Annual Report

October 9, 2018

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System
Permit No. 11-DP-3313 MD0068276
Permit Term
October 2015 to October 2020

Submitted to:
Sediment, Stormwater, and Dam Safety Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Submitted by:
Maryland Department of Transportation
State Highway Administration
Office Of Environmental Design
707 North Calvert Street, C-303
Baltimore, MD 21202

MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Larry Hogan
Governor
Boyd K. Rutherford
Lt. Governor
Pete K. Rahn
Secretary
Gregory Slater
Administrator

October 9, 2018

Mr. Stewart Comstock, Chief
Sediment, Stormwater & Dam Safety Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 440
Baltimore MD 21230

Dear Mr. Comstock:

The Maryland Department of Transportation State Highway Administration (MDOT SHA) Office of Environmental Design is pleased to submit this third annual report (2018 Annual Report) addressing conditions under the MDOT SHA NPDES MS4 permit (11-DP-33133 MD 0068276) which took effect on October 9, 2015. The report covers compliance efforts from July 1, 2017 to June 30, 2018 and incudes an overview of the MDOT SHA MS4 program, addresses MDE comments on the 2017 Annual Report, addresses MDE comments on the 2016 Annual Report that were not addressed with the 2017 Annual Report submission, and discusses how MDOT SHA has progressed in implementing water quality improvements. Items that are noteworthy in this report include:

- Point-by-point responses to the MDE comments on the 2017 Annual Report dated 5/17/18 are included in **Attachments A-I and A-II**. Point-by-point responses to the MDE comments on the 2016 Annual Report dated 4/26/2017 are included in **Attachments B-I and B-III**.
- We are submitting revised versions of Parts I, III, and IV of the *MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan*. This is an *Interim Review Draft.* Part II will be revised after MDOT SHA receives decision from MDE on the impervious baseline accounting submitted to MDE on June 29, 2018. A full Implementation Plan including Part II will be submitted to reflect updates resulting from MDE's comments on the baseline accounting.
- Interim targets for 2020 and 2025 for all TMDLs have been modeled and provided in Table 3-2 of Part III of the Implementation Plan, in individual watershed plans in Part IV, and in progress report in this 2018 Annual Report in Table 1-28 for the 2020 milestone.
- A Gantt chart of programmed projects to meet the current permit term 20 percent restoration is included in **Attachment C.** This is in lieu of Table 2-2, which will be updated and delivered with Part II of the full TMDL Implementation Plan.
- Source ID data for the MDOT SHA impervious surfaces is not included with this delivery since we included our latest data with the 6/29/2018 MDOT SHA Final Impervious Baseline Assessment.

- This year, to simplify reporting for Section D.1.d, Preventative Maintenance, we are reporting field inspection grades of D-E (failing grades), which provides a clear indication of which facilities are failing to the point of not providing water quality. In previous annual reports, internal work order ratings were included in addition to field inspection grades, which caused an error in reporting the information in a clear manner. Remediation Tables 1-4 and 1-6 have been revised to remove facilities with field inspection grades of A-C (passing grades) and new tables 1-4a and 1-6a have been added to indicate the facilities reported last year that were not failed but needed some level of maintenance or repair. We have also attached an Appendix C that addresses non-functioning restoration BMPs and MS4 credit to standardize methods.
- We are updating the *MDOT SHA Restoration Modeling Protocol*. This protocol was originally delivered to MDE as Appendix E in the 2016 Annual Report. In the 2017 Annual Report we included an abbreviated version to address specific MDE comments concerning modeling reduction targets. The updated protocol will be included along with Part II, in the full Implementation Plan submission to MDE.

This submission includes one hard copy of each report, a compact disc containing an electronic version with accompanying digital geodatabase, and an external hard drive containing additional data related to Appendix A, MDOT SHA Delegated Authority: Plan Review Division and Quality Assurance Inspection Program.

If you have any questions or need additional information regarding this delivery, please contact Ms. Karen Coffman at (410) 545-8407 and kcoffman@sha.state.md.us or me at (410) 545-8640 and sram@sha.state.md.us.

Sincerely,

Sonal Ram

Sonal Ram, Director
Office of Environmental Design

Enclosures

cc: Mr. Brian Cooper, MDE WSA Sediment, Stormwater and Dam Safety Program
Ms. Karen Coffman, Chief, MDOT SHA OED Water Programs Division
Ms. Dorothy Morrison, Director, MDOT TSO Office of Environment
Mr. Kevin Wilsey, Deputy Director, MDOT SHA OED

ATTACHMENT A

MDOT SHA RESPONSES TO MDE 5/17/2018
COMMENTS TO
2017 ANNUAL REPORT

A-I: General MS4 Permit Conditions

A-II: Implementation Plans

A-III: Delegation of Stormwater Management Plan Review Authority
(NOT ATTACHED – Included with Appendix A of 2018 Annual Report)

Attachment A-I – MDOT SHA Responses (10/9/2018) to MDE Comments on MDOT SHA 2017 Annual Report Review

MDOT SHA responses to the MDE 2017 MS4 Annual Report Review comments that were delivered to MDOT SHA OED on May 17, 2018 are integrated into the table below. MDE comments requiring response or follow-up are highlighted in bold text and the MDOT SHA response is provided immediately below.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part V.A Annual Reporting	1. The Maryland Department of Transportation State Highway Administration (MDOT SHA) submitted its annual report by the due date (October 9, 2017). 2. This report is the second annual report for the current permit term. 3. The report covers July 1, 2016 to June 30, 2017 (fiscal year 2017).
Part IV.A Permit Administration	4. MDOT SHA's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) permit is administered by an MS4 Program Manager in the Water Programs Division. Industrial NPDES stormwater permits are managed through the Environmental Compliance Division. MDOT SHA provided an updated organizational chart describing staff roles in relation to NPDES stormwater tasks.
Part IV.B Legal Authority	5. MDOT SHA included a description of its legal authority in the previous annual report. It was noted in this report that the information remains unchanged. MDOT SHA continues to maintain adequate legal authority for compliance with all permit conditions.
Part IV.C Source Identification	6. MDOT SHA completed the inventory of its storm drain system in 2008 and reports that it has been regularly updating information and populating missing data such as drainage areas and addresses. 7. During fiscal year (FY) 2017, MDOT SHA implemented the Highway Hydraulics Division (HHD) Web Research Application to enhance efforts for drainage improvement projects, retrofits, major remediation, outfall stabilization, and quick emergency repair responses. The tool organizes geographic information system (GIS) layers for environmental features, outfalls, projects, and public flooding information into a central map. 8. In FY2016, MDOT SHA reported that it purchased video cameras for each MDOT SHA District Office for an enhanced Video Pipe Inspection (VPI) Program. For FY2017, MDOT SHA reports that it acquired "nine cameras operating Granite XP software." MDOT SHA evaluated and revised the video inspection process to include data collection, management, and storage. A pilot program will be used before implementing the improved VPI statewide. 9. MDOT SHA reports that it has plans to update the current database hardware and software to enable improved efficiency, updates, and mobile operations. Additionally, a new best management practice (BMP) inspection and inventory field tool is being developed to improve the efficiency and accuracy of the

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.C Source Identification (Cont.)	inspection data. **10. MDOT SHA reported that the cities of Salisbury, Cambridge, and Cumberland have been removed from its reporting. Until the Phase II permit is finalized and MDOT SHA enters the next permit term, the jurisdictional area shall remain unchanged. Therefore, since the City of Salisbury is an existing Phase II jurisdiction, it should be added back to MDOT SHA's reporting.** **<u>MDOT SHA Response:</u>** MDOT SHA has added the City of Salisbury back to its reporting. 11. In FY2017, MDOT SHA developed a GIS layer identifying industrial sites in its right-of-way. No commercial sites were included in the GIS layer since there are no commercial sites on MDOT SHA property. 12. MDOT SHA submitted GIS data on its storm drain system in a geodatabase. A review of these data found the following: – 170,697 structure records (e.g., inlets, end sections, manhole structures, junction boxes, pipe connections, ditch intersections) – 139,972 conveyance records (i.e., pipes, ditches) This is an increase from the previous FY in which 163,271 structure records and 133,803 conveyance records were reported. MDE commends MDOT SHA for its continued updates. • MDOT SHA also submitted GIS data on its impervious surfaces and industrial sources in a geodatabase. A review of these data found the following: – 26,806 polygons for impervious surfaces throughout Maryland – 32 polygons for industrial facilities throughout Maryland 13. MDOT SHA provided GIS data on its monitoring site locations for established Assessment of Controls Watershed Assessment and Stormwater Management Assessment sites. 14. GIS data were reported in the May 2017 MDE MS4 Geodatabase format. MDE acknowledges the large effort involved in amassing these data and MDE commends MDOT SHA for its endeavor. A review of MDOT SHA's MS4 Geodatabase found the following: – Outfalls ▪ 15,138 outfalls (an increase from last year's 14,785 records) ▪ 1,748 outfall drainage areas – Monitoring Locations ▪ 19 monitoring site records (only current monitoring activities reported) ▪ 2 monitoring drainage area records – BMPs ▪ BMP POI ○ 4,411 records ▪ BMP

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.C Source Identification (Cont.)	○ 3,505 records ○ 3,429 BMP inspection records ○ Per MDE's request, all records had a City, State, and Zip ○ **76 records have drainage areas equal to 0 and are missing related Last Inspection Dates (these are all redevelopment projects)** **<u>MDOT SHA Response</u>:** Redevelopment project accounting is discussed in *Appendix E: Redevelopment Project Credit Accounting Methodology* of the 2018 annual report. This credit is project based and includes reconstructed impervious areas and existing impervious areas only. Every project credited has received SWM/ESC approval from either MDE or PRD and therefore, has addressed the SWM requirements for construction. The SWM may be addressed through proposed SWM BMPs and retrofits or, more typically, WQ bank debits and impervious area removal. The key to this credit is understanding that the credit is a result of the project and not SWM BMPs; therefore, this credit is mapped to a single point within the project limits. This is explained in detail in Appendix E. ▪ BMP Drainage Area ○ 3,845 records ▪ Alternative BMP Line ○ 44 records (an increase from last year's 34 records) ○ 44 alternative BMP line inspection records (an increase from last year) ○ **All stream restoration records are missing loading values for TSS, TP, and TN** **<u>MDOT SHA Response</u>:** MDOT SHA has provided the additional information in the FY18 Annual Report geodatabase submission. ○ **12 records have an implementation cost of $0; all other records have a value of $32,767** **<u>MDOT SHA Response</u>:** MDOT SHA has provided the additional cost information, where available, in the FY18 Annual Report geodatabase submission. In addition, the field type of short integer will be updated to field type of long integer to accommodate values greater than $32,767 ○ 10 stream restoration protocol records (represents all seven of the FY2016 and FY2017 projects) ▪ Alternative BMP Point ○ 0 records ○ 0 alternative BMP point inspection records ▪ Alternative BMP Poly ○ 1,680 records (an increase from last year's 1,532 records) ○ 1,680 alternative BMP poly inspection records (an increase from last

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.C Source Identification (Cont.)	year) ○ Although these are optional fields, a majority of the records contain values for TSS, TN, and TP ○ **143 records contain cost values of $32,767; 1,140 records have values between $145 and $32,739; 397 are reported as having no cost data** **<u>MDOT SHA Response</u>:** MDOT SHA has provided the additional cost information, where available, in the FY18 Annual Report geodatabase submission. In addition, the field type of short integer has been updated to field type of long integer to accommodate values greater than $32,767 ▪ Restoration BMP records ○ 906 records (an increase from last year's 616 records) ○ **470 records missing drainage areas (all are redevelopment projects)** **<u>MDOT SHA Response</u>:** Redevelopment project accounting is discussed in *Appendix E: Redevelopment Project Credit Accounting Methodology* of the 2018 annual report. This credit is project-based and includes reconstructed impervious areas and existing impervious areas removed only. Every project credited has received SWM/ESC approval from either MDE or PRD and therefore, has addressed the SWM requirements for construction. The SWM may be addressed through proposed SWM BMPs and retrofits or, more typically, WQ bank debits and impervious area removal. The key to this credit is understanding that the credit is a result of the project and not SWM BMPs; therefore this credit is mapped to a single point within the project limits. This is explained in detail in Appendix E. ○ **471 records missing implementation cost (excluding one BMP, all are redevelopment projects)** **<u>MDOT SHA Response</u>:** MDOT SHA has provided the additional cost information, where available, in the FY18 Annual Report geodatabase submission. In addition, the field type of short integer has been updated to field type of long integer to accommodate values greater than $32,767 ○ 344 records have an implementation cost of $32,767 (maximum field value) ○ Per MDE's request, all records include as-built dates, City, State, and Zip, as well as TN, TP, and TSS reduction values ○ 169 Rest BMP Inspection records 15. Detailed below are important items that require SHA's attention.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	– **5,609 of the reported outfalls have a construction year of "9999". This is an improvement from last year in which 8,582 outfalls had a placeholder year. MDE requests that MDOT SHA continue working toward completing this segment of the Geodatabase.** **MDOT SHA Response:** MDOT SHA performed research into historic roadway plans and was able to populate the remainder of these records with approximate construction years. – **Redevelopment BMPs, which account for approximately 1.4% of claimed baseline credit, are missing delineated drainage areas and inspection dates. As previously discussed, MDE understands that these drainage areas are being developed and with time, missing data will be remedied.** **MDOT SHA Response:** Redevelopment project accounting is discussed in *Appendix E: Redevelopment Project Credit Accounting Methodology* of the 2018 annual report. This credit is project-based and includes reconstructed impervious areas and existing impervious areas removed only. Every project credited has received SWM/ESC approval from either MDE or PRD and therefore, has addressed the SWM requirements for construction. The SWM may be addressed through proposed SWM BMPs and retrofits or, more typically, WQ bank debits and impervious area removal. The key to this credit is understanding that the credit is a result of the project and not SWM BMPs; therefore, this credit is mapped to a single point within the project limits. This is explained in detail in Appendix E. – **Although the length of outfall stabilization projects are different, all outfall stabilization projects are reported as reducing the same amounts of TSS, TP, and TN. MDE requests clarification that the calculated reductions are accurate.** **MDOT SHA Response:** MDOT SHA has provided the additional information in the FY18 Annual Report geodatabase submission. Reductions were changed. – **BMP records with a reported implementation cost of "$0" should include a comment identifying the reason the BMP has no cost (e.g., volunteer/non-profit funded).** **MDOT SHA Response:** MDOT SHA has provided the additional information in the FY18 Annual Report geodatabase submission. – **As the implementation cost field does not allow values greater than $32,767, MDOT SHA may modify this field type from Short Integer to Long Integer so that larger cost values may be reported.** **MDOT SHA Response:** The field type of short integer was updated to field type of long integer to accommodate values greater than $32,767.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	– **The StrRestProtocols associated table has not been populated for stream restoration projects installed before FY2016. These projects account for 487 acres of stream restoration. As MDOT SHA continues to switch to the new geodatabase format, this associated table needs to be populated, whether the stream restoration project uses the interim rate or one of the protocols.** **MDOT SHA Response:** MDOT SHA has provided the additional information in the FY18 Annual Report geodatabase submission. – **As indicated in MDE's previous review, stream restoration records are missing loading values for TSS, TP, and TN. This is a repeated issue and MDOT SHA shall work toward populating these fields.** **MDOT SHA Response:** MDOT SHA has provided the additional information in the FY18 Annual Report geodatabase submission. 16. Per MDE's request in the previous annual report review, many of the required fields in MDOT SHA's MS4 Geodatabase were populated. MDE commends MDOT SHA for its efforts and requests that it continues working toward complete records with required fields such as as-built dates, outfall locations, and delineated drainage areas.
Part IV.D.1 Stormwater Management (SWM)	17. To help with increased demand, MDOT SHA added four new consultant staff to its Asset Management team. In April 2017, training was given for all SWM BMP inspectors in order to improve the quality and consistency of inspections. Additionally, a visual guide was developed to help promote consistency with protocols and to reduce subjectivity. 18. In FY2017, MDOT SHA conducted 4,249 inspections of SWM facilities in large and medium MS4 jurisdictions as well as in the cities of Cambridge, Salisbury, and Cumberland. Out of 4,165 facilities, 1,209 required routine maintenance, 622 required major remedial maintenance, and 41 required retrofit design. This is an increase from FY2016 in which major maintenance and retrofits were required for 133 and 14 BMPs, respectively. MDOT SHA attributes this increase to new staff and training. For the identified facilities, maintenance work has been prioritized and expected completion dates are between fall 2017 and fall 2021. MDE commends MDOT SHA for improving its inspection program by increasing inspection staff and providing more training opportunities. 19. MDOT SHA reports that, within the MS4 controlled areas, there were 753 submissions to its Plan Review Division (PRD) during FY2017. Table 1-3: Stormwater Management Review and Approval documents that PRD issued approvals for 130 concept, 95 site development, and 87 final designs. Also, 142 redevelopment projects were approved. **20. According to the annual report, 179 SWM waivers and 50 variance requests were granted statewide in FY2017. However, according to the MS4**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.D.1 SWM (Cont.)	**Geodatabase, a total of 374 waivers were requested and 196 waivers were granted. There is a discrepancy with the reported values for waivers.** **<u>MDOT SHA Response</u>:** The PRD database has been refined to better capture waiver and variance requests/approvals. This issue has been addressed programmatically for FY18 and future reports. **21. The MS4 Geodatabase indicates that there were 3,877 construction inspections and 21 violations. Additionally, there were 388 initial maintenance inspections, 9 maintenance follow-up inspections, and no maintenance violations. The annual report indicates that there were 3,877 inspections and 25 non-compliance findings statewide while there were 21 violations in MS4 permitted jurisdictions. MDE cautions MDOT SHA against mixing statewide and MS4 only statistics in geodatabase reporting. In future submissions, in order to maintain consistency, MDE requests that the geodatabase only contain SWM and Erosion & Sediment Control statistics related to the MS4 permitted jurisdictions. As done in FY2016 and FY2017, MDOT SHA should continue to clearly report both groups of statistics in the annual report narrative.** **<u>MDOT SHA Response</u>:** This concern is noted and the geodatabase only contains data related to the MS4 jurisdictions. The report text continues to report both statewide and MS4 only statistics. 22. Two exemptions were issued. 23. MDOT SHA reported that 142 redevelopment projects were received. This is an increase from last year in which only 40 were received. 24. Review of MDOT SHA's 2017 annual report for the Delegation of Stormwater Management Plan Review Authority is included in Attachment III. 25. As part of the delegation agreement and MDE's MS4 review activities, MDE reviewed MDOT SHA's stormwater management construction and maintenance inspection program in November and December, 2017. The results of this review will be sent at a later date.
Part IV.D.2 Erosion and Sediment Control (E&SC)	26. MDOT SHA continues to maintain its authority to review and approve E&SC and SWM plans, including inspections and enforcement. 27. A review of the E&SC and Quarterly Grading Permit Info associated tables in MDOT SHA's MS4 Geodatabase found the following Statewide data: – 89 grading permits issued (an increase from last year's 49) – 411 disturbed acres (an increase from last year's 152 acres) – 16 inspectors and 2 supervisory staff – 25 violations – 14 stop work orders issued – 0 fines issued – 0 court cases – 13 sediment control complaints received

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.D.2 E&SC (cont.)	As requested in MDE's previous review, mandatory fields that were previously unpopulated have been populated with data. 28. In FY2017, 3,877 E&SC inspections were performed at 382 sites, resulting in an overall compliance rate of 99%. MDOT SHA achieved the same overall compliance rate during FY2015 and FY2016. 29. MDOT SHA reported 478 and 322 people received or were recertified for Level I (Yellow Card) training, respectively. Responsible Personnel Certification training is administered through MDE's online Responsible Personnel Course. 30. As part of the delegation agreement, MDE reviewed MDOT SHA's E&SC procedures in the field during the previous FY. In response to this review, MDOT SHA made multiple improvements to its Quality Assurance Program, consisting of: – Monthly meetings to discuss lessons learned, review specifications, and participate in exercises to "build consistency and improve knowledge base." – "Peer review (of field work) where [Regional Environmental Coordinators (RECs)] review, critique, and document each other's efforts for group discussion and improvement." These reviews focused on improving stabilization and reducing offsite impacts as a result of dewatering activities. – Spot checks "where team leaders review REC's field work", focusing on stabilization and offsite impacts. – "Specification changes to eliminate the stabilization exemption at subgrade, the use of matting in lieu of straw mulch for smaller areas, and the [increased] use of wash racks to prevent tracking onto roadways". During FY2017, out of the 25 non-compliance findings, 19 of them were attributed to "questionable" stabilization practices, 3 were the result of questionable stabilized construction entrances, and 3 were due to questionable dewatering practices. These statistics show an increased awareness of compliance issues and are indicators of program growth. MDE commends MDOT SHA for taking the necessary steps to improve its Erosion and Sediment Control program. 31. Further review on MDOT SHA's E&SC activities is included in Attachment III.
Part IV.D.3 Illicit Discharge Detection and Elimination (IDDE)	32. As reported in the MS4 Geodatabase IDDE associated table, submitted with MDOT SHA's 2017 annual report, MDOT SHA conducted 181 dry weather screenings at 180 outfalls and performed chemical tests of dry weather discharges. Dry weather flows were discovered at 56 outfalls. An illicit discharge originating from construction activity was reported at one outfall and was eliminated in coordination with Prince George's County. **33. MDE requests that MDOT SHA describe the process by which outfalls are chosen for screening each year. In order to maximize the likelihood of discovering illicit discharges, outfalls should be prioritized to target areas with high pollutant potential, such as proximity to commercial, industrial, and urban land uses.**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.D.3 IDDE (Cont.)	**<u>MDOT SHA Response</u>:** The Phase I County outfall selection for yearly IDDE inspection is based on the need to inspect Counties with the oldest last inspection date. The County(s) with the oldest IDDE inspection dates are the priority outfalls. The team attempts to perform inspections in multiple adjacent Counties per year in both rural and urban environments. This allows for the IDDE investigation to be performed throughout the State. SHA plans to visit up to 200 sites prior to beginning the inspection effort. To ensure that the teams inspect 150 sites (as required by the Permit), the team selects 200 sites knowing that some sites will be inaccessible. The goal is to prepare to visit enough sites so that pre-field tasks are only completed once. These pre-field tasks include mapping and mobilization planning. Prior to fieldwork, the team identifies the major outfalls in the SHA NPDES database for the focus Counties by running a query in ArcGIS to select the STRUCTURES features where the Major Outfall field is equal to true. From the list selected, the team identifies if there are past inspections in a focus County where an IDDE was detected during the previous investigation. These sites are included in the 200 sites. The team attempts to group IDDE outfalls by geography in urban and rural areas per County. This allows the team to minimize travel time from site to site, but still allows for urban and rural variances. While reviewing the selected outfalls in the office, the team identified if the outfall meets the definition for a major outfall. Major outfall being defined as a >=36" equivalent pipe that receives flow from closed storm drain systems, i.e. inlets. If the outfall is determined to be a valid major outfall, the outfall is added to the list of 200 outfalls. The team created field maps and / or mobile tablets to be used during the field investigation. For the next reporting year SHA plans to focus on concentrated urban areas and industrial corridors in Phase I Counties. **34. MDOT SHA is required to conduct and report on annual visual surveys of commercial and industrial areas for discovering, documenting, and eliminating pollutant sources. MDOT SHA is required to annually report areas surveyed. MDOT SHA submitted a GIS layer identifying the location of facilities covered under the 12-SW permit. MDOT SHA is relying on compliance with the 12-SW for compliance with Part IV.D.3.b of the MS4 permit. No commercial areas are within MDOT SHA's jurisdictional boundaries. However, other activities on SHA property that are not covered under a 12-SW have a high pollution potential and should be included in the visual surveys. These activities parallel those listed in MDOT SHA's Property Management requirements (PART IV.D.5) and can include garages, parking lots, rest areas, and other highly trafficked areas. MDOT SHA stated in the 2016 annual report that a Hot Spot Jr. Inspection Form would be utilized. This form is an appropriate checklist for areas that have high pollution potential but do not have NPDES permits. In conjunction with implementing the property management and maintenance program, MDOT SHA must include a summary of visual surveys conducted (e.g., number of areas surveyed, polluted discharges discovered, corrective actions taken).**

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	<u>MDOT SHA Response</u>: Over 1,500 visual surveys were conducted at 162 facilities in FY17 including primary maintenance facilities (covered under 12-SW) as well as properties not covered under 12-SW such as satellite facilities, salt storage areas, welcome centers / rest areas, weigh stations, materials laboratory and offices. We do not use the Hot Spot Jr. Inspection Form for non-12SW facilities as noted in the 2016 annual report. Rather we employ multi-media checklists that include a visual assessment of stormwater compliance / pollution controls. The following lists examples of potential pollution issues noted during these inspections with corresponding corrective actions: • Oil stains noted on paved areas of facility, placed drip pan under leak with subsequent repair of leaking vehicle • Erodible materials such as sand and/or top soil found uncovered on impervious surface of facility – Piles covered and/or relocated, and lot swept • Salt maintained to ensure full containment within storage structure • Spill Kit on fuel island found low on supplies, restocked • Leaking brine maker repaired. **35. MDOT SHA's Environmental Compliance Division has maintained a program to address and respond to illegal discharges, dumping, and spills. MDOT SHA received two illicit discharge complaints. MDOT SHA is coordinating with Baltimore and Frederick Counties to resolve the respective discharges. In the next annual report, MDE requests an update on outstanding violations.** **<u>MDOT SHA Response</u>:** 2018 Annual Report includes update on Frederick County and Baltimore County IDDE Closures from FY17 report • Baltimore County – Inspected and closed by the County. • Frederick County – Inspected by County in 2017. No evidence of discharge. During recent County-led follow-up evidence was found that discharge was occurring again. County referred it to City of Mt. Airy Department of Public works for follow-up with business owner. MDOT SHA will follow-up with City of Mt. Airy and continue to monitor progress. **36. In the 2016 annual report review, MDE requested that MDOT SHA submit procedures for investigating and reporting illicit discharges. MDOT SHA developed a process flow diagram detailing the progression of actions to take after a suspected illicit discharge is reported or discovered. Actions include documentation, database management, and coordination with Maryland Environmental Service for chemical testing. MDE requests that MDOT SHA provide greater clarity on the dry weather screening and illicit discharge investigation processes. More specifically, MDE requests details on**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	procedures associated with the "Source Identification Inspection", "attempts to identify source", and preparation of the "illicit report." Examples of procedures include outfall inspection checklists, instructions on how to track a suspected illicit discharge up the storm sewer system, and investigation report templates. **MDOT SHA Response:** MES IDDE Procedures for MDOT SHA OED requests are provided with this 2018 annual report as Appendix F. **37. MDOT SHA made progress on the GIS-based database that will be used to track IDDE program activities. MDOT SHA reported finalizing the requirements document and proceeding with system implementation. MDE requests that MDOT SHA report on implementation status in the next annual report.** **MDOT SHA Response:** As discussed in Section D.3.c, page 1-43 of the FY18 annual report, MDOT SHA has completed the requirements and design documentation for our IDDE management tool, and the implementation project is queued for FY20 implementation based on priority. The implementation will leverage a new strategic platform for application deployment and will align with MDOT SHA's processes for tracking and follow-up for illicit discharge cases. 38. MDOT SHA continued to coordinate with the appropriate jurisdictions to eliminate illicit discharges outside of MDOT SHA's right-of-way. Per MDE's request in the previous annual report review, MDOT SHA provided an example of educational materials given to property owners when an illicit discharge is discovered. 39. MDOT SHA submitted complete data in the IDDE associated table of the MS4 geodatabase.
Part IV.D.4 Trash and Litter Part IV.D.4 Trash and Litter (Cont.)	40. MDOT SHA reports that maintenance crews, contractors, and inmate clean-up crews collected approximately 1.77 million pounds of litter, an increase from the 1.25 million pounds of litter that was collected during the previous FY. The three counties with the highest amounts of litter collected were Baltimore (557,088 pounds), Anne Arundel (273,364 pounds), and Prince George's (263,228 pounds). 41. MDOT SHA reports that the daily cost for litter pick-up by maintenance crews, inmates, contractors, and MDOT SHA team leaders with temporary crews were \$1,700, \$950, \$400, and \$1,100, respectively. In total, "MDOT SHA spent \$8.1 million in [FY2017] on litter removal operations." This is a slight increase from the \$7.9 million spent in FY2016. 42. MDOT SHA continues to maintain its anti-litter program that includes Adopt-a-Highway (AAH) and Sponsor-a-Highway programs in addition to litter awareness events at schools and civic events. In FY2017, a total of 152 miles were adopted while 390 miles were sponsored. According to the annual report, many of the AAH groups are disposing of their trash bags and/or separating recyclables,

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.D.4 Trash and Litter (Cont.)	helping to reduce litter in landfills and reduce costs. 43. In April 2017, MDOT SHA began an educational effort, titled "We Live Here, Too", that used various forms of media to inform the public "about the harmful impacts of litter on the state's roadsides and natural resources". This included a news release to encourage volunteer participation as well as an Op-Ed in the Baltimore Sun. 44. MDOT SHA continued discussions with Maryland State Police and local government agencies regarding litter reduction enforcement. 45. The "Litter Reduction Educational Initiative" was initiated to determine current levels of litter awareness, perceptions, behavior, and motivation towards littering. SHA also intends on using focus groups to gauge limitations and direct marketing to targeted audiences. – As requested, MDOT SHA reported that during FY2017, approximately $41,000 was used to fund the research study, review and evaluation of the results, and the development of a communication plan. – Quantitative data were collected through 1,200 surveys. Some key findings were: ▪ Litter and trash were not a major concern statewide but "Baltimore Metro Area respondents did indicate a higher level of concern compared to residents of other regions." ▪ "More than half of the study participants admitted to having littered at some point, accidentally or otherwise." ▪ 83% of respondents "report that they have not seen, heard, or read any advertising messages about litter or trash in the State of Maryland within the past 6 months." As a result of the research, MDOT SHA's anti-litter campaign will try to increase awareness of impacts, "change people's attitudes and behavior toward their local environment", and "promote and nurture a sense of civic pride within communities" to encourage responsibility. The key audiences and tactics to address each goal have been identified and messaging has been selected. 46. MDE commends MDOT SHA for its efforts to increase litter awareness throughout the State.
Part IV.D.5 Property Management and Maintenance	47. MDOT SHA continued to sweep roads April through November and dispose of the materials in a landfill. A total of 4,649 inlets were cleaned and an estimated 489 tons of material were collected across 11 counties with a continued focus in central Maryland. 48. A total 21,992 gallons of pesticides were applied during FY2017. MDOT SHA applicators continued to be registered with Maryland Department of Agriculture (MDA) and operate under a certified pesticide applicator. MDOT SHA is working with MDA to pioneer biological pest controls. 49. In FY2017, 206,501 pounds of fertilizer were applied. MDOT SHA is partnering with two universities on studies to reduce the use of fertilizer. **50. Anti-icing and liquid applications have resulted in continued annual**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	reduction of salt application. During the winter season, 91,494 tons of salt and 91.2 million gallons of salt brine were applied. The Salt Management Plan was revised and made available to the public online. MDE commends MDOT SHA for its proactive efforts in management of deicing material. **<u>MDOT SHA Response</u>:** An error was discovered in the 2017 deicing materials Table 1-21. The Salt Brine number was reported as 91,169,839 gallons in error and should have been reported as 1,169,839 gallons. **51. Monthly and quarterly inspections of industrial facilities continued to be performed using standard operating procedures. Stormwater pollution prevention plans (SWPPPs) are updated annually and as needed. Example facility inspection documents were submitted with the annual report. Inspections at select facilities (Churchville, Owings Mills, Dayton, and Elkton) noted that issues to be corrected were the responsibility of the Highway Hydraulics Division. In the next annual report, MDOT SHA should provide information on the process of tracking and follow-up, including typical turnaround time, to ensure that issues are corrected.** **<u>MDOT SHA Response</u>:** MDOT SHA reviewed these CSCEs and did not find any mention of HHD in the Dayton or Churchville inspection reports. As stated in the annual report (Section D.5a, Page 1-55), if issues related to a storm water management facility are noted during ECD's inspection process that are beyond routine maintenance, the issues are compared with the latest inspection report conducted by MDOT SHA's Highway Hydraulics Division's (HHD). If the issues are not already noted in the most recent HHD inspection, ECD relays the issue to HHD. HHD prioritizes and schedules any necessary repairs in accordance with MDOT SHA's Stormwater Management program detailed in Section D.1 of the annual report. 52. MDOT SHA incorporates training into several aspects of its Property Management and Maintenance program. Annual SWPPP training was provided to 836 staff members in all seven districts over 30 training dates. In-house pesticide application training was given to 185 attendees during 24 training sessions across five class levels. Additionally, 183 employees attended seven Snow College training sessions including all new employees and hired equipment contractors, plus a portion of existing MDOT SHA employees on a 5-year cycle. An additional 1,000 maintenance facility employees and 2,100 hired equipment contractors were trained regarding salt management. MDE commends MDOT SHA for these efforts.
Part IV.D.6 Public Education Part IV.D.6	53. MDOT SHA continues to operate its Customer Care Management System that allows for the submission of complaints and concerns. In FY2017, this system received 23,000 service requests with a total of 2,136 related to litter and illegal dumping. Both of these figures have increased since FY2016 in which 19,860 service requests were received with 427 being related to illegal dumping.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Public Education (Cont.)	54. MDOT SHA developed and released a new public education webpage. Examples of the website content include proper vehicle fluid disposal, stormwater management, and reducing roadside dumping. 55. MDOT SHA has "strategically placed 'No Dumping' signs throughout the [S]tate." In addition to these signs, MDOT SHA established "designated pet walking areas" at some of its welcome centers. "These areas contain pet waste disposal stations which feature pet waste bag dispensers, educational signs, and [pet waste] trash bins". 56. MDE commends MDOT SHA for its continued efforts with Public Education.
Part IV.E Restoration Plans and Total Maximum Daily Loads (TMDLs) Part IV.E Restoration Plans and	*Watershed Assessments* 57. In order to facilitate cooperation and identify partnering opportunities, MDOT SHA created "an outreach team tasked with coordinating the pollution reduction strategies in each of the MS4 jurisdictional counties." 58. In FY2017, four new TMDLs were approved by the Environmental Protection Agency (EPA). As required, MDOT SHA submitted three of the completed implementation plans by the due dates. The fourth plan was not due during FY2017. The name and submission dates of the received plans are as follows: – Bush River Oligohaline Segment PCB TMDL Implementation Plan, August 2, 2017 – Swan Creek Watershed Sediment TMDL Implementation Plan, September 29, 2017 – Gunpowder River and Bird River Subsegments of the Gunpowder River Oligohaline Segmentshed PCB TMDL Implementation Plan, October 3, 2017 *Restoration Plans* 59. MDOT SHA submitted a revised Impervious Restoration and Coordinated TMDL Implementation Plan on 7/31/2017 (for baseline accounting updates) and again on 10/9/2017 (for modeling revisions). **60. In MDOT SHA's annual report and revised impervious area assessment, using a variable baseline year (VBY) between 2002 and 2005, it proposed a restoration baseline of 4,709 impervious acres. MDOT SHA is working with MDE to finalize its impervious baseline and must submit a final impervious assessment to MDE by June 30, 2018. Once reviewed and approved by MDE, this final assessment will constitute the baseline upon which the 20% restoration requirement will be computed for this permit term. In the interim, MDOT SHA will continue working towards meeting the 20% restoration requirement based on its proposed restoration baseline of 4,709 impervious acres.** **MDOT SHA Response:** The final impervious baseline assessment was submitted to MDE on June 29, 2018. The restoration progress reported in the attached 2018 annual report is based on our final assessment and 20% restoration goal of 4,439 acres, however we are working towards the 4,709 until final determination from

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
TMDLs (Cont.)	MDE on final baseline. 61. From the VBY to FY2016, MDOT SHA reports that it completed approximately 1,493 acres of restoration. According to the annual report, in FY2017 MDOT SHA completed approximately 442 acres of additional restoration through: – 150 acres of inlet cleaning – 81 acres of redevelopment credit – 67 acres of stream restoration – 54.8 acres of new stormwater BMPs – 33 acres of street sweeping – 22.1 acres of tree planting – 16.2 acres of outfall stabilization – 11.6 acres of grass swales – 4.8 acres of retrofits – 1.9 acres of impervious surface elimination (to pervious) **Some of the redevelopment and tree planting BMPs implemented in previous FYs were reported in FY2017 restoration totals. Excluding these BMPs results in the redevelopment credit decreasing to 0.5 acres and tree planting decreasing to 13.6 acres, bringing the total acres restored in FY2017 to 353.6 acres.** **Using the VBY to FY2017, MDOT SHA's total impervious acres restored is 1,936, or 41% of its total restoration requirement.** **MDOT SHA Response:** A revised Table 1-27 is included in the report, that lists corrected numbers to all the restoration years. Appendix D contains explanation in the changes between the 2017 and 2018 reporting. **62. In the previous annual report review, MDE documented that MDOT SHA provided general categories of BMPs and stated that "specific BMP types should be available for the immediate years to come." MDE requested that specific data be included as it becomes available, especially for the next two years. MDOT SHA did not provide updates to the listed BMPs and instead provided a list of completed projects. In the next annual report submission, MDOT SHA shall provide updates to the comprehensive list of restoration practices provided in Part II, Section E of the 2016 implementation plan. This list should reflect any changes that resulted from delays and/or adaptive management strategies.**
Part IV.E Restoration Plans and TMDLs	**MDOT SHA Response:** Because the tables related to the planned BMPs by FY are contained in the *MDOT SHA Impervious Restoration and TMDL Implementation Plan*, and MDOT SHA determined to hold off updating Part II of that plan until we receive MDE decision on the 6/29/2018 *Final MDOT SHA Baseline Assessment*, we have not included the updated Table 2-2 a-f to avoid potentially having to update them again based on the revised baseline. This is a very extensive and complicated table to update given the extent of MDOT SHA

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
(Cont.)	right-of-way and projects throughout the MS4 areas. MDOT SHA is committed to providing this updated information and will include it upon redelivery of the Implementation Plan containing Part II. The fully revised Implementation Plan is attached to this annual report delivery but does not include Part II at this time. We will update Tables 2-2 a-f to include additional locations and BMP type details that have emerged since originally publishing of the implementation plan. If MDE decision regarding final baseline from the 6/29/2018 delivery is delayed beyond December 2018 (6 months from delivery of the 6/29/18 Final Baseline Assessment) MDOT SHA will update Table 2-2a-f and deliver to MDE in January regardless. **63. The annual report states that the "[l]ists of proposed practices and estimated costs…are not vetted through the site search and concept development process to determine feasibility." MDE questions whether the provided lists include viable practices or if a large number of the listed practices will likely not be implemented. MDE requests that MDOT SHA provide reassurances that the identified practices are feasible.** **MDOT SHA Response:** Table 2-2 of the *Interim Review Draft* Implementation Plan will contain this list of projects. All projects to meet this permit term are close to final review or beyond design milestones, with permits and right-of-way acquisitions either in hand or in the last stages of negotiation. We also have allocated several projects as 'buffer' projects and are moving those forward in case unforeseen circumstances at late stages in design cause delays for delivery. We have attached a Gantt chart of current projects for this permit term that are in various stages of design, advertisement, or construction. The data making up this chart is also included in tabular form. The blue horizontal lines on the Gantt chart represent the construction phase for each project from notice-to-proceed through construction completion. The anticipated impervious acres are listed as the last set of parentheses in the label for each row. We have not completed the site search and feasibility process for sites located in the new Phase II jurisdictions for the next permit term, but have many projects shelved within the current MS4 coverage for implementation with the next permit term. 64. Comments from WSA's Integrated Water Planning Program on the restoration plans are provided in Attachment II. General comments regarding these plans are provided below.
Part IV.E Restoration Plans and TMDLs (Cont.)	Pollutant Load Baseline Analysis – **As a reminder, an accurate pollutant load baseline analysis is dependent on the completeness of the BMPs reported in the MS4 Geodatabase. Any BMPs with deficient records (e.g., missing inspection dates or drainage areas for redevelopment BMPs) are not allowed for claiming water quality treatment and pollutant load reductions. With the exception of redevelopment BMPs discussed above, these data shall be completed by**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.E Restoration Plans and TMDLs (Cont.)	**MDOT SHA prior to load reduction use.** **<u>MDOT SHA Response</u>:** Restoration BMP records have the required records. Redevelopment credit is discussed in Appendix E of this 2018 annual report. The 'Optional worksheets for MS4 Stormwater WLA Implementation Planning' are also included as Appendix H to the FY18 Annual Report, which detail the BMPs used for load reduction. <u>Consistency with MDE Guidance</u> – **In MDE's previous review, MDE requested that for trash TMDLs, MDOT SHA clarify what the "Target Drainage Systems and Waterways" practice entailed and provide any analyses or monitoring supporting these reductions. This clarification and analyses were not provided in the 2017 annual report. Clear and specific activities are needed to ensure that targets may be met. In the next annual report, MDOT SHA shall provide clarifications for this deficiency.** **MDOT SHA Response:** The trash implementation has been updated in the10/9/2018 *Interim Review Draft* of the Implementation Plan attached to this delivery that includes Parts I, III, and IV. The trash plan update is under Part III, page 3-36, and the individual projected BMPs with interim target dates (2020 and 2025) are included in Part IV plans for Anacostia (page 4-8), Jones Falls (page 4-108), and Gwynns Falls (page 4-100) watersheds. Also, descriptions of the Drainage System and Waterway Cleanups are updated in Part I, page 1-30, of the Implementation plan. The updated trash plan relies upon the San Francisco Bay *BASMAA Trash Load Reduction Tracking Method* and adds trash reduction credits included in Table 3-9 on page 3-39 of Implementation Plan. The BMP definitions for Media Relations, Community and School-Age Children Outreach are included in the BASMAA document. The *MDOT SHA Restoration Modeling Protocol* is under revision to update all our modeling protocols to fall in synch with the current version of the Implementation Plan and will be delivered to MDE along with the complete Implementation Plan with Part II included.. – **MDOT SHA reports that it is including "practices not previously reported as restoration practices" and that "if the restoration requirement for this permit term is exceeded, excess restoration credit should be applied to the next permit term restoration requirement." MDOT SHA's current MS4 permit does not address excess credit being applied toward future impervious surface restoration requirements. However, the current draft permit does allow for this credit option. Please proceed with restoration activities with the understanding that in the next permit term, excess restoration credits may be applied toward restoration requirements rather than baseline treatment.** **<u>MDOT SHA Response</u>:** Practices that were built prior to the last permit expiration date (10/21/2010) but not claimed for credit in the last permit, were

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.E Restoration Plans and TMDLs (Cont.)	removed from this permit restoration BMP data and applied to the baseline treatment in the 6/29/2018 final baseline assessment. During the 5/14/2018 conference call between MDE and MDOT SHA, MDE clarified that MDOT SHA can claim restoration credit against next permit term restoration requirement rather than baseline treatment if MDOT SHA exceeds the current permit term 20 percent restoration. <u>Implementation Schedules and Interim Milestones</u> – **In MDE's previous review, a request was made for MDOT SHA to develop and include interim targets (i.e., four-year targets) in the next submission. The 2017 report states that "MDOT SHA has prioritized and focused efforts on developing, adapting, and implementing restoration efforts targeting the overall 20 percent requirement". Additionally, "it would not be prudent for MDOT SHA to commit to developing individually targeted restoration plans for each of the 26 watersheds, until the 20 percent Bay restoration work is implemented." MDE understands the amount of effort needed to develop interim targets. However, clear interim targets are necessary to accurately track progress toward meeting the final deadline. Based on MDOT SHA's current restoration implementation rate, it should estimate reasonable interim targets for meeting WLAs and submit them with its next annual report.** **<u>MDOT SHA Response</u>:** Interim target dates for 2020 and 2025 have been modeled and included for each pollutant and watershed in Table 3-2 beginning on page 3-19 of the Interim Review Draft of the Implementation Plan included with this submission. Additionally, tables with BMPs used to meet the interim target dates and end dates are included in Part IV individual plans. Progress of pollutant load reductions for FY20 2018 MS4 annual report in Table 1-28. – MDOT SHA reports implementing higher amounts of street sweeping and inlet cleaning than what is currently being claimed for restoration credit. MDOT SHA feels that the more conservative amounts of 33 acres and 150 acres, respectively, can be consistently achieved. MDE agrees with this conservative approach to claiming credit for inlet cleaning and street sweeping. – For the Bird River and Bush River Oligohaline Segment PCB TMDLs, MDOT SHA proposes using new stormwater management practices, retrofits, and inlet cleaning to meet a portion of the reduction requirements. However, these BMPs will only achieve 4.5% of the target reductions for the Bird River and 9.1% of the target reductions for the Bush River. The remaining reduction amounts will be achieved through source targeting and elimination, a monitoring and evaluation plan, and partnering with other MS4s to reduce local PCB concentrations. – For MDOT SHA's Swan Creek Sediment TMDL, it plans on implementing new stormwater management practices, tree planting, and inlet cleaning to achieve 11.2 % of the reduction target. The implementation plan states that the

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	remaining reduction requirement will be met through load splitting on joint projects with other MS4s and possibly nutrient credit trading. MDE encourages MDOT SHA to continue planning and utilizing adaptive management strategies, especially for this sediment TMDL and the previously discussed PCB TMDLs. 65. MDOT SHA submitted modifications to its Existing Water Quality Grass Swale Identification Protocol. The review of these modifications will be sent at a later date. *Public Participation* 66. The public comment periods for the three Implementation Plans were announced in the Baltimore Sun, Washington Post, and on SHA's website. 67. No comments were received during the comment periods. 68. This satisfies reporting requirements for Part IV.E.3 of SHA's MS4 permit. *TMDL Compliance* 69. MDOT SHA provided an assessment of progress towards meeting TMDLs. – Per MDE's request, MDOT SHA provided a current status for the fulfillment of bacteria, trash, and PCB TMDLs. – The MS4 geodatabase included the target and current loading amounts for TN, TP, and TSS, and local concerns. – The annual report documented and compared the net change in pollutant load reductions from completed projects, programs, and initiatives with the established target reductions, deadlines, and applicable stormwater WLAs. – MDOT SHA has achieved the following reductions for Bacteria, PCB, and TSS TMDLs:

Pollutant	Average Reduction	Minimum Reduction	Maximum Reduction
Bacteria	1.9%	0.1%	7.2%
PCB	4.0%	0.3%	33.3%
TSS	20.0%	1.4%	94.5%

	– **Per MDE's request, the annual report included permit-wide Bay TMDL progress, specifically for Nitrogen and Phosphorus. However, given that no reduction target is provided, the reduction achieved to-date has no meaningful benchmark for comparison. Permit-wide baseline and current load amounts were reported by County (i.e., Anne Arundel, Baltimore, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, Prince George's, and Washington Counties). MDE will work with MDOT SHA to establish benchmarks for each MS4 County in which there is a WLA.** **<u>MDOT SHA Response</u>:** MS4-wide targets are provided in Table 1-28 of the 2018 annual report that include 2020 and 2025 (MDOT SHA Reduction

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	Target) and were derived based on the current MDOT SHA progress in impervious restoration and modeled load reductions, compared to projected impervious reduction and nitrogen target for the next permit term. – **Table 1-28 of the annual report shows that the current reductions achieved and reduction targets are equal for the Patapsco, Gwynns Falls, and Jones Falls Trash TMDLs. This indicates meeting 100% of the reduction requirement for these two TMDLs. However, the geodatabase shows that the current loads for these TMDLS are actually greater than the target loads. Conversely, the annual report shows that for the Anacostia River Trash TMDLs in Prince George's and Montgomery Counties, the current reductions are 0 while the current loads in the geodatabase are less than the target loads. MDE requests greater clarity and consistency when reporting progress and fulfillment of reduction targets.** **<u>MDOT SHA Response</u>:** MDOT SHA has worked to ensure greater consistency in report and geodatabase numbers. – Documentation was provided that describes how MDOT SHA continuously plans for alternative strategies as part of the adaptive management process through the course of the permit term. These strategies include using database tools to "track project development progress" in order to adjust schedules "to account for unforeseen issues". MDOT SHA has also used "alternative contracting mechanisms such as full delivery stream restoration contracts, development of alternative crediting protocols, purchasing listed properties, and partnerships with other jurisdictions." Other mechanisms, as reported in the 2016 implementation plan, include "increased maintenance activities such as inlet cleaning and street sweeping". – **The 2017 annual report states that part of MDOT SHA's efforts include investigating ways to "reduce the restoration requirement through methods to reduce the impervious baseline." MDE must note that once an impervious baseline is established under Part IV.E.2.a of the permit, it will not change for the entire permit term. Any changes to this number shall be reported and justified as part of the reapplication process and reported in the fourth-year annual report. This information will be considered and discussed as part of the negotiation process during the next permit cycle.** **<u>MDOT SHA Response</u>:** Understood. The baseline reduction methods included in the 6/29/2018 submission are part of establishing the impervious baseline for this permit term. No other baseline reduction methods are proposed for this permit term. Additional baseline reduction methods will be included in the 2019 fourth-year baseline reassessment for the next permit term. – **One of the proposed reduction methods is investigating potential**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	impervious disconnections. MDE requests that MDOT SHA develop a proposal on how it plans to use Howard County's protocol for impervious area disconnects in order to claim credits for road systems. This proposal may be submitted for review before or as part of the next annual report submission. **<u>MDOT SHA Response</u>:** This proposal was included in the June 29^{th} final baseline assessment submission as Attachment D. Also, a separate memo relating to no overlaps between the MDOT SHA existing grass swale identification protocol and this disconnection protocol was delivered via email from Sonal Ram to Brian Cooper on 5/21/2018. Additional copies of these documents can be provided upon request. **70. As per Part IV.E.4.c of its MS4 permit, MDOT SHA provided itemized costs for completed projects, programs, and alternatives. MDE highly encourages MDOT SHA to continue providing as much cost information as possible. MDOT SHA shall include the total expenditures to date at the bottom of Table 1-31.** **<u>MDOT SHA Response</u>:** MDOT SHA continues to provide this cost data. The total expenditures was added to the bottom of Table 1-31 although they do not represent the total program BMP implementation expenditures as some costs are unknown and operations costs are not included in Table 1-31. 71. Fund allocations for TMDL Restoration were reported for FYs 2017-2022.
Part IV.F Assessment of Controls	72. MDE approved MDOT SHA's proposal to begin its Assessment of Controls monitoring in the Little Catoctin Creek Watershed on October 4, 2016. **73. According to MDOT SHA's annual report, water quality data equipment was installed at the Little Catoctin Creek monitoring location in December 2016. Storm sampling began in January 2017; between January and July 2017, MDOT SHA reported capturing 8 sets of discrete storm samples. However, the Chemical Monitoring associated table shows 5 sets of storm samples captured through May 2017 (plus one base flow measurement). MDE requests that the remaining measurements be submitted as part of the next annual report.** **<u>MDOT SHA Response</u>:** In FY17, 8 total samples were collected but this includes only 7 sets of storm samples and one baseflow sample. MDE requested that "the remaining measurements be submitted as part of the next annual report"; The FY18 MDOT SHA data submission incorporates all chemical monitoring data, including the remaining FY17 data (which includes the 7 sets of storm samples for FY2017, rather than the 8 stated in the FY17 report). It should also be noted that chemical data submitted to MDE in FY17 is being overwritten with new data in the FY18 submittal because the previous submittal included some observations still flagged by USGS as provisional. Moving forward

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	with the submission of some data in this state was necessary to meet the 2017 reporting deadline and was done so with the understanding that subsequent files would update any provisional entries accordingly. A detailed description of the nature and extent of changes is included Section 3 of Appendix I of the 2018 annual report. **74. MDE understands that monitoring efforts began halfway into the current FY, and for future submissions, reminds MDOT SHA of the requirement to monitor 12 storms per year as part of PART IV.F.1.a.i of its MS4 permit.** **<u>MDOT SHA Response</u>:** Numerous challenges were encountered during FY18 with regard to sample collection including an extreme storm event that significantly damaged the sampling equipment (as explained in Appendix I of the 2018 annual report), conflicts with property owners regarding access, and atypical weather patterns of frequent and persistent rain during the spring and summer months that impacted the antecedent dry time requirements for sampling. During this time period, burial of auto-sampler intakes, auto-sampler mechanical failure/replacement, and high-flow/site-access issues have also prevented successful sample collection. As a result, USGS was only able to successfully collect a total of 11 samples (6 storm flow, 5 base flow) in FY18. To improve success moving forward, USGS has reconsidered the time-based rainfall and base-flow requirements being used to define antecedent flow conditions needed to collect storm samples and are now utilizing water chemistry as the best indicator of return to base-flow conditions. This change in base-flow indicator criterion was implemented on August 24, 2018. Furthermore, USGS is modifying the auto-sampler configuration to be able to capture more samples during an event and improve the ability to successfully sample events that are not forecasted or occur at night (or during other times when it is unsafe or impractical to collect a direct storm sample). 75. The data submitted in the Chemical Monitoring associated table is complete, as well as the Monitoring Site and Monitoring Drainage Area feature classes. 76. The Biological Monitoring associated table is complete; MDOT SHA submitted data for benthic samples collected in the spring of 2016. Results were submitted to MDE in Appendix J of MDOT SHA's annual report. MDOT SHA partially attributes fine sand and silt deposits to lower Benthic Index of Biotic Integrity (BIBI) scores measured in the Little Catoctin Creek monitoring locations. 77. MDOT SHA conducted physical and geomorphic monitoring in Little Catoctin Creek as required and submitted findings to MDE in Appendix J of its annual report. Five cross-sections were analyzed. Initial assessments found additional bank erosion as well as some aggradation that had occurred in the past two years. 78. MDOT SHA is conducting its Stormwater Management Assessment in the Little Patuxent River Watershed and has submitted its analysis in Appendix K of the annual report. Currently, MDOT SHA plans to install environmental site design

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	(ESD) controls along the intersection of I-70 and Marriottsville Road in Howard County. Preliminary analysis has been conducted and the first year of monitoring is scheduled to begin in December 2017. MDE reviewed this monitoring site in December 2017. The results of this review will be sent at a later date.
Part IV.G Program Funding Part IV.G Program Funding (Cont.)	• MDOT SHA's capital and operating expenditures for implementing NPDES stormwater permit requirements during FY2017 were \$79.7 million and \$13.2 million, respectively, and totaled \$92.9 million. • In FY2017, MDOT SHA secured additional capital funds for engineering and BMP remediation as well as increased operations and maintenance funding for enhanced inlet cleaning. • According to the 2016 annual report, capital expenditures were reported to be \$69.7 million. This level of funding has increased significantly in the past few years and MDE commends MDOT SHA for its commitment to the NPDES program and improving water quality. • The requirements for Part IV.G have been met.

