPPoly**

- As in previous comments, we again recommend separating the AltBMPPoly feature class into two polygon feature classes: one for Treatment AltBMPs and one for Land Use AltBMPs.

    - The main issue is not in tracking restoration credits but in the functionality of the layer itself. The land use AltBMPs (e.g. tree plantings) are difficult to visualize, edit, and QA/QC in GIS in the same layer as the large polygons representing treatment AltBMPs (e.g. inlet cleaning).

    - From a user perspective, two different polygon layers may make more sense. While we can split them ourselves and then merge for annual reporting, the closer MDE can design a GDB to what permittees actually use, the better. We think it would be worth asking permittees for feedback on this idea.

- *MDE has responded that they would like to hear from other permittees on this topic.*

- dBMPType removal of GMB and FB domains
  - We have a large number of grass and forest buffers that were accepted for impervious credit on our current administratively extended permit and on previous permits.

  - The GMB and FB domains were removed from the dBMPType domain in the new GDB. We recognize that our BMPs must fit into one of the Bay Model BMP types with assigned reduction efficiencies. However, we also feel it's important to maintain those older records of approved practices for impervious restoration requirements.

  - In order to transition our older grass buffers into the new GDB, we recoded them as Riparian Conservation Landscaping BMPs and edited the GEN_COMMENTS field to say, "Grass Buffer Crediting."

    - The impervious crediting remains the same as when it was accepted in previous permit years.

    - We did not split these into riparian and non-riparian polygons; they all originated as Water Resource Easements and/or Floodplain Easements, which means they are all centered on surface waters. While there may be areas that would extend beyond the 100-ft buffer that designates Riparian vs. Non-Riparian Conservation Landscaping, they are all one contiguous piece of a riparian buffer.

    - We felt this was a reasonable approach to maintaining the older grass buffer records while also making them fit the Bay Model requirements.

  - In order to transition our older forested buffers into the new GDB, we recoded them as Forest Conservation (FCO) BMPs and edited the GEN_COMMENTS field to say, "Forest Buffer Crediting."

    - Again, the impervious crediting remains the same as when it was accepted in previous permit years.

- Annual Practice Records:
  - MDE has commented that for annual practices (e.g. street sweeping), we should delete old records and only retain the current year record. We recommend against this approach. In order to calculate the running average for the permit term each year, we will need all records for previous years in the permit term. We also recognize the value in keeping previously submitted records for things like reviews and audits.

- We recommend either (a) adding the Reporting_Year field back in so the most recent year's records are easily identified, or (b) changing the BMP_STATUS to Removed if it is a record from a previous year.

- Whichever method is selected, please update the geodatabase guidance manual to reflect this in the next revision.

- EIA_ANNUAL_CREDIT field: We populated the average credit for the current permit but did not go back and calculate the average on older permits.

- There are now three fields that capture an acre value for various alternative BMPs: LAND_COVER_CONV_ACRES, ACRES_CONSERVED, and SOIL_REST_ACRES. Is it possible to combine these into a single field?

- Add Project_Name back as an optional field
  - *MDE commented that this is acceptable, but they will give other permittees a chance to provide comments first.*

- Miles_Swept field:

  - Change from short integer to Float or Double. Permittees should be able to receive credit for partial miles.
    - *MDE commented that this is acceptable.*

  - Consider adding description to field that this is lane miles

- *MDE commented that the following items will be updated in future revisions to the geodatabase design and schema documentation*:

  - TIMES_SWEPT was changed from Short to Text to accommodate new domain. Description/data validation check should no longer say limit to two significant digits.

  - IMPL_COST validation check says should be >0 but we have practices that are performed at no cost. Change to ≥0.

  - dSDV_Type is called dSDVType on the Domains tab. Change to dSDVType.

  - dSweepSched should be corrected to dSweepingSchedule, as is listed on the Domains tab

**AltBMPLine**

- Design type can often be a combination of types. For this year's submission, we selected "Other" for these projects. MDE may want to consider editing the domain to include "Multiple" as an option.

- For AltBMP_Type, the data validation should be updated to specify that a record must be created in the Protocols table if Stream Restoration is selected *and the status is Complete.*

- Because there is now a 1:1 relationship between AltBMPLine and the Stream Restoration Protocols table, would it be possible to eliminate the related table and just add the Protocols fields into the feature class?

- Add Project_Name back as an optional field
    - *MDE commented that this is acceptable, but they will give other permittees a chance to provide comments first.*

**AltBMPPoint**

- Add Project_Name back as an optional field
    - *MDE commented that this is acceptable, but they will give other permittees a chance to provide comments first.*

- Annual practice records: same comment as in AltBMPPoly section above.

- EIA_ANNUAL_CREDIT field: We populated the average credit for the current permit but did not go back and calculate the average on older permits.

**AltBMPInspections**

- AltBMPInsp_ID field:
    - Per MDE guidance, when the existing AltBMP inspections were migrated to this table, we retained their old PIN, LIN, and YIN inspection IDs.

