Carroll County Maryland

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

2019 ANNUAL REPORT

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Carroll County

NPDES ANNUAL REPORT

2019

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

Preface

This document summarizes Carroll County, Maryland's compliance efforts taken in response to conditions attached to the National Pollutant Discharge Elimination System Permit No. 11-DP-3319 (MD0068331) issued for the County's municipal storm sewer systems. Permit No. 11-DP-3319 is required under Section 1342 (p) of the Clean Water Act (ref.: USC, Title 33, Ch. 26, Sub. Ch. IV). It is in response to the specific requirements in 40 CRF122.42(c). This report provides documentation under Carroll County's fourth-generation permit from July 1, 2018, through June 30, 2019. In addition, supplemental documentation related to compliance with fourth-generation permit requirements through December 2019 has been included.

Table of Contents

MDE 2018 Annual Report Assessment Response

Executive Summary – Fourth-Generation Permit NPDES MS4 (11-DP-3319 MD0068331)

Appendices

MDE 2018 Annual Report Assessment Response

ATTACHMENT 1

This section of the annual report addresses documentation received from the state regarding MDE's Assessment and Recommendations related to the previously submitted 2018 Annual Report. Therefore, the response to comments from the assessment is focused on the reporting period July 1, 2017 to June 30, 2018. The August 30, 2019 assessment documentation included in Attachment 1 provided comments related to the reporting period as found in the submitted annual report. The following is a discussion, presented by permit condition, related to issues which were identified within the assessment.

Source Identification

Response to comment "The County should review its data and ensure that each BMPPOI has one drainage area polygon associated with the BMPPOI record." (page 2):

Carroll County delineates drainage areas to every BMP in our geodatabase. Due to nested BMPs, this creates scenarios where there are multiple BMPs that drain to the same POI. The County now understands that MDE only wishes to have one drainage area per POI and that every BMP within that drainage area should reference the same over-all POI drainage area. The County has revised our deliverable dataset to accommodate MDE's schema.

Illicit Discharge Detection and Elimination (IDDE)

Response to comment: "The County indicated that an evaluation of site selection methodology will be conducted at the end of the permit term that expires on December 29, 2019. The County must submit the evaluation with the next annual report." (page 4)

The evaluation is complete, and the modified methodology can be found in Part IV.D.3. of the 2019 Annual Report.

Restoration Plans and TMDL

Restoration Plans

Response to comment: "The County shall address all comments on the restoration plans in the 2019 annual report." (page 7)

All December 13, 2018 MDE comments have been incorporated into the final Restoration Plans which can be found in Appendix J of the 2019 Annual Report.

Response to comment: "The permit requires that the County submit an annual TMDL assessment that compares the net change in pollutant reductions from all completed activities

using approved BMPs with established benchmarks, deadlines, and applicable stormwater WLAs."

The TMDL Assessment has been completed and can be found as Appendix F, Chesapeake Bay and Local TMDL Reductions. The benchmarks, deadlines, and applicable stormwater WLAs are incorporated into Appendix J, Restoration Plans. The County worked cooperatively with MDE staff crafting the six restoration plans which culminated in a public participation process this past fall. The Plans found in Appendix J therefore provide compliance with Part IV.E of the permit. The County extends its sincere appreciation to MDE staff who provided extensive guidance and support through the Plan development process.

Impervious Area Restoration

Response to Comment: "The County shall submit in its 2019 annual report documentation relating to land use change associated with environmental easements to the Department for review and approved in order to receive impervious acreage credit." (page 7)

County staff met with MDE staff on October 21, 2019 in order to discuss the approach for addressing the above comment. The County has provided in Part IV.D.6 of the 2019 Annual Report a result of the discussion. Two types of land use change have been depicted including establishment of buffer where non previously existed (sheet flows to conservation) and preservation of buffer where the development envelope has changed the use of land (Forest to Grass). The examples of projects were perpetual, maintained, and inspected easements have been established since 2014 have been documented. The resulting acreage shown in Table 10 reflects only that acreage which the land use change applies for this permit term (2014-2019).

Response to Comment: "The County shall provide with the 2019 annual report documentation that shows the source of the septage being treated at the facility; if the data needed to adequately verify annual updates and credit amount cannot be provided, then the County cannot claim the associated credits (i.e. 260 acres)."

The County was unable to acquire address locations from the septage haulers therefore the 260 acres of impervious credit has been removed from Impervious Surface Analysis and Table 10.

Executive Summary – Carroll County Fourth-Generation Permit NPDES MS4 (11-DP-3319 MD0068331)

The following serves as a summary of Carroll County's NPDES MS4 efforts related to its fourth-generation permit. The current permit's expiration date is December 28, 2019. The information provided as part of this executive summary covers the permit term from December 29, 2014 to December 2019.

This summary is intended to provide a brief account of pertinent compliance requirements of the permit. Not every specific permit requirement is listed, and the reader is encouraged to review the entire document for a more complete and thorough discussion of the County's permit efforts.

Carroll County continues to coordinate and administer permit requirement efforts in cooperation with the 8 incorporated municipalities. The County and its municipal co-permittees have a strong commitment to aggressively and consistently pursue measures which will improve water quality and work toward compliance with the NPDES MS4 permit. This commitment between the County and its municipal partners was memorialized in a Memorandum of Agreement (MOA) signed October 23, 2014. This strong partnership between the County and municipalities provides for a seamless watershed-based approach to water quality improvements while establishing strong coordination, fiscal allocations, and a unified commitment to success.

County staff have completed identification and computerization of all requirements related to Source Identification. This includes the assignment of system ownership to storm drain systems and stormwater best management practices (BMPs) throughout the permit area. All pertinent data has been fully migrated to MDE's MS4 geodatabase format.

The County continues to maintain Stormwater Management and Erosion and Sediment Control Programs which are superior in their operations. The Environmental Inspection Services Division (EISD) completed 8,208 BMP inspections over the course of the permit term. The total included 4,586 inspections on structural and Environmental Site Design (ESD) BMPs and 3,622 inspections completed on alternative BMPs. At the conclusion of the 2018 permit year, a thorough evaluation of every single BMP stored in the geodatabase was conducted. This allowed any practices which had not been triennially inspected to be identified and inspected within the 3-year permit allowance. Now that the migration to fully implementing the geodatabase is complete, the geodatabase serves as a master list of both practices and inspection records, thus creating an efficient, effective compliance tool.

The County's EISD has maintained erosion and sediment control delegation from the state throughout the permit term. The current delegation is effective through June 2021, and MDE determined the program to be in compliance with Part IV.D.2 of this permit.

The County currently has 261 NPDES outfall study points associated with the permit Illicit Discharge Detection and Elimination (IDDE) requirements. During the permit term, 513 outfalls were screened resulting in 103 screenings per year. A ratio of 60 percent County and 40 percent

municipal outfalls across 7 watersheds are performed each permit year. The County developed and implements an MS4 IDDE Guidance Manual. The IDDE enforcement process is tracked electronically through Accela software and reported via the MS4 geodatabase. An MDE audit performed in November 2017 determined that the County's IDDE program was in compliance with Part IV.D.3 of the permit.

The County has a very well-planned and coordinated program to ensure staff and supervisors across jurisdictional boundaries are trained in MS4 compliance issues. Individuals responsible for property management and maintenance, and those associated with 12SW facilities, receive annual training coordinated by NPDES Compliance Specialists. During the permit term, a total of 1,435 staff, with an average 287 individuals/year, received MS4 training. In addition, the County holds an annual MS4 workshop specific to manager/supervisory level, in which all MS4 related jurisdictions are invited. The event has averaged 53 attendees/year over the permit term.

In addition to training, the County and its co-permittees participated directly or indirectly in an average of 26 educational activities per year throughout the permit term. Those events ranged from public tree plantings to public school environmental education activities to civic events.

The County's current impervious area restoration baseline, approved by MDE, is 8,070 acres. The County, therefore, is required to mitigate the equivalent of 1,614 acres of the baseline per requirements in the current permit. As of December 2019, a total of 2,034 acres have been mitigated. The County is progressing well in all watersheds associated with restoration plan implementation and impervious surface mitigation.

The following is a summary of stormwater wasteload allocation (WLA) reductions related to local receiving water bodies and the Chesapeake Bay:

- Watershed Restoration Efforts as of December 31, 2019, have achieved the following reductions:
    - 32,316 lbs. of Nitrogen,
    - 2,606 lbs. of Phosphorus, and
    - 64,309 tons of sediment.

- Progress toward achieving the Bay TMDL WLA from the 2009 baseline includes the following percentage reductions for watersheds:
    - Potomac – 13.33% Nitrogen and 10.08% Phosphorus,
    - Gunpowder – 21.56% Nitrogen and 35.00% Phosphorus, and
    - Patapsco – 29.98% Nitrogen and 29.37% Phosphorus

- Progress toward achieving local TMDL includes the following percentage reductions for watersheds:
    - Double Pipe Creek – 13% Phosphorus and 19% sediment,
    - Liberty – 35% Phosphorus and 41% sediment,
    - Loch Raven – 201% Phosphorus,
    - Lower Monocacy – 2% Phosphorus, and
    - Upper Monocacy – 127% Phosphorus and 30% sediment.

In addition to the nutrient reductions above, watershed restoration plans associated with the mitigation efforts have been completed. They can be found in **Appendix J** of this annual report.

The County and its municipal partners are extremely proud of the fiscal commitment memorialized in the MOA which was initiated at the onset of this permit. The municipalities provide funds toward capital costs associated with impervious surface mitigation. The remaining capital and total operating expenditures are funded by the County. The commitment by the Carroll County Board of Commissioners has been consistent and strong throughout the permit term. It was found that the expenditures reported in last year's (2018) Annual Report were incorrectly assigned to the permit term. The actual expenditures for the permit term – December 2014 to December 2019 – are approximately $27,540,034. These expenditures include approximately $9,285,106 for operating and approximately $18,254,928 in capital improvement costs.

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

Part I. Identification

A. Permit Number

11-DP-3319 (MD0068331)

B. Permit Area

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

C. Effective Date

December 29, 2014

D. Expiration Date

December 28, 2019

Part II. Definitions

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

Part III. Water Quality

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

In alignment with these goals, 402(p)(3)(B)(iii) of the CWA requires the County to implement "…controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and systems, design and engineering methods, and such other provisions as the administrator or state determine appropriate for the control of such pollutants." Carroll County and its co-permittees have aggressively and consistently pursued measures to improve water quality and work towards compliance with its NPDES MS4 permit,

effectively prohibiting pollutants in stormwater discharges or other unauthorized discharges into the MS4.

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

The U.S. Environmental Protection Agency (EPA), MDE, and the courts have determined that the 20 percent restoration requirement is an approved effluent limit consistent with, and satisfactory for, addressing both the Chesapeake Bay and other applicable Total Maximum Daily Load (TMDL) WLAs. The County and the municipal co-permittees continue to actively and aggressively implement an adaptive program of restoration to achieve the fourth-generation permit's impervious treatment requirements. As shown in Part IV.G. Program Funding section of this report, the resources needed to support the operating expenses of this program and permit administration, as well as the funding necessary to address the impervious restoration requirement, have been programmed and budgeted for the permit term. Additionally, Part IV.D. Management Programs, G. Program Funding, and Appendix J sections demonstrate that the programmatic structure is in place to develop and implement restoration plans to address WLAs and approved TMDLs for all of the County's watersheds which have a TMDL requirement.

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

Part IV. Standard Permit Conditions

A. Permit Administration

The legal responsibility for maintaining the conditions included in this permit lies with the Carroll County Board of Commissioners. In addition, the previously referenced municipal MOA also outlines specific programmatic and legal responsibilities between the County and co-permittees. The Commissioners have delegated responsibility to the Carroll County Department of Land and Resource Management (LRM) to provide administrative and technical implementation of the NPDES MS4 permit. The LRM Director provides direct administration of the permit. An organizational chart for program administration can be found in **Appendix A**.

LRM has 2 dedicated positions, NPDES Compliance Specialists, assigned to the NPDES MS4 program. The NPDES Compliance Specialist positions are jointly funded by Carroll County and the 8 incorporated municipalities. This arrangement was coordinated through the Water Resource Coordination Council (WRCC). Under the direction of the Director, the NPDES Compliance Specialists implement certain aspects of NPDES MS4 program requirements. Key responsibilities for these positions include:

- Technical Liaison to MDE;
- Coordinates, manages, and implements certain permit requirements in accordance with federal, state, and local laws;
- Coordinates with County/municipal personnel, other government officials, and citizens regarding NPDES compliance issues;
- Conducts and coordinates illicit discharge inspection screenings and routine surveys with County/municipal personnel to discover and eliminate pollutant sources;
- Coordinates with County personnel in the design, implementation, and maintenance of the County's NPDES Geographic Information System (GIS) and MDE Geodatabase Submission applications for NPDES MS4 compliance; and
- Coordinates development of compliance education, training, and outreach programs.

The Bureau of Resource Management (BRM) provides vital NPDES MS4 operational and technical support, including fieldwork, GIS operations, monitoring, inspections, compliance, watershed 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. **As part of the County's FY19 budget process, the Board of Commissioners received a request and approved an additional position which is fully dedicated to the NPDES MS4 program. The Resource Management Technician will perform project planning and administrative functions, oversee the maintenance program for the County's 201 stormwater facilities, and work closely with municipal partners on project implementation.**

The County/municipal joint permit eliminates political boundaries as a watershed planning and restoration consideration. Specific responsibilities related to permit reporting and support by the municipalities are outlined in the MOA. This working relationship has made compliance with the NPDES MS4 requirements more purposeful and effective. The NPDES Compliance Specialists support each municipality in storm sewer system mapping, illicit discharge detection and elimination inspections/investigations, visual surveys, training, 12SW permit applicability, property management and maintenance practices, public education and outreach efforts.

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

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

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 only. In December 2014, the Town of Mt. Airy and the 7 other municipalities within the County entered into an MOA relating to the NPDES MS4 Phase I requirements covering the portion of the town which is located within Carroll County. Concurrent with the issuance of the next-generation permit, a new MOA will be executed with a section included pertaining to the Frederick County side of Mt. Airy and how restoration efforts will be handled. 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 the content of Carroll County's Annual Reports and in the Geodatabase information provided with the annual reports. 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" of the Annual Report.

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

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

Source: Carroll County Bureau of Resource Management
** Review performed by / whose code*
***County assumed responsibilities associated with stormwater management in December 2015.*

B. Legal Authority

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

Chapter 53, Environmental Management of Storm Sewer Systems, of the County Code was adopted by all permit jurisdictions. The chapter gives Carroll County and the municipalities a practical, effective regulatory tool that provides standards to protect the MS4 described in detail under Part 5.3 Management Programs Section of this report.

C. Source Identification

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

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

The County did have to make some revisions to the GDB provided by MDE to allow for the County data to be entered. However, the only changes made to the GDB were those specifically addressed and allowed by MDE per the comments pertaining to the 2017 Annual Report and GDB submittal. It is anticipated that discussions with MDE regarding the relevancy of certain fields along with further quality assurance updates on the County data will lead to the County data loading clearly in the future. **Appendix G** provides documentation related to issues/concerns associated with the current GDB. This documentation includes the above-mentioned permitted changes as the County still believes these changes should be formally made to the GDB format supplied by MDE.

It is the mutual intent of the County and MDE to utilize the new GDB to facilitate the reporting and review of the Carroll County NPDES permit data. The County is confident in the utilization and implementation of the GDB at the end of this permit term. We welcome the comments and dialogue that will develop from MDE's review of the data both from this permit year and the entirety of the permit term. We ask that MDE keep in mind that there was a significant level of effort expended by the County to migrate to this new format and while the process is complete, time and dialogue will continue to improve the GDB and its functionality. With the finalization of the MDE GDB schema and the ongoing cleanup of the County data, we expect that with our next permit term, the GDB will be functioning as required to allow for a smoother data submission.

The permit requires identification of the sources of pollutants in stormwater and the systems which convey the runoff. Carroll County maintains staffing dedicated to NPDES MS4

compliance, concentrating on those efforts that relate to storm drain system delineation and facility compliance. GIS with incorporated GPS technology are employed to assist in mapping and data analysis to help identify drainage systems exhibiting stormwater quality deficiencies. GIS and GPS also provide detailed locations for issues identified during the watershed assessments, which aids in developing effective restoration plans.

1. Storm Drain System

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 process. Other sources for data capture include; archive records, desktop review, outfall screening verification, and public works staff observations. Management of this information is implemented through the County's GDB that stores data representing the infrastructure using ArcMap 10.3 software. The GDB has been restructured and developed by the BRM in conjunction with MDE's NPDES, MS4, Geodatabase Design, published in March 2015 and revised May 2017. The goal of the County's database design is to meet internal recording requirements of the County, while facilitating the reporting parameters of the MDE database. A functional classification of structures includes a designation of NPDES Study Point that includes major NPDES outfalls and other targeted outfalls monitored and screened for Illicit Discharge Detection and Elimination (IDDE) purposes.

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, map and field verification in maintaining this data. Digital storm drain system map files and hard copy maps are available as a quick reference tool to each municipality and County agencies as needed. The County has also reached out to other agencies and businesses who own and maintain infrastructure within county limits to confirm ownership. County staff met with State Highway Administration (SHA) staff and contractors on April 2, 2019, to compare data and open the lines of communication regarding GIS data between the two agencies. **Appendix B** CD MS4 Geodatabase contains outfall and associated drainage area data.

2. Industrial and Commercial Source

Carroll County maintains an inventory of industrial and commercial land uses and sites it has determined to have the potential to contribute significant pollutants as described in the previous annual report. This inventory is maintained in a geodatabase with periodic additions and subtractions based on the previous year's visual survey observations. The methodology for selecting these areas was documented in the 2015 Annual Report. The County evaluated its entire IDDE Visual Survey program, as part of this submittal, adjusting the selection criteria expanding the inventory for the program. The updated methodology is provided in Appendix C.

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

The BRM manages stormwater management facility data for the County and municipalities in the new geodatabase. The geodatabase contains information related to facility location, ownership, reviews and approvals, drainage area, impervious area, inspections, and other potential information for the 2,612 active BMPs.

Currently, there are 976 as-built certified and approved structural stormwater management BMPs throughout the county and municipalities, excluding the City of Taneytown. Of these BMPs, there are 54 structural restoration practices. This number does not include Taneytown's 40 structural BMPs. All facilities, drainage areas, and outfalls have been mapped with associated data provided. There are 1,593 non-structural practices (ESD practices), excluding the 3 practices in Taneytown. Of these BMPs, there are 5 non-structural restoration practices. The City of Taneytown has located and confirmed as-built plans for 18 facilities. County staff will be assisting the City in acquiring or developing the remaining 28 outstanding facility plans.

Appendix B includes the County stormwater management database map of newly added, for the 2019 permit submittal, stormwater facilities in the County.

4. Impervious Surfaces

Carroll County's Fourth-Generation Permit Impervious Surface Analysis (**Figure 1)** provides a breakdown of the history and current impervious area restoration program. During the last permit term, 10 percent of untreated impervious area was required to be treated. The baseline was based on the 6,720 acres of untreated impervious area in the County; this number did not include the municipalities (Phase II jurisdictions). 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, upon expiration of the third-generation permit, the County was permitted to work toward addressing the next 20 percent treatment requirement, which was anticipated to be part of the next-generation permit issued on December 29, 2014 (current permit). In December 2014, the County entered into a MOA with the 8 municipalities joining 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.

Activities associated with treatment efforts which have been taken during this permit term are listed in **Table 10** "Listing of Watershed Restoration Efforts July 2019 NPDES". Impervious acres treated to date (December 2019) are 2,034. Twenty percent of the 8,070-acre baseline is 1,614. Therefore, according to **Table 10**, the County has addressed 125 percent of the 20 percent requirement of the fourth-generation permit.

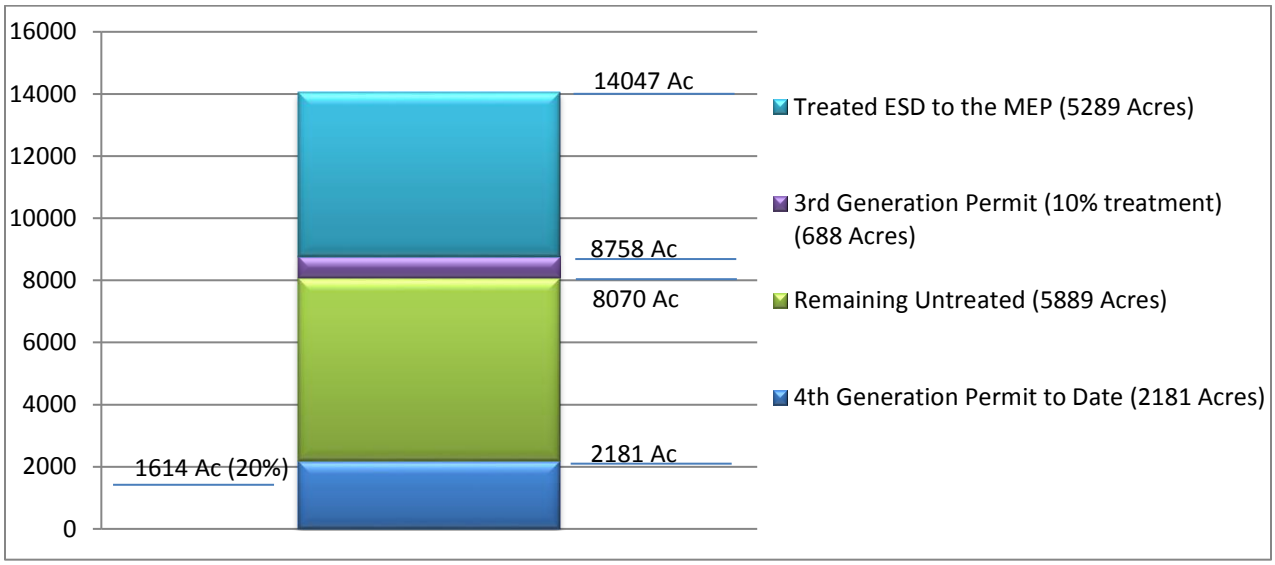


Figure 1: Carroll County Fourth-Generation Permit Impervious Surface Analysis

5. Monitoring Locations and Watershed Restoration

The BRM is responsible for monitoring and watershed assessment efforts required under the NPDES MS4 permit. These efforts include the survey and verification of existing conditions as well as the performance of site and natural resource assessments and potential water quality issues. These efforts are integral to the NPDES MS4 program since the results provide a means for measuring program implementation. The BRM's watershed assessments support the development of restoration plans required in the permit. Staff identifies watershed restoration opportunities and implements watershed improvement projects. Efforts related to these items are provided in Part IV.E. of this report and **Appendix J**.

6. Water Quality Improvement Projects

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

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

- rehabilitating and upgrading older stormwater management facilities to current standards or greater,
- implementing BMPs to manage existing untreated impervious areas,

- planting stream buffers, and
- stream restoration/floodplain reconnection.

From July 1, 2018, through June 30, 2019, construction occurred on 9 stormwater management retrofit projects, stream restoration projects, and various individual stream buffer plantings, treating 409.05 acres of untreated impervious area. In addition, another 379.4 acres of untreated impervious area via 6 projects have been initiated from July 1, 2019, to December 20, 2019. **Table 2** which appeared in the 2018 Annual Report provided an overview of restoration projects from 1993-2019 according to the watershed where these restoration projects occurred. This table has been removed since Appendix F summarizes how our restoration efforts go towards meeting local WLAs which then translates into actual Chesapeake Bay TMDL reductions.

Forest and Grass Buffers

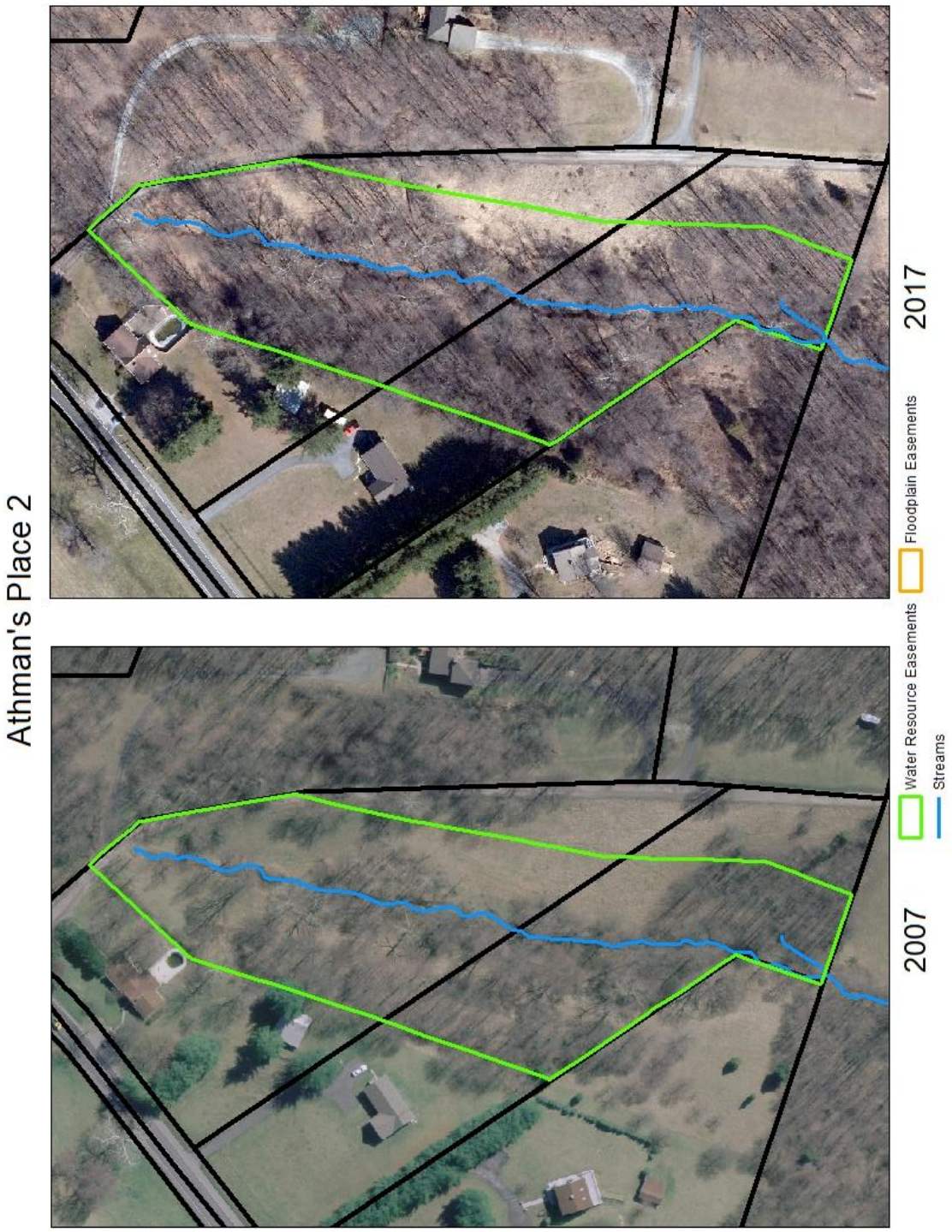
Stream riparian areas are one of the most important physiographic features that affect water quality in a watershed. The composition of vegetation, or lack thereof, has a significant effect on bank erosion, which is the largest source of sediment and nutrients to receiving water courses. The hyporheic zone is the area of interaction between ground water and surface water. This region is where denitrification occurs through the breakdown of nitrates by bacteria in the carbon-rich, oxygen-depleted, root zones of trees.

Riparian buffers also provide nutrient uptake of adjacent upland runoff. As land use changes through the development process, the preservation or creation of adjacent riparian buffers provides an additional secondary treatment of developed areas beyond required stormwater management.

The Carroll County Floodplain and Water Resources Easement Programs endeavor to create and protect riparian buffers from development activities that would adversely affect water quality through mechanisms that are not addressed in stormwater management programs. In a normal development scenario, disturbance and removal of vegetation up to stream banks is permitted. While stormwater management can be met for the newly constructed impervious, there is no requirement to offset the nutrient loads from fertilized yards, runoff from storm events beyond stormwater requirements, or nutrient loads from newly impacted stream banks.

The following are examples of the changes that occur during the development process via the County's Easement Program and the protection and benefit that the preservation of the buffers provides.

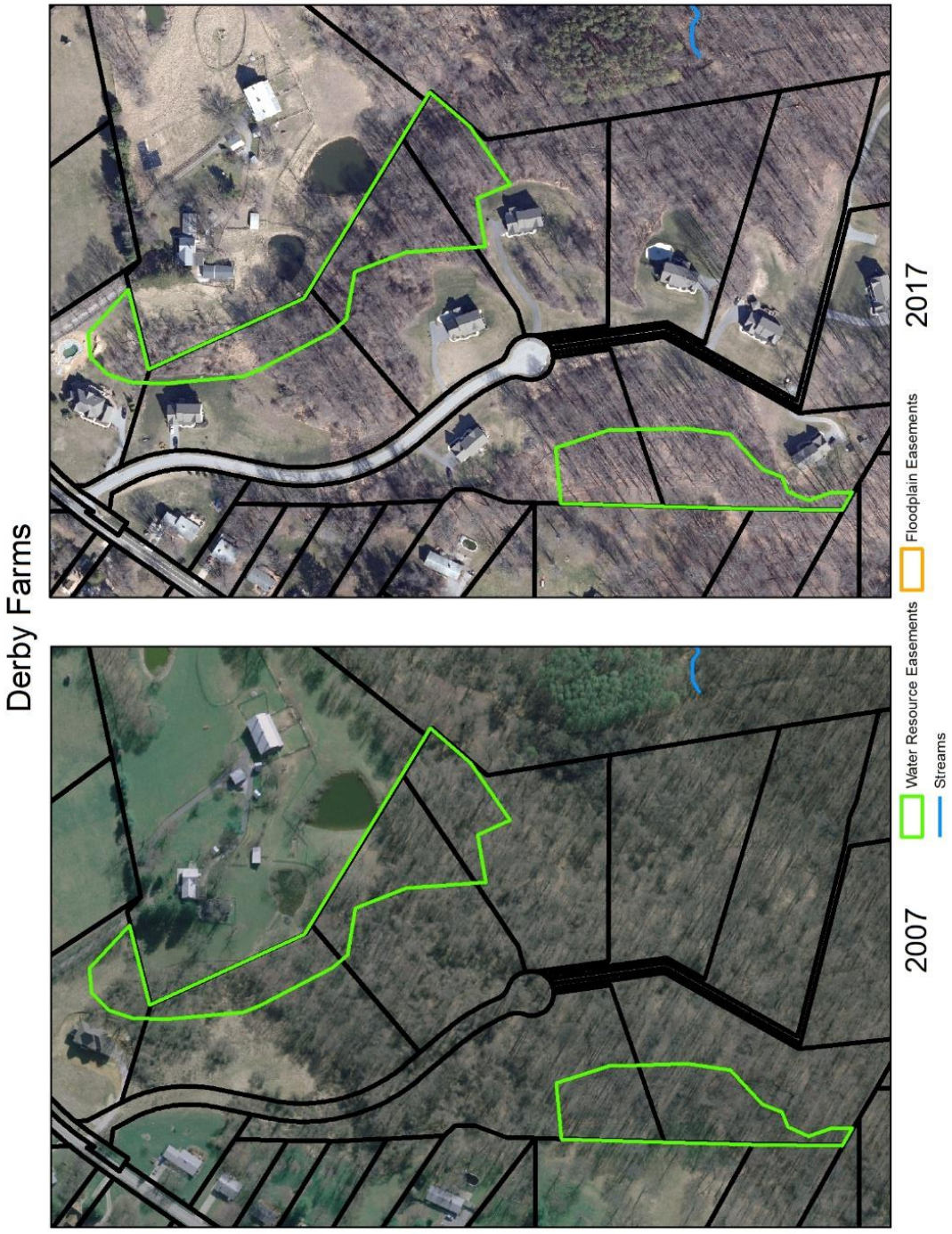
The following three examples provide a visual account of the actual creation or complete enhancement of riparian/buffer areas as a result of the easement requirement. Athman's Place 2 illustrates the change within buffers over time. Note the increase in woody vegetation as natural succession occurs in the easement area. The Beatty Property illustrates the change from agriculture to fallow meadow and woody vegetation through natural succession in the buffer area. Bedford Falls Farm shows the growth and establishment of a riparian buffer.

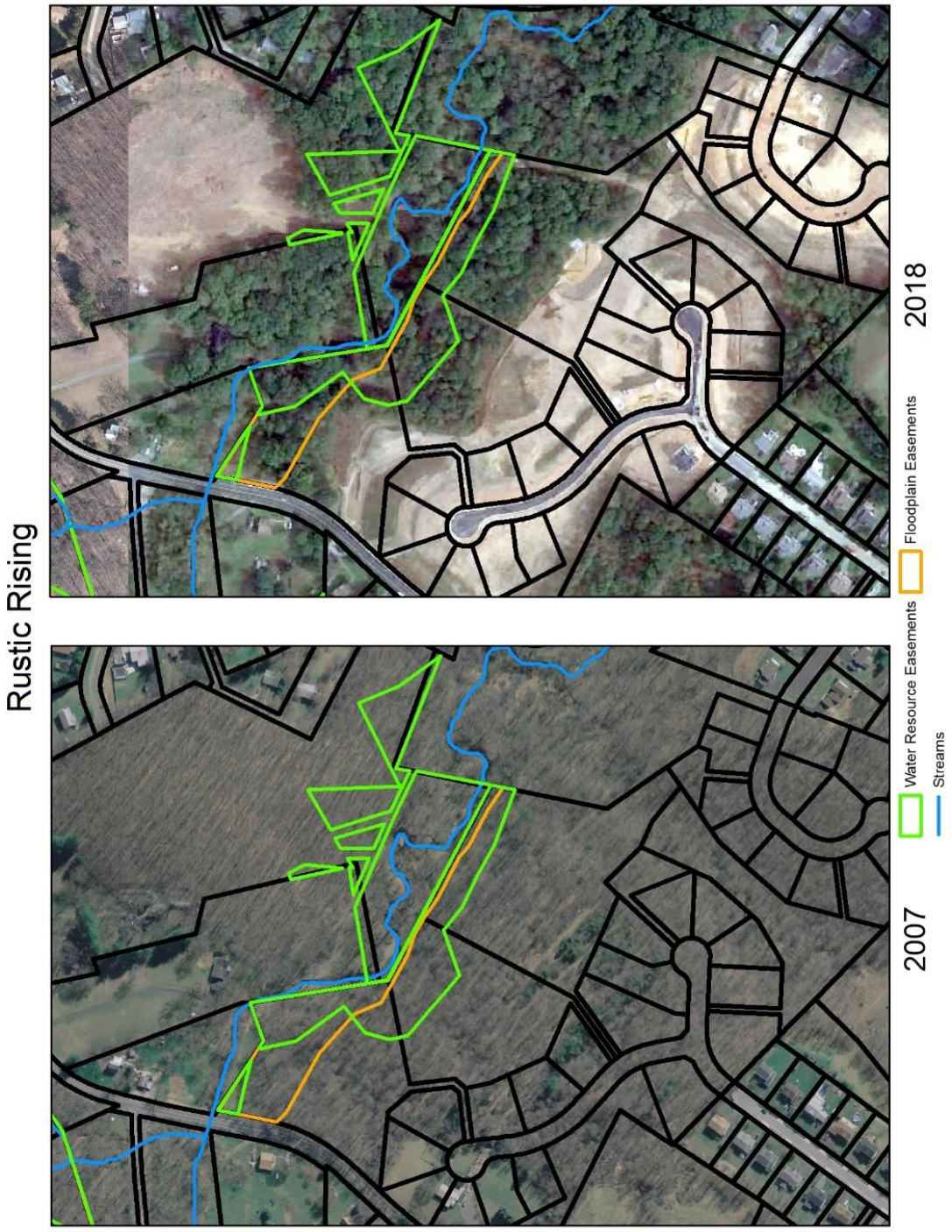

Athman's Place 2
2017
2007
Floodplain Easements
Water Resource Easements
Streams


Beatty Property LLC
2017
2007
Floodplain Easements
Water Resource Easements
Streams


Bedford Falls Farm
2017
2007
Floodplain Easements
Water Resource Easements
Streams

The next four examples depict the physical change in the landscape associated with development and the permanent establishment of riparian/buffer areas (via the easement programs), which provide perpetual nutrient uptake beyond stormwater management requirements from associated runoff. Onsite stormwater management is provided for the new impervious in Hewitt's Landing. The provided easements protect the riparian buffers that provide secondary treatment of the changed land use.


Derby Farms
2017
2007
Floodplain Easements
Water Resource Easements
Streams


Rustic Rising
2018
2007
Floodplain Easements
Water Resource Easements
Streams


Hewitt's Landing
2017
2007
Floodplain Easements
Water Resource Easements
Streams

The Floodplain and Water Resource Easements are created only during the development process, protecting natural areas that are under threat. In addition, the easements are inspected on a tri-annual basis using an easement inspection protocol (**Appendix I**). The easements are perpetual and documented in land records naming the County as the holder of the easements (**Appendix I**). The easements specifically restrict:

- Soil disturbance by filling, grading, stripping of topsoil, plowing, cultivating or other similar practices;
- Storing or dumping of any material including, but not limited to, yard waste, appliances, automobiles, garbage, trash, chemicals, pesticides, or construction debris;
- Composting or broadcast spreading of yard waste;
- Storing, maintaining or operating motorized vehicles except for emergency use;
- Housing or maintaining domestic animals and/or activities involving the construction of kennels, stables, or barns, disposal of manure, or grazing of livestock; and
- Burning of vegetation.

The easements allow for:

- Stream restoration activities;
- Scientific studies including monitoring and stream gauging;
- Natural forest regeneration and tree planting;
- Mowing of non-turf grass vegetation no more than twice per year; and
- Control of noxious weeds and multiflora rose provided that the soil exposed by treatment is immediately stabilized.

Carroll County has been using the impervious acre equivalent rates in the June 2011 Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated for grass and forest buffers. The creation of these buffers has been an important and critical part of the County's NPDES program for addressing impervious area treatment goal. Carroll County recognizes the importance of riparian buffer preservation not only for the myriad of environmental benefits, but also specifically for the reduction of nutrient loads from upland development and land use change.

D. Management Programs

The EISD of the BRM is responsible for all inspections and enforcement actions necessary to ensure that the conditions established in the review, approval, and permitting phases are met. The EISD also contributes to compliance with the County NPDES responsibilities by providing stormwater management facility maintenance inspections and assistance with illicit discharge inspections and visual surveys.

1. Stormwater Management

The County Stormwater Management Program is the responsibility of the BRM within LRM and implements Chapter 151, Stormwater, of the County Code. The implementation of Chapter 151

is applied to the municipalities of Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, and Union Bridge. The City of Westminster has its own approved stormwater management code, which is implemented by the County. The City of Taneytown implements an approved stormwater management code independent of the County (see **Table 1**). Reviews performed by the County are the responsibility of the Program Engineer and the Stormwater Management Review Assistant. Review and approval of stormwater management during the period of July 1, 2018, through June 30, 2019, consisted of 521 plans reviewed, 12 structural as-builts, and 186 non-structural as-builts approved.

Residential stormwater management facilities and storm sewer systems in unincorporated areas are owned by the County, while the municipalities own the residential facilities in their respective jurisdictions. All commercial and industrial facilities in the County and municipalities are maintained by the property owners. Database information on facilities located in Carroll County and an up-to-date map 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 at least on a triennial basis. This function is performed by the County for all municipalities except the City of Taneytown. Taneytown performs its own inspections.

Inspections of facilities in the County and 7 of the 8 municipalities are handled by EISD. Each facility is inspected every 3 years, with letters sent to the owner indicating the condition of the facility and, if required, the amount of time allowed for compliance to be achieved. In the case of County-owned structures, the notice is sent to the Bureau of Facilities, Bureau of Roads Operations, and BRM. The EISD performed 569 inspections this year on 486 individual facilities/sites. Follow-up inspections are performed to ensure compliance has been achieved in a timely matter. Of those 486 structural facilities, 185 facilities needed corrective action, and 63 were brought into compliance as of June 30, 2019. In cases where violations still exist, 11 facilities were issued Notices of Violation, allowing an additional amount of time to resolve issues. Currently, 1,027 structural stormwater management facilities in Carroll County are on the list to be inspected: Of these, 317 will be inspected during calendar year 2020; 315 will be inspected in 2021; and 395 will be inspected in 2022.

Currently, there are 1,591 non-structural practices throughout the County, and 501 inspections were performed in FY 2019 on 497 practices. One of the structures failed inspections, and 0 were brought into compliance by the end of the permit year. The EISD inspectors will be scheduling inspections over the next 3 years to spread the inspections performed over the 3-year period. At least 230 are planned to be inspected in FY 2020, 615 in FY 2021, and 746 in FY 2022.

City of Taneytown

Stormwater management structures and infrastructure intended for ownership by the City are inspected as constructed, typically by City staff and the City's consultant engineer. Frequency of inspections, and reports of such inspections, are determined by project specific factors. Reports, including narratives and photographs, are submitted to the Department of Public Works (DPW) for maintenance per the Department's State-approved records retention schedule. Facilities intended to be deeded to the City are typically the product of residential development projects,

which may include storm sewer system improvements, ESD features, stormwater management structures, and transfer of real property or deeds of easement. Projects involving stormwater management on City-owned properties, or involving City-owned facilities, are also subject to construction inspections by the City or its contractor. Park development projects and construction of or improvements to existing water, sewer, or stormwater infrastructure, are typical of these projects. These projects follow the same construction inspection, reporting, and report retention process as other projects intended for City ownership.

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

The City of Taneytown is required to inspect all public and private stormwater management facilities every 3 years under the City of Taneytown's stormwater management ordinance. Per the City's "Stormwater Management Facilities Inspection Report" prepared by the City's consulting engineer, all stormwater management facilities within the City of Taneytown are inspected on a triennial basis. The consulting engineer inspected 44 stormwater management facilities and ESD practices for the City between May 24, 2019, and June 8, 2019.

2. Erosion and Sediment Control

The EISD of the BRM is responsible for inspection and enforcement of erosion and sediment control in accordance with Chapter 152, Grading and Sediment Control, of the County Code. On October 24, 2018, MDE accompanied County personnel and the Carroll Soil Conservation District (SCD) to inspect 9 active construction sites, totaling 184 acres of earth disturbance. MDE and the County conducted a follow-up review of select sites on November 27, 2018, to observe corrected issues. Results of this field audit found the majority of sites to be in good condition, and enforcement by County inspection staff to be generally effective in achieving compliance. MDE observed progressive enforcement action taken by the County during the review.

Based on the findings of the evaluation, MDE granted the County's request for continued delegation of erosion and sediment control enforcement authority for 2 years; effective through June 30, 2021.

Inspection statistics relating to grading permits and inspections during the reporting timeframe included 94 grading permits issued and 3,101 sediment control inspections performed. All inspections are recorded with notices sent regardless of the site conditions. In 8 cases, Stop Work Orders were posted for violations, which in most instances required compliance within 36

hours. Currently, there are 4 outstanding violations moving through the enforcement process. These permits and inspections are included in the GDB

Grading permits are issued on all projects with disturbance in excess of 5,000 square feet. Pre-construction meetings are held with the contractor to discuss the sediment and erosion control plan associated with the project. Site meetings are held periodically with the foreman who holds a valid "Responsible Personnel Certification" throughout the duration of the project. As part of the NPDES permit requirements, grading permits issued with earth disturbance in excess of 1 acre are reported to MDE quarterly.

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

3. Illicit Discharge Detection and Elimination (IDDE)

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

Field screening of at least 100 outfalls annually is performed by the EISD of the BRM and NPDES Compliance Specialists. Staff participated in annual IDDE training prior to the inspection season. Current standard operating procedures (SOPs) are in the County's November 10, 2016, IDDE Guidance Manual. Screening assignments are prepared by County election district groupings and performed by EISD staff most familiar with stormwater management BMP facilities and local land use activities in these areas. Outfalls located in the 8 municipalities are inspected by an NPDES Compliance Specialist in cooperation with municipal staff most knowledgeable of their local environs.

To facilitate IDDE screening, an NPDES Study Point classification is assigned to major NPDES and other targeted outfalls that have greater illicit discharge potential, such as commercial and industrial land uses, densely populated areas, aging sewer infrastructure areas, or areas with past screening history. Outfalls with the study point designation and other outfalls are regularly evaluated and updated for relevance to facilitate a productive outfall screening program. NPDES Study Points are typically inspected on a triennial basis. There were 101 outfalls screened for the permit year. Approximately 52 percent were located in the County, and 49 percent were within the municipalities. Outfall screenings were distributed among 7 watersheds as follows:

Prettyboy Reservoir (7), Loch Raven Reservoir (2), Liberty Reservoir (36), Patapsco River - South Branch (15), Lower Monocacy River (10), Double Pipe Creek (16), and the Upper Monocacy River (15) (see outfall screening map in **Appendix C**).