Attachment A-II – MDOT SHA Responses (10/9/2018) to MDE Comments on MDOT SHA 2017 Annual Report Review

MDOT SHA responses to the MDE 2017 MS4 Annual Report Review comments that were delivered to MDOT SHA OED on May 17, 2018 are integrated into the table below. MDE comments requiring response or follow-up are highlighted in bold text and the MDOT SHA response is provided immediately below.

Nutrient Plans:

New Comments on Progress Reporting

Comment Type	Location	MDE Comment and MDOT SHA Response
1. General Nutrient	SHA Annual Report, Page 1-79	**1. SHA describes using the mass loading approach for calculating the nutrient load reductions and impervious acre equivalents for inlet cleaning. They describe a back-calculation from tons of wet sediment. The mass loading approach estimates a nutrient load reduction from tons of dry sediment. If SHA's estimated reductions are from wet sediment, its estimated nutrient load reductions and impervious acre equivalents could be incorrect.** **MDOT SHA Response:** MDOT SHA uses the conversion factor specified in the MDE 2014 Guidance of 0.7 to convert wet weight to dry weight of material. This process is in accordance with the mass loading approach example found in the MDE Guidance.
2. General Nutrient	SHA Annual Report, Table 1-28	2. **Table 1-28 reports progress SHA has made towards local TMDLs. MDE recommends that SHA add a field to this table indicating what percent of the reduction target has been achieved to date, in addition to the absolute load reduction that has been achieved. Also, the load reductions in this Table and in subsequent figures are only presented in aggregate. MDE would like to see the BMPs that have been used to achieve these load reductions, their implementation levels from baseline conditions, and the load reductions per BMP type. MDE recommends using the reporting spreadsheet "Optional Worksheet for MS4 SW-WLA Implementation Planning" available on MDE's TMDL Data Center at http://www.mde.state.md.us/programs/Water/TMDL/DataCenter/Pages/TMDLStormwaterImplementation.aspx**

		for reporting this information. **<u>MDOT SHA Response</u>:** Table 1-28 has been updated to show 2020 targets and percent reductions achieved relative to both the total target and the 2020 target. Also, as recommended by MDE to address the BMPs specific to progress, the 'Optional Worksheets for MS4 SW-WLA Implementation Planning' have been included as Appendix G of the FY18 Annual Report.

Old Comments on Implementation Plans not Addressed - Major Comments

Comment Type	Location	MDE Comment and MDOT SHA Response
1. General Nutrient	SHA SW-WLA Plans	**3. SHA's implementation plan discusses the possibility of internal credit trading to meet state TMDL watershed reductions, meaning the reduction of sediment beyond the TMDL in one watershed to compensate for a shortfall in another. Since the endpoint of state nutrient and sediment watershed TMDLs is based on the biological integrity in the 1st- through 4th-order streams in a given watershed, reductions from one watershed will have no impact on another and cannot be transferred. A surplus of reductions in one TMDL watershed cannot be applied to a shortfall in another.** **MDOT SHA Response: W**ording related to 'internal trading' between watersheds has been removed from the *Interim Review Draft* of the MDOT SHA Implementation Plan. Parts I, III, and IV of the plan are included with this annual report delivery. Part II will be updated and the entire plan redelivered to MDE with Part II included once MDOT SHA receives MDE decision on our 6/29/2018 final baseline assessment.

Specific Comments

Comment Type	Location	MDE Comment and MDOT SHA Response
1. Specific Nutrient	SHA Swan Creek TMDL plan	4. It would appear that in the Swan Creek Sediment TMDL plan SHA made all of the implementation modeling revisions previously discussed by MDE and SHA. MDE appreciates this, and the modeling now appears to be consistent with MDE guidance.
2. Specific Nutrient	SHA Swan Creek TMDL plan	**5. SHA does not provide any interim target dates for load reductions and/or BMP implementation between 2017 and the target date of 2030. It was previously discussed that SHA would provide interim goals for load reductions and BMP implementation.** **MDOT SHA Response:** Interim targets for 2020 and 2025 have been modeled and added to all pollutants and watershed in Table 3-2 of the *Interim Review Draft* Implementation Plan dated 10/9/2018.

Comment Type	Location	MDE Comment and MDOT SHA Response
3. Specific Nutrient	SHA Swan Creek TMDL plan	**6. The final load reduction does not meet the full required reduction percentage as called for by the TMDL. SHA acknowledges this and indicates that it will pursue trading and load splitting to close this gap. SHA should be mindful that any trading will need to be consistent with MD's trading regulations, once released, which could limit the means and methods for trading relative to local, State TMDLs and for sediment.** **<u>MDOT SHA Response</u>:** MDOT SHA understands that trading is not currently a viable option and that any trading will need to comply with the trading regulations. We will also work to develop additional adaptive management options to close the gaps between current BMP modeled reductions and the target reductions. Table 3-2 of the enclosed *Interim Review Draft* has been updated such that if modeled reductions do not meet the target, the total reduction target is the final reduction displayed for the end date.
4. Specific Nutrient	SHA Swan Creek TMDL plan, Table 6	**7. Can SHA provide load reductions for the individual BMPs listed in Table 6?** **<u>MDOT SHA Response</u>:** 'Optional Worksheets for MS4 SW-WLA Implementation Planning' have been included as Appendix G of the FY18 Annual Report.
5. Specific Nutrient	SHA Swan Creek TMDL plan, Page 11	**8. The report states "The baseline load for sediment in Swan Creek represents the approximate quantity of sediment that was being discharged by a given entity at the time the TMDL monitoring began in the watershed." The Swan Creek sediment TMDL was developed using the CBP P5.3.2 watershed model output, for which monitoring data from many different stations across the entire bay watershed was used for calibration purposes. Since no specific monitoring was conducted for the Swan Creek TMDL, it is suggested that the sentence be revised.** **<u>MDOT SHA Response</u>:** This sentence has been revised and is included in the revised *Interim Review Draft* of the Implementation Plan submitted to with this 2018 annual report.
6. Specific Nutrient	SHA Swan Creek TMDL plan, Table 2	**9. The MDOT SHA Baseline Load is said to be 60,575 lbs/year. Below the table in Section E.2.a, the plan states "Currently, it is calculated that MDOT SHA is responsible**

Comment Type	Location	MDE Comment and MDOT SHA Response
		for introducing 60,575 pounds per year of sediment into the watershed per the MDE TMDL document (MDE,2016b) as a MS4 permittee." The baseline load for SHA in the nonpoint source tech memo of the TMDL is 30 tons (60,000 lbs). Please clarify, and potentially remove the phrase "per the TMDL document", since the baseline load is actually output from SHA's own modeling system. **MDOT SHA Response**: This sentence has been removed in the *Interim Review Draft* implementation plan submitted to with this 2018 annual report. MDOT SHA recognizes that this is an output from our own modeling system, and for future TMDL plans, will clarify where our baseline load originates.

Old Comments on Implementation Plans not Addressed - Minor Comments

Comment Type	Location	MDE Comment and MDOT SHA Response
1. General Nutrient	SHA SW-WLA Plans	**10. MDE provided the previous comment on SHA's implementation plans. Once again, it is no imperative that SHA revisit the amount of street sweeping and inlet cleaning it plans to use to address impervious acre restoration goals, but the planned levels seem like they could be hard to sustain.** **"Street Sweeping and inlet cleaning are Annual Practices and need to be completed every year to receive credit SHA proposes 1,287 acres of Equivalent Impervious treatment with these BMPs (about 3,217 actual impervious acres, ~~two times per month~~, *MDE 2014 Guidance*) which is about 27% of the untreated baseline. MDE suggests SHA revisit goals for sweeping and inlet cleaning to determine sustainable levels. MDE will not adjust the load reduction and impervious accounting calculations for street sweeping to the new Expert Panel Report for Street Sweeping during this permit term. MDE recommends SHA transition to the new street sweeping technologies to position the organization for the next permit term."** **MDOT SHA Response:** MDOT SHA recognizes that a sustained level of inlet cleaning and street sweeping must be maintained to claim this credit. MDOT SHA has adjusted the inlet cleaning goal from 1,287 down to 400 acres in order to satisfy this concern. The goal of 33 acres of street sweeping

Comment Type	Location	MDE Comment and MDOT SHA Response
		remains, as MDOT SHA feels this level of street sweeping is sustainable. This will be reflected in future resubmission of Part II of the Implementation Plan. Delivery date of this revised Part II is contingent upon MDE approval of MDOT SHA final baseline.
2. General Nutrient	SHA SW-WLA Plans, Table 3-2.	**11. In SHA's annual report, they document that the below comment was not addressed due to resource constraints, which is not a problem. MDE would just like to point out that this comment still needs to be addressed.** **"The plan provides final target dates for when the WLA will be achieved, but does not give interim targets or milestones. MDE-SSA suggests including interim dates indicating how much progress is expected to be achieved by the end of the permit term. The interim targets can be described with a higher degree of certainty than long-term planning beyond the end of the permit term. SHA should submit interim target dates for TMDLs currently addressed in the plan as soon as they are developed, preferably in this year's annual report, if possible. MDE can work with SHA to determine interim load reductions and dates, if necessary. Interim dates can then be revisited in the 4th year annual report and SHA can report final TMDL progress in the 5th year annual report. SHA should submit interim target dates for additional TMDLs (see TMDLs listed in above text) in the 4th year annual report."** **MDOT SHA Response:** Target dates of pollutant load reductions for FY20 and FY25 are included in the 2018 Annual Report, as well as the revised implementation plan, submitted to MDE on October 9th 2018.

PCB Plans:

Specific Comments

Comment Type	Location	MDE Comment and MDOT SHA Response
1. Specific Concern	Gunpoweder and Bird River TMDL plan, Page 13	**12. Page 13 states the following: "For the Magothy, Severn, South and West and Rhode River TMDLs, the Bay tidal influence is the single major source of PCBs. Similarly, for**

Comment Type	Location	MDE Comment and MDOT SHA Response
	& Bush River TMDL plan, Page 13	**Bird River, Bush River, and Gunpowder River, the tidal portions are a PCB source". To clarify, in the Bird, Bush, and Gunpowder Rivers, there is a net export of PCBs from the embayments to the Chesapeake bay mainstem. It is unclear if that is what this statement is attempting to indicate, but in case it is not, this should be clarified.** **MDOT SHA Response:** This statement is clarified in the revised implementation plan submitted to MDE on October 9, 2018.
2. Specific Concern	Gunpoweder and Bird River TMDL plan, Page 13 & Bush River TMDL plan, Page 13	**13. On Page 17, under the "Monitoring and Evaluation Plan" section, SHA discusses how they will "continue to review MDE documentation of declining PCB concentrations in the local watersheds due to natural attenuation". To clarify, the only data MDE routinely collects that could be used to assess potential declining trends in all watersheds is fish tissue data. This data was previously collected based on a cycling strategy, however, it has now moved to a more targeted approach. The fish tissue data can certainly be used to show declining trends in PCBs due to natural attenuation, but this clarification was necessary to point out. It is anticipated that the research community will also continue to collect data that will demonstrate the natural attenuation of PCBs in various waterbodies, as was done and cited in PCB TMDLs to estimate that natural decline in PCB concentrations from the Susquehanna and subsequently the mainstem of the bay.** **<u>MDOT SHA Response</u>:** MDOT SHA will monitor the research community's collection of data that demonstrates attenuation of PCBs into various waterbodies**.**
3. Specific Concern	Bush River TMDL plan, Page 17	**14. Does SHA have a status update on the source tracking protocol referenced on page 17 of the plan? SHA's previous set of implementation plans reference this protocol as well, indicating that they plan to submit the protocol and have MDE approve it by 2018. MDE would be willing to sit down and discuss the protocol with SHA before they submit it, if so desired. Some potential ideas for inclusion in the protocol would be SWM facility sampling during maintenance operations. This could be used not only as a source tracking procedure, but it could also help inform tPCB and TSS relationships, which could be used to refine the tPCB and TSS relationships currently**

Comment Type	Location	MDE Comment and MDOT SHA Response
		used in the plan to estimate reductions from SW retrofits and other restoration BMPs. The plan currently states that two approaches were used to derive the TSS and tPCB relationship for estimating reductions from implementation practices. First, the plan discusses using the average tPCB concentration in the estuary sediments (see Page 15). However, it also discusses the use of 80 ng/g per the Schueler and Youngk 2015 study. Can SHA clarify which method was used? **MDOT SHA Response:** MDOT SHA is currently partnered with University of Maryland on a PCB research study. The findings of this study will be used to better develop PCB reduction strategies for the MDOT SHA. The feasibility of such a protocol needs to be researched. We do not have a solid date for delivering this protocol or what form it might take if feasible. Other methods to reduce PCBs will be researched as they become available. The 80 ng/g was used.

Old Comments on Implementation Plans not Addressed - Minor Comments

Comment Type	Location	MDE Comment and MDOT SHA Response
2. General PCB	Page 3-37, Section E.4.b	**15. This section states that, "[m]onitoring to identify the impairment may have been performed in the water column, in sediments, or in fish tissue depending on whether the impairment was for water contact recreation or fish consumption."** **"Water contact recreation" should be removed from this statement as PCB impairments are not listed based on water contact recreation. Maryland lists impairments based on human health impacts from fish consumption and aquatic life impacts.** **MDOT SHA Response:** This statement has been revised in the revised implementation plan submitted to MDE on October 9th, 2018.

Comment Type	Location	MDE Comment and MDOT SHA Response
3. General PCB	Page 3-38, Section E.4.b	**16. This section states that, "[b]ottom sediments were not considered a source in any of the TMDLs, since the PCBs stayed within the waterbody. This sentence is not accurate and should be either removed or revised to state that the transport of PCBs from bottom sediments to the water column through resuspension and diffusion can be a source of PCBs; however, within the TMDLs it is considered an internal loading and not assigned a baseline load or allocation.** **<u>MDOT SHA Response</u>:** This statement has been revised in the revised implementation plan submitted to MDE on October 9th, 2018.
6. General PCB	Page 3-42, E.4.d	**17. The implementation plan states that MDE has specifically stated, "Reduction of PCB concentrations within stormwater runoff through BMP implementation is not deemed by MDE to be an effective strategy for removal of PCBs in the environment" (MDE, 2014e, p. 11).** **This statement is from a comment response document for the Lake Roland PCB TMDL in regards to comments from SHA on prioritizing source targeting over BMP implementation. It is taken slightly out of context as it refers to the implementation of BMPs to effectively reduce low concentrations of PCBs in stormwater runoff from non-point sources in the Lake Roland watershed which is comprised primarily of residential and forestland. BMP implementation could be effective in removing PCBs from sediments within watersheds containing significant, widespread sources of PCBs.** **<u>MDOT SHA Response</u>:** This statement has been revised in the revised implementation plan submitted to MDE on October 9th, 2018.

ATTACHMENT B

**MDOT SHA RESPONSES TO MDE 4/26/2017
COMMENTS TO
2016 ANNUAL REPORT**

B-I: General MS4 Permit Conditions

B-II: Impervious Area Assessment Report
(NOT ATTACHED because comments were responded to in 7/31/2017 Impervious Baseline Accounting submittal to MDE.)

B-III: WLA Implementation Plan Comments for Nutrients, PCBS, Trash, Sediment, and Bacteria

Attachment B-I – MDOT SHA Responses (10/9/2018) to MDE Comments on MDOT SHA 2016 Annual Report Review

MDOT SHA responses to the MDE 2016 MS4 Annual Report Review comments that were delivered to MDOT SHA OED on April 26, 2017 are integrated into the table below. MDE comments requiring response or follow-up are highlighted in bold text and the MDOT SHA response is provided immediately below.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part V.A Annual Reporting	1. The State Highway Administration (SHA) submitted its Annual Report by the due date (October 9, 2016). 2. The report is the first report for the current permit. 3. The reporting period covers October 1, 2015 to June 30, 2016 (2016 reporting period). The 2016 reporting period was shortened in order to comply with the permit requirement to report using a State fiscal year (FY). However, MDE's 2015 review indicated that the 2016 reporting period was to cover July 1, 2015 to June 30, 2016. 4. All future annual reports shall be based on the preceding State FY (e.g., July 1, 2016 to June 30, 2017).
Part IV.A Permit Administration	5. SHA's permit is administered by a municipal separate storm sewer system (MS4) Program Manager in the Water Programs Division. Industrial National Pollutant Discharge Elimination System (NPDES) stormwater permits are managed through the Environmental Compliance Division. SHA provided an updated organizational chart describing staff roles in relation to NPDES stormwater tasks .
Part IV.B Legal Authority	6. As requested, SHA included a description of its legal authority. The description was previously submitted in the permit application for the 1999 permit. SHA indicated that the description is currently under review by its Attorney General Counsel and any updates will be included in the next annual report.
Part IV.C Source Identification	7. SHA completed the inventory of its storm drain system in 2008 and reports that it has been regularly updating information. SHA reports that it has purchased video cameras for each SHA District Office to perform inspections and future assessments of drainage systems that are reaching the end of their service life. 8. SHA submitted GIS data on its storm drain system and impervious surfaces in a geodatabase (SHA_NPDES_2016geodatabase.gdb). A review found: – Storm Drain System ▪ 163,271 structure records (e.g., inlets, end sections, manhole structures, junction boxes, pipe connections, and ditch intersections) ▪ 133,803 conveyance records (i.e., pipe, ditch) – Impervious Surfaces ▪ 17,775 polygons for impervious surfaces throughout Maryland – Industrial and Commercial Sources

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.C Source Identification (Cont.)	▪ SHA reports that it will include this GIS data by FY2018 (this can be submitted as a narrative file in the MS4 geodatabase or in a separate geodatabase) 9. A review of SHA's MS4 Geodatabase (SHA_MDE_2016geodatabase.mdb) found the following: – Outfalls ▪ 14,785 Outfalls ▪ 1,664 Outfall Drainage Areas – Monitoring Locations ▪ 48 Monitoring Site records (17 are new for this reporting year) ▪ 0 Monitoring Drainage Area records – Best Management Practices (BMPs) ▪ BMP POI ○ 4,659 records ▪ BMP ○ 4,659 records ○ 4,658 BMP Inspection records ○ All Records missing City, State, and Zip. ▪ BMP Drainage Area ○ 4,977 records ▪ Alternative BMP Line ○ 34 records ○ 24 Alt BMP Line Inspection records ○ All records missing load and reduction values for TSS, TP, and TN ▪ Alternative BMP Point ○ 0 records ○ Alt BMP Point Inspection records ▪ Alternative BMP Poly ○ 1,532 records ○ All records missing Implementation Cost, City, State, and Zip ○ 1,194 Alternative BMP Poly Inspection records ▪ Restoration BMP records ○ 616 records ○ 275 records missing drainage areas (all redevelopment projects) ○ 6 records missing as-built dates ○ All records missing Implementation Cost, City, State, and Zip ○ 112 Rest BMP Inspection records 10. SHA has input a wealth of data into MDE's MS4 Geodatabase format. MDE commends SHA for this great undertaking. 11. **Detailed below are important items that require SHA's attention.** – **When reporting stream restoration in the Alternative BMP Line feature class, load and reduction values for TN, TP, and TSS are required fields.**
Part IV.C	

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Source Identification (Cont.)	**Additionally, the Stream Restoration Protocols associated table must be completed when reporting these projects.** **<u>MDOT SHA Response</u>:** MDOT SHA has provided load reduction values for TN, TP and TSS for all stream restoration projects in the 2017 geodatabase submittal. Stream Restoration Protocol information was provided for seven stream restoration projects, specifically those projects where the construction was completed after October 9, 2015. (See response to follow-up question in MDE 2017 comments in A-I) – **Over half of the reported outfalls (i.e., 8,582) have a construction year of "1058" or "9999".** **<u>MDOT SHA Response</u>:** MDOT SHA is in the process of reviewing all structures, not just outfalls, to ensure the best available plandates are attributed on the structure. For structures with a contract number, MDOT SHA could derive the plandate from the contract date. This resolved over 55,000 structures with this issue. For those with a null construction date, MDOT SHA established a method by which the plandates are researched using available data (roadway plans, BMP plans, historical records) and documenting the best available plandate in the database. MDOT SHA is continuing to perform this review. – **The Built Date for BMP POI "SHA19POI060024" is "9/30/2019".** **<u>MDOT SHA Response</u>:** MDOT SHA corrected the anomaly in the 2017 MDOT SHA MS4 Geodatabase submittal. – **"SHA00BMP130265" is identified as a structural BMP but the BMP_TYPE is listed as "MSWW" (or Wet Swale).** **<u>MDOT SHA Response</u>:** MDOT SHA corrected the anomaly in the 2017 MDOT SHA MS4 Geodatabase submittal. – **The Last Inspection Date for BMP Inspection "SHA06BIN100781" was reported as "3/15/2106".** **<u>MDOT SHA Response</u>:** MDOT SHA corrected the anomaly in the 2017 MDOT SHA MS4 Geodatabase submittal. – **Six redevelopment projects reported in the RestBMP feature class have missing built dates and years while the implementation statuses are identified as "Complete". These and the other redevelopment BMPs,**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	which account for approximately 0.8 % of claimed baseline credit, are missing delineated drainage areas. **<u>MDOT SHA Response</u>:** As an outcome of the December 18, 2015 meeting between MDE and MDOT SHA about "MS4 Redevelopment Coordination", it was agreed that MDOT SHA would "provide MDE with a point at the POI or center of each 6-digit watershed to display the baseline reduction values to address MDE's visual confirmation request." Due to limitations in the older source Water Quality Summary Sheets (WQSS), MDOT SHA does not have specific project locations or drainage areas for redevelopment baseline treatment. – **There are 2,753 BMP records for grass swales that have a Built Date of "10/1/2010" and a Last Inspection Date of "9/22/2016". This accounts for approximately 22% of the claimed baseline treatment. SHA shall provide an explanation on how all of these BMPs were constructed on the same date and then inspected on the same date.** **<u>MDOT SHA Response</u>**: MDOT SHA corrected the anomaly in the 2017 MDOT SHA MS4 Geodatabase submittal. – **A number of mandatory fields have been changed to allow null values. MDE understands that some mandatory fields such as Address, City, State, and Zip are difficult for SHA to populate and null values are necessary. In these instances, MDE requests that SHA populate these fields to the best of its ability. Conversely, other modified fields like Implementation Cost and Alternative BMP Line, Point, and Poly Last Inspection Date must be provided in future submissions. The updated MS4 Geodatabase schema, released on November 22, 2016, identifies those fields that may be modified.** **<u>MDOT SHA Response</u>:** MDOT SHA populated the fields for address, city, state and zip through a spatial analysis operation to associate the features to the nearest address. MDOT SHA provided values, where available, for Implementation Cost and the Last Inspection Dates. The Implementation Cost provided per BMP was calculated by distributing the total expenditures to date for the project across the constructed BMPs based on the percent acreage each BMP contributed to the total project acreage.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	12. **Complete records, including as-built dates, outfall locations, and delineated drainage areas are required fields and MDE requests that SHA continue its effort to complete and maintain its MS4 Geodatabase.** **MDOT SHA Response:** MDOT SHA is continuing our efforts to improve the records in the MDOT SHA MS4 Geodatabase submittal.
Part IV.D.1 Stormwater Management (SWM) Part IV.D.1 SWM (Cont.)	13. "As of June 30, 2016," SHA reports that statewide it "inspected and maintained nearly 6,000 permanent stormwater management facilities and [environmental site design (ESD)] practices". SHA added that "This includes over 5,000 permanent stormwater facilities and ESD practices…within MS4 jurisdictions". 14. Out of 4,659 stormwater management facilities, major maintenance is required on 133 while 14 are reported as needing retrofit design. This is an improvement from FY2015 where major maintenance and retrofits were required for 303 and 49 BMPs, respectively. For the identified facilities, maintenance and remediation work has been prioritized and expected completion dates are between Fall 2016 and Fall 2020. MDE commends SHA for continuing its inspection efforts and reducing maintenance needs. 15. **SHA reports that, statewide, there were 610 submissions to SHA's Plan Review Division (PRD) during this reporting period. Table 1-3: Stormwater Management Review and Approval documents that from these submissions, PRD issued approvals for 143 concept, 69 site development, and 56 final designs. Corresponding tables in the report were slightly off indicating 146 concept approvals and 70 site development approvals.** **MDOT SHA Response:** Over the course of this Permit Term, MDOT SHA PRD has developed and implemented a new plan review tracking database to help facilitate the accurate reporting of plan review activity. This database consolidates information regarding plan submittals, review and approval activity, waiver and variance requests and approvals, and detailed information regarding the proposed projects. This database was queried to extract the elements required for this Annual Report and will help to ensure that discrepancies in reporting data are addressed. 16. **According to the MS4 Geodatabase, a total of 93 waivers were requested and 54 Waivers were granted. There appears to be a discrepancy with the reported values for quantity, quality, and combined quality and quantity waivers. SHA reports that 54 quality, 9 quantity, and 54 combined quantity and quality waivers were granted. However, based on the total waivers granted, the specific numbers for each category may be incorrect. In the next annual report, please clarify how these numbers are acquired and ensure that they are correctly reported.**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	<u>MDOT SHA Response</u>: As referenced above, MDOT SHA PRD has implemented a new project tracking database to consolidate project activity records and facilitate reporting analyses. Included in this database are records related to all variance and waiver requests submitted to SHA PRD. Database queries were created that facilitate the extraction of reporting metrics required for the NPDES Annual Report. These queries will help to ensure that reported values are consistent and accurate. Over the next Permit Term, SHA PRD will be integrating a new GIS component to their program that will further ensure consistency in reporting information. 17. No exemptions were issued. 18. SHA reported that 40 redevelopment projects were received. 19. The MS4 Geodatabase indicates that there were 108 construction inspections and 2 violations. Additionally, there were 2,329 initial maintenance inspections, 1,217 maintenance follow-up inspections, and 137 maintenance violations. 20. During this reporting period, PRD made minor changes or modifications to the Administrative Procedures including the "consolidation of the Inspection, Compliance, Enforcement, and Plan Modification into its own section and updating the Water Quality Banking section". 21. In the Spring of 2017, MDE intends to conduct an evaluation of SHA's stormwater management plan review, inspection, and enforcement activities.
Part IV.D.2 Erosion and Sediment Control (E&SC) Part IV.D.2 E&SC	22. On February 24, 2015, SHA was granted authorization to begin the review and approval of erosion and sediment control (E&SC) and stormwater management plans, including procedures for inspections and enforcement. 23. A review of the E&SC and Quarterly Grading Permit Info associated tables in SHA's MS4 Geodatabase found the following: – 49 grading permits issued – 152 disturbed acres – 15 inspectors and 3 supervisory staff – 2 violations – 2 stop work orders issued – 0 fines issued – 0 court cases 24. **The field Disturbed Area for Active Permits Other, LU_County_BF (County land cover before grading), LU_County_AF (County land cover after grading), and Quarter were modified to allow null values. In future annual reports, please be sure to populate mandatory fields as best as possible.** **<u>MDOT SHA Response</u>:** MDOT SHA is making every effort to completely populate these fields for all projects contained within the Geodatabase submittals.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
(cont.)	25. SHA reported 368 and 140 people received or were recertified for Level I (Yellow Card) training, respectively. Responsible Personnel (Certification) training is administered through MDE's online Responsible Personnel Course. 26. SHA is determining if it will require E&SC Certification for designers and further training for E&SC plan design. 27. During the 2016 reporting period, 261 E&SC inspections were performed, resulting in an overall compliance rate of 99%. SHA achieved the same overall compliance rate during FY2015. 28. As part of the delegation agreement, MDE reviewed these procedures in the field during November and December of 2016. This review was documented in a letter dated February 9, 2017. Results of this field audit found that while most of the program elements were being implemented effectively, two important issues needed attention: – Approximately a quarter of the sites visited by MDE required stabilization or improved stabilization. The main issues identified were poor coverage of mulch and seed and the maintenance of stabilized construction entrances. – **Two sites had offsite impacts as a result of dewatering activities.** **<u>MDOT SHA Response</u>:** MDOT SHA has addressed the issues and the results are discussed in Section D.2.a of the 2017 Annual Report
Part IV.D.3 Illicit Discharge Detection and Elimination (IDDE) Part IV.D.3 IDDE (Cont.)	29. **SHA resubmitted outfall screening data originally submitted with its 2015 annual report, spanning September 2014 through September 2015. For FY2016, SHA indicated that 62 outfalls were screened during the 1st quarter, one was screened during the 2nd quarter, and that 180 outfall screenings have occurred since 6/30/2016, which will be submitted with next year's annual report. As SHA continues to transition to State FY reporting, MDE requests that SHA ensure that 150 outfalls are screened each FY.** **<u>MDOT SHA Response</u>:** MDOT SHA is ensuring that 150 outfalls are screened each FY. The records are provided in subsequent MS4 Geodatabase submittals. 30. SHA provided a narrative describing outfall screenings conducted during the FY2017 reporting year that will be submitted in the MS4 Geodatabase due October 2017. SHA screened 180 outfalls and discovered and sampled 57 dry weather flows. One illicit discharge was identified and is currently being resolved in coordination with Prince George's County. 31. **SHA is required to conduct and report on annual visual surveys of commercial and industrial areas for discovering, documenting, and eliminating pollutant sources. SHA is expanding its IDDE program to meet this permit condition. SHA is developing a GIS layer to identify industrial and commercial land uses, utilizing numerous data sources including Standard Classification or North American Industry Classification System codes, industrial permits, and MS4 county data. This layer will be completed**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	by June 30, 2018. SHA plans to use the Hot Spot Jr. Inspection Form and will begin reporting visual surveys in 2018. MDE requests that SHA provide a progress update in the next annual report. **MDOT SHA Response:** See Attachment A-1, MDOT SHA response to 2017 MDE Comment #34. 32. SHA's Environmental Compliance Division has maintained a program to address and respond to illegal discharges, dumping, and spills. SHA is currently developing a GIS-based database to track IDDE program activities. 33. **SHA maintains procedures for investigating and reporting illicit discharges. MDE requests that SHA submit these procedures with the next annual report.** **MDOT SHA Response:** See Attachment A-1, MDOT SHA response to 2017 MDE Comment #36. **SHA coordinates with the appropriate jurisdiction to eliminate illicit discharges outside of SHA's right-of-way (ROW). SHA has also developed educational materials on non-stormwater discharges that it provides to property owners when a discharge is found to be originating from their properties. If the discharge cannot be resolved through property owner engagement and jurisdiction coordination, SHA will contact MDE for assistance. During this reporting year, SHA coordinated with MDE to eliminate detergent discharges from vehicle washing activities on a commercial property. MDE requests that SHA provide examples of educational materials with its next annual report.** **MDOT SHA Response:** Section D.3.d of the 2017 & 2018 Annual Reports include a figure illustrating the "Keep our Waterways Clean" flyer; an example of the educational material provided to property owners during initial notification. 34. **Some deficiencies in SHA's MS4 Geodatabase include: 1) CFS_FLOW data are missing for outfalls that were recorded as having flow; and 2) COMPLA_NUM is missing for all records. Furthermore, in the past SHA has not consistently performed chemical test when an observed flow was found. For the next reporting period, SHA should consistently complete chemical test and submit a complete IDDE associated table.** **MDOT SHA Response:** MDOT SHA has resolved all deficiencies referenced, and results are included in subsequent MS4 Geodatabase submittals.

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.D.4 Trash and Litter Part IV.D.4 Trash and Litter (Cont.)	35. The Annual Report documents that the areas with litter problems include roadsides, isolated dumping sites, highway interchanges, areas near landfills, and bus stops. 36. SHA reports that maintenance crews, contractors, and inmate clean-up crews collected approximately 1.25 million pounds of litter. 37. SHA continues to maintain its anti-litter program that includes Adopt-a-Highway and Sponsor-a-Highway programs in addition to litter awareness events at schools and civic events. 38. Through its "Litter Reduction Educational Initiative", SHA will determine current levels of litter awareness, perceptions, behavior, and motivation towards littering. SHA also intends on using focus groups to gauge limitations and direct marketing to targeted audiences. From these activities, SHA hopes to hone in on areas, demographics, and methods to best thwart littering. MDE commends SHA for this approach. 39. **As per its MS4 permit, SHA has indicated that it "will report annually on the progress and effectiveness of the program components and the funding level will also be evaluated and adjusted". The resources expended have not been included for this reporting period. SHA also reports that "[t]he effectiveness of the litter education and outreach program will be evaluated annually beginning in 2018". MDE requests that in its next annual report, SHA include an evaluation that details existing programs as well as progress towards the developing program.** **MDOT SHA Response:** Details of MDOT SHA's multi-faceted existing public education program with goals to educate the public on environmental stewardship and reduce littering are included in subsequent annual reports.
Part IV.D.5 Property Management and Maintenance	40. **SHA continued to develop a method to estimate reductions from street sweeping and inlet cleaning, and indicated that in the future, reductions will be reported as part of TMDL Compliance. Until that method is approved for restoration credit, MDE requests that SHA track and report measurable efforts to fulfill this program requirement, such as miles swept, number of inlets cleaned, and weight of material collected, as requested in MDE's previous annual report review.** **MDOT SHA Response:** In subsequent annual reports, MDOT SHA has reported its method to estimate reductions as well as the impervious acre credits claimed for each annual practice within Section E.4.a. A table showing total number of inlets cleaned is included in Section D.5.b. Subsequent reports also include updates on MDOT SHA's "Inlet Cleaning Pollutant Characterization Study". 41. **De-icing material continued to be reduced through a programmatic focus on pretreatment and expanding the use of Liquid Only Snow Routes. In the MS4**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	Geodatabase, 137,358 tons of sodium chloride were reported as applied in the past year. MDE requests that SHA clarify in the next annual report the amount of sodium chloride applied as liquid pretreatment (salt brine) versus road salt. Additionally, SHA's annual report stated that abrasives, calcium chloride, and magnesium chloride were used but specific amounts were not provided in the MS4 Geodatabase. MDE requests that future MS4 Geodatabase submissions include these specific data. **<u>MDOT SHA Response</u>:** Subsequent reports include this data within the MS4 Geodatabase submittals. 42. Snow removal training was provided in 7 sessions to a total 114 attendees. In 28 sessions, approximately 1,000 employees were trained in salt management at facility maintenance shops. 43. **Thorough pesticide training was conducted in the past year. Three different course levels were offered and 13 training sessions were held, training a total of 192 staff. Pesticide usage was reported in MS4 Geodatabase format as "General Herbicide" with no chemical name(s) or amount provided per chemical(s). Specific materials and amounts applied are necessary for MDE to evaluate this important program and shall be included in SHA's next annual report.** **SHA Response:** A table that includes specific materials and amounts applied are included in subsequent annual reports within section D.5.b. 44. **SHA increased the efficiency of fertilizer application using methods such as the use of slow release fertilizer, installing low maintenance native meadows, and implementing nutrient management plans developed using soil test results. SHA reported that contractors apply fertilizer and that SHA does not track its application; instead, contractors provide this information annually to the Maryland Department of Agriculture. This is a reporting requirement and MDE requests that SHA specify the materials and amounts of fertilizer application in the next annual report.** **SHA Response:** The materials and amounts of fertilizer applied are included in subsequent annual reports within section D.5.b. 45. Monthly, quarterly, and annual comprehensive site inspections continued to be performed for major SHA maintenance shops and industrial facilities, which were listed in the annual report. Stormwater Pollution Prevention Plans (SWPPP) and Spill Prevention, Control, and Countermeasure (SPCC) plans continued to be updated annually and as needed. Improvements in the past year included petroleum storage tank system upgrades, new vehicle wash bays, and salt storage

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	barn repair. SHA demonstrated commitment to its pollution prevention program through an increased projected budget in FY2017. 46. Annual SWPPP training was conducted for 208 maintenance personnel at 7 facilities, fulfilling SWPPP training requirements. Dates of training were listed in the annual report. This amount was also correctly reported in SHA's MS4 Geodatabase.
Part IV.D.6 Public Education Part IV.D.6 Public Education (Cont.)	47. SHA continues to operate its Customer Care Management System that allows for the submission of complaints and concerns. During the 2016 reporting period, this system received 19,860 service requests. A total of 427 service requests were related to litter and illegal dumping. 48. SHA maintains its public education webpage and has developed materials to educate the public on topics such as stormwater management, roadside dumping, pet waste management, and car washing. 49. SHA promotes alternative transportation through carpooling, HOV lanes, SHA's Safe Routes to School program, mass transit, and employee teleworking and flexible work schedules. 50. SHA reports that its vehicle equipment idling policy, in existence since September 2009, has saved more than 170,000 gallons of gasoline. 51. MDE believes that the SHA continues to operate a strong Public Education program and commends SHA for its continued efforts.
Part IV.E Restoration Plans and Total Maximum Daily Loads (TMDLs)	*Watershed Assessments* 52. SHA's permit area crosses 84 8-digit watersheds. 53. SHA has completed assessments that represent 21 8-digit watersheds within its permit area. *Restoration Plans* 54. SHA's permit requires the development of an impervious surface area assessment and restoration of twenty percent of its impervious surface area. In SHA's annual report, it proposed a restoration baseline of 4,719 impervious acres. This level of activity is preliminary until MDE and SHA agree on a restoration baseline. Comments regarding the impervious surface area assessment are found in Attachment II. 55. **For FYs 2011 to 2015, SHA reports that it completed approximately 969.5 acres of restoration. According to the Annual Report, in FY2016 SHA completed approximately 362.5 acres of additional restoration through:** – **62.6 acres of new stormwater BMPs** – **2.0 acres of outfall stabilization** – **85.3 acres of retrofits** – **143.7 acres of stream restoration** – **68.9 acres of tree planting**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.E Restoration Plans and TMDLs (Cont.)	**This brings SHA's total impervious acres restored to 1,332, or 6% of the 20% requirement. MDE understands that the amount of restoration will increase as planned BMPs are implemented. SHA plans to achieve 8% completion in FY2017, 9% in FY2018, 13% in FY2019, 19% in FY2020, and 20% in FY2021.** **<u>MDOT SHA Response</u>:** MDOT SHA provided its final baseline impervious accounting, 20 percent restoration goal, and supporting documents to MDE on June 29, 2018. 56. **MDE observed discrepancies between the amount of completed tree planting and new SWM practices reported in the MS4 Annual Report versus the MS4 Geodatabase (i.e., 68.9 acres versus 29.8 acres of tree planting and 62.6 acres versus 36.7 acres of new stormwater practices, respectively). these discrepancies need to be reconciled.** **<u>MDOT SHA Response</u>:** MDOT SHA has corrected the anomaly in the subsequent MDOT SHA MS4 Geodatabase submittals and annual reports. MDOT SHA has provided an appendix "Restoration Accounting Methodology", with subsequent annual reports which is a step-by-step process document to detail how to replicate the restoration impervious acre credits by BMP type. 57. SHA plans on fulfilling its restoration requirement through 27% inlet cleaning, 26% stream restoration, and 18% tree planting. The remaining requirement will be achieved through SWM retrofits, new SWM facilities, outfall stabilization, redevelopment, street sweeping, and impervious surface elimination. SHA reports that only 1% of the restoration requirement will be achieved through street sweeping. 58. SHA has provided a list of BMPs, to be implemented from FYs 2016 to 2020, that will meet the 20% requirement. A majority of the BMPs have specific watersheds, locations, and impervious acres treated. MDE commends SHA for preparing such an extensive list. 59. **A total of 438 acres of restoration are reported without specific watersheds and locations. SHA should work to provide more specific information on these BMPs.** 60. **There are numerous BMPs identified as retrofits with specific watersheds, locations, and impervious acres treated. It is understandable that general categories are needed for distant years but the specific BMP types should be available for the immediate years to come. Please include specific data as it becomes available, especially for the immediate two years.**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.E Restoration Plans and TMDLs (Cont.)	**MDOT SHA Response:** Table 2-2 of the *Interim Review Draft* Implementation Plan delivered with the 2018 annual report will be updated once the determination on the 6/29/2018 baseline assessment has been completed. In the interim, we have provided a chart with all projects and anticipated impervious credit to complete the 2020 restoration goal. 61. **As documented in the meeting summary dated June 30, 2015, SHA intends on fulfilling 50% or greater of the restoration requirement by treating impervious surfaces in SHA ROW and urban land areas outside of SHA ROW. No more than half of the restoration requirement shall be achieved through treating impervious surfaces in non-urban areas. Bay TMDLs can be met within the Phase I/Phase II permit area according to the direct and indirect connection BMP policy provided in the June 30, 2015 summary.** **<u>MDOT SHA Response</u>:** MDOT SHA continues to comply with the required distribution of restoration efforts between Urban and Non-Urban areas. 62. SHA submitted restoration plans for 39 TMDLs with EPA approved stormwater waste load allocations (WLAs). MDE commends SHA for the substantial effort in developing these plans. SHA will meet with MDE to further clarify TMDLs covered under this permit. Comments from MDE's Science Services Administration on the restoration plans are provided in Attachment III. Unless indicated elsewhere, SHA shall respond to these comments in the next Annual Report. In the meantime, SHA should continue its implementation efforts. 63. General comments regarding these plans are provided below. **<u>Pollutant Load Baseline Analysis</u>** – **An accurate pollutant load baseline analysis is dependent on the completeness of the BMPs reported in the MS4 Geodatabase. Any BMPs with deficient records (e.g., missing inspection dates or drainage areas for redevelopment BMPs) are not allowed for claiming water quality treatment and pollutant load reductions. These data shall be completed by SHA prior to load reduction use.** **<u>MDOT SHA Response</u>:** MDOT SHA understands this requirement and is seeking to comply with the 2018 data delivery. <u>Consistency with MDE Guidance</u> SHA proposes to use a number of BMPs that are not identified in MDE's 2014 "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
Part IV.E Restoration Plans and TMDLs (Cont.)	Stormwater Permits" (Guidance). These include education, pet waste management, internal credit trading, agricultural BMPs, and nutrient trading. The following comments are in regard to these practices and the acceptability of credits in accordance with MDE Guidance: – **For trash TMDLs, SHA indicates that it will utilize increased roadside pick-up, "Target Drainage Systems and Waterways", and public education. Please clarify what the "Target Drainage Systems and Waterways" practice entails and provide any analyses or monitoring that supports these reductions and any alternative actions that may be needed** **<u>MDOT SHA Response</u>:** The trash implementation has been updated in the10/9/2018 *Interim Review Draft* of the Implementation Plan attached to this delivery that includes Parts I, III, and IV. The trash plan update is under Part III, page 3-36, and the individual projected BMPs with interim target dates (2020 and 2025) are included in Part IV plans for Anacostia (page 4-8), Jones Falls (page 4-108), and Gwynns Falls (page 4-100) watersheds. Also, descriptions of the Drainage System and Waterway Cleanups are updated in Part I, page 1-30, of the Implementation plan. The updated trash plan relies upon the San Francisco Bay *BASMAA Trash Load Reduction Tracking Method* and adds trash reduction credits included in Table 3-9 on page 3-39 of Implementation Plan. The BMP definitions for Media Relations, Community and School-Age Children Outreach are included in the BASMAA document. The *MDOT SHA Restoration Modeling Protocol* is under revision to update all our modeling protocols to fall in synch with the current version of the Implementation Plan and will be delivered to MDE along with the complete Implementation Plan with Part II included. – **Internal credit trading was identified as a potential alternative for meeting nutrient and sediment reduction targets. This practice, which uses three trading regions based on river basins (Western Shore, Eastern Shore, & Susquehanna River Basin; Patuxent River Basin; and Potomac River Basin), would entail trading the overachievement in meeting WLAs in one watershed with underachievement in another. This is not an approved practice and SHA should continue to explore all currently approved BMPs for meeting the reduction requirements.** **<u>MDOT SHA Response</u>:** MDOT SHA is no longer pursuing this as an option. – **Nutrient credit trading has been included as a potential option for future planning but was not identified in the list of proposed BMPs. As a matter of policy, MDE supports this option as a means for achieving pollutant reductions and is committed to addressing how regulatory process requirements, including permit language and public participation, can be**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	satisfied under this scenario. Until formal processes are in place, SHA should continue to explore all currently approved BMPs for meeting the reduction requirements. SHA's implementation plan discusses the use of riparian buffers and cattle fencing, stating that SHA "may use these strategies on stream restoration projects in rural areas". SHA adds that "[f]armers who implement cattle fencing and create riparian buffers on their property must do so on their own accord" and "[o]nce implemented, farmers may utilize nutrient credit trading". MDE commends SHA for cooperating with farmers to provide these enhancements to stream restoration projects; however, SHA and MDE have agreed that these additional agricultural BMPs are not creditable under the MS4 permit until formal trading regulations have been promulgated. **<u>MDOT SHA Response</u>:** MDOT SHA acknowledges this statement of confirmation. Implementation Schedules and Interim Milestones – **Final dates were included for final TMDL completion but benchmarks were not included for interim periods. Meaningful interim targets are needed to gauge progress overtime. MDE requests that SHA develop and include interim targets (i.e., four-year targets) in the next submission. The next annual report shall also include a TMDL assessment that compares the net change in pollutant reductions from all completed initiatives with the established benchmarks, deadlines, and applicable stormwater WLAs (in accordance with Part IV.E.4 of SHA's MS4 Permit).** **<u>MDOT SHA Response</u>:** Targets for 2020 and 2025 have been modeled for all pollutants and watershed and are included in both the Interim Review Draft of the Implementation Plan and the 2018 annual report progress. See A-1 for detailed response. – **MDE cautions SHA for its heavy reliance on inlet cleaning and stream restoration to meet the impervious area restoration requirement. Inlet cleaning is an annual BMP that requires consistent implementation to maintain treatment credit. Stream restoration projects can often take longer than expected to complete. SHA should continuously plan for alternative strategies as part of the adaptive management process through the course of the permit term.** **<u>MDOT SHA Response</u>:** SHA continues to refine and improve the distribution of restoration efforts between the available treatment strategies. Updates on