    - MDE commented that future inspection records should continue being given these various codes. However, we recommend using one inspection code going forward to streamline the process for assigning this unique ID field (e.g. "AIN" for alternative BMP inspection).

    - Whichever method is selected, please update the geodatabase guidance manual to reflect this in the next revision.

- ALTBMP_ID: the fields listed in the data validation check are incorrect. They should be ALTBMP_PT_ID, ALTBMP_LN_ID, and ALTBMP_PY_ID.
    - *MDE commented that they will revise in future updates to validation checks*

- The table description says, "all inspection and verification records for all alternative BMPs." Certain practices do not require inspection (e.g. septic disconnection). Please update the table description to specify which practices must have inspection records.

- Septic denitrification BMPs are achieved through implementation of BAT technology on septic systems, which are then inspected by MDE as required. 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?

**SWM**

- MAIN_ENF: recommend removing this field.
    - *MDE commented that they will consider this change since other fields provide sufficient information and will update the guidance and schema as needed.*

**Outfall**

- There are now four fields tracking outfall dimensions. Although three are now optional, it just seems like too many fields for getting at the question of whether it is large enough to be a major. Is there a way to condense?
    - *MDE commented that they are supportive of this change but will give other permittees an opportunity to provide feedback.*

- SIZE_OUTFALL: To avoid confusion with DIM_OUTFALL, recommend changing name of this field to something like EQUIV_DIAMETER to clarify that we're populating with the equivalent pipe diameter.
    - *MDE commented that they will consider this change.*

- LAND_USE: recommend removing this field for the same reason it was removed from BMPs – this information can be understood and batch extracted in GIS.
    - *MDE commented that this is acceptable and they will update the documentation and schema in the next revision.*

- OUT_YEAR:
    - Description now specifies fiscal year. Older records were populated using the calendar year. We are keeping those values the same, but will populate new outfalls on the fiscal year going forward

    - This field is mandatory, but many outfalls in this feature class pre-date records being kept. For these outfalls, we have populated the attribute if known or estimated the year from nearby as-builts where possible. Any remaining unknown years were populated with -ZZZ as an error code.

**OutfallDrainageArea**

- The feature class description says this is only for major outfalls. In a previous comment, we asked if we would need to map non-major outfall DA's since the IDDE program is moving to a prioritization process that will involve screening at minor outfalls. MDE commented that the permit only requires mapping of major outfalls. However, if the IDDE table requires an MDE Outfall ID for each record, and the Outfall feature class requires a Drainage Area for each Outfall, it would follow that we will be mapping DA's for minor outfalls as well. Recommend editing the description to reflect this. If only major outfall DA's should be mapped, please provide additional direction on how to fill out the mandatory fields in the IDDE and Outfall layers.

**MunicipalFacilities**

- Update description – this table will be tracking more than just industrial facilities if including GHP properties now.
    - *MDE commented that they will revise in future updates to guidance documents.*

- LAST_INSP_DATE

    - Recent guidance from MDE clarified that annual inspections are not required at all GHP properties. Some GHP properties (e.g. a prioritized subset of properties) will undergo an annual review. The Last_Insp_Date field should be updated to reflect this. For example, make conditional on SWPP=Yes so that only the quarterly visuals at 20SW facilities are being submitted. Alternatively, make optional if GHP=Yes, and change the field description to "latest visual inspection date."

- Training numbers: Given that the same employees may be involved with more than one facility (especially as we expand the list to include GHP properties), how should we report training numbers? For example, if there are 10 staff who get trained and they do work at both a 12SW public works facility and at an offsite material storage location with a GHP, would we enter 10 for both facilities? Or should we enter this in a way to avoid double counting?

**Chemical Application Table**

- The Guidance Manual does not have the CHEM_AM_UNIT field and specifies everything in pounds. While the schema is correct, the guidance should be updated.

- The CHEM_AM_CUR and CHEM_AM_PR fields say that units are tons in the description, but then the CHEM_AM_UNITS field allows you to specify pounds, tons, etc. Change the description in CHEM_AM_CUR and CHEM_AM_PR.
    - *MDE responded that they will clarify this in future updates to the guidance.*

- CHEM_PER_CH causes problems when a chemical used this year was not used last year. If the previous year is 0, the equation for percent change is undefined. Make conditional on chemical being used in previous fiscal year.
    - *MDE responded that they will consider this change but would like to hear comments from other permittees first.*

- Antiicing vs. Deicing: In the new GDB, Antiicing was added the dChemCat domain.

    - For FY22, we entered all of our salt-related records as Deicing. While antiicing efforts were used throughout the County, the data could not be parsed out for this permit year.

    - Are permittees required to track pre-storm and during storm application separately? This is not how we currently have our DPW and municipal co-permittees track and report this data.

**MonitoringSite**

- STATION_LOC: Change from conditional to mandatory.

- LAND_USE and LU_COUNTY: Recommend removing. This information can be understood and extracted in GIS.
    - *MDE replied that this is acceptable and they will provide greater clarity in the future.*

**ChemicalMonitoring**

- TN_EMC field: If constituent parameters (TKN, Nitrate/Nitrite N) are below detection limit, should TN be calculated with 0 for that parameter?