Dry weather screening found 51 outfall flows. Each outfall having a flow received a chemical field screening test for parameters defined by the permit. One outfall plunge pool presented physical indicators of a potential recent illicit discharge. A known hotspot up the storm drain system was checked, and a commercial automotive business had been washing the exterior of vehicles was determined to be the source. The intermittent discharge was eliminated. The business was referred to, contacted, and met with MDE wastewater permits, who issued a Maryland General Permit No. 16 Vehicle Washing groundwater discharge permit. Two other suspect outfalls with physical indicators, but negative field chem test results were followed up with analytical lab sampling. One outfall discharges from a distant stormwater facility that had waterfowl presence in the past had slightly elevated bacteria. The outfall will continue to be visually monitored and screened in the 2020 permit year. The other sampling was taken above the stormwater outfall study point at a BMP inflow pipe observed to have flow and physical indicators. The initial lab results indicated a significant level of bacteria and is under investigation by BRM's Water Resource Management and the Carroll County DPW's Bureau of Utilities. The geodatabase includes the results of this year's outfall screening and can be found on CD in **Appendix B**.

Specific industrial and commercial land use areas with potential to contribute significant pollutants were identified per PART IV.C.2 for the permit term. SOPs for conducting visual surveys of these commercial and industrial areas were utilized for discovering, documenting, and eliminating pollutant sources in the MS4. Prior to conducting visual IDDE surveys, NPDES Compliance Specialists and EISD staff receive training and review permit regulations and procedures. If a significant pollutant source of concern or an illicit discharge is discovered, the property owner is contacted by the EISD or respective municipal authority. The SOP guidelines and Chapter 53 relating to enforcement measures are followed until the source is eliminated. County or MDE good housekeeping/BMP information may be provided in person or sent to businesses with potential significant sources as a result of the visual survey process.

An assessment of the program was conducted at the conclusion of this permit term by staff expanding the selection of sites for the Visual Survey program. An updated methodology is provided in Appendix C. The visual survey inspection form functions well guiding 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 proximity to storm drain inlets or waterways.

A total of 52 visual surveys were conducted during the permit year. No illicit discharges were discovered, but 8 sites were listed to receive stormwater pollution prevention good housekeeping/BMP information as a recommended follow-up. A Visual Survey (VS) Accela database is in place and managed by the County EISD. Updating the commercial/industrial site inventory database will be based on these observations and includes retaining 37 of the sites for future surveys while 15 sites will be removed. One of these sites was determined to have an active NPDES permit per the MDE Wastewater Interactive Search Portal, and the remaining sites had a "no-exposure" condition with regard to "significant" pollutant sources, such as commercial

offices, mini-storage facilities, and vacant business space, etc. During the permit term, 237 visual surveys were performed.

The MS4 permittee is required to maintain a program to address and, if necessary, respond to illegal discharges, dumping, and spills. The County maintains a Stormwater Pollution Hotline for all Carroll County residents as indicated on the County website. "Illicit Discharge Incident Response" SOPs have been implemented and are documented in the County IDDE Guidance Manual to quickly respond to and eliminate potential illicit/pollutant discharges in the MS4. A Pollutant Discharge (PD) Accela database is in place and managed by the County EISD. Calls from the public are investigated and processed through this program and tracked through to abatement. Protocols are also in place for quick response to inter-agency and co-permittee reporting. EISD closely coordinates with respective municipalities for elimination if an incident proves to be an illicit discharge. Fifteen IDDE discharge complaints were processed during the permit reporting year. Sixty percent of the concerns were commercial related, while 40 percent were residential. Eleven were citizen driven, where 8 contacted the MS4 and 3 citizen complaints came through MDE compliance. Three concerns were reported by trained County and municipal employees and 1 from a Maryland Department of Natural Resources (DNR) Geological Survey employee. Six illicit discharges were confirmed with all being in the commercial sector. These were eliminated and resolved through voluntary compliance or through interagency efforts. Three investigations revealed the potential for illicit discharges and were either monitored, referred to other agencies, or a letter sent with stormwater pollution prevention BMPs to take preventive actions. An IDDE Incident Investigation Summary is in **Appendix C** of this report.

Chapter 53 establishes methods of controlling the introduction of illicit discharges or pollutants into the MS4 in order to comply with requirements of the permit. The adoption of the ordinance by each municipality provides enforcement authority, either solely or in conjunction with the County, necessary to comply with permit requirements. **Table 2** lists the municipalities that have adopted this County Code and the responsible enforcement authority.

Table 2
Municipal Adoption and Enforcement of Carroll County Code
Chapter 53, Environmental Management of Storm Sewer System

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

An annual NPDES Stormwater Pollution Prevention training event is held each fall for administrative and public works manager/supervisory-level personnel of pertinent County bureaus and the 8 municipalities. Attendance during this year's workshop was 57. An overview

of the NPDES permitting program is provided along with MS4 and 12SW Industrial Permit requirements. The training strongly emphasizes good housekeeping BMPs, Stormwater Pollution Prevention Plan practices, IDDE, property management and maintenance, employee training, and recordkeeping. This year's training agenda, located in **Appendix C,** included a Maryland Statewide Salt Management Plan and Implementation presentation by the Director of Maintenance of the Maryland SHA's Maryland Department of Transportation.

Many County and municipal public works staffs are trained through their respective departments to perform visual inspections of storm drain systems as they go about their workday and report potential illicit discharges to their supervisors. County and municipal staffs performing IDDE investigations and enforcement, responding to and reporting illicit discharges, dumping, spills, etc., per the permit, received training coordinated by the LRM NPDES MS4 staff. A total of 264 employees received training during the permit year, covering the MS4 permit, general stormwater pollution prevention, good housekeeping/BMPs, and IDDE.

On November 29, 2017, MDE conducted a field audit of the County's IDDE program. MDE issued a letter dated February 12, 2018, commending the County for its commitment to implementing a successful program and finding the County in compliance with Part IV.D.3 of the permit. Requests noted in the letter have been addressed or responded to.

4. Litter and Floatables

The permit requires the permittees to address problems associated with litter and floatables in waterways that adversely affect water quality. MDE is concerned with litter discharges to receiving waters and has required Carroll County to evaluate its current litter control associated with discharges from its storm drain system. The permit requires that a public outreach and education program be developed and implemented, as needed, on a watershed by watershed basis. The County, via its watershed assessment efforts, has not identified any issue related to litter and floatables within those areas assessed. In addition, no State listing or identified TMDL exists within Carroll County related to litter and floatables. Therefore, a problem with litter and floatables is not an identified concern in Carroll County, as it relates to this permit.

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

- Eleven groups actively volunteer to pick up trash along an individually designated mile stretch of roadway once in the fall and once in the spring, as part of the Carroll County DPW Adopt-A-Road program. This program was initiated to control and reduce litter on Carroll County's roads and invites public, individual, and civic group volunteer participation. This program is promoted through an online video entitled, "A Cleaner Carroll" found on the Roads Operations' webpage. Equipment is provided along with safety guidelines and tips on how to pick up trash along roadways for disposal at the County's Resource Recovery Facility. Signs recognizing individual or group efforts in helping keep Carroll clean are provided by the County. Additionally, the Bureau of Facilities provides trash/ litter and recycling receptacles at facilities where they are considered practical.
- DPW staff spent 405 hours on roadside trash pickup in FY 2019.

- Trash nuisance remediation is primarily complaint driven and site or address specific. Contractors hired by the Carroll County DPW's Roads Operations abate the trash. In FY 2019, 53 complaints were received, and 2 sites were abated by County contractors.
- The program for the County and the municipalities includes a combination of trash receptacles along streets and in parks, litter ordinances, street sweeping, trash and recycling collection service, litter collection along roads and in public spaces, trash guards at storm drain inlets, and public education through newsletters, websites, social media, radio, television/cable, informational materials, and special events. Special events include, but are not limited to, clean-up days with local college volunteers and Boy Scouts, festivals, and fairs.

Carroll County also has developed and implemented a public education and outreach program to reduce littering and increase recycling, actively seeking to divert waste from the landfill. As seen in **Figure 2**, recycling participation in Carroll County was on the rise from 2008 to 2013. The drop-in recycling from 2013 to 2014 can partially be attributable to the County's waste diversion efforts, which result in less waste to recycle. This decrease may also be partially due to the increasing costs of recycling to the companies that use the recycled materials, which, among other factors, has pushed down the market demand. Recycling markets have tightened up, and recovered material is being scrutinized for contamination. A significant percentage (60%) of U.S. recyclables has been exported to China in the past. However, the Chinese Government announced a plan to ban all recovered material imports by 2020. China's initiatives would impose stricter quality standards for materials entering its ports and set deadlines for material bans.

In 2017, Carroll County began the process of eliminating the collection of plastic grocery shopping bags to the curbside collection. These bags create problems for the machinery, and the Material Recovery Facility (MRF) has to shut down the process to clean out the plastic from the equipment. All recycling is now required to be loose and not in plastic bags. Plastic grocery bags that are collected must go back to the supermarket or retail outlets that have their collections in the front of their store. As a result, Carroll County is encouraging residents "when it doubt, throw it out and not in the recycling bin" to improve the quality and viability of recovered recyclable materials.

Options for both curbside and drop-off opportunities have increased, as has the type of materials that can be recycled. While pick-up of recyclables within municipalities is provided by each individual municipality, the County's recycling public education and outreach efforts are implemented countywide, including within the municipalities.

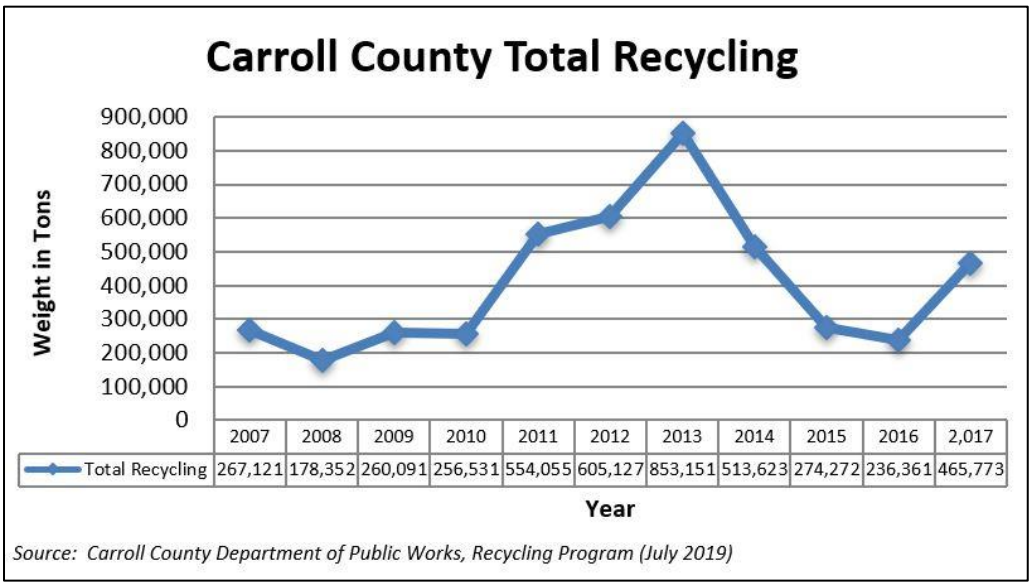


Figure 2: Total Recycling

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

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

The Recycling Center accepts all materials recycled through the County's curbside program plus many items that are not eligible for curbside pickup such as textiles, polystyrene foam, rigid plastics, electronics, cases and disks, car and truck batteries, used motor oil, antifreeze, waste oil, cooking oil, as well as aluminum can reimbursement. Aluminum can reimbursement fluctuates with the market value. The Resource Recovery Park also accepts white goods/scrap metal for recycling. The Loading Dock offers recycling of reusable building materials onsite.

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

Since 1994, the County has banned yard waste from being mixed with household waste for disposal or in plastic bags. Citizens countywide can dispose of grass, leaves, and branches in the

yard waste area of the Resource Recovery Facility. These items are mulched by a third party. Several municipalities offer curbside yard waste pickup.

Citizens are encouraged to consider backyard composting. The County provides an opportunity to purchase compost bins and rain barrels at a discounted rate in the spring. Public education materials have been created and are provided at events and on the website.

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

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

In FY 2018, the County hosted several "Reduce, Reuse, Recycle!" public outreach efforts as explained below.

1. Two residential household hazardous waste drop-off events took place on October 26, 2018, and May 11, 2019. Events such as these provide County residents with a safe means for:
   - disposing of household chemicals;
   - shredding of unneeded documents; and
   - learning about measures to protect the environment.
2. County residents were encouraged to dispose of unused prescription and non-prescription drugs at designated law enforcement agencies in the County.
3. The County hosted a rain barrel and compost bin sale event on April 27, 2019, to provide rain barrels and composting bins to residents at a reduced cost.

Through all recycling efforts, the County has achieved a 52.40 percent recycling waste diversion rate that included a 5 percent source reduction credit in 2017 (based on MDE's Recycling Report). The State-mandated recycling rate is 35 percent (as of December 31, 2015).
To proactively address changing and future solid waste needs, a Solid Waste Work Group evaluated options and prepared a report with recommendations. A Solid Waste Advisory Council (SWAC) was subsequently established by the Board of County Commissioners in 2014 to help implement recommendations of the various solid waste plans and advise staff. The SWAC continues to meet regularly.

The Recycling Office hosts a webpage entitled "Recycling" which provides extensive public education materials and opportunities (www.recyclecarroll.org). The homepage provides general information and materials on recycling, as well as information targeted to recycling in the home, at schools, and for businesses. All recycling events are posted on the website, and related

educational materials and documents are posted and available for download. The Recycling Office also hosts a Facebook page for followers to receive regular information and updates.

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

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

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

Additionally, County Recycling staff partners with the CCPS STEM (Science, Technology, Engineering, & Math) programs each year to educate and engage students, usually in elementary school, on issues related to recycling that coincide with the curriculum. This program is available upon request by a school.

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

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

Figure 3, "Carroll County MRA Recyclables," and **Figure 4,** "Carroll County Recycling & Waste Diversion Rates," demonstrate the trend in both the recycling weight and rates, respectively, in Carroll County from 2007 to 2017 (2018 data not yet published by MDE). Recycling of MRA recyclables in Carroll County rose steadily from the start and expansion of the program in 2007 and 2008. However, falling oil prices, a strong U.S. dollar, and a weakened economy in China have caused the national and global industry to take a significant downturn since 2011. This downturn has impacted Carroll's recycling market as well. These market

conditions, which are beyond the County's control, have subsequently impacted Carroll's recycling rates for MRA recyclables. Although the County is currently paying to dispose of the recyclables, the County continues to encourage recycling to reduce the waste stream to the landfill, and the recycling rate (as shown in Figure 4) is on the rise since 2012.

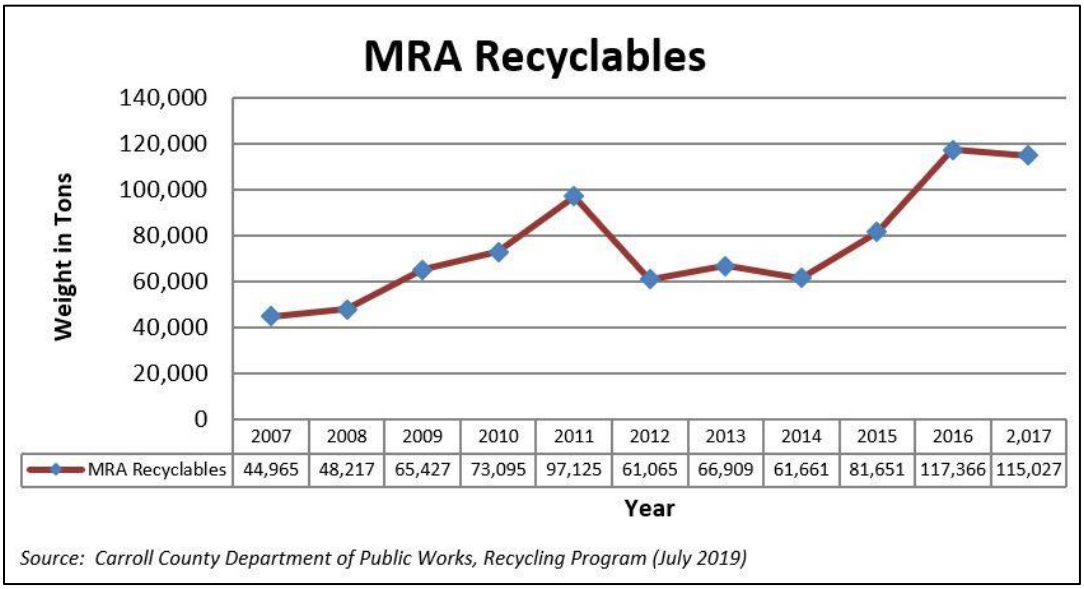


Figure 3: Carroll County MRA Recyclables

Figure 4, "Carroll County Recycling & Waste Diversion Rates," shows the rate of MRA recycling as well as the waste diversion rate. The source reduction credit is reflected in the waste diversion rate (added to the recycling rate).

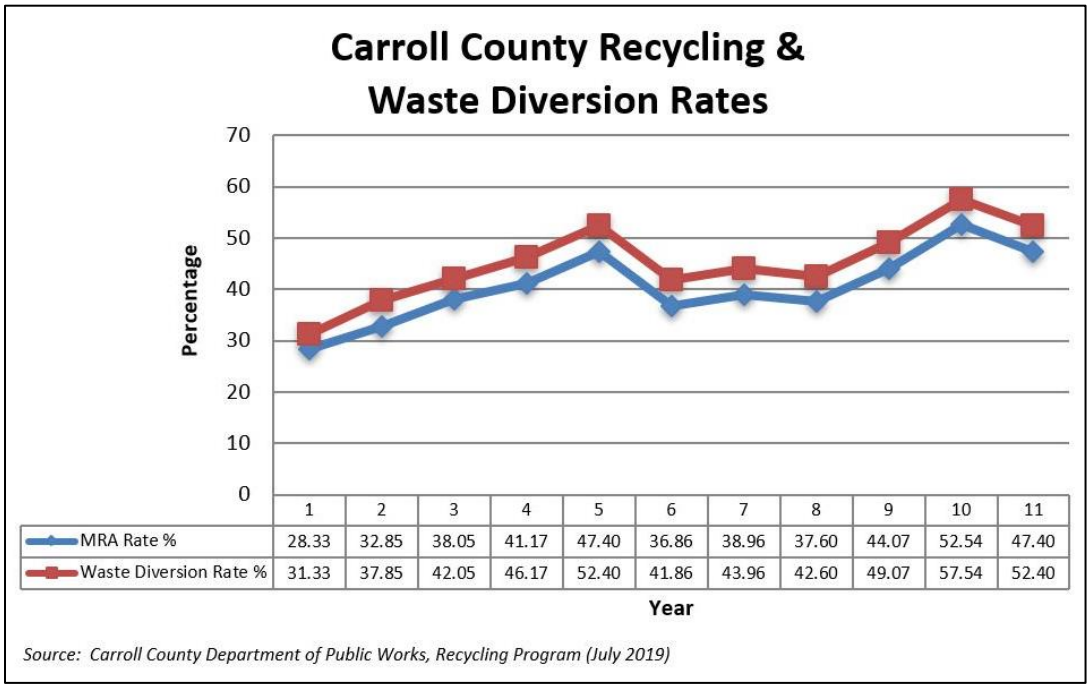


Figure 4: Carroll County Recycling & Waste Diversion Rates

Non-MRA recyclables may include automobile components, construction/building materials, and other materials. The County's MRA recycling rate has decreased since 2011, which is subsequently reflected in the drop in total recycling from 2013 to 2014. However, overall, the County's total recycling still reflects an increase between 2007 and 2016 and is still meeting the 35 percent recycling rate required by the MRA (see **Figure 2).** This success continues to divert waste from the landfills. The decrease in total recycling overall from 2013 to 2014 is likely due, in part, to the County's waste diversion efforts, resulting in less available resources to recycle.

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

5. Property Management and Maintenance

The permit requires a Notice of Intent (NOI) submitted to MDE for each County-owned or municipal facility requiring NPDES stormwater general permit coverage. **Table 3** lists those facilities owned by County or municipal co-permittee requiring current 12SW permit registration.

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	8/27/2018	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1755/MDR001755
County Maintenance Center	8/28/2018	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW1861/MDR001861
County Northern Municipal Landfill	8/27/2018	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0660/MDR000660
County Hoods Mill Landfill (Convenience Drop-off)	8/27/2018	Yes	June 30, 2014	MDE Registration Effective Date 08/11/2014 12SW0661/MDR000661
Hampstead – Public Works Gill Maintenance Shop	8/09/2018	Yes	June 16, 2014	MDE Registration: 07/30/14 12SW2213 / MDR002213
Manchester Public Works Maintenance Shop	8/15/2018	Yes	May 5, 2014	MDE Registration: 06/04/14 12SW2201/MDR02201
Mount Airy Public Works Maintenance Shop	8/8/2018	Yes	June 6, 2015	MDE Registration: 06/24/15 12SW2257/MDR002257
Mount Airy Public Works WWTP	8/8/2018	Yes	March 30, 2015	MDE Registration: 04/10/15 12SW2258/MDR002258
Taneytown Public Works Maintenance Facility	8/20/2018	Yes	June 16, 2014	MDE Registration: 07/17/14 12SW2263 / MDR001743

County- or Municipal-Owned Facility	Review Applicability	SWPPP Submitted to MDE	NOI Submittal Date	MDE REGISTRATION
Taneytown Public Works WWTP	8/20/2018	Yes	June 16, 2014	MDE Registration: 06/26/14 12SW1743 / MDR001743
Westminster Public Works Streets Maintenance Shop	8/17/2018	Yes	March 31, 2014	MDE Registration: 06/26/14 12SW2292/MDR002292
Westminster Public Works WWTP	8/17/2018	Yes	July 3, 2014	MDE Registration: 08/14/14 12SW2252 / MDR002252
Westminster Public Works Utilities	8/17/2018	Yes	June 17, 2014	MDE Registration: 07/28/14 12SW2455 / MDR002455

The permit also requires that the status of stormwater pollution prevention plan (SWPPP) development and implementation for each facility be reviewed, documented, and submitted to MDE annually. **Table 4** reflects each facility manager's response with respect to their facility's SWPPP status. A total of 209 employees participated in 12SW/SWPPP training at their facilities.

Jurisdictions having facilities with 12SW permits listed in **Table 4** are responsible for developing and maintaining their SWPPPs which include non-structural BMP/good housekeeping practices. These practices may include proper materials storage, fuel management practices, recycling, secondary containment, spill kits, and spill control measures. Quarterly routine inspections of the site include storm drain system infrastructure. Visual grab samples, personnel training, and annual evaluations continuously improve on-site pollution prevention effectiveness.

Carroll County Regional Airport (CCRA) has an Oil Operations permit issued by MDE, requiring the facility to implement a *Spill Prevention Control and Countermeasures Plan* (SPCC) be submitted to MDE as part of the renewal application and inspection process. Carroll County DPW contracted AECOM to update Spill Control and Countermeasures Plans at several 12SW permitted County facilities. AECOM met with appropriate County personnel on-site and reviewed 12SW SWPPP plans for coordination with those spill control and countermeasure practices and personnel.

Table 4
MS4 Co-Permittee – 12SW General Stormwater Industrial Permit
SWPPP Status (During MS4 Permit Reporting Year) *

Facility	SWPPP Plan Current *Y/N*	SWPPP Implemented *Y/N*	Facility Employees Trained *Y/N / #*	Training *Date(s)*	SWPPP Routine Inspections & Visual Grab Samples Performed *Y/N*	SWPPP Annual Comprehensive Evaluation Performed and Certified *Y/N*	Annual Comprehensive Evaluation Report Prepared and Posted in SWPPP *Date*
County Regional Airport	Y	Y	Y/2	3/14/19	Y[1]	Y	3/12/19
County Maintenance Center	Y	Y	Y/124	10/23/18 6/5/19	Y[1]	Y	5/21/19
Northern Municipal Landfill	Y	Y	Y/10	12/19/18	Y[1]	Y	10/16/18
Hoods Mill Landfill (Convenience Drop-Off)	Y	Y	Y/10	12/19/18	Y[1]	Y	10/16/18
Hampstead – Public Works Gill Maintenance Shop	Y	Y	Y/8	12/10/18	Y	Y	12/10/18
Manchester Public Works Maintenance Shop	Y	Y	Y/13	7/7/18	Y	Y	6/3/19
Mount Airy Public Works Maintenance Shop	Y	Y	Y/3	6/28/19	Y	Y	10/11/18
Mount Airy Public Works WWTP	Y	Y	Y/3	6/28/19	Y	Y	10/11/18
Taneytown Public Works Maintenance Facility	Y	Y	Y/7	6/13/19	Y	Y	6/13/18
Taneytown Public Works WWTP	Y	Y	Y/3	6/13/19	Y	Y	6/13/18
Westminster Public Works Streets Maintenance Shop	Y	Y	Y/17	2/26/19	Y	Y	12/20/18
Westminster Public Works WTTP	Y	Y	Y/12	2/26/19	Y	Y	1/31/19
Westminster Public Works Utilities	Y	Y	Y/10	2/26/19	Y	Y	9/11/18

*Status reported by jurisdiction/facility.
[1] Partial. Frequency self-corrected by facility.

The permit requires the County to continue to implement a program to reduce pollutants associated with maintenance activities at County-owned facilities, including parks, roadways, and parking lots. In a cumulative effort, County and municipal co-permittees under the MS4 permit reduce pollutants thru BMPs implemented in various maintenance activities. NPDES Stormwater Pollution Prevention and IDDE training is provided annually to County, municipal managers, and DPW supervisory level staff. Training includes BMPs for non-hazardous spill or leak containment and clean-up, and procedures for reporting to the appropriate authorities.

County-owned facilities including parks, roadways, and parking lots are maintained by numerous bureaus under the Carroll County DPW. The Bureau of Facilities provides general maintenance for over 40 County-owned properties ranging from administrative to maintenance of park facilities. The County's fleet maintenance operation includes a garage/shop, fuel island area, fleet wash facility, and warehouse all managed and maintained by the Bureau of Fleet Management/Warehouse using applicable BMPs including auto fluid recycling. The Bureau of Roads Operations provides routine maintenance of the roads including roadside mowing, pavement patching, pavement line striping, drainage work, pipe cleaning and replacement, tree trimming and removal, storm drain maintenance and repair, and surface sealing operations for approximately 988 miles of predominantly rural open section roadways (923 miles paved/65 miles gravel), 154 bridges, and salt dome facilities. CCRA, with a 5,100-foot runway, supporting tarmac and small parking lot, is maintained by the DPW Airport Operations. Access roads and parking lots for the water and wastewater treatment plants and their small maintenance facility are maintained under the Bureau of Utilities. The Bureau of Solid Waste maintains access roads to and from the County's active landfill and convenience drop-off location. The Department of Recreation and Parks, Bureau of Parks, maintains facilities for three natural resource-related parks, while the Department of Economic Development provides maintenance for the Carroll County Farm Museum tourism venue. See **Table 5:** MS4 Permittee Reported Pollution Reduction Activities Associated with Facility Maintenance Activities for permittee maintenance pollution reduction efforts.

During the 2019 permit year, County staff developed and implemented the use of an electronic form to aid in submission of property management and maintenance data from county agencies and municipal co-permittees. The web application (app) JotForm was utilized. This app allowed County staff to generate questions including multiple choice, short-answer, and even select-a-date. Feedback on the utilization of this new, electronic method has been overwhelming positive from both County staff and municipal co-permittees.

There are many benefits that have been identified after utilizing an electronic process this permit year. The app allows County staff to require certain questions be answered before the form can be submitted. This ensures that all required data is received at the same time. Due to the customization in question-type allowed to the form author, questions can require a response in a specific format. This is especially helpful when requesting inspection dates. For example, the question can only be answered and submitted if a day, month, and year are input. The electronic format also lends itself well to storage of data for future reference as well as improving the speed with which it is received.

Table 5
MS4 Permittee Reported Pollution Reduction Activities Associated with Facility Maintenance Activities (Parks, Roads, Parking Lots, etc.)

	Street Sweeping (1)	Inlet Inspection and Cleaning (1)	Integrated Pest Management practices used to reduce the use of pesticides, herbicides, fertilizers, and other pollutants associated with vegetation management	Reducing use of deicing materials through research, continual testing and improvement of materials, equipment calibration, employee training, and effective decision making.	Ensuring staff receives adequate training in pollution prevention and good housekeeping practices
Total MS4	✓	✓	✓	✓	✓
Carroll County	✓ Roads/Facilities (6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13,14,16,17)	✓ (3)
	✓ Solid Waste (4,5,6)		✓ (2a,10)	✓ (11,12,13)	✓ (3)
	Airport	✓ (9)	✓ (2,10)	✓ (11,12)	✓ (3)
	Parks	✓ (8)	✓ (2a,10)	✓ (11,12)	
	Farm Museum	✓ (4,9)	✓ (2,10)	✓ (11,12,13)	✓ (3)
Hampstead	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12,13,16,17)	✓ (3)
Manchester	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12,13,16)	✓ (3)
Mount Airy	✓ (3,6)	✓ (9,3)	✓ (2,10)	✓ (11,12,13)	✓ (3)
New Windsor	✓ (6)	✓ (7,8)	✓ (2,10)	✓ (11,12,16)	✓ (3)
Sykesville	✓ (6)	✓ (8,9)	✓ (2a,10)	✓ (11,12)	✓ (3)
Taneytown	✓ (3,4,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13)	✓ (3)
Union Bridge	✓ (5,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,16,17)	✓ (3)
Westminster	✓ (3,4,5,6)	✓ (7,8)	✓ (2,10)	✓ (11,12,13,14,15,16,17)	✓ (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, ie. mowing/hand trimming, etc.
(11) Training, Research or technical Information, SHA Guidance Document
(12) Visual observations/effective decision making
(13) Equipment calibration
(14) Salt Brine / Pre-Treatment
(15) Dry Salt/Salt Brine Mix (lower temp activation and less bouncing off road)
(16) Written Sale Management Procedures
(17) Contractor Training

Street Sweeping

Street sweeping maintenance programs are implemented in numerous municipal co-permittee urban and suburban areas covered by the permit as shown in **Table 5**. Carroll County does not have a street sweeping program for their predominantly rural open section roadways. The County Bureau of Solid Waste sweeps weekly at the Northern Landfill and monthly, or as needed, at the Hoods Mill residential drop-off facility. Approximately 1,088 linear miles of streets continue to be swept countywide. These services are performed by a combination of

County, municipal operations, and contractors. Municipal co-permittees typically prioritize road selections for street sweeping on downtown commercial business districts and higher density residential zoned areas with known heavier traffic patterns expanding out through primary ingress and egress street routes to commercial and residential suburb areas. Street sweeping also occurs in all permittee jurisdictions as a BMP when necessary for emergency management, construction-related activities, or after special events.

Inlet Inspection and Cleaning

All permittees conduct regularly scheduled, complaint-driven, or clog-driven inlet inspections and clean-out programs. A total of 782 storm drain inlets were cleaned countywide through manual, vacuum, or a combination of both cleaning methods during the permit reporting year. **Table 5** shows each permittee's pollution reduction efforts associated with maintenance activities. These inspections are included in the GDB.

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

Carroll County and all co-permittees employ Integrated Pest Management (IPM) practices to reduce herbicide usage associated with vegetation management primarily through mechanical control. The County's Bureau of Facilities, which manages over 40 properties, utilizes an IPM program resulting in efficient, minimal, and/or no usage of chemical materials in maintenance and weed control management practices. The Bureau's strategy is to rely on pre-emergent, selective herbicides and minimize post-emergent, non-selective products. No fertilizer usage for vegetation maintenance purposes was reported by any permittees for the permit year. Pollution reduction efforts at park venues managed by the Bureau of Parks only use mechanical controls for vegetation management. The CCRA facility has reduced the use of herbicides for vegetation management through increasing mechanical control methods and minimizing application area.

The overall management of noxious weed occurrences along County road rights-of-way and on private properties is implemented via an agreement with the Maryland Department of Agriculture (MDA). Employees from MDA perform spot spraying along County rights-of-way as well as private lands. Related herbicide usage for this application is reported through MDA. Pollution reduction efforts are noted in **Table 5** and in the MS4 Geodatabase Chemical Application table.

Deicing Materials

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

Permittees reduce the use of winter weather deicing materials through research, continual testing and improvement of materials, equipment calibration, and/or employee training as shown in **Table 5** and the MS4 Geodatabase Chemical Application table. Research and materials, salt management, and equipment calibration are periodically covered in training. All permittee

jurisdictions have been provided with a copy of the SHA's salt management program/plan and other salt management technical resources. County Roads Operations and most municipalities report having written salt management procedures and contractors are increasingly being trained as reported in **Table 5**.

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

The County and municipalities manage their salt storage facilities through employee training and the use of good housekeeping BMPs that include sweeping up residual materials into the salt storage structures. On-site spill kits are available at each facility in case of equipment failure during loading operations. In the county, the increased use of salt brine is utilized whenever feasible for pre-wetting of road surfaces in advance of winter storm events forecasted by national and local winter weather advisory sources. Snow plowing and salt application procedures are designed to limit the number of necessary passes to prevent overlapping and over usage of deicer materials.

Every storm event is treated as a unique event, with decisions made based on actual conditions. Pollution reduction measures include area supervisors performing real-time road inspections to determine if application rates are sufficient and efficient to deliver the best road conditions possible for public safety in a cost-effective manner and in the most environmentally sound manner, when practicable. Gravel roads do not receive deicer applications. Stone applications are provided as needed to improve traction. Citizen information is provided on the Roads Operations' webpage entitled "Clearing the Way Through Carroll County Efficiently," which provides instructions for the public that will help salt crews limit the number of return passes necessary to clear roadways and reduce the amount of salt applications. Staff researches materials, methods, and technologies and attends national and regional seminars and local workshops when possible to stay current on winter road maintenance practices and affordable deicer/chemical technologies with reduced environmental impact.

Deicers are used at pertinent facilities when winter weather conditions affect public and employee safety. Appropriate applications of chemicals are used at facilities having year-round usage but not where facilities are inactive during the winter season, which is a pollution reduction practice. These actions result in the reduction of salt in solid form in everyday practice.

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 through using proper mechanical practices minimizes chemical usage until conditions

necessitate the use of deicers in dry form. Effective decision making with regard to deicer usage is facilitated through Federal Aviation Administration (FAA) regulations and guidelines, national and local winter weather warning and forecast information, regular surface winter condition inspections, and good communication between experienced Fixed Base Operator (FBO) and CCRA airport management personnel. Research for effective, economical deicers that reduce pollutants includes keeping current with industry-related technical resource bulletins and information.

Staff Training

A total of 264 employees were trained under the NPDES MS4 permit for Carroll County. Each fall an annual NPDES MS4 permit training workshop event is held for pertinent County and municipal co-permittee managerial and supervisory staff who oversee maintenance activities within their agencies or jurisdictions. The annual workshop was held on November 2, 2018, at the Carroll County Public Safety Training Center, Westminster, MD. The agenda is located in Appendix C.

Topics included:

- NPDES MS4 Permit Overview and Regulatory Update
- Employee Training Requirements
- Stormwater Pollution Prevention BMP's (City of Richmond/DPW training video)
- Spill Clean-Up Measures
- Illicit Discharge Detection and Elimination
- MD General Discharge Permit 11-HT (MDE Industrial Discharge Permits Division)
- MD Statewide Salt Management Plan & Implementation (MDSHA Director of Maintenance)
- Property Management and Maintenance - 12SW Permit Update
- Property Management and Maintenance - Pollution Reduction through Maintenance Activities
- Property Management and Maintenance - Working Through 12SW Permit Compliance Investigation

Permittees ensure their pertinent public works maintenance staffs are trained in municipal stormwater pollution prevention and good housekeeping/BMP practices, IDDE, and 12SW SWPPP training for permitted facilities. Of 264 total employees trained under the Carroll County MS4 for the permit year, 242 were maintenance staff.

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

6. Public Education

The permit requires Carroll County to continue to implement a public education and outreach program to reduce stormwater pollutants. Outreach efforts may be integrated with other aspects of the County's activities.

Hotline

The permit requires maintenance of a compliance hotline or similar mechanism for public reporting of water quality complaints, including suspected illicit discharges, illegal dumping, and spills. Individuals are encouraged to report any evidence of illicit discharge or illegal dumping. Citizens throughout the County can call the non-emergency Stormwater Pollution Prevention Hotline at 410-386-2210. The hotline for Carroll County and each municipality is readily visible on the Resource Management website at carrollcountymd.gov/government/directory/land-resource-management/resource-management/stormwater-hotline/.

Webpages

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

The Bureau of Resource Management (BRM) hosts a dedicated NPDES webpage entitled "NPDES" (carrollcountymd.gov/government/directory/land-resource-management/resource-management/npdes/), which is the primary source of information related to the NPDES MS4 permit. The webpage provides links to the permit and Annual Reports from the past five years. It describes actions the average property owner may take to help prevent stormwater runoff pollution. Educational materials for both children and homeowners are available for viewing or download on the BRM website (carrollcountymd.gov/government/directory/land-resource-management/resource-management/outreach/). Links to various agricultural and urban BMPs are also available from this page. Further information regarding the County's and municipalities' stormwater program is provided on the BRM website as well. Copies of the Bureau's quarterly newsletter, *Down to Earth*, are available on the webpage, which include educational information and reporting on stormwater activities and program implementation.

The "Water Resource Coordination Council" (WRCC) webpage provides access to the resolution creating the WRCC. The Memorandum of Agreement (MOA) and Memorandum of Intent (MOI) prescribing the coordination between the County and municipalities on permit implementation and compliance are also available for download. (carrollcountymd.gov/government/boards-commissions/water-resource-coordination-council/)

The Carroll County "Environmental Advisory Council" (EAC) website (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/) provides access to materials related to stormwater pollution, TMDLs, recycling and solid waste reduction, and other relevant environmental topics. All 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

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 equip Carroll County homeowners and residents with knowledge regarding how to minimize stormwater runoff and prevent stormwater pollution from residential properties. Materials and resources related to stormwater pollution prevention and past workshop presentations are available for viewing by the public as well. (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 equip Carroll County businesses with knowledge of the good housekeeping and BMPs that will protect water quality and prevent issues for these businesses in the future. Materials related to stormwater pollution prevention and past workshop presentations are available for viewing by the public as well. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/stormwater/stormwater-workshop-for-businesses/)

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

The Carroll County Recycling Office hosts a website, entitled "Welcome to the Carroll County Recycling Office," which provides extensive public education materials and opportunities. The homepage provides general information and materials on recycling, as well as information targeted to recycling in the home, at schools, and at businesses. All recycling events are posted on the website, and related educational materials and documents are posted and available for download. The Recycling Office also hosts a Facebook page for followers to receive regular information and updates. Public Service Announcements are periodically run on WTTR (the local radio station), the County's social media outlets, and various other venues. (carrollcountymd.gov/government/directory/public-works/office-of-recycling/)

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

Materials and Publications

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

The "NPDES" webpage (carrollcountymd.gov/government/directory/land-resource-management/resource-management/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 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.

Events

All permittees participated during the permit year in public and commercial outreach efforts. In addition, storm drain stenciling and tree planting are implemented throughout the County and are often coordinated as a volunteer or outreach event. A complete listing of specific FY 2019 events can be found in **Table 6**.

Table 6
Carroll County NPDES Phase 1 MS4 Public Outreach Events in FY 2019

Event	Date	Watershed(s)	Description
Mid-Atlantic Car Wash Assoc "Wash to Save the Bay" Event	Month of June 2019	◆ Multiple	Public outreach materials
High School Student Outreach	May 16, 2019	◆ Liberty ◆ South Branch Patapsco	Presentation to South Carroll High School students about BRM's functions, including NPDES responsibilities
Carroll County Employee Appreciation Day	May 14, 2019	◆ Multiple	Recycling materials and direct discussion w/ attendees
Carroll County Household Hazardous Waste Spring Clean-Up	May 11, 2019	◆ Multiple	Hazardous household materials drop off for homeowners, which keeps them from being dumped down the drain on in the yard. Paper shredding also offered and then recycled.
Westminster Flower & Jazz Festival	May 11, 2019	◆ Multiple	Materials and direct discussion w/ attendees
McDaniel College Clean-Up Day	May 4, 2019	◆ Double Pipe Creek	Volunteers (22 students) collected 100 pounds of trash from drainage ditch along railroad track and alleys along Pennsylvania Ave. Tree pits were cleaned.
Sykesville Annual Spring Clean Up Day	April 27, 2019	◆ South Branch Patapsco	Stream bank cleaning
New Windsor Town Beautification Day	April 27, 2019	◆ Double Pipe Creek	Cleaned up streams of trash and stenciled inlets
Carroll County Envirothon	April 23, 2019	◆ Multiple	Partnership with Carroll County Conservation District. Provides hands-on environmental and natural resource management education to high school students.
Rain Barrel & Composting Event	April 27, 2019	◆ Multiple	County-hosted rain barrel and composting event. Provides rain barrels and composting bins to residents at a reduced cost.
Carroll County Seniors on the Go Expo	April 3, 2019	◆ Multiple	Recycling materials and direct discussion w/ attendees
Carroll County Home Show	March 30-31, 2019	◆ Multiple	Recycling materials and direct discussion w/ attendees
Carroll Forestry Board Spring Thaw Workshop	March 23, 2019	◆ Multiple	Experts from private, state, federal, and local government agencies presented topics covering flood risk management; stormwater implementation strategies to improve water quality; rain gardens and other homeowner scale stormwater management techniques; riparian forest buffer restoration; stream health and local trout waters; tree care and pruning for storm resilience; and more.
Hampstead-Manchester Business & Community Expo	March 16, 2019	◆ Multiple	Materials and direct discussion w/ attendees
Scrap Tire Drop Off Day	March 1-11, 2019	◆ Multiple	Carroll County participated in MDE's (w/ MES + MD Farm Bureau) tire collection event, where scrap tires collected at no cost to farmers.
Carroll Arts Council Festival of Wreaths	November 23-December 2, 2018	◆ Multiple	Recycling materials and direct discussion w/ attendees
America Recycles Day	November 15, 2018	◆ Multiple	Recycling materials and direct discussion w/ attendees

Event	Date	Watershed(s)	Description
Hampstead 2nd Grade Field Trips	November 7, 2018	◆ Loch Raven Reservoir ◆ North Branch Patapsco ◆ Prettyboy Reservoir	Event to introduce children how to be a good citizen and various town roles. Included discussion about water conservation and keeping the waters of Maryland clean through BMPs.
Hampstead Tree Commission Tree Planting	November 5, 2018	◆ Multiple	Planted five maple trees and one white oak tree on Sugar Maple Street in some roadway islands and at Panther Park.
Carroll County NPDES MS4 Permit Annual Stormwater Pollution Prevention Compliance Training	November 2, 2018	◆ Multiple	Training provided to key management, supervisory, and assistant supervisory level personnel responsible for NPDES stormwater permit regulations, requirements, and implementation for County and municipalities.
Carroll County Household Hazardous Waste Fall Clean-Up	October 27, 2018	◆ Multiple	Hazardous household materials drop off for homeowners, which keeps them from being dumped down the drain on in the yard. Paper shredding also offered and then recycled.
Taneytown City Harvest Fest	October 5-6, 2018	◆ Multiple	Booth – materials and direct discussion w/ attendees
Hampstead Fall Fest	October 6, 2018	◆ Multiple	Materials and direct discussion w/ attendees
Fall Earth Day @ Farm Museum	October 3, 2018	◆ Multiple	Taneytown STEM students participated in educational event to learn about best practices. Hands-on exercise used to teach where to put these practices.
Westminster FallFest	September 27-30, 2018	◆ Multiple	Materials and direct discussion w/ attendees; Enviroscapes Watershed model provided for public education and demonstration
New Windsor Community Day	August 25, 2018	◆ Double Pipe Creek	Booth – materials and direct discussion w/ attendees
National Night Out	August 7, 2018	◆ Multiple	Materials and direct discussion w/ attendees

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

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

Media and Social Media

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

The County actively utilizes cable TV resources to convey public service information. This may include upcoming events, presentations, good housekeeping BMPs, and other resources. In FY 2018, LRM staff, in conjunction with Carroll's Community Media Center (CMC), produced the first in a series of videos on BMPs for homeowners entitled "Stormwater Pollution Prevention for Homeowners, Part 1 – Stormwater and Homeowners." The video introduced homeowners to stormwater and why it is important. The next video will incorporate various sources of pollutants in residential yards and simple practices homeowners can employ to reduce runoff and prevent pollution. The video 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 the GIS story map (ESRI) used at the public workshops and is available online.