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	impervious restoration credit by BMP Type are included in Section E.4.a of subsequent annual reports. 64. **Some implementation plans were not submitted because the TMDLs were determined to not apply to SHA through negotiations, held in 2014, between SHA and MDE that resulted in Attachment B of the permit. MDE requests that SHA complete the remaining plans by the deadline discussed at the MDE/SHA meeting on TMDLs, described in Attachment III.** **<u>MDOT SHA Response</u>:** We acknowledge this and are working to comply. 65. Based on the meeting between MDE and SHA, held April 10, compliance with Chesapeake Bay TMDL pollutant reductions will be determined based on adherence to comments in Attachment III. *Public Participation* 66. The public comment period for the Impervious Restoration and Implementation Plan was announced in the Baltimore Sun, Washington Post, and on SHA's website. 67. The plan was made available on SHA's website and comments were accepted between August 1, 2016 and August 30, 2016. 68. SHA received four comments from private citizens, Clean Chesapeake Coalition, and the Maryland Department of Natural Resources. 69. The Annual Report included a summary of the public comments received and SHA's responses. 70. This satisfies reporting requirements for Part IV.E.3 of SHA's MS4 permit. *TMDL Compliance* 71. To date, SHA has completed restoration to meet the Upper Monocacy River phosphorus TMDL (302%) and the Rock Creek phosphorus and sediment TMDLs (259% and 100%, respectively). MDE commends SHA for meeting reduction requirements far ahead of target year. 72. SHA's annual report documents that, for the phosphorus and sediment TMDLs that have not been met, current progress ranges from 1% to 34% for phosphorus and 2% to 51% for sediment. Many of the restoration projects that will be implemented to address these TMDLs are under design or planning. Additionally, this was the first reporting period under the new permit term. In the coming years, progress toward meeting these TMDLs should improve as restoration increases. 73. **Unfortunately, SHA has not provided a current status for the fulfillment of bacteria, trash, and PCB TMDLs. Please include an assessment of progress in the next annual report.**

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	MDOT SHA Response: This information is included within Section E.4.a of subsequent annual reports. 74. **When including the estimated net change in pollutant load reductions from completed projects, programs, and initiatives, please specify TN, TP, and TSS reductions for each practice. For more guidance on how to implement a program and show progress towards reductions, please refer to the SSA's "Guidance for Developing Stormwater Wasteload Allocation Implementation Plans".** **MDOT SHA Response:** Reductions for these pollutants are included in subsequent reports. 75. MDE requests that SHA's itemized cost for completed projects, programs, and alternatives include an amount for the total expenditures of all completed projects. **MDOT SHA Response:** Costs are itemized for each restoration project and detailed within Section E.4 of subsequent annual reports.
Part IV.F Assessment of Controls	76. SHA submitted a proposal on May 11, 2016 to conduct its chemical, biological and physical monitoring at Little Catoctin Creek near US Route 340 in Frederick County. MDE reviewed this proposal and participated in a joint field review with SHA on June 24, 2016. A letter granting formal approval was sent by MDE on October 4, 2016. 77. In the June 24, 2016 field review, MDE requested monitoring site location, land use and BMP data from 2009-2010 as well as BMP data from 2002-2003. This data was submitted to MDE on September 14, 2016. 78. SHA indicates in its 2016 annual report that the pre-construction phase of chemical monitoring was to begin in October 2016, and biological monitoring began in March 2016. 79. **The MonitoringSite feature class in the MS4 Geodatabase is complete; however, the MonitoringDrainageArea feature class (also required information) has not been populated. Please provide these data in the next annual report.** **MDOT SHA Response:** MDOT SHA has provided the MonitoringDrainageArea features in subsequent MDOT SHA MS4 Geodatabase submittals. 80. In the BiologicalMonitoring table, BIBI score for FY2015 monitoring has been recorded; however, Embeddedness, Epifaunal and Habitat scores have not been populated. MDE understands that SHA uses the Maryland Biological Stream

Permit Condition	MDE Assessment and Recommendations and MDOT SHA Responses
	Survey (MBSS) protocol, and guidance on how to input the equivalent parameters using this protocol will be forthcoming. MDE also understands that data collected during the 2016 reporting period was being analyzed at the time this report was submitted. 81. According to their annual report, SHA has established physical monitoring stations and collected initial data, although these data could not be located in the annual report. 82. **SHA submitted a draft of its stormwater management assessment proposal to monitor a stream around the interchange of I-70 and Marriottsville Road in Howard County, MD. MDE reviewed this proposal and offered comments. SHA responded to these comments in November 2016; additional comments from MDE were sent in December 2016. SHA shall continue to work with MDE in establishing an appropriate monitoring site.** **MDOT SHA Response:** MDOT SHA is conducting its Stormwater Management Assessment in the Little Patuxent River Watershed and has submitted an updated assessment of controls monitoring plan with the FY17 annual report. The first year monitoring report is included with the FY18 annual report.
Part IV.G Program Funding	83. SHA's capital and operating expenditures for implementing NPDES stormwater permit requirements during FY2016 were $69.7 million and $13.7 million, respectively, and totaled $83.4 million. 84. According to the 2015 Annual Report, capital expenditures were reported to be $54.57 million. This level of funding has increased significantly in the past few years and MDE commends SHA for its commitment to the NPDES program and improving water quality. 85. The requirements for Part IV.G have been met.

Attachment B-III – MDOT SHA Responses (10/9/2018) to MDE Comments on MDOT SHA 2016 Annual Report Review

MDOT SHA responses to the MDE 2016 MS4 Annual Report Review comments that were delivered to MDOT SHA OED on April 26, 2017 are integrated into the table below. MDE comments requiring response or follow-up are highlighted in bold text and the MDOT SHA response is provided immediately below.

Major Comments

The plan discusses the possibility of internal credit trading to meet state TMDL watershed reductions, meaning the reduction of sediment beyond the TMDL in one watershed to compensate for a shortfall in another. Since the endpoint of state nutrient and sediment watershed TMDLs is based on the biological integrity in the 1st- through 4th-order streams in a given watershed, reductions from one watershed will have no impact on another and cannot be transferred. A surplus of reductions in one TMDL watershed cannot be applied to a shortfall in another.

SHA does not currently model baseline loads for each local, State TMDL watershed, and does not apply the required reduction percentage to estimate a loading reduction in terms of its own modeling system. Rather, SHA uses the absolute load reduction back calculated from the TMDL Data Center published WLAs and reduction percentages. SSA would recommend that SHA use the reduction percentage approach, as it can make a significant difference (see attached example).

<u>MDOT SHA Response</u>: SHA used the recommended percent reduction modeling approach for subsequent annual reports, the results are presented in Section E.4.a.

As discussed at the meeting, SHA will develop new reduction targets based on this SSA recommendation. SHA will subtract loads treated by baseline BMPs through the TMDL baseline year to develop an untreated baseline load, and then apply the TMDL listed reduction percent to this untreated baseline to determine the reduction target. SHA will use 'No Action' scenario loading extracted from MAST to derive the baselines. MDE clarified that the 'No Action' loading does not include any BMPs and is strictly based on landuse loads. To be consistent with the TMDLs and reductions applied to urban SW sources, the required reduction percentages should be applied to the baseline load reflective of both treated and untreated urban acres. For instance, if the baseline year was 2005:

Reqd. Reduction (lbs/yr) = (Reqd. Reduction %) x [2005 Treated Urban Load (i.e., w/SWM)(lbs/yr) + 2005 Untreated Urban Load (i.e., no SWM)(lbs/yr)]

In order to address this change in the implementation plan modeling, SHA and MDE agreed to the following timeframes to make adjustments to the SHA Impervious Restoration and Coordinated TMDL Implementation Plan:

- **For the next Annual Report, due October 9, 2017, SHA will provide MDE with a revised Table 3-2 (page 3-12 to 3-15) that will include re-calculated baseline loads, load reduction targets, and progress as of the implementation plan date of October 8, 2016. Target Years for meeting the reduction loads will also be revised as necessary.**

  MDOT SHA Response: Revised pages 3-12 through 3-16 were included as Appendix G with the FY17 annual report. MDOT SHA provided its final baseline impervious accounting, 20 percent restoration goal, and supporting documents to MDE on June 29, 2018.

- **By the following Annual Report, due October 9, 2018, SHA will revise Part III, Coordinated TMDL Implementation Plan and Part IV, SHA Watershed TMDL Implementation Plans. The revised sections will include a summary of the impacts of the re-calculated load reduction targets and how SHA plans to meet them.**

  MDOT SHA Response: MDOT SHA is submitting revised versions of Parts I, III, and IV of the MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan. Part II will be revised when MDE provides decision on the impervious baseline accounting submitted to MDE on June 29, 2018. The original version of the Implementation Plan was submitted to MDE on 10/08/2016 and has been updated periodically. A full revised version including Part II will be submitted once updates are completed.

- SHA should continue implementing projects in these local watersheds and is to include progress reporting with each annual report. MDE and SHA understand that the load reductions will be adjusted over time as the baseline BMP data is refined and improved over the permit term.

Also, SSA recommends that SHA run its model for their entire permitted area to account for planned progress towards the Phase II WIP. It was determined at the meeting that SHA will work with MDE to develop a strategy to demonstrate compliance with Chesapeake Bay TMDL load reductions.

> **MDOT SHA Response:** This is included in the Local TMDL Pollutant Reduction Progress table found within Section E.4.a of subsequent annual reports.

This strategy will be included in the next annual report due, October 9, 2017 and progress reporting will be included each year as well. It was agreed that the strategy will not track progress at the County or watershed level but rather will focus on MS4-wide geographic area.

Implementation plans for several TMDLs were not provided in this report, likely because they did not show up in the TMDL Data Center output. At the meeting, it was clarified that MDE and SHA worked together to develop the list of TMDLs included in Attachment B of the permit based upon mutually acceptable criteria. Because good faith was demonstrated by SHA in this effort, for this permit term MDE will not require SHA to meet the additional TMDLs listed below. SHA and MDE agreed that SHA will develop implementation plans for the additional TMDLs by the end of the permit term and submit with the fifth year annual report, due October 9, 2020. SHA will provide analysis of reductions required, progress, and timeframes for meeting the additional TMDLs by the fourth year annual report due October 9, 2019. SHA may start reporting additional TMDLs in upcoming annual reports, as they are analyzed and documented.

These plans are as follows:

Bacteria: Anacostia River, Antietam Creek, Herring Run, Cabin John Creek, Conococheague Creek, Double Pipe Creek, Gwynns Falls, Jones Falls, Liberty Reservoir, Lower Monocacy River, Lower Patuxent River, Magothy River, Piscataway Creek, Prettyboy Reservoir, Rock Creek, Severn River, South River, Upper Monocacy River, Other West Chesapeake Bay Drainage, West River, Wicomico River Headwaters & Wills

Creek

Nutrients: Anacostia River (Tidal Portion), Back River, Loch Raven Reservoir, Mattawoman Creek, Prettyboy Reservoir, Rocky Gorge Reservoir & Triadelphia Reservoir

Sediment: Anacostia River (Non-Tidal Portion), Anacostia River (Tidal Portion), Loch Raven Reservoir, Potomac River Washington County & Triadelphia Reservoir

Nutrient Plans:

General Comments

Comment Type	Location	Comment
1. General Nutrient	SHA SW-WLA Plans	**Street Sweeping and inlet cleaning are Annual Practices and need to be completed every year to receive credit. SHA proposes 1,287 acres of Equivalent Impervious treatment with these BMPs (about 3,217 actual impervious acres, MDE 2014 Guidance) which is about 27% of the untreated baseline. MDE suggests SHA revisit goals for sweeping and inlet cleaning to determine sustainable levels. MDE will not adjust the load reduction and impervious accounting calculations for street sweeping to the new Expert Panel Report for Street Sweeping during this permit term. MDE recommends SHA transition to the new street sweeping technologies.** **<u>MDOT SHA Response</u>:** See MDOT SHA response to 2017 MDE Comments A-II
2. General Nutrient	SHA SW-WLA Plans, Table 3-2	**The plan provides final target dates for when the WLA will be achieved, but does not give interim targets or milestones. MDE- SSA suggests including interim dates indicating how much progress is expected to be achieved by the end of the permit term. The interim targets can be described with a higher degree of certainty than long-term planning beyond the end of the permit term. SHA should submit interim target dates for TMDLs currently addressed in the plan as soon as they are developed, preferably in the next annual report, if possible. MDE can work with SHA to determine interim load reductions and dates, if necessary. Interim dates can then be revisited in the fourth year annual report and SHA can report final TMDL progress in the fifth year annual report. SHA should submit interim target dates for additional TMDLs (see TMDLs listed in above text) in the fourth year annual report.** **<u>MDOT SHA Response</u>:** See MDOT SHA responses to 2017 MDE Comments A-II
3. General Nutrient	SHA SW-WLA Plans	**The plan indicates that load reductions from both current and planned restoration practices are based on back-calculated rates from a No Action scenario in MAST. For new BMPs on existing developed land, this approach is reasonable; however, for retrofits of existing practices, this**

Comment Type	Location	Comment
		approach likely overestimates the impact of the practice. SHA should consider calculating the loading rate from a back-calculated Progress scenario loading rate in MAST. The plan should also clarify that the reductions estimated in the report for new practices are for the treatment of land developed prior to the TMDL baseline year, not after. **MDOT SHA Response:** Section 3 of the MDOT SHA Restoration Modeling Protocol, included with the FY17 annual report as Appendix H, includes a detailed explanation of how retrofitted stormwater facilities and newly constructed stormwater facilities are modeled for pollutant load reductions.
4. General Nutrient	SHA SW-WLA Plans	**Please clarify whether the phrase "new stormwater controls" refers to new SWM facilities treating impervious area that previously had no SWM and whether "retrofits" refers to upgrades to pre-existing SWM facilities.** **MDOT SHA Response:** New stormwater controls are new SWM facilities treating impervious area that previously had no SWM treatment. Retrofitted stormwater facilities are SWM facilities that have been upgraded to increase the treatment from its original runoff treatment depth to a greater runoff treatment depth. The delta between existing stromwater runoff treatment depth and newly designed stormwater runoff treatment depth is what is used to calculated the nutrient load reduction and the impervious acreage credit.

Nutrient Plans:

Specific Comments

Comment Type	Location	Comment
5. Specific Nutrient	Page 3-18	**Page 3-18 states that sources such as fertilizer application and streambank erosion, "are not included in the TMDLs." These source contributions, while possibly not individually quantified in the TMDLs, are implicitly included in all of the State's watershed TMDLs, as well as in the 2010 Chesapeake Bay TMDLs. Most of these TMDLs were developed using loading rates from versions of the Phase 5 Chesapeake Bay Watershed Model and the Edge-of- Stream urban loading rates include any contributions from the land surface as well as from bank erosion in small order streams. Although these contributions are not explicitly quantified in the model output, it is possible to estimate them using model input or watershed delivery factors.** **<u>MDOT SHA Response</u>**: MDOT SHA takes note and has revised this sentence. MDOT SHA is submitting revised versions of Parts I, III, and IV of the MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan. Part II will be revised when MDE provides decision on the impervious baseline accounting submitted to MDE on June 20, 2018. The original version of the Implementation Plan was submitted to MDE on 10/08/2016 and has been updated periodically. A full revised version including Part II will be submitted once updates are completed.

PCB Plans:

General Comments

Comment Type	Location	Comment
6. General PCB	Page 3-36, Section E.4.a	**SHA did not include PCB baseline loads and WLAs in Table 3-2 for the Anacostia River Tidal and Potomac River Upper Tidal watersheds from the Tidal Anacostia and Potomac River PCB TMDL report.** **Table 12 (pg 32) of the Tidal Anacostia & Potomac River PCB TMDL presents the aggregate PCB regulated stormwater baseline loads and WLAs by County and Chesapeake Bay Land River segment code. SHA should be able to disaggregate the SHA baseline loads and WLAs based on the percent of SHA ROW within the land river segment areas.** **<u>MDOT SHA Response</u>:** Reduction targets and benchmarks are added to Table 3-2 in the Interim Review Draft Implementation Plan.
7. General PCB	Page 3-37, Section E.4.b	**This section states that, "[m]onitoring to identify the impairment may have been performed in the water column, in sediments, or in fish tissue depending on whether the impairment was for water contact recreation or fish consumption."** **"Water contact recreation" should be removed from this statement as PCB impairments are not listed based on water contact recreation. Maryland lists impairments based on human health impacts from fish consumption and aquatic life impacts.** **<u>MDOT SHA Response</u>:** See MDOT SHA responses to 2017 MDE Comments A-II
8. General PCB	Page 3-38, Section E.4.b	**This section states that, "[b]ottom sediments were not considered a source in any of the TMDLs, since the PCBs stayed within the waterbody. This sentence is not accurate and should be either removed or revised to state that the transport of PCBs from bottom sediments to the water column through resuspension and diffusion can be a source of PCBs; however, within the TMDLs it is considered an internal loading and not assigned a baseline load or allocation.**

Comment Type	Location	Comment
		<u>MDOT SHA Response</u>: See MDOT SHA responses to 2017 MDE Comments A-II
9. General PCB	Section E.4.b	**Although many industrial sites may not have PCB concentrations in soil that exceed cleanup standards associated with inhalation, ingestion, and dermal contact, PCBs present in the soils could be transported to local waters resulting in bioaccumulation in fish at levels that pose a risk to humans from fish consumption. Transformers at many industrial sites are one example of ongoing sources of PCB contamination.** **<u>MDOT SHA Response</u>**: MDOT SHA takes note and has revised this sentence. MDOT SHA is submitting revised versions of Parts I, III, and IV of the MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan. Part II will be revised when MDE provides decision on the impervious baseline accounting submitted to MDE on June 20, 2018. The original version of the Implementation Plan was submitted to MDE on 10/08/2016 and has been updated periodically. A full revised version including Part II will be submitted once updates are completed.
10. General PCB	Page 3-39, E.4.c	Table 3-12 shows BMP efficiencies for "TSS Removal." Please clarify whether it is assuming an equivalent removal rate for PCBs based on the TSS removal rate. <u>MDOT SHA Response</u>: The MDOT SHA Restoration Modeling protocol that was delivered at Appendix E of the 2016 report is being updated. All modeling information for any pollutant will be included in that document. Modeling information such as efficiencies have been removed from the *Interim Review Draft* Implementation Plan. The information in Table 3-12 will be found there once revisions are completed. The revised Restoratoin Modeling Protocol will be delivered to MDE with the complete Implementation Plan including Part II when MDE determination on the 6/29/2018 final baseline assessment is received. Table 3-12 is showing BMP TSS removal efficiencies for SWM BMPs. It is not intended to indicate to the reader that these are equivalent removal efficiencies for PCBs. For SWM BMPs treating PCBs, the TSS removed by the BMP is first calculated at EOS in lbs/yr. Then the TSS EOS lbs/yr removed is then converted to g/yr removed and then multiplied by the average sediment tPCB concentration from the TMDL document to

Comment Type	Location	Comment
		calculate load reduction in PCB g/yr. The load reduction in PCB g/yr is then reduced by 50 percent to account for uncertainty in SWM PCB removal.
11. General PCB	Page 3-42, E.4.d	**The implementation plan states that MDE has specifically stated, "Reduction of PCB concentrations within stormwater runoff through BMP implementation is not deemed by MDE to be an effective strategy for removal of PCBs in the environment" (MDE, 2014e, p. 11).** **This statement is from a comment response document for the Lake Roland PCB TMDL in regards to comments from SHA on prioritizing source targeting over BMP implementation. It is taken slightly out of context as it refers to the implementation of BMPs to effectively reduce low concentrations of PCBs in stormwater runoff from non-point sources in the Lake Roland watershed which is comprised primarily of residential and forestland. BMP implementation could be effective in removing PCBs from sediments within watersheds containing significant, widespread sources of PCBs.** **<u>MDOT SHA Response</u>:** See MDOT SHA responses to 2017 MDE Comments A-II

Trash Plans:

General Comments

Comment Type	Location	Comment
1. Trash	Table 3-2	The plan identifies final dates for achieving the SW-WLA. MDE-SSA recommends including dates for achieving interim targets, as well.

Trash Plans:

Specific Comments

Comment Type	Location	Comment
12. Content Trash	Table 3-19	At the meeting, SSA reiterated that SHA should coordinate with SSA.
13. Content Trash	Table 3-13	**The values in the WLA (lbs/day) column include the MOS and therefore do not match the values in the TMDL. To avoid confusion, SSA recommends removing the lbs/day column or changing the column name to "total annual responsibility" since the values provided by SHA include the MOS.** **<u>MDOT SHA Response</u>:** MDOT SHA takes note and has revised this table. MDOT SHA is submitting revised versions of Parts I, III, and IV of the MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan. Part II will be revised when MDE provides decision on the impervious baseline accounting submitted to MDE on June 20, 2018. The original version of the Implementation Plan was submitted to MDE on 10/08/2016 and has been updated periodically. A full revised version including Part II will be submitted once updates are completed.
14. Specific Trash		**The clarity of this section might be improved by dividing it into two parts, with one focused on the inconsistencies between the WLA and the loading rates and the other discussing the trash currently being reduced by structural stormwater controls. SSA recommends separating these two important topics into two sections.** **<u>MDOT SHA Response</u>:** MDOT SHA takes note and has revise this section. MDOT SHA is submitting revised versions of Parts I, III, and IV of the MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan. Part II will be revised when MDE provides decision on the impervious baseline accounting submitted to MDE on June 20, 2018. The original version of the Implementation Plan was submitted to MDE on 10/08/2016 and has been updated periodically. A full revised version including Part II will be submitted once updates are completed.

Sediment Plans:

General Comments

Comment Type	Location	Comment
15. General Sediment	Section E.2.c	**The sediment TMDLs were developed with different versions of the Chesapeake Bay Watershed Model, each with slightly different land use breakdowns and pollutant loading rates. MDE SSA's recommended approach would be to develop implementation plans either using output from the specific models (P5, P5.2, P5.3.2, etc), or using a percent reduction method to translate between models.** **MDOT SHA Response:** MDOT SHA modeled sediment reduction based on SSA recommendation of the percent reduction method to account for variability in the different Chesapeake Bay Models**.**

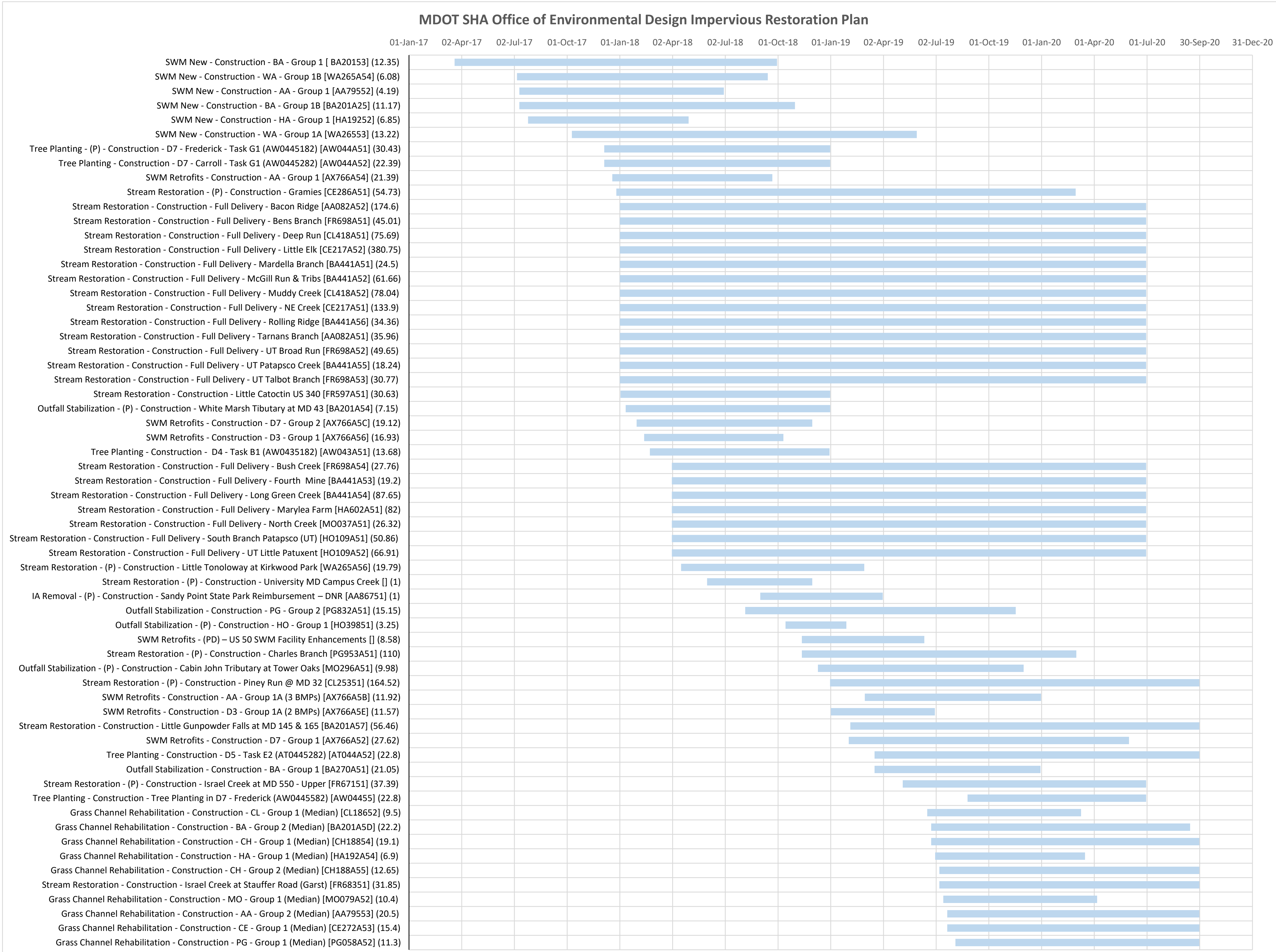
Bacteria Plans:

General Comments

Comment Type	Location	Comment
16. General Bacteria	p. 3-16; Table3-3	**Columns 9, 10, and 11 should have "SHA" removed from the heading, as the numbers in these columns represent the entire stormwater load of the watershed and are not specific to SHA. One suggestion is that "SHA" can be replaced with "Stormwater" or "MS4".** **MDOT SHA Response:** MDOT SHA is now modeling its specific bacteria baseline load and thus the baseline load, WLA, and reduction requirement are specific to MDOT SHA**.**

ATTACHMENT C

GANTT CHART OF
PROJECTS TO MEET 2020 RESTORATION GOAL


MDOT SHA Office of Environmental Design Impervious Restoration Plan
01-Jan-17
02-Apr-17
02-Jul-17
01-Oct-17
01-Jan-18
02-Apr-18
02-Jul-18
01-Oct-18
01-Jan-19
02-Apr-19
02-Jul-19
01-Oct-19
01-Jan-20
01-Apr-20
01-Jul-20
30-Sep-20
31-Dec-20
SWM New - Construction - BA - Group 1 [BA20153] (12.35)
SWM New - Construction - WA - Group 1B [WA265A54] (6.08)
SWM New - Construction - AA - Group 1 [AA79552] (4.19)
SWM New - Construction - BA - Group 1B [BA201A25] (11.17)
SWM New - Construction - HA - Group 1 [HA19252] (6.85)
SWM New - Construction - WA - Group 1A [WA26553] (13.22)
Tree Planting - (P) - Construction - D7 - Frederick - Task G1 (AW0445182) [AW044A51] (30.43)
Tree Planting - Construction - D7 - Carroll - Task G1 (AW0445282) [AW044A52] (22.39)
SWM Retrofits - Construction - AA - Group 1 [AX766A54] (21.39)
Stream Restoration - (P) - Construction - Gramies [CE286A51] (54.73)
Stream Restoration - Construction - Full Delivery - Bacon Ridge [AA082A52] (174.6)
Stream Restoration - Construction - Full Delivery - Bens Branch [FR698A51] (45.01)
Stream Restoration - Construction - Full Delivery - Deep Run [CL418A51] (75.69)
Stream Restoration - Construction - Full Delivery - Little Elk [CE217A52] (380.75)
Stream Restoration - Construction - Full Delivery - Mardella Branch [BA441A51] (24.5)
Stream Restoration - Construction - Full Delivery - McGill Run & Tribs [BA441A52] (61.66)
Stream Restoration - Construction - Full Delivery - Muddy Creek [CL418A52] (78.04)
Stream Restoration - Construction - Full Delivery - NE Creek [CE217A51] (133.9)
Stream Restoration - Construction - Full Delivery - Rolling Ridge [BA441A56] (34.36)
Stream Restoration - Construction - Full Delivery - Tarnans Branch [AA082A51] (35.96)
Stream Restoration - Construction - Full Delivery - UT Broad Run [FR698A52] (49.65)
Stream Restoration - Construction - Full Delivery - UT Patapsco Creek [BA441A55] (18.24)
Stream Restoration - Construction - Full Delivery - UT Talbot Branch [FR698A53] (30.77)
Stream Restoration - Construction - Little Catoctin US 340 [FR597A51] (30.63)
Outfall Stabilization - (P) - Construction - White Marsh Tibutary at MD 43 [BA201A54] (7.15)
SWM Retrofits - Construction - D7 - Group 2 [AX766A5C] (19.12)
SWM Retrofits - Construction - D3 - Group 1 [AX766A56] (16.93)
Tree Planting - Construction - D4 - Task B1 (AW0435182) [AW043A51] (13.68)
Stream Restoration - Construction - Full Delivery - Bush Creek [FR698A54] (27.76)
Stream Restoration - Construction - Full Delivery - Fourth Mine [BA441A53] (19.2)
Stream Restoration - Construction - Full Delivery - Long Green Creek [BA441A54] (87.65)
Stream Restoration - Construction - Full Delivery - Marylea Farm [HA602A51] (82)
Stream Restoration - Construction - Full Delivery - North Creek [MO037A51] (26.32)
Stream Restoration - Construction - Full Delivery - South Branch Patapsco (UT) [HO109A51] (50.86)
Stream Restoration - Construction - Full Delivery - UT Little Patuxent [HO109A52] (66.91)
Stream Restoration - (P) - Construction - Little Tonoloway at Kirkwood Park [WA265A56] (19.79)
Stream Restoration - (P) - Construction - University MD Campus Creek [] (1)
IA Removal - (P) - Construction - Sandy Point State Park Reimbursement – DNR [AA86751] (1)
Outfall Stabilization - Construction - PG - Group 2 [PG832A51] (15.15)
Outfall Stabilization - (P) - Construction - HO - Group 1 [HO39851] (3.25)
SWM Retrofits - (PD) – US 50 SWM Facility Enhancements [] (8.58)
Stream Restoration - (P) - Construction - Charles Branch [PG953A51] (110)
Outfall Stabilization - (P) - Construction - Cabin John Tributary at Tower Oaks [MO296A51] (9.98)
Stream Restoration - (P) - Construction - Piney Run @ MD 32 [CL25351] (164.52)
SWM Retrofits - Construction - AA - Group 1A (3 BMPs) [AX766A5B] (11.92)
SWM Retrofits - Construction - D3 - Group 1A (2 BMPs) [AX766A5E] (11.57)
Stream Restoration - Construction - Little Gunpowder Falls at MD 145 & 165 [BA201A57] (56.46)
SWM Retrofits - Construction - D7 - Group 1 [AX766A52] (27.62)
Tree Planting - Construction - D5 - Task E2 (AT0445282) [AT044A52] (22.8)
Outfall Stabilization - Construction - BA - Group 1 [BA270A51] (21.05)
Stream Restoration - (P) - Construction - Israel Creek at MD 550 - Upper [FR67151] (37.39)
Tree Planting - Construction - Tree Planting in D7 - Frederick (AW0445582) [AW04455] (22.8)
Grass Channel Rehabilitation - Construction - CL - Group 1 (Median) [CL18652] (9.5)
Grass Channel Rehabilitation - Construction - BA - Group 2 (Median) [BA201A5D] (22.2)
Grass Channel Rehabilitation - Construction - CH - Group 1 (Median) [CH18854] (19.1)
Grass Channel Rehabilitation - Construction - HA - Group 1 (Median) [HA192A54] (6.9)
Grass Channel Rehabilitation - Construction - CH - Group 2 (Median) [CH188A55] (12.65)
Stream Restoration - Construction - Israel Creek at Stauffer Road (Garst) [FR68351] (31.85)
Grass Channel Rehabilitation - Construction - MO - Group 1 (Median) [MO079A52] (10.4)
Grass Channel Rehabilitation - Construction - AA - Group 2 (Median) [AA79553] (20.5)
Grass Channel Rehabilitation - Construction - CE - Group 1 (Median) [CE272A53] (15.4)
Grass Channel Rehabilitation - Construction - PG - Group 1 (Median) [PG058A52] (11.3)

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System
Permit No. 11-DP-3313 MD0068276
Permit Term October 9, 2015 to October 8, 2020

Third Annual Report
October 9, 2018

Submitted to:
Sediment, Stormwater, and Dam Safety Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Submitted by:
Maryland Department of Transportation
State Highway Administration
Office of Environmental Design
707 North Calvert Street, C-303
Baltimore, MD 21202

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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List of Abbreviations

AAH	Adopt-A-Highway
AB	As-Built
ABE	As-Built Engineer
ADE	Assistant District Engineer
AMT	Automated Modeling Tool
BMP	Best Management Practice
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CWA	Clean Water Act
CCMS	Customer Care Management System
CSCE	Comprehensive Site Compliance Evaluations
DEC	District Environmental Coordinator
DLA	Direct Liquid Application
ECD	Environmental Compliance Division
ECU	Environmental Crimes Unit
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
ESCM	Erosion and Sediment Control Manager
ESD	Environmental Site Design
FY	Fiscal Year
GIS	Geographic Information System
GP	General Permit
HEC-2	Hydrologic Engineering Centers – Water Surface Profiles
HEC-RAS	Hydrologic Engineering Centers River Analysis System
HHD	Highway Hydraulics Division
HSPF	Hydrologic Simulation Program – Fortran
HOV	High Occupancy Vehicle
ID	Illicit Discharge
IDDE	Illicit Discharge Detection and Elimination
IVMM	Integrated Vegetation Management Manual
JPA	Joint Permit Application
lbs.	Pounds
LDG	Landscape Design Guide
LMG	Landscape Maintenance Guide
LOD	Limit of Disturbance
MBSS	Maryland Biological Stream Survey
MD	Maryland
MDE	Maryland Department of the Environment
MDOT	Maryland Department of Transportation
MET	Maryland Environmental Trust
MES	Maryland Environmental Service
MEP	Maximum Extent Practicable
MOU	Memorandum of Understanding
MTBMA	Maryland Transportation Builders and Materials Association
MS4	Municipal Separate Storm Sewer System
N	Nitrogen
NOI	Notice of Intent
NTP	Notice to Proceed
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
NTWP	Nontidal Wetland Permit
OAG	Office of the Attorney General

OC	Office of Communication
OED	Office of Environmental Design
OHD	Office of Highway Development
OHDU	OHD University
OOM	Office of Maintenance
P	Phosphorus
PCB	Polychlorinated Biphenyls
PRD	Plan Review Division
QA	Quality Assurance
REC	Regional Environmental Coordinator
RBP	Rapid Bioassessment Protocol
S	Sediment
SAH	Sponsor-A-Highway
SHA	State Highway Administration
SMP	Salt Management Plan
SOIRP	Storm Drain and Outfall Inspection and Remediation Program
SOP	Standard Operating Procedure
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorous
TPH	Petroleum Hydrocarbons
TSS	Total Suspended Solids
TWIS	Truck Weigh Inspection Station
WLA	Waste Load Allocation
WSA	Water and Science Administration
WPD	Water Programs Division
WQ	Water Quality
WQv	Water Quality Volume

Part One

Standard Permit Conditions and Responses

PART ONE

1. Standard Permit Conditions and Responses

Introduction

The Maryland Department of Transportation State Highway Administration (MDOT SHA) is committed to continuing the National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Program efforts and is pleased to partner with the Maryland Department of the Environment (MDE) Water and Science Administration (WSA), the Environmental Protection Agency (EPA), and other NPDES jurisdictions to achieve the program goals.

The original MDOT SHA NPDES Phase I permit, MS-SH-99-011, was issued on January 8, 1999 and expired in 2004. This permit guided MDOT SHA through establishing an NPDES MS4 program.

The Phase II State and Federal Small MS4 General Permit (GP), 05-SF-5501, MDR 055501, was issued November 12, 2004 and expired November 12, 2009. MDOT SHA submitted an NOI for coverage under the Phase II MS4 GP and received authorization for coverage May 25, 2005. Under the authority of this Phase II permit, MDOT SHA extended the same MS4 program elements established under the Phase I permit to the MDOT SHA storm drain systems in Phase II areas.

The next Phase I permit (99-DP-3313, MD0068276, issued October 21, 2005 and expired on October 21, 2010) focused on improving water quality benefits, developing an impervious accounting database and developing a watershed-based outlook for stormwater management and MS4 program elements.

MDOT SHA submitted a re-application for the Phase I permit on October 21, 2009 and a new permit was issued to MDOT SHA on October 9, 2015. This current permit covers MDOT SHA storm sewer systems in both the originally designated Phase I and Phase II jurisdictions. This report covers compliance with the permit that was issued in 2015. MDOT SHA has provided the permit general information in the Permit Information table (PER) as specified in the May 2017 MDE Geodatabase Guideline format.

Report Format and Deliverables

This third annual report covers Fiscal Year 18 (FY18) from July 1, 2017 through June 30, 2018, in accordance with the current permit reporting requirements listed in Part V.A.1.

Geographically, this report covers MDOT SHA compliance for storm drain systems owned or operated by MDOT SHA located within the NPDES counties of Anne Arundel, Baltimore, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, Prince George’s, and Washington, as well as the City of Salisbury, as depicted in green on the map in **Figure 1-1**.

Part One of this report lists permit conditions and discusses MDOT SHA compliance activities throughout the reporting period. Wherever possible, future activities and schedules for completion are provided. **Part Two** of this report discusses the MDOT SHA Stormwater and Drainage Asset Management Program. **Appendices** are included at the end of the report which include the MDOT SHA Plan Review Division FY18 Annual Report, information on data including methodologies and protocols, a protocol for MS4 credit related to non-functioning best management Practices (BMPs), analysis of variations in reported annual impervious restoration between 2017 and this annual report, discussion of methods MDOT SHA uses for determining and reporting redevelopment credit, MDOT SHA IDDE investigation processes, MS4 stormwater WLA implementation planning worksheets, comprehensive lists of restoration practices by contract, , monitoring reports for the Assessment of Controls condition (Part IV.F of the permit), as well as the geospatial database and data dictionary.

A CD is included that contains portable document format (PDF) files of the report, database tables, and GIS spatial data.

MDE Comments on MDOT SHA 2016 MS4 Report and One-Year Submittals

MDE supplied comments dated April 26, 2017 relating to the results of MDE review of the MDOT SHA 2016 MS4 annual report, data submittal, impervious accounting, and the MDOT SHA 2016 Impervious Restoration and Coordinated TMDL Implementation Plan. The MDE comments were divided into three attachments:

I: MDE Assessment and Recommendations,

II: Impervious Area Assessment Report, and

III MDOT SHA Stormwater Waste Load Allocation (WLA) Implementation Plan Comments for Nutrients, PCBs, Trash, Sediment, and Bacteria.

MDE's Impervious Area Assessment Report (MDE Attachment II) outlined specific information required to be submitted to MDE by July 31, 2017 to finalize its assessment and approval of the MDOT SHA baseline impervious accounting. On 7/31/2017, MDOT SHA delivered to MDE a complete reassessment of the baseline impervious accounting, 20 percent restoration goal, and detailed responses to the specific comments included in MDE Attachment II.

A response letter addressing the comments included in MDE Attachments I and III has been included with this third annual report.

MDE Comments on MDOT SHA 2017 MS4 Report and Two-Year Submittals

MDE supplied comments dated May 17, 2018 related to the results of MDE review of the MDOT SHA 2017 MS4 annual report and data submittal.

In those comments, MDE requested MDOT SHA finalize and submit its baseline impervious accounting and revised 20 percent restoration goal by June 30, 2018. MDOT SHA provided its final baseline impervious accounting, 20 percent restoration goal, and supporting documents to MDE on June 29, 2018.

A response letter addressing May 17, 2018 MDE comments has been included with this third annual report submission.

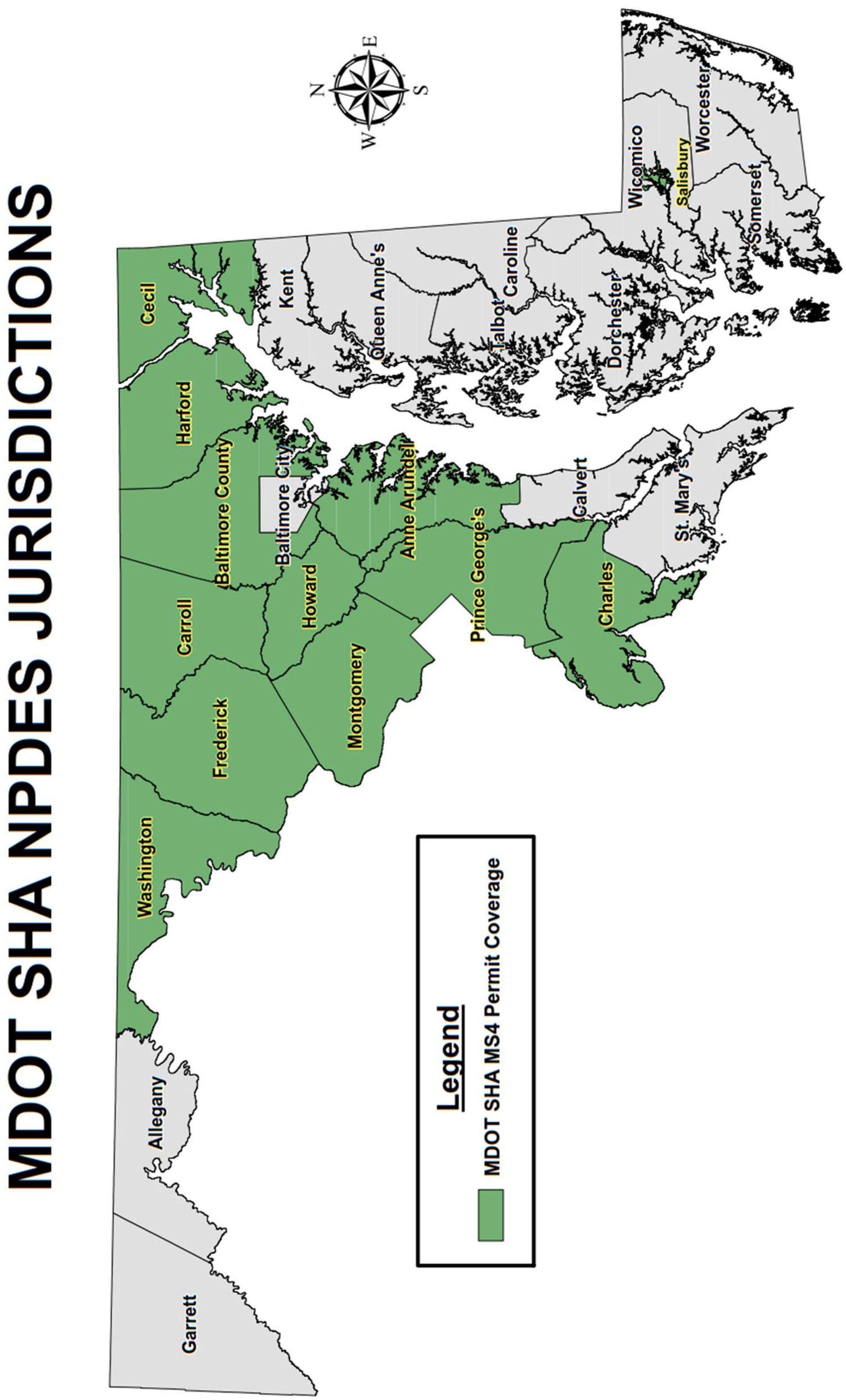


Figure 1-1: Municipal Separate Storm Sewer System (MS4) Jurisdictions

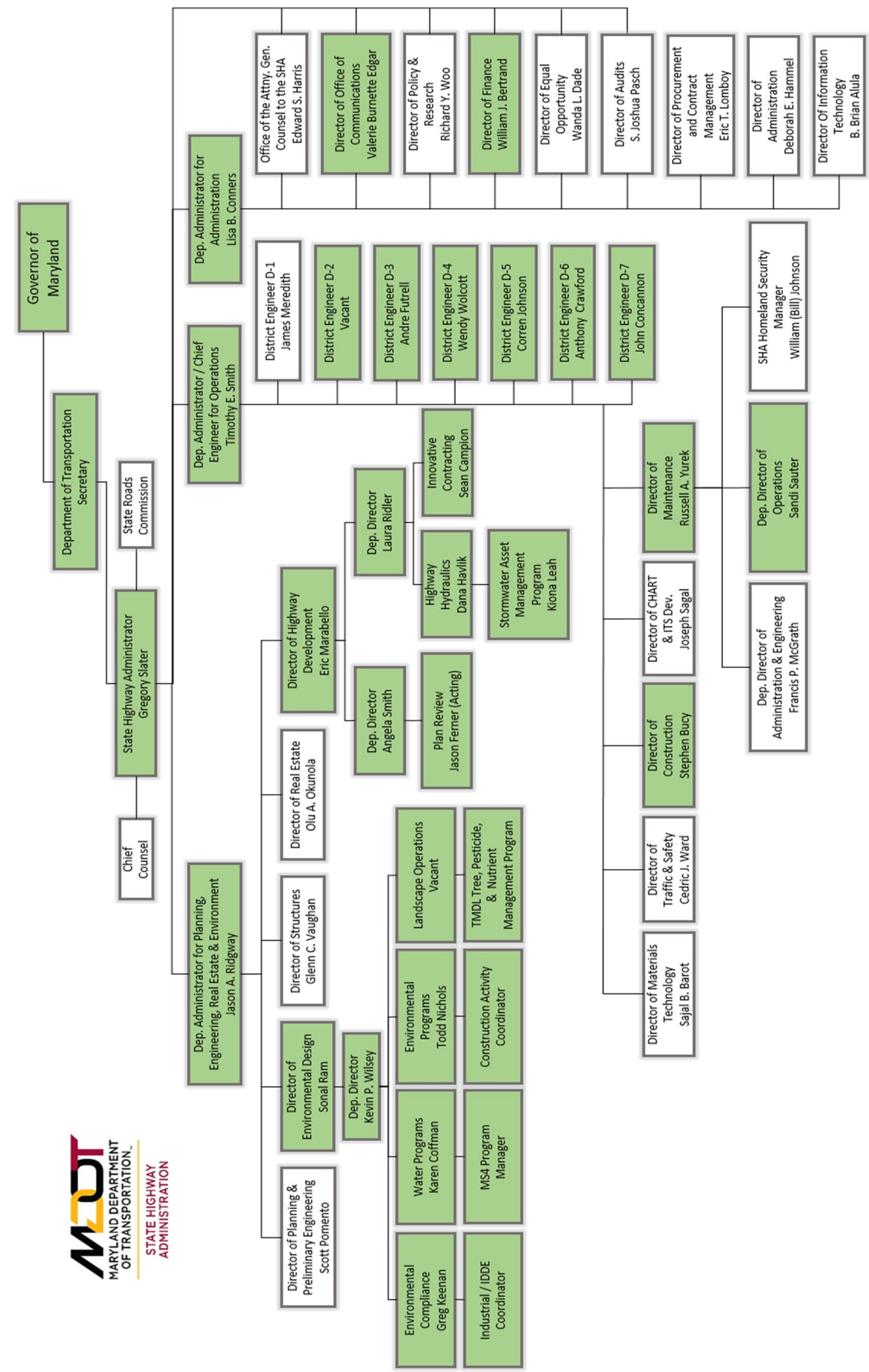


Figure 1-2: 2018 Organizational Chart for MDOT SHA NPDES MS4 Permit Administration

A. Permit Administration

The MDOT SHA Administration coordinator for the NPDES Program is listed below and an organizational chart detailing personnel responsible for major program components is included in **Figure 1-2**.