- Discharge_Instream and Discharge_Outfall:
    - Please provide more information on how to fill in these fields. Would this be peak discharge for storm events and instantaneous discharge for baseflow sampling?

    - Because each record corresponds to a single monitoring location, recommend replacing these fields with a single "Discharge" field that would be the discharge at the individual monitoring site.

- For EMC fields, the description says to use dt for values "at or below" the detection limit, but the validation check says "below" only. We populated with dt if the value was below detection limit. If at the detection limit, we put the value. Please update either the field description or the validation check.

- NH3_NH4_EMC: update description to say, "EMC for total ammonia (mg/L) using "dt" for values at or below the detection limit" for consistency.

- EVENT_DATE:

    - Update description to be sampling date for baseflow (not taken during a storm event) and specify what date should be entered for storm samples (e.g. date of storm start, peak flow, etc.).

    - MDE may want to consider adding a field like EVENT_END_DATE field, since storms may span several days.

- EVENT_TIME: Update description to be sampling time for baseflow and specify what should be entered for storm samples (e.g. time of storm start, peak flow, etc.).

- DURATION: Please update the description to specify whether this is the duration of the sampling or the duration of the precipitation event.

- HARDNESS_EMC: The units for hardness should be changed to mg/L.

- For PO4_dt and PO4_EMC, should these be reported as P or PO4?

- For Total_Phosphorus_dt and Total_Phosphorus_EMC, should this be reported as P?

- For TN_dt/TN_EMC, NH3_NH4_dt/NH3_NH4_EMC, and TKN_dt/TKN_EMC, should these be reported as N?

- General comments:
    - Using dt for censored values in EMC and loading calculations is generally unacceptable for mass loading estimation.

    - How will continuous parameters be reported (turbidity, pH, temperature, conductivity)? Also, these parameters only apply to the instream site.

**BiologicalMonitoring**

- HABITAT_DESCRIP: Update description to specify on what this field is conditional.
    - *MDE replied that they will provide greater clarity in the future.*

- EVENT_TIME: Change to 24-hour format for consistency with ChemicalMonitoring table.

**Fiscal Analyses**

- Recommend deleting all optional cost fields in order to streamline this table. ‘
    - *MDE replied that they will clean up the table and is awaiting comments from other permittees.*

**Impervious Surface Table**

- This may have been an oversight on the County’s end, but we have always reported the number of impervious acre credits in the Under_Design, Under_Constr, and Completed fields. The description asks for the number of projects. We’ve never received a comment back though – please verify which value MDE would like.

**Local TMDL Progress and Chesapeake Bay Progress Tables**

- POLLUTANT: Change field length to at least seven characters to accommodate the domain values.

## Domains

Please update the dQuantityManagement domain.

- Occasionally, the 25- and 50-year storm is required to be managed. For example, if a downstream cross-culvert was designed to pass the 25- or 50-year storm, this would be a requirement of the upstream project. Additionally, if there are buildings in or near the floodplain, quantity management may be needed above the minimum requirement. Please add these (and their combinations) to the list of coded values.

- How should this field be used for ESD BMPs? A subdivision may have requirements for Cpv, 2-yr, and 10-yr, but an individual dry well may only manage the WQv. Non-rooftop disconnects only receive credit for WQv treatment. Recommend adding an option such as "None (e.g. WQv only)" to the list of coded values.

- Also recommend adding an option "Other (specify in comments)" to provide flexibility for exceptions to the list.

- The following domain values are highly unlikely combinations and could be removed: Cpv & 10 yr; Cpv & 100 yr; Cpv, 2 yr, & 100 yr; and 2 yr & 100 yr.

Delete the following domains, as they are no longer used:

- **dNutrValue** (was in IDDEScreening table under TN_Value and TP_Value, which have been removed)

- **dQrtInsp** (was in QRT_INSP field in MunicipalFacilities, which has been deleted)

- **dPrefix** (was in ResponsiblePersonnel table, which has been removed)

The following recommendations were made in previous comments to MDE regarding domain changes. MDE responded that they will update the User Guide and schema in future updates. The suggestions are included here for reference.

**dAltBMPPoly**

- SDV – recommend changing description to "(i.e., Storm Pipe Cleaning)" to clarify that it does not include inlet/catch basin cleaning

- FPU – recommend changing description to "Non-Riparian Forest Planting" as the counterpart to RFP, "Riparian Forest Planting"

**dBayPollutant**

- Domain description is incorrect

**dBMPStatus**

- Recommend adding "PROP – Proposed" back in, as this will allow us to accurately describe restoration BMPs that are in the planning stage.

**dBMPType**

- OWSW and MSWW have same description, "Wet Swale." Update description to be unique and clear.

- WEDW – "ED Shallow Wetland" should be changed to "Extended Detention Shallow Wetland" for consistency (ED spelled out everywhere else).