On June 25, 2019, the first in 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.

Appointed and Staff Groups

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

In its role to promote environmental awareness and outreach, every other year the EAC accepts nominations for Environmental Awareness Awards. Winners are recognized in a joint ceremony with the Board of County Commissioners, in the press, and on the EAC's website, generally in conjunction with Earth Day and/or Arbor Day. The 2018 award winners were recognized in a presentation ceremony with the EAC and members of the Board of County Commissioners. Information about the award winners is available on the EAC webpage and was disseminated through a news release, social media, and newsletters (hardcopy and electronic). The award winners were also be honored at a tree planting ceremony held at Carroll Community College on September 28, 2018. (carrollcountymd.gov/government/boards-commissions/environmental-advisory-council-eac/environmental-awareness-awards/)

The EAC's Carroll County Environmental Stewardship booklet, which is updated every other year, is available on the website and is provided at various venues. The booklet describes various efforts and initiatives undertaken by the County to demonstrate environmental stewardship and protection, including stormwater mitigation and management projects and progress. The booklet was updated in 2019. (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 the sustainable, responsible, and cost-effective practices of Solid Waste Management and Recycling in the best interests of the citizens of Carroll County and the environment. The SWAC researches and discusses issues related to solid waste and recycling and provides recommendations to the Board as requested. The SWAC meets on a regular basis and all meetings are open to the public. A member of the EAC sits on both councils and reports the status of the SWAC initiatives regularly to the other EAC members.

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

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

The WRCC serves as the local Watershed Implementation Plan (WIP) team for local implementation of Maryland's WIP and continues in this role to address WIP issues and tasks as they arise. The WRCC will continue to serve in this role as the State turns to local jurisdictions to assist with implementing its Phase III WIP.

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

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

The town/city councils and the municipal planning commissions meet regularly. Discussions related to expenditure of funds and approval for stormwater projects may be discussed at these

meetings, which are open to the public. **Table 7** provides the regular meeting time for each of the co-permittee's public bodies.

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

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

Public Outreach Plan

The WRCC developed a Public Outreach Plan in permit year 2014-15. The primary goal of the *Carroll County and Municipalities NPDES MS4 Public Outreach Plan* is compliance with the permit. This plan provides a review of the public outreach opportunities currently available to residents and businesses in Carroll County and the municipalities regarding specific requirements of the permit and related stormwater program activities. As a result of this review, activities were suggested to round out those opportunities and improve outreach. The intent is to raise public awareness and encourage residents and businesses to take measures to reduce and prevent stormwater pollution. This is a dynamic, iterative plan, which will be revised on a regular basis as projects are completed and other needs arise. The public outreach plan was submitted as Appendix E of the 2015 Annual Report and is available. **Table 8** indicates the activities/programs under the Public Outreach Plan objectives that have been implemented thus far.

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 in mail or via social media or news release.
Create comprehensive website that is more user-friendly and accessible	Restructure website to bring NPDES under one umbrella	26	Carroll County completed the process to revamp its entire website in April 2019. The NPDES page was included in this process. Various items related to NPDES were brought together in one place, under the BRM website. The new website is intended to be more user friendly.
Create comprehensive website that is more user-friendly and accessible	Add materials to website to address broader range of issues and needs	26	Separate materials directed to homeowners and businesses were developed and posted to the following webpages: Homeowner Workshop, Stormwater Workshop for Businesses, Municipal Resident Workshop, Carroll Clean Water Partnership, Municipal Residents Workshop, Stormwater Public Outreach Publications. Homeowners & Stormwater video added to webpage & County YouTube.
Increase awareness of compliance hotline availability and improve access	Create a more prominent location on NPDES website for hotline	27	With the rollover to the new website, the hotline was added to the Bureau of Resource Management website with a direct link on the main BRM menu.
	Explain in more detail the purpose of the hotline	27	The webpage explains for what to call the hotline and when an emergency should warrant a call to 911. It includes phone numbers for each municipality as well.
	Add hotline # to more informational materials	27	The hotline phone number was included on the business and homeowner outreach materials developed during the 2016 - 2018 permit years. It is included on most stormwater educational materials and municipal websites.
Continue to offer opportunities and materials for increased public awareness and access to permit-related, water quality information.	Conduct workshop to education general public	27	A workshop, *Homeowners & Stormwater*, was held on March 18, 2017. A workshop for municipal residents 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, *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.
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.

Objective	Activity/Program	Page	Implementation
	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 & DPW staff	32	DPW staff provided the needed documentation for the Annual Report and continued to implement the Recycling program. DPW staff attends the monthly WRCC meetings. The departments work together to plan and implement and maintain water, wastewater, and stormwater projects.
	Public Engagement – Volunteer Opportunities: Individuals / Groups	32	Volunteers assisted with several projects in FY15-FY19. The events for FY19 are described in Table 7.
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.

Community Partnership

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

Businesses start by assessing their current activities and identifying any specific actions needed to prevent pollution and improve water quality stewardship. For this assessment, a self-inspection checklist, titled "Completing Your Stormwater Pollution Prevention Self-Inspection Checklist and Action Plan," is available to guide business owners in identifying good housekeeping measures that could be implemented. This checklist then may also be used as an 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 is available to assist in this process if desired.

Other Outreach Activities

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

Staff partners with the CCPS Outdoor School Program each year to educate and engage sixth grade students on issues related to water quality that coincide with the curriculum. Sessions are provided on topics such as biological/stream health, stormwater, and the importance and benefits of tree planting.

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

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

The County conducted SCAs in accordance with the Stream Corridor Assessment Survey Protocols, developed in 2001 by the Maryland DNR, Watershed Restoration Division. Assessments were performed between January and March, in the years assessed, by County staff through cooperation of private landowners and municipalities. Landowner permission for access to stream corridors is obtained through a mailing detailing the purpose and timing of the assessment with a return response postcard. The County received permission to assess 786 miles of the 1,464 miles, or approximately 54 percent, of the stream miles within the County **(Table 9**).

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

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

Table 9
Watershed Assessment Status

8-Digit Watershed	Major Basin	Miles Assessed	Total Miles	% Assessed	Year Assessed
Watersheds Assessed					
Prettyboy	Gunpowder	80	97	82%	2011
Liberty	Patapsco	255	458	56%	2012
South Branch Patapsco	Patapsco	156	218	72%	2013
Lower N. Branch Patapsco	Patapsco	6	6	100%	2014
Lower Monocacy	Monocacy/Potomac	10	23	43%	2014
Conewago Creek	Susquehanna	11	18	61%	2014
Upper Monocacy	Monocacy/Potomac	71	128	55%	2015
Double Pipe	Monocacy/Potomac	266	514	52%	2016
Loch Raven	Gunpowder	2	3	66%	2016
	Total:	***786***	***1,464***	***54%***	

2. Restoration Plans

Six of the nine 8-digit watersheds in Carroll County have an associated TMDL WLA for developed source types. Each restoration plan focuses on impacts documented during the SCA for each watershed and prioritizes projects at the 12-digit scale based on assessment findings. Restoration plans for the 6 watersheds were sent to MDE in August 2016 for review. The 6 watersheds included Prettyboy, Liberty, Loch Raven, Lower Monocacy, Upper Monocacy, and Double Pipe Creek. In addition to the restoration plans, the submission included SCA's and Watershed Characterizations for each watershed.

In September 2017, the County received written comments from MDE's Sediment, Stormwater, and Dam Safety Program and the Water and Science Administration relating to TMDL implementation plans (restoration plans). The County addressed various points and deficiencies provided by MDE and re-submitted the 6 restoration plans in December 2017. The County received correspondence from MDE regarding the December 2017 submission in November 2018 and met with MDE in December 2018 to clarify the comments made by MDE's Integrated Water Planning Program (IWPP). Following this meeting, the County revised the 6 watershed restoration plans and began releasing the restoration plans for public comment in October 2019. The County completed the public participation process the end of November. The Restoration Plans, attached as Appendix J of this annual report, have incorporated all MDE comments and the limited number of public comments that were applicable. The 6 restoration plans provided in Appendix J address approved stormwater WLAs and provide compliance with Part IV.E of the permit.

Carroll County continues implementing an aggressive program related to watershed restoration projects. The County's restoration under the fourth-generation permit as of December 2019, was 2,034 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 percent requirement in the third-generation permit.

Table 10 provides a complete accounting of the impervious area treated and planned to be treated. Projects planned or in design scheduled for completion in 2020-2023 are shown in red and will address future impervious acre and nutrient reduction requirements anticipated in the fifth-generation permit. As of this date, approximately 761 impervious acres are planned to be treated. These acres, along with the 566.96 extra acres treated under the fourth-generation permit, keep the County moving in a positive direction relating to treatment of untreated impervious acreage and addressing local and Chesapeake Bay nutrient reduction requirements.

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

Table 10
Listing of NPDES Watershed Restoration Efforts
July 2019

First Carroll County Permit Requirements					
Year	**Project Name**	**Project Type**	**Project Status**	**IA Credit**	**MDE Watershed**
1997	Longwell County Park	600 LF Stream Restoration	Completed	142.80	Liberty Reservoir
1998	Carroll County Times	200 LF Stream Restoration	Completed	0.50	Liberty Reservoir
1999	Piney Run	936 LF Stream Restoration	Completed	258.07	Loch Raven Reservoir
1993-2005	Forest Buffer Easements	Forest Buffer	Completed	147.47	
1993-2005	Grass Buffer Easements	Grass Buffer	Completed	139.43	
Completes 1st permit term requirement of 10% treatment				***688.27***	
Watershed Restoration Efforts Completed December 2019					
Year	**Project Name**	**Project Type**	**Project Status**	**IA 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

Year	Project Name	Project Type	Project Status	IA Credit	MDE Watershed
2011	Edgewood	Retrofit	Completed	16.70	Liberty Reservoir
2011	Heritage Heights	Retrofit	Completed	4.10	Liberty Reservoir
2011	Oklahoma Phase I	Retrofit	Completed	10.00	Liberty Reservoir
2011	Quail Meadows	Retrofit	Completed	23.25	Liberty Reservoir
2012	Hampstead Impervious Area Removal	Impervious Removal	Completed	0.13	Prettyboy Reservoir
2012	Clipper Hills - Gardenia	Retrofit	Completed	15.24	S Branch Patapsco River
2012	Clipper Hills - Hilltop	Retrofit	Completed	25.49	S Branch Patapsco River
2012	Harvest Farms 1A	Retrofit	Completed	15.47	S Branch Patapsco River
2012	Parrish Park	Retrofit	Completed	18.20	S Branch Patapsco River
2012	Sunnyside Farms	New Construction	Completed	3.30	Double Pipe Creek
2012	Wilda Drive	New Construction	Completed	1.63	Liberty Reservoir
2013	Westminster Community Pond	New Construction	Completed	87.85	Liberty Reservoir
2013	Westminster High School	New Construction	Completed	44.81	Liberty Reservoir
2013	Tree plantings	Tree plantings	Completed	7.13	
2014	Benjamin's Claim	Retrofit	Completed	20.55	S Branch Patapsco River
2014	Carrolltowne 2A Gemini Drive	Retrofit	Completed	47.26	S Branch Patapsco River
2014	Carrolltowne 2B	Retrofit	Completed	14.27	S Branch Patapsco River
2014	Diamond Hills Section 5	Retrofit	Completed	16.27	Liberty Reservoir
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	162.70	
2006-2014	Grass Buffer Easements	Grass Buffer	Completed	135.00	
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

Year	Project Name	Project Type	Project Status	IA Credit	MDE Watershed
2017	Farm Museum - Rain Garden	New Construction	Completed	0.05	Double Pipe Creek
2017	Finksburg Industrial Park	Retrofit	Completed	22.34	Liberty Reservoir
2017	Jenna Estates	Outfall Restoration	Completed	0.50	S Branch Patapsco River
2017	Miller/Watts	Retrofit	Completed	35.24	Liberty Reservoir
2018	Blue Ridge Manor	Retrofit	Completed	11.25	Double Pipe Creek
2018	Central Maryland (Wet Facility)	Retrofit	Completed	35.51	Liberty Reservoir
2018	Eldersburg Business	Retrofit	Completed	70.36	Liberty Reservoir
2018	Exceptional Center	Retrofit	Completed	16.57	Double Pipe Creek
2018	Feeser Property	New Construction	Completed	1.72	Liberty Reservoir
2018	Hawks Ridge	Retrofit	Completed	25.10	S Branch Patapsco River
2018	Randomhouse	Retrofit	Completed	22.52	Liberty Reservoir
2018	Small Crossings Bioretention	New Construction	Completed	0.53	Prettyboy Reservoir
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	Under Construction	61.88	Liberty Reservoir
2019	Elderwood Village Parcel B	Retrofit	Completed	61.00	Liberty Reservoir
2019	Elmer Wolfe	Retrofit	Completed	4.85	Double Pipe Creek
2019	Langdon (Jantz)	New Construction	Under Construction	92.10	Double Pipe Creek
2019	Merridale Gardens	Retrofit	Completed	28.39	S Branch Patapsco River
2019	Oklahoma 4	Retrofit	Completed	19.96	Liberty Reservoir
2019	Roberts Mill	Retrofit	Under Construction	88.48	Upper Monocacy River
2019	Shannon Run	Retrofit	Completed	46.89	S Branch Patapsco River
2019	Shiloh Middle	Retrofit	Under Construction	23.05	Liberty Reservoir
2019	Tree plantings	Tree plantings	Completed	5.40	
2019	Whispering Valley Phase 4	Retrofit	Under Construction	24.87	Prettyboy Reservoir
2019	Willow Pond	Retrofit	Under Construction	100.00	Liberty Reservoir
2019	Willow Pond - Stream restoration	Stream Restoration	Under Construction	77.50	Liberty Reservoir
2015-2019	Forest Buffer Easements	Forest Buffer	Completed	57.10	
2015-2019	Grass Buffer Easements	Grass Buffer	Completed	31.60	
2019	Inlet Cleaning (updated yearly)	Inlet Cleaning	Completed	16.00	

Year	Project Name	Project Type	Project Status	IA Credit	MDE Watershed
2019	Septic Upgrades (to date)	Retrofit	Completed	53.56	
2019	Septic Pumping (updated yearly)	Septic Pumping	Completed	0.00	
2019	Street Sweeping (updated yearly)	Street Sweeping	Completed	1.00	
	Completed toward 20% goal			***2,034.61***	
Watershed Restoration Projects in Planning					
Year	**Project Name**	**Project Type**	**Project Status**	**IA Credit**	**MDE Watershed**
2020	Greens of Westminster Sec 2 #6	Retrofit	Design	16.04	Double Pipe Creek
2020	Hampstead Regional Facility	Retrofit	Concept	116.88	Liberty Reservoir
2020	IDA Property (Mt. Airy)	New Construction	Design	14.44	S Branch Patapsco River
2020	Locust wetland	New Construction	Design	11.00	Double Pipe Creek
2020	Trevanion Terrace	Retrofit	Design	52.00	Upper Monocacy River
2020	Woodsyde Estates Large Facility	Retrofit	Design	19.28	S Branch Patapsco River
2020	Woodsyde Estates Small Facility	Retrofit	Design	1.05	S Branch Patapsco River
2020	Woodsyde Stream Restoration	Stream Restoration	Design	63.00	S Branch Patapsco River
2020	Tree Plantings	Tree Plantings	Design	6.70	
2021	Bevard Square	Retrofit	Concept	36.10	Liberty Reservoir
2021	Brynwood	New Construction	Concept	29.84	Liberty Reservoir
2021	Candice Estates	New Construction	Concept	17.88	Lower Monocacy River
2021	Manchester Elementary	New Construction	Concept	4.94	Prettyboy Reservoir
2021	Mayberry	Stream Restoration	Design	203.00	Double Pipe Creek
2021	Melstone Valley	Retrofit	Concept	22.50	S Branch Patapsco River
2021	Valley Vista	New Construction	Concept	6.50	Prettyboy Reservoir
2022	Piney Ridge Village As-Built 57	Retrofit	Concept	11.00	S Branch Patapsco River
2022	Squires	Retrofit	Concept	13.75	Liberty Reservoir
2022	Winters Street	Retrofit	Concept	36.01	Liberty Reservoir
2023	Wind Song Est.	New Construction	Concept	11.76	Lower Monocacy River
2023	New Windsor Railroad	New Construction	Concept	15.34	Double Pipe Creek
2023	Manchester East	New Construction	Concept	36.60	Prettyboy Reservoir
2023	Carroll Co Health Department	New Construction	Concept	6.72	Double Pipe Creek
2023	Meadowbrook	Retrofit	Concept	8.70	Upper Monocacy River
	Anticipated impervious treatment			***761.03***	

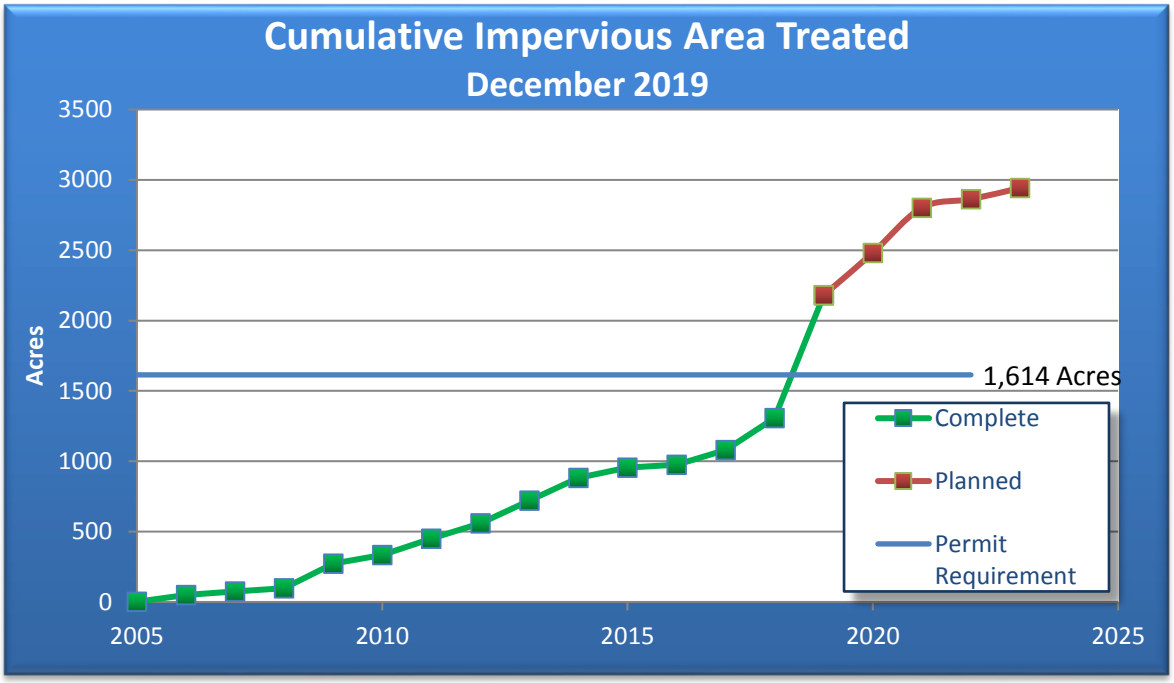


Figure 5: Impervious Surface Acres Treated: Projects Completed (Constructed/Under Construction) and Planned (incl Under Design)

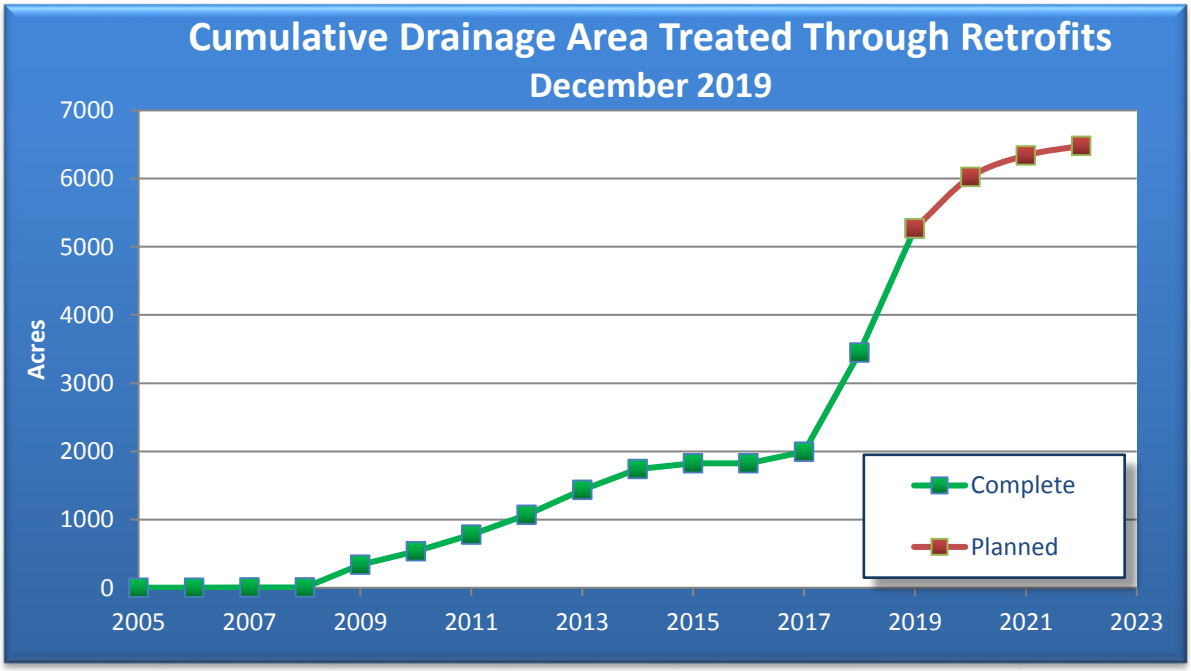


Figure 6: Drainage Area Acres Treated: Projects Completed (Constructed/Under Construction) and Planned (incl Under Design)

3. Public Participation

As part of the watershed restoration efforts, Carroll County solicited input from the public regarding development of the County's TMDL implementation plans. Public involvement occurred following interim submissions of the restoration plans to MDE that provided feedback and subsequent revisions to the plans.

Interim submissions to MDE included Watershed Characterizations, Stream Corridor Assessment summary, and Watershed Restoration Plans for the six 8-digit watersheds in Carroll County that have an approved TMDL WLA for developed source types.

All the above plans were initially sent to MDE in August 2016 for review. In September 2017, the County received written comments from MDE's Sediment, Stormwater, Dam Safety Program and the Water and Science Administration relating to TMDL implementation plans (restoration plans). The County addressed various points and deficiencies provided by MDE and re-submitted the 6 restoration plans in December 2017. The County received correspondence from MDE regarding the December 2017 submission in November 2018 and met with MDE in December 2018 to clarify the comments made by MDE's IWPP.

Following this meeting, the County revised the 6 watershed restoration plans and began releasing the restoration plans for public comment in October 2019. Notice of this release was sent to the Carroll County Times, as well as posted on the Carroll County webpage. The County provided hard copies of the plans within BRM for review and comment, as well as posted the plans on the Bureau's webpage to allow for electronic comments to be submitted.

Following the press release on September 26, 2019, the Watershed Restoration Plans were released for 30-day public comment in a staggered method beginning on October 1, 2019. Upper and Lower Monocacy Watersheds were open for public comment from October 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 related to any of the 6 restoration plans. A discussion of the feedback and its applicability to the restoration plans can be found in Appendix J.

4. TMDL Compliance

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

restoration requirement as well. This progress demonstrates the County's aggressive implementation toward meeting these goals.

In addition to 27 percent of the untreated impervious area restored during this permit term throughout the county, 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 and 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 associated reduction to loads delivered to the Chesapeake Bay by segment shed is also included 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 will be reported following approval of the restoration plans for the individual watersheds. Attachment B of the County's permit lists the EPA-approved TMDLs for Carroll County.

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

The list of EPA-approved TMDLs for Carroll County, found in Attachment B of the permit, also includes bacteria. MDE's *Guidance for Developing a Stormwater Wasteload Allocation Implementation Plan for Bacteria Total Maximum Daily Loads* (May 2014) does not provide quantifiable methodology for tracking and measuring bacteria pollutant load reductions. However, in Carroll County, both bacteria and mercury load reductions will primarily be addressed through the measures and BMPs implemented to address nutrient and sediment TMDLs in the County. Carroll County's primary approach to stormwater retrofits is the use of enhanced infiltration and filtration. This strategy optimizes removal of mercury and bacteria. Therefore, while not strictly quantifiable, this approach provides enhanced removal of these constituents to the maximum extent practicable.

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

The County fully supports its stormwater program through strong fiscal commitments, staffing resources to implement the program, and coordination between co-permittees. During the FY20 operating budget process, the Board of County Commissioners approved funding a new position within the BRM entitled, Resource Management Technician. This position was funded to assist

the Bureau with work associated with NPDES efforts. The position was filled in August 2019. The County's fiscal expenditures and capital budgeting – historically, currently, and planned – demonstrate the implementation of this commitment.

The permittees further demonstrate the commitment to achieve the impervious restoration requirement and other provisions and requirements contained in the permit through the MOA signed by all co-permittees. This MOA obligates funding for the capital costs to meet the permit's impervious restoration requirements associated with the municipalities, as well as overall administrative support by the County.

Carroll County's annual operating expenditures for this program have more than tripled since 2008, from approximately $334,000 annually to almost $2.3 million annually. These expenses cover salaries and benefits of employees, monitoring supplies, educational material, monitoring analysis, training information, consultant fees, stormwater management facility maintenance, contractor costs, equipment needs, and bond interest and principle.

Additionally, $21.6 million has been reserved for 24 watershed restoration efforts in the Community Investment Program (CIP) for FY 2020 to FY 2025. Costs associated with restoration efforts have been offset through the success of the County's grants program. Since 2008, more than $17.4 million of grant funding has been awarded to Carroll 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.

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

Study Area and Requirements

The discharge characterization is completed in a first order stream that is a tributary to the West Branch of the North Branch Patapsco River. The location of the watershed where monitoring is conducted within the County is shown in **Figure 7**, while the location of the monitoring stations and other watershed features are shown in **Figure 8.** The study area is located near the topographic divide separating the eastern and western piedmont physiographic provinces. As shown in **Figure 7**, the unnamed tributary drains the upper-most extent of the first order tributary and is located in the Liberty Reservoir watershed.

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

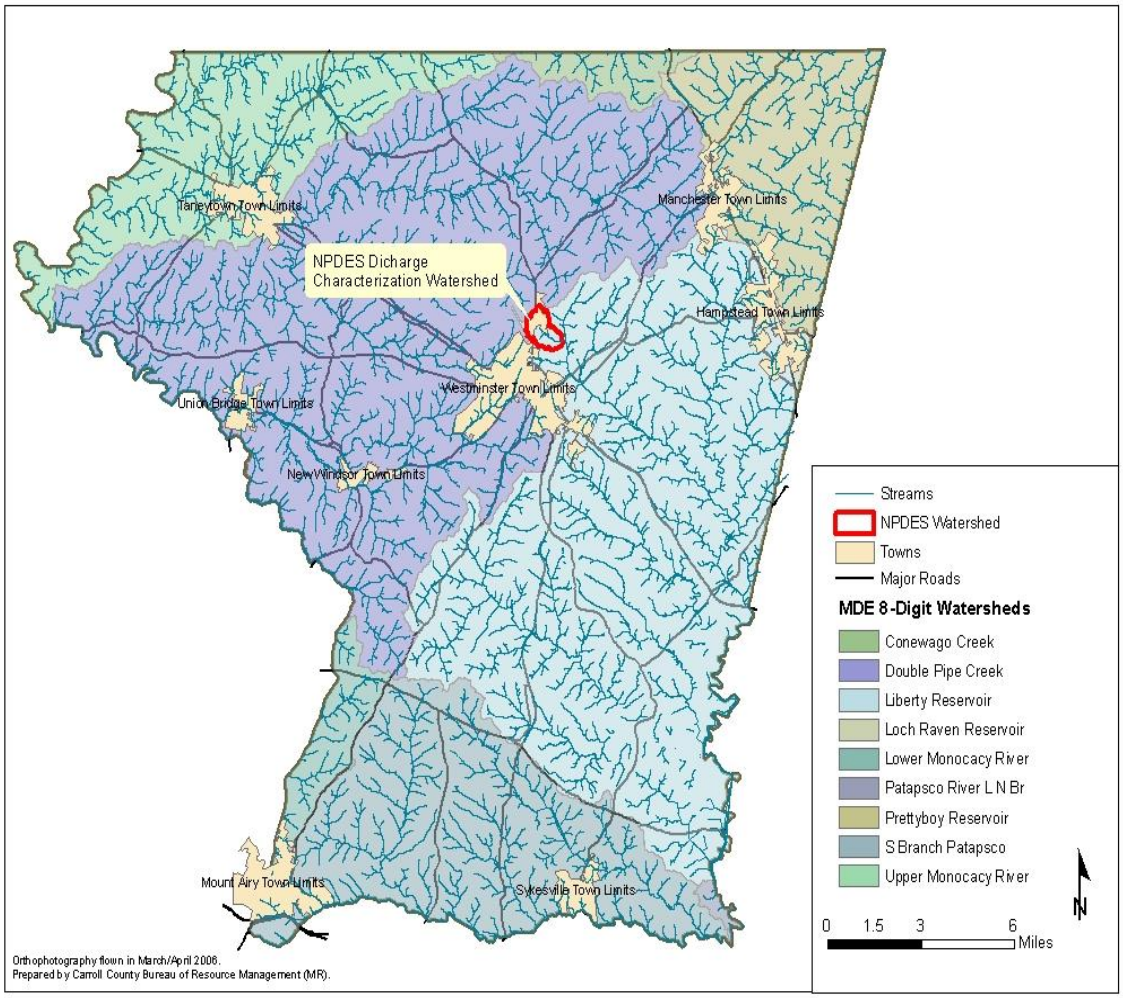


Figure 7: Carroll County NPDES Discharge Characterization Location

Center stormwater management facility. This facility also drains to the stream, just downstream of the outfall station.

Program Elements

The discharge characterization consists of three primary data collection efforts to assess the effectiveness of the stormwater controls on stream health: physical monitoring, chemical monitoring, and biological monitoring. These data are collected at the two monitoring stations shown in **Figure 8** where the cumulative effects of watershed restoration efforts can best be assessed.

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

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

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

- Samples of 8 storm events at each monitoring location, with at least 2 occurring each calendar year quarter. During extended dry periods, base-flow samples are collected 1 time per month.
- Sampling is completed with automated equipment to include pH and temperature, and each storm limb is characterized.
- Laboratory analysis is completed for a number of chemical constituents and Event Mean Concentrations (EMCs) calculated and reported.

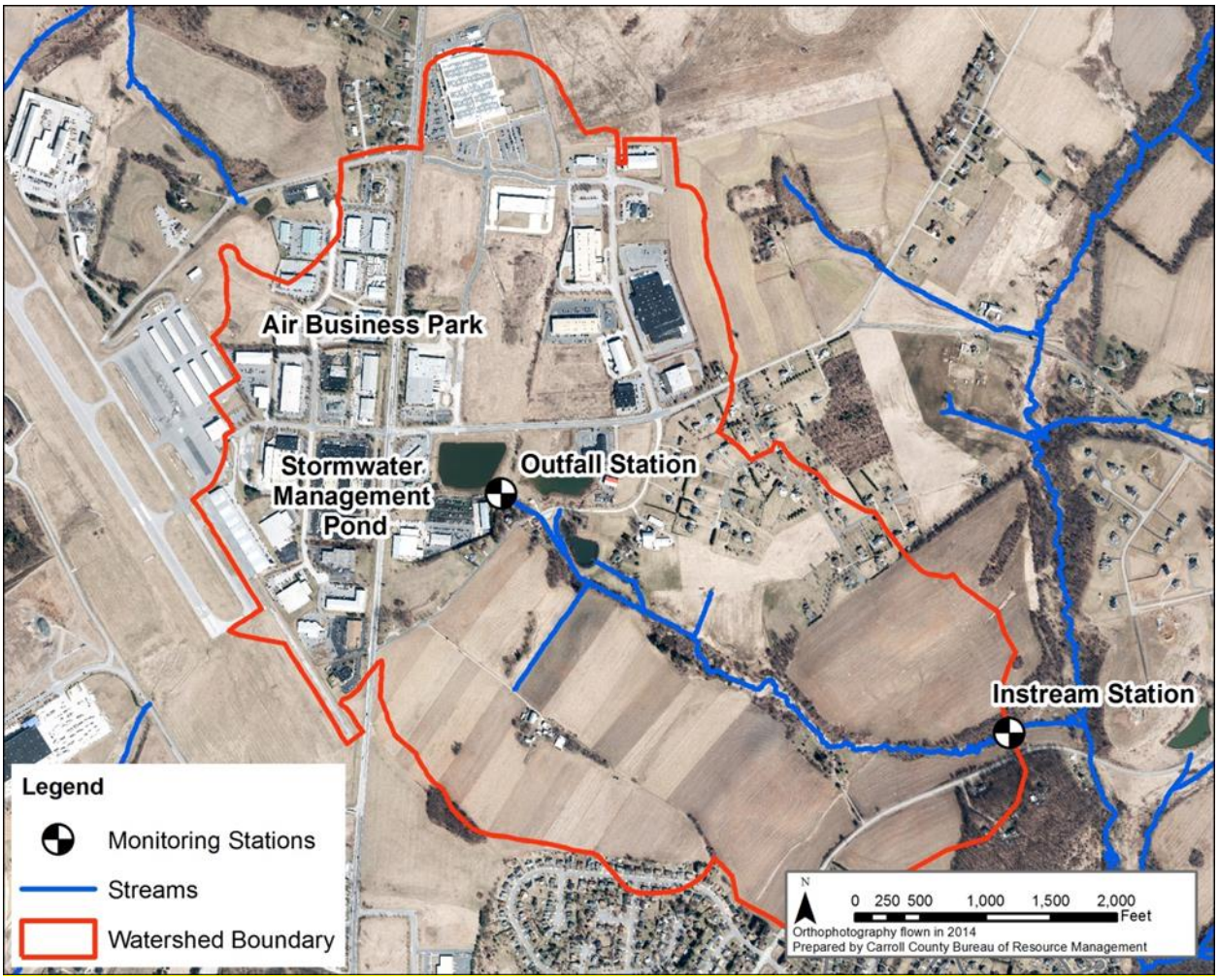


Figure 8: NPDES Discharge Characterization Watershed

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

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

2. Data Collection and Analysis Methods

Climatological

The climate of Carroll County is characterized as temperate and moderately humid (Meyer and Beall, 1958). The 30-year average county temperature is 54° Fahrenheit (F) with monthly means ranging from 32°F in January to 76°F in July (NOAA, 2014). The 30-year average county precipitation is 43.4 inches, with monthly means ranging from 2.5 inches in February to 4.3 inches in July (NOAA, 2014). Temperature data were collected from the weather station at the CCRA as in the previous reporting years. This station is operated by the Carroll County

Government in accordance with National Weather Service Standards. Precipitation data, previously collected at the CCRA, were collected for this reporting period at the Westminster Wastewater Treatment Plant (WWTP) and used for the annual report beginning in the 2017-2018 reporting period.

Hydrological

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

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

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

During this reporting period, collection efforts at the outfall station were impaired by equipment destruction/malfunction, channel alteration, and power surges. During the intense storm(s) from July 21-25, 2018, the spring ring, which holds the area-velocity sensor in the outfall pipe, was dislodged, damaging the measurement equipment. In addition, the channel became dammed with debris, and the outfall pipe became inaccessible due to pooling. With continued elevated discharge at the outfall station, the debris could not be safely removed completely until October 2018 when new equipment was installed. An intense storm event soon after caused a power surge and subsequently caused the equipment to malfunction. The equipment was sent out for repair in December 2018 and returned at the end of March 2019 when the repaired equipment was re-installed. Discharge at the outfall station was not estimated because so few data were measured (36%) over the reporting period. All estimates for the outfall station contain a greater-than (>) symbol representing a minimum value based on recorded data.

Geomorphological

During spring 2019, Carroll County conducted a geomorphologic assessment for the entire stream reach, from the outfall of the Air Business Park stormwater management facility to the

confluence with the West Branch of the Patapsco River. As required, survey points were again collected at the 6 permanent, monumented cross-sections determined to be representative of each stream reach. At each of these monumented cross-sections, the County surveyors collected data for bank slope, toe, stream edges, channel bottoms, and tops.

The County survey crew continues to collect data at each of the 28 segments (approximately 200-foot intervals) along the same stream reach. The data collected for this effort are similar to the data collected at the 6 monumented cross-sections, describing the stream channel cross-section. The survey crew collected data for the stream channel bottom at the thalweg, the edge of water at each bank, and the top of each stream bank.

A Level 1 geomorphologic stream assessment has been conducted on the entire stream reach to assess potential geomorphologic changes to the stream. This assessment consisted of 2 major components – an assessment of stream channel changes and an interpretation of these changes. The assessment of stream channel changes involves determining channel segment characteristics and assessing dimensional changes. The assessment evaluations include an interpretation of changes in channel response, manifested through a comparative evaluation of channel geometry changes, including cross-sectional dimensions, in the context of the physical setting.

Chemical

Carroll County staff collects all storm and baseflow chemical samples while continuing to contract with Martel Laboratories, Inc., in Baltimore, Maryland, to conduct all of the lab analyses. The sampling program consists of a first flush component for total petroleum hydrocarbons, bacteriological constituents, and physical parameters as well as chemical parameters collected during each of the three storm limbs. **Table 11** includes the required parameters for laboratory analysis, the laboratory method, and the corresponding method reporting limit.

Table 11
Laboratory Methods and Detection Limits for Parameters Tested

Parameter Tested	Method	Reporting Limit
	First Flush Sample	
pH	EPA 150.1	-
Temperature	EPA 170.1	-
Specific Conductance	SM 2510 B-97	1.0 µmhos/cm
Total Petroleum Hydrocarbons	EPA 1664	5.0 mg/L
Escherichia Coli	SM 9223 B-94	1.0 organisms/ 100mL
	Limb Samples	
Nitrate/Nitrite Nitrogen	SM 4500NO3-H00	0.05 mg/L
Biological Oxygen Demand	SM 5210 B-01	2.0 mg/L
Total Copper	EPA 200.8	2.0 µg/L
Total Lead	EPA 200.8	2.0 µg/L
Total Zinc	EPA 200.8	20.0 µg/L
Total Kjeldahl Nitrogen	SM 4500NH3 C-97	0.5 mg/L
Total Phosphorus	SM 4500P-P E-99	0.01 mg/L
Total Suspended Solids	SM 2540 D-97	1.0 mg/L

The County continues to use the same type of storm event monitoring equipment manufactured by ISCO, Inc. to comply with this component of the County's NPDES permit. The instream station is equipped with an ISCO Model 6712 auto sampler, whereas the outfall station has an ISCO Model 3700 auto sampler. The outfall sampler is paced with an ISCO Model 4250 level flow meter, while the instream sampler is paced using an ISCO Model 4230 bubbler flow meter. This reporting year was the third that all chemical sampling was collected by County staff. Personnel from Martel had previously collected some or all chemical samples. The flow monitoring and EMC calculation methods are the same as those used in previous reporting years. Martel Labs continues to send results via e-mail to the County, where the new records are appended to the existing MS Access database and NPDES GDB.

The event dates for this reporting year are shown in **Table 12.** Please note that 15 total sampling events are reported, 7 of which were storm events. As previously stated, the outfall station does not have hydrological and chemical data for storm events for most of the reporting period. Values for the outfall station during storm events have been populated with an "N/A". Any seasonal or annual flow weighted chemical loadings have greater-than (>) symbols representing a minimum value based on available recorded data.

Table 12
2018 – 2019 NPDES Discharge Characterization Sampling Events

			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)
2018-11	7/17/2018	Base Flow	7.03	75	410	7.07	66	360
2018-12	8/30/2018	Base Flow	N/A	N/A	290	N/A	N/A	340
2018-13	9/17/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-14	9/26/2018	Storm	N/A	N/A	N/A	7.29	67	270
2018-15	10/11/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-16	11/20/2018	Base Flow	7.25	43	810	7.15	48	500
2018-18	12/15/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-19	12/20/2018	Storm	N/A	N/A	N/A	6.73	51	290
2019-01	1/17/2019	Base Flow	7.33	42	650	8.24	41	350
2019-02	1/24/2019	Storm	N/A	N/A	N/A	6.84	43	410
2019-03	2/28/2019	Base Flow	8.25	40	1900	N/A	N/A	N/A
2019-04	3/29/2019	Base Flow	8.42	50	880	7.75	49	470
2019-05	4/18/2019	Base Flow	8.14	59	690	7.65	53	420
2019-06	6/13/2019	Storm	N/A	N/A	430	N/A	N/A	360
2019-07	6/27/2019	Base Flow	8.33	77	370	7.73	64	350

Biological

Two monitoring sites corresponding to the Outfall and Instream stations have been characterized since the 2000 reporting period. The 75-meter sampling sites, shown in **Figure 9,** were not randomly selected. Results from the data gathered over the years may reflect changes in stream conditions downstream of the regional stormwater management facility.

Data collection, macro-invertebrate identification, and analytical methods were in accordance with the Maryland Biological Stream Survey (MBSS) guidance manuals (Sampling Manual Field Protocols, 2014 (http://www.dnr.state.md.us/streams/pdfs/R4Manual.pdf). The County continues to contract with DNR to identify and enumerate all benthic macro invertebrate samples. The samples were processed and identified by Ellen Friedman, DNR principal taxonomist with over 20 years of identification experience. An index of Biotic Integrity (IBI) score was calculated using the criteria located in **Table 13.** These 6 criteria are rated a 1, 3, or 5 depending on the species present. The average of all criteria is considered the overall IBI score. Narrative ratings can be found in **Table 14.**

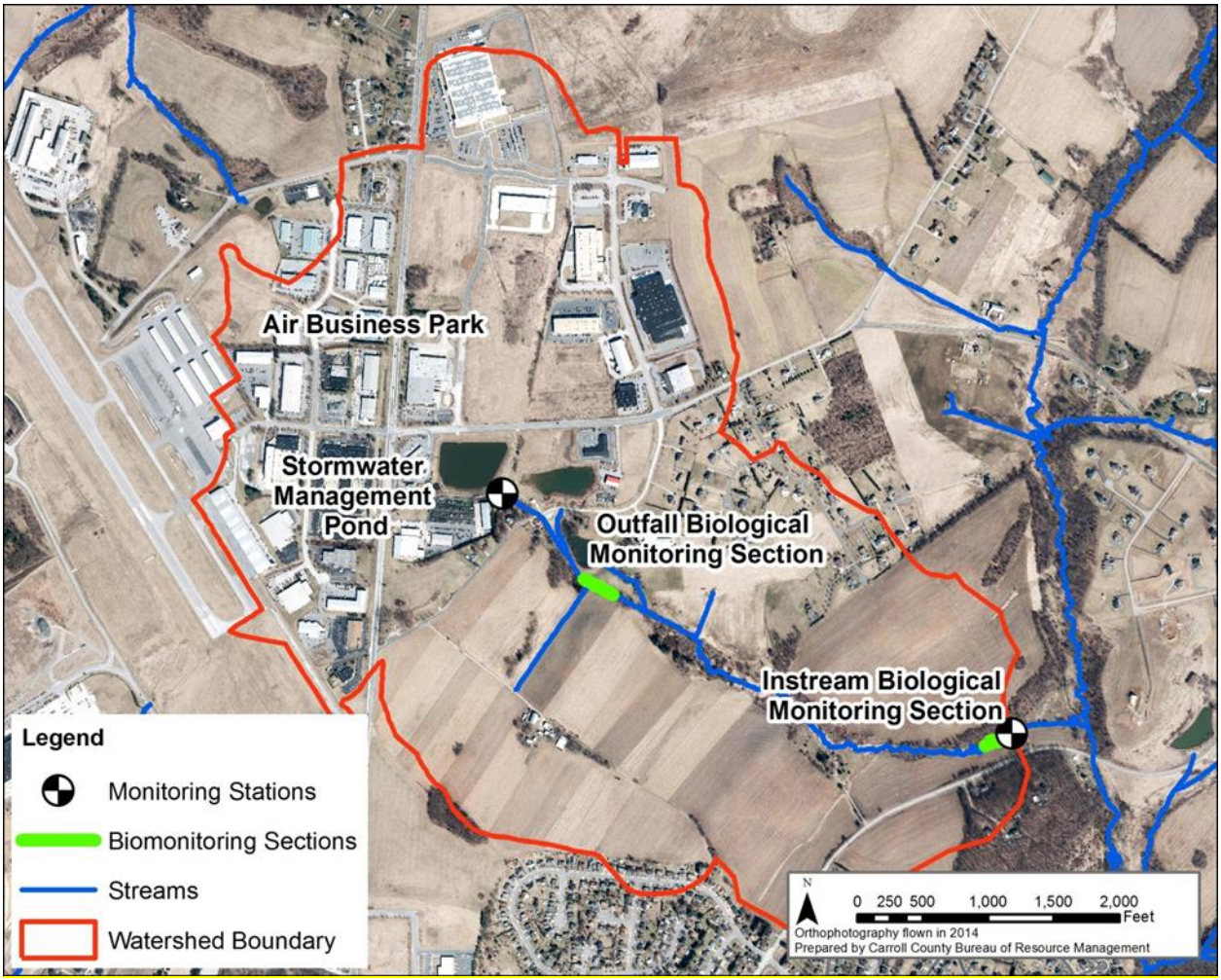


Figure 9: Biological Monitoring Station Locations

Table 13

MBSS Scoring Criteria for the Piedmont Region

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

Table 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.