Mr. Kevin Wilsey
Deputy Director
Office of Environmental Design
(410) 545-8605
kwilsey@mdot.state.md.us

The MDOT SHA Program Manager for the MS4 permit is:

Ms. Karen Coffman
Division Chief
Water Programs Division
Office of Environmental Design
(410) 545-8407
KCoffman@mdot.state.md.us

B. Legal Authority

A description of the legal authority maintained by MDOT SHA was included in the first annual report dated October 9, 2016 and remains unchanged.

C. Source Identification

According to the permit language, sources of pollutants in stormwater runoff should continue to be identified and linked to specific water quality impacts on a watershed basis. The data collected through source identification should be used by MDOT SHA and surrounding NPDES counties for watershed restoration planning.

Requirements under this condition include submitting MDOT SHA stormwater infrastructure data within the permit area in geographic information system (GIS) format on an annual basis:

1. *Storm drain system: Delineate all infrastructure, major outfalls, inlets, and associated drainage areas;*
2. *Industrial and commercial sources: Identify industrial and commercial land uses and sites that have the potential to contribute significant pollutants to SHA storm drain systems;*
3. *Urban best management practices (BMPs): Collect stormwater management facility data including outfall locations and delineated drainage areas;*
4. *Impervious surfaces: Delineate SHA-owned and private land owned (if within SHA BMP drainage area) controlled and uncontrolled impervious areas based on, at a minimum, Maryland's hierarchical eight-digit sub-basins;*
5. *Monitoring locations: Locations established for chemical, biological, and physical monitoring of watershed restoration efforts and the 2000 Maryland Stormwater Design Manual; and*
6. *Water quality improvement projects: Projects proposed, under construction, and completed with associated drainage areas delineated, when applicable.*

C.1 Storm Drain System

An inventory of MDOT SHA storm drain infrastructure, major outfalls, stormwater management facilities, and associated drainage areas has been tracked and displayed through a spatial Geographic Information System (GIS) database as part of the MDOT SHA Asset Management Program for over 10 years. Throughout the past several years, significant effort and resources were allocated to complete updates of the stormwater management facility inventory, inspections, and the associated drainage infrastructure to properly establish baseline MDOT SHA owned impervious treatment. As part of these efforts, all storm drains associated with SWM facilities are mapped as they are inspected.

Part Two of this report focuses on components of the MDOT SHA SWM and Drainage Asset Program. This includes inventory, inspections (both inside and outside permitted areas), functional rating, assessment for remedial activities, project planning, design, and implementation of remedial and retrofit projects.

MDOT SHA continues to populate missing data within database fields to add outfall drainage areas and other records such as City, State, and zip codes.

In the past year, continued research has been conducted to determine constructed (as-built) dates for drainage outfalls as well as as-built information for stormwater management facilities built prior to regulations requiring detailed documentation were developed. This effort will take several years to complete; however, it will be extremely beneficial to future inspection and maintenance efforts.

MDOT SHA has provided the outfall structure information in the Outfall feature class (OUT) and the Outfall Drainage Area feature class (ODA) as specified in the May 2017 MDE Geodatabase Guideline format.

Table 1-1 presents the number of BMP inspections performed in FY18, as well as BMP inspections planned for FY19 and FY20. The previous method by MDOT SHA to tie source data updates to geographical areas has proven ineffective due to large quantities of new SW control structures built in recent years, and we are shifting our focus to the 3-year SW BMP inspection cycle to determine update schedules. Associated storm drain infrastructure data will be updated based on this method in the future.

Table 1-1: Storm Drain System Source ID Update Schedule

Jurisdiction	Fiscal Year 2018 BMP Inspections Performed	Fiscal Year 2019 BMP Inspections Required	Fiscal Year 2020 BMP Inspections Required
Anne Arundel County	149	798	91
Baltimore County	53	527	81
Carroll County	40	125	80
Cecil County	70	116	97
Charles County	12	655	70
Frederick County	8	540	170
Harford County	95	193	43
Howard County	6	1011	50
Montgomery County	392	325	70
Prince George's County	249	838	187
Washington County	84	237	201
Salisbury	34	0	25
Total	**1,192**	**5,365**	**1,165**

C.2 Industrial and Commercial Sources

A GIS layer has been developed to identify industrial sites within MDOT SHA right-of-way that have the potential to contribute pollutants to MDOT SHA storm drain systems. The layer includes MDOT SHA 12-SW permitted industrial sites and has been updated this past FY18 to also include garages, parking lots, rest areas, and other highly trafficked or material storage areas as requested by MDE. There are no commercial sites on MDOT SHA properties.

This GIS layer is included in the MDOT SHA Supplemental 2018 Geodatabase, submitted with this annual report.

Section D.3.b of this annual report discusses how these potential sources will be inspected in accordance with the MDOT SHA current 12-SW inspection program.

C.3 Urban Best Management Practices (BMPs)

The GIS inventory database is continuously updated to include newly constructed SWM facilities and the delineation of accurate drainage areas. Updates include inventory and inspection of stormwater management facilities, associated outfalls, and drainage areas. This system for planning inspection locations will be modified in upcoming years with the implementation of the new tools outlined in **Part Two**.

The MDOT SHA continues to provide the urban BMP information in the BMP Point of Investigation feature class (BMPPOI) and the BMP table (BMP) as specified in the May 2017 MDE Geodatabase Guideline format.

C.4 Impervious Surfaces

MDOT SHA performed a reevaluation of its impervious baseline accounting to fall in line with the 2014 MDE Accounting Guidance and expectations for a baseline year of 2002. The previous baseline had been established as 2010 to coincide with the expiration of the last MDOT SHA MS4 permit (10/21/2010). Revised impervious surfaces were developed using available photogrammetry data that was closest to 2002 for each MS4 jurisdiction and the resulting baseline years range from 2002 to 2005. **Table 1-2** shows the MDOT SHA impervious surface baseline year by MS4 jurisdiction. This GIS layer was included in the MDOT SHA Supplemental 2018 Geodatabase, submitted with the *June 29, 2018 MDOT SHA Final Impervious Baseline Assessment* and is not redelivered with this report.

Table 1-2: MDOT SHA Impervious Surface Baseline Dates by County

County	Baseline Date
Anne Arundel	12/31/2005
Baltimore	12/31/2005
Carroll	12/31/2005
Cecil	12/31/2005
Charles	12/31/2004
Frederick	12/31/2005
Harford	12/31/2004
Howard	12/31/2002
Montgomery	12/31/2004
Prince George's	12/31/2005
Washington	12/31/2005

MDOT SHA submitted the final baseline impervious accounting, 20 percent restoration goal, and supporting documents to MDE on June 29, 2018. Discussion of the revised impervious accounting and additional information can be found within **Section E.2.a**of this report.

C.5 Monitoring Locations

Monitoring site locations for current studies to meet the Section IV.F Assessment of Controls permit conditions F.1 - Watershed Restoration Assessment, and F.2 - Stormwater Management Assessment, are provided in the Chemical Monitoring (CHE) and Biological Monitoring (BIO) tables as specified in the May 2017 MDE Geodatabase Guideline format. MDOT SHA has also provided the monitoring site location information in the Monitoring Site feature class (MSI) and the Monitoring Drainage Area feature class (MDA).

Discussion on progress for each of these studies and analysis of data obtained over the report period are included in **Section F** of this report while discussion of the monitoring locations is provided below.

Watershed Restoration Assessment Monitoring Locations

MDOT SHA is in the process of monitoring the physical, chemical and biological features of the Little Catoctin Creek. A description of monitoring activities can be found in **Section F.1** of this annual report. A monitoring report for FY18 (the second year of the 5-year monitoring plan) is included as **Appendix I**.

The study reach for Little Catoctin Creek project is 3,100 feet long. The approved monitoring plan was appended to the MDOT SHA 2016 annual report. During the reporting period, chemical, biological, and physical monitoring was performed as specified in the monitoring methodology of the monitoring plan. The monitoring locations can be found in **Figure 1-3**, and include two locations for discrete, manual chemical sampling (01636845 and 01636846); seven biological sampling locations (PRFR-201-X, PRFR-202-X, PRFR-203-X, PRFR-204-X, PRFR-205-X, PRFR-206-X, and

PRFR-107-X); as well as six physical monitoring locations (P-1, P-2, P-3, P-4, P-5, and P-6). Chemical monitoring site 01636846 is instrumented with an acoustic doppler velocity meter (ADVM) for continuous flow measurements.

Stormwater Management Assessment Monitoring Locations

In FY18, MDOT SHA initiated baseline monitoring to assess the impacts of environmental site design (ESD) practices on the Little Patuxent River main stem near I-70 and Marriottsville Road in Howard County. MDOT SHA received approval from MDE for this monitoring plan on September 19, 2018. The approved plan was appended to the MDOT SHA 2017 annual report.

Monitoring locations for the Little Patuxent River near I-70 and Marriottsville Road in Howard County are shown in **Figure 1-4** and include two physical monitoring locations consisting of permanently monumented cross-sections, which include a longitudinal profile through the monitoring reach, and three continuous flow monitoring station locations. These flow stations are optional sites that will only monitor stage/ discharge for the site and do not include any water chemistry parameters.

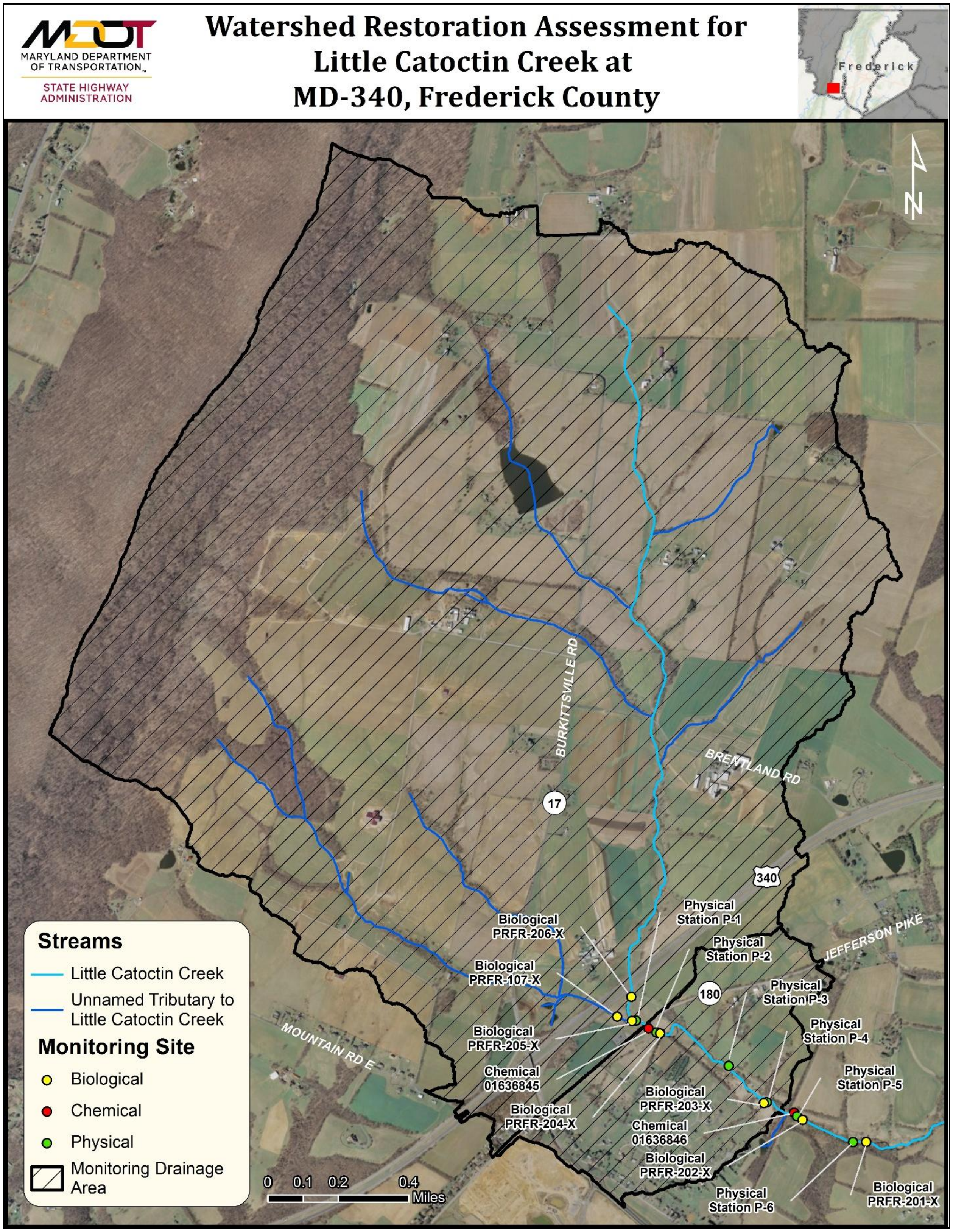


Figure 1-3: Watershed Restoration Assessment Monitoring Locations

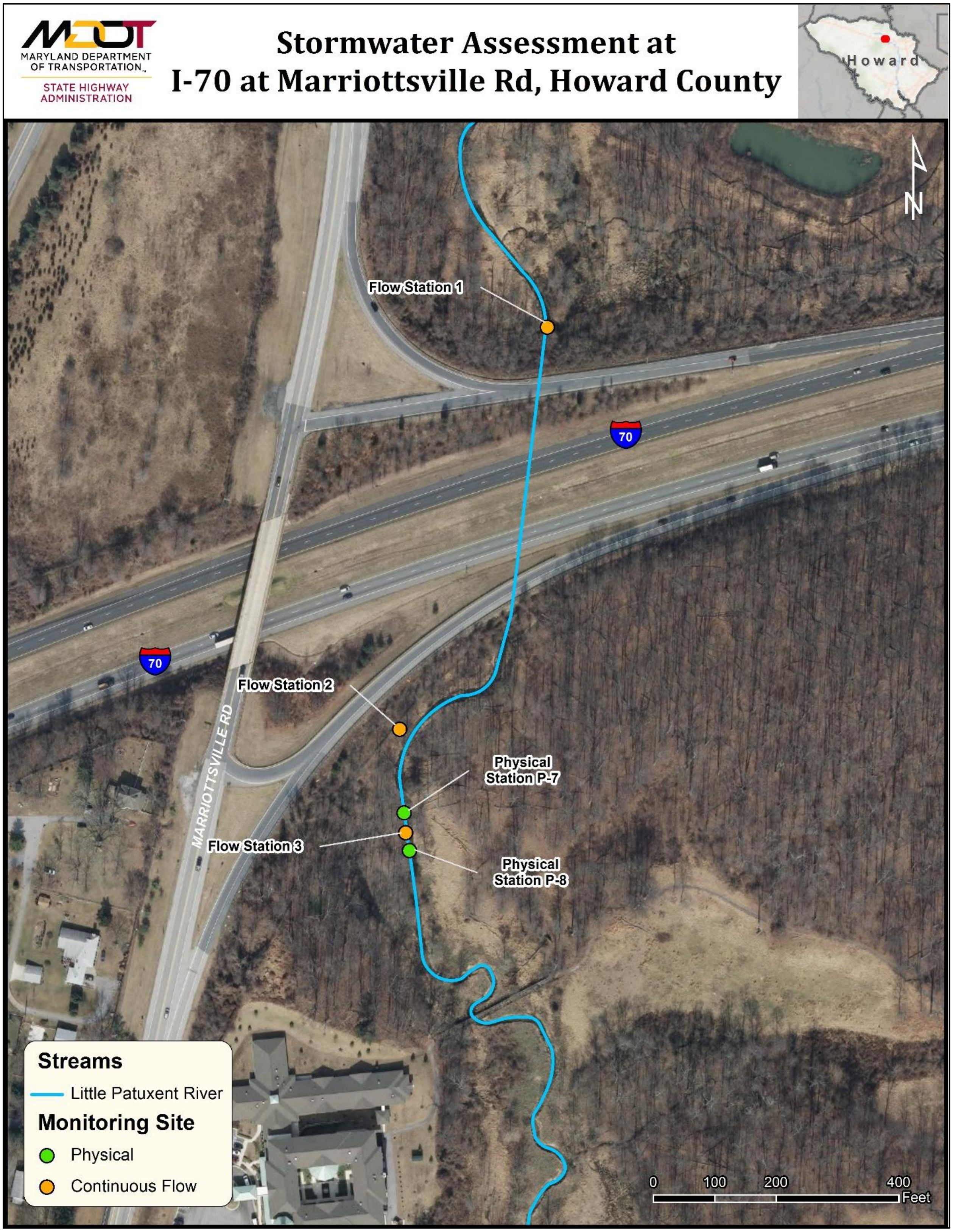


Figure 1-4: Stormwater Management Assessment Monitoring Locations

C.6 Water Quality Improvement Projects

MDOT SHA has provided water quality improvement project information for completed projects through FY18 (restoration BMPs) using the following feature classes and tables as specified in the May 2017 MDE Geodatabase Guideline format:

- Restoration BMP feature class (RST)
- Alternate BMP Polygon feature class (APY)
- Alternate BMP Line feature class (ALN)
- Stream Restoration Protocols table (SRP)

The submitted data includes only currently completed projects and does not include projects that are in planning design phase or under construction. Further discussion on progress meeting restoration goals is included in **Section E.4**.

The MDOT SHA provided information on planned and under construction restoration projects in Tables 2-2a – 2-2g within Part II of the *MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan* (Implementation Plan) that was delivered to MDE on October 8, 2016. These tables provide a comprehensive list of annual operations practices and completed, planned, and under construction built practices broken down by fiscal year that are targeted to meet the 20 percent impervious restoration goal.

Additionally, proposed practices to meet TMDL pollutant reductions for local watersheds with MDOT SHA assigned WLAs are provided in Section IV of the Implementation Plan.

The Implementation Plan has been completely updated and Parts I, III, and IV are included with this annual report delivery. Tables 2-2a through 2-2g and all of Part II of the Implementation Plan will be revised after MDOT SHA receives the MDE decision on the impervious baseline accounting submitted to MDE on June 29, 2018. A complete version of the updated Implementation Plan will be submitted to MDE once revisions to Part II are completed.

D. Management Programs

A management program is required to limit the discharge of stormwater pollutants to the maximum extent practicable (MEP). The idea is to eliminate pollutants before they enter waterways. This program includes provisions for stormwater management, erosion and sediment control, IDDE, trash and litter reduction, property management and maintenance, and public education concerning stormwater and pollutant minimization.

D.1 Stormwater Management

The continuance of an effective stormwater management program is the emphasis of this permit condition. Requirements under this condition include:

a) Implement the stormwater management design principles, methods, and practices found in the 2000 Maryland Stormwater Design Manual;

b) Maintain programmatic and implementation information including but not limited to number of plans received, number of projects received, number of exemptions issued, and number and type of waivers received and issued;

c) Maintain construction inspection information according to COMAR 26.17.02 for all ESD treatment practices and structural stormwater management facilities; and

d) Conduct preventative maintenance inspections according to COMAR 26.17.02 of all ESD treatment systems and structural stormwater management facilities at least on a triennial basis.

D.1.a Implement 2000 SW Design Manual and Regulations

The MDOT SHA continues to comply with State and federal laws and regulations regarding SWM as well as MDE permit requirements. The MDOT SHA also continues to implement the practices established in the *2000 Maryland Stormwater Design Manual* and the *MDOT SHA Sediment and Stormwater Guidelines and Procedures* (October

6, 2017) for all projects. The MDOT SHA remains in compliance with the Stormwater Management Act of 2007 (2007 SW Act), including the revised Chapter 5 of the *2000 Maryland Stormwater Design Manual*, by implementing environmental site design (ESD) to the MEP for all new and redevelopment projects.

The MDOT SHA and MDE signed a Memorandum of Understanding (MOU), dated July 8, 2014, designating MDOT SHA as an approving authority for both erosion and sediment control and stormwater management for all MDOT SHA projects. This authority was given by a letter of authorization from MDE on February 24, 2015. The MDOT SHA approval authority lies with the Plan Review Division (PRD) under the Office of Highway Development (OHD). PRD's sole responsibility is to review and approve MDOT SHA stormwater management and erosion and sediment control plans. PRD is separate and distinct from the OHD design divisions. In addition, the OHD design divisions are supervised by a different Deputy Director than PRD.

The MDOT SHA PRD tracks MDOT SHA progress toward satisfying requirements of the 2007 SW Act and identifies and reports problems and modifications needed to implement ESD to the MEP in its annual reports to MDE (included as **Appendix A** to this annual report). Draft Technical Procedures were submitted to MDE last year with the FY 2017 annual report. No comments were received from MDE and Version 1.5 was adopted by PRD.

As part of their reporting, PRD also makes required modifications to the plan review and approval processes to comply with the 2007 SW Act. During the reporting period, PRD made several minor revisions to the Guidelines and Procedures to clarify intent and ensure consistency with MDE Technical Memoranda.

D.1.b Maintain Programmatic and Implementation Information

PRD maintains a database to track stormwater management submittals, reviews, and approval progress on all MDOT SHA projects. To satisfy the requirements of the MDOT SHA delegated review and approval authority, PRD submitted its FY17 Annual Report to MDE in last year's MS4 Annual Report. The Plan Review Division FY18 Annual Report is included with this report as **Appendix A**.

Table 1-3 presents a summary of FY18 submissions received; comment memoranda issued; and approvals for concept design, site development and final design approvals by MS4 jurisdiction. Due to the timing of the change of permit review from MDE to PRD, there were several projects that MDE granted approval for as they had initiated project review prior to the change in procedures. MDE approved 65 final plans during FY18.

ESD must be implemented to the MEP. However, there are situations that warrant relaxing stormwater management requirements due to site specific circumstances. For those situations, waivers or variances may be applicable. **Table 1-3** also lists SWM quantity or quality control waivers and variance requests for SWM quantity control that were granted during FY18 broken out by MS4 areas and Maryland statewide.

The PRD has incorporated components in their Project Tracking database to facilitate the review and analysis of water quality and quantity waivers and variances. These requests are associated with specific Points of Investigation (POIs) for each project. The information collected in the database includes reference to the specific regulation for which a waiver or variance is sought, documentation for why the waiver or variance is appropriate, and includes the action taken in response to the request. This database now allows PRD to query and summarize requests and approvals associated with MDOT SHA development plans and to provide that information in support of the MS4 Annual Report.

The PRD FY18 Report is included as **Appendix A** to this annual report. The stormwater management program information is provided in the SWM table (SWM) as specified in the May 2017 MDE Geodatabase Guideline format.

Table 1-3: Stormwater Management Review and Approval

Jurisdiction	Number of Projects	Review Submissions	Comment Memoranda	Concept Design Submittal Approvals	Site Development Stage Approvals	Final Approvals	Granted SWM Waivers	Granted SWM Variances
Anne Arundel	36	134	54	15	10	9	35	7
Baltimore	42	103	64	14	11	8	3	9
Carroll	18	49	30	9	3	1	0	0
Cecil	8	23	10	3	2	2	1	0
Charles	9	20	10	0	3	3	6	0
Frederick	34	89	51	14	7	7	13	8
Harford	14	25	14	6	1	2	1	2
Howard	15	60	29	8	8	7	17	14
Montgomery	28	114	73	10	11	11	7	8
Prince George's	38	119	74	10	11	11	33	20
Washington	16	49	23	4	4	4	1	11
Salisbury	3	6	4	0	1	0	0	0
MS4 Totals	261	791	436	93	72	65	117	79
Outside MS4	152	426	238	65	43	57	150	28
Statewide Total	413	1217	674	158	115	122	267	107

Notes:
1. Projects included in the total number above include any project that had activity during the permit term. Activity can include submittal of any plan type, waiver or variance request, or the receipt of comments or approvals.
2. Granted SWM waivers or variances include only those requests associated with final design plans that have been approved during the reporting term.

D.1.c Maintain Construction Inspection Information

COMAR 26.17.02.10 details regulations for SWM facility inspections to be conducted during construction. MDOT SHA administers and continues to improve the SWM facility as-built (AB) certification process in compliance with the SWM approval and COMAR requirements. Refer to **Figure 1-5** for the AB certification process flow chart. The AB certification process facilitates the documentation and verification of the construction of SWM facilities.

Throughout the SWM facility construction process, the Contractor's SWM facility As-Built Engineer (ABE) inspects and documents construction activities and completes the SWM facility as-built data tables, providing additional computations when deviations exceed allowed tolerances. The data tables work in conjunction with Section 317 of the MDOT SHA *Standards and Specifications for Construction and Materials*, which outlines the ABE qualification requirements, the necessary contents of the SWM facility as-built certification package, and allowable tolerances. Section 317 was revamped and included in the specifications during the reporting period. The MDOT SHA standard specifications are available on-line at: https://www.roads.maryland.gov/Index.aspx?PageId=689

The SWM facility AB certification is a bid item on each Contract with SWM facilities. Payment is made per the payment schedule: 60 percent upon initial submission of a complete package, 30 percent upon structural acceptance, and 10 percent upon final acceptance.

Once a SWM facility AB package has been completed, the Contractor submits the package via the Quality Assurance Toolkit, SWM AB module, which is part of the streamlined process created during the reporting period. Refer to **Figure 1-6** for an example screenshot of the software application. The submittal is first reviewed by the ADE for Construction and verified complete before moving the package to HHD.

Once HHD receives the package, it is reviewed, and comments are provided to the Contractor for any necessary corrections to either the package or the SWM facility that may be in question. When Contractors receive comments, they address the deficiencies and submit corrections, along with point-by-point responses to comments. Once HHD is satisfied with the SWM facility AB package, it is submitted though the Toolkit AB module to PRD.

The review and approval process by PRD is similar to the HHD process. Once PRD is satisfied with the SWM facility AB package, it is checked for whether any of the SWM facilities are small ponds that must meet Maryland NRCS Pond Code 378 requirements and received MDE Small Pond Approval. SWM facilities that are required to meet Pond Code 378 and have Small Pond Approval must have the SWM facility AB package approved by MDE. PRD coordinates the MDE reviews. Once MDE is satisfied with the SWM facility AB package, MDE issues SWM facility AB acceptance. Once PRD has a complete SWM facility AB package, including any other approvals from other agencies as needed, PRD issues Structural Acceptance, which is acceptance of all required data for the SWM facility AB package with the single exception of vegetation establishment.

Once vegetation establishment has occurred, the Contractor submits an entirely-complete SWM facility AB certification package to HHD and another review process ensues. Once HHD is satisfied with the SWM facility AB package, HHD issues Final Acceptance.

Copies of the accepted AB package are retained and integrated into the Drainage and Stormwater Assets GIS database where they are used for future functionality inspections. A Contract may not be closed out until the SWM facility AB certification package receives Final Acceptance.

MDOT SHA also created a shortened version of the SWM facility AB certification specification for use on remediation work orders. These activities, undertaken to perform remediation or major maintenance on SWM facilities, are documented and verified to ensure they have been completed. As with traditional AB certification packages, the inspections are performed by an engineer working for the Contractor. The completed construction verification package follows the information outlined in Chapter 3 of the *Maryland State Highway Administration Stormwater NPDES Program Standard Procedures – Best Management Practice Assessment Guidelines for Maintenance and Remediation.* The data is added to the Drainage and Stormwater Assets GIS database where they are used for future functionality inspections.

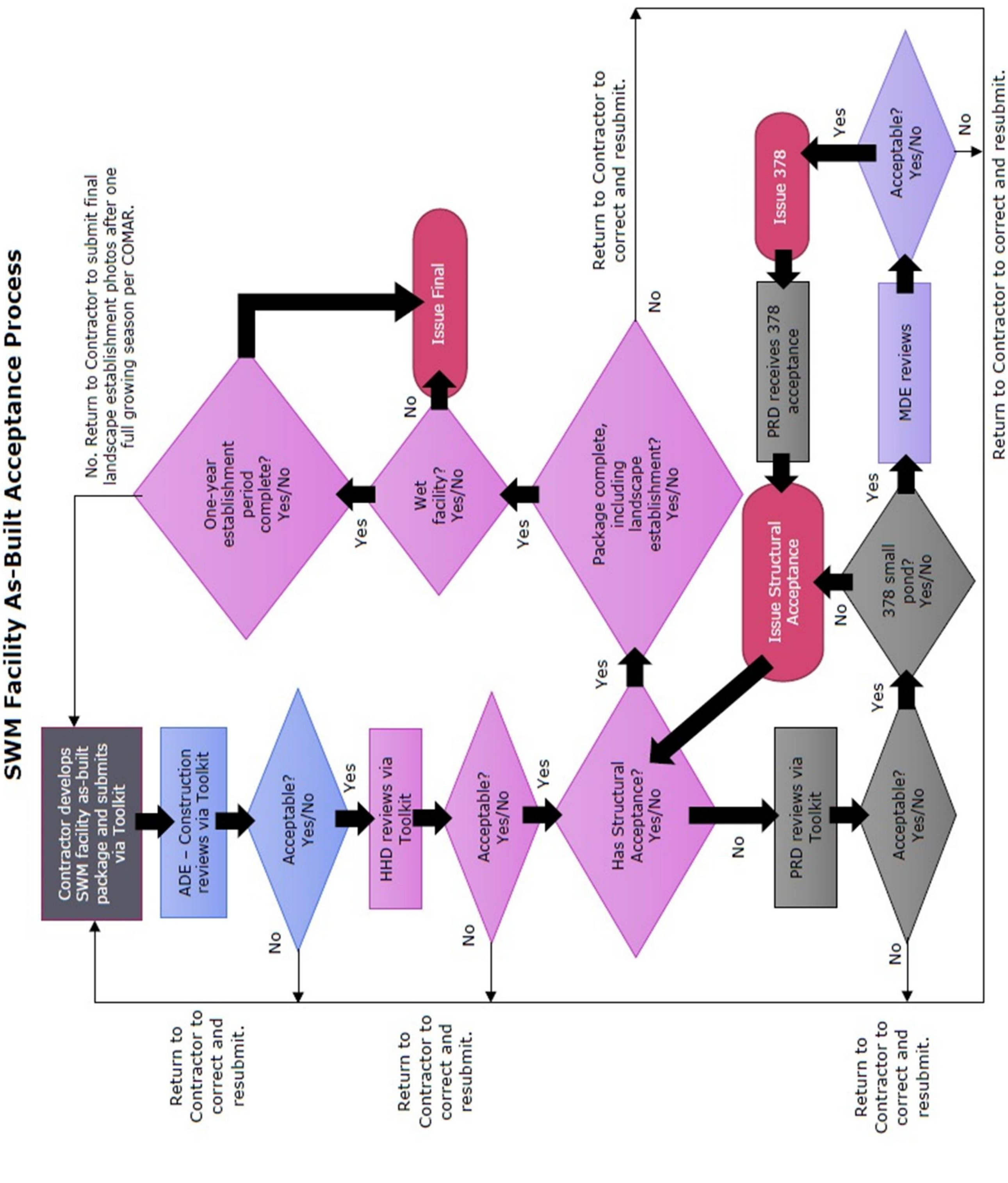
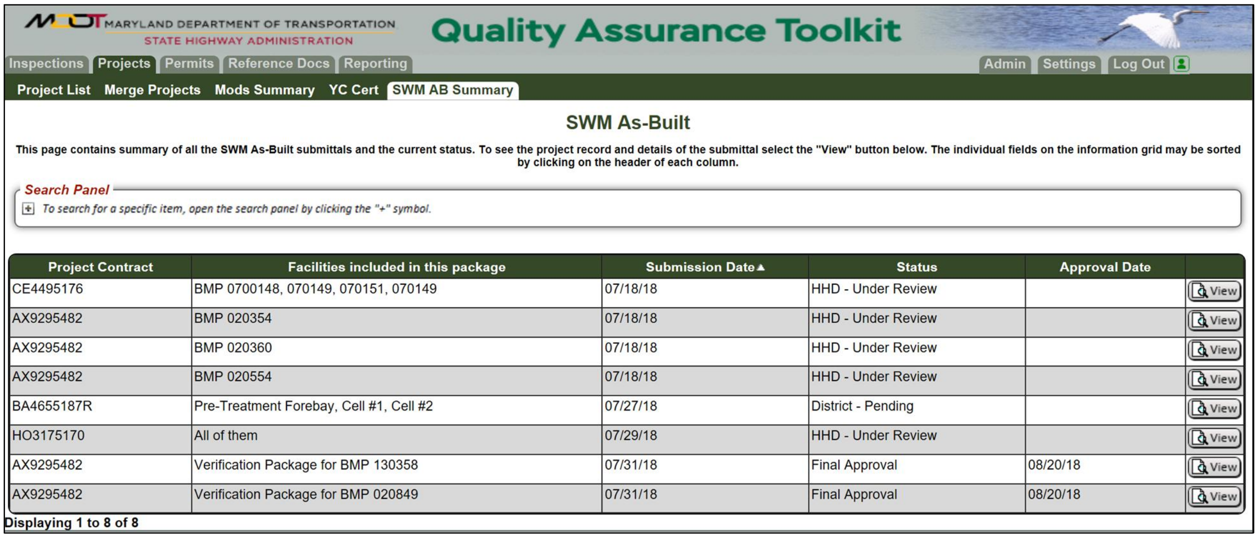


Figure 1-5: Internal Process for SWM Facility AB Review and Acceptance



Project Contract	Facilities included in this package	Submission Date▲	Status	Approval Date	
CE4495176	BMP 0700148, 070149, 070151, 070149	07/18/18	HHD - Under Review		View
AX9295482	BMP 020354	07/18/18	HHD - Under Review		View
AX9295482	BMP 020360	07/18/18	HHD - Under Review		View
AX9295482	BMP 020554	07/18/18	HHD - Under Review		View
BA4655187R	Pre-Treatment Forebay, Cell #1, Cell #2	07/27/18	District - Pending		View
HO3175170	All of them	07/29/18	HHD - Under Review		View
AX9295482	Verification Package for BMP 130358	07/31/18	Final Approval	08/20/18	View
AX9295482	Verification Package for BMP 020849	07/31/18	Final Approval	08/20/18	View

Displaying 1 to 8 of 8

Figure 1-6: Quality Assurance Toolkit - SWM Facility AB Certification Module

D.1.d Preventative Maintenance

MDOT SHA owns, operates, and maintains an extensive roadway network with significant drainage and stormwater management systems. The MDOT SHA Stormwater and Drainage Asset Management Program was established to operate and remediate permanent drainage and stormwater assets that convey and treat highway runoff. The program's goal is to provide preventative and remedial solutions for drainage and stormwater infrastructure within MDOT SHA right-of-way. **Part Two** of this report is a detailed discussion of this asset management program progress.

Alternative BMPs that are built to achieve impervious restoration or pollutant load reductions relative to Part IV.E of the MS4 permit are also required to be inspected every 3-years. For this reason, discussion of those inspections is included here, and **Section E** of this report should be referred to related to progress meeting the impervious restoration and TMDL pollutant load reductions. Discussion of the SWM facility inspections follows this brief discussion.

Triennial Inspections for Impervious Restoration and TMDL Load Reduction BMPs

MDOT SHA performed field inspections in MS4 areas to ensure all impervious baseline and restoration facilities are eligible for credit in the impervious surface area assessment and comply with the triennial inspection requirement. The following counties were the focus of BMP field inspection efforts during the reporting period:

- Anne Arundel,
- Baltimore,
- Carroll,
- Cecil,
- Charles,
- Frederick,
- Harford,
- Howard,
- Montgomery,
- Prince George's,
- Washington, and
- Salisbury.

During this reporting period, baseline treatment BMP inspections were performed for:

- zero (0) stream restoration sites,
- 71 tree planting sites, and
- about 941 SWM facilities.

MDOT SHA performed restoration BMP inspections for:

- 9 stream restoration sites,
- 562 tree planting sites,
- zero (0) impervious area removal sites and
- 107 SWM facilities.

MDOT SHA has provided the inspection program information in the following tables, as specified in the May 2017 MDE Geodatabase Guideline format:

- BMP Inspections table (BIN),
- Alternative BMP Line Inspections table (LIN),
- Alternative BMP Poly Inspections table (YIN), and
- Restoration BMP Inspections table (RIN).

A separate protocol included as **Appendix C**, *Non-Functioning Baseline and Restoration BMP Accounting Protocol*, was developed to clarify MDOT SHA procedures for handling any BMP designated to provide baseline treatment or impervious restoration credit when it receives a failing field inspection rating (D or E). Because timeframes for remediating failures can vary based on the BMP type (SWM or alternative) and severity of the condition, a standardized method is needed for determining when baseline treatment or restoration credit is removed from MDOT SHA impervious accounting and at what point it will be added back to the accounting framework.

Triennial Inspections of SWM Facilities

During the reporting period, MDOT SHA continued to locate, inspect, evaluate, and remediate SWM facilities to sustain their functionality, improve water quality and stability, protect sensitive water resources, and provide an aesthetic and safe transportation system. MDE requires all facilities be inspected at least on a triennial basis and maintained or remediated as appropriate to ensure they continue to function as originally designed and permitted.

The MDOT SHA uses a two-tiered approach to meet this requirement that includes field inspections and ratings followed by engineering remediation assessments and work orders. Field inspections are performed on a cyclical basis leveraging a detailed standard operation procedure (SOP) and inspection rating protocol and results in determination of pass/fail inspection designation. During FY18 MDOT SHA began using an upgraded field inspection tool that is discussed in detail in **Part Two** of this report.

Maintenance and remediation assessments follow by evaluating and ranking the field inspection data based on additional rating criteria outlined in the SOPs. Rated facilities are then prioritized for completion of maintenance, remedial workorders design and permitting. More details on this program are outlined in **Part Two** of this report.

SWM Facility Remediation Program

Routine and preventive maintenance is performed by MDOT SHA District maintenance shops as part of their roadside maintenance and other operational activities. Major maintenance and remediation of SWM facilities is prioritized based on severity of condition, public safety, funding levels, and construction contracts availability with the goal to complete remediation within several years after a failed field inspection. Detailed information on these procedures is included in **Part Two** of this report.

Continued outreach and education efforts by MDOT SHA continue to improve coordination of preventative maintenance efforts. Additional maintenance manuals were provided at the request of District staff to promote a systematic approach and ensure continued high maintenance standards.

MDOT SHA has prioritized completing the maintenance for BMPs published in the FY17 Annual Report. However, as mentioned above, MDOT SHA is adjusting the method for reporting failed inspections for the purposes of standardizing procedures for baseline treatment and restoration credit management related to the impervious restoration requirement. This will impact how information in the stormwater BMP remediation tables below are handled. During the reporting period, we are differentiating between remediation efforts for BMPs that failed field inspections versus those BMPs that passed field inspections but still require remediation.

Table 1-4 details remediation commitments for failed BMPs, while **Table 1-4a** details BMPs that MDOT SHA has classified as an action rating requiring remediation although they are not a top priority due to passing the last BMP field inspection. MDOT SHA is presenting the last field inspection grade rather than the action rating to help illustrate this differentiation. MDOT SHA has completed various levels of work on these BMPs and is presenting this subset in Table 1-4a as a lower priority for completion over the duration of the permit term.

Table 1-4 includes an additional 107 new records when compared to the same table included in the FY17 annual report (Table 1-4 also). This table is updated to include BMPs that have recently exceeded the three-year timeframe since inspection, and engineering reviews clearly flagged with a blue row labeled as 'New BMPs Added to the Remediation List in 2018'.

Table 1-4 includes notes indicating BMP remediation projects that may require additional approvals such as a Joint Permit Application (JPA) permit, a small pond, dam safety, or NRCS Code 378 review. The table also includes revised commitment dates and newly established commitment dates for completion.

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
020013	Wet pond	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020094	Infiltration trench	D	XX1725174	6/30/2020		
020110	Wet pond	E	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020124	Wet pond	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020178	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval Pending AA County Soil Conservation District Approval resulting in permitting and construction delays
020357	Infiltration trench	E	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
020434	Infiltration trench	D	XX-1725174	6/30/2020		
020456	Infiltration trench	D	XX-1725174	6/30/2020		
020490	Infiltration trench	D	AX7665D82	6/30/2019		
020528	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
020812	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
030175	Dry pond	E		6/30/2020		
030245	Infiltration trench	D		6/30/2020		
030256	Infiltration trench	D		6/30/2019		
080034	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
100065	Dry pond	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
100126	Grass Swale	D	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
100128	Dry swale	D	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
100325	Bio-Swale	D		6/30/2020		
100326	Bio-Swale	D		6/30/2020		
100327	Bio-Swale	D		6/30/2020		
100328	Bio-Swale	D		6/30/2020		
100329	Bio-Swale	D		6/30/2020		
100330	Bio-Swale	D		6/30/2020		
100331	Bio-Swale	D		6/30/2020		
100471	Other filtering	D		6/30/2020		
120291	Wet pond	D		6/30/2020		
130161	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130167	Infiltration basin	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130175	Infiltration basin	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130199	Wet pond	D		6/30/2019		
130204	Infiltration basin	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130208	Infiltration trench	D	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130292	Other infiltration	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
130294	Other infiltration	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130325	Shallow marsh	E	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130366	Infiltration trench	E	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130369	Shallow marsh	E	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130370	Infiltration trench	E	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130377	Infiltration basin	D	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130417	Grass Swale	D	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130421	Wet pond	D		6/30/2020		
132056	Micro-Bioretention	E		6/30/2020		
150232	Infiltration trench	D		6/30/2020		
150706	Infiltration trench	D		6/30/2020		
160187	Wet swale	D	XX1675174	6/30/2020		
160203	Shallow marsh	D		6/30/2020		
160378	Dry pond	E		6/30/2020		
160408	Infiltration trench	E		6/30/2020		
160427	Infiltration trench	D		6/30/2020		
160505	Wet pond	D	XX1675174	6/30/2020		
160806	Wet pond	D		6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
210003	Dry swale	E	XY1695174	6/30/2018		
210009	Infiltration basin	D	XY1695174	6/30/2019		
210233	Dry pond	D	XY1695174	6/30/2018	6/30/2020	
New BMPs Added to the Remediation List in 2018						
020244	Infiltration trench	D		6/30/2020		
020276	Wet pond	E	AX7665D82	6/30/2020		
020282	Infiltration trench	D		6/30/2020		
020339	Infiltration basin	D		6/30/2020		
020399	Infiltration basin	D		6/30/2020		
020409	Infiltration trench	D		6/30/2020		
020410	Infiltration trench	E		6/30/2020		
020411	Infiltration trench	D		6/30/2020		
020412	Infiltration trench	D		6/30/2020		
020413	Infiltration trench	D		6/30/2020		
020429	Infiltration trench	D		6/30/2020		
020494	Infiltration basin	D		6/30/2020		
020514	Infiltration basin	E		6/30/2020		
020515	Dry pond	D		6/30/2020		
020516	Infiltration trench	D		6/30/2020		
020517	Infiltration trench	D		6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
020520	Infiltration trench	D		6/30/2020		
020561	Infiltration basin	D		6/30/2020		
020747	Grass Swale	D		6/30/2020		
020787	Infiltration trench	D		6/30/2020		
020801	Infiltration basin	E	AX7665D82	6/30/2020		
020811	Infiltration trench	D		6/30/2020		
020818	Surface sand filter	D	AX7665D82	6/30/2020		
020823	Infiltration basin	D	AX7665D82	6/30/2020		
020891	Infiltration trench	D		6/30/2020		
020895	Infiltration trench	D		6/30/2020		
030001	Grass Channel Credit	D		6/30/2020		
030002	Grass Channel Credit	D		6/30/2020		
030004	Grass Channel Credit	D		6/30/2020		
030006	Grass Channel Credit	D		6/30/2020		
030011	Wet pond	D	XX1675274	6/30/2020		
030116	Infiltration basin	D		6/30/2020		
030124	Infiltration trench	D		6/30/2020		
030136	Infiltration basin	D		6/30/2020		
030157	Infiltration trench	D		6/30/2020		
030178	Wet extended detention pond	D		6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
030200	Infiltration basin	D	XX1675274	6/30/2020		
030209	Infiltration trench	D	XX1675274	6/30/2020		
030210	Infiltration trench	D		6/30/2020		
030215	Infiltration basin	D		6/30/2020		
030220	Infiltration trench	D		6/30/2020		
030276	Dry extended detention pond	D	AX7665D82	6/30/2020		
030333	Infiltration trench	D		6/30/2020		
030338	Infiltration trench	D		6/30/2020		
030344	Infiltration trench	D		6/30/2020		
030384	Bio-Swale	D		6/30/2020		
030385	Surface sand filter	E		6/30/2020		
060104	Dry pond	D	AX7665D82	6/30/2020		
060113	Infiltration trench	D		6/30/2020		
060329	Grass Channel Credit	D		6/30/2020		
060341	Grass Channel Credit	D		6/30/2020		
070003	Infiltration basin	D		6/30/2020		
070004	Infiltration basin	D		6/30/2020		
080007	Wet pond	D		6/30/2020		
082251	Infiltration trench	D		6/30/2020		
100004	Surface sand filter	D	XX1675374	6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
100060	Infiltration basin	D	AX7665D82	6/30/2020		
100061	Infiltration basin	D		6/30/2020		
100099	Wet pond	D		6/30/2020		
120008	Dry pond	D	AX7665D82	6/30/2020		
120009	Dry pond	D		6/30/2020		
120017	Infiltration trench	E		6/30/2020		
120060	Infiltration trench	D		6/30/2020		
120063	Infiltration trench	D		6/30/2020		
120095	Infiltration basin	E		6/30/2020		
120112	Infiltration trench	D		6/30/2020		
120116	Infiltration trench	D		6/30/2020		
120118	Dry pond	D		6/30/2020		
120203	Wet extended detention pond	D		6/30/2020		
120208	Surface sand filter	D		6/30/2020		
120216	Surface sand filter	D		6/30/2020		
130070	Infiltration trench	E		6/30/2020		
130203	Infiltration basin	D		6/30/2020		
130251	Surface sand filter	E		6/30/2020		
130253	Dry swale	D		6/30/2020		
130259	Surface sand filter	E		6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
130271	Dry pond	D	AX7665D82	6/30/2020		
130620	Bio-Swale	D		6/30/2020		
150036	Infiltration trench	D		6/30/2020		
150066	Dry pond	D		6/30/2020		
150081	Infiltration basin	D		6/30/2020		
150295	Bioretention	D		6/30/2020		
150304	Surface sand filter	D		6/30/2020		
150306	Surface sand filter	D		6/30/2020		
150355	Wet pond	D		6/30/2020		
150398	Dry pond	D	AX7665D82	6/30/2020		
150399	Shallow marsh	D	AX7665D82	6/30/2020		
160012	Infiltration trench	D		6/30/2020		
160126	Infiltration trench	D		6/30/2020		
160127	Wet pond	D		6/30/2020		
160131	Infiltration trench	D		6/30/2020		
160176	Dry extended detention pond	D		6/30/2020		
160181	Infiltration trench	D		6/30/2020		
160211	Infiltration trench	D		6/30/2020		
160218	Dry extended detention pond	D	AX7665D82	6/30/2020		
160224	Infiltration trench	D		6/30/2020		

Table 1-4: MDOT SHA SWM Facilities for Remediation Work Orders

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Comments
160230	Infiltration trench	D		6/30/2020		
160232	Infiltration trench	E		6/30/2020		
160246	Infiltration trench	D		6/30/2020		
160247	Infiltration trench	D		6/30/2020		
160250	Infiltration trench	D		6/30/2020		
160301	Dry pond	D	AX7665D82	6/30/2020		
160402	Infiltration trench	D		6/30/2020		
160429	Infiltration trench	D		6/30/2020		
160553	Shallow marsh	D	AX7665D82	6/30/2020		
160624	Infiltration trench	D		6/30/2020		
160749	Infiltration trench	D		6/30/2020		

Change in Reporting for Non-Functioning SWM Facilities

In this annual report, field inspection functionality grades (A-E) are used to determine which BMPs are currently in compliance with intended design and continue to provide water quality treatment. Facilities graded A, B and C are complying. Facilities graded D or E are not functioning as designed and their water quality treatment capacity has been potentially compromised.