- XDED change from "Extended Detention Structure, Dry" to "Dry Extended Detention Basin" for consistency with change in wet ED pond

- XDPD change from “Detention Structure (Dry Pond)” to “Dry Pond” for consistency with change in wet pond

**dDesignType**
- Add domain description

**dFacType**
- Recommend changing new domain to “OTH GHP” (or at least “OTH GHP Req” for consistency)

## Relationship Classes

**Create a new relationship class for:**
- rBMPDrainageArea_BMP (1:Many)

**Delete the following relationship classes:**
- rBMP_BMPDrainageArea
- rMonitoringSite_NarrativeFiles

# 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 highlight supplemental information specific to the Town of Mt. Airy's Phase II MS4 permit, which was issued for its jurisdictional area within Frederick County.

As in past years, the Carroll County Phase I MS4 Annual Report provides information for both the Phase I co-permittees (i.e. the County and eight municipalities, including the Carroll County side of Mt. Airy) and the Frederick County side of Mt. Airy for its Phase II requirements. Programmatic information continues to be reported in this narrative, as well as in the associated GDB on the **Appendix B** CD. MDE has affirmed in discussion and within the enclosed correspondence 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 (MOA) between Carroll County and the eight municipalities – including Mt. Airy – contained provisions for the County to perform numerous programs and duties in coordination with each municipality to meet Phase I MS4 permit requirements. Per MDE guidance, a formal MOA between the Town of Mt. Airy and Carroll County (enclosed) was entered into on March 10, 2022, and documented the coordinated responsibilities in support of permit compliance for the Phase II permit that have been in place since the issuance of the Phase II permit. The Phase II permit requirements for the Frederick County side of Mt. Airy have been and are being met through the existing partnership with Carroll County, as validated by an MDE October 17, 2019 letter and subsequent email correspondences (enclosed).

As requested by MDE, Appendix H has been expanded to describe, highlight, and demonstrate the Town's active implementation of its Phase II MS4 permit requirements.

## 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 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) | 25.2 |
| | East West Pond (Complete) | 53.0 |
| | **Total IA Crediting** | ***78.2*** |

## Restoration Planning and Implementation

The Town of Mt. Airy has been working closely with the Carroll County 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. Construction is now complete and the facility has been as-built approved.

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** | **Cost** | **Impervious Area Credit** | **MDE Watershed** |
| 2021 | Twin Ridge | Retrofit | Complete | $802,690 | 25.20 | Lower Monocacy |
| 2022 | East West Pond | New Construction | Complete | $1,334,605 | 53.00 | Lower Monocacy |

## Minimum Control Measures (MCMs)

The Town of Mt. Airy has provided information on implementation of Phase II Minimum Control Measures (MCMs) for incorporation into the Carroll County Phase I Annual Report. Many of these MCM-related efforts are discussed in the corresponding Phase I sections of the main report. The table below lists the corresponding section(s) where this information can be found and also highlights specific progress related to each MCM.

**MCM Cross Reference Table**

| Phase II MS4 Permit MCM # | Phase II MS4 Permit Minimum Control Measure | CC Phase I MS4 Report Section *Part IV.D Standard Permit Conditions – Mgmt. Programs* | Comment |
|---|---|---|---|
| **MCM #1** | **A. Public Education and Outreach** | **6. Public Education**<br>**5. PMM (Staff Training)** | **See Phase I Report Narrative** |

- **Report Water Quality Complaints:** Municipal website "Report a Concern," office phone number, or link to co-permittee Carroll Co. Stormwater Pollution Hotline to report water quality issues, coordinated with Town personnel.

- **Determine the Target Audience:** Mount Airy Sustainability Commission (MASC) (Maryland Certified) consists of nine residents and Town Council member with Town staff liaison. Their charter is 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." MASC makes recommendations to the Town Council on reasonable environmentally-friendly policies and practices and advises mayor, staff, and Council on zoning and planning measures. MASC also provides stormwater runoff and pollution prevention guidance, with support from Phase I co-permittee Carroll Co. NPDES and BRM staff.

- **Distribute Stormwater Educational Materials:**
  - Materials available in the Town Hall foyer, on the municipal website, in newsletters, and at public education & outreach booth events.
  - Municipal website provides:
    - A variety of materials and resources promoting environmental/green practices that residents can implement at home and in the community
    - Information on water quality and stormwater pollution prevention
    - A link to the Carroll Co. NPDES public education websites, etc.
    - Public announcements.
  - Monthly Town vlog educational forum for related subjects and sponsored community events.

- **Annual Employee Training:** Regular NPDES MS4 permit stormwater pollution prevention training provided, with emphasis on reducing pollutants through implementation of Good Housekeeping Best Management Practices in property management and maintenance activities. See also MCM #6. Training is provided by staff and also coordinated with Carroll Co. BRM NPDES Compliance Specialists.