The assessment of spring habitat also utilized guidance from the 2014 MBSS Sampling Manual: Field Protocols. This approach is entirely subjective, and bias is often high with this approach depending on the assessor(s) and other factors. The scoring criteria measures 8 parameters as shown in **Table 15**. Each parameter can be scored a maximum of 20 points for a total maximum score of 160 points. Each parameter is subdivided into narrative ratings of poor, marginal, sub-optimal, and optimal.

Table 15
MBSS Habitat Assessment Criteria
(MBSS Sampling Manual Field Protocols, 2014)

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

3. Results and Discussion

Climatological

Monthly precipitation data for the 2018 – 2019 reporting year are summarized in **Figure 10**. Also included for reference are 30-year monthly averages and monthly high and low extremes from the previous 28 years that local data are available. The total precipitation for the reporting period was 76.83 inches, a 33.43-inch surplus from the normal yearly total. Relative to normal monthly average precipitation, September 2018 was the wettest month with a surplus of 11.16

inches, while October 2018 was the driest month with a deficit of 0.81 inches. This reporting year was the wettest year for total precipitation since reporting began at this station in 2000.

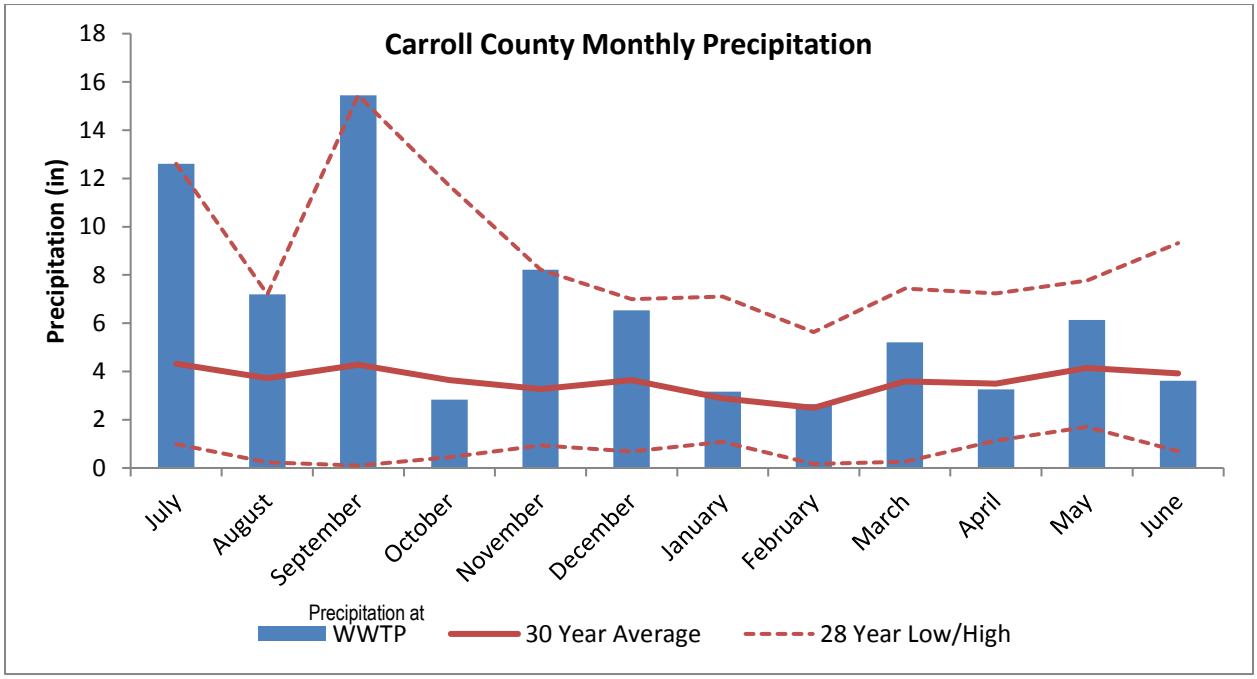


Figure 10: Monthly Precipitation Summary for the 2018 – 2019 Reporting Period

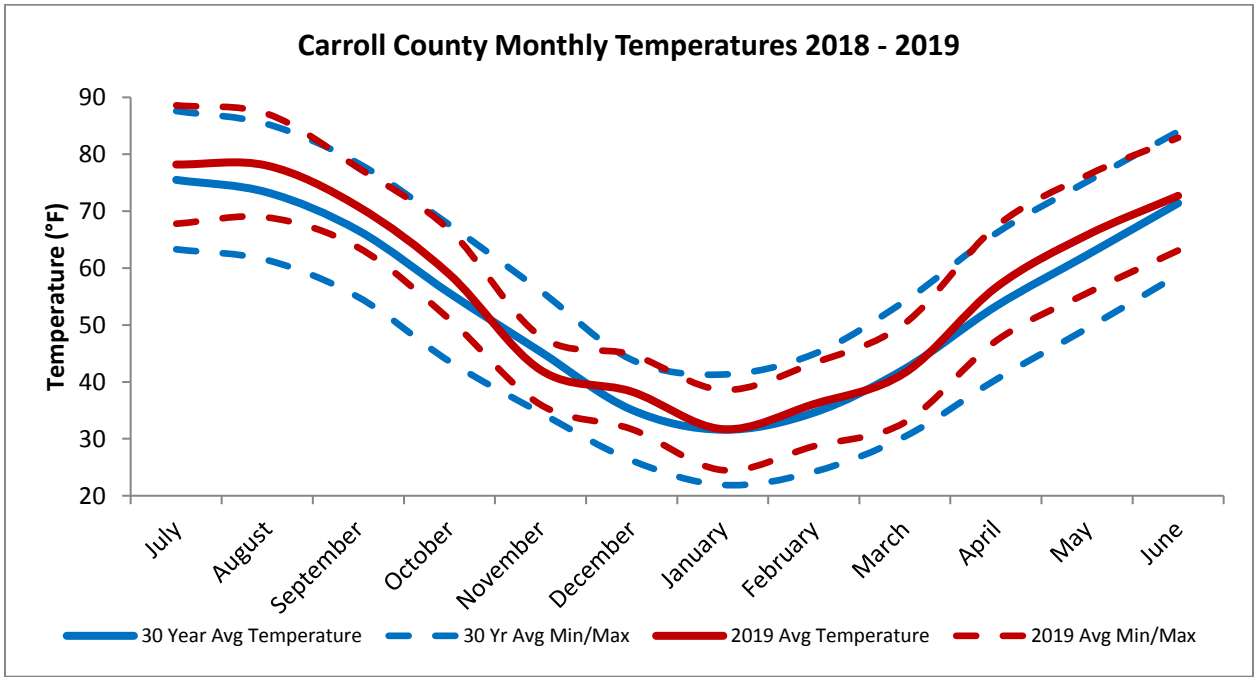


Figure 11: Monthly Temperature Summary for the 2018 – 2019 Reporting Period

Monthly temperature data for the 2018 – 2019 reporting year are summarized in **Figure 11**. The 30-year monthly average temperatures are included for reference. Overall, the reporting period experienced an annual average temperature of 55.9°F, 2.0 degrees warmer than the 30-year annual average. Ten of the 12 months were warmer than average with those months averaging 2.8 degrees warmer than normal. Two of the 12 months were cooler than average, with those months averaging 2.0 degrees cooler than normal. August 2018 and September 2018, in particular, were significantly warmer than normal, with a 4.7- and 4.2-degree increase, respectively, from normal temperatures. It should be noted that warmer than average daily minimum temperatures were observed for every month; the average for this reporting period was 5.2 degrees above normal.

Hydrological

Hydrographs were prepared for stage height and discharge for each monitoring station during the reporting period. Instream and outfall stage heights and discharge measurements, in addition to daily precipitation totals, are shown in **Figures 12 and 13,** respectively. A surplus of 33.43 inches of precipitation was observed during this reporting period relative to a normal year. The reporting period had many large storm events and a relatively high frequency of smaller storm events, primarily in the wetter periods during summer 2018 and autumn 2018. 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 the record annual precipitation and the high number of storm events with high precipitation observed over a long duration, record stage heights and discharge measurements were recorded for both stations during this reporting period. As previously stated, due to equipment destruction, channel alteration, power surges, and equipment malfunction/failure, very few discharge data were recorded for the outfall station. Recorded discharge data are only available for 36 percent of the year, many of which are unusable because of equipment malfunction due to power surges. Most of those available data are from early summer 2018, autumn 2018, and spring 2019. While data for many of the largest storm events during the second half of 2018 were not recorded, the largest storm event during the reporting year was partially recorded before the monitoring equipment was destroyed due to elevated discharge. This occurred during a storm(s) over the period of July 21-25, 2018, when 11.7 inches of precipitation was recorded. Before the equipment at the outfall station was destroyed, it recorded a stage height of 1.4 feet, which corresponds to 201,171 gallons per minute (gpm). A stage height of over 1.5 was also recorded on November 22, 2018. Although there was some stormwater runoff from a recent snow event, this elevated stage height was due to equipment malfunction. Baseflow at the outfall monitoring station was marginal, typically with a stage height of 0.12 feet. The resulting baseflow discharge was approximately 84 gpm.

Typical stage heights observed for the instream monitoring station were approximately 0.42 feet, or 1,025 gpm. During the July 21-25 storm event, stage height reached the peak for the reporting year at 4.8 feet. The resulting discharge was 2,485,062 gpm, though this value is highly inaccurate as the stage height was well above the weir walls. During the reporting period, there were 15 other storm events with peak stage heights of over 1 foot (7,833 gpm), primarily during summer and autumn 2018.

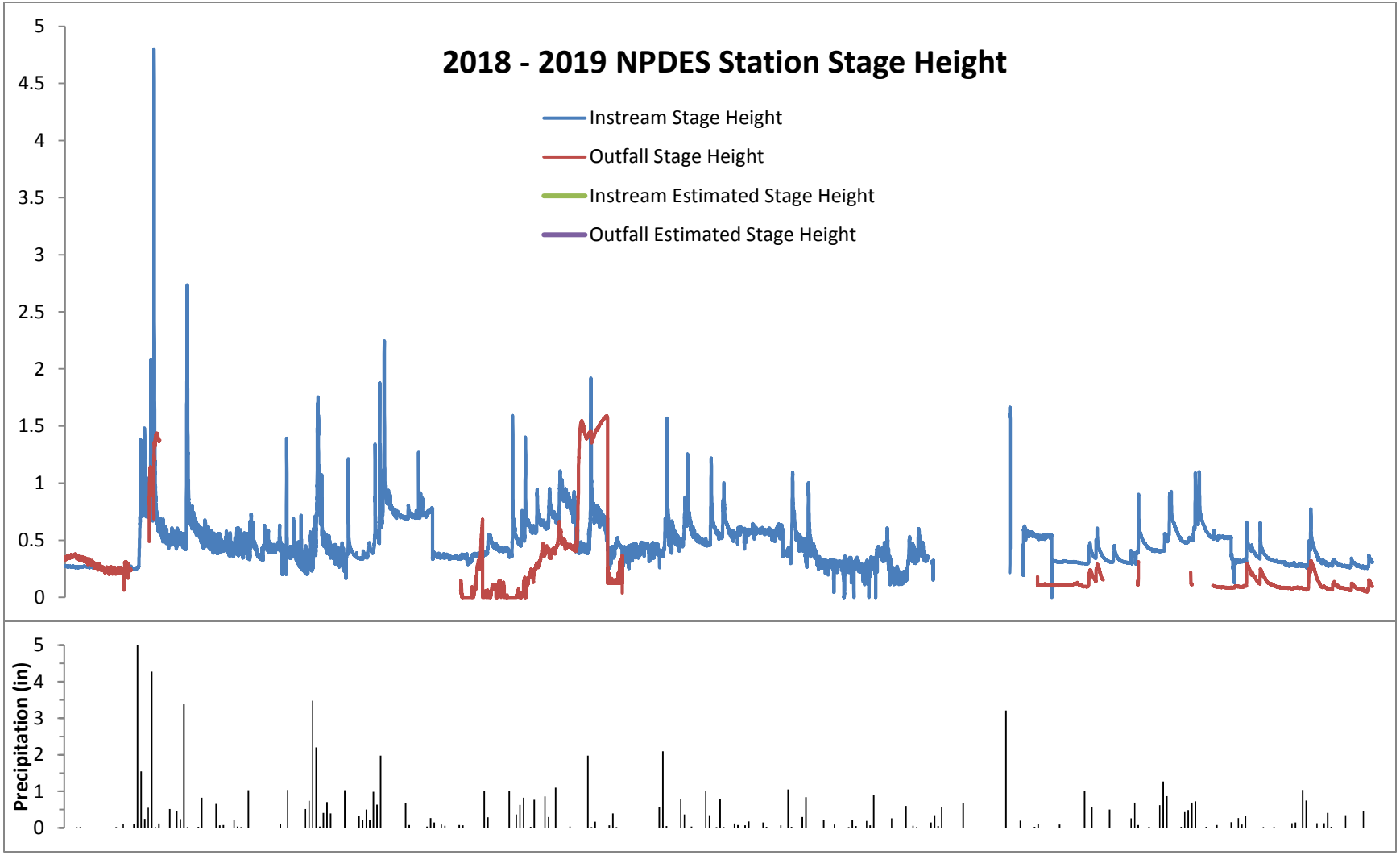


Figure 12: Stage Heights and Daily Precipitation for NPDES Monitoring Stations for the 2018 – 2019 Reporting Year

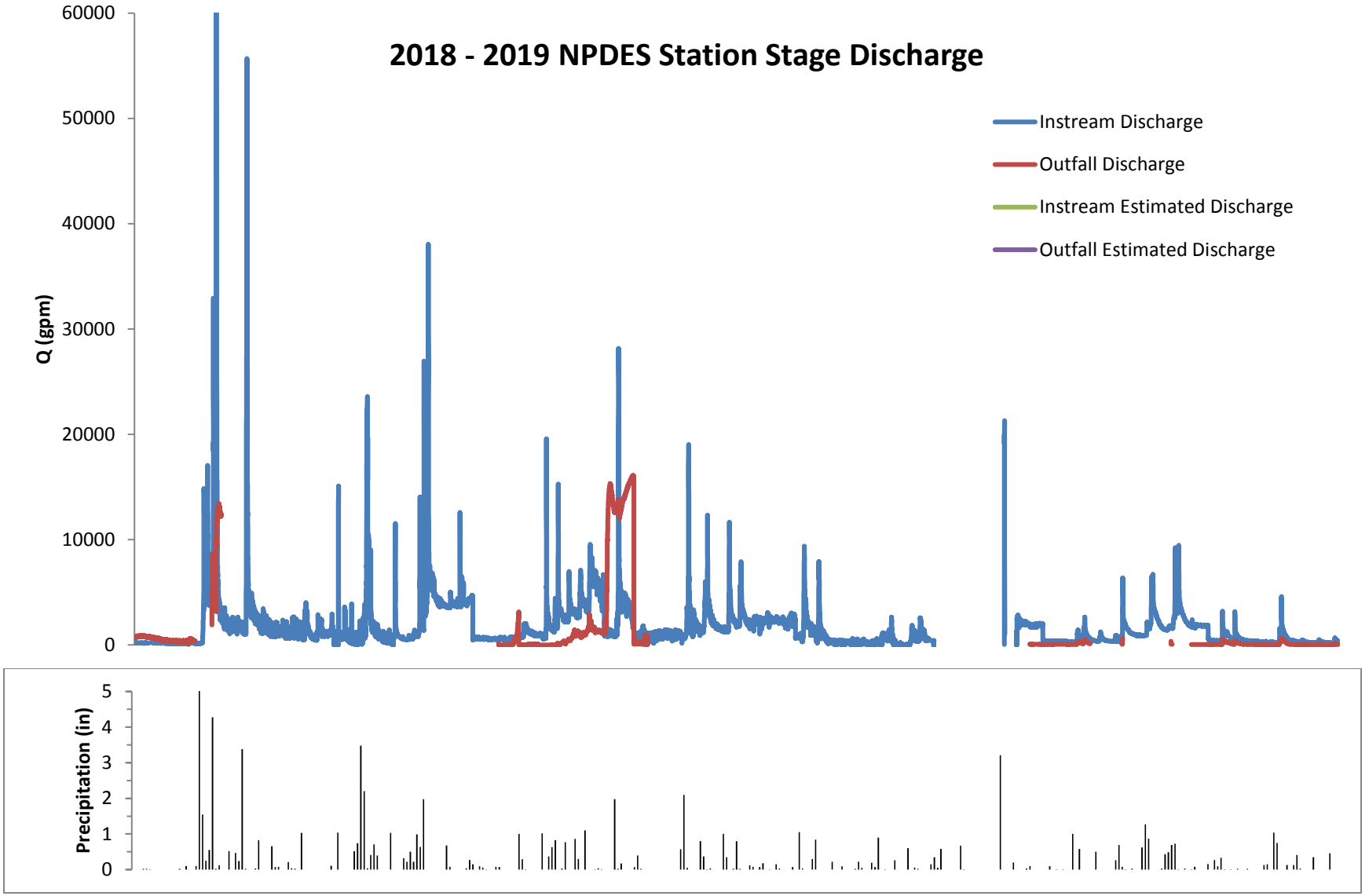


Figure 13: Discharge and Daily Precipitation for NPDES Monitoring Stations for the 2018 – 2019 Reporting Year

Total, seasonal, and categorical discharges for each monitoring station can be found in **Table 16**. Due to the previously stated issues at the outfall station throughout the reporting year, seasonal discharge cannot be estimated as in most years. Typically, stormwater contribution from the outfall pond consists of about 20 percent to 50 percent in a year with normal precipitation. 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 greater percentage of the total discharge at the instream station. At the instream station, discharge was elevated throughout much of the reporting period, particularly summer and autumn 2018. Those two seasons contributed 70 percent of the total observed discharge at the instream station. During autumn 2018, 52 million more gallons were observed than during summer 2018, despite having lower total precipitation. More moderate intensity storm events were observed in autumn 2018 compared with a few high intensity storm events as observed in summer 2018. Baseflow remained elevated throughout the entire autumn season.

Please note that stage heights and discharges from both stations were periodically estimated. These data were lost due to equipment failure. Additionally, the instream station weir height was adjusted and a new rating curve (R^2=0.99) was established after September 22, 2016.

Table 16
Categorical Discharges and Stage Heights for the 2018 – 2019 Reporting Year

	Instream	Outfall	Difference	Outfall Contribution (%)
Total (gallons)	822,553,941	>255,429,530	<567,124,411	N/A
Avg Stage (ft)	0.46	0.27	0.19	-
Median Stage (ft)	0.42	0.12	0.30	-
Avg Q (gpm)	1,689	1,364	325	80.8 %
Median Q (gpm)	1,025	84	941	8.2 %
Summer Q (gallons)	261,951,270	>56,399,408	<205,551,862	N/A
Autumn Q (gallons)	313,577,606	>190,462,268	<123,115,338	N/A
Winter Q (gallons)	121,004,450	>237,663	<120,766,787	N/A
Spring Q (gallons)	126,020,615	>8,330,191	<117,690,424	N/A
Dry (<700gpm)	63,440,194	>17,617,205	<45,822,989	N/A
Wet (>700gpm)	759,113,747	>236,835,186	<522,278,561	N/A

To compare pre- and post-pond-retrofit hydrology, cumulative discharge frequency was plotted in **Figure 14**. This figure compares the discharge frequencies from the outfall monitoring station for the 2006-2007 and 2018-2019 reporting years. The maximum discharge during the pre-retrofit period (2007) is normally an order of magnitude higher than the post-retrofit period (2019), but record total precipitation and a large number of intense storm events were observed this year. The maximum discharge in 2007 was 23,537 gpm, while the maximum in 2019 was only 13,496 gpm. Additionally, the frequency and magnitude of high discharge events was still greater during the pre-retrofit period. Fifty-seven percent of all discharge measurements were

below or equal to 100 gpm. This contrasts with the pre-retrofit measurements where only 23 percent of measurements were below 100 gpm. Ten percent of all measurements in 2007 were greater than 2,000 gallons per minute, which are greater in magnitude than most of the highest discharges from most post-retrofit years. Many of the higher discharge measurements were observed during the record storm event on July 21-25, 2018. It should also be noted that only a third of the yearly discharge measurements were recorded due to the previously stated equipment problems at the outfall station. Despite the record the record storm event, the peak discharge at the outfall station was over 10,000 fewer gallons per minute than during the pre-retrofit period.

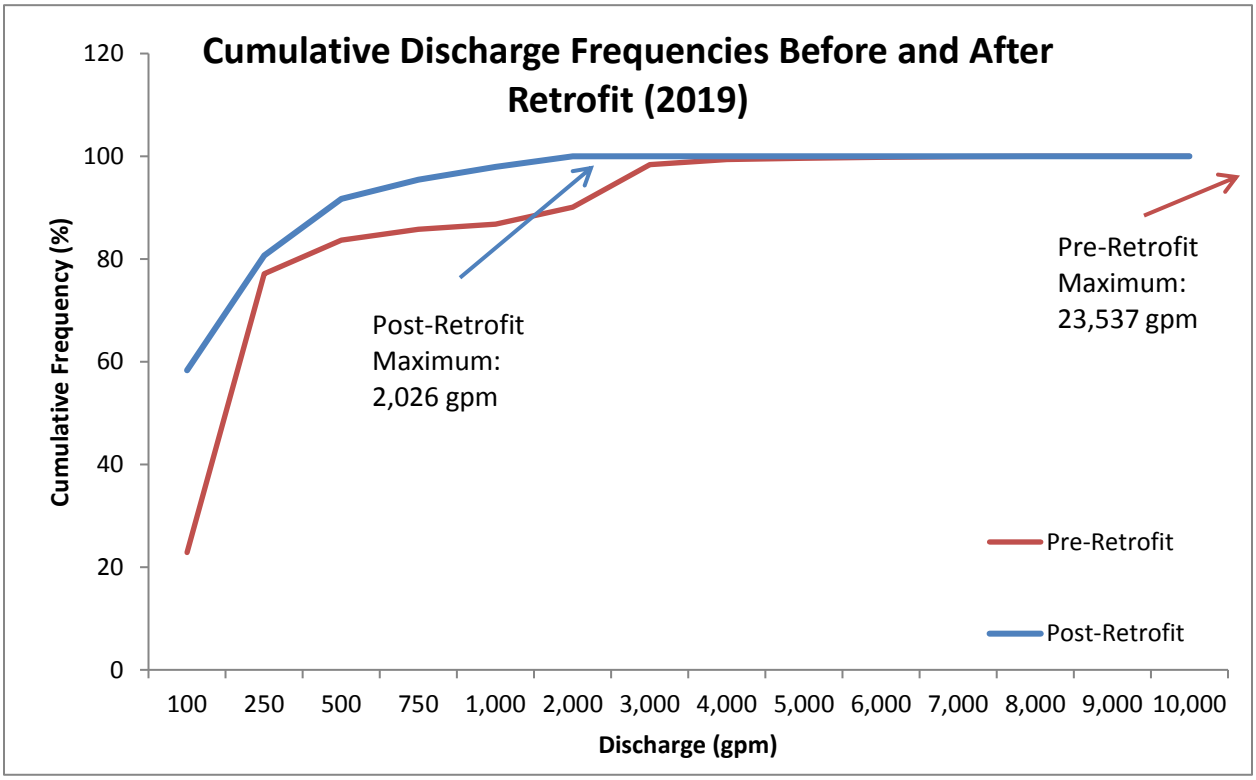


Figure 14: Outfall Discharge Frequencies for 2007 and 2019

Looking at individual components of the hydrograph allows one to observe the distinct mechanism behind any changes in cumulative frequencies throughout the year. **Figure 15** represents two analogous storm events, one before and one after the stormwater retrofit, and a hydrological comparison therein. This figure contains hydrographs before and after retrofit for instream and outfall stage heights and discharges. Unlike previous years which compared storm events with nearly identical precipitation totals, this comparison is of a larger storm event to the same pre-retrofit storm. The pre-retrofit event had 0.39 inches of precipitation observed while the post-retrofit event had 1.73 inches of precipitation observed. Despite the higher precipitation intensity, the ascending limb for the post-retrofit outfall station still had a lower slope and peak discharge than the hydrograph of the pre-retrofit outfall station. The outfall to instream station discharge ratio for the post-retrofit storm event averaged a ~26 percent contribution, peaking at 37 percent as was roughly the case for the overall discharge and separated stormflow for the reporting period. During the pre-retrofit storm, however, the outfall station contributed ~70

percent of the total instream discharge. The lesser contribution during the post-retrofit storm event is evident in the instream station hydrographs despite more than four times greater precipitation. Overall, longer baseflow recessions and lower peak discharges were observed with the current stormwater configuration.

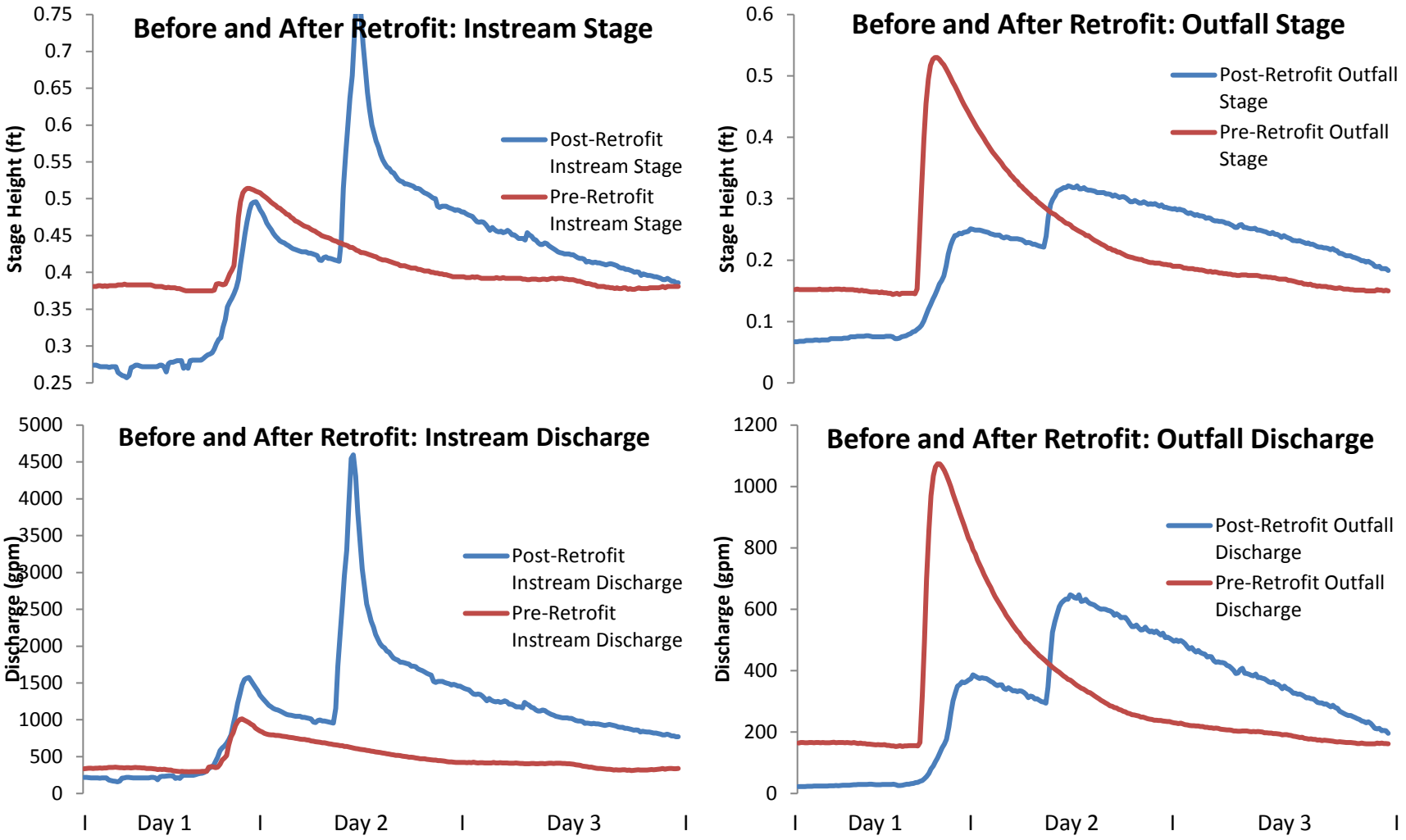


Figure 15: Characteristics of Analogous Storms Pre-Retrofit (7/23/2006, 0.39") and Post-Retrofit (6/13/2019, 1.73")

Geomorphological

The physical stream assessment consists of evaluating the 6 monumented cross-sections and 28 sections for stream physical character, shape, and slope. Physical data collection stations are shown in **Figure 16**.

Results from this year's monumented cross-section data collection are provided in **Appendix D**. Since this monitoring effort is in part designed to detect changes to the stream system over time, staff compared results from this year at the 6 permanent cross-sections with results from 2000, the initial year this type of monitoring was initiated.

There does not appear to be large scale degradation or aggradation of the stream channel in the last 19 years. At the first cross-section, located approximately 500 feet downstream of the pond outfall, the left bank had previously moved approximately 2 to 3 feet to the west, but has recently migrated closer to the location of the channel, though the thalweg has migrated about a foot east of the location in 2018 due to scour. Aggradation along the right edge was observed at this location and it now has a much steeper bank. This section is located approximately 200 feet downstream of a road culvert and just upstream of the input location from the West Branch Stormwater Management Pond.

Cross-section 2 experienced incision for the first time during the study period. The stream channel decreased elevation by approximately 1 foot from the previous year. Cross-section 3 is still generally unchanged since 2000, with only minor changes in stream channel shape. The left bank has continued to slowly erode and migrate west, moving approximately one-half foot over the previous year. Located approximately 65 feet downstream of a series of bends and 2 draws, cross-section 4 has shown relatively significant aggradation and narrowing of the channel since 2000. Aggradation occurred during all previous years apart from this reporting period, which experienced some minor incision from the previous year. The channel shape remains largely unchanged as the previous year apart from the incision. Cross-section 5 is essentially unchanged since 2000; however, the channel has widened and moved slightly west over the last 19 years. Over the past year, some incision occurred along the east bank, widening the channel slightly.

Consistent with past findings, analysis at monumented cross-section 6 indicates that the stream channel has widened by 4 feet since 2000, extending from a width of 5 feet to a width of 9 feet. This width is unchanged during the past several years. This monumented cross-section is located approximately 200 feet upstream of the confluence on a straight reach of stream that precedes a series of bends. As is discussed below, this region of the stream has the steepest slope and corresponding highest energy for stream bank erosion. Bank soils in this area are of the Manor Series, which is characterized as highly erodible (USDA, 1969).

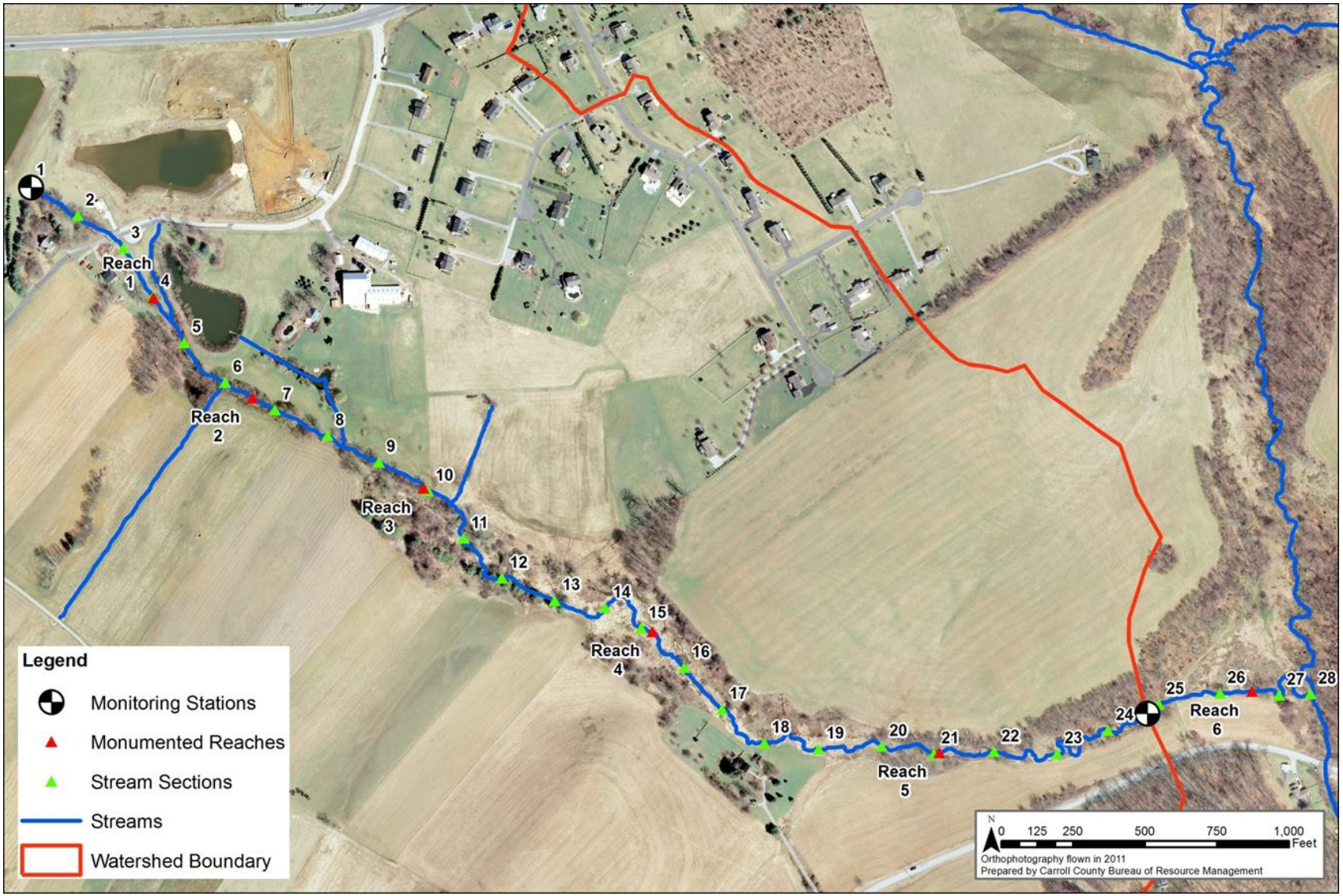


Figure 16: Physical Data Collection Stations

Table 17 displays thalweg elevation and section gradient for selected years from 2004 through 2019. 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, which one would expect to find in an area with low gradients.

Figure 17 displays stream gradients from the current reporting year (2019), 2018, and 2004 as a longitudinal profile along with the locations of the 6 monumented stream reaches. The overall average gradient has remained unchanged over this period and has remained a gentle slope with only 1 section above a 2 percent gradient, but some individual sections have changed significantly. In general, increases in gradient between stations are indicative of higher energy and potential for increased channel scour. The first third of the stream profile has remained relatively unchanged during this period, but the gradient is generally higher than that of the final two thirds of the tributary. This can be seen in the survey of monumented section 1 where the stream channel has moved laterally approximately 2 to 3 feet over this period. The gradient has changed significantly over the second third of the stream profile and ranges from 0.02 percent to 1.26 percent. These ever-changing low gradients can explain why there is so much deposition at monumented section four which has roughly a flat gradient. The final third of the stream profile changes gradient a number of times, but slopes are relatively similar for 2019 and 2004. The slope at station 22 has a decreasing gradient, while station 24 has an increasing gradient over time. Increased sinuosity and slope have been observed at the terminus of the tributary. The tributary has abandoned the previous channel at station 27 and formed a new channel. This explains the increase in thalweg elevation at this location.

Figure 18 displays the longitudinal stream profile for elevation and depth of deposition or incision at each of the 28 sections along the profile. Included are the 6 monumented reaches for reference. The profile shows the low gradients in the center section of the stream and that the areas with lowest gradient have moved down stream, which is the cause of elevated deposition at monumented reach 4. Over the previous reporting period, deposition increased in the first third of the tributary while there was some incision in the middle third of the tributary. Overall, there was no major sediment loss or gain over the previous year; no station exceeded a 1-foot change in thalweg elevation from the original survey. Since the stream has 2 small tributaries, varying bends and straight segments, as well as a number of soils series represented along the channel, it is important to monitor the physical characteristics of the stream channel over time.

Table 17
Cross-Section Station Results for Selected Years 2004 – 2019

		2019		2018		2017		2010		2008		2006		2004	
Station	Distance (ft)	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope	Elev	Slope
1	0							730.89		730.89		730.68		730.89	N/A
2	201	728.12		728.12		728.15		728.01	1.43%	728.01	1.43%	727.83	1.42%	727.90	1.49%
3	394	724.93	1.65%	724.99	1.62%	725.19	1.54%	724.58	1.78%	724.56	1.79%	724.26	1.85%	724.20	1.92%
4	592	721.97	1.50%	721.86	1.58%	721.87	1.68%	722.06	1.27%	721.49	1.55%	721.30	1.50%	721.51	1.36%
5	786	718.36	1.86%	718.15	1.91%	718.11	1.93%	717.78	2.20%	717.81	1.89%	717.77	1.81%	717.75	1.93%
6	988	716.35	1.00%	716.16	0.99%	716.14	0.98%	716.73	0.52%	716.61	0.59%	716.27	0.74%	715.82	0.96%
7	1184	716.27	0.04%	715.75	0.21%	715.75	0.20%	715.58	0.59%	715.70	0.46%	715.60	0.34%	715.49	0.17%
8	1388	714.27	0.98%	714.38	0.67%	714.36	0.68%	714.28	0.64%	714.24	0.72%	714.30	0.64%	714.42	0.52%
9	1589	712.94	0.66%	713.02	0.68%	713.27	0.54%	712.80	0.74%	712.78	0.73%	712.83	0.73%	712.74	0.84%
10	1787	711.17	0.89%	711.24	0.90%	711.27	1.01%	711.59	0.61%	711.66	0.57%	711.20	0.82%	711.22	0.77%
11	1986	709.92	0.63%	709.89	0.68%	709.77	0.76%	709.93	0.84%	710.06	0.81%	709.58	0.82%	709.61	0.81%
12	2189	709.40	0.26%	709.41	0.24%	709.39	0.19%	709.16	0.38%	709.58	0.24%	709.02	0.28%	709.48	0.06%
13	2386	708.72	0.34%	708.70	0.36%	708.60	0.40%	708.46	0.35%	709.04	0.27%	709.81	-0.40%	709.45	0.02%
14	2564	708.44	0.16%	708.40	0.17%	708.50	0.06%	708.17	0.16%	707.88	0.66%	707.94	1.06%	707.74	0.97%
15	2707	706.98	1.02%	707.26	0.79%	707.25	0.87%	707.02	0.80%	707.06	0.57%	707.07	0.61%	706.81	0.65%
16	2910	705.22	0.87%	705.42	0.91%	705.40	0.91%	705.44	0.78%	705.55	0.74%	705.20	0.92%	705.18	0.80%
17	3106	704.32	0.46%	704.49	0.48%	704.58	0.42%	704.78	0.34%	704.48	0.55%	704.37	0.43%	704.18	0.51%
18	3298	703.41	0.47%	703.57	0.48%	703.68	0.47%	703.62	0.60%	703.27	0.63%	703.16	0.63%	702.94	0.64%
19	3490	701.80	0.84%	701.83	0.91%	701.84	0.96%	701.75	0.97%	701.48	0.93%	701.48	0.88%	701.69	0.65%
20	3704	698.86	1.37%	699.16	1.25%	699.10	1.28%	698.90	1.33%	698.92	1.19%	698.92	1.19%	698.99	1.26%
21	3896	697.74	0.59%	697.78	0.72%	697.96	0.60%	697.73	0.61%	697.69	0.64%	697.83	0.57%	697.95	0.54%
22	4100	695.57	1.06%	695.79	0.97%	695.43	1.24%	694.70	1.48%	694.78	1.42%	694.90	1.43%	694.62	1.63%
23	4320	694.19	0.63%	694.22	0.71%	694.15	0.58%	693.90	0.36%	693.73	0.48%	693.44	0.66%	693.42	0.54%
24	4511	691.01	1.67%	691.24	1.56%	691.11	1.60%	691.17	1.43%	691.10	1.38%	691.05	1.25%	691.12	1.21%
25	4717	689.41	0.77%	689.57	0.81%	689.53	0.76%	689.35	0.88%	689.41	0.82%	689.52	0.74%	689.65	0.71%
26	4933	687.37	0.95%	687.55	0.94%	687.51	0.94%	687.38	0.91%	687.59	0.84%	687.71	0.84%	687.59	0.96%
27	5137	686.14	0.60%	685.78	0.87%	685.81	0.83%	685.44	0.95%	685.45	1.05%	685.53	1.07%	685.82	0.87%
28	5248	683.46	2.41%	683.37	2.16%	683.10	2.43%	682.80	2.37%	682.70	2.47%	682.71	2.53%	682.83	2.68%

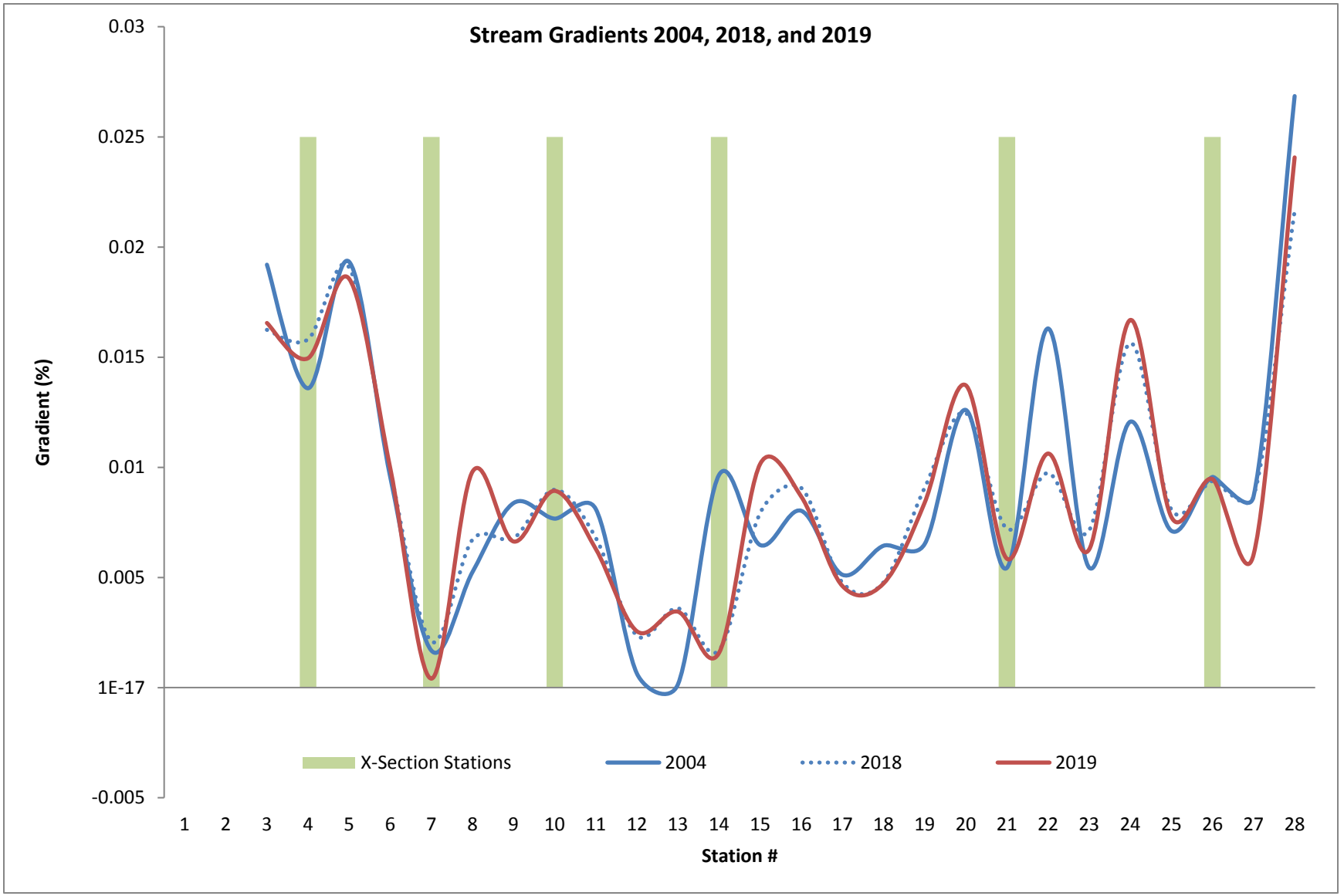


Figure 17: Stream Gradient Change from 2004 – 2019

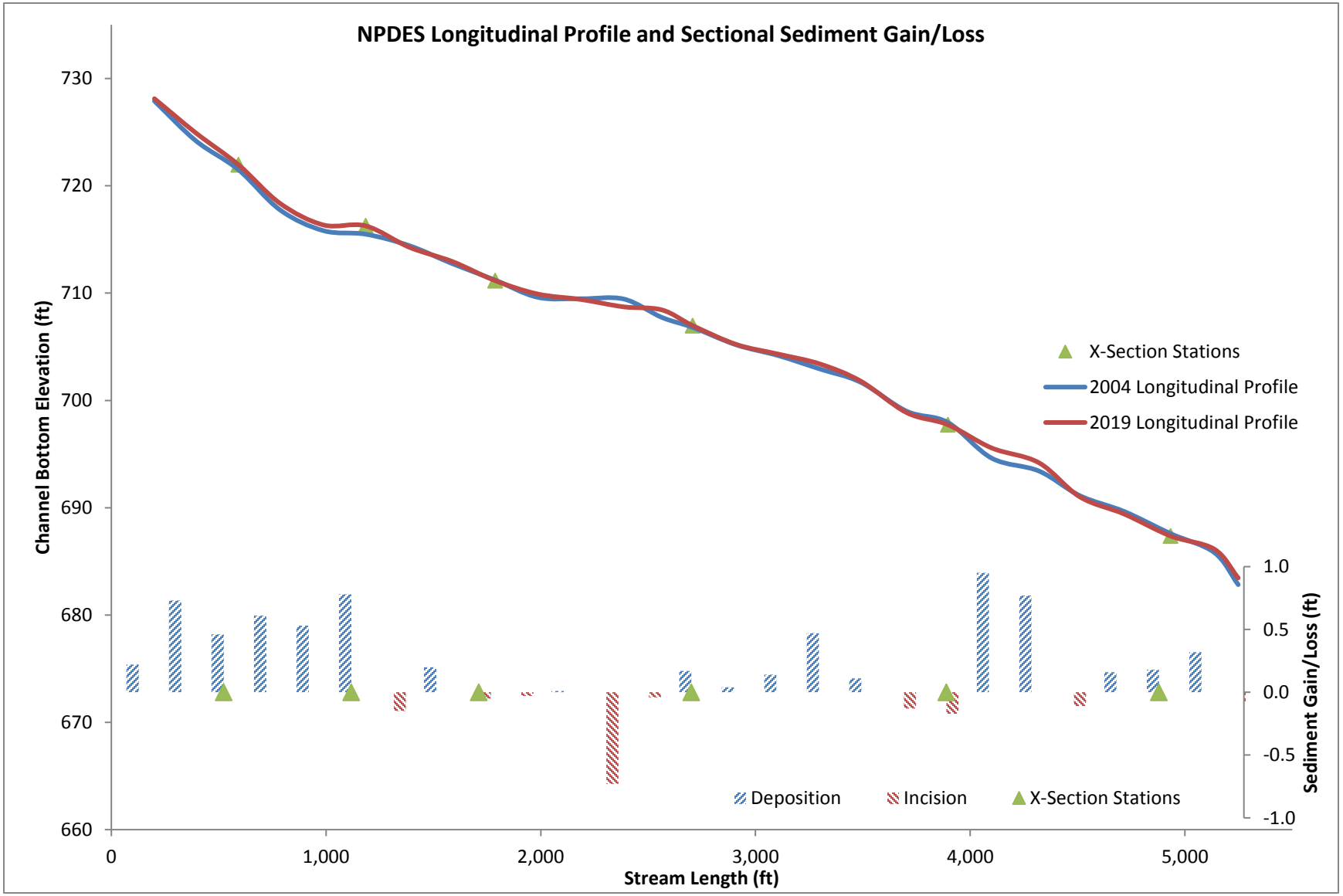


Figure 18: Comparison of Longitudinal Profile and Sectional Deposition/Incision from 2004 - 2019

Chemical

Physical Water Data

Physical water analysis results for both monitoring stations are displayed in **Table 18**. Overall, the outfall station water samples were slightly more basic and exhibited higher temperatures and conductivities, apart from late summer/early autumn, as in previous years.