Previously, internal engineering ratings (I-VI) were used to determine compliance, however this was not their intended purpose. The engineering ratings are intended for categorizing follow up remedial actions required by MDOT SHA to remain in compliance. The use of these ratings resulted in misleading interpretation of the SWM infrastructure functionality status since many facilities were interpreted as failing inspections, when the required repairs were unrelated to the water quality treatment capacity of the facility.

In this report, this oversite has been corrected and the functionality of SWM BMPs is being determined by the field inspection functionality grade alone. This secondary engineering rating will still be used internally for prioritization and development of remedial action. Detailed information on both as well as summaries of prioritization plans can be found in **Part Two** of this report and **Appendix C**.

In order to transition this change in reporting failed SWM facilities, two new interim tables have been added to this year's report. The list of SWM facilities presented in **Table 1-4a** have a passing grade for the 'Last Field Inspection Grade' although they were included in the 2017 annual report *Table 1-4: MDOT SHA BMPs for Maintenance Work Orders*. Similarly, the list of SWM facilities presented in **Table 1-6a** also have a passing grade although they were included in the 2017 annual report *Table 1-6: Priority MDOT SHA BMPs for Major Remediation or Retrofits*. The current **Table 1-4a** and **Table 1-6a** will not be included in future reports and are only presented here to identify SWM facilities that had previously been flagged as failing but were not.

The MDOT SHA internal engineering rating process will be revised such that if a facility was previously rated as passing, but determined to be failing by the engineering rating, the field inspection grade will be revised to D or E, thus making consist reporting easier and ensuring accuracy. Please refer to **Appendix C** for a protocol outlining this procedure.

Table 1-4a: MDOT SHA SWM Facilities for Remediation Work Orders - Lower Priority

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Remediation Comments
020083	Infiltration trench	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval Pending AA County Soil Conservation District Approval resulting in permitting and construction delays
020112	Bioretention	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020115	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020173	Infiltration trench	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval Pending AA County Soil Conservation District Approval resulting in permitting and construction delays
020210	Dry swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
020240	Infiltration basin	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020248	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020250	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020307	Infiltration trench	C	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
020436	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.

Table 1-4a: MDOT SHA SWM Facilities for Remediation Work Orders - Lower Priority

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Remediation Comments
020479	Wet extended detention pond	B	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020487	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
020809	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
030258	Infiltration trench	C		6/30/2019		
030287	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
030335	Dry swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
070012	Dry pond	C		6/30/2019		
070013	Dry pond	C		6/30/2019		
080057	Infiltration basin	C		6/30/2019		
080081	Infiltration basin	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
080091	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
100034	Wet pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
100122	Underground detention	C	N/A	6/30/2020		
100127	Dry swale	Not Rated	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130178	Infiltration basin	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130181	Wet pond	C		6/30/2019		

Table 1-4a: MDOT SHA SWM Facilities for Remediation Work Orders - Lower Priority

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Remediation Comments
130225	Shallow marsh	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130228	Shallow marsh	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130230	Micro pool extended detention pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130267	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130268	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130291	ED shallow wetland	C	XX1675374	6/30/2019		Work Order Approved - In Construction Queue
130293	Other infiltration	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130322	Infiltration basin	C	N/A	6/30/2020		
130323	Infiltration basin	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130346	Dry extended detention pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130349	Dry pond	C	AX9295482	6/30/2018	6/30/2020	SWM/ESC Approval on Hold with MDE for 'Embankment Facility Maintenance Pilot Program' resulting in construction delays.
130365	Infiltration trench	C	AX9295482	6/30/2018	6/30/2020	Work Order Approved - In Construction Queue
130388	Grass Swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130390	Grass Swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130393	Grass Swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD
130394	Grass Swale	C	AX9295482	6/30/2018	6/30/2020	Awaiting work order approval from PRD

Table 1-4a: MDOT SHA SWM Facilities for Remediation Work Orders - Lower Priority

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Completion Commitment Date	Revised Completion Commitment Date	Remediation Comments
150285	Dry pond	Not Rated		6/30/2020		
150352	Dry pond	C	N/A	6/30/2020		
150555	Infiltration trench	B	N/A	6/30/2020		
210014	Infiltration trench	B	D6 MOU	6/30/2018	6/30/2020	
Note: The list of SWM facilities presented in **Table 1-4a** have a passing grade although they were included in the 2017 annual report *Table 1-4: MDOT SHA BMPs for Maintenance Work Orders*. The current **Table -4a** and BMPs listed here will not be included in future reports and are only presented here to identify SWM facilities that had previously been flagged as failing but were not. Please refer to **Appendix C** for updated protocol the MDOT SHA will use in future to determine how failing facilities will be reported and the MS4 credit will be handled.						

Delays due to Remediation Approval Requirements

While MDOT SHA has made strides to complete SWM facility remediation (discussed below) and further our maintenance program, several factors have severely limited our ability to complete all the maintenance and remedial construction originally anticipated during the 2018 reporting period. As result, MDOT SHA has provided revised commitment dates for completing the remediation. The following is a summary of key issues that impacted MDOT SHA ability to meet committed timeframes for the remediation program.

- **Lack of MDE General SWM/ESC Permit renewal for SWM maintenance program** – In the past, MDOT SHA had effectively utilized a General Permit (GP) issued to implement routine maintenance and remediation activities to quickly address repairs for SWM facilities rated II and III. Because this general permit authority is no longer available to us, all workorders are being permitted individually and require Concept and Site Development Approvals before Final SWM/ESC Approval can be issued. The SWM/ESC general permit application was submitted for final approval in September 2017, and MDOT SHA is still awaiting feedback from MDE. This is having serious impact on our resources as the work necessary to develop these individual work orders on SWM facilities that formerly fell under GP authority, is detracting from work to move other remediation activities forward.

- **Delays due to SWM Facilities Perceived as Jurisdictional Wetlands** – Many facilities designed and constructed in high groundwater conditions have become wetlands over time. Although constructed SWM facilities, these facilities have developed vegetation as well as wildlife habitat resembling natural wetland environments. These facilities are being considered jurisdictional wetlands or Waters of the US and require MDE Non-Tidal Wetland Permits (NTWP) for routine maintenance and remedial activities to preserve their functionality. Joint Permit application permitting process for these facilities adds another time-consuming component to work order development and implementation

- **Delays due to Small Pond or Dam Safety Reviews** – Recently, MDOT SHA is experiencing new delays in the issuance of the SWM/ESC approvals for individual SWM facilities that are considered small ponds or contain embankments and require either MDE Plan Review Small Pond Approval or Dam Safety Permit for maintenance and remedial activities. MDE and MDOT SHA are collectively developing an 'Embankment Facility Maintenance Pilot Program' to establish agreed upon embankment remediation procedures. The program is a phased process that incudes remedial actions that MDE feels comfortable to allow MDOT SHA PRD to approve on their behalf during early phases. Subsequent phases will require additional reporting and MDE feedback which is resulting in a timeline exceeding the original schedule developed to meet the previously committed timeframe for remediation completion. This pilot program is being implemented for the MDOT SHA procured SWM facility remediation contract that is targeting many of the facilities in Table 1-4 from the 2017 annual report. A list of those facilities is included in **Table 1-4** noted with a contract number of AX9295482. Additional details on the work order requirements and pilot program can be found within **Part Two** of this year's annual report.

- **Delays due to Anne Arundel County Soil Conservation District (AASCD) Reviews** – While MDOT SHA is already undergoing delays in SWM/ESC permit approval that arise because of the more complex permitting process required as outlined above, for facilities located within the Severn River Watershed, for MDOT SHA PRD to fully approve them, a secondary approval from AASCD is also required. MDOT SHA reached out early in the process of the above-mentioned contract for clarification. Facilities that are considered exempt from erosion and sediment control permit requirements are also exempt from AASCD approval. At the end of the reporting period, MDOT SHA was still waiting for further clarification of requirements for facilities that do require approval, in part as a result of staffing changes at Anne Arundel County.

MDOT SHA SWM Facility Remediation Progress

MDOT SHA has focused efforts during the 2018 reporting period to allocate funding and resources on performing required remediation of SWM facilities with FY18 commitment dates. **Table 1-5** reflects remediation progress achieved during the reporting period and below are several actions completed by MDOT SHA to further advance the maintenance and remediation program:

- Allocated funding for remediation contracts;
- Established District-level contracts with capacity to perform drainage and SWM facility remediation;
- Issued a remediation contract specifically for prioritized facilities with 2018 commitment dates (AX9295482);
- Allocated resources for engineering design, work order development, and permitting processing; and
- Enhanced SWM remediation tracking system.

During the reporting period, MDOT SHA performed maintenance and remediation construction on SWM facilities to ensure facilities are performing as designed and continue providing water quality. MDOT SHA is focused on improving its process for performing inspections, ratings and maintenance assessments. During this reporting period, MDOT SHA implemented a new field inspection software tool, performed inspector training, optimized workflows, and implemented SOPs to improve rating consistency. This resulted in the re-evaluation of several stormwater BMPs. In some cases, it was determined that the original inspection results were not accurate. In these instances, revised engineer reviews modified previous ratings. **Table 1-5** reflects remediation progress achieved during the reporting period, specifically completing construction of 23 BMPs as well as one engineer adjusted rating.

In addition, eight SWM facilities from **Table 1-5** were removed due to either being completed prior to the report period of FY18 or research determining the facility is not owned by MDOT SHA including: 020807, 020893, 030123, 060158, 100046, 122002, 130308, 130357, 130378, 160616 and 160805.

Table 1-5: MDOT SHA SWM Facility Remediation Progress

SWM Facility Number	Facility Type	Fiscal Year Remediation Completed	Last Field Inspection Grade	Contract	Comments
020003	Infiltration basin	2018	A	AX9295482	Construction Complete
020036	Infiltration trench	2018	A	AX9295482	Construction Complete
020143	Infiltration trench	2018	A	AX9295482	Construction Complete
020196	Infiltration trench	2018	A	AX9295482	Construction Complete
020217	Infiltration trench	2018	A	AX9295482	Construction Complete
020218	Infiltration trench	2018	A	AX9295482	Construction Complete
020241	Infiltration trench	2018	A	AX9295482	Construction Complete
020242	Infiltration trench	2018	A	AX9295482	Construction Complete
020243	Infiltration trench	2018	A	AX9295482	Construction Complete
020354	Infiltration trench	2018	A	AX9295482	Construction Complete
020360	Infiltration trench	2018	A	AX9295482	Construction Complete
020398	Infiltration trench	2018	A	AX9295482	Construction Complete
020554	Infiltration trench	2018	A	AX9295482	Construction Complete
020849	Infiltration trench	2018	A	AX9295482	Construction Complete
030227	Infiltration trench	2018	C	XX1675274	Construction Complete
030228	Infiltration trench	2018	B	XX1675274	Construction Complete
030242	Infiltration trench	2018	B	XX1675274	Construction Complete
030244	Infiltration trench	2018	C	XX1675274	Construction Complete
130136	Infiltration trench	2018	A	AX9295482	Construction Complete
130198	Micropool extended detention pond	2018	C		Engineer re-evaluated and upgraded Action Rating
130358	Infiltration trench	2018	A	AX9295482	Construction Complete
150201	Infiltration trench	2018	N/A		Determined Not SHA Owned
160747	Wet extended detention pond	2018	N/A		Reinspected and upgraded Action Rating

In addition to the remediation progress outlined in **Table 1-5** above, MDOT SHA has identified 38 stormwater facilities in the MS4 area requiring major remediation or enhancements originating from inspections and engineer reviews greater than three years ago. These facilities are listed in **Table 1-6.** There are 18 facilities that remain in this table from last year, and as indicated by the text in the light blue row, 20 stormwater facilities were added to the retrofit list for the first time. **Table 1-6a** shows facilities that were included in Table 1-6 in the 2017 annual report but were not failing. Table **1-6a** will not be included in the next annual report. **Table 1-7** identifies SWM facilities that have completed major remediation or retrofits.

MDOT SHA has provided the SWM facility maintenance information in the BMP table (BMP) as specified in the May 2017 MDE Geodatabase Guideline format.

Table 1-6: Priority MDOT SHA SWM Facilities for Major Remediation or Retrofits

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Retrofit Completion Commitment Date	Revised Retrofit Completion Commitment Date	Remediation Comments
020061	Infiltration basin	E		9/30/2020		
020092	Infiltration trench	E	XX1675574	9/30/2021		
020177	Dry swale	E		9/30/2021		
020226	Infiltration trench	D		9/30/2021		
020260	Infiltration basin	D	AA8825174	9/30/2018	6/30/2020	Permitting delays for small ponds Construction NTP is Fall 2018.
020268	Infiltration basin	E	AA8825174	9/30/2018	6/30/2020	Permitting delays for small ponds Construction NTP is Fall 2018.
020338	Infiltration basin	E		9/30/2021		
020388	Infiltration basin	D		9/30/2020		
020394	Infiltration basin	D		9/30/2020		
020850	Infiltration basin	E		9/30/2020		
030189	Infiltration basin	D		9/30/2020		
030214	Infiltration basin	D		9/30/2020		
030224	Infiltration trench	D		9/30/2020		
130074	Micropool extended detention pond	E		9/30/2020		Engineer re-evaluated and downgraded to a major remediation
130315	Wet pond	D		9/30/2020		
130316	Wet pond	D		9/30/2020		
130375	Infiltration basin	E		9/30/2020		
160225	Infiltration trench	D		9/30/2021		
New BMPs Added to the Major Remediation or Retrofit List in 2018						
020026	Wet pond	D		9/30/2020		
020167	Dry pond	D		9/30/2020		
020363	Infiltration basin	E		9/30/2020		

Table 1-6: Priority MDOT SHA SWM Facilities for Major Remediation or Retrofits

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Retrofit Completion Commitment Date	Revised Retrofit Completion Commitment Date	Remediation Comments
020489	Infiltration basin	D		9/30/2020		
030003	Grass channel credit	D		9/30/2020		
030137	Infiltration basin	D		9/30/2020		
030153	Infiltration trench	D		9/30/2020		
030522	Grass Swale	D		9/30/2020		
100171	Dry extended detention pond	D		9/30/2020		
120039	Infiltration trench	E		9/30/2020		
120042	Infiltration trench	D		9/30/2020		
120105	Dry extended detention pond	D		9/30/2020		
120133	Infiltration basin	E		9/30/2020		
130027	Dry extended detention pond	D		9/30/2020		
130072	Dry extended detention pond	D		9/30/2020		
130073	Wet pond	E		9/30/2020		
130077	Wet pond	E		9/30/2020		
130206	Wet pond	D		9/30/2020		
130220	Dry extended detention pond	D		9/30/2020		
150312	Dry extended detention pond	D		9/30/2020		

Table 1-6a: Priority MDOT SHA SWM Facilities for Major Remediation or Retrofits – Lower Priority

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Retrofit Completion Commitment Date	Revised Retrofit Completion Commitment Date	Remediation Comments
020162	Wet Pond	C		9/30/2020		Engineer re-evaluated and downgraded to a major remediation
020165	Dry Pond	C		9/30/2020		Engineer re-evaluated and downgraded to a major remediation
020393	Infiltration basin	C		9/30/2020		
030050	Infiltration basin	C	XX1675274	9/30/2020		Engineer re-evaluated and downgraded to a major remediation
080015	Infiltration trench	C		9/30/2020		
160656	Dry extended detention pond	C		9/30/2020		Engineer re-evaluated and downgraded to a major remediation
210008	Infiltration basin	C		9/30/2020		

Table 1-6: Priority MDOT SHA SWM Facilities for Major Remediation or Retrofits

SWM Facility Number	Facility Type	Last Field Inspection Grade	Contract	Original Retrofit Completion Commitment Date	Revised Retrofit Completion Commitment Date	Remediation Comments
Note: The list of SWM facilities presented in **Table 1-6a** have a passing grade although they were included in the 2017 annual report *Table 1-6: Priority MDOT SHA BMPs for Major Remediation or Retrofits*. The current **Table -6a** and BMPs listed here will not be included in future reports and are only presented here to identify SWM facilities that had previously been flagged as failing but were not. Please refer to **Appendix C** for updated protocol the MDOT SHA will use in future to determine how failing facilities will be reported and the MS4 credit will be handled.						

MDOT SHA has performed major retrofits of priority stormwater BMPs to redesign, construct, and enhance facility performance. Resolution of major remediation issues restores water quality functions of the facilities. During the reporting period, MDOT SHA completed the retrofit of one priority SWM facility as shown in **Table 1-7** below.

Table 1-7: Priority MDOT SHA SWM Facility Major Remediation and Retrofit Progress

SWM Facility Number	Facility Type	Fiscal Year Remediation Completed	Revised Field Inspection Grade	Contract	Comments
160737	Wet pond	2018	A	AT0865182	Construction Complete
Note: This table does not represent all BMP retrofits that occurred over FY18, but just those that had previously been rated as failing.					

D.2 Erosion and Sediment Control

Requirements under this condition include:

a) *Implement program improvements identified in any MDE evaluation of SHA's erosion and sediment control program;*

b) *Ensure construction site operators have received training regarding erosion and sediment control compliance and hold a valid Responsible Personnel Certification as required by MDE;*

c) *Record program activity on MDE's annual report database and submitted as required in Part V of this permit;*

d) *Ensure all applicable construction projects obtain a notice of intent (NOI) for stormwater associated with construction activity.*

D.2.a SHA's Erosion and Sediment Control Program

MDOT SHA continues to comply with Maryland State and federal laws and regulations for erosion and sediment control (ESC) as well as MDE requirements for permitting. MDOT SHA maintains compliance with the NPDES Stormwater Construction Activity permit for projects that disturb at least one acre of land. MDOT SHA continues to submit applications for coverage under this general permit for all qualifying roadway projects as described under **Section D.2.d** below.

As discussed in Section **D.1.b** above, MDOT SHA and MDE signed an MOU designating MDOT SHA as an approving authority for stormwater management and erosion and sediment control for all MDOT SHA projects. The PRD maintains a database to track ESC submittals and design progress on all MDOT SHA projects. MDOT SHA continues to comply with the *Maryland Erosion & Sediment Control Guidelines for State and Federal Projects* published in January 1990 and revised in January 2004. In December 2011, MDE published the 2011 *Maryland Standards and Specifications for Soil Erosion and Sediment Control*. Projects are designed and constructed in compliance with these specifications.

As presented in **Table 1-3** above, during FY18, PRD approved 122 final plans statewide. It should be noted that approval of a final plan does not necessarily indicate that a grading permit has been issued, as there are often several other permits that may be required prior to earth disturbance being initiated. As presented in **Table 1-8** above, there were 78 unique projects receiving permits for grading activity statewide. These projects encompassed the disturbance of 471.94 acres of land. Within the MS4 areas, 61 projects were approved that had a combined disturbance area of 421.22 acres.

MDOT SHA has provided the grading permit program information in the Quarterly Grading Permit feature class (QGP) and the Quarterly Grading Permit information table (QPI) as specified in the May 2017 MDE Geodatabase Guidelines.

MDOT SHA ESC Quality Assurance (QA) Program

MDOT SHA QA Program ensures that permits and plan approval conditions are adhered to by performing unannounced inspections at project sites. QA inspectors, also known as Regional Environmental Coordinators (RECs) perform these inspections. To ensure a complete E&S/SWM compliance check, the QA inspector completes a QA-1 (Erosion / Sediment Control & Stormwater Management Field Investigation Report) and QA-2 (National Pollutant Elimination System and Stormwater Management Evaluation Report) as part of the inspection process.

During FY18, MDOT SHA performed 4,632 inspections comprised of 3,272 QA-1 and 1,360 QA-2 reports at 360 project sites. within the MS4 areas. These inspections resulted in the identification of 30 projects deemed to be non-compliant with ESC plans or standards. and two projects where no grade was assigned due to extenuating circumstances. See **Table 1-8.**

While 12 projects had their grading operations shut down until corrective actions were completed, 16 projects were completely shut down until corrective actions were completed. No court enforcement actions were initiated; however, MDOT SHA utilizes liquidated damages against the contractors responsible for improper ESC activities. The potential amounts are communicated to the contractor in the Contract Documents and subsequent reporting documents. Liquidated damages resulting from these types of violations reduce the payment amount due to contractors.

Per the contract documents, liquidated damages were to be assessed on 25 different inspections impacting 24 projects in the amount of $181,116 within the MS4 area. Currently within the MS4 area, two violations have resulted in liquidated damages withdrawn in the amount of $16,100, 24. Additional violations are in the process of being applied ($158,176.00), and one violation has not been started ($6,840.00).

A total of 3 projects did not have liquidated damages in their contract documents and therefore could not have damages applied.

Per the contract documents, projects with a ‘D’ or ‘F’ rating also lost their ESC incentives for the quarter in which the liquidated damages were issued along with their final incentive amount. Two non-compliance inspection reports were issued to projects along with no-grade ratings due to extenuating circumstances.

Extenuating circumstances are conditions where a non-compliance exists, but some or all aspects of the situation is outside the contractor’s control. Examples include poor or incorrect direction to the contractor from MODT SHA representatives or situations caused by outside parties not working under MDOT SHA contract. This condition does not remove the responsibility to make all necessary corrections immediately, although it does stop the liquidated damages from being imposed due to the fact there is no grade assigned. The details and reason for the extenuating circumstances is clarified in the general comments of the project inspection reports.

MDOT SHA has provided the erosion and sediment control program information in the Erosion Sediment Control table (ESC) as specified in the May 2017 MDE Geodatabase Guideline format. A summary by MS4 jurisdiction is presented in **Table 1-8**.

It is important to note that plans reviewed and approved by PRD will not necessarily correlate directly to the number of permits issued during any reporting period. This reflects the fact that PRD approval by itself does not constitute permit issuance as projects must meet additional regulatory criteria beyond MDE SWM and ESC standards. Additionally, the number of inspections and the associated number of projects on which these inspections were performed include projects whose approvals were issued during previous fiscal years and are therefore not included in the sum of permit activity presented below.

MDOT SHA QA Program improvements include:

- The QA Program continues to meet monthly to engage in discussions, exercises, specification review, lessons learn, etc. These meetings are an effort to build consistency and improve knowledge base.
- The QA Program practices a peer review (of field work) where RECs review, critique and document each other's efforts for group discussion and improvement.
- The QA Program also practices an oversight spot check where team leaders review REC's field work.
- The QA Program participated in specification changes to improve adherence to regulations.

Table 1-8: Erosion and Sediment Control Permits and Disturbance Acreage

Jurisdiction	Number of Permits Issued	Acreage of Disturbance	Violations (Non-Compliance Inspections)	D-Grade Inspections (Shut Down Grading)	F-Grade Inspections (Shut Down Entire Project)	No-Grade Inspections (Extenuating Circumstances)	Liquidated Damages per IFB	Liquidated Damages in Progress	Liquidated Damages Taken	Liquidated Damages Outstanding	Court Cases
Anne Arundel	7	69.43	3	1	2	0	$ 16,353.00	$ 16,353.00	$ -	$ -	0
Baltimore	7	41.8	4	3	0	1	$ 17,036.00	$ 3,886.00	$ 13,150.00	$ -	0
Carroll	1	7.96	1	1	0	0	$ 3,029.00	$ 3,029.00	$ -	$ -	0
Cecil	1	11.91	0	0	0	0	$ -	$ -	$ -	$ -	0
Charles	4	11.65	0	0	0	0	$ -	$ -	$ -	$ -	0
Frederick	8	66.21	3	1	2	0	$ 20,822.00	$ 17,872.00	$ 2,950.00	$ -	0
Harford	2	1.89	0	0	0	0	$ -	$ -	$ -	$ -	0
Howard	6	64.84	5	2	3	0	$ 29,658.00	$ 29,658.00	$ -	$ -	0
Montgomery	11	64.24	6	2	4	0	$ 53,599.00	$ 53,599.00	$ -	$ -	0
Prince George’s	10	52.23	5	2	3	0	$ 30,359.00	$ 30,359.00	$ -	$ -	0
Washington	4	29.06	3	0	2	1	$ 10,260.00	$ 3,420.00	$ -	$ 6,840.00	0
Salisbury	0	0	0	0	0	0	$ -	$ -	$ -	$ -	0
MS4 Total	61	421.22	30	12	16	2	$ 181,116.00	$ 158,176.00	$ 16,100.00	$ 6,840.00	0
Outside MS4	17	50.72	6	1	2	3	$ 19,839.00	$ 8,260.00	$ 8,260.00	$ 3,319.00	0
Statewide Total	78	471.94	36	13	18	5	$ 200,955.00	$ 166,436.00	$ 24,360.00	$ 10,159.00	0

Notes:

1. MDOT SHA utilizes Liquidated Damages resulting from contractor’s non-compliance with ESC and SWM approved plan elements.
2. Violations, Stop Work Orders, LD’s and Court Cases occur in direct response to the results of ESC inspections. Inspections occurring on projects whose permits were issued prior to this Fiscal Year are included in this summary table.
3. MDOT SHA often packages small projects spanning multiple jurisdictions together in what are referred to as “Areawide Projects”. Where possible, these projects have been assigned to a county representative of the location of the majority of the impacts. Where this is not possible, the county has been assigned by determining the location of the center of all consolidated projects.

D.2.b MDE Responsible Personnel Certification

MDE Responsible Personnel Certification is required for anyone overseeing the installation and maintenance, or performing the installation and maintenance, of erosion and sediment control practices and measures in Maryland. MDOT SHA specifications require that the Contractor assigns an employee as the Erosion and Sediment Control Manager (ESCM) for each construction project. The ESCM and the superintendent must have successfully completed the MDE Responsible Personnel Certification course along with MDOT SHA's Erosion and Sediment Control Certification (Yellow Card). In addition, MDOT SHA requires all QA Inspectors or RECs, who inspect each project for compliance with the approved erosion and sediment control plan, hold valid certifications.

The QA Toolkit now tracks Yellow Card information related to individuals working on MDOT SHA projects, allowing REC's to conduct audits of these credentials. The entire MDOT SHA PRD, consisting of the Division Chief, the Assistant Division Chief, four Team Leaders, and consultant review staff are all required to hold a valid MDE Responsible Personnel Certification.

The MDE Responsible Personnel Certification is currently only available through an online training course through MDE's website, so numbers of MDOT SHA personnel certified through that website is not reported here.

SHA Erosion and Sediment Control Certification (Yellow Card)

The MDOT SHA, in cooperation with the Maryland Transportation Builders and Materials Association (MTBMA), continues to offer updated erosion and sediment control training, initiated in 2004. This erosion and sediment control online training is mandatory for MDOT SHA contractor superintendents and ESC managers and is highly recommended for contractor project managers, field personnel, and personnel responsible for erosion and sediment control.

Figure 1-7: MDOT SHA Yellow Card Certification

Each participant is required to hold a valid MDE Responsible Personnel Certification prior to taking this course. The class covers the basic science of erosion and sediment control, installing and maintaining E&S controls, using the ESC Quality Assurance checklist to monitor compliance, reviews key requirements of the NPDES construction activity permit, details ESC specifications, and reviews the process for addressing ESC modifications during construction.

Certification is contingent upon successful completion of an exam. Successful completion requires a score of 80 percent or higher on the exam. This certification expires three years from the date of issuance. Yellow Card Certification is a prerequisite for MDOT SHA's Erosion and Sediment Control Certification for designers, described in the following sections. The number of MDOT SHA personnel certified during the reporting period is summarized in **Table 1-9.**

SHA Erosion and Sediment Control Re-Certification (Yellow Card Re-Certification)

MDOT SHA Erosion and Sediment Control Re-Certification (Yellow Card Re-Certification) is only available for those that have previously completed the MDOT SHA Yellow Card Certification. Topics covered include any changes to the specifications and environmental regulations along with updated information related to the MDOT SHA Quality Assurance program. Re-certification is contingent upon passing an exam and re-certification is valid for three years. MDOT SHA provides on-line re-certification training. The number of MDOT SHA personnel re-certified during the reporting period is summarized in **Table 1-9.**

Table 1-9: MDOT SHA ESC Training

Type of Training	Number Certified
MDOT SHA Erosion and Sediment Control Certification (Yellow Card)	590
MDOT SHA Erosion and Sediment Control Re-Certification (Yellow Card Re-Certification)	289

SHA Erosion and Sediment Control Certification for Designers

Designers holding valid professional engineering licenses for the State of Maryland are held to the standards of the profession and therefore MDOT SHA will not offer a separate design certification for designers. Designers are required to hold valid MDE Responsible Personnel Certification and valid MDOT SHA Erosion and Sediment Control Certification (Yellow Card).

Design guidelines for aspects and concerns pertinent to MDOT SHA are being developed and will be published when available.

D.2.c Recording Program Activity

MDOT SHA has provided the erosion and sediment control program information in the Erosion Sediment Control table (ESC) as specified in the May 2017 MDE Geodatabase Guideline format

D.2.d NOI for Stormwater Associated with Construction Activity

The MDE issued the 2014 General Permit for Stormwater Associated with Construction Activity, which took effect on January 1, 2015. Projects that disturb one acre or more of earth must obtain a General or Individual Permit for Stormwater Associated with Construction Activity before beginning any earth disturbance.

The MDOT SHA HHD reviews all MDOT SHA advertised project's limit of disturbance (LOD) as reported on the SWM and ESC final approvals. HHD also reviews all subsequent approval modifications, to determine if an NPDES Permit Associated with Construction Activity is necessary. Completed NPDES Notice of Intent (NOI) applications are submitted to MDE by HHD via the MDE e-Permits Portal, an online application system. HHD tracks the status of each NOI and ensures that all applicable NPDES permits are obtained prior to the issuance of notice-to-proceed for construction. At the initial E&S meeting the QA program identifies the required NOI and ensures the project has it in hand prior to starting work. The NPDES CA permit is posted at each construction site. During the reporting period, between July 1, 2017 and June 30, 2018, a total of 74 MDOT SHA construction projects receiving Notice to Proceed (NTP) required an NPDES CA permit.

D.3 Illicit Discharge Detection and Elimination

Requirements under this condition include:

a) *Field screen at least 150 outfalls annually;*

b) *Conduct annual visual surveys of commercial and industrial areas to discover, document and eliminate pollutant sources;*

c) *Maintain program to address and, if necessary, respond to illegal discharges, dumping and spills;*

d) *Use appropriate procedures to investigate and report illicit discharges, illegal dumping and spills to local or State authorities as applicable for control or clean-up. Report significant discharges to MDE for enforcement and/or permitting.*

e) *Coordinate with surrounding jurisdictions when illicit connections originate from beyond SHA's rights-of-way; and*

f) *Report illicit discharge detection and elimination activities as specified in Part V of this permit.*

D.3.a Illicit Discharge Screening

IDDE screening is coordinated by MDOT SHA's Environmental Compliance Division (ECD). During the reporting period, 171 outfalls were screened. Of these outfalls, 66 had a discernible dry-weather flow and were sampled. None of the outfalls sampled were identified as an illicit discharge (ID) **Table 1-10** summarizes field screening efforts for the reporting period. MDOT SHA has provided the illicit discharge detection and elimination program information in the IDDE table (IDD) as specified in the May 2017 MDE Geodatabase Guideline.

Table 1-10: Field Screening Summary

County	Number of Outfalls Field Screened FY 18	Discharges requiring follow-up
Cecil	40	0
Frederick	119	0
Washington	12	0
Totals	**171**	**0**

D.3.b Annual Visual Surveys of Commercial and Industrial Areas

As discussed in **Section C.2**, a GIS layer has been developed to identify industrial sites within MDOT SHA right-of-way that have the potential to contribute pollutants to MDOT SHA storm drain systems.

The MDOT SHA sites include industrial NPDES 12-SW general permitted facilities. As a best management practice, MDOT SHA sites not permitted under MDE's 12-SW permit are also included in the state-wide inspection program. These additional sites include: salt domes, satellite shops, truck weigh inspection stations (TWIS), office buildings, and rest areas. These MDOT SHA facilities will be inspected in accordance with the MDOT SHA current 12-SW inspection program.

There are three types of inspections performed at MDOT SHA facilities:

- Routine Facility Inspections;
- Comprehensive Site Compliance Evaluations (CSCE); and
- 12-SW Quarterly Visual Monitoring.

The MDOT SHA facility inspection program includes two inspections:

1. A weekly/monthly routine facility inspection performed by shop personnel;
2. A routine inspection is performed by ECD's District Environmental Coordinator (DEC) on either an annual, semi-annual or quarterly basis depending on the type of facility.

Inspection checklists are completed and uploaded to the MDOT SHA web-based database for both types of inspections. A separate summary report is generated by the DECs following each inspection.

For 12-SW permitted facilities an annual CSCE is performed in the fourth quarter of every calendar year. The 12-SW permit requires MDOT SHA to prepare an annual report summarizing the evaluation and implementation of site storm water management for the year. The annual report is generated prior to January 31 each year.

D.3.c Illegal Discharge, Dumping, and Spill Program

The MDOT SHA ECD manages a program to address and respond to illegal discharges, dumping, and spills. As part of the overarching program, ECD continues to coordinate with MDE, surrounding jurisdictions, and property owners to eliminate illicit discharges, and clean up spills and dumping.

During the reporting period ECD finalized the requirements document for a GIS-based database that will be used to track all actions related to illicit discharges. MDOT SHA has completed the requirements and design documentation for the IDDE management tool, and the implementation project is queued for FY20 implementation based on priority. The implementation will leverage a new strategic platform for application deployment and will align with MDOT SHA processes for tracking and follow-up for illicit discharge cases.

A process flow diagram was included with the FY17 annual report detailing the progression of actions to take after a suspected illicit discharge is reported or discovered. This process is described in detail in **Appendix F** of this annual report. As illicit discharges are identified through the illicit discharge screening process and other sources, ECD utilizes an agreement with Maryland Environmental Service (MES) to follow-up and collect samples for laboratory analysis. If laboratory analysis indicates the discharge exceeds acceptable parameters, ECD coordinates elimination of the discharge with local NPDES coordinators, property owners, and MDE. MES also performs on-call inspections of potential illicit discharges, spills and dumping that are reported by MDOT SHA field staff or the public.

Discharges are deemed illicit based on two main criteria: flow and exceedance of discharge parameter(s). Any no-flow outfalls showing signs of potential pollution are investigated further to ensure no stormwater pollution is occurring.

D.3.d Investigation and Report of Illicit Discharge, Illegal Dumping and Spills

As noted in **SectionD.3.c**, the MDOT SHA dry weather screening and illicit discharge investigation process is described in detail within **Appendix F** of this annual report.

MDOT SHA ECD may be initially notified of an illicit discharge by many sources, including the MDOT SHA routine NPDES illicit discharge (ID) screening process, right-of-way inspections, citizen reporting, spills, illegal dumping or construction division inspections. If a suspected illicit discharge is encountered through the MDOT SHA routine NPDES ID screening process, there is an attempt to identify the source of the illicit discharge and a report is written and submitted to ECD. In all cases, and upon being advised of a dry weather flow or other unnatural indicators, ECD contacts its IDDE investigation team (MES) to request a site visit. Once this occurs, it is now considered an open investigation in IDDE tracking.

If the outfall is dry at the time of the site visit, the IDDE tracking is considered closed, and the investigation ends, unless there is evidence of pollution present. If the site visit confirms an illicit discharge, a flow sample is collected and sent to a lab for testing. MES then provides ECD with lab analysis results and an additional report, which are saved as records for IDDE tracking. The investigation ends if the lab results provide no indication of an illicit discharge.

When lab results confirm an illicit discharge, ECD contacts the applicable county and the property owner of the source of the illicit discharge. ECD remains in contact with whichever entity (county or property owner) agrees to manage the illicit discharge, to confirm follow-ups and corrective actions until the illicit discharge is corrected and the investigation can be closed. A field test may be required to verify corrective actions have been taken to cease the illicit discharge.

If an illicit discharge is still present at the site after these steps have been taken, ECD contacts the MDE Enforcement and Compliance Program to inspect the site. If the inspection confirms the illicit discharge has been corrected, all communication and corrective actions are saved or updated for IDDE tracking, and the investigation can be closed. If the illicit discharge persists, MDE manages the investigation through to resolution.

Once the eGIS IDDE database is in full service, the business process will involve inputting all documentation, including communication, lab results, reports, and corrective actions. Users will be able to manage and track IDDE investigations from initiation to closing.

To achieve better elimination results and increase public awareness of the issue, MDOT SHA notifies property owners when they are determined to be the origin of the illicit discharge. Educational materials such as the flyer depicted in **Figure 1-8** on non-stormwater discharges and MS4 permits are included with the initial notification.

Figure 1-8: MDOT SHA Illegal Dumping and Illicit Discharge Flyer

D.3.e Annually Report Illicit Discharge Detection and Elimination Activities

Outfalls were screened in three Phase I counties for illicit discharges including Frederick, Cecil, and Washington. **Table 1-10** lists the IDDE screenings for FY18. During the reporting year, zero illicit discharges were identified during the screening process, however one illicit discharge was reported outside the normal screening process. During SWM facility inspections, an illicit discharge was identified in Prince George's County. Dry weather flow containing detergents is entering a MDOT SHA stormwater management pond. MDOT SHA is working closely with the County on identifying a source. The pond serves a large multi-use commercial property. The County is in the process of obtaining as-built drawings to trace the source.

Table 1-11 below contains information for the illicit discharge requiring follow-up, as well as an update on the Baltimore and Frederick County violations discussed in the FY17 annual report.

Table 1-11: Illicit Discharges Requiring Follow-up

Number	County	SHA Structure #	Date Identified	Potential Pollutant	Status
1	Prince Georges	BMP 160660	10/04/2017	Detergents	Open
2	Baltimore County	BMP 0305091	03/30/2017	Fats and Grease	Closed
3	Frederick County	BMP 100085	05/10/2017	Solids	Closed – Winter 2017 Reopened – August 2018 after follow-up with the County revealed discharge was occurring again. County referred the matter to City of Mt. Airy. (See point by point response to comments for further detail)

D.4 Trash and Litter

Requirements under this condition include:

a) *Document litter problems on properties, ways of eliminating litter, and opportunities for overall improvement;*

b) *Within one year of permit issuance, as part of the public education program, SHA shall develop and implement a public education and outreach program with specific performance goals to reduce littering. This shall include:*

   i) *Educating the transportation community on the importance of reducing, reusing, and recycling;*

   ii) *Disseminating information by using signs, articles and other media outlets; and*

   iii) *Promoting educational programs for SHA employees, consultants, contractors, travelling/trucking public, vacationers and commuters, etc.;*

c) *Evaluate annually the effectiveness of the education program; and*

d) *Submit an annual report that details progress toward implementing the public education and outreach program and trash reduction strategies.*

D.4.a Litter Control Problems and Methods for Elimination

The MDOT SHA has long maintained an anti-litter program and continues to implement improvements to this program to minimize litter. This helps to increase safety, improve the health of our environment, and keep our state beautiful.

The MDOT SHA Office of Maintenance and regional maintenance shops evaluate and document litter control problems within MDOT SHA right-of-way throughout the entire State. Besides general roadside litter problems, typical problem areas identified include isolated dumping sites, highway interchange ramps, areas near landfills, and bus stops.

The MDOT SHA has many programs in place to address and control litter within MDOT SHA right-of-way. A critical aspect of the MDOT SHA year-round highway maintenance is the removal of litter from roadway shoulders and drainage systems. The MDOT SHA uses a multi-pronged approach to control litter utilizing MDOT SHA employees, state workers, contractors, inmate clean-up crews, as well as labor donated through the Sponsor-A-Highway (SAH) program and partnerships with Adopt-A-Highway (AAH) volunteers. MDOT SHA also has taken several steps to 'green' our litter removal efforts. For instance, instead of just picking up litter, MDOT SHA now provides our crews and volunteers with the means to separate recyclables from trash. All seven MDOT SHA Districts are currently recycling roadway litter in a formal manner. As the recycling efforts increase, the volume of waste taken to landfills continues to decrease.

The MDOT SHA currently collects a substantial amount of litter and trash including pick-up along state roads, inlet cleaning, and structural stormwater control structures. The MDOT SHA primary efforts to clean up and prevent litter and trash along our roadways are described in detail below.

Maintenance Crew Clean-Ups

MDOT SHA currently has 28 maintenance shops across the state, and 17 are responsible for areas within the 11 MS4 jurisdictions. Each maintenance shop is responsible to perform several routine activities including trash clean-up as well as mowing, plowing, and other activities to ensure safety and environmental stewardship along the ROW. Trash clean-ups are performed regularly throughout the year, with additional attention in the spring and summer mowing seasons. Spot cleaning is scheduled upon public request for hot spots near landfills. During the reporting period, MDOT SHA maintenance crews, inmate crews and contracted litter crews collected 5,024 truckloads of trash within the 11 MS4 jurisdictions, which is approximately 1.93 million pounds. Trash pick-up by MS4 Jurisdiction is summarized in **Table 1-12** below.

Contracted Clean-Ups

In addition to MDOT SHA maintenance crew clean-ups, MDOT SHA enters contractual agreements for supplemental clean-ups along the right-of-way. This includes contracts with private companies as well as 33 inmate crews contracted with various state penitentiaries. Contracts are awarded for designated roadway segments and contractors are required to pick up on a regular schedule. MDOT SHA provides dump trucks, maintenance of traffic, crash attenuators, and other safety precautions for field crews working to pick up trash along the roadway. Contracted clean-up activities occur throughout the state, including MS4 jurisdictions.

Table 1-12: Maintenance/Contracted/Inmate Right-of-Way Trash/Litter Removal

Jurisdiction	Truckloads	Conversion to Pounds
Anne Arundel	747	261,450
Baltimore	2048	716,800
Carroll	69	24,150
Cecil	258	90,300
Charles	119	41,650
Frederick	202	70,700
Harford	225	78,750
Howard	481	168,350
Montgomery	297	103,950
Prince George's	860	301,000
Washington	197	68,950
Totals	**5,503**	**1,926,050**
Data extracted for period 7/1/2017 to 6/30/2018		

Adopt-A-Highway Program

This program encourages volunteer groups (families, non-profit organizations, schools and civic organizations) to pick up litter along one to two mile stretches of non-interstate roadways four times a year for a two-year period as a community service. MDOT SHA provides each group with training, safety vests, trash bags, and tips on how to pick-up trash and recyclables. The trash collected is placed in bags that are picked up by MDOT SHA maintenance crews. MDOT SHA will also place signs recognizing the organization or group at both ends of the adopted roadside (See **Figure 1-9)**.

Figure 1-9: MDOT SHA AAH Sign

Since the AAH program started in 1989, MDOT SHA has partnered with thousands of civic organizations and volunteer groups. **Table 1-13** identifies the participation for the AAH program throughout the current reporting period.

Table 1-13: AAH Program Right-of-Way Trash/Litter Removal

Jurisdiction	Number of Groups	Number of Bags	Miles Adopted
Anne Arundel	1	7	2
Baltimore	41	582	46
Carroll	7	67	10
Cecil	11	96	11
Charles	1	12	1
Frederick	8	72	7
Harford	19	213	27
Howard	5	59	4
Montgomery	0	0	0
Prince George's	3	53	3
Washington	10	97	12
Salisbury	0	0	0
Totals	106	1,258	123
Data extracted from the AAH database for the period 07/01/2017 to 06/30/2018.			

Sponsor-A-Highway Program

Maryland has joined numerous other states in the SHA national effort to reduce litter along our roads. Each year, MDOT SHA spends millions of dollars to remove litter and debris from our roadways, which can create safety and environmental hazards for motorists, cyclists, and pedestrians. Litter removal also forces MDOT SHA maintenance staff to commit time, money, and manpower to this effort when they should be concentrating on other highway safety activities.

The MDOT SHA corporate sponsorship program allows corporations to sponsor sections of Maryland roadways by funding contracted clean-ups for one-mile sections of Maryland roadways. The sponsor enters an agreement with a maintenance provider to remove litter from the sponsored highway segment, typically an interstate roadway. The maintenance providers are responsible for removal of trash from sponsored segments of roadways.

Each sponsor is acknowledged by a sign with a recognition panel that is placed at the beginning of the highway segment they are sponsoring, see **Figure 1-10**. MDOT SHA does not receive any reimbursement from the sponsor or maintenance provider. The MDOT SHA primary role is to ensure litter removal is properly performed, recognition signs are installed to MUTCD standards, manage the inventory of segments available for sponsorship, review additional areas for inclusion in the program, and approve artwork submitted for sponsor panels.

Figure 1-10: MDOT SHA SAH Sign

Table 1-14 below shows the miles currently being sponsored through the SAH program within the MS4 jurisdictions. Currently, 382 out of 532 available roadway segments, or 72% have been sponsored.

Table 1-14: SAH Program

Jurisdiction	Available Miles	Miles Sponsored
Anne Arundel	37	90
Baltimore	12	110
Carroll	2	0
Cecil	0	0
Charles	12	12
Frederick	6	19
Harford	9	0
Howard	14	44
Montgomery	2	50
Prince George's	20	72
Washington	12	6
Salisbury	0	0
Totals	**126**	**403**
Data extracted from the SAH database for the period 07/01/2017 to 06/30/2018.		

Stormwater Management Facilities

SWM facilities are designed to capture stormwater runoff, allowing the velocity to reduce and the pollutants to settle out before being released to an outfall structure or infiltrate directly into the ground. Many SWM facilities are constructed with a forebay and a riser structure with a trash rack. The main purpose of the forebay is to reduce water velocities and collect sediment as stormwater enters the facility. An additional benefit is that it helps to collect and concentrate trash, debris, and floatable material within the stormwater management basin. Trash racks prevent large debris, trash, and floatable materials from entering the outfall conveyance structure. Maintenance crews can then collect the trash and debris contained within the SWM facilities during routine maintenance.

D.4.b Public Education and Outreach

In addition to these programs to reduce and control litter along roadways, which ultimately reduces litter to local waterways, MDOT SHA continues to make impacts through its multi-faceted public education program with goals to educate the public on environmental stewardship and litter reduction. See **Figure 1-11**.

Some key components of the MDOT SHA public education program are discussed below.

Outreach

The MDOT SHA Office of Communication (OC) and Office of Maintenance (OOM) collaborate on program components which include disseminating information through press releases, websites, social media, informational materials, and special events. Special events include, but are not limited to schools, festivals, and civic events. The program offers materials such as coloring books, brochures, and speakers to help educate the public.

MDOT SHA hosts a webpage entitled 'Educational Outreach' which provides resources to members of the transportation community interested in reducing pollutants in local waterways and the Chesapeake Bay. The webpage includes outreach materials to the public that discourages littering behavior, including information on proper litter and trash disposal, and links to learn more about plastics in the aquatic environment, and ways to reduce the volume of trash entering our waterways. The webpage also encourages individuals or groups to participate in trash cleanups through the MDOT SHA AAH and SAH programs. This website can be found at:

https://www.roads.maryland.gov/Index.aspx?pageid=48.