- **Education and Training Programs:** Programs have helped the general public and staff to increase their awareness of conditions of our waterways, potential pollutant sources, and everyday activities that can result in stormwater runoff contaminants entering and exiting the MS4. Implementing stormwater pollution prevention practices through intentional community efforts help to support municipal staff in protecting the Town's MS4 and waterways.

| Phase II MS4 Permit MCM # | Phase II MS4 Permit Minimum Control Measure | CC Phase I MS4 Report Section *Part IV.D Standard Permit Conditions – Mgmt. Programs* | Comment |
|---|---|---|---|
| **MCM #2** | **B. Public Involvement and Participation** | **6. Public Education 4. Litter and Floatables.** | **See Phase I Report Narrative** |

- **Target Audience for Public Involvement and Participation Activities:** This was developed and shaped through the formation of the Maryland Certified Mount Airy Sustainability Commission (MASC) and in working with the Town Council, Town of Mt. Airy Main Street Association, and municipal agencies (e.g. Recreation and Parks), and staff. The target audience reflects a cooperative community effort with a focus on residents working with the business community, civic groups, volunteers, municipal leadership, boards and commissions, and municipal staff support.

- **Specify Activities for Target Audience to Promote Participation**:
  - > Teaching and instruction through demonstrations and exhibits.
  - > Interactive public education outreach booth at municipal events, markets, festivals, etc.
  - > Vlog educational forums on social media
  - > Community garden demonstrations on water conservation, mulching, rain barrels, etc.
  - > Community beautification and clean-up events and litter clean-up events.
  - > Municipal Adopt-A-Road program – two-year commitment, four times per year
  - > Weed Warrior program
  - > Recreation and Parks – park, weed control, and stream clean-up days

- **Public Events**
  - > 04/22/2022 Windy Ridge Park – Park & Stream Clean-up, Town-hosted, 15 participants
  - > 05/20/2022 Rails 2 Trails Clean-up, Town-hosted, 10 participants
  - > 07/29/2022 Rails 2 Trails Clean-up, Town-hosted, 7 participants
  - > 08/12/2022 Windy Ridge Park – Park & Stream Clean-up, Town-hosted, 10 participants
  - > 10/21/2022 Windy Ridge Park – Park & Stream Clean-up, Town-hosted, 3 participants
  - > Town of Mt. Airy Adopt-A-Road Program – 4 adopted roads and 4x per year – 16 events
  - > Mt. Airy Sustainability Commission MASC Public Meetings – 6x per year
  - > Farmers Market Demo Days, established by MASC – interactive public outreach and participation
  - > 06/29/2022 I Heart Mt. Airy Vlog on Facebook and YouTube – Featured segment on MS4 permit awareness and stormwater pollution prevention
  - > 06/29/2022 MASC Farmers Market Demo Day with Carroll Co. BRM Water Resource Booth - interactive educational exhibits, games, and materials for all ages, promoting water quality, municipal stormwater pollution prevention, etc.

- **MS4 Progress Reports:** Information on the Town of Mt. Airy Phase II MS4 permit progress is provided by the Town for incorporation into the Carroll Co. Phase I MS4 Permit Annual Report.
  - Past and present annual reports can be accessed from the following County website: https://www.carrollcountymd.gov/government/directory/land-resource-management/protecting-carroll-county-waters-npdes/annual-reports/
  - Comments regarding the Town of Mt. Airy Phase II MS4 Permit progress reporting may be addressed to:

    Attention: Town Administrator
    Re: Town of Mount Airy Phase II MS4 Permit Progress Report
    110 S. Main Street
    P.O. Box 50
    Mt. Airy, MD 21771

| Phase II MS4 Permit MCM # | Phase II MS4 Permit Minimum Control Measure | CC Phase I MS4 Report Section *Part IV.D Standard Permit Conditions – Mgmt. Programs* | Comment |
|---|---|---|---|
| **MCM #3** | **C. Illicit Discharge Detection and Elimination (IDDE)** | **3. Illicit Discharge Detection and Elimination (IDDE) with Appendix C** | **See Phase I Report Narrative** |

- **MS4 Storm Drain System Map:** A municipal storm drain system map for the entire corporate limits was initially developed under previous Town and Carroll Co. MS4 permits. Mapping for the Phase II permit area (Frederick Co. portion) is maintained and regularly updated by Carroll Co. BRM NPDES Compliance Specialists using GIS. Field verification is by Mt. Airy DPW and Carroll Co. NPDES Compliance staff. Updates to stormwater infrastructure (e.g. for new development), including stormwater BMPs, is provided through the as-built process. Quality control is performed by both Town and County staff. Hard copy and digital maps are provided to the Town.

- **Municipal Ordinance Chapter 94A Storm Sewer Systems**: The "Town of Mt. Airy Environmental Management of Storm Sewer Systems Ordinance" prohibits illicit discharges to the MS4 and provides legal access to private property to investigate and eliminate illicit discharges and/or connections.

- **Develop, Implement and Submit Written Standard Operating Procedures (SOP):** The SOP manual, "Illicit Discharge Detection and Elimination Manual, A Guidance Manual for Carroll Co. Government and Municipalities of Carroll Co., MD" was previously submitted with MS4 Annual Reports and was reviewed and approved by MDE. The manual outlines the procedures utilized with Municipal Ordinance Chapter 94A and describes coordination with adjacent and interconnected MS4 operators. The IDDE program is coordinated between the Town of Mt. Airy Municipal Code Enforcement and Carroll Co. Bureau of Resource Management NPDES Compliance staff. This SOP is scheduled to be updated under next Carroll County MS4 Phase I Permit Term in 2023.