On average, temperatures at the outfall station were 6 percent warmer than those at the instream station. Temperature differences ranged from -5°F during base flow sampling in November 2018 to 13°F during June 2019. The increased temperatures at the outfall station are most likely due to solar heating of water stored in the pond. Additionally, groundwater interaction and shading at and upstream of the instream station could be cooling the water relative to the outfall station.

Table 18
Physical Water Data for 2018 – 2019 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)
2018-11	7/17/2018	Base Flow	7.03	75	410	7.07	66	360
2018-12	8/30/2018	Base Flow	N/A	N/A	290	N/A	N/A	340
2018-13	9/17/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-14	9/26/2018	Storm	N/A	N/A	N/A	7.29	67	270
2018-15	10/11/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-16	11/20/2018	Base Flow	7.25	43	810	7.15	48	500
2018-18	12/15/2018	Storm	N/A	N/A	N/A	N/A	N/A	290
2018-19	12/20/2018	Storm	N/A	N/A	N/A	6.73	51	290
2019-01	1/17/2019	Base Flow	7.33	42	650	8.24	41	350
2019-02	1/24/2019	Storm	N/A	N/A	N/A	6.84	43	410
2019-03	2/28/2019	Base Flow	8.25	40	1900	N/A	N/A	N/A
2019-04	3/29/2019	Base Flow	8.42	50	880	7.75	49	470
2019-05	4/18/2019	Base Flow	8.14	59	690	7.65	53	420
2019-06	6/13/2019	Storm	N/A	N/A	430	N/A	N/A	360
2019-07	6/27/2019	Base Flow	8.33	77	370	7.73	64	350

Conductance was generally greater at the outfall station, 40 percent greater on average. Conductance ranged from 270 µmhos/cm to 1,900 µmhos/cm. Both stations displayed trends of elevated conductivities in the winter and spring and decreasing conductivity levels throughout the summer and autumn seasons, suggesting that conductance levels may be influenced by deicing 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 pH measurements at the outfall averaged 7.8, and the instream station averaged a pH of 7.4. The pH values ranged from 6.7 to 8.4 pH units. This

pattern is typical as the pH at the outfall station is generally more basic, possibly due to the local goose population, biological activity within the pond, stormwater interaction with carbonate rocks and concrete used in the construction of the stormwater facility, and influence of roadway derived materials such as road salt.

Event Mean Concentrations

The EMC mean values and ranges observed for the 15 storm flow and baseflow events for this reporting year are displayed in **Table 19**. Of the observed analytes, nitrate/nitrite was the only one to show a significant difference between the 2 stations for this reporting year. In this case, nitrates/nitrites were significantly greater at the instream station.

Table 19
EMC Values for 2018 – 2019 Reporting Year

Event Mean Concentration		Instream Station			Outfall Station			Significance
Analyte	Units	Mean	Min	Max	Mean	Min	Max	p-value
BOD	mg/L	4.42	2.00	14.18	3.67	2.00	8.02	0.445
TKN	mg/L	1.14	0.05	5.27	0.73	0.50	1.90	0.342
NO2/NO2	mg/L	3.99	1.05	6.80	0.77	0.05	1.60	$3.1x10^{-5}$
Phosphorus	mg/L	0.39	0.01	3.33	0.07	0.02	0.15	0.331
TSS	mg/L	218.75	3.00	1224.58	12.74	2.00	43.69	0.407
Copper	µg/L	9.04	2.00	49.28	2.73	2.00	5.87	0.500
Lead	µg/L	6.17	2.00	32.58	2.00	2.00	2.00	0.351
Zinc	µg/L	39.05	20.00	156.00	21.07	20.00	29.59	0.351
TPH	mg/L	6.29	5.00	23.00	5.00	5.00	5.00	0.351

Figures 19 and 20 present annual mean EMC values for 8 analytes from the 2001 through 2019 reporting years. Also presented are mean EMC values before and after the stormwater retrofit. The only analyte with a significant observed difference between the outfall and instream stations consistently from 2001-2019 was nitrites/nitrates. The pre- and post-retrofit graph reinforces this difference. Though not all mean EMC values were significantly different for the 3 metals at the instream station, all EMC values for copper, lead, and zinc decreased at the outfall station after the retrofit. This is not unexpected given the increased residence within the stormwater facility. Please note that a single outlying measurement in July 2014 caused a large increase in average zinc for that reporting year. The instream concentration increases over outfall for 2019 are due to the non-paired analysis. Seven storm events were measured for the instream station as opposed to only 1 for the outfall station.

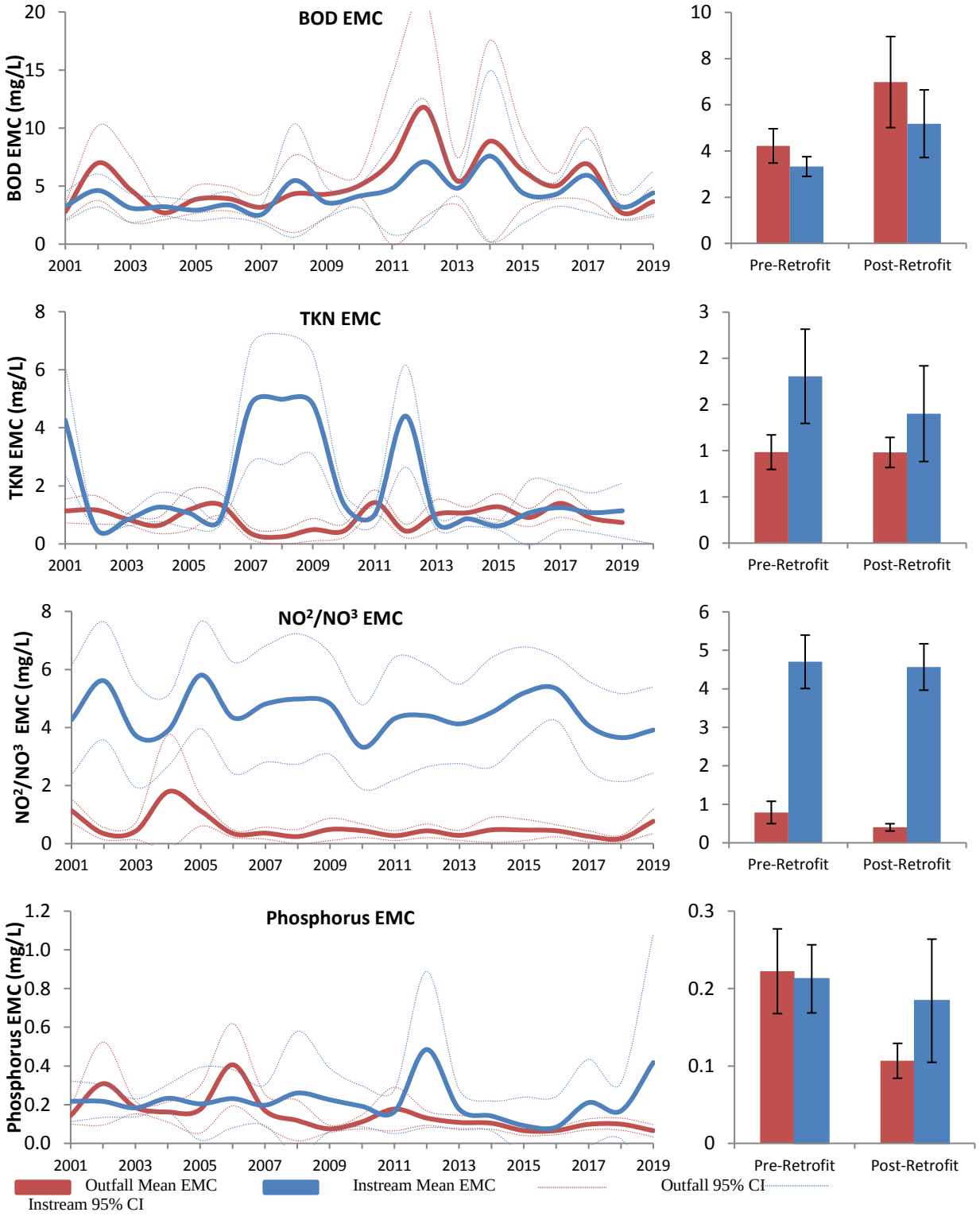


Figure 19: EMC Values from 2001 – 2019 for BOD, TKN, NO^2/NO^3, and Phosphorus

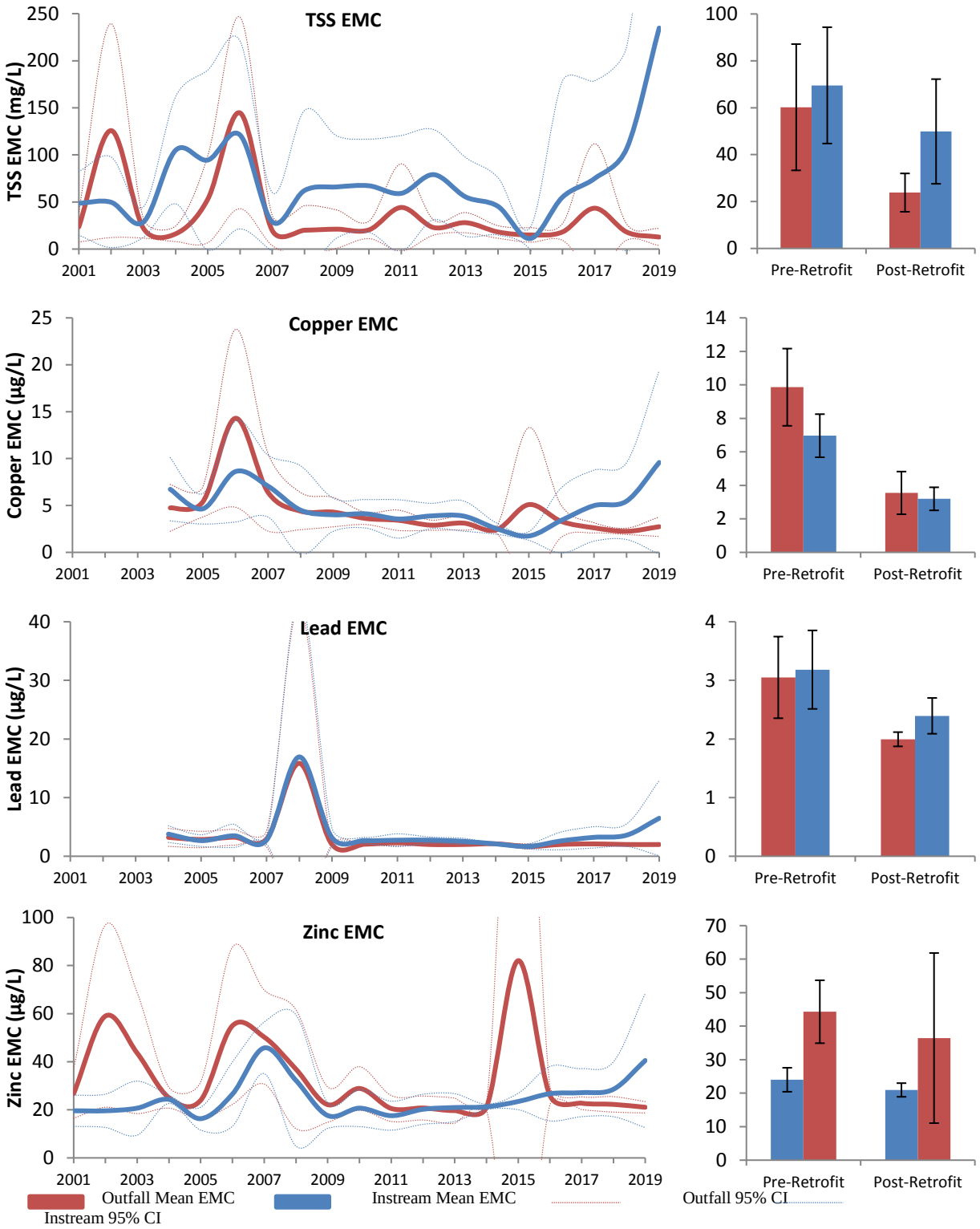


Figure 20: EMC Values from 2001 – 2019 for TSS, Copper, Lead, and Zinc

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**.

Expectedly, greater analyte loads were observed at the instream station. Annual loading is typically reported and analyzed in this report as a measure of outfall contribution to the instream station. Due to the lack of outfall data, as previously stated, the 2 sites are incomparable. In the table below, greater-than (>) symbols are used to represent minimum loadings based on available data. Typically, the contribution of analyte loading at the outfall station to total loading (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. During this reporting period, baseflow loadings were much lower than in previous years, primarily because of the record precipitation and high frequency of storm events meant that many data were recorded as storm events. Compared to the previous year, which was typical, storm loadings were a minimum of 6 times greater this year; phosphorous had the greatest increase with loading 11 times greater than the previous year. However, these loadings are most likely overestimated, as 2 storm events went above the weir walls and the rating curve currently used at the instream site is inaccurate at this stage height. Additionally, the EMC for every analyte was greater than the previous year. It should be noted that for loading calculation, the detection limit concentrations were used instead of 0 values with samples below detection. Therefore, actual loadings are likely less than values displayed below. Additionally, almost all TPH samples were below detection.

Table 19
Annual Pollutant Loads for the 2018 – 2019 Reporting Year

Annual Pollutant Loading (lbs/Year)										
oc.	Type	BOD	TKN	NO2/NO3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Base	1,664	265	2,988	12	3,555	1.1	1.1	11	4,009
	Storm	36,137	11,304	14,833	4,797	$2.7x10^{-6}$	101.9	65.5	368	31,675
	Total	37,801	11,568	17,821	4,809	$2.7x10^{-6}$	103.0	66.6	379	35,684
Outfall	Base	>459	>107	>120	>8	>1,304	>0.3	>0.3	>3	>735
	Storm	>15,851	>1,601	>850	>297	>86,352	>11.6	>4.0	>59	>9,882
	Total	>16,310	>1,708	>970	>305	>87,656	>11.9	>4.3	>62	>10,617

Seasonal Pollutant Loads

Seasonal discharge for each monitoring station is provided in **Figure 21** for reference**.** The instream station unsurprisingly displayed greater discharges for each season. Therefore, it is not unexpected to have greater loadings. Seasonal loadings based on the EMC values and seasonal discharges from **Figure 21** are located in **Table 20**. The estimation of seasonal loading

encounters the same problem as with annual loadings, lack of data at the outfall station, as previously stated.

All analytes had the greatest loadings in the autumn season. This is not surprising considering the autumn season had the greatest total discharge of the reporting period. While many analytes had only slightly greater loading in autumn relative to summer, TKN, TP, and TSS all had greater than half of the total annual estimated loadings, ranging from 54 percent to TP with 75 percent. Typically, the outfall station relatively consistently correlates to values estimated for the instream station. It should be noted that for loading calculation, the detection limit concentrations were used instead of 0 values with samples below detection. Therefore, actual loadings are likely less than values displayed below. Almost all TPH samples were below detection during the reporting year so any differences are due to differences in flow volume.

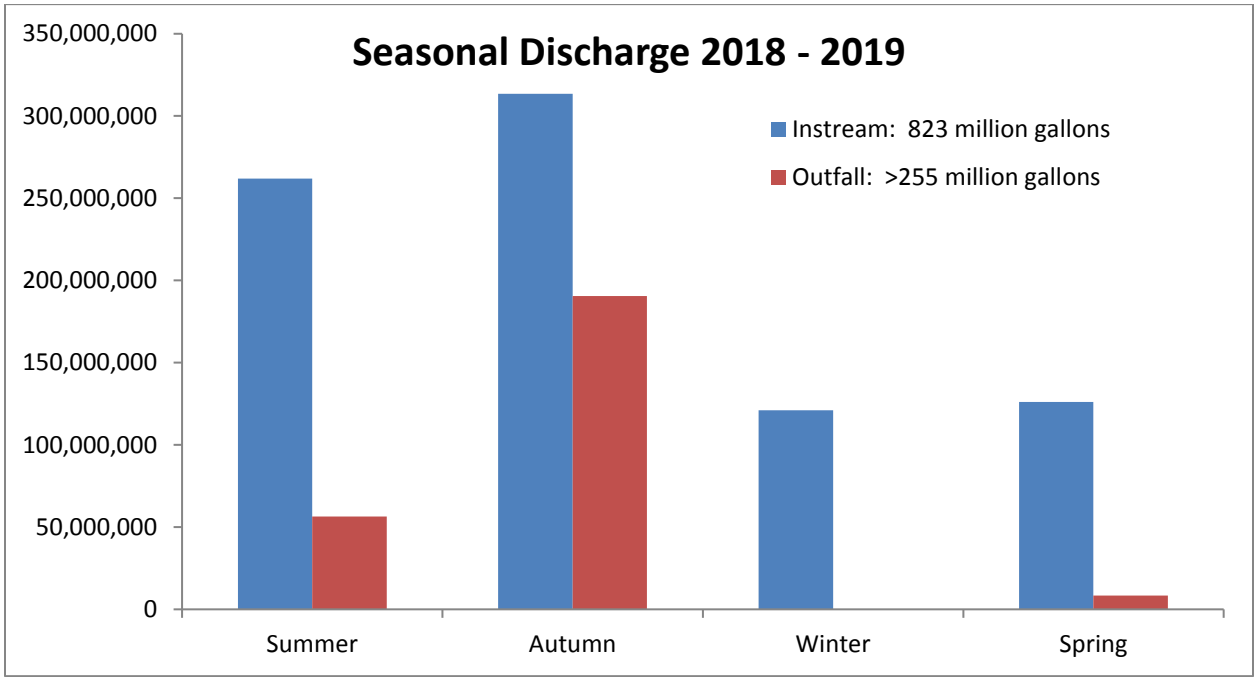


Figure 21: Seasonal Discharge for the 2017 – 2019 Reporting Year

Table 20
Seasonal Pollutant Loads for the 2018 – 2019 Reporting Year

Seasonal Pollutant Loading (lbs)										
Loc.	Season	BOD	TKN	NO2/NO3	TP	TSS	Copper	Lead	Zinc	TPH
Instream	Summer	9,914	2,438	8,444	590	433,322	18.7	14.2	80	10,930
	Autumn	10,212	4,606	8,793	2,421	946,423	32.9	21.7	128	13,085
	Winter	3,366	805	4,628	135	217,730	15.2	9.3	73	11,108
	Spring	6,373	736	4,644	98	61,741	8.3	5.7	49	5,258
	Total	29,866	8,583	26,510	3,244	1,659,216	75.0	50.9	329	40,381
Outfall	Summer	>1,183	>659	>38	>45	>5,645	>0.9	>0.9	>9	>2,353
	Autumn	>6,358	>795	>1,431	>111	>6,358	>3.2	>3.2	>32	>7,947
	Winter	>5	>1	>3	>0.1	>16	>0	>0	>0	>10
	Spring	>302	>42	>41	>5	>1,453	>0.2	>0.1	>1.6	>348
	Total	>8,548	>1,497	>1,512	>161	>13,475	>4.4	>4.3	>43	>10,658

Biological

A complete list of species found at each site and the frequency of their occurrence can be found in **Appendix E**. MBSS scoring criteria for the genus level benthic macro-invertebrate IBI for the Eastern Piedmont region of Maryland is shown in **Table 13**. An IBI score was calculated for each station by dividing the total score by the six metrics used for this index, thus deriving an average IBI score. Corresponding narrative ratings were also determined for each station in accordance with MBSS Standards. The narrative rating guidelines can be found in **Table 14.**

The biological health of the outfall and instream monitoring stations are summarized by **Tables 21 and 22**, respectively. The stations for the 2019 reporting year displayed very poor and poor health ratings. The outfall station had an IBI score of 2 while the instream station had an IBI score of 1.67.

Table 21
Outfall Station IBI Score for the 2018 – 2019 Reporting Year

Metric	Result	Score
Number of Taxa	19	3
Number of EPT	0	1
Number Ephemeroptera	0	1
% Intolerant Urban	4	1
% Chironomidae	51	3
% Clingers	38	3
	Total Score	**12**
	IBI Score	**2**
	Narrative Rating	**Poor**

Table 22
Instream Station IBI Score for the 2018 – 2019 Reporting Year

Metric	Result	Score
Number of Taxa	24	3
Number of EPT	4	1
Number Ephemeroptera	0	1
% Intolerant Urban	1	1
% Chironomidae	79	1
% Clingers	53	3
	Total Score	**10**
	IBI Score	**1.67**
	Narrative Rating	**Very Poor**

Figure 22 presents these scores annually from 2001 through 2019. The trends of both stations appear to be correlative throughout this time period. On average, the score for the instream station remains 0.8 greater than that of the outfall station. The average score for the outfall station is 2.2, which is rated as poor biological health according to MBSS guidelines. The average score for the instream station is 3, which is on the boundary between poor and fair biological health according to MBSS guidelines. The outfall reach had a slightly lower score than the previous year; the only metric that changed was the number of taxa, which decreased the score from 5 to 3. Though it did not change the score, the number of EPT taxa decreased from four to zero from 2018 to 2019. The instream reach score decreased from the previous year. While the total number of taxa was higher than the previous year, the percent Chironomidae in the sample increased while percent intolerant urban species and EPT, particularly Ephemeroptera decreased resulting in a lower score than the previous year. Both stations appear to be relatively intolerable for sensitive species; the outfall reach, which typically has far fewer (or none) intolerant urban species had slightly more present than the instream reach in which only one percent of the sample was made up of intolerant urban species.

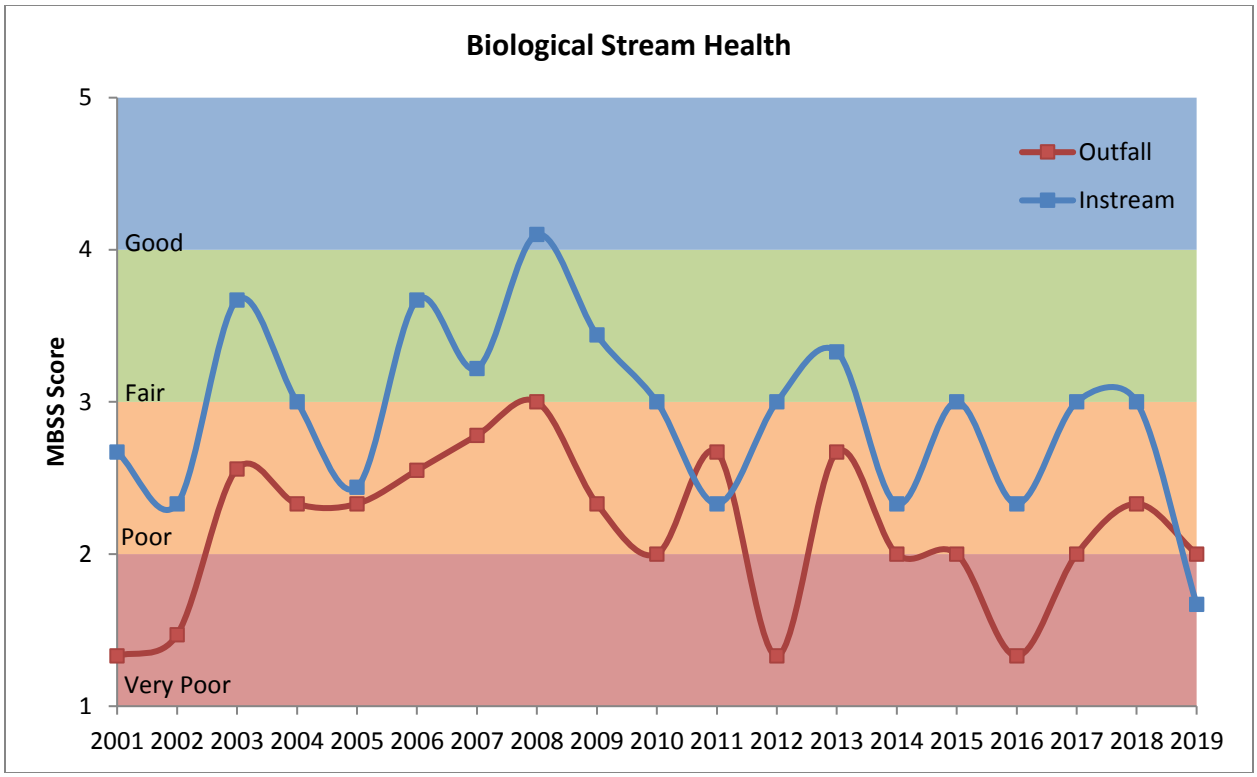


Figure 22: Macro-Invertebrate IBI Analysis 2001 – 2019

The biological habitat assessment results for each station are summarized in **Table 23**. The scores are of a maximum 160 points based on 8 parameters as shown in **Table 15**. Overall, the quality of biological habitat at the instream station remains higher than the outfall station with overall habitat scores of 99 and 65, respectively. From 1998 through 2019 (excluding 2001), as shown in **Figure 23**, the stations have average habitat scores of 93 for the instream station and 69 for the outfall station. This was a fairly typical year for both stations, with the instream scoring 2 points higher but the outfall station scoring 4 points below average, with considerable decrease in the instream habitat category. The weakest parameters for both stations are riffle/run quality, embeddedness, and shading.

Table 23
Spring 2019 Habitat Assessment Results

Parameter	Outfall	Category	In-stream	Category
Instream Habitat	7	marginal	15	sub-optimal
Epifaunal Substrate	9	marginal	14	sub-optimal
Velocity/Depth Diversity	7	marginal	12	sub-optimal
Pool/Glide/Eddy Quality	6	marginal	9	marginal
Riffle/Run Quality	7	marginal	11	sub-optimal
Embeddedness	4	poor	11	sub-optimal
Shading	8	marginal	8	marginal
Trash Rating	17	optimal	19	optimal
Total Score (max. of 160)	**65**		**99**	
Score (percent)	**41%**		**62%**	

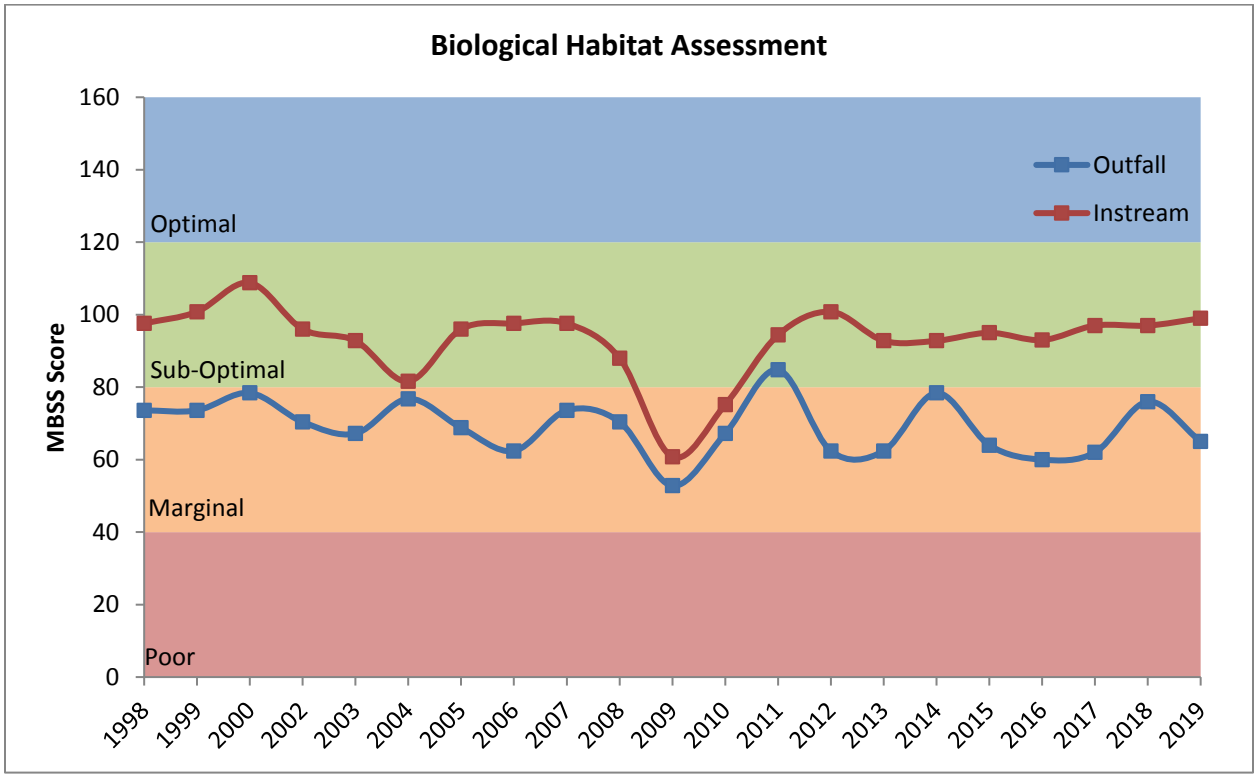


Figure 23: Comparison of NPDES Station Habitat 1998 – 2019 (Excluding 2001)

It should be noted that the habitat assessment is wholly subjective. Slight changes may be a result of inconsistencies in assessor(s) scoring methodology. To show a general relationship between the habitat and biological scores, these have been plotted for the outfall and instream stations in **Figures 24 and 25**, respectively. These are plotted on each assessment's overall scoring range. Though not unexpected, it is evident that the lower the quality of habitat in this case, the lower the biological quality found in said habitat. Both stations appear to have a 1- to 2-year period of latency between habitat and biological changes. The certainty of any evident

relationship is low given the high degree of bias and chance that is probable in these assessments.

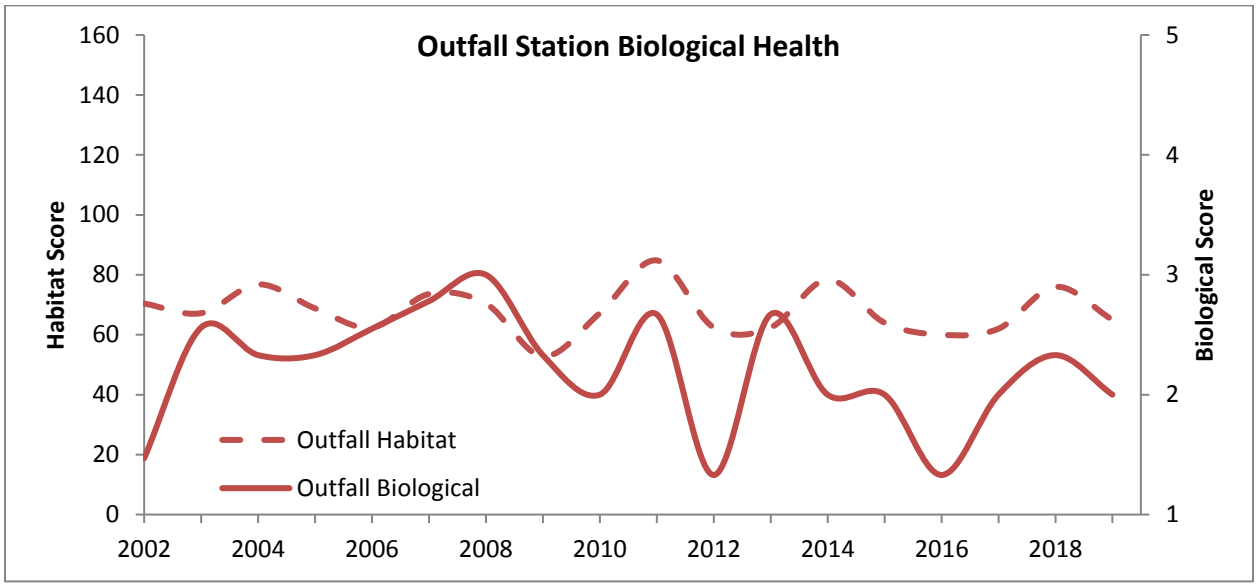


Figure 24: Comparison of Outfall Station Habitat and Biological IBI Scores 2002 – 2019

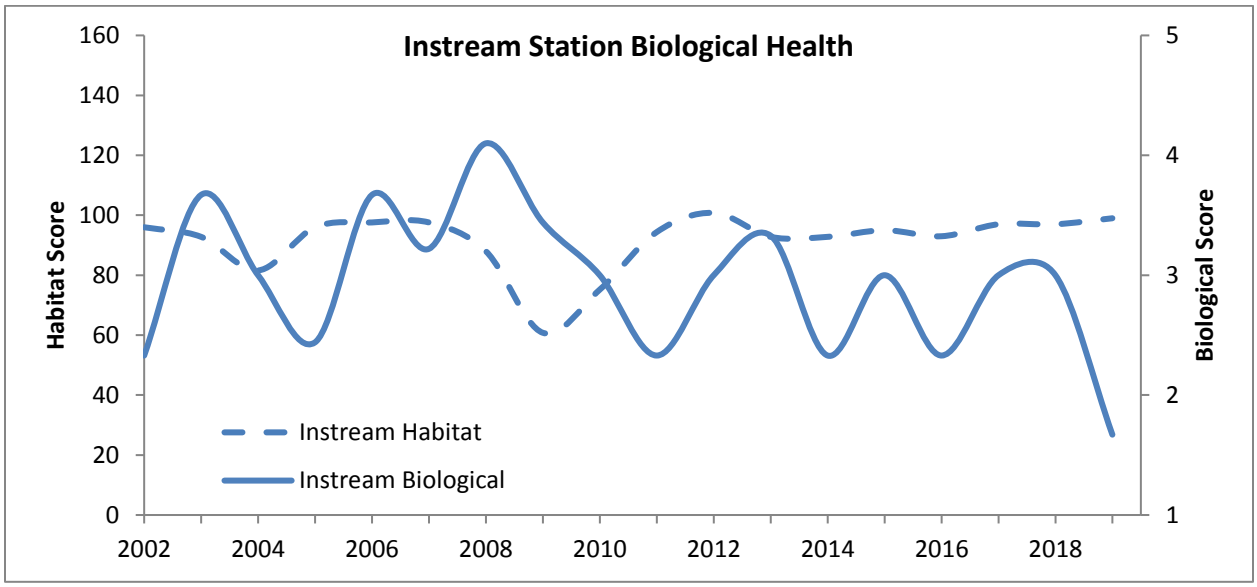


Figure 25: Comparison of Instream Station Habitat and Biological IBI Scores 2002 – 2019

G. Program Funding

1. Operational Expenses

Table 24 relates to the operating budget expenses to 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 BMP, and other responsibilities associated with the daily operations of the LRM and BRM.

Table 24
Operating Expenses

Operating Program Elements	Expenditures
Administration - Salaries and Benefits	$1,100,791.42
Operation and Maintenance - Mowing, Gasoline, Repairs/Parts	$128,850.15
Public Education and Outreach	$5,840.87
Lab Testing/Supplies, Contract Services, Small Equipment, Conferences	$20,008.09
Debt Service Payment	$1,013,866.62
Total Operating Expenditures for FY 19	***$2,269,357.15***

2. Capital Expenses

A capital budget was established early in the program to support compliance needs for the County's NPDES MS4 permit responsibilities. Capital expenditures (**Table 25**) in this program are principally associated with the permit's Watershed Assessment and Restoration requirements.

Table 25
Capital Expenses

Capital Programs	Expenditures
Watershed Assessment and Improvement (NPDES)	$4,906,461.68
Environmental Compliance	$0.00
Stormwater Facility Renovations	$365,382.00
Total Capital Expenditures for FY 19	***$5,271,843.68***

Cumulative capital expenditures for the program since 2005 can be found in **Table 26**. The approved FY 2020-2025 CIP estimates of program funds can be found in **Tables 27, 28, and 29**. It is important to note that the funding beyond FY 2020 is subject to future budget review and approval processes. Therefore, no guarantee is made to future appropriations beyond FY 2020.

Table 26
Total NPDES MS4 Capital Expenditures
Carroll County, Maryland
July 15, 2005 through June 30, 2019

Permit Year	Capital Expenditure
7/15/05 to 6/30/06	$36,040.19
7/1/06 to 6/30/07	$53,593.00
7/1/07 to 6/30/08	$1,978,829.14
7/1/08 to 5/30/09	$816,823.30
7/1/09 to 5/30/10	$1,744,986.91
7/1/10 to 6/30/11	$672,479.04
7/1/10 to 6/30/11	$23,269.00
7/1/11 to 6/30/12	$1,635,671.32
7/1/12 to 6/30/13	$1,012,067.26
7/1/13 to 6/30/14	$2,147,337.51
7/1/14 to 6/30/15	$2,964,442.44
7/1/15 to 6/30/16	$2,297,193.78
7/1/16 to 6/30/17	$4,851,451.61
7/1/17 to 6/30/18	$2,137,222.04
7/1/18 to 6/30/19	$5,271,843.68
Total permit expenditures, to date	***$27,643,250.22***
Grants received	***$8,093,616.70***
Actual County expenditures	***$19,549,633.52***

Approved Community Investment Plan 2020 – 2025

Table 27
Watershed Assessment and Improvement (NPDES)

	FY 20	FY 21	FY 22	FY 23	FY 24	FY25	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	40,000	140,000	130,000	485,000	170,000	200,000			**1,165,000**
Land Acquisition									**0**
Site Work									**0**
Construction	4,100,000	3,885,000	3,045,000	3,175,000	2,725,000	3,588,000			**20,518,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**4,140,000**	**4,025,000**	**3,175,000**	**3,660,000**	**2,895,000**	**3,788,000**	**0**	**0**	**21,683,000**

Table 28
Environmental Compliance

	FY20	FY21	FY22	FY23	FY24	FY25	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design									
Land Acquisition									
Site Work									
Construction									
Equipment/Furnishings									
Other									
EXPENDITURES									
TOTAL							**1,037,832.12**	**0**	**1,037,832.12**

The Stormwater Management Facility Renovation Program CIP (**Table 29)** has renovated (back to as-built condition) 27 of the 209 existing County owned structural stormwater management facilities. 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 $965,000.00 has been spent on this renovation effort.