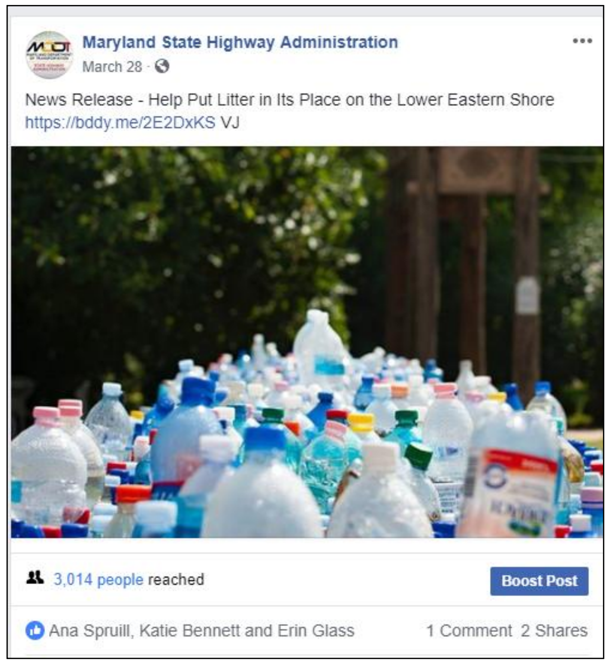


Figure 1-11: Example of MDOT SHA's Use of Social Media in Promoting Litter Education

Where Does It Go?

MDOT SHA has rolled out a new statewide 'Where Does It Go?' campaign. The campaign strives to educate drivers about the harmful effects of littering on highways. This campaign is currently focused on increased outreach through social media and special events, and an emphasis on clean up events called "Litter Blitzes".

As part of the 'Where Does It Go?' campaign, MDOT SHA hosted an exhibit at the 2017 MD State Fair providing a perfect opportunity to interact directly with MDOT SHA customers about MDOT SHA services, as well as the importance of litter reduction. MDOT SHA provided re-useable lunch bags to attendees to raise awareness of its litter removal efforts. See **Figure 1-12**.

'Litter blitzes' involve MDOT SHA crews out in force picking up litter on MDOT SHA maintained roadways. Litter blitzes' are publicized on social media to encourage MDOT SHA customers to be mindful of their waste and debris. These social media postings also include links for customers to request litter removal.

Figure 1-12: Where Does It Go? Digital Poster

Figure 1-13: Litter Blitz Social Media Announcement

Captain Trash Wheel

MDOT MPA hosted a press event on June 5, 2018 for the unveiling of Captain Trash Wheel, a device that collects litter from the water at Masonville Cove. Captain Trash Wheel is the third device of its kind in Baltimore. Partners for the event included MDOT SHA, the National Aquarium, Living Classrooms, Waterfront Partnership and Clearwater Mills. Captain Trash Wheel is stationed behind the Masonville Cove Environmental Education Center. The event coincided with the Masonville Cove Environmental Festival. The audience included Baltimore-area students. MDOT SHA Administrator Greg Slater spoke at the event welcoming Captain Trash Wheel to Masonville Cove. The MDOT SHA messaging centered on keeping trash off roadways because it likely will end up in Maryland waterways.

Figure 1-14: MDOT SHA Administrator Greg Slater at the Captain Trash Wheel Unveiling

Earth Day

MDOT SHA held Earth Day events from April 17-19 to promote environmental education to all MDOT SHA employees, consultants, contractors and the public. A list of events held at the MDOT SHA Headquarters Building can be found below.

- Landscape Architecture One-on-One Consulting:

  On April 17th, The Earth Day team hosted an interactive Lunch & Learn where MDOT SHA Headquarters employees could bring their landscape questions, pictures, and/or dream ideas and meet one-on-one with a member of the Landscape Architecture team. Seven Landscape Architects and Foresters were on hand with their expertise to answer questions from approximately 18 employees about their gardens, the design of their landscape, and identification of plants. Some employees also brought their desk plants in for a quick diagnosis on the health of their plants, and corrective steps.

- Waterfront Partnership of Baltimore Lunch and Learn:

  On April 18, 21 MDOT SHA employees turned out for a Lunch and Learn on the Baltimore Waterfront Partnership and the "Healthy Harbor" initiative that is working toward a cleaner, swimmable, and fishable Baltimore Harbor. Ms. Casey Marbler, Project Coordinator, discussed three categories of pollutants - trash, stormwater runoff, and sewage pollution - that pollute the Baltimore Harbor; as well as strategies that the Partnership utilizes to engage the public and introduce them to the benefits of a cleaner and healthier harbor.

- Service Project: Get Your Hands Dirty by Beautifying SHA HQ & Make Your Own Planter Activity:

  On April 19, 15 MDOT SHA employees volunteered their time during lunch to perform a service activity at MDOT SHA Headquarters. Volunteers came from multiple offices such as Office of Structures, Office of Planning and Preliminary Engineering, Office of Highway Design, Office of Equal Opportunity, Office of Communications, and the Office of Environmental Design. The Earth Day team asked that volunteers "Get ready to get your hands dirty!" as the Earth Day team continued its annual service project of beautifying the walkways surrounding Headquarters entrances. Volunteers watered plants in need, cleaned up planters, and removed dead matter. The project culminated in the planting of new annuals that bloom from spring through fall to brighten employees' and visitors' days as they enter MDOT SHA Headquarters.

  Following the service project, approximately 20 MDOT SHA employees attended a workshop to build planters using recycled plastic bottles and filled them with a variety of locally grown herbs. Employees could take home or display their personally constructed planters at their desks as an opportunity to engage others. The workshops demonstrated that plastic materials can be repurposed and utilized further than their initial use, reduce plastic consumption and waste, and show that gardens can be planted in any space!

Figure 1-15: MDOT SHA Tweet about Earth Day Workshop

Park(ing) Day

On September 15, 2017, MDOT SHA participated in the worldwide 12th annual PARK(ing) Day event, where artists, designers and citizens transform metered parking spots into temporary public parks. The mission of PARK(ing) Day is to call attention to the need for more urban open spaces, to generate critical debate around how public space is created and allocated, and to improve the quality of urban human habitat.

The MDOT SHA theme focused on urban agriculture with an emphasis on planting and maintaining perennial plants that attract valuable pollinators. Sustainable gardening techniques, ways to maximize space for sustainable agriculture. and the importance of fostering growth of urban pollinator habitats were highlighted. Some features of PARK(ing) Day are plants sowed and maintained by MDOT SHA volunteers.

MDOT SHA volunteers, in cooperation with Baltimore City Department of Transportation converted a parking space located at the corner of Calvert Street and Monument Street in Mt. Vernon into an urban garden for the day. MDOT SHA volunteers remained on-site to answer questions from MDOT SHA staff and the public.

Figure 1-16: MDOT SHA's 2017 PARK(ing) Day Display

Keep Maryland Beautiful Environmental Education Grants

The Maryland Environmental Trust (MET) awards grants to nonprofits, community groups, and schools to support cleaning and greening activities, environmental education and stewardship practices across the state. These grants are administered by the MET and funded by the Maryland Department of Housing and Community Development, and MDOT SHA.

D.4.c Evaluation and Effectiveness

MDOT SHA recognizes the importance of communicating the level of trash in local waterways and keeping the public educated about MDOT SHA environmental programs encouraging litter reduction. Public education is promoted through press releases, websites, social media, informational materials and special events. New campaigns like the 'Where Does It Go?' campaign are key to motivating the public to continue to improve their litter reduction habits.

MDOT SHA employees lead by example, and actively seek to reduce littering and increase recycling. These recycling efforts are evaluated through the MDOT Excellerator program which includes two performance measures to track the percentage of office waste and non-office waste diverted from the landfill or incineration through recycling: Performance Measures 9.2A - *Office Waste Recycled* and 9.2B - *Non-Office Waste Recycled*. The MDOT Excellerator Report is updated and shared each quarter, and is publicly available online here:

http://www.mdot.maryland.gov/newMDOT/Planning/Excellerator/MDOTExcellerator

The reporting periods for these performance measures are based on the calendar year, not the fiscal year. In CY2017, MDOT SHA recycled 32% of its office waste, and 76% of its non-office waste.

Office Waste Includes:

- Commingled containers (glass, metal, and plastic);
- Glass (fluorescent light tubes, mixed glass containers);
- Metals (mixed cans, and tin/steel cans);
- Paper (corrugated cardboard, mixed paper, shredded paper and newspaper);
- Plastic (mixed plastic bottles, other plastics);
- Electronics; and
- Printer cartridges

Non-Office Waste Includes:

- Lead-acid batteries (vehicle);
- Compostables (grass, leaves, brush, branches, mixed yard trimmings, food waste, and other);
- Metals (white goods - refrigerators, stoves, washing machines, dryers,
- water heaters, and air conditioners);
- Animal protein/solid fat;
- Tires;
- Antifreeze;
- Industrial fluids;
- Motor oil;
- Scrap automobiles; and
- Scrap metals.

D.5 Property Management and Maintenance

Requirements under this condition include:

a) *Ensure that an NOI has been submitted to MDE and a pollution prevention plan developed for each SHA-owned facility requiring NPDES stormwater general permit coverage. The status of the pollution prevention plan development and implementation for each SHA-owned municipal facility shall be reviewed, documented and submitted to MDE annually;*

b) *Continue to implement a program to reduce pollutants associated with maintenance activities at SHA-owned facilities including garages, roadways parking lots, rest areas and* *park and rides. The maintenance program shall include, but not be limited to, these activities:*

i) Street sweeping;

ii) Inlet inspection and cleaning;

iii) Minimizing the use of pesticides, herbicides, fertilizers and other pollutants associated with vegetation management through increased use of integrated pest management;

iv) Minimize to the MEP the use of winter weather deicing materials through research, continual testing and improvement of materials, equipment calibration, employee training and effective decision-making; and

v) Ensure that all SHA staff receives adequate training in pollution prevention and good housekeeping practices.

SHA shall report annually on the changes in any maintenance practices and the overall pollutant reductions resulting from the maintenance program. Within one year of permit issuance, an alternative maintenance program may be submitted for MDE approval indicating the activities to be undertaken and associated pollutant reductions.

D.5.a NOI Submission and Pollution Prevention Plan Development

As discussed in previous annual reports, MDOT SHA has implemented an Environmental Management System (EMS) to ensure multi-media compliance at maintenance facilities statewide. The EMS covers procedures for management of environmental compliance issues, including those related to Industrial NPDES at maintenance facilities, such as spill response, material storage and vehicle washing. It includes the implementation of Standard Operating Procedures (SOPs), routine compliance inspections and environmental training covering a variety of media areas including stormwater management and spill prevention and response.

The EMS includes routine multimedia compliance inspections of 162 MDOT SHA facilities. These inspections include recommendations for stormwater improvements and pollution prevention. As shown in **Table 1-15**, certain facilities are currently covered under the General Discharge Permit (12-SW). Actions taken to meet 12-SW requirements include:

- Updated Storm Water Pollution Prevention Plans (SWPPP) and maps;
- Roll-out and training of standard operation procedures for Quarterly Visual Monitoring;
- Updated internal self-assessment compliance checklists for routine and annual inspections;
- Trained shop personnel on pollution prevention requirements and incorporated updates in annual environmental awareness training provided to all MDOT SHA maintenance staff;
- Established a specific training program for pollution prevention team members performing stormwater inspections and quarterly visual monitoring assessments;
- Evaluated all permitted facilities for the presence of non-stormwater sources; and
- Completed annual comprehensive site compliance evaluations.

Table 1-15: Industrial NPDES Permit Status

District	Maintenance Facility	Permit Type
1	Berlin	General
	Cambridge	General
	Princess Anne	General
	Salisbury	General
	Snow Hill	General
2	Centreville	General
	Chestertown	General
	Denton	General
	Easton	General
	Elkton	General
3	Fairland	General
	Gaithersburg	General
	Laurel	General
	Marlboro	General
4	Churchville	General
	Golden Ring	General
	Hereford	General
	Owings Mills	General
5	Annapolis	General
	Glen Burnie	General
	La Plata	General
	Leonardtown	General
	Prince Frederick	General
	Hanover Auto Shop	General

Table 1-15: Industrial NPDES Permit Status

District	Maintenance Facility	Permit Type
6	Hagerstown	General
	Keyser's Ridge	Individual – GW
	La Vale	General
	Oakland	General
7	Dayton	General
	Frederick	General
	Thurmont	General
	Westminster	General
Notes: SW = Surface Water, GW = Groundwater		

The MDOT SHA maintenance facility staff are continuing to perform monthly inspections and the MDOT SHA ECD is continuing to perform inspections at all MDOT SHA facilities through its DECs. ECD, through the DECs, is performing annual comprehensive site compliance evaluations for all 12-SW permitted facilities. Quarterly and annual inspections are performed to ensure stormwater pollution prevention BMPs are implemented and the 12-SW permitting requirements are being met. The DEC and facility staff are responsible for ensuring compliance with all applicable permits, plans, and regulations at facilities in their region.

If issues related to a storm water management facility are noted during ECD's inspection process that are beyond routine maintenance, the issues compared with the latest inspection conducted per HHD's process. If the issues are not noted in the most recent HHD inspection, ECD relays the issue to HHD. HHD prioritizes and schedules any necessary repairs in accordance with MDOT SHA's Stormwater Management program detailed in **Section D.1** above.

The MDOT SHA has provided the erosion and municipal facility and SWPPP information in the Municipal Facilities feature class (MUN) as specified in the May 2017 MDE Geodatabase Guideline format.

12-SW Bay Restoration

As a MS4 permit holder, MDOT SHA has assessed the Bay Restoration requirement for facilities covered under the 12-SW permit and included them in the MDOT SHA MS4 20 percent impervious baseline and restoration implementation. Further discussion of the MDOT SHA impervious baseline assessment and 20 percent restoration goal can be found in the MDOT SHA June 29, 2018 submission to MDE (*MDOT SHA Final Impervious Baseline Assessment*) as well as in **Section E.2.a** of this annual report.

MDOT SHA performed an impervious accounting assessment of all industrial facilities covered under the 12-SW permit. The assessment of the controlled and uncontrolled impervious surfaces on the property of MDOT SHA industrial facilities was included in the overall impervious accounting assessment for the entire MDOT SHA MS4 area submitted on June 29, 2018 to MDE.

The 12-SW permit is applicable to the discharge of stormwater associated with industrial activities to waters of the state. MDOT SHA considers any site that is partly industrial as if it is entirely industrial and this was the methodology applied to the entire property boundary of the maintenance shop. This impervious accounting information, for each maintenance facility, has been updated to align with the final baseline and the data provided in the June 29, 2018 submittal to MDE.

As presented in **Table 1-16** below, each MDOT SHA maintenance facility covered under the 12-SW in MS4 areas of responsibility has a controlled and uncontrolled impervious area and an associated 20 percent restoration requirement.

Table 1-16: 12-SW Impervious Accounting Included in MS4 Baseline

Maintenance Facility	Total Impervious Area (AC)	Controlled Area (AC)	Uncontrolled Area (AC)	20% Impervious Restoration Requirement (AC)
Annapolis	6.57	0	6.57	1.31
Churchville	6.06	1.39	4.67	0.93
Dayton	15.79	6.34	9.45	1.89
Elkton	9.78	0.73	9.05	1.81

Table 1-16: 12-SW Impervious Accounting Included in MS4 Baseline

Maintenance Facility	Total Impervious Area (AC)	Controlled Area (AC)	Uncontrolled Area (AC)	20% Impervious Restoration Requirement (AC)
Fairland	5.52	0.90	4.62	0.92
Frederick	9.07	3.60	5.47	1.09
Gaithersburg	12.26	1.77	10.49	2.10
Glen Burnie	7.64	0.09	7.55	1.51
Golden Ring	7.5	1.83	5.67	1.13
Hagerstown	5.8	0	5.80	1.16
Hanover	14.21	9.69	4.52	0.90
Hereford	5.87	1.15	4.72	0.94
LaPlata	6.18	5.45	0.73	0.15
Laurel	6.31	0	6.31	1.26
Marlboro	10.62	2.96	7.66	1.53
Owings Mills	7.76	0	7.76	1.55
Westminster	7.79	5.82	1.97	0.39
Totals	**144.73**	**41.70**	**103.03**	**20.61**
Note: This accounting is presented to illustrate MDOT SHA 12-SW permitted areas that are covered under the MS4 impervious baseline and 20 percent treatment requirement of 4,439 acres. This information has been updated to reflect the newest impervious accounting information submitted in June 29, 2018. See Section E.2.a for more discussion on the MDOT SHA impervious accounting and 20 percent impervious restoration.				

As described above, MDOT SHA continues to maintain an effective Industrial Stormwater NPDES Program through ECD to ensure pollution prevention and permit requirements are being met at MDOT SHA maintenance facilities. Annually, and as change dictates, MDOT SHA updates its combined Storm Water Pollution Prevention Plans (SWPPP) and Spill Prevention, Control, and Countermeasure (SPCC) Plans. As a continuing best management practice, MDOT SHA has developed SWPPPs for facilities that are typically not required to have one (e.g. salt storage facilities).

Throughout the reporting year, MDOT SHA continued to address potential stormwater pollution issues by implementing BMPs and designing/constructing capital improvements. BMPs were identified during pollution prevention plan updates and routine facility inspections. The status of BMP implementation for maintenance facilities is tracked by each DEC during routine inspections. Potential capital improvements are prioritized based on risk to human health and the environment, and funding availability. The following list details the major pollution prevention efforts and maintenance facility improvements since the last annual report.

Completed Projects:

- 12-SW quarterly visual monitoring and annual comprehensive site compliance evaluations
- Update of all associated SWPPP Maps
- Standard Operating Procedure creation and updates to ensure compliance with 12-SW permit
- Updating existing and creation of a new training program to ensure compliance with 12-SW permit
- Construction of new wash bays to ensure indoor vehicle washing
- Petroleum storage tank system upgrades at various SHA maintenance facilities, including the elimination of an individual discharge permit at MDOT SHA's Centreville maintenance facility through installation of a holding tank for wash bay wastewater

Ongoing Projects / Efforts:

- Statewide brine tank upgrades and replacement
- Design and construction of new vacuum truck dewatering station.
- Salt barn repair plan and development of on-call repair contracts
- Statewide discharge sampling and reporting program for facilities with Individual Discharge Permits
- Compliance inspections at all MDOT SHA facilities
- Annual multimedia compliance training provided to maintenance shop personnel

Table 1-17 shows the MDOT SHA capital expenditures towards industrial pollution prevention BMPs from the current and past 13 fiscal years. Projected expenditures for FY18 are also included.

Table 1-17: Capital Expenditures for Pollution Prevention BMPs

Fiscal Year	Expenditure
2005	$ 613,210 - actual
2006	$ 592,873 - actual
2007	$ 450,608 - actual
2008	$ 590,704 - actual
2009	$ 478,889 – actual
2010	$ 613,766 - actual
2011	$ 595,984 - actual
2012	$ 664,577 - actual
2013	$ 917,902 - actual
2014	$641,512 - actual
2015	$2,339,971 - actual
2016	$1,858,544 - actual
2017	$2,006,170 - actual
2018	$5,465,375 - Actual
2019	$800,000 - Projected

D.5.b Maintenance Activity Pollution Reduction Program

MDOT SHA continues to implement programs and activities aimed at reducing pollutants associated with maintenance activities at MDOT SHA owned facilities. Such activities include street sweeping and inlet cleaning and are discussed in the following sections. In addition, MDOT SHA is conducting efforts to minimize the use of pesticides, herbicides, and fertilizers associated with vegetation management and minimizing the use of winter weather deicing materials.

i. Street Sweeping

The current MDOT SHA street sweeping program is predicated upon operational and safety needs for maintaining drainage from roadways, keeping roadsides free from lose debris that can be thrown by turning wheels, and keeping roadsides visually attractive. As MDOT SHA has developed the Implementation Plan discussed in **SectionE.2.b**, street sweeping programs to address water quality issues and various guidance from MDE and the Chesapeake Bay program have been development. This section of the report addresses operational and safety needs for street sweeping. **Section E.4.a** of this annual reports discusses MDOT SHA progress in implementing street sweeping routes.

Sweeping of the roadway is essential in the collection and disposal of loose material, debris, and litter. This material such as dirt, sand, trash, and other debris collects along curbs and gutters, bridge parapets, inlets, and outfall pipes. Street sweeping prevents buildup along sections of roadway and allows for the free flow of water from the highway to enter the storm drain system. MDOT SHA sweeps a selected number of roadways regularly during the spring, summer, and fall months from April through November. The collected material is then properly disposed of in an approved landfill. See **Figure 1-17** for an example of MDOT SHA's street sweeping activity.

Figure 1-17: MDOT SHA Nighttime Street Sweeping Operation

The MDOT SHA desired operational condition is 95 percent of the traveled roadway clear of loose material or debris. In addition, 95 percent of closed section roadways (curb and gutter) should have less than 1-inch depth of loose material, debris, or excessive vegetation that can capture debris in the curb and gutter.

ii. Inlet Cleaning

As stated above under **Section D.5.b.i** for street sweeping, inlet cleaning is another operations practice that has been identified as useful in meeting water quality standards. The current MDOT SHA inlet cleaning program is predicated upon operational and safety needs for maintaining drainage from roadways, deterring flooding, minimizing ice development during winter storms, keeping roadsides free from lose debris that can be thrown by turning wheels, preventing damage to underground inlets and pipes, and keeping roadsides visually attractive.

MDOT SHA is currently developing inlet cleaning programs to address water quality standards, MDE and Chesapeake Bay Program guidance, data tracking and reporting, and modeling and reduction calculations. This section of the report addresses operations and safety components of the current MDOT SHA inlet cleaning program and **Section E.4** discusses progress in implementing inlet cleaning efforts to meet water quality standards.

Inlets are structures that allow water to flow from the roadway surface and enter closed storm drain systems. These storm drain systems convey runoff to a discharge point at a ditch, channel, or waterway. Some inlets have been designed with catch basins, chambers where sediment, trash, and debris are captured before it can enter the waterway. These catch basins, along with 'self-cleaning' inlets are cleaned periodically by MDOT SHA maintenance crews using vacuum trucks to remove the sediment and debris and to allow free flow through the inlet and prevent the storm drain system from becoming clogged. MDOT SHA maintenance personnel perform routine inlet inspection and cleaning. This helps to ensure proper water flow, protects drainage structures, and lessens the likelihood of flooding.

MDOT SHA owns and operates four vacuum pump trucks used to routinely clean storm drain inlets. Sediment and trash make up most of the material that is removed. The vacuum trucks operate in central Maryland, spanning the following counties: Anne Arundel, Baltimore, Calvert, Carroll, Charles, Frederick, Harford, Howard, Montgomery, Prince George's, and St. Mary's. See **Figure 1-18** and **Figure 1-19** for examples of inlet cleaning equipment and before and after results.

Table 1-18 presents numbers of inlets and tons of material collected from MDOT SHA inlet cleaning operations in FY18.

Figure 1-18: MDOT SHA Vacuum Truck Used to Clean Inlets

Figure 1-19: Inlet Before and After Cleaning

Table 1-18: Number of Inlets Cleaned and Estimated Tons Collected in FY18

Table 1-18: Number of Inlets Cleaned and Estimated Tons Collected in FY18

County	MDOT SHA Shop	Total Number of Inlets Cleaned[1]	Tons[2] Collected
Anne Arundel	Annapolis	38	4
	Glen Burnie	86	9
Baltimore	Golden Ring	350	36.8
	Hereford	193	20.3
	Owings Mills	348	36.5
Carroll	Westminster	13	1.4
Cecil	Elkton	2	0.2
Charles	La Plata	6	0.6
Frederick	Frederick	8	0.8
Harford	Churchville	1410	148.1
Howard	Dayton	14	1.5
Montgomery	Fairland	493	51.8
	Gaithersburg	277	29.1
Prince George's	Laurel	114	12
	Upper Marlboro	156	16.4
Washington	Hagerstown	0	0
Total		**3508**	**368**

[1]Excludes front-end loader records in which the cleaning took 1 hour or less per inlet. If the time per inlet is longer than this, it is assumed the inlet was deep cleaned using the front-end loader.

[2]Following the assumption that 300 lbs. of wet weight cleaned from each inlet. Applied 0.7 to calculated wet weight to estimate dry weight and converted to tons.

iii. Minimize Use of Pesticides, Herbicides, Fertilizers and Other Pollutants

Landscape management efforts by MDOT SHA are directed towards efficient use of resources with the least environmental impacts. To promote best practices, MDOT SHA develops guidance documents, provides training, and develops specifications such as Nutrient Management Plans.

Landscape Management Guide

During the previous reporting period, the *MDOT SHA Landscape Management Guide* (LMG) was developed to fully revise and replace the M*DOT SHA Integrated Vegetation Management Manual for Maryland Highways* (IVMM, 2003).

This new document presents a performance-based guide for managing green assets along Maryland highways, and a major step forward to minimizing pesticide and fertilizer use on MDOT SHA right-of-way. Key concepts and draft chapters of the LMG were discussed at all pesticide applicator training sessions presented by OED to MDOT SHA pesticide applicators in FY18, and the final draft is nearing approval.

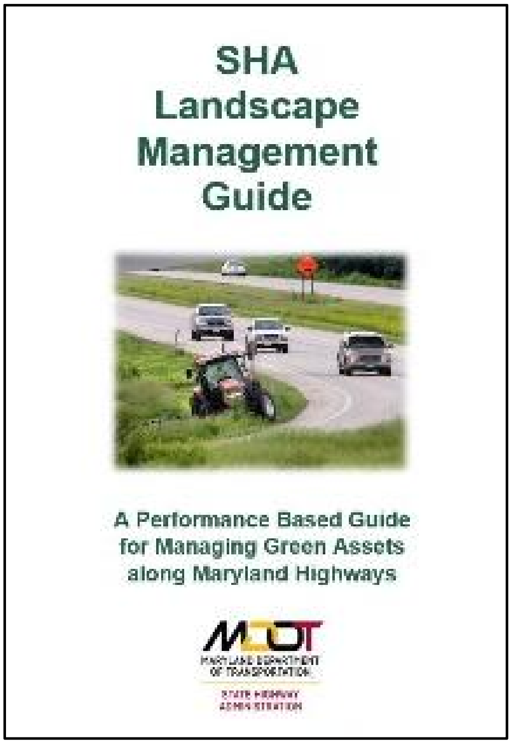


Figure 1-20: MDOT SHA Landscape Management Guide (LMG)

The LMG differs substantially from the IVMM by focusing on very specific management goals for different highway corridor zones. Vegetation management operations are presented as options that are used to meet zone goals for highway safety and operability, for environment and community, and for operations and scheduling.

The LMG provides key safety guidance for pesticide use, and presents information related to application rates, mixtures and target uses in a consistent and readily understood format for managers and end users.

Chemical Application

MDOT SHA has provided the chemical application program information in the Chemical Application table (CAP) as specified in the MDE 2017 Geodatabase Guideline format.

OED offers five different pesticide applicator training classes each year. ENV 100 allows participants to become a Registered Pesticide Applicator with the Maryland Department of Agriculture; ENV 200 provides recertification credits for MDOT employees, consultants and contractors; ENV 210 is a Pesticide Core and Right-of-Way Certification preparation class; ENV 220 is an aquatic pesticide training to qualify MDOT personnel to take the Pesticide Category 5 Aquatic test; and ENV 221 is the Aquatic preparation class.

Table 1-19 displays classes and participation during this reporting period. Training was increased by 30 percent over the previous year.

Table 1-19: Pesticide Applicator Training

	Training Sessions				
Date	ENV 100	ENV 200	ENV 210	ENV 220	ENV 221
08/09/2017	17				
08/23/2017	6				
09/07/2017				6	
03/01/2018		11			
02/12/2018			2		
04/05/2018		23			
04/10/2018		7			
04/12/2018		22			
04/17/2018		29			
04/19/2018	28				
04/26/2018		26			
05/01/2018		8			
05/08/2018		3			
05/22/2018		9			
05/31/2018		12			
06/05/2018		11			
06/07/2018		12			
06/26/2018	9				
Sum Total	**60**	**173**	**2**	**6**	**0**
Total	**241**				

Integrated Pest Management

MDOT SHA continued to work with the Maryland Department of Agriculture (MDA) in cooperative research programs to control invasive plants using insect biocontrols. MDA released Mile-a-Minute

Vine Weevil and Purple Loosestrife Beetle at 15 locations within MDOT SHA right-of-way during the previous year. These insects consistently reduce the growth and seed production of the target plants and reduce the need for herbicide control.

Herbicide Application

Vegetation controlled by MDOT SHA includes noxious weeds, invasive weeds, and plant material that reduces highway safety and operability. Most vegetation management on MDOT SHA property is performed mechanically by mowers and similar machinery. Management objectives are defined in the LMG, and herbicides are applied when not practical or feasible to meet objectives by mechanical methods alone.

All MDOT SHA employees and contractors who apply herbicide on MDOT SHA right-of-way must be registered with MDA and operate under the supervision of a MDA certified pesticide applicator. The LMG promotes the safe and responsible use of herbicides for vegetation control and focuses on the use of selective herbicides in targeted applications rather than non-selective herbicides and broadcast application methods. Herbicide mix tables of the LMG specify the use of surfactants and anti-drift agents to reduce droplet size, drift, non-target herbicide impacts, and non-point source contamination.

The LMG presents a relatively narrow range of recommended herbicides and herbicide mixtures to ensure efficacy with the least non-target impact. Herbicides with active soil residuals are only used where necessary, and application rates of all herbicides are based on the labeled minimum amount required to control the targeted plant species, which further reduces the potential for runoff and non-point source pollution.

Table 1-20 lists, the herbicides that were applied statewide during the reporting period to MDOT SHA property by MDOT SHA personnel and contractors.

Table 1-20: Herbicides Applied to MDOT SHA Property

Chemical	Gallons
2,4-D Amine	1,650
Aminopyralid	240
Imazapic	390
Chlorsulfuron	1,770
Clethodim	190
Clopyralid	1,450
Dithiopyr	390
Fosamine	690
Glyphosate	10,760
Halosulfuron-methyl	1,330
Isoxaben	180
Mefluidide	440
Metsulfuron	240
Oryzalin	550
Prodiamine	120
Triclopyr	780
Trinexapac-ethyl	200
Total Gallons Herbicide	**21,370**

Herbicide application equipment is routinely inspected and calibrated to ensure that applications are accurately applied to conform with applicable laws, the herbicide label and guidance of the LMG. A greater variety of selective herbicides were used in the past year, and total use declined slightly due to reduced spraying along guardrails and because of reduced supply of certain products.

Nutrient Management Plans

The Maryland Lawn Fertilizer Law limits the total amount and timing of fertilizer applications. MDOT SHA uses slow-release nitrogen and low or no phosphorus fertilizers when establishing and maintaining turfgrass, meadows and other vegetation. Topsoil, both salvaged and furnished, is sampled and tested for major and minor plant nutrients, pH, organic matter, and soluble salts. The test results are used to develop Nutrient Management Plans (NMP) to ensure optimal nutrient levels and growing conditions, and to avoid excess fertilizer application.

Topsoil producer stockpiles are tested every two months, and test results are used to develop NMPs.

Fertilizer use during the reporting period includes:

- 148,550 lbs. 20-16-12 fertilizer; ureaform, monoammonium phosphate, potassium sulfate
- 45,200 lbs. 38-0-0 fertilizer; ureaform, and
- 4,700 lbs. 15-30-15 fertilizer; urea, mono-ammonium phosphate, potassium chloride.

MDOT SHA continued cooperative research with the University of Maryland Appalachian Lab on a research project to evaluate native grass species that can thrive under roadside conditions with limited mowing and fertilizer inputs.

A research project with the University of Maryland Department of Entomology Bee Lab at College Park continued through 2018 to evaluate current MDOT SHA integrated roadside vegetation management practices and potentially improve habitat along roadsides. MDOT SHA also continued cooperative research with the Engineering Department of the University of Maryland at College Park to evaluate the use of different compost products and soil mixtures to improve grass establishment. It is hoped that the use of certain types of compost may allow lower usage of fertilizer during construction.

Both research projects are discussed further in **Section H** of this annual report.

Mowing Reduction & Native Vegetation Establishment

A major initiative at MDOT SHA is to reduce the extent of frequently mowed areas within the right-of-way, and to limit mowing in other areas to no more than once per year in the dormant season. One of the major features of the LMG are corridor management zones that focus attention on mowing only where and when it is necessary to meet management goals. Reduced mowing is also a benefit to pollinators and other insects and wildlife in highway areas.

The MDOT SHA standard specifications and guidance of the MDOT SHA Landscape Design Guide (LDG) specify locations where native meadow can be installed for mowing reduction. Most new construction includes one or more of the following types of meadow: upland, lowland, wet, and bioretention meadow. Forested and native meadow areas require infrequent mowing, enhance and preserve native vegetation, and provide stormwater benefits such as increased nutrient uptake.

iv. Minimize Use of Winter Weather Deicing Materials

MDOT SHA continues to test and evaluate new winter materials, equipment and strategies in an on-going effort to improve the level of service provided to motorists during winter storms while at the same time minimizing the impact of its operations on the environment.

One method employed to decrease the overall application of deicing materials is to increase application of deicing materials prior to and in the early stages of a winter storm (anti-icing). This prevents snow and ice from bonding to the surface of roads and bridges and ultimately leads to lower material usage during storm events, thus lessening the overall usage of deicers.

MDOT SHA continues to expand the number of direct liquid application (DLA) snow routes across the State. This operation identifies a designated snow route that only uses a critically measured salt brine solution to prevent the snow and ice from bonding to the pavement. Unlike anti-icing, which takes place prior to the event, this operation continues for the duration of the winter storm event and has proven to be quite effective. Data has shown that at an average application rate of 120 lbs. per lane mile per inch, this operation met the MDOT SHA level of service metric.

In addition, MDOT SHA is continuing its 'sensible salting' training of State and hired equipment operators in an on-going effort to decrease the use of deicing materials without jeopardizing the safety and mobility of motorists during and after winter storms. **Table 1-21** lists the types of materials and quantities applied by MDOT SHA in winter deicing operations.

Table 1-21: MDOT SHA Deicing Materials

Material	Characteristics	FY18 Quantity Applied Statewide
Sodium Chloride (Rock and Solar Salt)	The principal winter material used by SHA. Effective down to 20° F and is relatively inexpensive.	182,615 tons (does not include the salt used to make the liquid brine)
Abrasives	These include sand and crushed stone and are used to increase traction for motorists during storms. Abrasives have no snow melting capability.	19,544 tons (only applied in Allegany and Garrett Counties)
Calcium Chloride	A solid (flake) winter material used during extremely cold winter storms. SHA uses limited amounts of calcium chloride.	0 gallons
Salt Brine	Liquid sodium chloride or liquefied salt is a solution that can be used as an anti-icer on highways prior to the onset of storms, or as a deicer on highways during a storm. Used extensively by SHA. Freeze point of -6° F.	3,007,064 gallons
Magnesium Chloride (Mag)	A liquid winter material used by SHA for deicing operations in its northern and western counties. It has a freeze point of -26° F and has proven cost effective in colder regions.	9,870 gallons

New Road Salt Management

On May 20, 2010, the Governor approved Senate Bill 775, requiring MDOT SHA, in consultation with the MDE, to develop a best practices road salt management guidance document by October 2011. This document is necessary to reduce the adverse environmental impacts of road salt storage, application, and disposal on Maryland's water and land resources. The objective and goal of this Statewide Salt Management Plan (SMP) is to provide a framework for highway agencies to deliver safe, efficient roadway systems during winter storms in a cost-effective manner, while recognizing their obligation to do so in the most environmentally sensitive manner applicable.

MDOT SHA posted the SMP on its website in October 2011. The SMP was subsequently updated in October 2012 and October 2015 and has recently been revised and approved for publication in 2016. The current October 2016 SMP can be accessed via the MDOT SHA website: http://www.roads.maryland.gov/OOM/Statewide_Salt_Management_Plan.pdf

The SMP provides guidance on snow and ice control operations with an emphasis on reducing the impact of salt on the environment. The SMP covers all aspects of winter operations including:

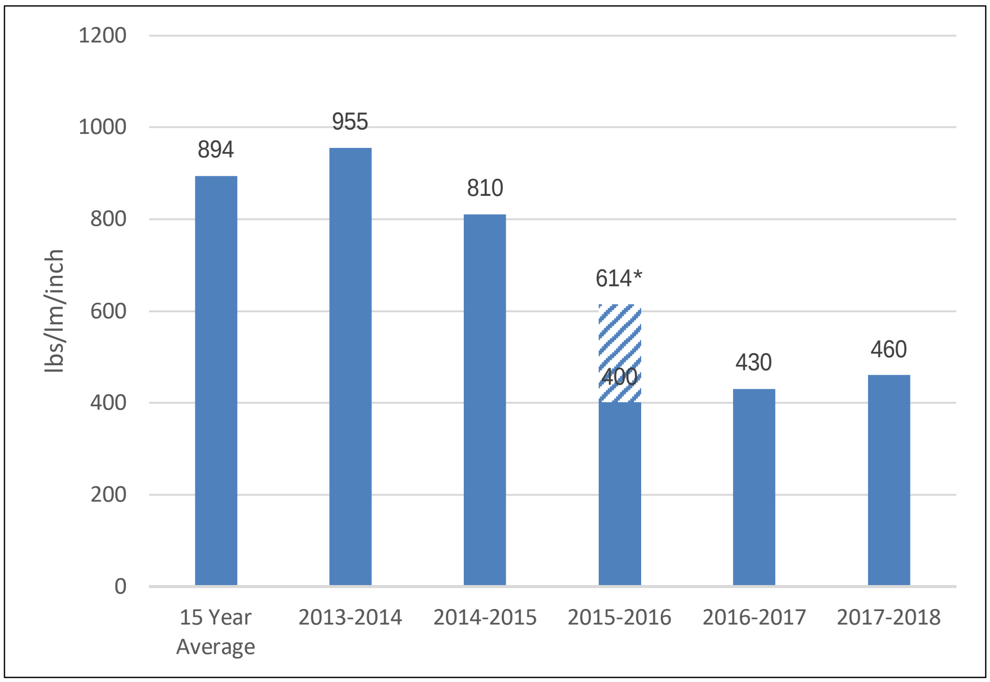
- Safety and mobility of motorists during and after winter storms;
- Defining levels of service provided during winter storms;
- Establishing long-term goals to lessen the usage of salt, and reduce its impact on the environment;
- Salt and other winter materials;
- Material storage and handling;
- Winter storm fighting equipment;
- Training initiatives;
- Winter storm management from pre-storm preparations through post-storm operations;
- Post-storm material and equipment cleanup;
- Post-storm and post-season data analysis;
- Public education and outreach, and
- Testing and evaluation of new materials, equipment, and strategies for continual improvement.

Table 1-22: Recent Salt Usage Statewide

Winter	Storms	Inches	Salt Used (tons)
2012 to 2013	10.3	25.0	205,212
2013 to 2014	17.3	66.5	551,443
2014 to 2015	16.0	47.4	340,083
2015 to 2016	7.6	40.0	137,358
2016 to 2017	7.8	27.16	91,494
2017 to 2018	13	31.53	190,294

Roadside Deicer Application

Table 1-22 displays application data starting from the adoption of the SMP such as the yearly average number of storms fought by MDOT SHA and the average amount of precipitation in inches. The salt usage in tons, shown in **Table 1-22**, is a statewide seasonal total and includes areas outside of the MS4 Permit areas. Within the areas covered under the MS4 Permit, MDOT SHA applied a total of 127,250 tons of salt. Expressed as a function of pounds of salt per road lane mile per inch of precipitation, the amount of salt applied during FY18 across the state is 460 lbs./lm./inch. Focusing on the future, a trend seems to be developing that shows movement toward reduced road salt usage, represented by the graph in **Figure 1-21**. In reading the graph, it is important to understand how MDOT SHA makes comparisons of road salt usage. MDOT SHA uses a metric of pounds of road salt per total lane miles per inch of snow. This allows an equal comparison across the state in the measurement of road salt usage.



*Adjusted salt usage rate. Extraordinary snow accumulation from blizzard removed from calculations.

Figure 1-21: Comparison of Salt Usage Normalized by Snow Depth Statewide

Prior to the 2014-2015 winter season, a challenge was issued by MDOT SHA management to reduce road salt usage by five percent. This challenge resulted in a statewide reduction in pounds per lane mile per inch of 14 percent. The MDOT SHA salt usage numbers have dropped 43 percent over the last 4 years.

By encouraging the expanded use of salt brine for anti-icing and re-application (liquid-only routes), reduced granular road salt application, and improved weather forecasting, further reduction of deicing applications is achievable without impacting the level of service to the traveling public.

MDOT SHA Annual Snow College

This training is offered annually at each of the seven MDOT SHA districts for new maintenance shop hires as well as 20 percent of veteran shop forces. The goal is to train all maintenance personnel over a five-year period and repeat the process. This ensures that all maintenance personnel are exposed to current trends and technologies.

The training presentations are included in the Statewide Salt Management Plan, Appendices II and III. Snow College includes the following subjects: safety, pre-season and pre-storm preparations, use of chemicals, environmental impacts of winter operations, weather information and data collection, equipment maintenance, plowing tips and techniques, and post-storm operations. During the reporting period, seven Snow College sessions were held, and more than 100 employees were trained. See **Table 1-23** for number of participants trained during this reporting period.

Table 1-23: MDOT SHA Snow College Training

SHA District Shops	Dates	Attendees
1 DO, WI, WO, SO	12/13/17 – 12/14/17	11
2 CE, KE, QA, CO, TA	12/11/16 – 12/17/16	15
3 MG, MF, PL, PM	N/A	0
4 BG, BH, BO, HA	11/20/17 – 11/21/17	9
5 AA, AG, CV, CA, CH, SM	11/13/17 – 11/14/17	10
6 GA, AL, WA	11/15/17 – 11/16/17	18
7 FR, CL, HO	12/14/16 – 12/15/16	16
	Total	**79**

Annual Maintenance Shop Winter Meetings

In 2015, MDOT SHA developed training on Best Practices for Salt Management and Environmental Stewardship during Winter Operations. Training is based on the practices outlined in the Salt Management Plan and is targeted specifically at the facility maintenance employees who manage or perform winter emergency operations. During the reporting period, 28 sessions were held and approximately 1,000 employees were trained.

Hired Equipment Operator Training

Prior to the start of each winter season, MDOT SHA provides this training to hired equipment contractors and operators. The training presentations are included in the Statewide Salt Management Plan, and topics covered include effective plowing, sensible salting, TMDL regulations, and adhering to all pertinent MDOT SHA policies and procedures. This training has also been made available in a bilingual format aiding in information decimation. During the reporting period, more than 28 sessions were held and approximately 2,100 hired equipment operators were trained.

v. Pollution Prevention and Good Housekeeping Training

SWPPP Training

MDOT SHA continues to provide annual training to its maintenance personnel. Environmental compliance training covers a variety of media areas including stormwater management, spill prevention and response, pollution prevention requirements, and training for pollution prevention team members performing stormwater inspections and quarterly visual monitoring assessments.

Each facility has a designated Pollution Prevention Team that is responsible for developing, implementing, maintaining control measures, utilizing corrective actions when required, and revising the SWPPP.

The Pollution Prevention Team is responsible for making sure that all operations staff understands the components of the SWPPP, how it will be implemented, and their role in contributing to the effectiveness of stormwater control measures. The Resident Maintenance Engineer is responsible for coordinating discharge prevention activities at the facility. Appropriate training and instruction is given to all employees regarding the SWPPP. Initial training occurs within six months of hiring. At a minimum, personnel training will be conducted annually to provide consistent understanding of pollution prevention and to notify employees of SWPPP changes.

Training documentation is maintained on the MDOT SHA Online Learning Center. **Table 1-24** includes information related to SWPPP training during this reporting period.

Table 1-24: SWPPP Training by Shop

Maintenance Facility	Training Date	Total Trained
Cambridge	Dec-17	28
Princess Anne	Dec-17	21
Salisbury	Dec-17	30
Snow Hill	Nov-17	34
Centreville	Nov-17	31
Chestertown	Nov-17	25
Denton	Nov-17	21
Easton	Nov-17	25
Elkton	Nov-17	31
Fairland	Oct-18	32
Gaithersburg	Apr-18	41
Laurel	Nov-18	24
Upper Marlboro	Oct-17	36
Churchville	Apr-18	39
Hereford	Apr-18	32
Golden Ring	May-17	31
Owings Mills	Apr-18	28
Annapolis	Aug-17	37
Glen Burnie	Aug-17	39
La Plata	Aug-17	29
Leonardtown	Aug-17	21
Prince Frederick	Sep-17	29
Keysers Ridge	Nov-17	41
La Vale	Oct-17	35
Hagerstown	Apr-17	23
Dayton	Oct-17	22
Frederick	Nov-17	52
Westminster	Oct-17	22
Hanover	May-18	16
	Total:	**875**

SWM Maintenance Training

During FY18, the Drainage and SWM Asset Team continued with presentations to MDOT SHA maintenance personnel with the purpose of highlighting the importance of SWM facility maintenance in extending the service life of these facilities. The primary audience was maintenance staff, but training was also presented to additional staff.

The largest training was October 12, 2017 during the annual MDOT SHA Office of Maintenance Seminar Retreat. This large-scale training presented annually by the office is for all management personnel working at the 7 District Offices and is presented in a resort style setting where managers are immersed in training for a couple days continuously. The SWM presentation consisted of reviews of the general overview of the program, inspection schedules, and access to facilities, location of BMPS, and the available Asset Operations Manual. Digital copies of the manual were handed out to each shop at the presentation. The programming was successful with FY18 inspections requiring no additional requests to Maintenance shops for minor maintenance in order to access facilities for inspection purposes. The remainder of the year, several requests for additional hard copies of the manuals were fulfilled with several shops ordering nearly 10 manuals each for all their field personnel to keep on hand. Future updates to the manual to show the newly added facilities in the inventory are being planned. Other trainings on GIS components, general program components and work order development are discussed in Part Two of this report.

MDE Review of MDOT SHA Property Management and Maintenance Program

On February 14, 2018, staff from MDE and MDOT SHA visited four facilities. MDE reviewed the Property Management and Maintenance Program, focusing on winter storm management activities. The four facilities visited were the Laurel Maintenance Facility, Jessup Salt Storage Facility, Pipe Yard Salt Storage Facility, and the Glen Burnie Maintenance Facility.

Figure 1-22: MDE Audit of MDOT SHA Property Management and Maintenance Program

Figure 1-23: OED Tree Program Field Trip

OED Tree Program Field Trip

On April 11, 2018, staff from several divisions within OED held field meetings at several existing TMDL planting locations to collaborate on improving the TMDL tree planting program. The day was spent reviewing a draft performance specification and inspector checklist to improve MDOT SHA use of the tree planting BMP to meet impervious and pollutant load reductions. Sites visited included existing restoration plantings along the MDOT SHA right of way and DNR park properties.

EPA Region III MS4 Training

MDOT SHA participated in a forum on May 15th and 16th, 2018, hosted by EPA Region III. The forum was held in Hanover, MD and focused on increasing communication, sharing best practices, future collaborations, and overall improvement in programs and water quality. MDOT SHA staff presented on the MDOT SHA stormwater management program. See **Figure 1-24.**

Figure 1-24: EPA Region III DOT MS4 Forum

D.5.c Changes in Maintenance Practices and Overall Pollutant Reductions

The MS4 permit also requires MDOT SHA to report annually on the changes in any maintenance practices and the overall pollutant reductions resulting from the maintenance program. MDOT SHA has reviewed its current maintenance program and determined that the program is adequately meeting the requirements.

Concerning overall pollutant reductions resulting from the MDOT SHA maintenance program, we are assuming that data relative to this condition is for deicing, fertilizer, and herbicide. The Chemical Application (CAP) Table from the May 2017 MDE Geodatabase Guidance has been provided along with this report and provides detailed information regarding applied chemicals.

Section E.4, TMDL Compliance, contains details regarding the pollutant reductions associated with MDOT SHA's street sweeping and inlet cleaning programs. Additionally, these two restoration strategies are detailed within the attached Geodatabase under the AltBMP elements.