- **IDDE Outfall Screening Process Documentation:** The latest outfall screenings were performed by Carroll Co. NPDES Compliance Specialists in coordination with Mt. Airy DPW staff during FY2022. Records, results, investigations, and enforcements are documented and maintained by Carroll Co. BRM.
  - > 20% or 8 IDDE screenings required. Eight IDDE screenings performed. No illicit discharges.
  - > Results: 4 No Flow, 4 Flows / 4 Negative Chem Test. 3 flows natural groundwater, 1 pond discharge.
  - > Results documented and infrastructure condition provided.

- **IDDE Program Investigation Records:** Town of Mt. Airy Code Enforcement leads and coordinates IDDE investigations with Carroll Co. BRM NPDES Compliance staff, who provide guidance on- and off-site as needed. Investigations are processed until resolved. Mt. Airy administers enforcement per Chapter 94A, consistent with permit requirements. BRM tracks and documents each IDDE investigation in their database, and program records are maintained and available for MDE field review. Investigations are also tracked and documented internally by Mt. Airy Code Enforcement.
  - > IDDE investigation results are included in the Carroll Co. Phase I Report, Part IV.D.3 and Appendix C.

| | | | |
|---|---|---|---|
| **MCM #4** | **D. Construction Site Stormwater Runoff Control** | **2. Erosion and Sediment Control** | **See Phase I Report Narrative** |

- This program is delegated to Carroll Co.

| | | | |
|---|---|---|---|
| **MCM #5** | **E. Post Construction Stormwater Management** | **1. Stormwater Management** | **See Phase I Report Narrative** |

- This program is delegated to Carroll Co.

| Phase II MS4 Permit MCM # | Phase II MS4 Permit Minimum Control Measure | CC Phase I MS4 Report Section *Part IV.D Standard Permit Conditions – Mgmt. Programs* | Comment |
|---|---|---|---|
| **MCM #6** | **F. Pollution Prevention and Good Housekeeping** | **5. Property Management and Maintenance** | **See Phase I Report Narrative** |

- **Annual Training:** Regular employee stormwater pollution prevention training to reduce pollutants is provided and performed. Training provides an emphasis on implementation of Good Housekeeping BMPs in property management and maintenance activities including: street sweeping, storm drain inlet cleaning, winter weather salt management, and vegetation management**.** Additional topics include IDDE, spill control and clean-up measures, 12SW Industrial Stormwater Pollution Prevention Plan, etc. Trainings are provided through educational videos, in-person/on-the-job instruction, BMP shop posters, and BMP guidance manuals. Training Materials examples can be found in the "Carroll Co. Property Management and Maintenance Resource Guide."
  - > Mt. Airy DPW group training: 10/14/2020 - 14 Employees
  - > Mt. Airy DPW group training: 10/28/2021 - 13 Employees
  - > Mt. Airy DPW Superintendent and Assistant Superintendent attend Carroll Co. Annual NPDES Stormwater Pollution Prevention Training each fall. Last Date: 11/19/2021. Agenda attached.

- **Good Housekeeping Plan – Permittee-owned Properties:**
  - > Maintenance of vehicles and heavy equipment, fuel, deicer, herbicides, and road maintenance materials are stored at the Mt. Airy Public Works Shop, which is a 12SW permitted facility with SWPPP.
  - > Deicers are used for public streets and parking lots. Herbicides are applied for weed control along streets and municipal parks, including five parks in the Frederick Co. portion.
  - > Good Housekeeping BMP Fact Sheets: "Carroll County Property Management and Maintenance Resource Guide," including Pollution Prevention BMP Guidance Manual, is kept at the DPW Maintenance Shop and can be found on the enclosed **Appendix B** CD.

- **12SW Permitted Facility – Mount Airy Public Works Maintenance Shop**
  - > MDE Registration: 06/24/15 – 12SW2257/MDR002257
  - > Stormwater Pollution Prevention Plan (SWPPP) and inspection records onsite
  - > 20SW permit renewal - spring 2023

- **Property Management and Maintenance (Pollution Reduction thru Good Housekeeping BMPs)**
  - > See Carroll Co. Annual Report Part IV D.5. Property Management and Maintenance (including **Table 5**) for detailed Mt. Airy property management and maintenance activities and good housekeeping BMPs.
  - > Street sweeping is primarily focused on the high traffic areas of downtown, within Carroll Co., and along Prospect Rd. to the DPW Maintenance Shop, within Frederick Co. Streets are swept 2x per month in fall and spring and monthly during summer. Inlet cleaning is performed throughout the municipality, and materials are brought to the DPW Maintenance Shop (12SW facility) for disposal at the landfill.
  - > Vegetation management is primarily through mechanical and alternative methods, including mowing and trimming, pulling weeds, mulching, spot spraying, and providing training.
  - > Winter weather management: Practices include equipment calibration, weather forecasts, post-winter/-event evaluation, and employee training. A formal Salt Management Plan will be developed and implemented as part of the next generation Phase I MS4 permit.
  - > Litter Control and Prevention: Practices include "No Litter" signs, trash receptacles on streets and in parks, trash collection and recycling services, street sweeping, volunteer litter pick-up programs (e.g. Adopt-A-Road), staff litter collection (roads, parks, public spaces), clean-up of reported dumping incidents, and a litter ordinance.