Table 29
Stormwater Management Facility Renovations

	FY 20	FY 21	FY 22	FY 23	FY 24	FY25	Prior Allocation	Balance to Complete	Total Project Cost
Engineering/Design	10,000	35,000	20,000			10,000			**75,000**
Land Acquisition									**0**
Site Work									**0**
Construction	310,000	275,000	285,000	300,000	300,000	240,000			**1,710,000**
Equipment/Furnishings									**0**
Other									**0**
EXPENDITURES									
TOTAL	**320,000**	**310,000**	**305,000**	**300,000**	**300,000**	**250,000**	**0**	**0**	**1,785,000**

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

Table 30
Stormwater Management Facility Renovation Program
2016-2025

Year	Project Name	MDE8NAME
	PROJECTS COMPLETED	
2016	Poole Meadows	Liberty Reservoir
2016	Carroll Highlands	Liberty Reservoir
2016	Grand Valley Farms Sec. 2	Double Pipe Creek
2016	Washington Square	Liberty Reservoir
2016	Oklahoma Phase 1 Pond #2	Liberty Reservoir
2016	Jenna Estates Sec. 2 Ph. 1 Pond 1	South Branch Patapsco
2017	Oklahoma Sweetwater	Liberty Reservoir
2017	Grand View Resub. Lot 38	South Branch Patapsco
2017	Eldersburg Estates Sec. 1	South Branch Patapsco
2017	Sun Valley Waterloo Section	Liberty Reservoir
2017	Carrollyn Manor Section 6	Double Pipe Creek
2017	O'Brecht Estates	South Branch Patapsco
2017	Carmae Acres	South Branch Patapsco
2017	Kalten Acres Sec. 1	Double Pipe Creek
2018	Wilmot Manor	Liberty Reservoir
2018	Matthews Meadows Sec. 2	Liberty Reservoir
2018	Piney Ridge Village 7	South Branch Patapsco
2018	Exceptional Center	Double Pipe Creek
2018	Carroll Woods Est. Sec. 7	Lower Monocacy River
2018	C. C. Commerce Center	Liberty Reservoir
2018	Larash Manor	Liberty Reservoir
2018	Squires Subdivision	Liberty Reservoir
2018	Stafford Estates	Liberty Reservoir
2019	Aspen Run	Liberty Reservoir
2019	Eldersburg 3-5	South Branch Patapsco
2019	Hoff Pond	Liberty Reservoir
2019	Hunters Crossing #2	South Branch Patapsco
	PROJECTS UNDER CONSTRUCTION	
2020	St. Georges Gate Sec. 2	Liberty Reservoir
2020	Bluebird Hills	Prettyboy Reservoir
2020	Bluebird Hills (plunge pool)	Prettyboy Reservoir
2020	Benjamin's Claim Condo	South Branch Patapsco
2020	Tydings Acres	South Branch Patapsco
	PROJECTS PLANNED	
2021	North Carroll Library	Prettyboy Reservoir

PROJECTS PLANNED		
2021	Northern Landfill	Liberty Reservoir
2021	Hoods Mill Landfill Closure	South Branch Patapsco
2021	Sumners Hollow Pond 1	Liberty Reservoir
2021	Sumners Hollow Pond 2	Liberty Reservoir
2022	Carrollyn Manor Section 7	Double Pipe Creek
2022	Squire Village	Liberty Reservoir
2022	Ralph Street Extension	Liberty Reservoir
2022	C. C. Assoc. Retarded Citizens	Liberty Reservoir
2022	Carroll Co. Multi. Parking	Liberty Reservoir
2022	Benjamins Claim Basin A	South Branch Patapsco
2022	Center Street Road Extension	Liberty Reservoir
2022	Farm Museum Pond	Double Pipe Creek
2022	Sullivan Heights	Liberty Reservoir
2022	Sun Valley Sec. 2	Double Pipe Creek
2023	Johanna's Joy 2	Double Pipe Creek
2023	Meadow Ridge ED Pond 1	Double Pipe Creek
2023	Meadow Ridge ED Pond 2	Double Pipe Creek
2023	Meadow Ridge ED Pond 3	Double Pipe Creek
2023	Cranberry Hill Resub. Lot	Liberty Reservoir
2023	Patapsco Valley Overlook	South Branch Patapsco
2023	Stoffle Park	Liberty Reservoir
2023	Bark Hill Park	Double Pipe Creek
2024	C. C. Regional Airport	Liberty Reservoir
2024	C. C. Regional Airport	Liberty Reservoir
2024	C. C. Regional Airport	Liberty Reservoir
2024	C. C. Regional Airport	Liberty Reservoir
2024	C. C.. Regional Airport	Liberty Reservoir
2024	Edgewood Sec. 7	Liberty Reservoir
2025	Safe Haven	Double Pipe Creek
2025	Tira Estates	Liberty Reservoir
2025	Piney Ridge Village 5/6	South Branch Patapsco
2025	Piney Ridge Village 5/6	South Branch Patapsco
2025	Piney Ridge Village 5/6	South Branch Patapsco
2025	Bradford Knoll	Liberty Reservoir

Part IV. Special Programmatic Conditions

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

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

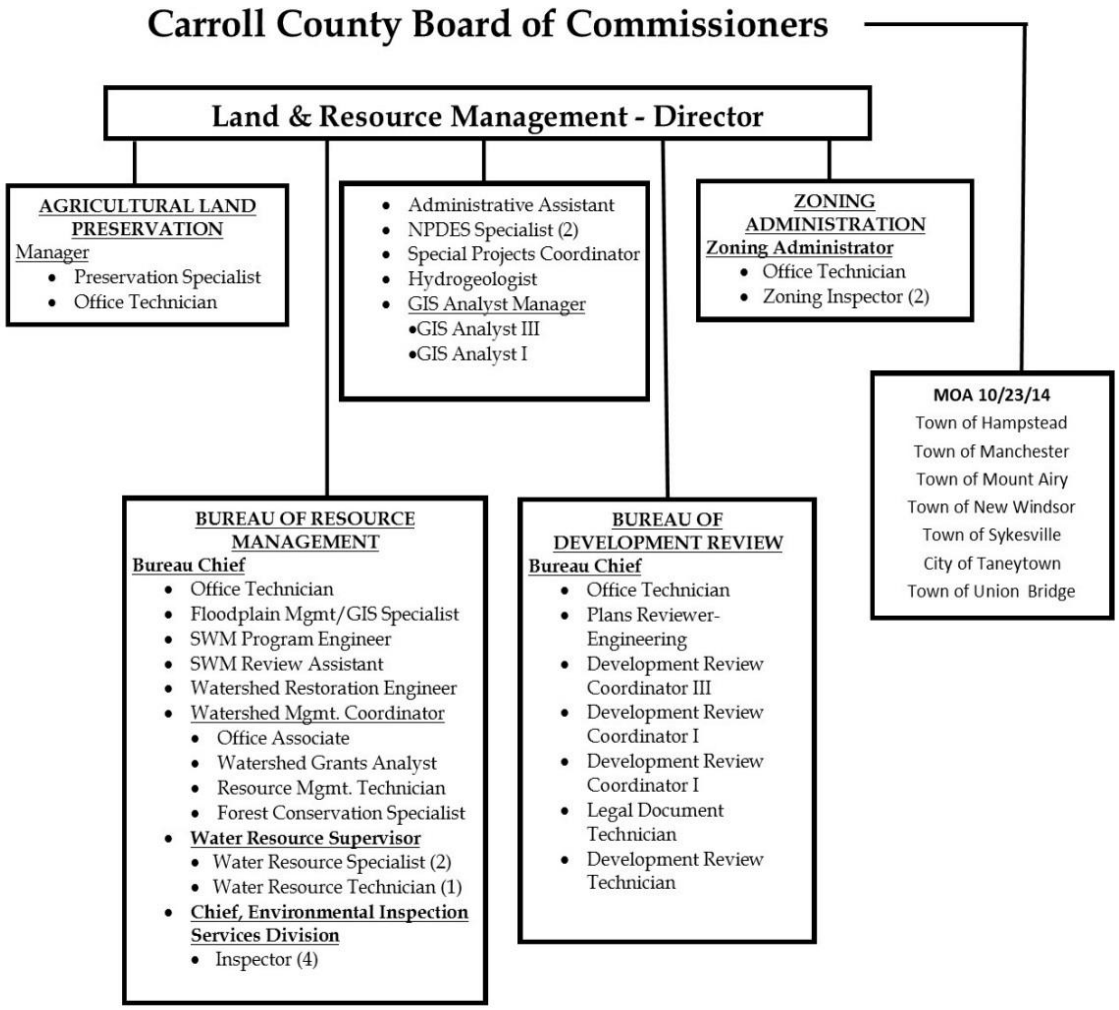
County staff participate as members of the Baltimore Metropolitan Council's Reservoir Technical Group, which meets regularly to discuss issues of common concern regarding protection of the watersheds. Staff also has a very close working relationship with the local SCD. County and SCD staff coordinate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

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

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

Appendix A

Organizational Chart:
Department of Land and Resource Management

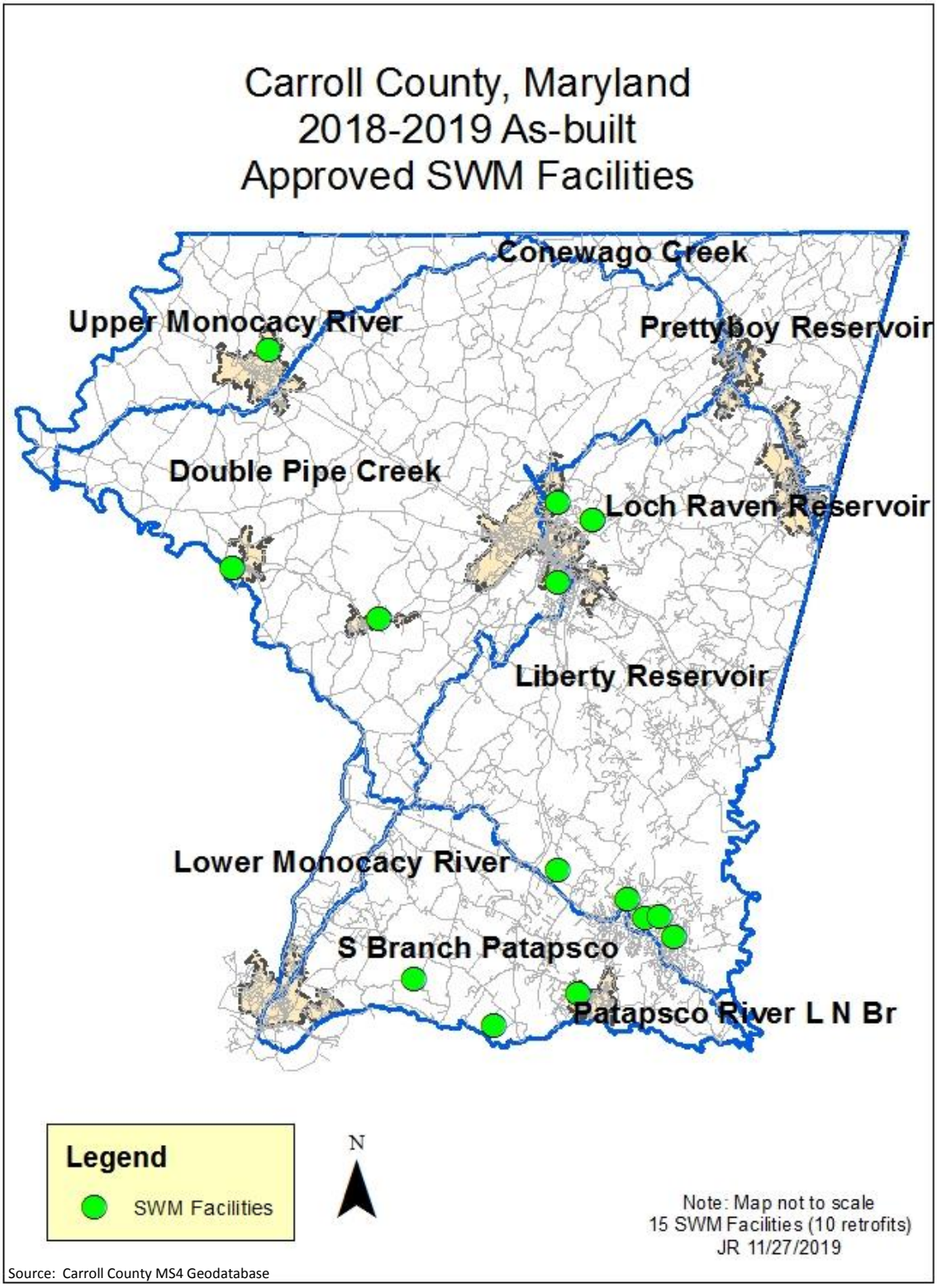

Carroll County Board of Commissioners
Land & Resource Management - Director
AGRICULTURAL LAND PRESERVATION
Manager
Preservation Specialist
Office Technician
Administrative Assistant
NPDES Specialist (2)
Special Projects Coordinator
Hydrogeologist
GIS Analyst Manager
GIS Analyst III
GIS Analyst I
ZONING ADMINISTRATION
Zoning Administrator
Office Technician
Zoning Inspector (2)
MOA 10/23/14
Town of Hampstead
Town of Manchester
Town of Mount Airy
Town of New Windsor
Town of Sykesville
City of Taneytown
Town of Union Bridge
BUREAU OF RESOURCE MANAGEMENT
Bureau Chief
Office Technician
Floodplain Mgmt/GIS Specialist
SWM Program Engineer
SWM Review Assistant
Watershed Restoration Engineer
Watershed Mgmt. Coordinator
Office Associate
Watershed Grants Analyst
Resource Mgmt. Technician
Forest Conservation Specialist
Water Resource Supervisor
Water Resource Specialist (2)
Water Resource Technician (1)
Chief, Environmental Inspection Services Division
Inspector (4)
BUREAU OF DEVELOPMENT REVIEW
Bureau Chief
Office Technician
Plans Reviewer-Engineering
Development Review Coordinator III
Development Review Coordinator I
Development Review Coordinator I
Legal Document Technician
Development Review Technician

Appendix B

County NPDES MS4 Database CD

(Available Upon Request)

Carroll County, Maryland
2018-2019 As-Built
Approved SWM Facilities Map

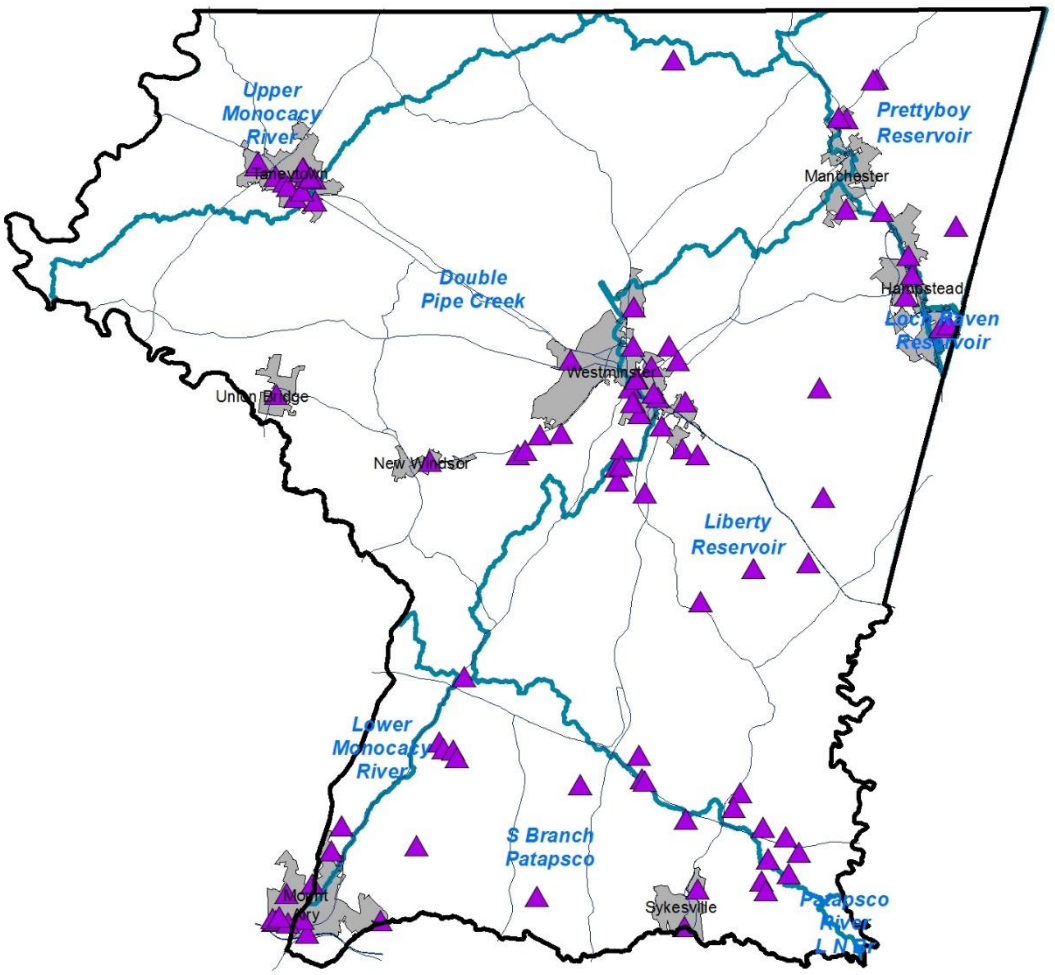

Carroll County, Maryland
2018-2019 As-built
Approved SWM Facilities
Conewago Creek
Upper Monocacy River
Prettyboy Reservoir
Double Pipe Creek
Loch Raven Reservoir
Liberty Reservoir
Lower Monocacy River
S Branch Patapsco
Patapsco River L N Br
Legend
SWM Facilities
N
Note: Map not to scale
15 SWM Facilities (10 retrofits)
JR 11/27/2019
Source: Carroll County MS4 Geodatabase

Appendix C

Illicit Discharge Detection and Elimination (IDDE)

- Carroll County MS4 2019 NPDES Study Point Location (Map)
- 2019 Illicit Discharge Summary, Illicit Discharge Complaints
- 2019 IDDE Commercial/Industrial Visual Survey Locations (Map)
- 2019 Visual Survey Summary
- MDE IDDE Audit Letter
- Modified Visual Survey Methodology and Procedures
- 2019 NPDES MS4 Permit Annual Training Stormwater Pollution Prevention Workshop

Carroll County MS4
2019 NPDES Study Point Location Map



Legend

▲ 2019 IDDE NPDES Outfall Study Points (101)

# Outfalls	MDE 8-Digit	Watershed
2	02130805	Loch Raven Reservoir
7	02130806	Prettyboy Reservoir
36	02130907	Liberty Reservoir
15	02130908	Patapsco River - South Branch
10	02140302	Lower Monocacy River
15	02140303	Upper Monocacy River
16	02140304	Double Pipe Creek

Source: Carroll County MS4 Geodatabase (December 2019 (GE))

Appendix C
IDDE Program
2019 Illicit Discharge Incident Report Summary
Illicit Discharge Complaints Processed from July 1, 2018 – June 30, 2019

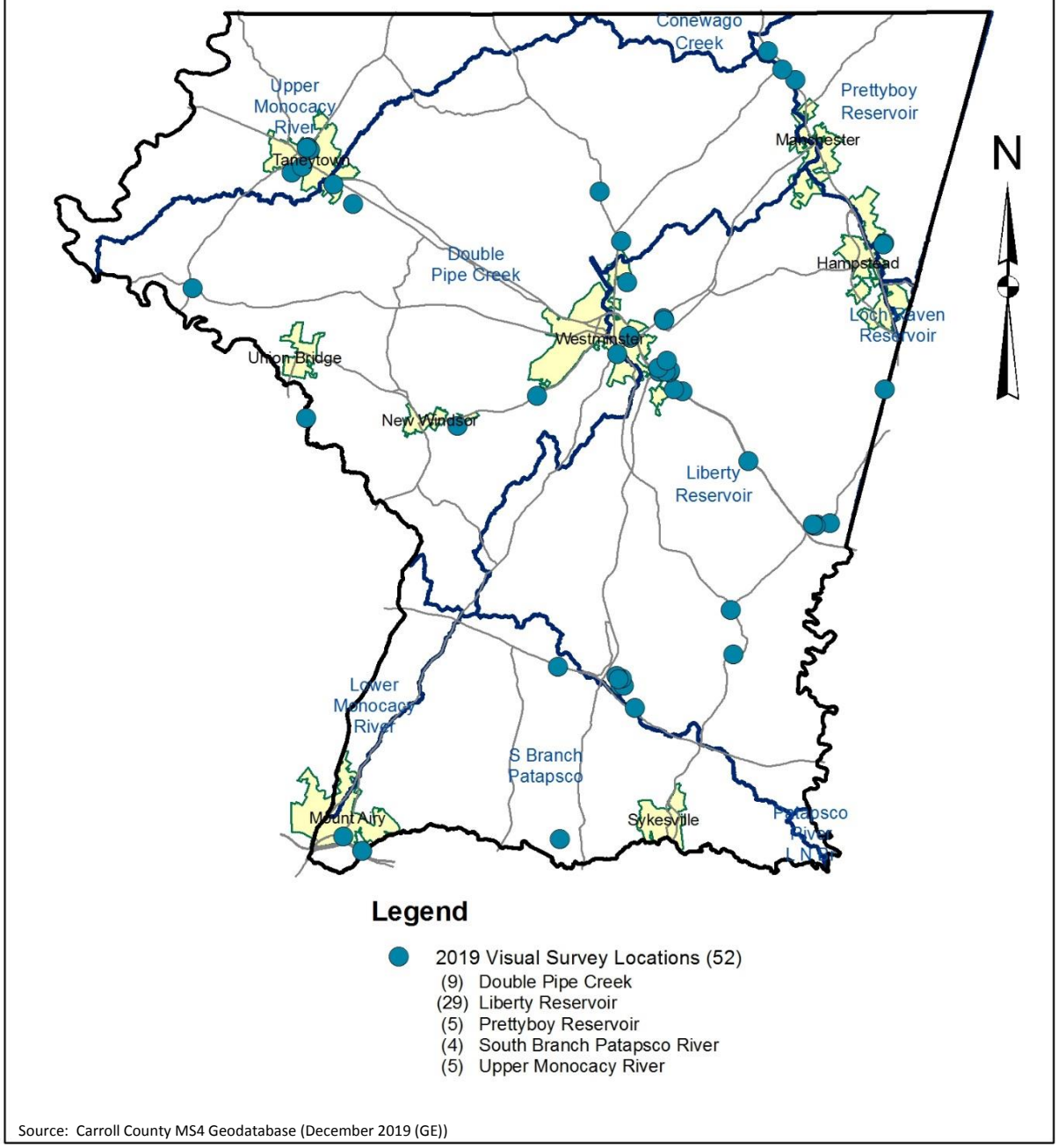
Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-18-0007	Citizen reported commercial automotive shop vehicle washing draining to MS4 Reported: 07/20/18	City of Westminster DPW staff and County NPDES Compliance staff investigated, monitored and confirmed complaint. Met with owner who stopped intermittent activity. Discussed and provided written alternative options contingent on local planning, sanitary commission or state authorizations. Owner engaged lengthy planning/zoning process with City. Met w/MDE, applied for and received MDGP 16VW0036 Commercial Vehicle Washing permit.	Illicit Discharge Eliminated 08/15/18 Case Closed: 5/20/19	East Man & Bishop Avenue Westminster, MD
PD-18-0008	Citizen reported fuel on public roadway near convenience/gas store. Reported: 07/20/18	CC Emergency Operations Center, City of Westminster, MDE responded to diesel fuel draining from dump truck bed confirmed by convenience store video footage. Store receipt records indicated 3.1 gallons onto pavement. MDE provided instructions for dry absorbent cleanup and street sweeping. MDE compliance investigation.	Illicit Discharge Eliminated Case Closed: 7/20/18	Magna Way and MD 140 Westminster, MD
PD-18-0009	Citizen report/MDE Compliance referral re: possible sediment may be leaving site from business expansion. Reported: 8/15/18	CC EISD investigated complaint re: erosion and sediment control. Sediment not leaving site. Grading disturbance checked and less than permit requirements. Silt fence in place, business contacted regarding maintenance w/follow up monitoring. Zoning investigation opened. Reported findings to MDE compliance.	Non-Illicit Discharge Case Closed: 11/19/18	Old Westminster Pike Westminster, MD
PD-18-0010	County staff reported potential swimming pool discharge to storm drain inlet. Reported: 9/12/18	City of Westminster and County NPDES Compliance staff investigated with no visible or active pipe connection or discharge. Letter and MDE Swimming Pool BMP document sent to homeowner.	Non-Illicit Discharge Case Closed: 9/20/2018	Wyndtryst Drive Westminster, MD
PD-18-0011	Citizen reported gray water from house sump pump to street and separate concern regarding visible rainbow sheen coming from ground water seep at neighbor's property line. Reported:10/01/18	County NPDES Compliance staff investigated and monitored sump pump discharge w/no evidence of gray water dish charge. Follow-up discussion with complainant found their last visual of gray water to be 4 years prior and concern mostly about water down public roadway. CC Roads has been working on drainage complaint and copied on this complaint. Rainbow sheen was natural Iron floc bacteria from groundwater/spring area w/educational info provided to citizen.	Non-Illicit Discharge Case Closed: 10/03/18	Braddock Road, Woodbine, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
PD-18-0012	County DPW Utilities staff reported grease and syringe found at storm drain inlet at rear of commercial center. Reported: 11/26/18	County EISD investigated. Carroll County Health Department contacted who was aware and investigating for compliance regarding grease enforcement and syringe. Property Management company notified.	Illicit Discharge Eliminated Case Closed: 11/26/18	Hanover Pike Hampstead, MD
PD-18-0013	Citizen reported concern regarding murky gray water noticed in small stream that crosses public road and passes through multiple upstream properties. Reported: 11/30/18 Some suds and algae Reported: 04/30/19	County NPDES Compliance staff investigated and field-tested water having no physical indicators at time of site visit. Testing for detergents negative. Upstream residential areas observed for potential gray water sources along public roadway. Multiple site visits performed. Reviewed recent upland development construction sediment trap activity with EISD staff as possible source. County EISD staff reviewed bmp activities with contractor. Ongoing periodic monitoring for gray water. Follow-up stream observation found clear water with very small amount of natural bubbles and algae.	Potential Illicit Discharge: 12/05/18 Case Closed: 05/15/19	Hoffman Mill RD Hampstead, MD
PD-18-0014	Citizen reported gray water being sump pumped onto public roadway Reported: 12/12/18	County NPDES Compliance staff investigated, found pipe location but no evidence during multiple observations. Turned over to CC Health Department following up with homeowner, discuss regulations, and resolve with possible assistance to connect to City sanitary or other option.	Potential Illicit Discharge Case Closed: 12/27/18	Taneytown Pike, Taneytown, MD
PD-19-0001	Citizen reported stormwater during an exceptionally heavy storm event w/sediment on public roadway. Reported: 1/07/2019	County NPDES Compliance staff investigated and determined rain gutter discharge pipes added to extend away from neighbor's house foundation to prevent basement flooding during a very wet season. Discharge passing partly through wooded area picking up some sediment and down neighbor's driveway partly on public road and grass roadside swale to culvert. Checked for detergents from nearby sump pump discharge (negative). Complainant later noted greater concern regarding road freezing issue not so much sediment. Referred to CC Roads and CC EISD regarding drainage issue 1/10/19. Monitored continued with no sediment issues for several months.	Non-Illicit Discharge Case Closed: 4/15/19	Freter RD Sykesville, MD
PD-19-0002	Citizen report/MDE Compliance referral: Citizen observed and photographed commercial carpet cleaning service	City of Westminster Code Enforcement Officer and County NPDES Compliance staff investigated the 1/4/19 incident. Checked system and connecting system and outfall with no flow or physical indicators. MDE confirmed similar activity	Illicit Discharge Eliminated Case Closed: 4/05/19	Mathias CT Westminster, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
	employee dumping apparent wastewater where company van parked at apartment complex site private storm drain inlet. Reported: 1/09/19	by same company in adjoining County. Carpet cleaning company contracted by property management. Spoke with property management company noting their responsibility to ensure no dumping into storm drain systems. City contacted carpet cleaning company management 1/18/19 regarding violation with order to immediately stop activity followed by letter and bmp info. Forwarded initial investigation summary and proposed action to MDE for supporting documentation as requested to support adjoining MS4/MDE investigation.		
PD-19-0003	Citizen reported a business is incorrectly handling hazardous toxic waste with potential to discharge to nearby drainage ditch and is also improperly transporting through the County. Reported: 1/16/19	Advised complainant to contact MD Attorney General's Environmental Crimes Unit noting he had. CCDLRM contacted MDE Wastewater Permitting and Compliance noted they received a complaint from same individual on 12/9/18. They performed on 12/10/18, an unannounced site investigation and found site in compliance and responded to complainant. MDE performed two subsequent multi-departmental investigations (Air and Radiation/12/21/18 and Oil Control 12/31/18) finding no hazardous waste issues. MDE- no further investigations. City and County MS4 performed final site perimeter on 1/25/19 with no illicit discharges observed.	Non-Illicit Discharge Case Closed: 1/28/19	27 Liberty Street Westminster, MD
PD-19-0004	Citizen reported a concern regarding possible oil/gasoline discharge from a spring area on their property that drains to SWM facility. Reported: 4/8/19	County NPDES Compliance staff investigated and identified iron floc bacterial with rainbow sheen at this groundwater discharge.	Non-Illicit Discharge Case Closed: 4/15/19	Skyline Ct Westminster, MD
PD-19-0005	MDNR Geological Survey Staff reported a partially covered salt pile in commercial shopping center parking lot. Reported: 6/17/19	County NPDES Compliance staff investigated and found the pile to have been removed and site cleaned up.	Potential Source Eliminated 6/25/19 Case Closed: 7/17/19	N. Center St Westminster, MD
PD-19-0007	Citizen reported ongoing trash hauler vehicles leaking auto fluids at frequent stops on public roadway. Reported: 6/25/19	County NPDES Compliance staff investigated. Complainant noted ongoing problem. Vendor has been coming out to apply absorbent and clean up upon resident complaints but situation not getting better. Hauler contacted by phone with a follow up notification letter to check/repair leaking trash haulers on this	Illicit Discharge Eliminated Case Closed: 8/26/19	Ridge RD Finksburg, MD

Case No.	Complaint/ Date	Action Taken	Status	Jurisdiction/ Location
		specific route. Hauler affirmed they would address. Subsequent visual roadway inspections indicated satisfactory improvement.		
PD-19-0008	MS4 Municipal staff reported restaurant grease receptacle overflow spillage discharge Reported: 6/28/19	Town and County NPDES Compliance staff investigation confirmed discharge, met with restaurant management regarding multiple corrective measures of clean up, soil removal and remediation, container replacement, employee BMPs documented by notification letter. Compliance achieved.	Illicit Discharge Eliminated 8/8/19 Case Closed: 9/13/19	E. Ridgeville RD Mount Airy, MD

Carroll County MS4
2019 IDDE Commercial/Industrial Visual Survey Areas



Source: Carroll County MS4 Geodatabase (December 2019 (GE))

Appendix C
IDDE Program
2019 Commercial Industrial Visual Survey Summary
Visual Survey Areas Requiring Follow-up Actions
Processed from July 1, 2018 – June 30, 2019

This table presents the 8 of 52 Commercial/Industrial Visual Surveys recommended for follow-up.
No Illicit Discharges Observed / Potential Sources or Activity

Unique ID#	Visual Survey # Date	Land Use	Activity/ Location/ Watershed	Potential Significant Pollutant Source	Follow-Up Action/Status
0704052188	VS-19-0005 02/06/19	C	Industrial Park Drive Finksburg, MD	Automotive Body and Transmission Shops	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
0704052161	VS-19-0006 02/06/19	C	Industrial Park Drive Westminster, MD	Automotive Equipment and Pressure Washer Business	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
0714037446	VS-19-0011 02/06/19	C	Klees Mill Road Sykesville, MD	Automotive Repair Ship and Plumbing Contractor	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
0707042922	VS-19-0019 02/07/19	C	N/S Gorsuch Road Westminster, MD	Automotive Industry	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
070812903	VS-19-0020 02/07/19	C	Fairmount Road Hampstead, MD	Automotive Repair & Towing	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
0714043160	VS-19-0015 02/06/19	C	Adam Smith Street Sykesville, MD	Site Development Contractor	Provide Stormwater Pollution Prevention Awareness Letter w/ MDE Stormwater Pollution Prevention Guidance Document
0707139578	VS-19-0044	C	Market Street Westminster, MD	Home and Building Supply Retail Store	Provide Stormwater Pollution Prevention Awareness Letter w/ MS4 General Business BMP brochure
0707135513	VS-19-0045	C	Malcolm Drive Westminster MD	Restaurant	Provide Stormwater Pollution Prevention Awareness Letter w/ MS4 Restaurant BMP brochure

Maryland
Department of
the Environment

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

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

February 12, 2018

Mr. Tom Devilbiss, Director
Department of Land and Resource Management
Carroll County Government
225 North Center Street
Westminster MD 21157-5194

Dear Mr. Devilbiss:

The Maryland Department of the Environment, Water and Science Administration (the Department) has completed a review of Carroll County's (the County) illicit discharge detection and elimination (IDDE) program required in PART IV.D.3 of the County's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) permit (11-DP-3319, MD0068331). As part of this evaluation, the Department met with County staff on November 29, 2017. The meeting included an in-office presentation and discussion on program implementation. A field review was also conducted that involved the County demonstrating the outfall screening process and visual surveys of two commercial areas. The Department wishes to thank you and your staff for your assistance during the review process.

The Department's evaluation of the County's IDDE program included an assessment of the storm drain system mapping, outfall screening prioritization and procedures, commercial and industrial visual survey procedures, enforcement activities, citizen outreach, and response to complaints. A summary of findings and recommendations is as follows.

1. **Storm Drain System Mapping.** The County hired a geographic information system (GIS) specialist and is working on improving the accuracy of the GIS map of the storm drain system. As part of this effort, the County reviewed all as-built drawings to verify stormwater best management practices and conveyances. The County also verified drainage areas and impervious areas and is currently in the process of scanning mylar drawings of older infrastructure onto its GIS platform. Through a Memorandum of Agreement, the County has taken responsibility for mapping the storm drain systems of eight incorporated municipalities. These are updated once a year to account for new development.

   Field verification is completed by Environmental Inspection Services Division (EISD) staff and NPDES Compliance Specialists during stormwater facility inspections that include outfalls and pipes. The Department of Land and Resource Management coordinates with the Department of Public Works for field verification when necessary. While currently using hard copy maps in the field, the County plans to switch to electronic maps. In the County's efforts to transition to the MS4 geodatabase, data (e.g., outfall dimensions, material) are being refined. The Department has determined that the County is making acceptable progress toward completing its storm drain system map and commends the County for investing resources into this effort. The Department requests that the County report on progress in future annual reports.

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

2. **Outfall Screening.** The County has identified more than 300 "NPDES Study Points" that include all major outfalls and some outfalls designated as having a high potential for pollution. Outfalls are screened on a triennial basis and include those in the incorporated municipalities. The County has developed a standard operating procedures manual for outfall screenings and investigations, and staff undergo annual training. Procedures detailing data collection and management using the new MS4 geodatabase were also developed. The County's procedures provide essential information on the implementation of an IDDE program and the Department recommends continued implementation of those procedures.

   Outfall screenings in the County and the municipalities are conducted by EISD staff and NPDES Compliance Specialists, respectively. Within 24 hours of discovering any suspected illicit discharge, NPDES Compliance Specialists conduct chemical testing and based on the results, initiate an investigation when necessary. County staff conducted an outfall screening and associated chemical testing on the day of the Department's review. Outfall screening procedures were appropriately followed and the inspection was documented.

   The County and the Department discussed major outfalls that are consistently inundated with groundwater and are not connected to developed areas. These outfalls are on the County's inspection schedule. To comply with PART IV.D.3.1, the groundwater flows are chemically tested each time the outfalls are inspected, but the results are consistently within acceptable chemical parameters. The County suggested establishing a baseline to document consistent groundwater flows to consider making chemical testing optional unless other indicators suggest an illicit discharge is present. As discussed in the meeting, the County can propose a revision of procedures for the Department's review and approval.

3. **Visual Surveys of Commercial and Industrial Areas.** The County's criteria for including commercial/industrial areas in the survey schedule are properties that are one acre or more and within 300 feet of a stream. In the 2017 annual report, the County documented that 60 visual surveys were conducted. Of those, no illicit discharges were discovered and the County provided educational good housekeeping information to four sites. Commercial and industrial surveys are an essential component of the IDDE program because they provide the opportunity to discover pollution closer to the source. These surveys can be more effective in eliminating pollution than dry weather screenings at major outfalls at the end of a large system.

   The Department requests that the County evaluate whether expanding the current survey area will add properties that have a high potential to pollute. For example, large restaurant operations may not be within 300 feet of a stream but are still of concern to the storm sewer system when fats, oils, and grease are not properly discarded.

   The County developed an inspection form for conducting visual surveys. It is currently being field tested and will be revised if field experiences demonstrate changes are needed. The Department requests that in the next annual report, the County provide an update on the use of the inspection form and submit an example.

4. **Program Implementation and Enforcement.** The County responds to hotline complaints within 24 hours and tracks complaints with an Accela database. Each incident remains open until

resolved. The day of review, the County provided a list of illicit discharge complaints and resolutions for 2017. The documentation demonstrates appropriate actions taken by the County to respond to citizen complaints and resolve illicit discharges.

The County's enforcement is authorized in Chapter 53 of Carroll County's ordinance: Environmental Management of Storm Sewer Systems. The County's use of progressive enforcement is a letter, a notice of violation (NOV), and billing the property owner for any repairs that the County made due to lack of compliance. The County allows 30 days for correction, and seven days for more serious violations. The County reports that most violations are resolved voluntarily. On the day of review, the County provided examples of enforcement and educational letters sent to businesses and residents when violations or potential violations were observed. The enforcement letters demonstrate appropriate formal correspondence for resolving instances of stormwater pollution.

5. **Education and Outreach.** The County has engaged in numerous public outreach and education initiatives related to illicit discharge prevention and elimination. The County developed educational brochures targeting specific industries, including automobile related businesses and the restaurant and food service industry. The County has also engaged the local business community to voluntarily pledge to prevent pollution and improve water quality stewardship. The County has hosted public workshops on stormwater pollution prevention for citizens and the business community. The County conducts annual training on stormwater pollution prevention for County and municipal staff. The County is continuously proactive in identifying new training opportunities to stay informed and improve staff performance. The County should continue to report these activities in annual reports.

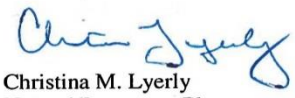
6. **Partnerships with Municipalities.** The County has a Memorandum of Agreement to implement the IDDE program with the eight incorporated municipalities that are co-permittees with the County. The County reported that communication is effective and the municipalities participate in inspections and outreach activities. The County provides technical assistance when needed to all municipalities. The County has sole enforcement authority in four municipalities and joint authority in the remaining four. The County must continue to annually report the activities undertaken to implement minimum control measures for the municipalities.

The Department has determined that the County's program is in compliance with PART IV.D.3, Illicit Discharge Detection and Elimination, of the County's NPDES MS4 permit. In summary, the Department requests that the following be addressed in the next annual report:

- Provide a progress update on the County's efforts to refine the map of the storm drain system
- Evaluate whether expanding the surveyed commercial and industrial areas would add potential significant polluters to the County's inventory
- Provide an update on the use of the visual survey inspection form and submit an example
- Continue to annually report training activities, education initiatives, and collaboration with the incorporated municipalities
- Continue to implement the standard operating procedures and report updates when applicable

The Department recognizes the substantial effort required to implement the illicit discharge detection and elimination program. This effort is essential in our mutual quest to protect local streams and the Chesapeake Bay. The Department commends Carroll County for its commitment to implement a successful program. If you have any questions regarding this review, please contact me at 410-537-3546, christina.lyerly@maryland.gov or Ray Bahr at 410-537-3545, raymond.bahr@maryland.gov.

Sincerely,



Christina M. Lyerly
Natural Resources Planner
Sediment, Stormwater, and Dam Safety Program

cc: Gale Engles, Carroll County Government
Glenn Edwards, Carroll County Government
Mary Dela Dewa, Maryland Department of the Environment

Appendix C

NPDES Commercial/Industrial Property Selection Methodology for Visual Surveys
Modified December 5, 2019

To identify specified properties within Carroll County, ArcGIS 10.3 was used to expand the Commercial/Industrial area inventory to a total of 875 properties per the following criteria.

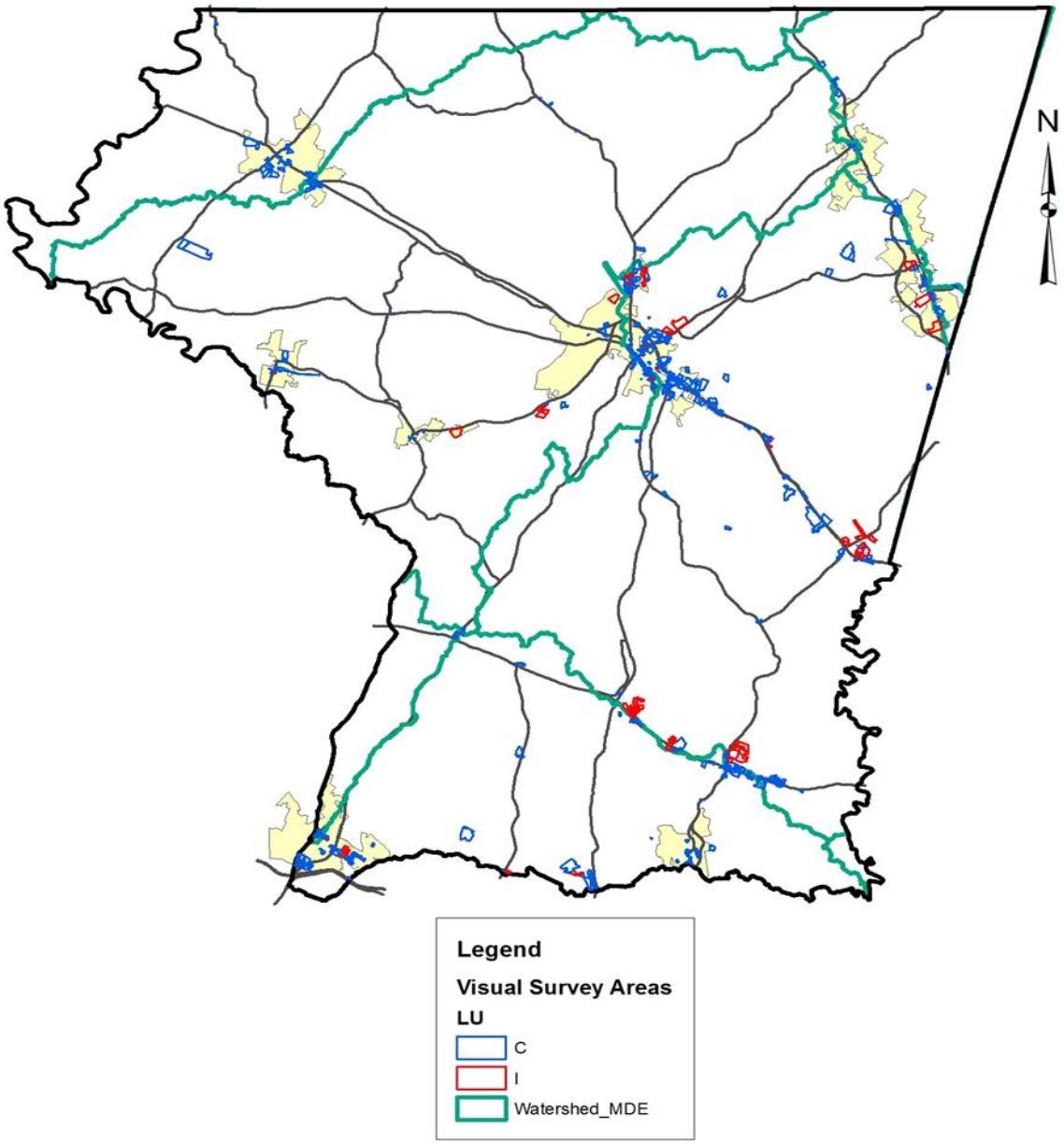
1. Commercial and Industrial parcels were selected from the Land Use category from MD SDAT property data to create a shape file. (No stream buffer or property size limits were used)

2. The shape file was then reduced by removing; unimproved and extractive parcels, and properties covered under MDE permits such as 12SW permits, etc. Non source properties such as; banks, churches, retirement communities and driving ranges were also removed.

3. Properties within 50' feet of a MS4 storm drain inflow feature, such as; inlets, trench drains, etc., were then extracted using the MS4 storm drain structures shape file attributes creating a final shape file containing 875 commercial and industrial parcels.

Carroll County MS4 Visual Survey Locations

Revised Criteria: 12/5/2019



Source: Carroll County MS4 Geodatabase (December 2019 (GE))

Appendix C

Standard Operating Procedures
MS4 - Annual Visual Survey of Commercial/Industrial Areas
Revised December 5, 2019

DISCOVER/DOCUMENT/ELIMINATE

1. Identify commercial/industrial land use areas that have the potential to contribute significant pollutants. Areas to be surveyed are determined and selected through GIS analysis based on parameters in the permit as described in "NPDES Commercial/Industrial Property Selection Methodology for Visual Surveys" (Appendix C). A geodatabase containing the list of areas to be surveyed will be maintained and managed by the County's Department of Land and Resource Management. Each survey will be tagged with a VS number (ex.VS-15-0001) from the Accela database system. Each property will have a unique ID number which will be the Tax ID number for the property.

2. Randomly selected commercial/industrial areas will be surveyed during the permit cycle. An aerial sketch with mapped storm drain systems, property lines, contours and streams of the area may be provided or electronic device with map referencing capability will be available for each survey. An excel spreadsheet or access database will be used to record each permit year's detailed results.

3. County Bureau of Resource Management Environmental Inspection Services Division staff and County NPDES Compliance staff will receive periodic IDDE training prior to performing field site visits. County NPDES Compliance staff will coordinate with municipal co-permittee personnel for surveys within their respective jurisdictions.

4. A "Carroll County Routine Visual Survey for Commercial/Industrial Areas" form will be filled out for each survey. Visual observations will be taken from locations generally accessible by the public. It is not an on-site inspection. Key activity areas to observe are; vehicle operations, loading/unloading areas and paved surfaces, waste management, and outdoor material storage. The survey should document the business type to determine if the business is a source for potential significant pollutants. Other observations are to include poor housekeeping/bmp practices for significant pollutants with potential to be exposed to stormwater runoff, illicit discharges, etc. Areas/properties not having a significant pollutant source will be removed from the visual survey geodatabase inventory.