D.6 Public Education

Requirements under this condition include:

a) *Maintain a compliance hotline or similar mechanism for public reporting of water quality complaints, including suspected illicit discharges, illegal dumping and spills;*

b) *Provide information to the transportation community about the benefits of:*

   i) *Stormwater management implementation and facility maintenance;*

   ii) *Proper erosion and sediment control practices;*

   iii) *Increasing proper disposal of vehicle fluids such as brake fluid or motor oil (not in inlets or catch basins);*

   iv) *Refraining from and reporting roadside dumping;*

   v) *Proper litter and trash disposal;*

   vi) *Decreasing vehicle idling;*

   vii) *Utilizing alternative modes of transportation (bus, train, walking, biking, carpooling);*

   viii) *Car care and washing; and*

   ix) *Proper pet waste management at rest areas and welcome centers.*

c) *Provide information regarding the following water quality issues to the regulated community when requested:*

   i) *NPDES permitting requirements;*

   ii) *Pollution prevention plan development;*

   iii) *Proper housekeeping; and*

   iv) *Spill prevention and response.*

D.6.a Mechanism for Public Reporting

The MDOT SHA Customer Care Management System, better known as CCMS, was implemented in July 2007 as a centralized customer service reporting and tracking system for MDOT SHA. CCMS is updated regularly based on input from its primary users and the CCMS Administrator. Every

MDOT SHA administrative office, district office, and maintenance shop participates in CCMS.

Customers can submit their concerns or requests directly into CCMS from the MDOT SHA webpage at:

http://marylandsha.force.com/customercare/request_for_service

This feature reduces emails to generic and project specific group email accounts. Once the customer clicks the submit request button, the ticket is in the system and on its way to the correct work unit. Inputs to CCMS are monitored and tracked daily. Each request is handled individually and closed out of the tracking system once MDOT SHA completes the service or addresses an inquiry. The system can be used to report a variety of service requests including water quality complaints such as suspected illicit discharges, illegal dumping, spills, and trash and litter problems along MDOT SHA roadways and facilities.

During the reporting period of July 1, 2017 through June 30, 2018, the MDOT SHA CCMS system received approximately 25,000 service requests. There were 2,600 service requests regarding littering and illegal dumping related issues of which 2,539 are closed. Tickets reporting debris, litter, and graffiti account for 10 percent of all CCMS tickets. Such tickets peak in late February, March, and April following the winter season.

An email reporting mechanism has also been implemented via wpd@sha.state.md.us

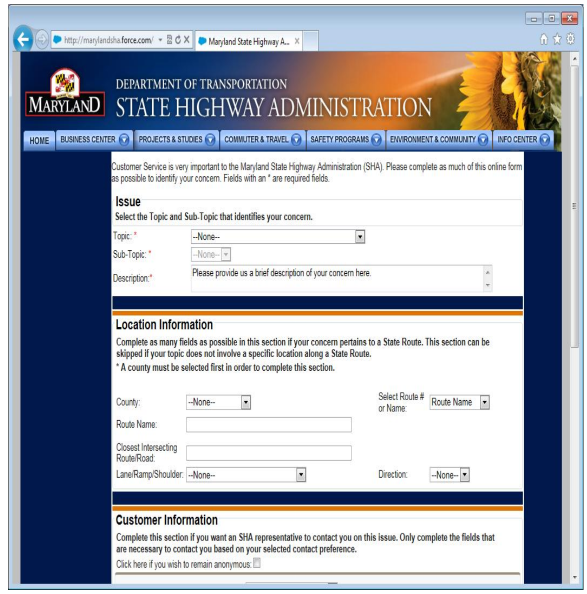


Figure 1-25: Screen Capture of CCMS

D.6.b Provide Information to the Transportation Community

MDOT SHA is dedicated to providing resources to members of the transportation community interested in learning about ways to reduce stormwater pollution in local waterways and the Chesapeake Bay. As discussed in **SectionD.4.b**, MDOT SHA hosts an educational outreach webpage, developed for this purpose, that can be accessed at:

https://www.roads.maryland.gov/Index.aspx?pageid=48.

The webpage includes information related to the following topics:

i. Stormwater Management Implementation and Facility Maintenance

As discussed in the 2016 MS4 Annual Report, MDOT SHA has created a brochure titled MDOT SHA *Chesapeake Bay and Local Waterway Restoration Projects*.to educate the transportation community regarding stormwater management implementation as it relates to our Bay restoration strategies. This brochure provides information on environmental concerns resulting from increased stormwater runoff from urbanization along with descriptions of various stormwater management restoration strategies MDOT SHA utilizes, such as structural stormwater controls, non-structural stormwater and natural resource controls, land use change, and pollutant source controls. This brochure is currently being updated.

MDOT SHA hosts a number of valuable resources on its webpages. The Bay Restoration Strategies webpage includes information on the use of BMPs to reduce nitrogen, phosphorus, and sediment from reaching the Chesapeake Bay. This webpage includes information on structural SW controls, nonstructural SW controls, land use change strategies, as well as source control strategies. This webpage can be found here:

http://www.roads.maryland.gov/Index.aspx?pageid=37

The MDOT SHA also hosts several interactive maps on their webpage, including the Chesapeake Bay Restoration Viewer. The public can enter an address into the interactive mapping tool to find projects MDOT SHA is planning in the MS4 jurisdictions or to explore projects in their own neighborhood. The webpage includes background information on the projects and programs MDOT SHA is implementing to improve water quality across the state, including a link to a 'Best Management Practices Glossary of Terms'. The viewer can be accessed here:

http://www.roads.maryland.gov/Index.aspx?PageId=714

ii. Proper Erosion and Sediment Control Practices

MDOT SHA has a well-established erosion and sediment control training program which serves to educate and bring awareness to MDOT SHA designers, construction employees, design consultants, and contractors. See **Section D.2** above for information on training provided throughout the reporting period.

Since 2004, the MDOT SHA Erosion and Sediment Control Certification (Yellow Card) has served to provide up to date awareness and education, and this certification is a requirement to conduct construction business with MDOT SHA. This training can now serve a greater number of participants since it went on-line. This training is discussed in **Section D.2.b**

In addition to these training courses MDOT SHA has created a variety of other media to provide education and awareness of the regulatory requirements on MDOT SHA projects. For instance, MDOT SHA has published an *Environmental Guidelines for Construction* along with an erosion and sediment control field guide to support the 2011 MDE ESC specifications and standards and illustrate increased requirements. A reference library (on-line/CD) was also created for project personnel use and is available on the MDOT SHA OED QA Toolkit. This program also uses in-field education and working partnerships throughout MDOT SHA to help end users understand and meet environmental requirements.

To increase public awareness regarding proper erosion and sediment control practices, the MDOT SHA educational outreach webpage includes links to the MDE erosion and sediment control page for community members interested in learning more about the program.

iii. Increasing Proper Disposal of Vehicle Fluids (Not in Inlets or Catch Basins)

The MDOT SHA education outreach webpage includes valuable information about the importance of proper vehicle fluid disposal, along with links to the MDE Maryland Used Motor Oil Recycling Program webpage. See **SectionD.6.b** above.

iv. Refraining from and Reporting Roadside Dumping

As part of MDOT SHA's public education initiative to discourage and report problems associated with illegal roadside dumping, MDOT SHA created a flyer titled *Keep Our State Waterways Clean* (see **Figure 1-8**). This flyer provides information related to the definition of illegal dumping, the problems associated with illegal dumping, common items associated with illegal dumping, and steps to report illegal dumping if encountered along MDOT SHA roadways. The flyer can be found via the MDOT SHA education outreach webpage discussed in **Section D.6.b** above along with links to the MDOT SHA CCMS to report roadside dumping. Additionally, MDOT SHA has strategically placed “No Dumping” signs throughout the state.

v. Proper Litter and Trash Disposal

As discussed in **SectionD.4** above, MDOT SHA has a multi-faceted existing public education program in effect with goals to educate the public on environmental stewardship and reduce littering.

The MDOT SHA educational outreach webpage includes information and links about proper litter and trash disposal and how members of the transportation community can help reduce the volume of trash entering local waterways. See **SectionD.6.b** above.

vi. Decreasing Vehicle Idling

MDOT SHA is saving money and reducing emissions through a vehicle equipment idling policy. The newest idling policy for the MDOT SHA vehicle and equipment fleet took effect on September 22, 2009. The policy restricts operation of a motor vehicle engine for more than five consecutive minutes when the vehicle is not in motion. The two exceptions to this policy are when a unit is deployed along a state route in preparation for winter operations, or when a unit is functioning under an emergency or maintaining traffic using emergency lighting. The policy applies to all operators of MDOT SHA vehicles and equipment, as well as drivers of consultant support vehicles.

To increase public awareness regarding the benefits of reducing vehicle idling, educational information has been provided on the MDOT SHA educational outreach webpage.

vii. Utilizing Alternative Transportation

MDOT SHA offers several incentives to reduce the number of drivers and/or number of commuter days/miles per week by Administration employees. Fewer commuter days and miles mean less vehicle pollutants entering the watershed.

Alternate Work Schedules for Employees

Alternate work schedules include flexible work hours allowing employees to work compressed workweeks reducing the total number of commuting days and miles.

Teleworking for Employees

Teleworking allows employees to work from a remote location (presumably at or close to home) and reduces the number of commuting days and miles per week. Each office has or is developing a teleworking policy.

Carpooling

Carpooling reduces the number of commuters on the road and has been encouraged at MDOT SHA for both its employees and the traveling public for many years. MDOT SHA carpooling incentives for employees include prioritizing parking space allocation to those in a designated car pool and administrative assistance in locating a carpool within the employee’s residential area for those that wish to carpool to work.

MDOT SHA promotes carpooling for the traveling public by constructing and maintaining park and ride facilities throughout the entire state. All MDOT SHA park and ride facilities are free and can accommodate carpools and van pools. Overnight parking is also permitted. MDOT SHA currently has more than 100 park and ride locations throughout Maryland that provide more than 12,000 free parking spaces for commuters. There is an interactive map on the MDOT SHA web page to help the traveling public locate and get directions to all the MDOT SHA park and ride facilities, see **Figure 1-26**. It can be accessed from the link below:

http://roads.maryland.gov/pages/parkandridemaps

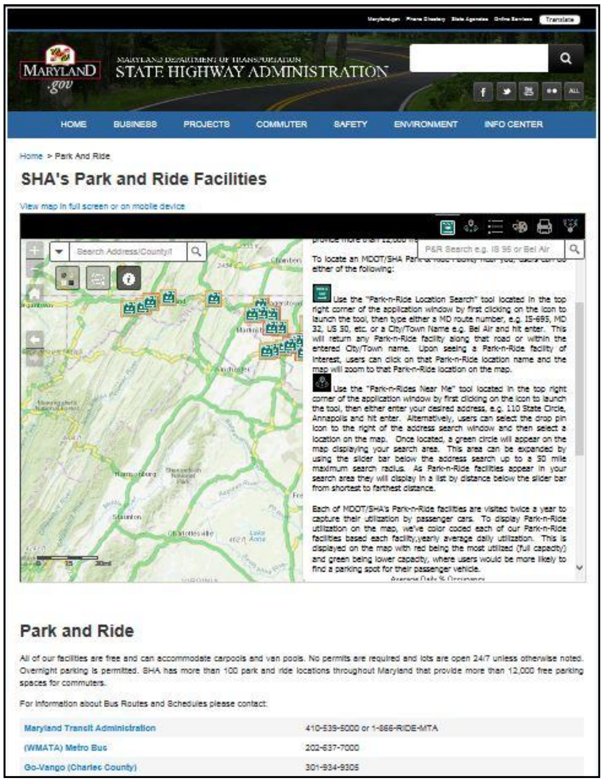


Figure 1-26: Screen Capture of MDOT SHA's Park and Ride Facility Locator Interactive Map

HOV Lanes

In addition to park and ride facilities, MDOT SHA has also constructed High Occupancy Vehicle (HOV) lanes on some of its interstates to promote carpooling. HOV lanes are reserved for carpools, vanpools, buses, and motorcycles during designated time periods. HOV lanes are intended to save commute time for carpool users and bus riders by enabling them to bypass areas of heavy traffic congestion. By giving carpool users and bus riders a faster and more reliable ride during peak traffic periods, HOV lanes serve as a strong incentive for ridesharing, which in turn helps to manage congestion and contributes to improved air quality. HOV lanes are generally designated via white diamonds on signage and pavements markings. MDOT SHA currently has two HOV facilities, along I-270 in Montgomery County and along US 50 in Prince George's County.

MDOT SHA hosts an HOV page on its website that can be accessed at the link below. The page includes information about regulations concerning HOV lane usage, maps of HOV lane locations in Maryland, and contact information.

http://www.roads.maryland.gov/index.aspx?PageId=249

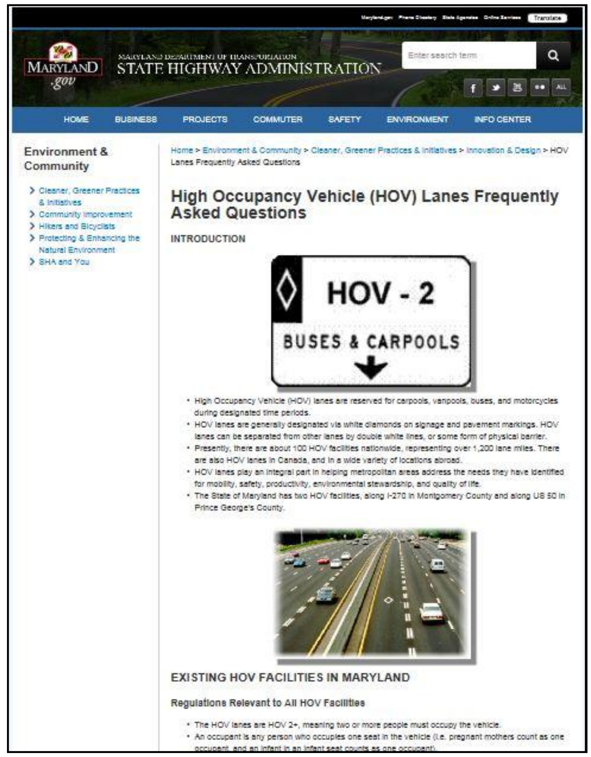


Figure 1-27: MDOT SHA HOV Lane

Bicycle Safety Awareness

MDOT SHA has continued its bicycle safety campaign, 'Look Out For Each Other', which stresses the role of the vehicle driver in bicycle safety. Featuring Maryland professionals who commute with bicycles, the campaign reminds drivers 'A Cyclist Might Be Someone You Know.' With special emphasis during the spring and summer months when bicycle crashes increase, the year-long campaign also advises bicyclists to obey the rules of the road, ride predictably and stay visible when riding at night.

At the Annual Artscape event in Baltimore City (July 20-22, 2018), MDOT SHA sponsored a booth along West Mount Royal Avenue to enhance awareness of bicycle safety. The booth was titled 'Look Out for Each Other: A Cyclist May be Someone You Know'. MDOT SHA provided valuable safety information to festival attendees.

Figure 1-28: MDOT SHA Artscape Bike Safety Social Media Post

National Bike to Work Day

For Baltimore's Bike to Work Day on June 1, 2018, MDOT SHA hosted a morning pit stop located at the corner of Guilford Avenue and East Monument Street for the public taking part in the event. The pit stop included bike tune ups from Twenty 20 Cycling Company, snacks, bike accessories and demonstrations with MTA's bus bike rack, all to promote bike safety.

National Bike to School Day

National Bike to School Day provides an opportunity for schools across the country to join to celebrate and build off the energy on National Bike Month. National Bike to School Day was held on May 9, 2018. MDOT SHA promoted this event through public outreach via news release on May 8, 2018, and using its social media feeds such as Facebook, Twitter, and Instagram.

Walk to School Day

To promote walking, MDOT SHA promoted National Walk to School Day in October through a new release and its social media feeds on Twitter. National Walk to School Day highlights the benefits of walking and biking to school. This event was held on October 4, 2017.

Safe Routes to School

The MDOT SHA Safe Routes to School program focuses on improving the safety of children who walk or bicycle to school using sidewalks, crosswalks, signage, pedestrian signals, and bike racks. This enables and encourages children in grades K-8 to walk and bicycle to school and makes walking and bicycling to school a safer and more appealing transportation alternative. The result is improved safety, reduced traffic, fuel consumption, and air pollution near elementary and middle schools.

Mass Transit

The MDOT SHA public education webpage includes information regarding the benefits of using alternative transportation as well as links to learn more about the above-mentioned programs. See **Section D.6.b**.

viii. Proper Car Care and Washing

Improper car care and car washing can readily contribute pollutants into the adjacent storm drain system. Simply following a few simple steps when maintaining or washing your vehicle can help to conserve water and protect the quality of nearby water bodies.

To increase public awareness regarding proper car care and washing, educational information has been provided on the MDOT SHA educational outreach webpage. See **Section D.6.b**.

ix. Proper Pet Waste Management

MDOT SHA currently owns and maintains seven welcome centers and rest areas within the MS4 jurisdictions of Charles, Frederick, Howard, and Washington Counties. MDOT SHA welcome centers and rest areas are provided as a service to the traveling public. Not only do these facilities allow humans to rest from long journeys, but they also provide areas to walk pets.

The risk of water pollution increases when pet waste is left on rest area sidewalks, parking lots, and grassy areas as stormwater runoff can carry pet waste left on the ground into storm drains and nearby waterways. MDOT SHA has addressed proper pet waste management at some of its rest areas and welcome centers.

Figure 1-29: Pet Waste Disposal Station at the I-70 Eastbound Rest Area

For instance, at the MDOT SHA newer welcome centers, such as the I-70 eastbound and westbound rest area and welcome center situated on South Mountain between Fredrick and Hagerstown in Frederick County, MDOT SHA has incorporated designated pet walking areas. These areas contain pet waste disposal stations which feature pet waste bag dispensers, educational signs, and trash bins specifically for the collection and proper disposal of pet waste. The disposal stations aim to educate the public on the importance of proper pet waste management and to encourage pet owners to pick up and properly dispose of their pet's waste, thereby keeping pet waste out of our waterways.

x. Other MDOT SHA Water Quality Awareness Training & Events

Terrapin Institute Turtle Relocation

While Annapolis Harbour Center Pond was being environmentally renovated, MDOT SHA allowed the utilization of an MDOT SHA-owned and maintained BMP in Anne Arundel, Maryland, by the Terrapin Institute as a temporary sanctuary for Eastern Painted turtles to be relocated from the Annapolis Harbour Center pond. In total, 75 turtles were temporarily relocated away from the heavy machinery.

On Saturday May 19, 2018, the Terrapin Institute hosted 'TurtleFest'. The event celebrated the release of the turtles back to their habitat. In collaboration with the South River Federation, Anne Arundel County Watershed Protection and Restoration Program, and Maguire Marine Construction, the turtles returned to their new and improved aquatic environment. The event served to educate the public that clean stormwater keeps the turtles of the Annapolis Harbour Center Pond thriving.

See **Figure 1-30** and **Figure 1-31**, for a flyer promoting the event, as well as a photo during the turtle release.

Figure 1-30: TurtleFest Flyer

Figure 1-31: TurtleFest Turtle Release

Chesapeake Bay Field Trips

Annual Chesapeake Bay field trips are led by Tiffany Granberg and Adam Wickline of the Chesapeake Bay Foundation. The trips demonstrate the link between highway runoff and its impacts on streams, rivers, and the health of the Chesapeake Bay. It is a great opportunity for

MDOT SHA employees to learn about one another's careers as well as habits and actions in our daily work and home environment that may affect the health of the Chesapeake Bay.

This field trip is offered through the MDOT SHA On-line Learning Center, College of Engineering, environmental design training (ENV400). It is a class that requires no pre-requisite training and is offered to all employees seeking to improve their environmental awareness. Therefore, this class has a mixture of employees from all over the state with varied levels of experience and educational background.

The training includes visits to important environmental sites including wetlands, streams, forests, and a boat trip on the Bay. Two trips were held during this reporting period on March 14, 2018, and April 3, 2018 with 42 participants attending in all. See **Figure 1-32** for a photo from the April 3, 2018 training.

Figure 1-32: April 2018 MDOT SHA Chesapeake Bay Field Trip

OHD University

The Office of Highway Development University (OHDU) is an in-house training program initially established to provide new OHD employees with the technical and project management skills that have been identified as essential for success in OHD. The program currently includes eighteen first year classes and eight second year classes that cover a variety of topics. When first developed, the OHDU program course content was specifically developed for new OHD entry-level engineers. Since that time, this program has grown to include all new OHD employees and other newly hired professionals within OHD.

'Basic Hydrology' is a 1st year OHDU class that provides a basic overview of the hydrologic cycle and how it is relevant to roadway projects. This class was held on 11/01/2017 and included 14 participants.

'Basic Hydraulics' is a 1st year OHDU class that provides a basic overview of managing drainage systems with an emphasis on inlets, pipes, and ditches. Students learn about the adverse impacts of uncontrolled storm water runoff and why it is important to provide stable conveyance. Students learn about the methodologies for determining inlet spacing and sizing, pipe and ditch sizing, culvert sizing, and pipe material selection. This class was held on 11/15/2017 and included 17 participants.

'SWM & Erosion and Sediment Control' is a 2nd year OHDU class that provides an overview of SWM and ESC and how both are relevant to MDOT SHA projects. Topics include current regulations, design criteria, types of facilities, and common design issues. Discussion also includes these important key aspects: the difference between SW quality and quantity management, right-of-way allocation, requesting SWM borings, aesthetics associated with SWM facilities, safety, and maintenance access. This class was held on 11/29/2017 and included 8 participants.

'Environmental Permits and Regulations' is a 2nd year OHDU class that provides information on the types of environmental permits that are typically required for projects, including SWM, ESC, JPA, wetlands and waterways, dam safety, NEPA, roadside tree, and reforestation. The class includes discussion of what is needed for each permit submittal and the regulations with which MDOT SHA must comply as it relates to the project development process. This class was held on 2/28/2018 and included 16 participants.

May 2018 Stormwater Management Workshop

On May 9, 2018, OHD Deputy Director Laura Ridler and PRD Assistant Division Chief Jason Ferner presented a technical workshop on stormwater management. This workshop presented the PRD Current Technical Practices and showcased a preview of the upcoming Water Quality Summary Sheet WQSS. Approximately 150 design consultants attended the training.

D.6.c Information for the Regulated Community

i. NPDES Permitting Requirements

Information relating to NPDES Construction Activity Permits is available on the MDE website, and MDOT SHA directs requests for information to that site.

ii. Pollution Prevention Plan Development

Stormwater Pollution Prevention Plans (SWPPP) are required by NPDES General Permit No. 12—SW for each of MDOT SHA's industrial facilities. The SWPPPs are available for review upon request.

iii. Proper Housekeeping

Proper housekeeping measures are identified in the MDOT SHA Stormwater Pollution Prevention Plans for industrial facilities. These documents are available upon request.

Proper housekeeping measures include sweeping areas in front of salt and material storage structures, pick-up and proper disposal of garbage and floatable debris, routine inspections of drums, tanks, and other containers, and conducting vehicle and equipment repairs indoors or under cover.

iv. Spill Prevention and Response

SHA maintains SOPs related to spill prevention and response that are available upon request. These documents are updated on a routine basis per MDOT SHA Environmental Management System.

E. Restoration Plans and Total Maximum Daily Loads (TMDL)

In compliance with §402(p)(3)(B)(iii) of the CWA, MS4 permits require stormwater controls to reduce the discharge of pollutants to the MEP. By regulation at 40 CFR §122.44, BMPs and programs implemented pursuant to this permit must be consistent with applicable wasteload applications (WLAs) developed under EPA approved TMDLs.

In pursuit of these goals, SHA shall coordinate watershed assessments with surrounding jurisdictions and annually report on restoration plans, opportunities for public participation, and TMDL compliance status to MDE. As required below, watershed assessments and restoration plans shall include a thorough discussion of water quality analysis findings based on coordination with surrounding jurisdictions, TMDL documents and other resources when available, identification of water quality improvement opportunities, and a schedule for BMP and programmatic implementation to meet stormwater WLAs included in EPA approved TMDLs. SHA shall address both specific WLAs and target loads when SHA is part of larger aggregate loads. A list of EPA approved TMDLs for SHA in the permit area is included in Attachment B of the permit.

E.1 Watershed Assessments

Requirements under this condition include:

a) Coordinate watershed assessments with surrounding jurisdictions, which shall include, but not be limited to the evaluation of available State and county watershed assessments, SHA data, visual watershed inspections targeting SHA rights-of-way and facilities, and approved stormwater WLAs to:

i) Determine current water quality conditions;

ii) Include the results of visual inspections targeting SHA rights-of-way and facilities conducted in areas identified as priority for restoration;

iii) Identify and rank water quality problems for restoration associated with SHA rights-of-way and facilities;

iv) Using the watershed assessments established under section a. above to achieve water quality goals by identifying all structural and nonstructural water *quality improvement projects to be implemented; and*

v) Specify pollutant load reduction benchmarks and deadlines that demonstrate progress toward meeting all applicable stormwater WLAs.

MDOT SHA Implementation

MDOT SHA developed and submitted their Impervious Restoration and Coordinated TMDL Implementation plan (Implementation Plan) on October 8, 2016. This plan is the response to Part IV.E of the MS4 permit conditions. Since the original submittal of the Implementation Plan, various updates and revisions have taken place, and a fully revised *Interim Review Draft* version of that plan is attached to this report delivery and dated 10/9/2018, see **Figure 1-33**.

This *Interim Review Draft* is an interim draft of the fully revised plan and does not include *Part II: Impervious Restoration Plan and Chesapeake Bay TMDL Compliance*. Part II will be updated, and the complete revised final version of the Implementation Plan will be delivered to MDE once MDOT SHA receives MDE determination on the *July 29, 2018 MDOT SHA Final Baseline Impervious Assessment*.

Detailed description of the MDOT SHA Implementation plan is in **Section E.2**. Also, as new TMDLs are issued by MDE, MDOT SHA develops individual implementation plans within the one year of the TMDL issuance as described in **Section E.2.b**.

Figure 1-33: MDOT SHA 2018 Revised Implementation Plan

E.1.a Watershed Assessment

MDOT SHA has obtained, reviewed, and developed summaries of county watershed assessments that were developed by other MS4 jurisdictions. The watershed assessments were used in the development of MDOT SHA TMDL implementation plans for each watershed for which MDOT SHA has a wasteload allocation. Summaries of county assessments and MDOT SHA water quality restoration activities within the individual TMDL watersheds are included in each TMDL implementation plan MDOT SHA has developed. Additional discussion of the MDOT

SHA TMDL implementation plans is included under **Section E.2** below of this report.

MDOT SHA has established an outreach team tasked with coordinating pollution reduction strategies with each of the MS4 jurisdictional counties or municipalities. The purpose is to establish a cooperative relationship and identify partnering opportunities. This coordination is important to ensure that local jurisdictions are informed about and able to provide input on MDOT SHA restoration activities, and to ensure that efforts are complimentary and not duplicated. These meetings result in more efficient efforts to address TMDL load reductions in targeted areas and help establish relationships to coordinate other MS4 program initiatives, such as the litter education and outreach initiatives.

Additionally, MDOT SHA is utilizing information from MS4 county watershed assessments to help identify specific watershed issues and restoration project opportunities. This methodology and individual assessment summaries are presented in the MDOT SHA Implementation Plan, discussed in the following sections.

i. Current Water Quality Conditions

Designated uses and water quality criteria are discussed in each TMDL implementation plan MDOT SHA has developed. It is these designated uses and water quality criteria upon which TMDLs are based. County watershed assessments are reviewed and used to determine current water quality conditions, problem areas, and suggested methods to remediate water quality issues.

Summaries of these evaluations are included in each MDOT SHA implementation plan developed for each individual watershed section. Additional discussion of the MDOT SHA TMDL implementation plans is included under **Section E.2**of this report.

ii. Visual Inspections Targeting SHA ROW

Visual inspections targeting MDOT SHA right-of-way are described in Part III.C of the MDOT SHA Implementation Plan. Summaries of these evaluations are included in Part IV of the Implementation Plan for each individual watershed. Individual implementation plans that were developed after the 2016 plan contain visual inspections targeting MDOT SHA right-of-way in Section C and summaries of these evaluations are included in Section F. Additional discussion of the MDOT SHA TMDL Implementation Plans is included under **Section E.2** of this report.

iii. Water Quality Problems for Restoration

MDOT SHA uses several ways to identify and rank water quality problems. First, county watershed assessments are evaluated. These assessments identify and rank water quality problems for restoration within the local watersheds. Summaries of these evaluations are included in Part IV of the 2016 MDOT SHA implementation plan under each individual watershed section and in Section F of the subsequent individual TMDL implementation plans.

The visual assessment process that MDOT SHA has developed to assess the right-of-way for suitable restoration sites, also evaluates field conditions. This process is described in Part III.C of the 2016 Implementation Plan and summaries of these evaluations are included for each TMDL watershed plan located in Part IV of the 2016 plan and Section F of the subsequent individual plans.

Outfall inspections are another means that MDOT SHA employs to assess water quality problems within the right-of-way for restoration. An inspection protocol has been developed and includes a process for field inspection, assessment, and ranking of severity of stabilization issues. From these inspections come outfall restoration projects that are used to resolve stabilization issues, reduce pollutant loads, and meet impervious restoration requirements. This protocol is discussed in detail in **Part Two** of this report.

Additional discussion of the MDOT SHA TMDL implementation plans is included under **Section E.2**of this report.

iv. Water Quality Improvement Projects

County watershed assessments prioritize and rank structural and non-structural improvement projects to be implemented. Summaries of these evaluations are included in MDOT SHA TMDL implementation plans in Part IV in the 2016 plan and in Section F for the subsequent individual plans. Additional discussion of the MDOT SHA TMDL Implementation Plan is included under **Section E.2** of this report.

v. Pollutant Load Reduction Benchmarks and Deadlines

Interim benchmarks have been developed for 2020 and 2025 for all the local TMDLs and the Implementation Plan has been revised to incorporate these benchmarks and planned reductions. Progress in meeting these benchmarks is discussed in this annual report under **Sections E.2.b and E.4.b**.

E.2 Restoration Plans

Requirements under this condition include:

a) *Within one year of permit issuance, SHA shall submit an impervious surface area assessment consistent with the methods described in the MDE document "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits" (MDE, August 2014 or subsequent versions). Upon approval by MDE, this impervious surface area assessment shall serve as the baseline for the restoration efforts required in this permit.*

   By the end of this permit term, SHA shall commence and complete the implementation of restoration efforts for twenty percent of SHA's impervious surface area consistent with the methodology described in the MDE document cited in PART IV.E.2.a. that has not already been restored to the MEP. Equivalent acres restored of impervious surfaces, through new retrofits or the retrofit of pre-2002 structural BMPs, shall be based upon the treatment of the WQv criteria and associated list of practices defined in the 2000 Maryland Stormwater Design Manual. For alternate BMPs, the basis for calculation of equivalent impervious acres restored is based upon the pollutant loads from forested cover.

b) *Within one year of permit issuance, a coordinated TMDL implementation plan shall be submitted to MDE for approval that addresses all EPA approved stormwater WLAs (prior to the effective date of the permit) and requirements of Part VI.A., Chesapeake Bay Restoration by 2025 for SHA's storm sewer system. Both specific WLAs and aggregate WLAs which SHA is a part of shall be addressed in the TMDL implementation plans. Any subsequent stormwater WLAs for SHA's storm sewer system shall be addressed by the coordinated TMDL implementation plan within one year of EPA approval. Upon approval by MDE, this implementation plan will be enforceable under this permit. As part of the coordinated TMDL implementation plan, SHA shall:*

   i) *Include the final date for meeting applicable WLAs and a detailed schedule for implementing all structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives necessary for meeting applicable WLAs;*

   ii) *Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;*

   iii) *Evaluate and track the implementation of the coordinated implementation plan through monitoring or modeling to document the progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and*

   iv) *Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, program enhancements, new and additional programs, and alternative BMPs where EPA approved TMDL stormwater WLAs are not being met according to the benchmarks and deadlines established as part of the SHA's watershed assessments.*

MDOT SHA Impervious Restoration and Coordinated TMDL Implementation Plan

The 2016 MDOT SHA *Impervious Restoration and Coordinated TMDL Implementation Plan* was submitted to MDE on October 8, 2016. The plan was revised on July 31, 2017 to update the impervious baseline accounting. The impervious baseline accounting was finalized on June 29, 2018 and MDOT SHA is awaiting MDE determination on the final MDOT SHA baseline untreated impervious and 20 percent restoration goal before updating Part II of the plan. In the meantime, MDOT SHA updated the Implementation Plan to address MDE comments and is delivering Parts I, III, and IV with this annual report, see **Figure 1-33**. As stated above, Part II will be updated after the final baseline determination, and a fully updated Implementation Plan will be delivered to MDE at that time.

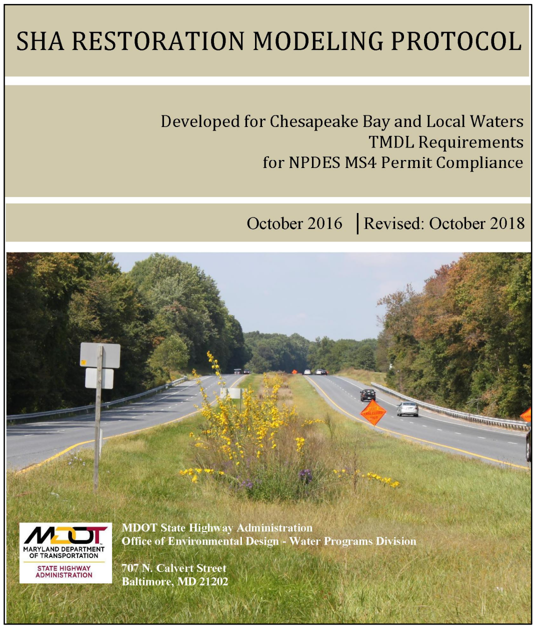


Figure 1-34: MDOT SHA 2018 Revised Restoration Modeling Protocol

Another revision this year is an update to the *MDOT SHA Restoration Modeling Protocol* (Modeling Protocol) that is closely related to the Implementation Plan, see **Figure 1-34**. The modeling methods used in developing and assessing progress for TMDL reductions are documented in this one document to avoid repeating discussion of modeling methods in the individual implementation plans that are developed as new TMDLs are issued. The Modeling Protocol was originally delivered as Appendix E in the 2016 annual report and revisions to methods associated with the MDOT SHA Automated Modeling Tool (AMT) related to MDE comments was delivered as Appendix H in the 2017 annual report. The 2018 revised Modeling Protocol will integrate revisions to the AMT as well as update modeling methods as new techniques and BMPs are introduced and will be delivered to MDE along with the completely revised Implementation Plan (with Part II included).

This section of the 2018 annual report discusses FY18 progress in implementing the Implementation Plan. This annual report will not reintegrate content from the implementation plan, but rather will reference pertinent sections as appropriate. The revised Implementation Plan consists of the following content and should be consulted directly for specifics:

Part I: Program Introduction

A. Purpose
B. Scope
C. Background
D. MDOT SHA MS4 Permit Requirements
E. Project Implementation Methodologies
F. Restoration Practice Descriptions

Part II: Impervious Restoration and Chesapeake Bay TMDL Compliance

Part II will be revised and delivered after MDE determination regarding MDOT SHA final baseline accounting.

Part III: Coordinated TMDL Implementation Plan

A. Water Quality Standards and Designated Uses
B. Watershed Assessment Coordination
C. Visual Inspections Targeting MDOT SHA ROW and Restoration Site Searches
D. Benchmarks and Detailed Costs
E. Pollution Reduction Strategies

Part IV: MDOT SHA Watershed TMDL Implementation Plans

Part IV consists of separate local TMDL implementation plans by watershed and each one consists of five sections:

1. Watershed Description
2. MDOT SHA TMDLs within the Watershed
3. MDOT SHA Visual Inventory of ROW
4. Summary of County Assessment Review

5. MDOT SHA Pollutant Reduction Strategies

MDOT SHA developed separate individual TMDL implementation plans for recently issued TMDLs for delivery to MDE within one year of issuance. These plans are comprised of the same content as Parts III and IV of the 2016 Implementation Plan, outlined above. The separate individual implementation plans are also loaded to the MDOT SHA webpage at this link:

https://www.roads.maryland.gov/Index.aspx?pageid=336

E.2.a Impervious Surface Area Assessment and Restoration Plan

MDOT SHA has performed a reevaluation of its impervious baseline accounting to fall in line with the MDE 2014 guidance and expectations for baseline year of 2002. The previous baseline had been established as 2010 to coincide with the expiration of the last MDOT SHA MS4 permit (10/21/2010). The revised impervious baseline assessment is based on baseline years that vary across the geographic MS4 jurisdictions, ranging from 2002 to 2005, and represent the best available data closest to 2002. Detailed information to verify these numbers was submitted to MDE on June 29, 2018 in the *MDOT SHA Final Impervious Baseline Assessment*.

Revised Impervious Surface Area Assessment

A summary of the revised MDOT SHA impervious baseline accounting is presented in **Table 1-25**, which displays the various baseline dates, total impervious surface area under MDOT SHA responsibility, and updated baseline treated and untreated impervious acres. The revised MDOT SHA 20 percent restoration goal to be met by October 8, 2020 is 4,439 acres. **Figure 1-35** presents a graphic illustration of the baseline treated and untreated impervious surfaces by county but does not include restoration credit by county.

MDOT SHA has not provided the updated impervious surface area feature class in the MDOT_SHA_Supplemental_2018geodatabase with this delivery. This was included in the June 29, 2018 final baseline accounting delivery. MDOT SHA has provided the impervious area assessment results in the Impervious Surface (IMP) table and the baseline treatment BMP information in the BMP Point of Investigation feature class (BMPPOI) and the BMP table (BMP) as specified in the May 2017 MDE Geodatabase Guideline format.

Impervious Re-Assessment for 2019

MDOT SHA will continue to investigate, research, and evaluate baseline treatment that is provided throughout the MS4 area for the purposes of refining and establishing an accurate baseline for the next permit term. Below are future initiatives that MDOT SHA may pursue:

- Apply the grass swale process addendum
- Additional BMP treatment determination;
- Additional BMP ownership verifications;
- County restoration research to remove from MDOT SHA baseline;
- Offsite treatment research;
- Inventory impervious disconnections; and
- Research impervious ownership transfers.

Table 1-25: MDOT SHA Final Baseline Impervious Surface by County (Acres) and 20% Restoration Goal

County	Baseline Date	Total MDOT SHA Owned Impervious	Baseline Treated Impervious	Untreated MDOT SHA Owned Impervious
Anne Arundel	12/31/2005	3308.96	511.52	2797.44
Baltimore	12/31/2005	3461.20	331.69	3129.50
Carroll	12/31/2005	1232.27	94.44	1137.83
Cecil	12/31/2005	1142.25	101.19	1041.06
Charles	12/31/2004	1236.45	241.47	994.99
Frederick	12/31/2005	2309.38	318.55	1990.83
Harford	12/31/2004	1588.91	114.01	1474.90
Howard	12/31/2002	1949.76	483.57	1466.18
Montgomery	12/31/2004	3328.44	428.88	2899.56
Prince George's	12/31/2005	4013.63	686.55	3327.08
Washington	12/31/2005	1935.72	131.38	1804.33
City of Salisbury (Wicomico)	12/31/2006	156.54	24.85	131.69
	Total:	**25,664**	**3,468**	**22,195**
			20% Restoration Goal:	**4,439**

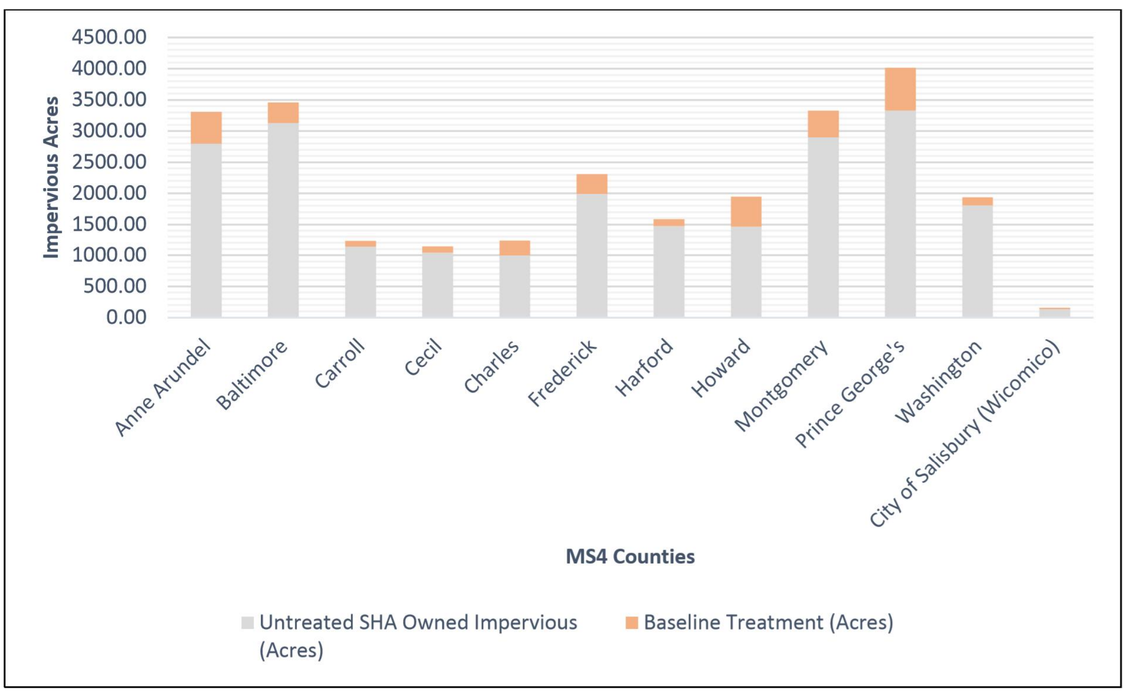


Figure 1-35: MDOT SHA Baseline Treated and Untreated Impervious Surfaces by County

Impervious Restoration Plan

The MDOT SHA impervious restoration plan is Part II the Implementation Plan and will be delivered to MDE once revised based on MDE determination of final MDOT SHA baseline. In order to meet the 20 percent impervious restoration requirement by October 8, 2020, a specific number of acres have been planned for treatment each fiscal year and benchmarks are included in Table 2-1 of the plan and also in **Table 1-29** of this report.

Revision to the previously projected benchmark for FY19 has been revised from 13% to 10% treatment of currently untreated impervious surfaces which is a reduction in the equivalent restoration achieved from 65% to 50%. This revision is also displayed in **Table 1-29** and is necessary to account for adjustments in project delivery because of issuing and awarding a full delivery stream contract. This contract allows contractors to perform all aspects of a stream restoration project while meeting a few strategic milestones set my MDOT SHA. This contract is also discussed in **Section E.4.b** below.

The MDOT SHA impervious restoration plan includes a combination of built practices, annual operations activities, and redevelopment credit. Part II of the revised MDOT SHA Implementation Plan will also include revisions to Tables 2-2a through 2-2g, which provide a comprehensive list of annual operations practices and completed, under design, and planned built practices broken down by year. Each table entry includes location information and estimated impervious runoff treatment acreage.

Discussion of progress in meeting the 20 percent impervious restoration requirement is combined with the TMDL Compliance discussion below in **Section E.4.**

E.2.b TMDL Implementation Plan

As stated above, the MDOT SHA TMDL implementation plans are included in the MDOT SHA Implementation Plan in Parts III and IV. This Implementation Plan was revised to address MDE comments and general updates and is delivered with this annual report as an *Interim Review Draft*, see **Figure 1-33** above. The final version will be delivered later when Part II updates are included (also discussed above).

Interim Targets Set

Over the reporting period, MDOT SHA worked to develop interim targets for the local TMDL implementation plans using BMPs that have been identified for implementation through 2025. Interim targets include 2020 and 2025 along with target end dates that vary for each watershed and pollutant. While this is the first step in developing full plans for each watershed, additional resources will be applied to the local TMDL planning efforts over the next few years to provide added implementation planning and follow-up.

The *Interim Review Draft* of the MDOT SHA TMDL Implementation Plan has been revised based on the modeling approach outlined in MDE comments dated April 26, 2017. Also, interim reduction targets for 2020 and 2025 were modeled and added to Part III.E, Table.3-2 for each watershed and pollutant. Table 3-3 has been eliminated and bacteria information added to Table 3-2. Individual watershed plans were updated to include the BMPs used to model the interim targets and estimated costs.

When setting interim targets, if the modeling showed that the BMPs proposed for a pollutant and watershed exceed the target reduction, this was used as the 2020 or 2025 interim target, depending upon which year the modeling was focused on. This was done to document watersheds that have more than enough BMPs proposed, and to provide assurance that if certain BMPs are eliminated from the plan due to unforeseen circumstances, the reduction will still be met.

But a consequence of setting interim targets in this manner is that the progress may appear to fall short of the interim target while meeting or exceeding the total target reduction. For this reason, percentages relative to both the total reduction and the 2020 reduction target are included in the progress report in **SectionE.4.a**, **Table 1-28**.

Individual TMDL Implementation Plans

Practices proposed to be built beyond the 2020 impervious restoration deadline to meet local TMDL WLAs are included in the *Interim Review Draft* Implementation Plan, Part IV, MDOT SHA Watershed TMDL Implementation Plans.

The 2016 Implementation Plan addressed all EPA approved stormwater WLAs prior to the effective date of the MS4 permit in 21 watersheds. WLAs for MDOT SHA include sediment, phosphorus, bacteria, PCBs, and trash. During the FY18 reporting period, the EPA approved four new TMDLs for which MDOT SHA was included in aggregated WLAs. Those TMDLs are listed below and MDOT SHA is working to develop implementation plans for two of the TMDLs for delivery to MDE a year from the approval dates and two were already delivered to MDE during FY19.

- TMDL of Polychlorinated Biphenyls in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments, EPA approval date September 19, 2017;
- TMDL of Sediment in the Non-Tidal South River Watershed, Anne Arundel County, Maryland, EPA Approval date September 28. 2017;
- The TMDL of Sediment in the Other West Chesapeake Watershed, Anne Arundel and Calvert Counties, Maryland, EPA approval date February 9, 2018; and
- Sediment in the Non-Tidal Back River Watershed, Baltimore County and Baltimore City, MD, EPA approval date March 5, 2018.

Implementation plans for the first two TMDLs listed above have been posted to the MDOT SHA website for public review. The implementation plans for the two recent TMDLs are being developed. This is discussed further in **Section E.3** of this report.

i. Schedule

During FY18 MDOT SHA submitted four implementation plans to MDE and in the period of FY19 prior to the October report deadline, MDOT SHA submitted an additional two plans. Four of these plans relate to TMDLs that EPA approved in FY17, and two relate to TMDLs that EPA approved in FY18. There are three sediment TMDLs and three PCB TMDLs. They are outlined in **Table 1-26.**

Table 1-26: TMDL Implementation Plans Submitted to MDE During FY18 and FY19

TMDL	EPA Approval Date	Date Plan Submitted to MDE
TMDL of PBCs in the Bush River Oligohaline Segment, Harford County	8/2/2016 (FY17)	8/2/2017 (FY18)
TMDL of Sediment in the Swan Creek Watershed, Harford County	9/30/2016 (FY17)	9/30/2017 (FY18)
TMDL of PCBs in the Gunpowder River and Bird River Subsegments of the Gunpowder River Oligohaline Segment, Baltimore and Harford Counties	10/3/2016 (FY17)	10/3/2017 (FY18)
TMDL of Sediment in the Lower Gunpowder Falls Watershed	5/4/2017 (FY17)	5/4/2018 (FY18)
TMDL of Polychlorinated Byphenyls in the Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments	9/19/2017 (FY18)	9/18/2018 (FY19)
TMDL of Sediment in the Non-Tidal South River Watershed, Anne Arundel County	9/28/2017 (FY18)	9/28/2018 (FY19)

ii. Cost Estimates

MDOT SHA advertises construction projects on eMaryland Marketplace. Detailed cost estimates for projects that are under design cannot be published due to the bidding process. Once project bids have been opened, the three lowest bids are posted on the MDOT SHA website linked below and can be found by searching for Bid Tabulations at the bottom of the page:

http://www.roads.maryland.gov/pages/cic.aspx?PageId=857

Total expenditures including design, right-of-way, and construction for each restoration contract advertised are included in **Section E.4**, **Table 1-31**.

Lists of proposed practices and estimated costs by FY to achieve the required reductions are included in Part IV of the 2016 MDOT SHA implementation plan under each individual watershed section and in the plans submitted after the 2016 plan.

iii. Documenting Progress

Benchmarks and target end dates for meeting established WLAs are discussed in Parts III and IV of the *Interim Review Draft* of the MDOT SHA Implementation Plan and in the plans submitted subsequent to the 2016 plan.