**Please see Attachment "B" CD for MOA Document PDF File**

**MEMORANDUM OF AGREEMENT (MOA)**

**Between**

**CARROLL COUNTY, MARYLAND**
**And**
**THE TOWN OF MOUNT AIRY**

**For**

**COUNTY SUPPORT TO TOWN IN COMPLYING WITH NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) REQUIREMENTS WITHIN THE PORTION OF THE TOWN LOCATED WITHIN FREDERICK COUNTY**

***NPDES Phase II MS4 PERMIT ISSUED to TOWN OF MOUNT AIRY***

---

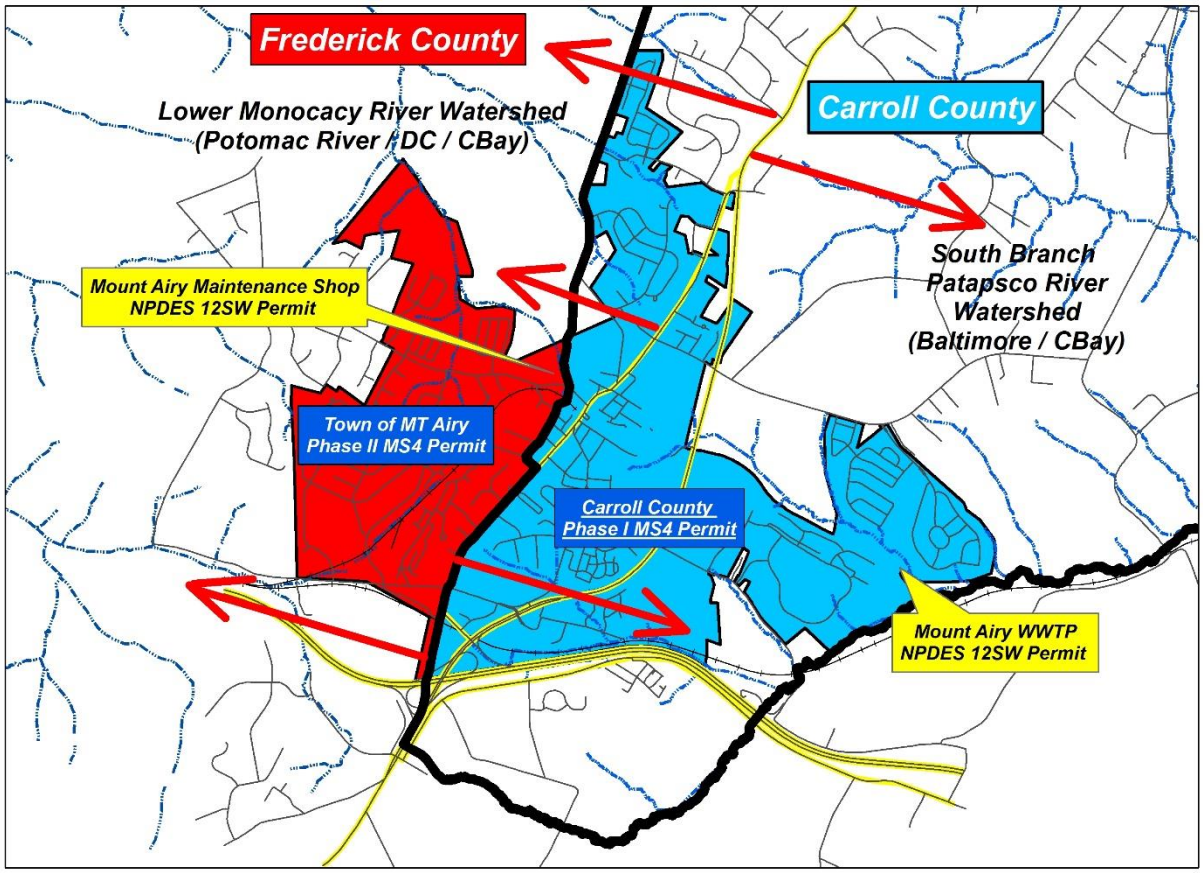
THIS MEMORANDUM OF AGREEMENT ("MOA") is made this 10th day of Mar, 2022, by and between Carroll County (hereinafter sometimes referred to as "Carroll County" or "the County") and the Town of Mount Airy (hereinafter referred to as the "Town").