5. Property or business owners with sites having exposed significant pollutants with the potential for discharge or an illicit discharge to the MS4 or local watercourse, will be contacted in person and/or by notification letter with appropriate corrective actions required per Carroll County Chapter 53 “Environmental Management of Storm Sewer Systems”. Sites with significant pollutant sources with no exposure but apparent poor housekeeping practices are sent letters w/good housekeeping best management practice brochures pertinent to their business activity. The Accela database tracking system will be used to document each Visual Survey with export capability to an Excel or Access Database to summarize survey results and actions taken.

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

2018 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-Permittee & Industrial Stormwater General Permit Holders
(Carroll County Public Safety Training Center ~ 50 Kate Wagner Road, Westminster, MD)

Friday, November 2, 2018

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

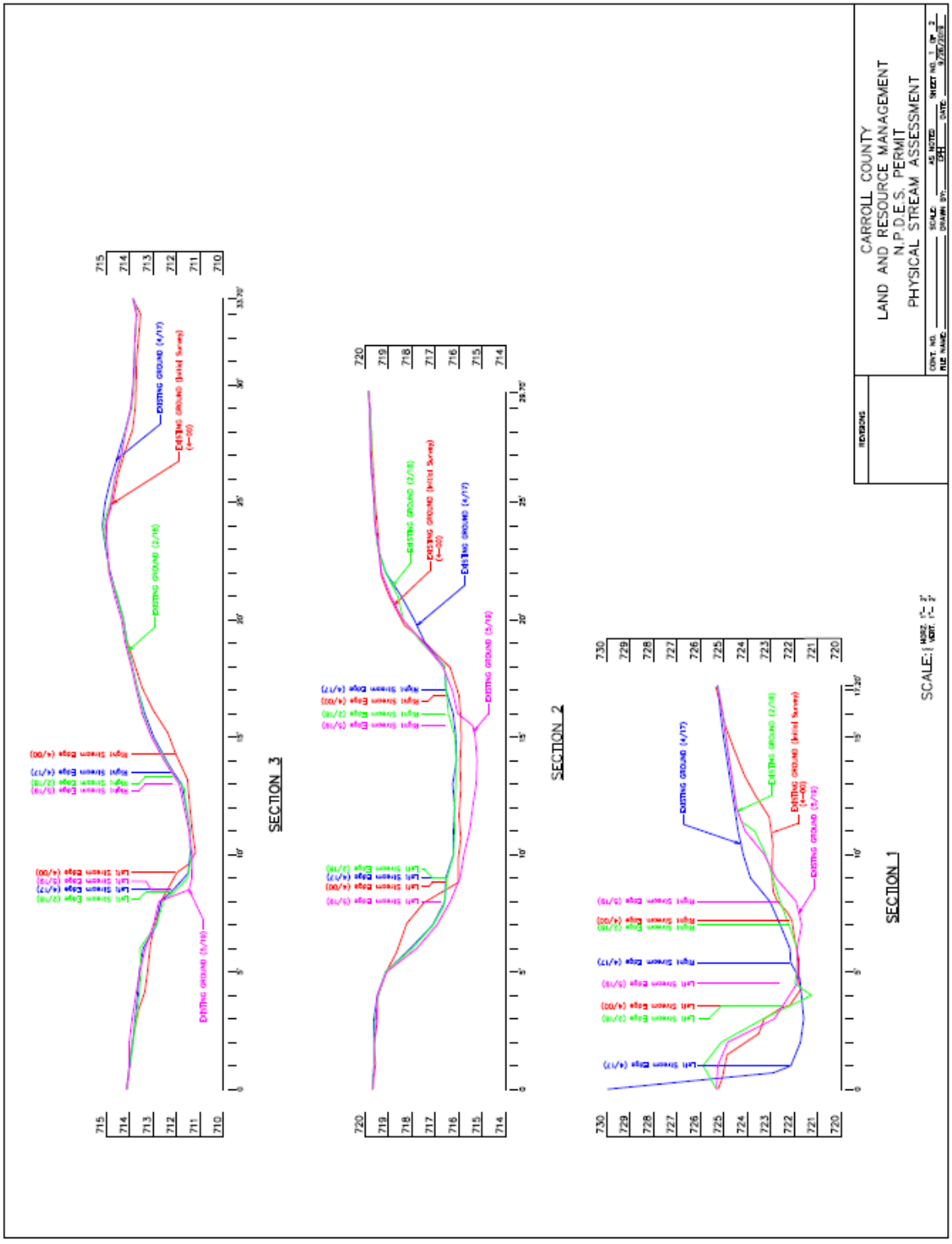
AGENDA

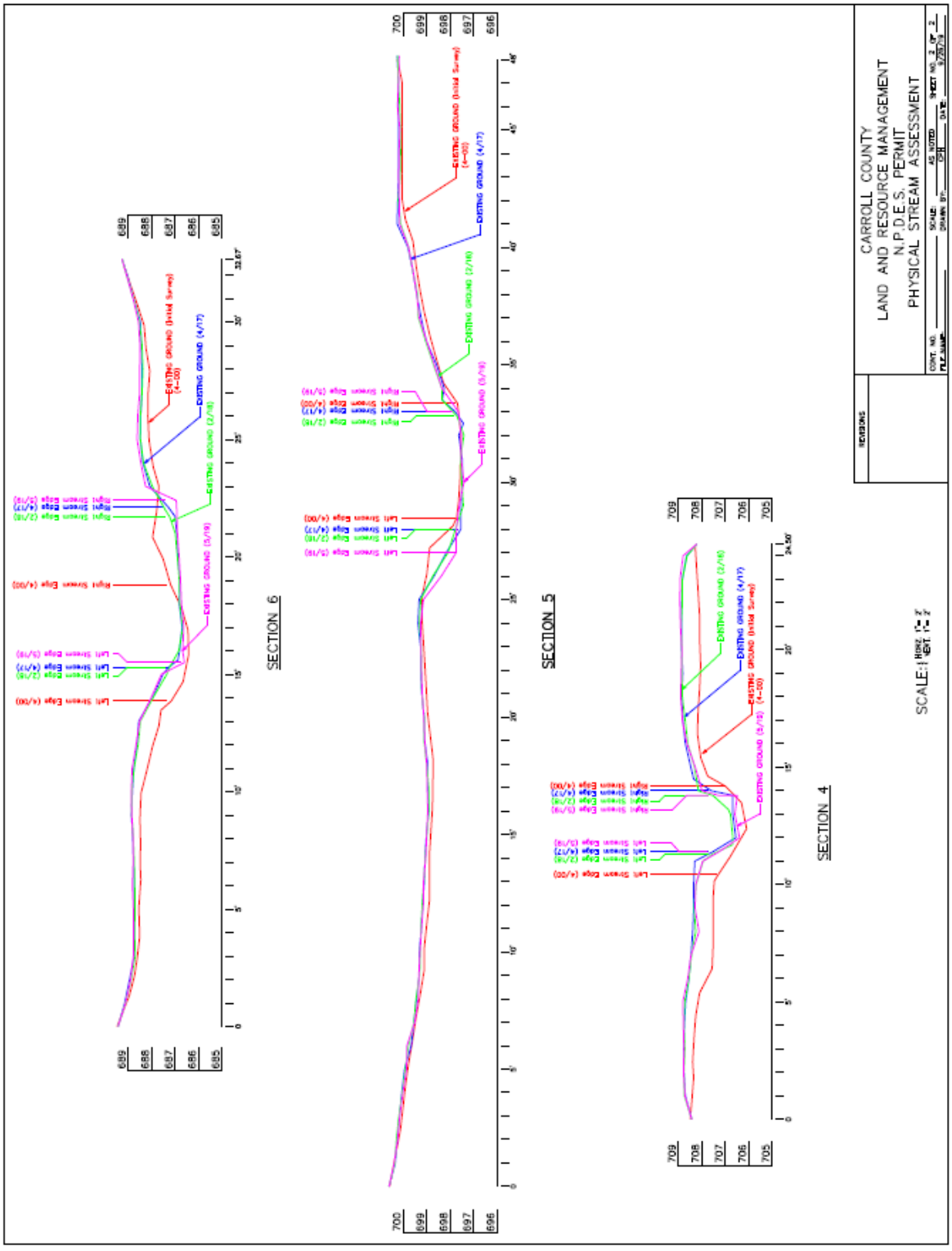
9:00 - 9:20AM	**Welcome, NPDES MS4 Permit Overview & Update** ▪ NPDES MS4 Permit ▪ Next Generation MS4 Permit & Anticipated Property Management and Maintenance Requirements	**Tom Devilbiss** Director, Carroll County Land & Resource Management CCLRM
9:20 - 9:25AM	**Employee Training Requirements & Resources** ▪ MS4 & 12SW Permits ▪ Training Resources	**Glenn Edwards** NPDES Compliance Specialist, CCLRM
9:25 - 9:50AM	**MS4 Stormwater Pollution Prevention BMP's, Spill Clean-Up Measures & Illicit Discharge Detection and Elimination** ▪ Stormwater Pollution Prevention Training Video - City of Richmond/DPW ▪ MS4 2018 IDDE Program Overview ▪ Reported Discharge Investigations	**Jo Reznik/Glenn Edwards** NPDES Compliance Specialists, CCLRM **Larry Bloom** Streets Superintendent, Department of Public Works, City of Westminster
	Break (10)	
10:00 - 10:20AM	**MD General Discharge Permit 11-HT Overview and Status** ▪ Potable Water Applications/Renewal of General Permit for Discharges from Tanks, Pipes, Other Liquid Containment Structures, Dewatering Activities, and Groundwater Remediation (Maryland General Permit No. 17-HT)	**Jonathan Rice** Regulatory Compliance Engineer/ Project Manager, MDE - Industrial Discharge Permits Division
10:20 - 11:00AM	**Maryland Statewide Salt Management Plan & Implementation**	**Russell (Russ) Yurek** Director of Maintenance MDOT State Highway Administration
	Break (15)	
11:15 - 11:30AM	**MS4 Property Management and Maintenance** ▪ 12SW Permit Renewal Status ▪ PMM Pollution Reduction Efforts through Maintenance Activities ▪ CC PMM Resource Guide – BMPs, Record Keeping and Reporting	**Glenn Edwards** NPDES Compliance Specialist, CCLRM
11:30 - 11:45AM	**Working Through a 12SW Permit Compliance Investigation** ▪ MDE Compliance Visit - Northern Landfill	**Dusty Hilbert** Chief, Bureau of Solid Waste, CCDPW
11:45	**Wrap Up / Q & A**	**Tom Devilbiss**

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
SECTION 1
SECTION 2
SECTION 3
EXISTING GROUND (4/17)
EXISTING GROUND (Initial Survey) (4-00)
EXISTING GROUND (2/18)
EXISTING GROUND (5/19)
Left Stream Edge (4/17)
Left Stream Edge (5/19)
Left Stream Edge (4/00)
Left Stream Edge (2/18)
Right Stream Edge (4/17)
Right Stream Edge (2/18)
Right Stream Edge (4/00)
Right Stream Edge (5/19)


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

Appendix E

2019 Macro-Invertebrate Taxonomic Identifications Results

Order	Family	Taxon	Outfall	Instream
Coleoptera	Dytiscidae	DYTISCIDAE	1	
Coleoptera	Elmidae	Optioservus		1
Coleoptera	Elmidae	Stenelmis	5	4
Coleoptera	Ptilodactylidae	Anchytarsus		1
Diptera	Chironomidae	Chaetocladius	1	
Diptera	Chironomidae	Cricotopus		11
Diptera	Chironomidae	Diamesa		3
Diptera	Chironomidae	DIAMESINAE		1
Diptera	Chironomidae	Eukiefferiella	7	5
Diptera	Chironomidae	Micropsectra	5	
Diptera	Chironomidae	Nanocladius	5	1
Diptera	Chironomidae	Orthocladiinae		4
Diptera	Chironomidae	Orthocladius	12	23
Diptera	Chironomidae	Parametriocnemus	2	3
Diptera	Chironomidae	Phaenopsectra	1	
Diptera	Chironomidae	Polypedilum	11	39
Diptera	Chironomidae	Rheocricotopus		10
Diptera	Chironomidae	Rheotanytarsus	5	4
Diptera	Chironomidae	Tanytarsus		2
Diptera	Chironomidae	Thienemannimyia Group	17	8
Diptera	Chironomidae	Tvetenia		1
Diptera	Empididae	Hemerodromia	1	
Diptera	Simuliidae	Simulium	1	2
Diptera	Tipulidae	Antocha		2
Haplotaxida	Enchytraeidae	ENCHYTRAEIDAE	1	
Haplotaxida	Naididae	NAIDIDAE	17	9
Trichoptera	Hydropsychidae	Cheumatopsyche		7
Trichoptera	Hydropsychidae	Hydropsyche		1
Trichoptera	Philopotamidae	Chimarra		3
Trichoptera	Uenoidae	Neophylax		1
Tricladida	Dugesiidae	Girardia	10	
Tubificida	Tubificidae	TUBIFICIDAE	26	
		Total Individuals	130	146
		Total Taxa	19	24

Appendix F

Chesapeake Bay and Local TMDL Reductions

Appendix F

Modeling with Mapshed

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

Model Description

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

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

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

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

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations
Prettyboy Watershed

Stormwater Facility Impervious Treatment– Prettyboy Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Whispering Valley	Retrofit	88.99	20.9	RR	1.76	15.3	319.7700	66%	212.0085	1.69	35.3210	77%	27.3713	0.44	9.1960	83%	7.6459
Small Crossings	Retrofit	26.73	9.07	RR	1.86	15.3	138.7710	67%	92.4176	1.69	15.3283	78%	11.9325	0.44	3.9908	84%	3.3342
Small Crossings	Bio-Retention	1.15	0.51	RR	1.00	15.3	7.8030	60%	4.6623	1.69	0.8619	70%	0.6025	0.44	0.2244	75%	0.1681

Stormwater Facility Pervious Treatment– Prettyboy Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Whispering Valley	Retrofit	88.99	68.09	RR	1.76	10.8	735.3720	66%	487.5540	0.43	29.2787	77%	22.6889	0.07	4.7663	83%	3.9629
Small Crossings	Retrofit	26.73	17.66	RR	1.86	10.8	190.7280	67%	127.0195	0.43	7.5938	78%	5.9115	0.07	1.2362	84%	1.0328
Small Crossings	Bio-Retention	1.15	0.64	RR	1.00	10.8	6.9120	60%	4.1299	0.43	0.2752	70%	0.1924	0.07	0.0448	75%	0.0336

Impervious to Pervious– Prettyboy Watershed

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

Buffer Plantings – Prettyboy Watershed

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

Catch Basin/Inlet Cleaning– Prettyboy Watershed

Location	Tons	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	8.6	3.5	30.100	1.4	12.040	420	3612	1.806
Manchester	0.674	3.5	2.359	1.4	0.944	420	283.08	0.142
		Total:	**32.4590**		**12.9836**		**3,895**	**1.948**

Forest Buffer Protection Easements– Prettyboy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	42.850	2009 -current	11.7	501.3450	45	225.6053	0.68	29.1380	40	11.6552	0.18	7.7130	55	4.2422

Grass Buffer Protection Easements– Prettyboy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	28.330	2009 -current	11.7	331.4610	30	99.43830	0.68	19.2644	40	7.7058	0.18	5.0994	55	2.8047

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Loch Raven Watershed

Catch Basin/Inlet Cleaning– Loch Raven Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	19.69	3.5	68.915	1.4	27.566	420	8269.8	4.135

Grass Buffer Protection Easements– Loch Raven Reservoir Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	6.230	2009 -current	11.7	72.8910	30	21.86730	0.68	4.2364	40	1.6946	0.18	1.1214	55	0.6168

Forest Buffer Protection Easements– Loch Raven Reservoir Watershed

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

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Lower Monocacy Watershed

Buffer Plantings – Lower Monocacy Watershed

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

Grass Buffer Protection Easements – Lower Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	0.680	2009 -current	11.7	7.9560	30	2.38680	0.68	0.4624	40	0.1850	0.18	0.1224	55	0.0673

Forest Buffer Protection Easements – Lower Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	0.980	2009 -current	11.7	11.4660	45	5.1597	0.68	0.6664	40	0.2666	0.18	0.1764	55	0.0970

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Upper Monocacy Watershed

Buffer Plantings – Upper Monocacy Watershed

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

Catch Basin/Inlet Cleaning– Upper Monocacy Watershed

Location	Tons	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Taneytown	0.08	3.5	0.280	1.4	0.112	420	33.6	0.017

Grass Buffer Protection Easements – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	13.770	2009 -current	11.7	161.1090	30	48.33270	0.68	9.3636	40	3.7454	0.18	2.4786	55	1.3632

Forest Buffer Protection Easements – Upper Monocacy Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	8.210	2009 -current	11.7	96.0570	45	43.2257	0.68	5.5828	40	2.2331	0.18	1.4778	55	0.8128

Stormwater Facility Impervious Treatment– Upper Monocacy Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Robert's Mill	Retrofit	303.6	88.48	ST	1.00	15.3	1353.7440	35%	473.1335	1.69	149.5312	55%	82.1225	0.44	38.9312	70%	27.2129

Stormwater Facility Pervious Treatment– Upper Monocacy Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Robert's Mill	Retrofit	303.6	215.12	ST	1.00	10.8	2323.2960	35%	811.9920	0.43	92.5016	55%	50.8019	0.07	15.0584	70%	10.5258

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Liberty Watershed

Catch Basin/Inlet Cleaning– Liberty Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hampstead	8.64	3.5	30.240	1.4	12.096	420	3628.8	1.814
Manchester	0.674	3.5	2.359	1.4	0.944	420	283.08	0.142
Westminster	0.49	3.5	1.715	1.4	0.686	420	205.8	0.103

Street Sweeping– Liberty Watershed

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

Grass Buffer Protection Easements – Liberty Reservoir Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	215.470	2009 -current	11.7	2520.9990	30	756.29970	0.68	146.5196	40	58.6078	0.18	38.7846	55	21.3315

Forest Buffer Protection Easements – Liberty Reservoir Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	273.490	2009 -current	11.7	3199.8330	45	1439.9249	0.68	185.9732	40	74.3893	0.18	49.2282	55	27.0755

Buffer Plantings – Liberty Watershed

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

Streambank Regeneration – Liberty Watershed

Location	Linear Feet	TN lbs reduced/linear ft	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/linear ft	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/linear ft	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Hickory Ridge	165	0.075	12.375	0.068	11.220	44.88	7405.2	3.703
Marriot Wood 1 Facility #2	150	0.075	11.250	0.068	10.200	44.88	6732	3.366
Edgewood Section 1	240	0.075	18.000	0.068	16.320	44.88	10771.2	5.386
Heritage Heights	510	0.075	38.250	0.068	34.680	44.88	22888.8	11.444
Westminster High School	416	0.075	31.200	0.068	28.288	44.88	18670.08	9.335
Central MD	960	0.075	72.000	0.068	65.280	44.88	43084.8	21.542
Hoff Pond	822	0.075	61.650	0.068	55.896	44.88	36891.36	18.446

Stormwater Facility Impervious Treatment– Liberty Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Marriot Wood 1 Facility #1	Retrofit	2.5	0.56	ST	1.00	15.3	8.5680	35%	2.9945	1.69	0.9464	55%	0.5198	0.44	0.2464	70%	0.1722
Hickory Ridge	Retrofit	23.75	4.8	ST	2.50	15.3	73.4400	39%	28.8729	1.69	8.1120	62%	5.0292	0.44	2.1120	79%	1.6645
Bateman SW Pond	Facility	47.25	4.52	RR	2.50	15.3	69.1560	68%	46.8186	1.69	7.6388	79%	6.0203	0.44	1.9888	85%	1.6885
Marriot Wood 1 Facility #2	Retrofit	7.12	2.04	ST	2.50	15.3	31.2120	39%	12.2710	1.69	3.4476	62%	2.1374	0.44	0.8976	79%	0.7074
Marriot Wood II	Retrofit	7.51	1.38	ST	2.50	15.3	21.1140	39%	8.3010	1.69	2.3322	62%	1.4459	0.44	0.6072	79%	0.4785
Elderwood Village	Retrofit	7.64	2.47	ST	2.50	15.3	37.7910	39%	14.8575	1.69	4.1743	62%	2.5879	0.44	1.0868	79%	0.8565
Westminster Airport Pond	Retrofit	204.84	85	ST	1.40	15.3	1300.5000	38%	489.0375	1.69	143.6500	59%	84.8894	0.44	37.4000	75%	28.1282
Oklahoma II Foothills	Retrofit	23.72	6.06	ST	2.35	15.3	92.7180	39%	36.3301	1.69	10.2414	62%	6.3218	0.44	2.6664	78%	2.0930
Oklahoma Phase I	Retrofit	24.44	7.27	ST	2.50	15.3	111.2310	39%	43.7305	1.69	12.2863	62%	7.6172	0.44	3.1988	79%	2.5210
Edgewood	Retrofit	38	12.12	ST	2.50	15.3	185.4360	39%	72.9042	1.69	20.4828	62%	12.6988	0.44	5.3328	79%	4.2029
Upper Patapsco Phase 1	Facility	24.6	10.1	ST	2.50	15.3	154.5300	39%	60.7535	1.69	17.0690	62%	10.5823	0.44	4.4440	79%	3.5024
Upper Patapsco Phase 2	Facility	101.8	2.98	ST	2.50	15.3	45.5940	39%	17.9253	1.69	5.0362	62%	3.1223	0.44	1.3112	79%	1.0334
Quail Meadowns	Retrofit	111.97	23.25	ST	1.00	15.3	355.7250	35%	124.3259	1.69	39.2925	55%	21.5794	0.44	10.2300	70%	7.1508
Heritage Heights	Retrofit	21.38	4.1	ST	1.00	15.3	62.7300	35%	21.9241	1.69	6.9290	55%	3.8054	0.44	1.8040	70%	1.2610
Westminster High School	Retrofit	117.25	32.59	ST	2.50	15.3	498.6270	39%	196.0352	1.69	55.0771	62%	34.1463	0.44	14.3396	79%	11.3013
Westminster Comm. Pond	Facility	250.22	63.89	ST	2.50	15.3	977.5170	39%	384.3108	1.69	107.9741	62%	66.9409	0.44	28.1116	79%	22.1553
Diamond Hills Section 5	Retrofit	51.8	12.94	ST	2.03	15.3	197.9820	39%	77.3732	1.69	21.8686	61%	13.4445	0.44	5.6936	78%	4.4534
Wilda Drive	Facility	6.75	1.6	ST	1.07	15.3	24.4800	36%	8.7093	1.69	2.7040	56%	1.5117	0.44	0.7040	71%	0.5009
Collins Estates	Retrofit	16.34	3.18	ST	1.87	15.3	48.6540	39%	18.9371	1.69	5.3742	61%	3.2891	0.44	1.3992	78%	1.0896
High Point	Retrofit	4.7	0.91	ST	1.00	15.3	13.9230	35%	4.8661	1.69	1.5379	55%	0.8446	0.44	0.4004	70%	0.2799
Willow Pond	Retrofit	601	72.75	ST	2.50	15.3	1113.0750	39%	437.6054	1.69	122.9475	62%	76.2240	0.44	32.0100	79%	25.2277
Finksburg Industrial Park	Retrofit	67.8	22.12	ST	1.04	15.3	338.4360	35%	119.5339	1.69	37.3828	56%	20.7477	0.44	9.7328	71%	6.8751
Elderwood/ Village Parcel	Retrofit	144	61	ST	1.01	15.3	933.3000	35%	327.0777	1.69	103.0900	55%	56.7714	0.44	26.8400	70%	18.8123
Oklahoma 4	Retrofit	56.93	14.52	RR	2.50	15.3	222.1560	68%	150.3996	1.69	24.5388	79%	19.3395	0.44	6.3888	85%	5.4240
Miller/Watts	Retrofit	39.65	25.63	ST	2.50	15.3	392.1390	39%	154.1694	1.69	43.3147	62%	26.8539	0.44	11.2772	79%	8.8878
Central MD (Wet)	Retrofit	92.72	25.83	ST	2.50	15.3	395.1990	39%	155.3725	1.69	43.6527	62%	27.0634	0.44	11.3652	79%	8.9571
Randomhouse	Retrofit	41.8	16.38	ST	2.50	16.3	266.9940	39%	104.9687	2.69	44.0622	62%	27.3173	1.44	23.5872	79%	18.5895
Central MD (Dry)	Retrofit	63.35	45	RR	2.50	15.3	688.5000	68%	466.1145	1.69	76.0500	79%	59.9364	0.44	19.8000	85%	16.8098
Eldersburg Business Center	Retrofit	97.98	52.7	ST	2.34	15.3	806.3100	39%	315.9077	1.69	89.0630	62%	54.9680	0.44	23.1880	78%	18.1993
Feeser Property	Facility	4.38	1.72	RR	1.00	15.3	26.3160	60%	15.7238	1.69	2.9068	70%	2.0319	0.44	0.7568	75%	0.5669
Shiloh Middle	Retrofit	83.83	25.64	RR	1.32	15.3	392.2920	64%	249.6827	1.69	43.3316	74%	32.2576	0.44	11.2816	80%	9.0031
Aspen Run	Retrofit	14.4	1.7	RR	1.30	15.3	26.0100	63%	16.5073	1.69	2.8730	74%	2.1327	0.44	0.7480	80%	0.5952

Stormwater Facility Pervious Treatment– Liberty Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Marriot Wood 1 Facility #1	Retrofit	2.5	1.94	ST	1.00	10.8	20.9520	35%	7.3227	0.43	0.8342	55%	0.4581	0.07	0.1358	70%	0.0949
Hickory Ridge	Retrofit	23.75	18.95	ST	2.50	10.8	204.6600	39%	80.4621	0.43	8.1485	62%	5.0518	0.07	1.3265	79%	1.0454
Bateman SW Pond	Facility	47.25	42.73	RR	2.50	10.8	461.4840	68%	312.4247	0.43	18.3739	79%	14.4808	0.07	2.9911	85%	2.5394
Marriot Wood 1 Facility #2	Retrofit	7.12	5.08	ST	2.50	10.8	54.8640	39%	21.5698	0.43	2.1844	62%	1.3543	0.07	0.3556	79%	0.2803
Marriot Wood II	Retrofit	7.51	6.13	ST	2.50	10.8	66.2040	39%	26.0281	0.43	2.6359	62%	1.6342	0.07	0.4291	79%	0.3382
Elderwood Village	Retrofit	7.64	5.17	ST	2.50	10.8	55.8360	39%	21.9519	0.43	2.2231	62%	1.3783	0.07	0.3619	79%	0.2852
Westminster Airport Pond	Retrofit	204.84	119.84	ST	1.40	10.8	1294.2720	38%	486.6955	0.43	51.5312	59%	30.4521	0.07	8.3888	75%	6.3091
Oklahoma II Foothills	Retrofit	23.72	17.66	ST	2.35	10.8	190.7280	39%	74.7337	0.43	7.5938	62%	4.6875	0.07	1.2362	78%	0.9704
Oklahoma Phase I	Retrofit	24.44	17.17	ST	2.50	10.8	185.4360	39%	72.9042	0.43	7.3831	62%	4.5773	0.07	1.2019	79%	0.9472
Edgewood	Retrofit	38	25.88	ST	2.50	10.8	279.5040	39%	109.8870	0.43	11.1284	62%	6.8993	0.07	1.8116	79%	1.4278
Upper Patapsco Phase 1	Facility	24.6	14.5	ST	2.50	10.8	156.6000	39%	61.5673	0.43	6.2350	62%	3.8655	0.07	1.0150	79%	0.7999
Upper Patapsco Phase 2	Facility	101.8	98.82	ST	2.50	10.8	1067.2560	39%	419.5917	0.43	42.4926	62%	26.3442	0.07	6.9174	79%	5.4517
Quail Meadowns	Retrofit	111.97	88.72	ST	1.00	10.8	958.1760	35%	334.8825	0.43	38.1496	55%	20.9518	0.07	6.2104	70%	4.3411
Heritage Heights	Retrofit	21.38	17.28	ST	1.00	10.8	186.6240	35%	65.2251	0.43	7.4304	55%	4.0808	0.07	1.2096	70%	0.8455
Westminster High School	Retrofit	117.25	84.66	ST	2.50	10.8	914.3280	39%	359.4681	0.43	36.4038	62%	22.5693	0.07	5.9262	79%	4.6705
Westminster Comm. Pond	Facility	250.22	186.33	ST	2.50	10.8	2012.3640	39%	791.1609	0.43	80.1219	62%	49.6733	0.07	13.0431	79%	10.2795
Diamond Hills Section 5	Retrofit	51.8	38.86	ST	2.03	10.8	419.6880	39%	164.0180	0.43	16.7098	61%	10.2730	0.07	2.7202	78%	2.1277
Wilda Drive	Facility	6.75	5.15	ST	1.07	10.8	55.6200	36%	19.7880	0.43	2.2145	56%	1.2380	0.07	0.3605	71%	0.2565
Collins Estates	Retrofit	16.34	13.16	ST	1.87	10.8	142.1280	39%	55.3190	0.43	5.6588	61%	3.4633	0.07	0.9212	78%	0.7174
High Point	Retrofit	4.7	3.79	ST	1.00	10.8	40.9320	35%	14.3057	0.43	1.6297	55%	0.8950	0.07	0.2653	70%	0.1854
Willow Pond	Retrofit	601	528.25	ST	2.50	10.8	5705.1000	39%	2242.9601	0.43	227.1475	62%	140.8251	0.07	36.9775	79%	29.1427
Finksburg Industrial Park	Retrofit	67.8	45.68	ST	1.04	10.8	493.3440	35%	174.2466	0.43	19.6424	56%	10.9016	0.07	3.1976	71%	2.2587
Elderwood Village	Retrofit	144	83	ST	1.01	10.8	896.4000	35%	314.1460	0.43	35.6900	55%	19.6544	0.07	5.8100	70%	4.0723
Oklahoma 4	Retrofit	56.93	42.41	RR	2.50	11.8	500.4380	68%	338.7965	1.43	60.6463	79%	47.7965	1.07	45.3787	85%	38.5257
Miller/Watts	Retrofit	39.65	14.02	ST	2.50	10.8	151.4160	39%	59.5292	0.43	6.0286	62%	3.7376	0.07	0.9814	79%	0.7735
Central MD (Wet)	Retrofit	92.72	66.89	ST	2.50	10.8	722.4120	39%	284.0163	0.43	28.7627	62%	17.8321	0.07	4.6823	79%	3.6902
Randomhouse	Retrofit	41.8	25.42	RR	2.50	10.8	274.5360	39%	107.9338	0.43	10.9306	62%	6.7767	0.07	1.7794	79%	1.4024
Central MD (Dry)	Retrofit	63.35	18.35	RR	2.50	10.8	198.1800	68%	134.1679	0.43	7.8905	79%	6.2187	0.07	1.2845	85%	1.0905
Eldersburg Business Center	Retrofit	97.98	45.28	ST	2.34	10.8	489.0240	39%	191.5969	0.43	19.4704	62%	12.0168	0.07	3.1696	78%	2.4877
Feeser Property	Facility	4.38	2.66	RR	1.00	10.8	28.7280	60%	17.1650	0.43	1.1438	70%	0.7995	0.07	0.1862	75%	0.1395
Shiloh Middle	Retrofit	83.83	58.19	RR	1.32	10.8	628.4520	64%	399.9918	0.43	25.0217	74%	18.6270	0.07	4.0733	80%	3.2506
Aspen Run	Retrofit	14.4	12.7	RR	1.30	10.8	137.1600	63%	87.0486	0.43	5.4610	74%	4.0539	0.07	0.8890	80%	0.7074

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

Double Pipe Creek Watershed

Stormwater Facility Impervious Treatment– Double Pipe Creek Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Sunnyside	Facility	30.2	2.69	ST	1.91	15.3	41.1570	39%	16.0402	1.69	4.5461	61%	2.7862	0.44	1.1836	78%	0.9230
Friendship Overlook	Retrofit	82.01	15.88	ST	1.68	15.3	242.9640	39%	93.6804	1.69	26.8372	61%	16.2656	0.44	6.9872	77%	5.3891
CC Farm Museum	Facility	6.44	0.45	RR	1.40	15.3	6.8850	64%	4.4280	1.69	0.7605	75%	0.5720	0.44	0.1980	81%	0.1597
Farm Museum 1	Facility	11.61	2.3	RR	1.44	15.3	35.1900	65%	22.7374	1.69	3.8870	76%	2.9367	0.44	1.0120	81%	0.8198
Farm Museum 2	Facility	0.09	0.05	RR	1.00	15.3	0.7650	60%	0.4571	1.69	0.0845	70%	0.0591	0.44	0.0220	75%	0.0165
Farm Museum 3	Facility	0.79	0.06	RR	1.00	15.3	0.9180	60%	0.5485	1.69	0.1014	70%	0.0709	0.44	0.0264	75%	0.0198
Farm Museum 4	Facility	0.03	0.03	RR	1.00	15.3	0.4590	60%	0.2743	1.69	0.0507	70%	0.0354	0.44	0.0132	75%	0.0099
Farm Museum 5	Facility	0.01	0.01	RR	1.00	15.3	0.1530	60%	0.0914	1.69	0.0169	70%	0.0118	0.44	0.0044	75%	0.0033
CC Maintenance	Retrofit	45.49	25.05	ST	2.50	15.3	383.2650	39%	150.6806	1.69	42.3345	62%	26.2462	0.44	11.0220	79%	8.6866
Blue Ridge Manor	Retrofit	36.28	9.26	RR	1.86	15.3	141.6780	67%	94.3535	1.69	15.6494	78%	12.1825	0.44	4.0744	84%	3.4041
Exceptional Center	Retrofit	46.5	14.7	ST	1.51	15.3	224.9100	38%	85.5642	1.69	24.8430	60%	14.8537	0.44	6.4680	76%	4.9216
Langdon	Facility	194	92.1	ST	1.00	15.3	1409.1300	35%	492.4909	1.69	155.6490	55%	85.4824	0.44	40.5240	70%	28.3263
Elmer Wolfe	Facility	9.78	4.26	ST	1.40	15.3	65.1780	38%	24.5094	1.69	7.1994	59%	4.2545	0.44	1.8744	75%	1.4097

Stormwater Facility Pervious Treatment– Double Pipe Creek Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Sunnyside	Facility	30.2	27.51	ST	1.91	10.8	297.1080	39%	115.7926	0.43	11.8293	61%	7.2500	0.07	1.9257	78%	1.5017
Friendship Overlook	Retrofit	82.01	66.13	ST	1.68	10.8	714.2040	39%	275.3779	0.43	28.4359	61%	17.2345	0.07	4.6291	77%	3.5704
Farm Museum	Facility	6.44	5.99	RR	1.40	10.8	64.6920	64%	41.6061	0.43	2.5757	75%	1.9372	0.07	0.4193	81%	0.3381
Farm Museum 1	Facility	11.61	9.31	RR	1.44	10.8	100.5480	65%	64.9674	0.43	4.0033	76%	3.0246	0.07	0.6517	81%	0.5279
Farm Museum 2	Facility	0.09	0.04	RR	1.00	10.8	0.4320	60%	0.2581	0.43	0.0172	70%	0.0120	0.07	0.0028	75%	0.0021
Farm Museum 3	Facility	0.79	0.73	RR	1.00	10.8	7.8840	60%	4.7107	0.43	0.3139	70%	0.2194	0.07	0.0511	75%	0.0383
Farm Museum 4	Facility	0.03	0	RR	1.00	10.8	0.0000	60%	0.0000	0.43	0.0000	70%	0.0000	0.07	0.0000	75%	0.0000
Farm Museum 5	Facility	0.01	0	RR	1.00	10.8	0.0000	60%	0.0000	0.43	0.0000	70%	0.0000	0.07	0.0000	75%	0.0000
CC Maintenance	Retrofit	45.49	20.44	ST	2.50	10.8	220.7520	39%	86.7886	0.43	8.7892	62%	5.4491	0.07	1.4308	79%	1.1276
Blue Ridge Manor	Retrofit	36.28	27.02	RR	1.86	10.8	291.8160	67%	194.3412	0.43	11.6186	78%	9.0447	0.07	1.8914	84%	1.5802
Exceptional Center	Retrofit	46.5	31.8	ST	1.51	10.8	343.4400	38%	130.6575	0.43	13.6740	60%	8.1757	0.07	2.2260	76%	1.6938
Langdon	Facility	194	101.9	ST	1.00	10.8	1100.5200	35%	384.6317	0.43	43.8170	55%	24.0643	0.07	7.1330	70%	4.9860
Elmer Wolfe	Facility	9.78	5.52	ST	1.40	10.8	59.6160	38%	22.4179	0.43	2.3736	59%	1.4027	0.07	0.3864	75%	0.2906

Streambank Regeneration – 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)
Blue Ridge Manor	220	0.075	16.500	0.068	14.960	44.8	9856	4.928

Catch Basin/Inlet Cleaning– Double Pipe Creek Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Union Bridge	0.44	3.5	1.540	1.4	0.616	420	184.8	0.092
County	0.4	3.5	1.400	1.4	0.560	420	168	0.084
Westminster	0.49	3.5	1.715	1.4	0.686	420	205.8	0.103

Street Sweeping– Double Pipe Creek Watershed

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

Buffer Plantings – Double Pipe Creek Watershed

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

Grass Buffer Protection Easements – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	116.930	2009 -current	11.7	1368.0810	30	410.42430	0.68	79.5124	40	31.8050	0.18	21.0474	55	11.5761

Forest Buffer Protection Easements – Double Pipe Creek Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	54.790	2009 -current	11.7	641.0430	45	288.4694	0.68	37.2572	40	14.9029	0.18	9.8622	55	5.4242

Chesapeake Bay TMDL Edge-of-Stream Load Reduction Calculations

South Branch Patapsco Watershed

Buffer Plantings – South Branch Patapsco Watershed

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

Streambank Regeneration – 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)
Carroltonwe 2A	1100	0.075	82.500	0.068	74.800	44.8	49280	24.640
Eledersburg Estates 3-5	600	0.075	45.000	0.068	40.800	44.8	26880	13.440
Shannon Run	680	0.075	51.000	0.068	46.240	44.8	30464	15.232

Catch Basin/Inlet Cleaning– South Branch Patapsco Watershed

Location	Tons*	TN lbs reduced/ton	TN Pollutant Loads Reduced (lbs)	TP lbs reduced/ton	TP Pollutant Loads Reduced (lbs)	TSS lbs reduced/ton	TSS Pollutant Loads Reduced (lbs)	TSS Pollutant Loads Reduced (Tons)
Sykesville	0.25	3.5	0.875	1.4	0.350	420	105	0.053

Grass Buffer Protection Easements – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Grass Buffer 2009-Current	69.640	2009 -current	11.7	814.7880	30	244.43640	0.68	47.3552	40	18.9421	0.18	12.5352	55	6.8944

Forest Buffer Protection Easements – South Branch Patapsco Watershed

Subdivision	Acres	Recorded Date	TN Pollutant Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Forest Buffer 2009-Current	106.140	2009 -current	11.7	1241.8380	45	558.8271	0.68	72.1752	40	28.8701	0.18	19.1052	55	10.5079

Stormwater Facility Impervious Treatment– South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac)	Impervious Area (Acres)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Arthurs Ridge	Retrofit	51.17	5.14	ST	2.13	15.3	78.6420	39%	30.7707	1.69	8.6866	62%	5.3487	0.44	2.2616	78%	1.7715
South Carroll High-Fine Arts	New construction	24.22	12.94	RR	1.00	15.3	197.9820	60%	118.2942	1.69	21.8686	70%	15.2862	0.44	5.6936	75%	4.2651
Brimfield	Retrofit	34.69	9.15	RR	2.50	15.3	139.9950	68%	94.7766	1.69	15.4635	79%	12.1871	0.44	4.0260	85%	3.4180
Harvest Farms 1A	Retrofit	43.8	11.25	ST	1.00	15.3	172.1250	35%	60.1577	1.69	19.0125	55%	10.4417	0.44	4.9500	70%	3.4601
Parrish Park	Retrofit	94.23	18.2	ST	1.00	15.3	278.4600	35%	97.3218	1.69	30.7580	55%	16.8923	0.44	8.0080	70%	5.5976
Clipper Hills Gardenia	Retrofit	33.19	11.08	ST	2.50	15.3	169.5240	39%	66.6484	1.69	18.7252	62%	11.6091	0.44	4.8752	79%	3.8422
Clipper hills Hilltop	Retrofit	80.17	18.54	ST	2.50	15.3	283.6620	39%	111.5217	1.69	31.3326	62%	19.4253	0.44	8.1576	79%	6.4292
Carroltowne 2B	Retrofit	34.61	10.38	ST	2.50	15.3	158.8140	39%	62.4377	1.69	17.5422	62%	10.8757	0.44	4.5672	79%	3.5995
Carroltowne 2A	Retrofit	87.73	34.43	ST	2.49	15.3	526.7790	39%	207.0259	1.69	58.1867	62%	36.0580	0.44	15.1492	79%	11.9343
Benjamins Claim	Retrofit	47.1	15.78	ST	2.21	15.3	241.4340	39%	94.5156	1.69	26.6682	62%	16.4347	0.44	6.9432	78%	5.4426
Eldersburg Estates 3-5	Retrofit	34.91	8.16	ST	2.50	15.3	124.8480	39%	49.0840	1.69	13.7904	62%	8.5497	0.44	3.5904	79%	2.8297
Braddock Manor West	Retrofit	49.3	7.65	ST	2.50	15.3	117.0450	39%	46.0162	1.69	12.9285	62%	8.0153	0.44	3.3660	79%	2.6528
Benjamins Claim Basin B	Retrofit	1.33	0.55	ST	1.04	15.3	8.4150	35%	2.9721	1.69	0.9295	56%	0.5159	0.44	0.2420	71%	0.1709
Hawks Ridge	Retrofit	63.48	19.8	ST	2.07	15.3	302.9400	39%	118.4601	1.69	33.4620	62%	20.5866	0.44	8.7120	78%	6.8188
Merridale Gardens	Retrofit	81	23.81	RR	1.77	15.3	364.2930	66%	241.6521	1.69	40.2389	78%	31.1985	0.44	10.4764	83%	8.7152
Shannon Run	Retrofit	213.5	34.1	ST	2.50	15.3	521.7300	39%	205.1181	1.69	57.6290	62%	35.7284	0.44	15.0040	79%	11.8249

Stormwater Facility Pervious Treatment– South Branch Patapsco Watershed

Project	Project Type	Drainage Area (Ac)	Pervious Area (Ac)	Practice Type	Runoff depth treated (In.)	TN Pollutant Runoff Load	Total Loads (lbs)	TN BMP Efficiency (%)	TN Pollutant Loads Reduced (lbs)	TP Pollutant Load	Total Loads (lbs)	TP BMP Efficiency	TP Pollutant Loads Reduced (lbs)	TSS Pollutant Load	Total Loads (tons)	TSS BMP Efficiency	TSS Pollutant Loads Reduced (Tons)
Arthurs Ridge	Retrofit	51.17	46.03	ST	2.13	10.8	497.1240	39%	194.5127	0.43	19.7929	62%	12.1873	0.07	3.2221	78%	2.5238
South Carroll High-Fine Arts	New construction	24.22	11.28	RR	1.00	10.8	121.8240	60%	72.7898	0.43	4.8504	70%	3.3904	0.07	0.7896	75%	0.5915
Brimfield	Retrofit	34.69	25.54	RR	2.50	10.8	275.8320	68%	186.7383	0.43	10.9822	79%	8.6553	0.07	1.7878	85%	1.5178
Harvest Farms 1A	Retrofit	43.8	32.55	ST	1.00	10.8	351.5400	35%	122.8632	0.43	13.9965	55%	7.6869	0.07	2.2785	70%	1.5927
Parrish Park	Retrofit	94.23	76.03	ST	1.00	10.8	821.1240	35%	286.9828	0.43	32.6929	55%	17.9549	0.07	5.3221	70%	3.7201
Clipper Hills Gardenia	Retrofit	33.19	22.11	ST	2.50	10.8	238.7880	39%	93.8795	0.43	9.5073	62%	5.8943	0.07	1.5477	79%	1.2198
Clipper hills Hilltop	Retrofit	80.17	61.63	ST	2.50	10.8	665.6040	39%	261.6822	0.43	26.5009	62%	16.4298	0.07	4.3141	79%	3.4000
Carroltowne 2B	Retrofit	34.61	24.23	ST	2.50	10.8	261.6840	39%	102.8811	0.43	10.4189	62%	6.4594	0.07	1.6961	79%	1.3367
Carroltowne 2A	Retrofit	87.73	53.3	ST	2.49	10.8	575.6400	39%	226.2284	0.43	22.9190	62%	14.2028	0.07	3.7310	79%	2.9392
Benjamins Claim	Retrofit	47.1	31.32	ST	2.21	10.8	338.2560	39%	132.4190	0.43	13.4676	62%	8.2996	0.07	2.1924	78%	1.7186
Eldersburg Estates 3-5	Retrofit	34.91	26.75	ST	2.50	10.8	288.9000	39%	113.5810	0.43	11.5025	62%	7.1312	0.07	1.8725	79%	1.4758
Braddock Manor West	Retrofit	49.3	41.65	ST	2.50	10.8	449.8200	39%	176.8467	0.43	17.9095	62%	11.1034	0.07	2.9155	79%	2.2978
Benjamins Claim Basin B	Retrofit	1.33	0.78	ST	1.04	10.8	8.4240	35%	2.9753	0.43	0.3354	56%	0.1861	0.07	0.0546	71%	0.0386
Hawks Ridge	Retrofit	63.48	43.68	ST	2.07	10.8	471.7440	39%	184.4683	0.43	18.7824	62%	11.5554	0.07	3.0576	78%	2.3932
Merridale Gardens	Retrofit	81	57.19	RR	1.77	10.8	617.6520	66%	409.7167	0.43	24.5917	78%	19.0667	0.07	4.0033	83%	3.3303
Shannon Run	Retrofit	213.5	179.4	ST	2.50	10.8	1937.5200	39%	761.7360	0.43	77.1420	62%	47.8259	0.07	12.5580	79%	9.8972

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 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Lower Monocacy Watershed	35.02	<1%	307.19	**3.34%**
Upper Monocacy Watershed	473.39	4.63%	469.79	**9.22%**
Double Pipe Creek Watershed	855.30	8.36%	593.77	**14.16%**
Total	**1,363.71**	**13.33%**	**1,370.75**	**26.72%**

Gunpowder River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Loch Raven Reservoir Watershed	14.645	3.81%	0	**3.81%**
Prettyboy Reservoir Watershed	68.25	17.75%	49.08	**30.51%**
Total	**82.895**	**21.56%**	**49.08**	**34.32%**

Patapsco River Segment

8-Digit Watershed	Total Nitrogen (TN)			
	Reduction from BMPs Implemented 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	663.32	29.98%	285.73	**42.89%**
Total	**663.32**	**29.98%**	**285.73**	**42.89%**

Chesapeake Bay TMDL
Restoration Progress – Phosphorus

Potomac River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Lower Monocacy Watershed	2.11	<1%	31.83	**1.5%**
Upper Monocacy Watershed	69.73	3.13%	57.11	**5.69%**
Double Pipe Creek Watershed	152.95	6.86%	266.16	**18.80%**
Total	**224.79**	**10.09%**	**355.10**	**25.99%**

Gunpowder River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Loch Raven Reservoir Watershed	10.555	19.47%	0	**19.47%**
Prettyboy Reservoir Watershed	8.42	15.53%	7.26	**28.92%**
Total	**18.975**	**35.00%**	**7.26**	**48.39%**

Patapsco River Segment

8-Digit Watershed	Total Phosphorus (TP)			
	Reduction from BMPs Implemented 2009-2019 (lbs.)	% Bay TMDL Reduced by BMPs 2009-2019	Reduction from Planned BMPs Implemented 2020-2025 (lbs.)	**% Bay TMDL Reduced by Implemented and Planned BMPs 2009-2025**
Liberty Reservoir Watershed	0	0%	0	**0%**
South Branch Patapsco Watershed	181.53	29.37%	104.41	**46.27%**
Total	**181.53**	**29.37%**	**104.41**	**46.27%**

Appendix G

Discrepancies Between Documentation and the Geodatabase Design

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

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

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

1. PermitInfo, Associated Table

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

2. Outfall, Feature Class

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

3. OutfallDrainage Area, Feature Class

No issues found at this time.

4. BMPPOI, Feature Class

No issues found at this time.

5. BMP, Associated Table

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

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

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

6. BMPDrainageArea, Feature Class

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

7. ImperviousSurface, Associated Table

No issues found at this time.

8. MonitoringSite, Feature Class

No issues found at this time.

9. MonitoringDrainageArea, Feature Class

No issues found at this time.

10. AltBMPLine, Feature Class

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

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

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

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

11. StrRestProtocols, Associated Table

No issues found at this time.

12. ShorelineManagementPractices, Associated Table

No issues found at this time.

13. AltBMPPoint, Feature Class

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

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

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

14. AltBMPPoly, Feature Class

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

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

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

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

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

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

15. RestBMP, Feature Class

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

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

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

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

16. SWM, Associated Table

No issues found at this time.

17. BMPInspections, Associated Table

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

18. AltBMPLineInspections, Associated Table

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

19. AltBMPPointInspections, Associated Table

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

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

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

20. AltBMPPolyInspections, Associated Table

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

21. RestBMPInspections, Associated Table

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

22. ErosionSedimentControl, Associated Table

No issues found at this time.

23. QuarterlyGradingPermits, Feature Class

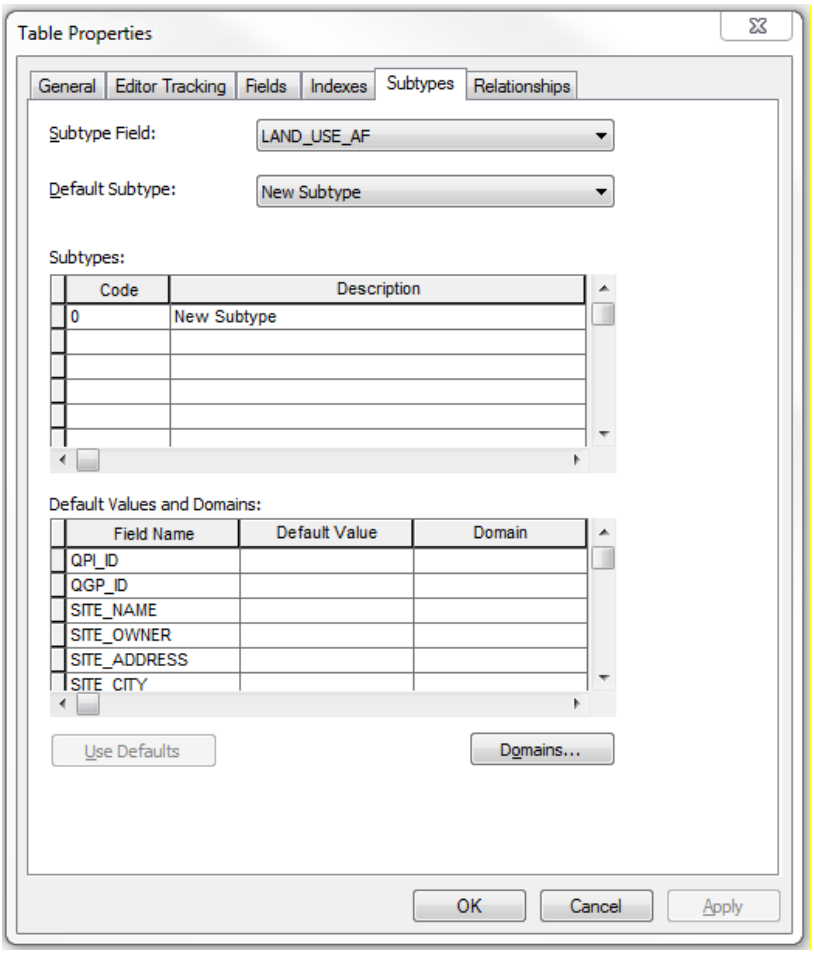
The PERMIT_NUM field is noted in the user's guide as being a mandatory data point. However, the schema in the geodatabase allows for null values. Every other table and feature class within MDE's geodatabase has this field as mandatory. This is an error with the geodatabase's schema that needs to be corrected.

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

24. QuarterlyGradingPmtInfo, Associated Table

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

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



25. RespPersonnelCertInfo, Associated Table

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

26. IDDE, Associated Table

No issues found at this time.

27. MunicipalFacilities, Feature Class

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

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

28. ChemicalApplication, Associated Table

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

29. CountywideStormwaterWatershedAssessment, Associated Table

No issues found at this time.

30. LocalStormwaterWatershedAssessment, Associated Table

No issues found at this time.

31. ChemicalMonitoring, Associated Table

No issues found at this time.

32. LocalConcern, Associated Table

No issues found at this time.

33. Biological Monitoring, Associated Table

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

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

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

34. FiscalAnalyses, Associated Table

No issues found at this time.

35. NarrativeFiles, Associated Table

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

Appendix H

Town of Mt. Airy Phase II Permit Requirements

APPENDIX H

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

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

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

Purpose and Background:

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

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

Impervious Acreage Baseline:

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

	Frederick County Side of Mt. Airy	
	Area	**Acres**
	Total Impervious Area	197
-	Treated Impervious Acres (IA)	66
	Untreated IA	***131***
	Restoration Requirement = 20% of Untreated IA	***26***
	Projects to Date	
	Twin Ridge	17.65
	East/West Pond	48.55
	Total Planned IA	***66.20***

Restoration Planning and Implementation:

The Town of Mt. Airy has been working very closely with the Bureau of Resource Management on their restoration efforts at 2 locations. In the fall 2016, the Town identified 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 and a facility with a large amount of untreated impervious acreage. Engineering began in October, and the facility should be approved for construction in January 2020. The Town is on board with a late spring, early summer 2020 construction with construction wrapping up in the fall 2020.

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 means 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 areas. This facility is currently in design and is proposed on a parcel owned by the Town located off Prospect Road. This project received grant funds from the MDE Bay Restoration Fund and will start construction in early summer 2020. The budget information listed below is to cover the engineering costs associated with the project. The Town of Mt. Airy will be including construction costs in their Fiscal Year 2021 budget.

This chart provides information for restoration efforts relating to the Phase II permit requirements.

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

Year	Project Name	Project Type	Project Status	Budget	Impervious Area Credit	MDE Watershed
2020	Twin Ridge	Retrofit	Construction	$900,000.00	17.65	Lower Monocacy
2021	East West Pond	New Construction	Design	$100,000.00	48.55	Lower Monocacy

Minimum Control Measures:

Multiple meetings were coordinated and held in July and October 2019 at the Town of Mount Airy with municipal and County staff to review and compare Restoration and Minimum Control Measures in the Phase II permit to the County Phase I permit.

Report discussion covering Part IV. Minimum Control Measures A. through F. can primarily be found in the correlating sections of the main report with additional comments as noted in the table below.

MCM Cross Reference Table

Phase II Minimum Control Measure (MCM)	CC Phase I MS4 Report Section Part IV. Standard Permit Conditions D. Management Programs	Comment
A. Public Education and Outreach	6. Public Education, 5. PMM (Staff Training)	
B. Public Involvement and Participation	6. Public Education, 4. Litter and Floatables	Future project opportunities discussed
C. Illicit Discharge Detection and Elimination (IDDE)	3. Illicit Discharge Detection and Elimination (IDDE)	IDDE Manual on CD
D. Construction Site Stormwater Runoff Control	2. Erosion and Sediment Control	
E. Post Construction Stormwater Management	1. Stormwater Management	
F. Pollution Prevention and Good Housekeeping	5. Property Management and Maintenance	Mount Airy Public Works Maintenance Shop (12SW/SWPPP) Municipal Property Management and Maintenance / Stormwater Pollution Prevention BMP Guidance Manual on CD

Correspondence

Maryland
Department of
the Environment

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

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

October 17, 2019

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

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

Attention:

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

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

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

Sincerely,

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

Attachment

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

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

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

FYI

Gale

Sent from my iPhone

Begin forwarded message:

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

Hi David,

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

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

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

Debbie

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

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

October 15, 2019

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

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

Dear Ms. Cappuccitti:

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

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

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

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

Sincerely:

David Warrington
Town Administrator
Town of Mt. Airy

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

cc: Gale Engles, Bureau Chief
Resource Management

Maryland
Department of
the Environment

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

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

November 29, 2018

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

RE: Notice of Intent Approval letter

Dear Town Administrator Weierbach:

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

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

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

Regards,

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

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www.mde.maryland.gov

Maryland
Department of
the Environment

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

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

April 27, 2018

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

RE: Designation Letter

Dear Ms. Weierbach:

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

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

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

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

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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

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

Appendix I

Floodplain and Water Resource Easement Documents

Land Records of Carroll County. The Deed of Trust is dated July 21, 2017, and recorded among the Land Records of Carroll County in Book No. 8758, Page 389 &c.; and

WHEREAS, Lender, Lien Guarantor, and Beneficiary, join herein for the purpose of assenting to this document and by such joinder do hereby agree to subject any sales of the aforementioned Lots on foreclosure, to the legal operation and effect hereof.

NOW THEREFORE, THIS DEED OF EASEMENT WITNESSETH, that for and in consideration of the premises and other good and valuable consideration, the receipt whereof is hereby acknowledged, the Grantor, Lender, Lien Guarantor, and Beneficiary, do grant, release and confirm unto Grantee, a **forested water resource protection easement** in, on, over and under so much of Grantor's property as is shown on a Plat entitled **"RUSTIC RISING" (6 Sheets),** and identified thereon as **"WATER RESOURCE PROTECTION EASEMENT",** which Plat is to be recorded among the Land Records of Carroll County simultaneously herewith at Plat Book No. 55, Pages 109 through 114; so that said property is subject to the covenants, conditions, limitations and restrictions hereafter set forth, so as to constitute an equitable servitude upon the land.

BEING an easement over a portion of the land conveyed unto the Grantor by Deed which is dated July 21, 2017, from Sabeeh Ahmed Amin (A/K/A Sabeeh Ahmed Amin Hamad) and Georgette Sabeeh Amin (A/K/A Georgette Ibrahim Al-Semaan), husband and wife, by and through their attorney-in-fact. Said Deed is recorded among the Land Records of Carroll County in Book No. 8754, Page 289 &c.

AND the Grantor covenants for and on behalf of Grantor with the Grantee to do and refrain from doing upon the above described land all and any of the various acts hereafter set forth, it being the intention of the parties that the said land shall be preserved in a condition which acts to protect the public water supply source. Furthermore, it is the intent of the parties that these covenants be deemed to be and are construed as real covenants running with the land. All subsequent purchasers of the lots burdened by the easement shall assume the position of "Grantor" for the purposes of this easement at the time of sale.

AND the parties further covenant and agree as follows:

1. That the following structures, practices, and activities are prohibited within the easement:

a. Soil disturbance by filling, grading, stripping of topsoil, plowing, cultivating, or other practices.

b. Storing or dumping of any material, including but not limited to yard waste, appliances, automobiles, garbage, trash, chemicals, pesticides, or construction debris.

c. Storing maintaining, or operating motorized vehicles except on designated roadways and driveways or for emergency use and maintenance; except as otherwise authorized herein.

d. Housing, grazing, or otherwise maintaining domestic animals to include activities involving the construction of kennels, stables, or barns; disposal of manure; grazing of livestock which would result in the destruction of vegetation and soil disturbance; or any other activity which would result in the destruction of vegetation and exposure of soil to erosion.

e. Cutting, clearing, or grubbing of trees except for normal maintenance of dead, wind-blown, or damaged trees; except as otherwise authorized herein.

2. That the following structures, practices and activities are permitted within the easement after review and approval by the Grantee:

a. Driveways, bridges and utilities if it is clearly proven that no other feasible alternative exists and that minimal disturbance takes place. These structures shall be located, designed, constructed, and maintained to provide maximum erosion control, to minimize impacts on wildlife and aquatic habitats, and to maintain hydrologic processes and water quality. Following any disturbance, the affected area shall be restored in accordance with methods approved by the Grantee.

b. Stream restoration projects and activities.

c. Scientific studies including water quality monitoring and stream gauging.

3. That the following structures, practices, and activities are permitted within the easement without review by the Grantee, provided that the general condition of the easement is maintained and any soil disturbance is kept to a minimum and immediately stabilized:

a. Horticultural practices used to maintain the health of individual trees.

b. Removal of trees which are in danger of falling on structures or causing blockage of streams.

c. Other timber management techniques deemed necessary and undertaken with advice and guidance from the Maryland Departments of Natural Resources and Agriculture to preserve the forest from extensive pest or disease infestation or threat from fire.

d. Clearing for one winding walking path, no wider than six feet. This path cannot be a straight line to the stream or water body as it would allow the water to channelize. The path must remain stabilized.

e. Pruning of live tree branches that are no higher than twelve feet from the ground if at least the top two-thirds of the tree canopy is maintained.

4. If a pond area is shown on the Plat, then the following shall apply:

a. Passive recreational activities are allowed within the pond area, including hiking, swimming, picnicking, wildlife viewing, and fishing.

b. Non-routine maintenance, such as dredging or dam and standpipe maintenance, is allowed in accordance with plans produced by a certified engineering firm or upon approval by the Carroll County Soil Conservation District.

c. The following routine maintenance is required within the pond area:

(i) overflows and emergency spillways shall be kept clean and free of woody vegetation; and

(ii) dams shall be maintained as mowed grass and any trees or shrubs on the dam shall be removed; and

(iii) establishment of burrowing animals in the dam structure shall be prevented; and

(iv) eroded areas of the dam structure shall be restored within 30 days.

d. A winding walking path may be installed to allow for pedestrian access to the pond bank. The path may not encircle the pond.

e. A bank area may be installed within the pond area, but shall not exceed 15 feet of shoreline or 12 feet from the edge of the water and shall be maintained with non-erosive materials.

f. Only pesticides approved for use with the aquatic habitat are allowed.

g. One dock may be constructed.

5. Signage as shown on the Forest Conservation Plan or Grading Plan shall be perpetually maintained at 100 foot intervals around the perimeter of the easement.

6. That any activity within the easement shall be conducted to minimize disturbance of existing forest floor, leaf litter, and vegetation. Where the existing ground cover is disturbed and results in exposed soil, that area shall be immediately stabilized by Grantor to avoid soil erosion.

7. That any activity or use not specifically prohibited or authorized must be submitted to the Grantee for review and approval. The Grantee may authorize the harvest of individual trees. Unless approved by the Grantee, the activity is prohibited.

8. That the Grantor shall not violate all applicable federal, state, and local laws. When the provisions of this easement conflict with other laws, regulations, or policies, the more restrictive shall apply.

9. That the Grantee or its authorized representative shall have the right to enter on the Grantor's land from time to time for the sole purposes of inspection and enforcement of the easement, covenants, conditions, limitations, and restrictions herein contained; provided, however, that the Grantee shall have no right under this easement to inspect any land outside the easement.

Any representative of the Grantee shall carry identification and shall access the easement from a publicly maintained roadway whenever possible.

10. That this easement does not grant the public in general any right of access to or any right or use of the above described land.

11. That nothing herein contained shall relieve the Grantor of the obligation to pay real estate taxes.

12. That this easement shall be in perpetuity, unless released by Grantee.

AS WITNESS the hand and seal of the Grantor herein.

RUSTIC RISING DEVELOPMENT, LLC

_____(SEAL)
BY: Mark Fizzera
TITLE: Member
Grantor

SABEEH AHMED AMIN
also known as Sabeeh Ahmed Amin Hamad
and
GEORGETTE SABEEH AMIN
also known as Georgette Ibrahim Al-Semaan

_____(SEAL)
BY: [redacted]
Attorney-in-Fact/Power of Attorney

and/or

_____(SEAL)
BY: J. BROOKS LEAHY
Attorney-in-Fact/Power of Attorney

CLEAR RIDGE DEVELOPERS, INC.

_____(SEAL)
BY: Mark Fiazzera
TITLE: President
Lien Guarantor

FARMERS & MERCHANTS BANK

_____(SEAL)
BY: James R. Bosley, Jr.
TITLE: President
Lender

NVR, INC.

_____(SEAL)
BY: Henry Johnson
TITLE: VP. Division Manager
Beneficiary

LR - Government
Instrument 0.00
Agency Name:
commissioners of Carroll
county
Instrument List: Deed
Describe Other:
Ref: Amin
==========
Total: 0.00
12/20/2017 03:39
CC06-AS
#9585043 CC0502 -
Carroll
County/CC05.02.01 -
Register 01

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017, before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Mark Frizzera, who acknowledged himself/herself to be the Member of **RUSTIC RISING DEVELOPMENT, LLC,** and that he/she, as such Member, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as Member.

Witness my hand and Notarial Seal.

Jennifer R. Caines
Notary Public
My Commission expires 9.29.18

JENNIFER R. CAINES NOTARY PUBLIC CARROLL CO., MD

~~STATE OF _____, COUNTY OF _____, to wit:~~

~~On this _____ day of _____, 20__, before me, the subscriber, in and for the State and County aforesaid, personally appeared **RICHARD LEE HULL,** known to me (or satisfactorily proven) to be the person whose name is subscribed Attorney-in-Fact\Power of Attorney, for **SABEEH AHMED AMIN, also known as Sabeeh Ahmed Amin Hamad;** and **GEORGETTE SABEEH AMIN, also known as Georgette Ibrahim Al-Semaan, husband and wife,** and acknowledged that he executed the same as the act of their principal for the purposes therein contained.~~

~~Witness my hand and Notarial Seal.~~

~~Notary Public~~
~~My Commission expires _____~~

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017 before me, the subscriber, in and for the State and County aforesaid, personally appeared **J. BROOKS LEAHY,** known to me (or satisfactorily proven) to be the person whose name is subscribed Attorney-in-Fact\Power of Attorney, for **SABEEH AHMED AMIN, also known as Sabeeh Ahmed Amin Hamad;** and **GEORGETTE SABEEH AMIN, also known as Georgette Ibrahim Al-Semaan, husband and wife,** and acknowledged that he executed the same as the act of their principal for the purposes therein contained.

Witness my hand and Notarial Seal.

Monica J. Llewellyn
Notary Public
My Commission expires 4/25/2019

MONICA J. LLEWELLYN NOTARY PUBLIC CARROLL COUNTY, MD

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017, before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Mark Frizzera, who acknowledged himself/herself to be the President of **CLEAR RIDGE DEVELOPERS, INC.**, and that he/she, as such President, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as President.

Witness my hand and Notarial Seal.

Notary Public
My Commission expires 9.29.18

JENNIFER R. CAINES NOTARY PUBLIC CARROLL CO. MD

STATE OF MARYLAND, COUNTY OF CARROLL, to wit:

On this 23RD day of OCTOBER, 2017, before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared JAMES R. BOSLEY, JR., who acknowledged himself/herself to be the PRESIDENT of **FARMERS & MERCHANTS BANK**, and that he/she, as such PRESIDENT, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as PRESIDENT.

Witness my hand and Notarial Seal.

Notary Public
My Commission expires 11/20/2019

YVONNE G. ZEMINSKI
NOTARY PUBLIC, STATE OF MARYLAND
My Commission Expires November 20, 2019

STATE OF Maryland, COUNTY OF Baltimore, to wit:

On this 24th day of October, 2017 before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Henry Johnsen, who acknowledged himself/herself to be the Vice President of **NVR, INC.**, and that he/she, as such Vice President, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as Vice President.

Witness my hand and Notarial Seal.

Notary Public
My Commission expires

DENISE C. AMSPACHER NOTARY PUBLIC BALTIMORE COUNTY, MD.

DENISE C. AMSPACHER
NOTARY PUBLIC OF
BALTIMORE COUNTY, MARYLAND
My Commission Expires Nov. 30, 2018

Rt County Attorney

ACCEPTED BY:
THE COUNTY COMMISSIONERS
OF CARROLL COUNTY, MARYLAND
a body corporate and politic of the State of Maryland

12/19/17
Date:

BY: CLAYTON R. BLACK, CHIEF
BUREAU OF DEVELOPMENT REVIEW

Approved for legal sufficiency:

TIMOTHY C. BURKE
COUNTY ATTORNEY

DEED EXHIBITED THIS 19th DAY
OF Dec 2017 TAX
STAMP NOT REQUIRED
Robert M Burk BB
COLLECTOR

THIS IS TO CERTIFY that the within instrument has been prepared by or under the supervision of the undersigned Maryland attorney, or by a party to this instrument.

TIMOTHY C. BURKE
COUNTY ATTORNEY

RC

TCB\dmg\attorney\pwa\PWALegalPackages\RusticRising\ForestedWaterResource
PWA No. F-14-006 (PWA-17-028)
Tax Account No. 05-0-004896
October 2, 2017
RETURN TO: Department of the County Attorney, 225 N. Center Street, Westminster, MD 21157

Carroll County Commissioners
RECORDATION TAX
AMT: 0
DATE: 12/19/17
INITIALS: BB

FLOODPLAIN DEED OF EASEMENT

THIS DEED OF EASEMENT, made this 19th day of December, 2017 by and between **RUSTIC RISING DEVELOPMENT, LLC,** including successors and assigns ("Grantor"); and **SABEEH AHMED AMIN,** also known as Sabeeh Ahmed Amin Hamad, and **GEORGETTE SABEEH AMIN,** also known as Georgette Ibrahim Al-Semaan, by **RICHARD LEE HULL** and **J. BROOKS LEAHY,** their, Attorneys-in-Fact/Power of Attorney, ("Lender"); and **CLEAR RIDGE DEVELOPERS, INC.** ("Lien Guarantor"); and **FARMERS & MERCHANTS BANK** ("Lender"); and **NVR, INC.** ("Beneficiary"); and **THE COUNTY COMMISSIONERS OF CARROLL COUNTY, MARYLAND,** a body corporate and politic of the State of Maryland, including successors and assigns ("Grantee").

WHEREAS, Grantor owns land which Grantor has expressed an intent to subdivide or otherwise develop; and

WHEREAS, Grantor's land includes floodplains to be permanently protected pursuant to Floodplain Management, of the Code of Public Local Laws and Ordinances of Carroll County; and

WHEREAS, Grantor is required to agree to the permanent preservation of the floodplain areas and their natural vegetation as open space, as a condition of Grantor's authorization to develop; and

WHEREAS, Lender has secured a loan to Grantor on property which wholly or in part is set forth on a Plat entitled **"RUSTIC RISING" (6 Sheets)** and intended to be recorded among the Land Records of Carroll County. The Deed of Trust is dated July 21, 2017, and recorded among the Land Records of Carroll County in Book No. 8754, Page 295 &c.; and

WHEREAS, Lender and Lien Guarantor have secured a loan to Grantor on property which wholly or in part is set forth on a Plat entitled **"RUSTIC RISING" (6 Sheets)** and intended to be recorded among the Land Records of Carroll County. The Deed of Trust is dated July 21, 2017, and recorded among the Land Records of Carroll County in Book No. 8758, Page 370 &c.; and

WHEREAS, Beneficiary has secured a loan to Grantor on property which wholly or in part is set forth on a Plat entitled **"RUSTIC RISING" (6 Sheets)** and intended to be recorded among the Land Records of Carroll County. The Deed of Trust is dated July 21, 2017, and recorded among the Land Records of Carroll County in Book No. 8758, Page 389 &c.; and

WHEREAS, Lender, Lien Guarantor, and Beneficiary, join herein for the purpose of

assenting to this document and by such joinder do hereby agree to subject any sales of the aforementioned Lots on foreclosure, to the legal operation and effect hereof.

NOW THEREFORE, THIS DEED OF EASEMENT WITNESSETH, that for and in consideration of the premises and other good and valuable consideration, the receipt whereof is hereby acknowledged, the Grantor, Lender, Lien Guarantor, and Beneficiary, do hereby grant, release and confirm, unto Grantee, a **floodplain easement** in, on, over and under so much of Grantor's property as is shown on a Plat entitled **"RUSTIC RISING" (6 Sheets),** and identified thereon as **"FLOOPLAIN EASEMENT",** which Plat is to be recorded among the Land Records of Carroll County simultaneously herewith at Plat Book No. 55, Pages 109 through 114; so that said property is subject to the covenants, conditions, limitations and restrictions hereafter set forth, so as to constitute an equitable servitude upon the land.

BEING an easement over a portion of the land conveyed unto the Grantor by Deed which is dated July 21, 2017, from Sabeeh Ahmed Amin (A/K/A Sabeeh Ahmed Amin Hamad) and Georgette Sabeeh Amin (A/K/A Georgette Ibrahim Al-Semaan), husband and wife, by and through their attorney-in-fact. Said Deed is recorded among the Land Records of Carroll County in Book No. 8754, Page 289 &c.

AND the Grantor covenants for and on behalf of Grantor with the Grantee to do and refrain from doing upon the above described land all and any of the various acts set forth below, it being the intention of the parties that the land shall be preserved in a condition which acts to protect the floodplain. Furthermore, it is the intent of the parties that these covenants be deemed to be and are construed as real covenants running with the land. All subsequent purchasers of the lots burdened by this easement shall assume the position of "Grantor" for the purposes of this easement at the time of sale.

AND the parties further covenant and agree as follows:

1. That the following structures, practices, and activities are prohibited within the easement:

a. Soil disturbance by filling, grading, stripping of topsoil, plowing, cultivating, or other practices.

b. Storing or dumping of any material, including but not limited to yard waste, appliances, automobiles, garbage, trash, chemicals, pesticides, or construction debris.

c. Composting or broadcast spreading of yard waste.

d. Storing maintaining, or operating motorized vehicles except on designated roadways and driveways or for emergency use and maintenance; except as otherwise authorized herein.

e. Housing or otherwise maintaining domestic animals to include activities involving the construction of kennels, stables, or barns; disposal of manure; grazing of livestock which would result in the destruction of natural vegetation and soil disturbance; or any other activity which would

result in the destruction of vegetation and exposure of soil to erosion.

f. Burning of vegetation.

2. That the following structures, practices and activities are permitted within the easement after review and approval by the Grantee:

a. Driveways, bridges and utilities if it is clearly proven that no other feasible alternative exists and that minimal disturbance takes place. These structures shall be located, designed, constructed, and maintained to provide maximum erosion control, to minimize impacts on wildlife and aquatic habitats, and to maintain hydrologic processes and water quality. Following any disturbance, the affected area shall be restored in accordance with methods approved by the Grantee.

b. Stream restoration projects and activities.

c. Scientific studies including water quality monitoring and stream gauging.

d. Allowing forests to naturally regenerate or planting fields with trees. Reforestation projects should be undertaken with the advice and guidance of the Maryland Departments of Natural Resources and Agriculture and conducted pursuant to the Carroll County Forest Conservation Ordinance and subsequent revisions.

e. Maintaining the easement in a dense and vigorous cover of non-lawn vegetation which may be mowed or harvested no more than twice a year to a height of no less than six inches. Control of noxious weeds and multiflora rose is permitted as long as soil exposed by the treatment process is immediately stabilized.

f. Development in compliance with Floodplain and Storm Drainage Areas Subject to Flooding by Surface Waters or Running Streams as adopted and codified in the Code of Public Local Laws and Ordinances of Carroll County, Floodplain Management.

3. If this easement is being utilized as a sheetflow to buffer credit in accordance with Chapter 5.0 Stormwater Credits for Innovative Site Planning of the 2000 Maryland Stormwater Design Manual Volumes I and II for compliance with Stormwater Management of the Code of Public Local Laws and Ordinances of Carroll County, then the following additional conditions apply:

a. The minimum buffer width shall be fifty feet as measured from bankfull elevation or centerline of the buffer.

b. The maximum contributing length shall be one hundred fifty feet for pervious surfaces and seventy-five feet for impervious surfaces.

c. Runoff shall enter the buffer as sheet flow. Either the average contributing overland slope shall be 5.0% or less, or a level spreading device shall be used where sheet flow can no longer be maintained.

d. Buffers shall remain unmanaged other than routine debris removal.

e. The natural vegetation shall be managed in a meadow or forest condition.

f. The boundaries of the easement shall be clearly marked and delineated on the property as approved by the Grantee.

4. That any activity within the easement shall be conducted to minimize disturbance of leaf litter and vegetation. Where the existing ground cover is disturbed and results in exposed soil, that area shall be immediately stabilized by Grantor to avoid soil erosion.

5. That any activity or use not specifically prohibited or authorized must be submitted to the Grantee for review. Unless approved by the Grantee, the activity is prohibited.

6. That the Grantor shall not violate all applicable federal, state, and local laws. When the provisions of this easement conflict with other laws, regulations, policies or easements, including but not limited to a water resource protection easement, the more restrictive shall apply.

7. That the Grantee or its authorized representative shall have the right to enter on the Grantor's land from time to time for the sole purposes of inspection and enforcement of the easement, covenants, conditions, limitations, and restrictions herein contained; provided, however, that the Grantee shall have no right under this easement to inspect any land outside the easement. Any representative of the Grantee shall carry identification and shall access the easement from a publicly maintained roadway whenever possible.

8. That this easement does not grant the public in general any right of access to or any right or use of the above described land.

9. That nothing herein contained shall relieve the Grantor of the obligation to pay real estate taxes.

10. That this easement shall be in perpetuity, unless released by Grantee.

AS WITNESS the hand and seal of the Grantor herein.

RUSTIC RISING DEVELOPMENT, LLC

_____(SEAL)
BY: Mark Frizzera
TITLE: Member
Grantor

SABEEH AHMED AMIN
also known as Sabeeh Ahmed Amin Hamad
and
GEORGETTE SABEEH AMIN
also known as Georgette Ibrahim Al-Semaan

_____ (SEAL)
BY: RICHARD LEE HULL
Attorney-in-Fact/Power of Attorney

and/or

_____ (SEAL)
BY: J. BROOKS LEAHY
Attorney-in-Fact/Power of Attorney

CLEAR RIDGE DEVELOPERS, INC.

_____ (SEAL)
BY: Mark Fizzera
TITLE: President
Lien Guarantor

FARMERS & MERCHANTS BANK

_____ (SEAL)
BY: James R. Bosley, Jr.
TITLE: President
Lender

LR - Government Instrument 0.00
Agency Name:
commissioners of carroll county
Instrument List:- Deed
Describe Other:
Ref: amin
==========
Total:- 0.00
12/20/2017 03:39 CC06-AS
#9585043 CC0502 -
Carroll
County/CC05.02.01 -
Register 01

NVR, INC.

_____(SEAL)
BY: HENRY JOHNSON
TITLE: VP, DIVISION MANAGER
Beneficiary

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017 before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Mark Frizzera, who acknowledged himself/herself to be the Member of **RUSTIC RISING DEVELOPMENT, LLC**, and that he/she, as such Member, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as Member.

Witness my hand and Notarial Seal.

JENNIFER R. CAINES NOTARY PUBLIC CARROLL CO., MD

_____
Notary Public
My Commission expires 9.29.18

STATE OF _____, COUNTY OF _____, to wit:

On this _____ day of _____, 20__, before me, the subscriber, in and for the State and County aforesaid, personally appeared **RICHARD LEE HULL,** known to me (or satisfactorily proven) to be the person whose name is subscribed Attorney-in-Fact\Power of Attorney, for **SABEEH AHMED AMIN, also known as Sabeeh Ahmed Amin Hamad;** and **GEORGETTE SABEEH AMIN, also known as Georgette Ibrahim Al-Semaan, husband and wife,** and acknowledged that he executed the same as the act of their principal for the purposes therein contained.

Witness my hand and Notarial Seal.

_____
Notary Public
My Commission expires _____

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017 before me, the subscriber, in and for the State and County aforesaid, personally appeared **J. BROOKS LEAHY,** known to me (or satisfactorily proven) to be the person whose name is subscribed Attorney-in-Fact\Power of Attorney, for **SABEEH AHMED AMIN, also known as Sabeeh Ahmed Amin Hamad;** and **GEORGETTE SABEEH AMIN, also known as Georgette Ibrahim Al-Semaan, husband and wife,** and acknowledged that he executed the same as the act of their principal for the purposes therein contained.

Witness my hand and Notarial Seal.

MONICA J. LLEWELLYN NOTARY PUBLIC CARROLL COUNTY, MD

Notary Public
My Commission expires 4/25/2019

STATE OF Maryland, COUNTY OF Carroll, to wit:

On this 24th day of October, 2017 before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Mark Frizzera, who acknowledged himself/herself to be the President of **CLEAR RIDGE DEVELOPERS, INC.,** and that he/she, as such President, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as President.

Witness my hand and Notarial Seal.

JENNIFER L. HAINES NOTARY PUBLIC CARROLL CO., MD

Notary Public
My Commission expires 9.29.18

STATE OF MARYLAND, COUNTY OF CARROLL, to wit:

On this 23RD day of OCTOBER, 2017, before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared JAMES R. BOSLEY, JR., who acknowledged himself/herself to be the PRESIDENT of **FARMERS & MERCHANTS BANK,** and that he/she, as such PRESIDENT, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as PRESIDENT.

Witness my hand and Notarial Seal.

Notary Public
My Commission expires 11/20/2019

YVONNE G. ZEMINSKI
NOTARY PUBLIC, STATE OF MARYLAND
My Commission Expires November 20, 2019

STATE OF Maryland COUNTY OF Baltimore, to-wit:

On this 24th day of October, 2017 before me, the subscriber, a Notary Public in and for the State and County aforesaid, personally appeared Henry Johnsen, who acknowledged himself/herself to be the Vice President of NVR, INC., and that he/she, as such Vice President, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of himself/herself as Vice President.

Witness my hand and Notarial Seal.

Denise C. Amspacher
Notary Public
My Commission expires

DENISE C. AMSPACHER
NOTARY PUBLIC OF
BALTIMORE COUNTY, MARYLAND
My Commission Expires Nov. 30, 2018

ACCEPTED BY:
THE COUNTY COMMISSIONERS
OF CARROLL COUNTY, MARYLAND
a body corporate and politic of the State of Maryland

12/19/17
Date:

BY: CLAYTON R. BLACK, CHIEF
BUREAU OF DEVELOPMENT REVIEW

Approved for legal sufficiency:

TIMOTHY C. BURKE
COUNTY ATTORNEY

DEED EXHIBITED THIS 19th DAY OF Dec 2017, TAX STAMP NOT REQUIRED

Robert M Burk BB
COLLECTOR

THIS IS TO CERTIFY that the within instrument has been prepared by or under the supervision of the undersigned Maryland attorney, or by a party to this instrument.

TIMOTHY C. BURKE
COUNTY ATTORNEY

TCB\dmg\attorney\pwa\PWALegalPackages\RusticRising\Floodplain
PWA No. F-14-006 (PWA-17-028)
Tax Account No. 05-0-004896
October 2, 2017

RETURN TO: Department of the County Attorney, 225 N. Center Street, Westminster, MD 21157

Carroll County, Maryland
Environmental Easement Inspection Protocol

1. Background and Inspection Protocol

Floodplain Management focuses on property and life safety and Water Resource Management largely focuses on the protection of streams, ponds, and wetlands. These codes are implemented partially through the recordation of easements. Floodplain and Water Resource Protection Easements provide a buffer to the stream system from adjacent land use and provide many benefits to the stream, watershed, or drainage area in which it resides. Benefits include filtering runoff, stabilization, nutrient uptake, moderating stream temperatures, and providing wildlife corridors. Each Deed of Easement defines permitted and restricted activities within the established easement. Restricted activities prohibited by the easements typically include soil disturbance; storing or dumping of materials; composting or broadcast spreading of yard waste; storing, maintaining, or operating motorized vehicles; housing or otherwise maintaining domestic animals; and burning of vegetation. Environmental Protection Easements are inspected once every three years to ensure compliance.

Upon notification of recordation of the easement agreement from the County Attorney's office, a County Investigation Progress Report number is assigned to the easement. This numbering system allows the Bureau of Resource Management to track the inspections. A GIS record is created using the coordinates of the recorded easement and includes recorded information of the easement. Field inspections are conducted by the Bureau of Land and Resource Management personnel, generally within a week of the easement's file folder completion. Reports and follow ups on any violations are kept with the Bureau of Land and Resource Management.

2. Folder Preparation for Each Easement:

A copy of the inspection form is printed for the file, see Appendix A.

Each easement's inspection folder contains a Maryland Real Property Search data sheet with details about the property, the deed(s) of easement, a plat or meets and bounds description of the easement, and a GIS map of the easement.

The map included in the folder shows the area(s) under easement. The easement area(s) may not encompass an entire property or stream. Using the most recent GIS ORTHOS, Property Data, StreamLidar and Wetlands layers, this ORTHO map is created for the inspector. It should show the property boundaries and any streams and/or wetlands. A title block is produced on the ORTHO map identifying the easement by name, file number and investigation number.

There may be several adjacent but separate properties owners under the same easement(s). Care should be taken to verify that the ORTHO map boundaries include each property under the easement.

One copy of the map is printed for the file to be taken as reference during the inspection. A master GIS map of all sites can be created and saved for future inspections, making the inspection routes more efficient.

The enclosed deed(s) of easement grants the inspector permission to access properties for inspection purposes. These easements do not require pre-arranged inspections or landowner notification prior to inspections, unless, otherwise noted in the file folder. If a landowner wants to meet at the site, the inspector will arrange a time that is convenient for the owner; otherwise as there is no need for the landowner to be present, and the inspector can inspect the site alone.

3. The Inspection

Prior to arriving at a property, the inspector should be familiar with the requirements as well as the permitted and restricted activities (i.e signage, forested or non-forested mowing, etc.) of each easement as detailed in the respective deed(s). Upon arriving at the property, the inspector should take one good photo that is representative of the easement. Additional photos documenting the conditions or possible violations should also be taken. Photos should show as much detail as necessary in case of suspected violations.

Depending on the proximity of the easement to the road, if the easement comes close to or right up to the road, the first inspection is an overall view from and along the road. If the easement has a long road frontage, the inspector may stop often to get out of the vehicle to get a better look and photograph the details. A panoramic view is often necessary as well as useful in portraying the scope of the site. Next, the inspector should enter the property through the driveway, orientating him or herself with the GIS map. At this point (s)he should make a judgement call about whether (s)he can see what needs to be seen from the vehicle or whether walking/hiking across the property on foot is necessary. If it is clear that the home or business is currently occupied, let the owner know who you are and why you are there. Bring a copy of the record plat and aerial photo showing the easement location and a copy of the deed of easement to provide to the owner. Special care should be taken to limit access of the property to the easement area(s) only, as clarified in the deed. If the inspector needs to leave the County vehicle to inspect and easement on foot, the inspector MUST carry the file folder and proper County identification at all times.

Based on the deed(s) requirements and restrictions, the inspector should grant an approval or disapproval based on site conditions observed during the inspection.

4. After the inspection (documenting the inspection)

All photos should be filed under the easement's name under the appropriate dated file located in: R:\Easements.

Any photos with details of extensive violations should be printed out and attached in the file. Recordation of the inspection should be documented electronically by uploading the photos in the appropriate folder and entering inspections in the electronic database. After each inspection is

documented, a future inspection should be scheduled in the electronic database for 3 years from the inspection date.

In the event of a violation noted during the inspection:
All violations should be well documented with photographs. Specific clauses of the deed(s) should be noted on the inspection form where violations occur. The letter mailed to the landowner informing them of the violation should clearly quote the clause of the deed(s) where permitted and restricted activities are and state what was observed during the inspection. The landowner should be given no more than 6 months to correct the violation. If at the time of re-inspection, after the grace period, the violation is still in place, a second letter to the landowner clearly noting a "NOTICE OF VIOLATION" should be sent. This official notice of violation letter should clearly reiterate the violation and results of the 2 completed inspections. The landowner should be given no more than 3 months to correct the violation. If at the time of re-inspection, after the notice of violation letter was sent, the violation is still in place, the violation should be forwarded to the County Attorney's office. A letter to the landowner informing them of this action should be sent.

When a re-inspection of a violation demonstrates the easement area is consistent with the permitted and restricted activities detailed in the deed(s), a compliance letter should be sent to the landowners informing them of the compliance and removing the violation from their property. The easement should then be re-inspected within six months to ensure compliance is maintained.

BUREAU OF RESOURCE MANAGEMENT
Environmental Easement

LONG TERM INSPECTION

NAME OF SUBDIVISION:_____

INVESTIGATION NUMBER:_____

FILE NUMBER:_____

INSPECTOR:_____

DATE:_____

SIGNS:

_____ STILL IN PLACE

_____ MISSING

_____ IN POOR CONDITION

_____ NEED TO BE REPLACED

EXPLANATION:_____

_____

_____

_____

_____

HAS THERE BEEN VIOLATIONS IN THE EASEMENT AREA: _____ YES _____ NO

_____ PATURING ANIMALS _____ DISTURBANCE

_____ MOTOR CROSSING _____ USED AS AG. FIELD

EXPLANATION:_____

_____

_____

_____

FENCING REMOVED IF REQUIRED: _____ YES _____ NO

EXPLANATION:_____

_____

_____

_____

_____

LOCATION OF EASEMENT:

LOTS _____ OPEN SPACE _____

STREAM BANK _____ FLOODPLAIN _____

OPEN FIELD _____ SWM FACILITY _____

OTHER _____

EXPLANATION:_____

_____

_____

_____

_____

INSPECTION APPROVED: _____ (YES/NO)

Appendix J

Restoration Plans CD

(Available Upon Request)

Double Pipe Creek Watershed
Liberty Reservoir Watershed
Loch Raven Reservoir Watershed
Lower Monocacy River Watershed
Prettyboy Reservoir Watershed
South Branch Patapsco Watershed (Baltimore Harbor)
Upper Monocacy River Watershed