WHEREAS, a portion of the Town is in part located within the geographic boundary of Frederick County, Maryland; and

WHEREAS, the Town is subject to a separate State-issued National Pollutant Discharge Elimination System ("NPDES") Municipal Separate Storm Sewer System ("MS4") permit pursuant to COMAR 26.08.04 in accordance with Section 402 of the Clean Water Act (40 CFR 122.26) for the area of the Town located in Frederick County; and

WHEREAS, the Permit allows a small municipality to coordinate with a surrounding county covered under an MS4 NPDES stormwater permit; and

WHEREAS, the parties have agreed that they will work together for the best interests of the citizens of the Town for the purpose of managing the stormwater systems and activities required by the Permit for the area of the Town within Frederick County; and




**Town of Mount Airy ~ NPDES/MS4 Jurisdictions & 12SW Permitted Facilities**

# Correspondence Related to Mt. Airy Phase II MS4 Permit

**Hirt, Claire C.R.**

| | |
|---|---|
| **From:** | Michelle L Crawford -MDE- <michelle.crawford1@maryland.gov> |
| **Sent:** | Friday, September 16, 2022 11:55 AM |
| **To:** | Hirt, Claire C.R. |
| **Cc:** | Deborah Cappuccitti -MDE-; Pat Depkin; O'Meara, Janet L.; Heyn, Chris; Edwards, Glenn D.; Singer, Edwin F |
| **Subject:** | Re: Mt Airy Phase II Reporting Requirements |



Good morning Claire,

My name is Michelle Crawford and I work with Debbie Cappuccitti administering the Phase II MS4 municipal general permit. Thanks for reaching out.

Yes, the Town may continue to report MS4 program activities in the County's Phase I MS4 annual report. The Town does not need to use the Appendix D forms. We included a standard comment in all Phase II reviews reminding permittees that we require reporting on the Minimum Control Measures every other year, and that next year this information is due. As you noted, Town activities are reported in the County's report each year.

In our last review we asked the next County annual report to include a separate section to more clearly summarize MCM activities specifically done within the Town, for example, indicate which outfall screenings were within the Town's boundaries and what is the strategy to prioritize outfall screenings in the Town.

For some of the programs it was reported clearly that efforts were being done Countywide including within the Town, such as staff training in pollution prevention to fulfill Minimum Control Measure 6. For Minimum Control Measure 2, we saw public participation events that occurred within the Town. However, it was unclear how some Phase II permit requirements were being fulfilled in partnership with the County.

If the report could please provide separate information and/or reference the annual report section that shows how the Countywide activities fulfill the Phase II permit requirements.

Please let me know if you have further questions.

I'm copying Pat Depkin the permit administrator for the County's Phase I permit and David Warrington the technical contact for the Town's permit.

Thank you,
Michelle

CHANGING Maryland FOR THE BETTER

**Deborah J. Cappuccitti**
Senior Regulatory Compliance Engineer
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
Deborah.cappuccitti@maryland.gov
410-537-3533 (O)
Website | Facebook | Twitter

CHANGING Maryland FOR THE BETTER

**Michelle Crawford**
Natural Resources Planner
Stormwater, Dam Safety and
Flood Management Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
michelle.crawford1@maryland.gov
410-537-3547 (O)
Website | Facebook | Twitter

**Hirt, Claire C.R.**

| | |
|---|---|
| **From:** | Hirt, Claire C.R. |
| **Sent:** | Thursday, September 8, 2022 2:48 PM |
| **To:** | Deborah Cappuccitti |
| **Cc:** | David Warrington; Heyn, Chris; O'Meara, Janet L.; Singer, Edwin F; Edwards, Glenn D. |
| **Subject:** | Mt Airy Phase II Reporting Requirements |

Good Afternoon Debbie,

My name is Claire Hirt and I am one of the NPDES Compliance Specialists for Carroll County. In our Annual Review of the 2021 permit year, MDE provided comments to us related to the Mount Airy Phase II MS4 Permit. We wanted to check in with you for clarification on one of the points, which said:

> *As a reminder, the Phase II MS4 permit requires reporting for the six MCMs in the next year's (FY 2022) Progress Report. The Department is available to answer any questions as this information is prepared.*

Will Mount Airy now be required to submit the Progress Report in Appendix D of the Phase II permit? It has been our understanding for some years now that the Phase II MCM requirements are being met through their collaboration with the County and that their reporting is already incorporated into our Phase I Annual Report. We reviewed our past correspondence with you and it seems to support this interpretation:

- Letter from Debbie Cappuccitti to David Warrington and Tom Devilbiss , 11/17/2019:
  *The Town and the County are requesting that reporting requirements for the [NPDES MS4 Phase II Permit] 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…. 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.*

- Follow-up email from Debbie Cappuccitti to David Warrington and Gale Engles, 11/24/2019:
  *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 basically 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 Town's requirements for the MCMs through your existing partnership.*

If acceptable, we would prefer to continue reporting all of our integrated MS4 efforts together in the annual report, with the Phase II Appendix capturing anything related to restoration progress on the Frederick County side of Mt. Airy. Please let us know your thoughts and expectations for reporting so we can support the Town as best as possible with their permit requirements. Thank you!

Sincerely,

Claire Hirt | NPDES Compliance Specialist
Bureau of Resource Management
Carroll County Government
225 N. Center Street
Westminster, MD 21157

**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,

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

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