Figure 1-36: Tree Planting in Howard County

iv. Adaptive Management

If benchmarks are not being met, both the Bay TMDL and the MDE MS4 permit allow for adjustments in the plan to accommodate shortages. This 'adaptive management' concept is discussed in Part II, Section C of the *Interim Review Draft* of the MDOT SHA implementation plan. **Section E.4** of this report discusses progress in meeting the 20 percent impervious restoration requirement compared to benchmarks set in the 2016 plan and revised with the *Interim Review Draft* as well as the local TMDLs.

Figure 1-37: Montrose Road Outfall Stabilization - After Construction

MDOT SHA employs adaptive management measures to ensure implementation progress remains on track. Using database tools to track project development progress, schedules are adjusted frequently within the portfolio of projects to account for unforeseen issues such as political pressure against implementing projects within MDOT SHA right-of-way, SWM small pond and dam safety permitting delays, loss of property owner cooperation, or excessive costs. Other methods that have been employed include alternative contracting mechanisms such as full delivery stream restoration contracts, development of alternative crediting protocols, purchasing listed properties, and partnerships with other jurisdictions. Through these measures, MDOT SHA will ensure that the 20 percent restoration goal will be met.

E.3 Public Participation

Requirements under this condition include:

SHA shall provide opportunity to the public regarding the development of its coordinated TMDL implementation plan by allowing for public participation, soliciting input, and incorporating any relevant ideas and program improvements that can aid in achieving TMDLs and water quality *standards according to the actions below. SHA is required to provide:*

a) Notice in a regional newspaper and SHA's website outlining how the public may obtain information on the development of the coordinated TMDL implementation plan and opportunities for comment;
b) Procedures for providing copies of the coordinated TMDL implementation plan to interested parties upon request;
c) A minimum 30 day comment period before finalizing the coordinated TMDL implementation plan; and
d) A summary in each annual report of how SHA addressed or will address any material comment received from the public.

As discussed in **SectionE.2.b**, and **Table 1-26** MDOT SHA developed and submitted to MDE six implementation plans; four in FY18 and two in FY19. For all the plans, public notices were issued in both the Baltimore Sun and the Washington Post. The plans were also posted for 30 days on the MDOT SHA website with instructions for downloading the plan and submitting comments. Notices and public comment periods for each plan are listed below.

Bush River Oligohaline Segment PCB TMDL Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on June 29, 2017 and June 30, 2017, respectively.
- The public comment period was held from June 28, 2017 to August 2, 2017. No comments were received during the public comment period.

Swan Creek Watershed Sediment TMDL Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on August 25, 2017.
- The public comment period was held from August 25, 2017 to September 25, 2017. No comments were received during the public comment period.

Gunpowder River and Bird River Subsegments of the Gunpowder River Oligohaline Segment PCB Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on September 1, 2017.
- The public comment period was held from September 1, 2017 to October 1, 2017. No comments were received during the public comment period.

Lower Gunpowder Falls Watershed Sediment Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on March 19, 2018.
- The public comment period was held from March 19, 2018 to April 20, 2018. No comments were received during the public comment period.

Patuxent River Mesohaline, Oligohaline and Tidal Fresh Chesapeake Bay Segments PCB Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on August 10, 2018.
- The public comment period was held from August 10, 2018 to September 10, 2018. No comments were received during the public comment period.

Non-Tidal South River Watershed Sediment Implementation Plan

- Notices were posted in the classified section of the Baltimore Sun and the Washington Post on August 24, 2018.
- The public comment period was held from August 24, 2018 to September 24, 2018. No comments were received during the public comment period.

A sample of the newspaper public notice is included as **Figure 1-38**. A screenshot of the MDOT SHA Public Notice webpage during the review and comment period of the *Patuxent River Mesohaline, Oligohaline and Tidal Fresh*

Chesapeake Bay Segments PCB and *Non-Tidal South River Watershed Sediment* implementation plans is presented in **Figure 1-39** below.

OPPORTUNITY FOR PUBLIC REVIEW AND COMMENT

DRAFT IMPLEMENTATION PLAN FOR THE TOTAL MAXIMUM DAILY LOAD (TMDL) OF SEDIMENT IN THE NON-TIDAL SOUTH RIVER WATERSHED, ANNE ARUNDEL COUNTY, MARYLAND

The Maryland Department of Transportation State Highway Administration (MDOT SHA) was issued a National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (MS4) Permit, (Permit No. 11-DP-3313), by the Maryland Department of the Environment (MDE) on October 9, 2015. This permit covers stormwater discharges from the storm drain system owned or operated by MDOT SHA within Anne Arundel, Baltimore, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, Prince George's, and Washington Counties. The permit requires MDOT SHA to submit an implementation plan to MDE that addresses Environmental Protection Agency (EPA)-approved stormwater waste load allocations (WLAs) within one year of EPA approval.

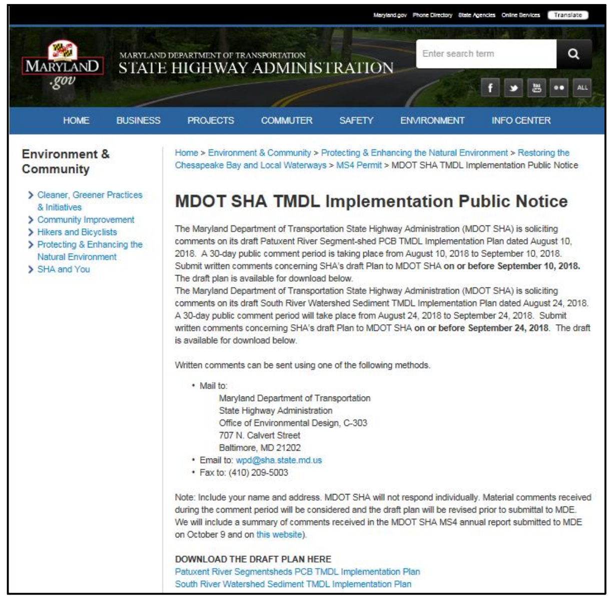
EPA approved the ***Total Maximum Daily Load of Sediment in the Non-tidal South River Watershed, Anne Arundel County, Maryland*** on September 28, 2017. The MDOT SHA Office of Environmental Design (OED) is soliciting comments on its draft Implementation Plan to meet this WLA as required under the MS4 Permit. A 30-day public comment period will take place from August 24, 2018 to September 24, 2018. The draft Implementation Plan is available on MDOT SHA's website at **http://www.roads.maryland.gov/Index.aspx?PageId=362.**

Comments should be submitted to MDOT SHA **on or before September 24, 2018** by emailing to **wpd@sha.state.md.us**, faxing to (410) 209-5003, or mailing to:

Maryland Department of Transportation
State Highway Administration
Office of Environmental Design, C-303
707 N. Calvert Street
Baltimore, MD 21202

Please note that comments should include the name and address of the person submitting the comments. Responses to comments will not be provided directly, but material comments received during the comment period will be considered and the draft Implementation Plan will be revised as appropriate prior to submittal to MDE. A summary of comments received will be included in the MDOT SHA MS4 annual report submitted to MDE annually on October 9 and posted to this website: **http://www.roads.maryland.gov/Index.aspx?pageid=336.**

Figure 1-38: Washington Post Public Notice for Non-Tidal South River Watershed Sediment Implementation Plan



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MDOT SHA TMDL Implementation Public Notice

The Maryland Department of Transportation State Highway Administration (MDOT SHA) is soliciting comments on its draft Patuxent River Segment-shed PCB TMDL Implementation Plan dated August 10, 2018. A 30-day public comment period is taking place from August 10, 2018 to September 10, 2018. Submit written comments concerning SHA's draft Plan to MDOT SHA **on or before September 10, 2018.** The draft plan is available for download below.
The Maryland Department of Transportation State Highway Administration (MDOT SHA) is soliciting comments on its draft South River Watershed Sediment TMDL Implementation Plan dated August 24, 2018. A 30-day public comment period will take place from August 24, 2018 to September 24, 2018. Submit written comments concerning SHA's draft Plan to MDOT SHA **on or before September 24, 2018**. The draft is available for download below.

Written comments can be sent using one of the following methods.

- Mail to:
  Maryland Department of Transportation
  State Highway Administration
  Office of Environmental Design, C-303
  707 N. Calvert Street
  Baltimore, MD 21202
- Email to: wpd@sha.state.md.us
- Fax to: (410) 209-5003

Note: Include your name and address. MDOT SHA will not respond individually. Material comments received during the comment period will be considered and the draft plan will be revised prior to submittal to MDE. We will include a summary of comments received in the MDOT SHA MS4 annual report submitted to MDE on October 9 and on this website).

DOWNLOAD THE DRAFT PLAN HERE
Patuxent River Segmentsheds PCB TMDL Implementation Plan
South River Watershed Sediment TMDL Implementation Plan

Figure 1-39: MDOT SHA TMDL Implementation Plan Public Notice Webpage

E.4 TMDL Compliance

Requirements under this condition include:

SHA shall evaluate and document its progress toward meeting all applicable stormwater WLAs included in EPA approved TMDLs. An annual TMDL assessment report with tables will be submitted to MDE. This assessment shall include complete descriptions of the analytical methodology used to evaluate the effectiveness of SHA's restoration plans and how these plans are working toward achieving compliance with EPA approved TMDLs. SHA shall further provide:

a) Estimated net change in pollutant load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives;

b) A comparison of the net change in pollutant load reductions detailed above with the established benchmarks, deadlines, and applicable stormwater WLAs;

c) Itemized costs for completed projects, programs, and initiatives to meet established pollutant reduction benchmarks and deadlines;

d) Cost estimates for completing all projects, programs, and alternatives necessary for meeting applicable stormwater WLAs; and *e) A description of a plan for implementing additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate.*

E.4.a Progress Achieved and Practices Implemented

The progress reported here includes both impervious restoration and TMDL pollutant load reduction implementation efforts. All the practices used to meet the impervious restoration goal were used to model TMDL reduction strategies for both the Chesapeake Bay TMDL and local TMDLs.

Impervious Restoration Progress

MDOT SHA worked to complete the various initiatives reported for the final baseline treatment accounting in the June 29, 2018 submission and stands behind that assessment. For this reason, and because that accounting integrated revisions related to comments from MDE related to previous accounting methods, MDOT SHA has determined to base the progress evaluation for this report on the 2018 assessment and 20 percent goal of 4,439 acres, rather than hold to the 4,709 acres from 2017 accounting.

Figure 1-40: Tree Planting Site

MDOT SHA has implemented a variety of BMPs to meet the 20 percent restoration requirement of 4,439 acres. A breakdown of the restoration BMP types and the restoration credit provided by each is provided in **Table 1-27** and **Figure 1-45**. This progress includes restoration practices implemented between the baseline year and the end of FY18. Only practices that were not previously reported as restoration practices in this timeframe are included in this credit assessment.

As discussed in the June 29, 2018 final baseline assessment, some restoration credit was switched to baseline treatment for BMPs built prior to 10/21/2010. According to MDE direction, facilities that were built (and are currently in functioning condition) prior to the previous permit term expiration date of 10/21/2010 are applied to the baseline treatment and those built or implemented after that date are applied against the 20 percent restoration goal. This June 29, 2018 submittal corrected a misunderstanding that was included in the 7/31/2017 submission and 2017 Annual Report, where certain BMPs built prior to 10/21/2010 were included as restoration BMPs. Those BMPs are now reflected on the baseline treatment and this credit variance, along with all variations between the 2017 to 2018 Annual Report are detailed in **Appendix D**.

MDOT SHA confirmed with MDE that as the 2020 deadline approaches, if the restoration requirement for this permit term is exceeded, excess restoration credit will be applied to the next permit term restoration requirement. This approach will allow MDOT SHA to over program in order to ensure that enough practices are under development to account for unforeseen circumstances that may preclude some of them from being completed during the permit term.

Annual Operations Practices

MDOT SHA has implemented a suite of BMPs including capital projects and annual operations practices. Impervious credit for the annual practices of street sweeping and inlet cleaning also are included in **Table 1-27**. MDOT SHA began taking restoration credit for these annual practices in FY 17 and has increased inlet cleaning activities to the extent that additional restoration has been added to the FY18 progress.

In dealing with these annual practices, it is understood that it must be ensured that a consistent level of treatment be maintained from the time the restoration credit is claimed moving forward.

Currently, MDOT SHA is confident that it is providing 33 acres and 175 acres of restoration credit for street sweeping and inlet cleaning credit, respectively. The data included with this report shows an amount of inlet cleaning and sweeping achieved for FY18 aligned with the claimed restoration credit.

Data Delivery

MDOT SHA has provided restoration BMP information in the following feature classes and tables as specified in the May 2017 MDE Geodatabase Guideline format:

- Restoration BMP feature class (RST)
- Alternate BMP Polygon feature class (APY)
- Alternate BMP Line feature class (ALN)
- Stream Restoration Protocols table (SRP)

A document has been prepared as **Appendix B** (*Restoration Accounting Methodology*) of this report which provides a step-by-step procedure for calculating the restoration credit using the MDOT SHA data provided in the May 2017 MDE Geodatabase Guideline format.

Figure 1-41: Bioretention BMP in Frederick County - Under Construction

Figure 1-42: Bioretention BMP in Frederick County - Under Construction

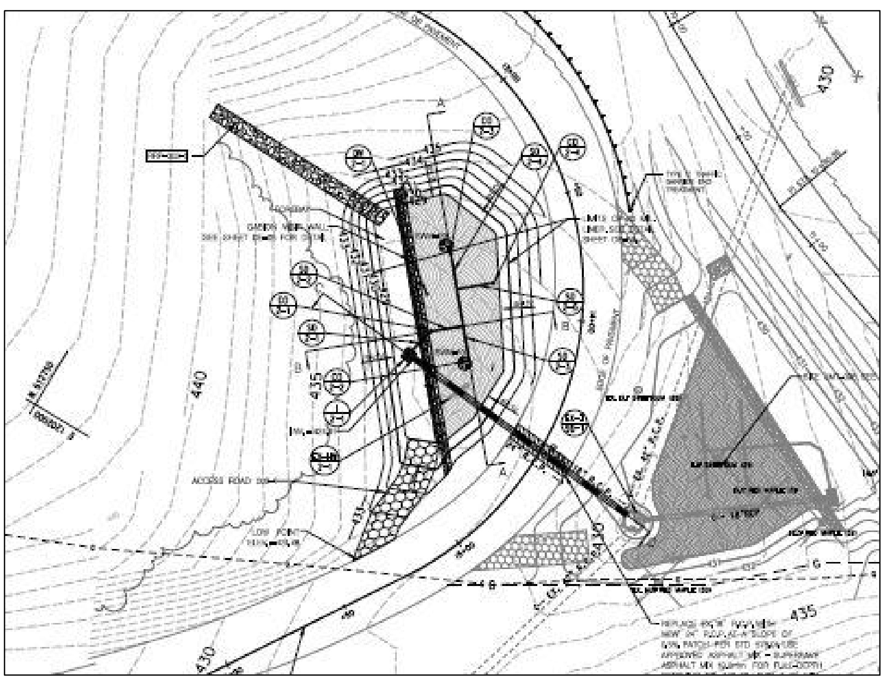


Figure 1-43: Bioretention BMP in Frederick County - Design Plan

Figure 1-44: Bioretention BMP in Frederick County - After Construction

Table 1-27: Impervious Restoration Credit by BMP Type for Timeframe between Baseline Year* through FY18

BMP Type	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater Control Structures	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit Existing Stormwater Control Structures	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25.00	175.00
Street Sweeping	0.00	0.00	33.00	0.00	33.00
Totals	**1,034**	**368**	**397**	**239**	**2,038**
20% Restoration Target					**4,439**
% Impervious Restoration					**9.2%**
% Progress Towards Restoration Goal					**45.9%**

See **Table 1-25 for variable baseline years by MS4 County.*

***See **Appendix D** for an analysis of impervious restoration credit variance to trace credit differences between reporting years.*

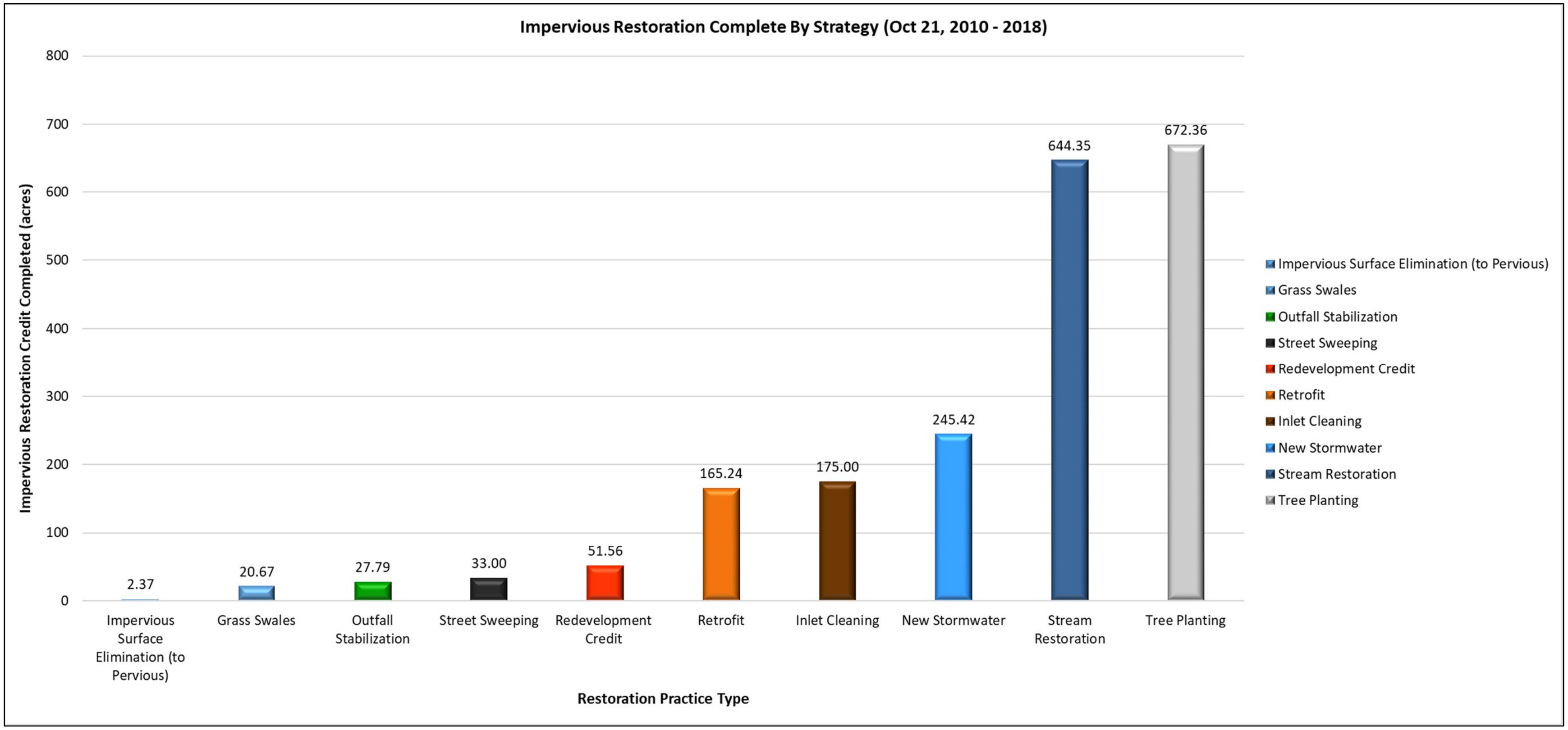


Figure 1-45: Impervious Restoration Completed by BMP Type (Oct 21, 2010 – June 30, 2018)

Pollutant Load Reductions Achieved

Table 1-28 in this annual report, shows FY18 progress reductions for each pollutant and watershed and compares this progress to 2020 interim targets and final reduction targets. Figures are also included that depict target reductions, FY18 progress, and BMPs implemented by watershed for sediment (**Figure 1-48**) , phosphorus (**Figure 1-49**), and trash (**Figure 1-50)**. Reductions for PCBs and bacteria are not suited to such depictions due to relatively small achievements to date.

Figure 1-46: Grass Swale Upgrade along I-97

A few of the TMDLs have been met or exceeded already and including Rock Creek and Upper Monocacy for phosphorus, and Jones Falls for trash.

Figure 1-47: Grass Swale Upgrade along I-97

To reiterate the discussion in **Section E.2** concerning interim targets, some of the interim targets shown in **Table 1-28** may exceed the total reduction targets. This will result in cases where the FY18 progress reduction meets of exceeds the total reduction but does not meet the interim target. Interim targets were set to reflect actual modeling and in some watersheds an excess of practices are planned due to circumstances that favor increased levels of restoration implementation. This provides added assurance that the WLAs in these instances will be met if unforeseen circumstances preclude all the BMPs from being implemented.

Table 1-28: Local TMDL Pollutant Reduction Progress Through June 30, 2018

Watershed Name	County	Pollutant	Unit	MDOT SHA Reduction Target	2020 Interim Reduction Target	Reduction Achieved as of 6/30/2018	% Reduction Achieved Relative to Total Reduction Target	% Reduction Achieved Relative to 2020 Reduction Target
Nutrient and Sediment TMDLs								
Antietam Creek	WA	Phosphorus	EOS-lbs/yr	277	102	41	15%	40%
		Sediment	EOS-lbs/yr	1,007,480	108,098	63,353	6%	59%
Bynum Run	HA	Sediment	EOS-lbs/yr	24,316	16,469	16,061	66%	98%
Cabin John Creek	MO	Sediment	EOS-lbs/yr	231,907	79,327	18,357	8%	23%
Catoctin Creek	FR	Phosphorus	EOS-lbs/yr	153	393	10	6%	2%
		Sediment	EOS-lbs/yr	594,338	280,379	39,907	7%	14%
Conococheague Creek	WA	Sediment	EOS-lbs/yr	522,112	43,821	38,068	7%	87%
Double Pipe Creek	FR, CL	Phosphorus	EOS-lbs/yr	1,040	585	20	2%	3%
	FR, CL	Sediment	EOS-lbs/yr	455,050	371,013	10,137	2%	3%
Gwynns Falls	BA	Sediment	EOS-lbs/yr	498,014	37,415	19,170	4%	51%
Jones Falls	BA	Sediment	EOS-lbs/yr	94,768	64,214	63,266	67%	99%
Liberty Reservoir	BA, CL	Phosphorus	EOS-lbs/yr	563	82	69	12%	84%
		Sediment	EOS-lbs/yr	506,848	68,649	66,892	13%	97%
Little Patuxent River	AA, HO	Sediment	EOS-lbs/yr	524,969	687,501	369,572	70%	54%
Lower Gunpowder Falls	BA	Sediment	EOS-lbs/yr	170,420	418,246	8,813	5%	2%
Lower Monocacy River	CL, FR, MO	Phosphorus	EOS-lbs/yr	1,119	1,108	106	10%	10%
	FR, MO	Sediment	EOS-lbs/yr	1,002,040	384,523	51,140	5%	13%
Patapsco LN Branch	AA, BA, HO	Sediment	EOS-lbs/yr	473,754	309,836	54,259	11%	18%
Patuxent River Upper	AA, HO, PG	Sediment	EOS-lbs/yr	39,183	100,163	8,294	21%	8%

Table 1-28: Local TMDL Pollutant Reduction Progress Through June 30, 2018

Watershed Name	County	Pollutant	Unit	MDOT SHA Reduction Target	2020 Interim Reduction Target	Reduction Achieved as of 6/30/2018	% Reduction Achieved Relative to Total Reduction Target	% Reduction Achieved Relative to 2020 Reduction Target
Potomac River MO County	MO	Sediment	EOS-lbs/yr	320,708	48,320	18,972	6%	39%
Rock Creek	MO	Phosphorus	EOS-lbs/yr	354	992	989	279%	100%
		Sediment	EOS-lbs/yr	666,193	661,381	656,594	99%	99%
Seneca Creek	MO	Sediment	EOS-lbs/yr	596,436	363,663	195,323	33%	54%
South River	AA	Sediment	EOS-lbs/yr	64,205	1,004,800	52,414	82%	5%
Swan Creek	HA	Sediment	EOS-lbs/yr	7,675	5,400	5,026	65%	93%
Upper Monocacy River	CL, FR	Phosphorus	EOS-lbs/yr	54	131	83	153%	64%
	CL, FR	Sediment	EOS-lbs/yr	412,831	65,776	47,034	11%	72%
PCB TMDLs								
Anacostia River Tidal	PG	PCBs	g/yr	16.08	0.97	0.3	2%	28%
Back River Oligohaline Tidal	BA	PCBs	g/yr	10.31	0.36	0.3	3%	95%
Baltimore Harbor	AA, BA	PCBs	g/yr	5.65	1.36	0.0	1%	3%
Bear Creek	BA	PCBs	g/yr	5.79	0.64	0.1	2%	22%
Bird River	BA	PCBs	g/yr	0.88	0.08	0.0	3%	32%
Bush River Oligohaline	HA	PCBs	g/yr	6.85	0.34	0.3	4%	88%
Curtis Creek/Bay	AA	PCBs	g/yr	29.26	1.39	0.9	3%	62%
Lake Roland	BA	PCBs	g/yr	4.71	0.22	0.1	2%	39%
NE Branch Anacostia River	MO, PG	PCBs	g/yr	7.89	0.23	0.1	1%	30%
NW Branch Anacostia River	MO, PG	PCBs	g/yr	7.55	0.36	0.1	2%	40%

Table 1-28: Local TMDL Pollutant Reduction Progress Through June 30, 2018

Watershed Name	County	Pollutant	Unit	MDOT SHA Reduction Target	2020 Interim Reduction Target	Reduction Achieved as of 6/30/2018	% Reduction Achieved Relative to Total Reduction Target	% Reduction Achieved Relative to 2020 Reduction Target
Patuxent River Tidal Fresh	AA, FR, HO, MO, PG	PCBs	g/yr	5.09	0.14	0.1	1%	53%
Potomac River Upper Tidal	CH, PG	PCBs	g/yr	1.14	0.06	0.0	1%	16%
Trash TMDLs								
Anacostia	MO	Trash	lbs/yr	6,044	3,273	2,273	38%	69%
	PG	Trash	lbs/yr	14,134	5,604	4,229	30%	75%
Patapsco - Gwynns Falls	BA	Trash	lbs/yr	2,415	2,499	1,390	58%	56%
Patapsco - Jones Falls	BA	Trash	lbs/yr	1,490	1,679	1,679	113%	100%
Note: For the Trash WLA MDOT SHA is required to continue practicing trash removal activities that are captured in the baseline and remove 100% of the WLA set in the TMDL documents.								
Bacteria TMDLs								
Baltimore Harbor - Marley Creek	AA	Enterococci	billion counts / day	26,525	1,300	1,114	0	86%
Baltimore Harbor - Furnace Creek	AA	Enterococci	billion counts /day	15,678	3,050	1,464	9%	48%
Loch Raven Reservoir	BA, CL, HA	E. coli	billion MPN /yr	99,289	1,818	1,762	2%	97%
Patapsco River LN Branch	AA, BA, CL, HO	E. coli	billion MPN /yr	34,276	1,829	843	2%	46%
Patuxent	AA, PG	E. coli	billion MPN /yr	11,869	45	45	0%	100%

Table 1-28: Local TMDL Pollutant Reduction Progress Through June 30, 2018

Watershed Name	County	Pollutant	Unit	MDOT SHA Reduction Target	2020 Interim Reduction Target	Reduction Achieved as of 6/30/2018	% Reduction Achieved Relative to Total Reduction Target	% Reduction Achieved Relative to 2020 Reduction Target
Chesapeake Bay TMDLs								
MS4 Area Wide	N/A	Nitrogen	DEL-lbs/yr	88,281	44,140	20,238	23%	46%
MS4 Area Wide	N/A	Phosphorus	DEL-lbs/yr	25,994	12,997	5,959	23%	46%
MS4 Area Wide	N/A	Sediment	DEL-lbs/yr	14,910,510	7,455,255	3,418,180	23%	46%
Note: The Modeling was conducted for the entire permitted area. MDOT SHA assumed a baseline year of 2011.								

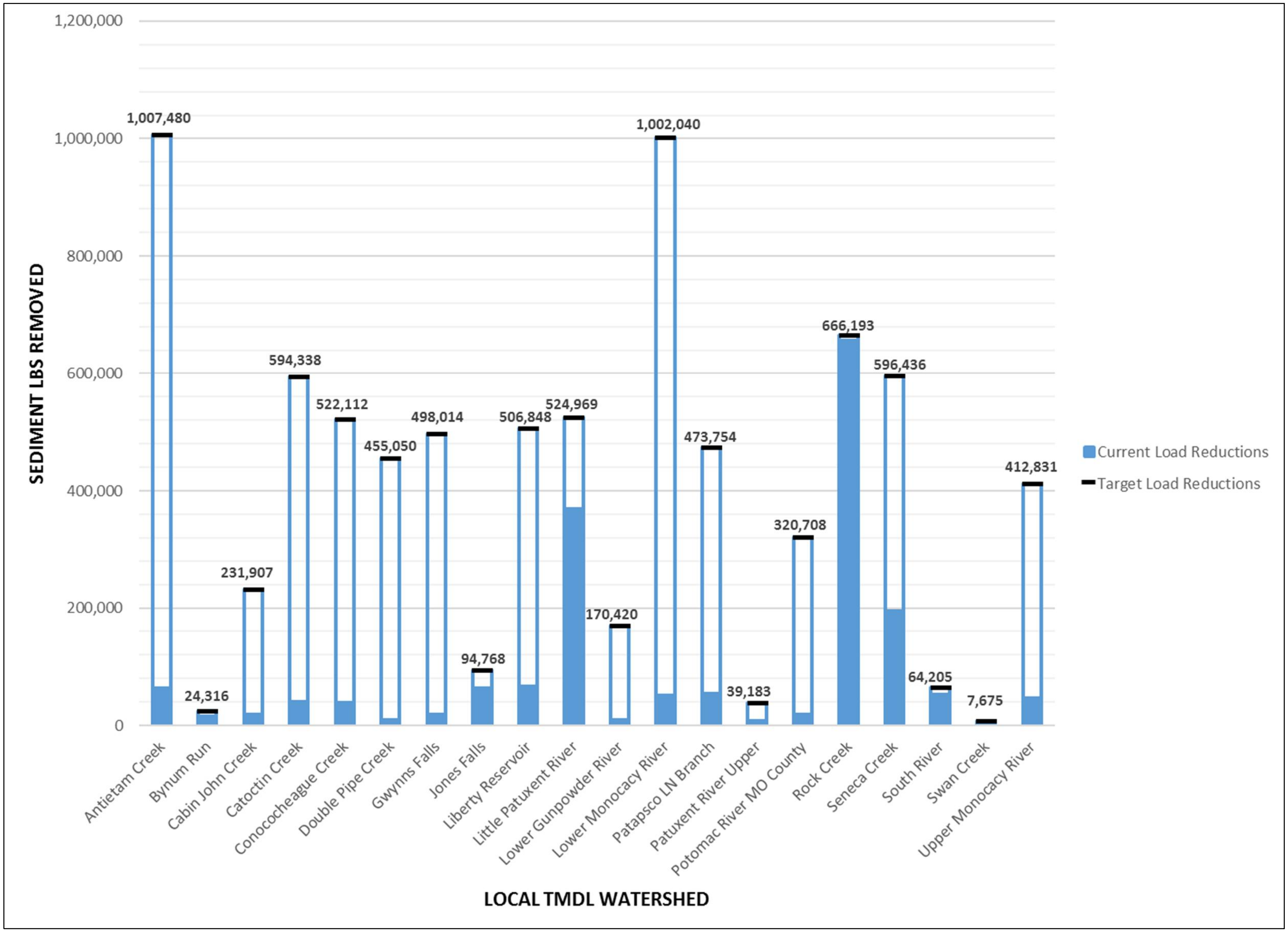


Figure 1-48: Sediment Reductions Achieved to Date

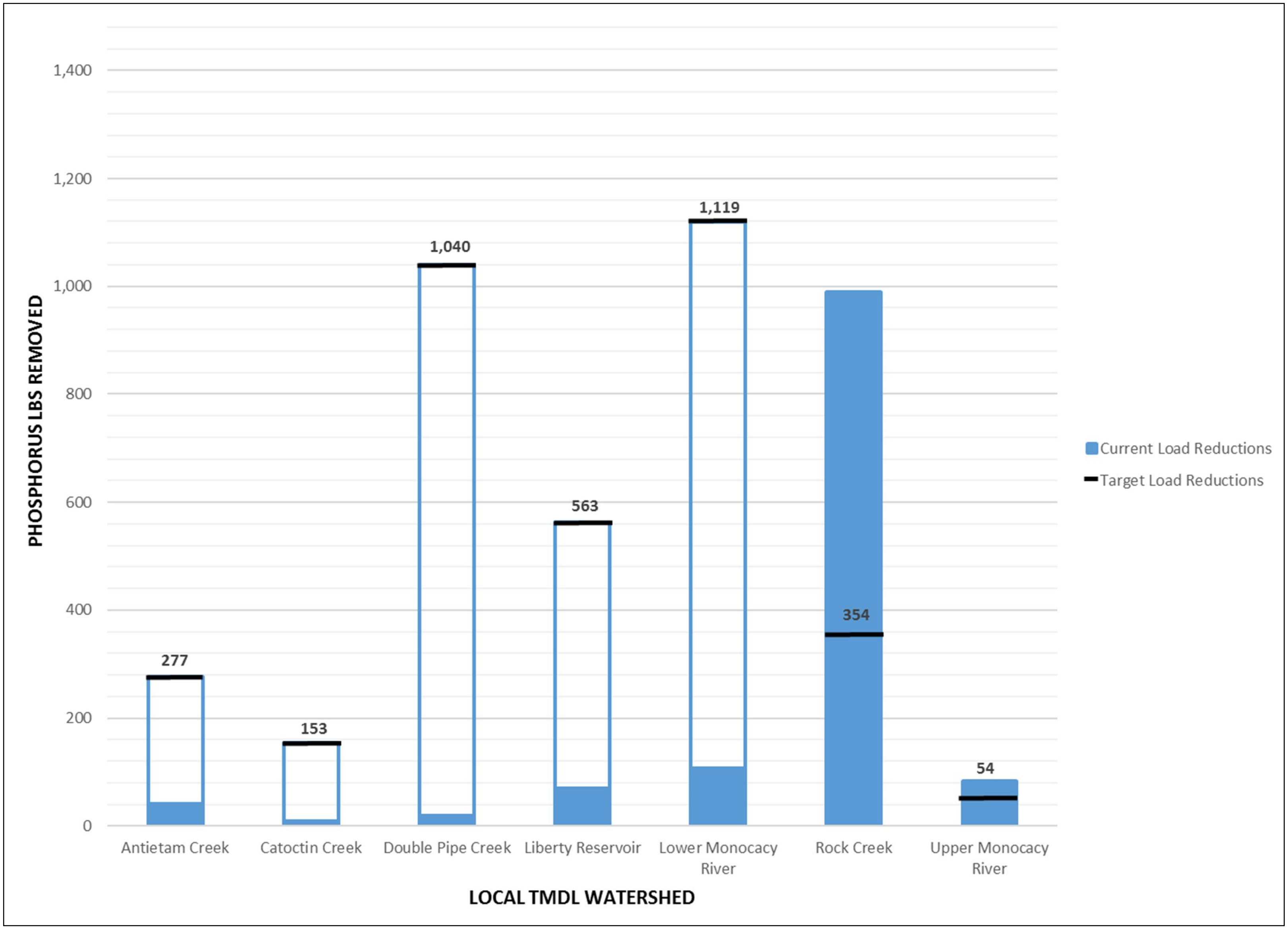


Figure 1-49: Phosphorus Reductions Achieved to Date

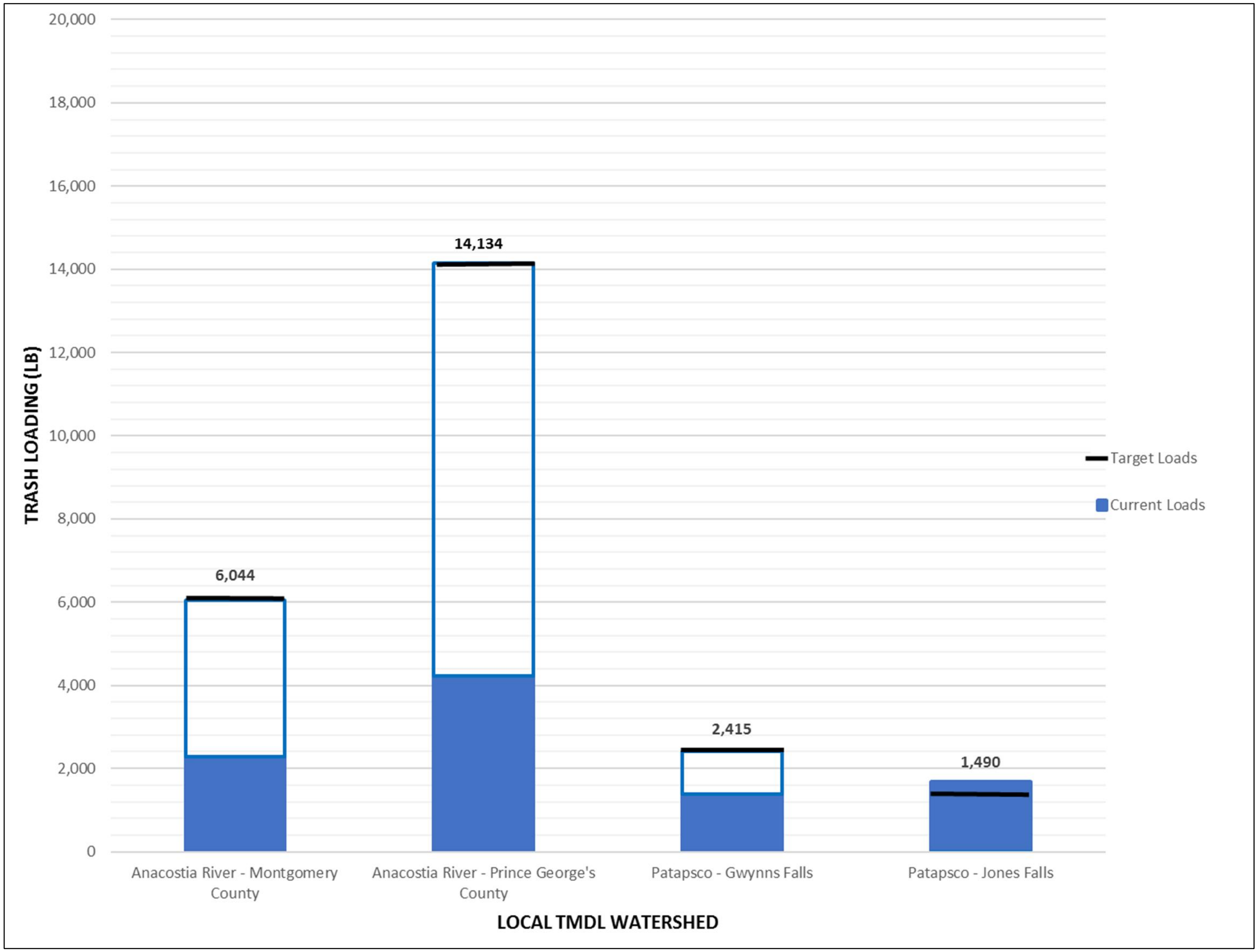


Figure 1-50: Trash Reductions Achieved to Date

Figure 1-51: SW Facility at Rosaryville State Park

E.4.b Benchmark Comparisons

Impervious Restoration Benchmarks

The 2016 MDOT SHA Implementation Plan included a schedule projecting restoration benchmarks through the first quarter of FY21 in Part II.D, Table 2-1. As a result of adaptive management and the maturation of the restoration project portfolio, MDOT SHA is proactively adjusting the annual benchmark for FY19 as presented in **Table 1-29** below. Since the original benchmarks were established, MDOT SHA issued the full delivery stream restoration contract and as a result, the benchmark for FY19 is being adjusted to reflect anticipated delivery of the full delivery stream credit in 2020 and 2021. This contract is projected to yield 1,706 acres of impervious restoration credit through stream restoration. For this reason, MDOT SHA is adjusting the FY19 benchmark down to 50 percent from 65 percent. The benchmarks for FY20 and FY21 remain unchanged.

Table 1-29 and **Figure 1-53** below compare the MDOT SHA impervious restoration progress through the end of FY18 to the impervious restoration benchmarks. The progress reflected in **Table 1-29** is based on the 2018 final baseline accounting and a restoration goal of 4,439 acres. As can be seen, MDOT SHA is currently exceeding its anticipated restoration achievements. MDOT SHA was originally projected to have achieved 45 percent of its restoration goal by the end of FY18 and has accomplished 46 percent.

Figure 1-54 displays cumulative impervious restoration progress by restoration BMP type through the end of FY18.

Figure 1-52: Bioretention at Rosaryville State Park

TMDL Pollutant Reduction Benchmarks

Benchmarks and comparative reductions for TMDL pollutants are discussed above under **Section E.4.a**.

Table 1-29: Percentage of Impervious Treatment (Benchmark versus Achieved)

	Benchmarks					Actual Achieved	
	Original (2016)	Original (2016)	Revised (2018)	Revised (2018)	Revised (2018)		
Fiscal Year	% Impervious Restoration	% Progress Toward Restoration Goal	% Impervious Restoration	% Progress Toward Restoration Goal	Projected Acres	Actual Restoration Achieved (Acres)	% Progress Toward Restoration Goal
Oct 21, 2010 to 2015	4%	20%	--	--	887.8	**1,034**	**23%**
2016	6%	30%	--	--	1,331.7	**1,403**	**32%**
2017	8%	40%	--	--	1,775.6	**1,799**	**41%**
2018	9%	45%	--	--	1,997.55	**2,038**	**46%**
2019	13%	65%	*10%	*50%	2,219.5		
2020	19%	95%	19%	95%	4,217.05		
2021	20%	100%	20%	100%	4,439		
*Represents a change in FY19 to adjust the original estimate % progress towards the MDOT SHA restoration goal from 65% and 13% impervious restoration to 50% and 10% respectively, due to changes to our implementation strategy applied through adaptive management. Specific details discussed above.							

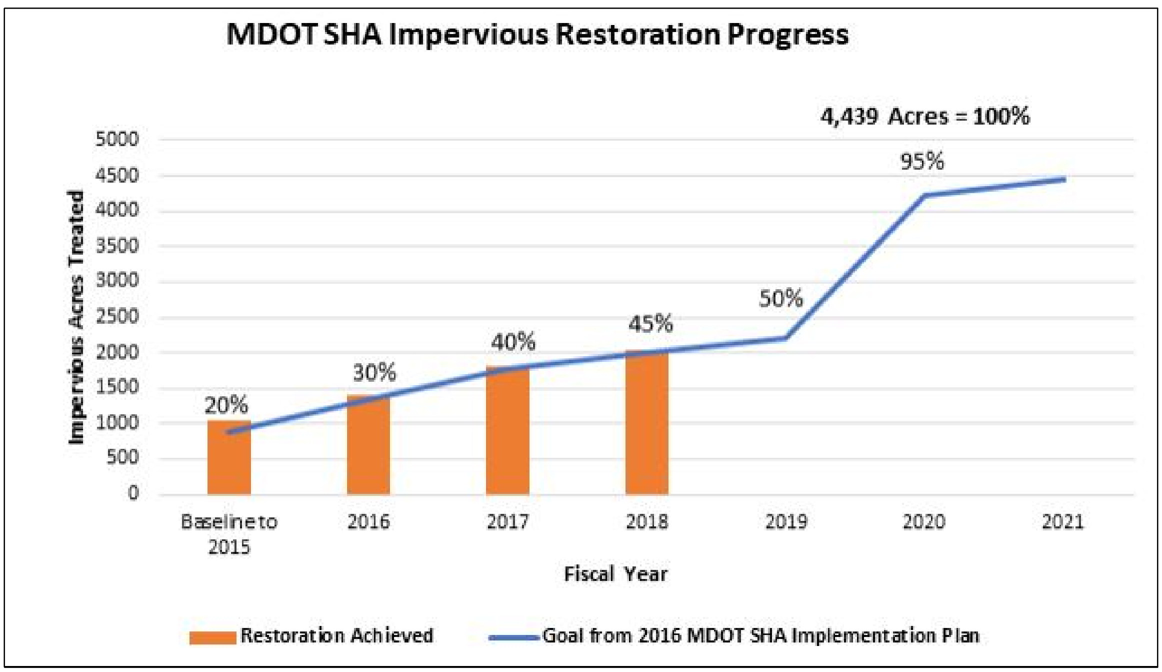


Figure 1-53: MDOT SHA FY18 Impervious Restoration Achieved Compared to Benchmark

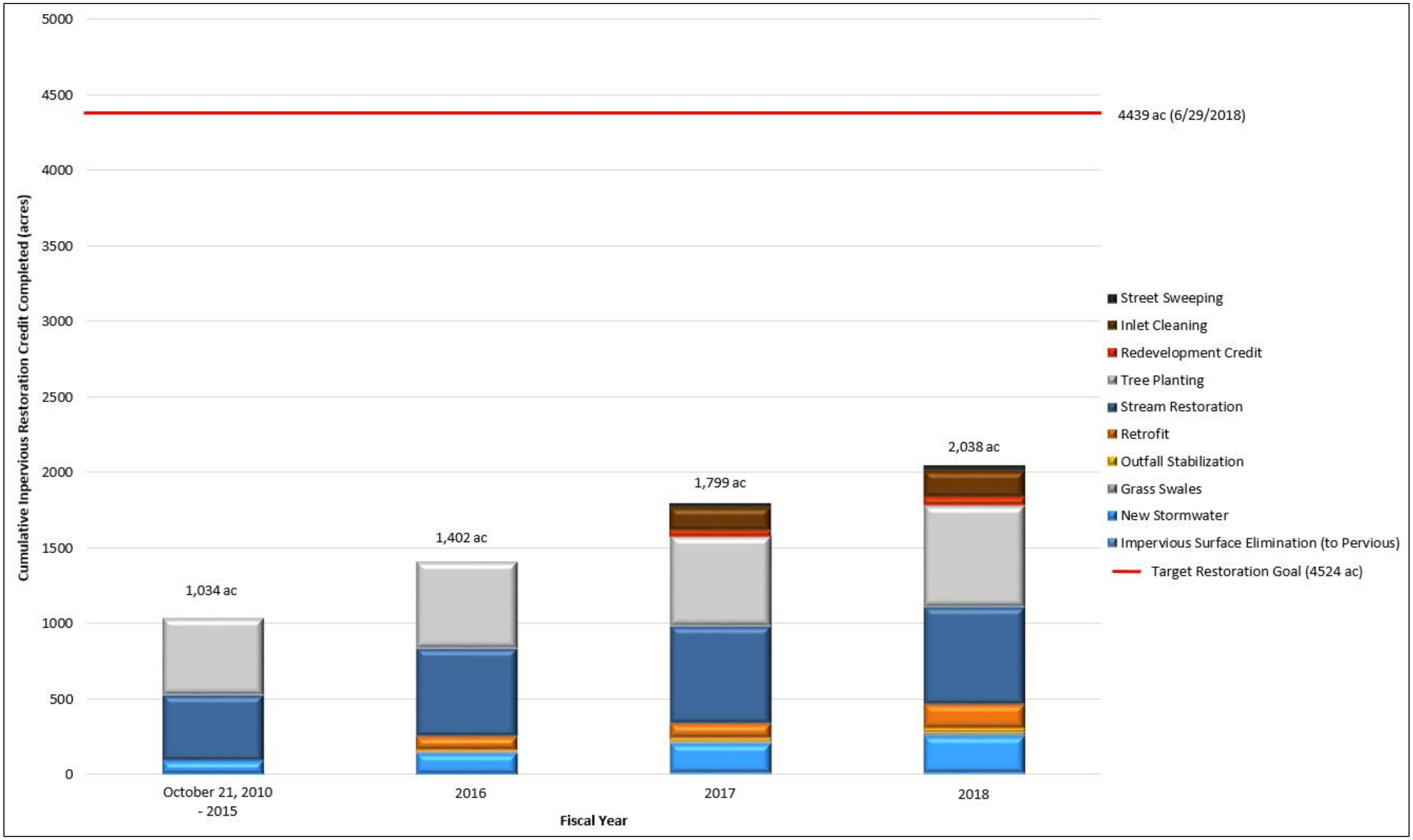


Figure 1-54: Cumulative Impervious Restoration Progress

E.4.c Itemized Costs

Impervious Restoration Costs

Expenditures are itemized for each restoration project that has advertised, is under construction, or has completed construction in **Table 1-31** . These expenditures are not always final because each project listed may be at different levels of completion. These costs include everything specific to implementing each BMP type and can include engineering design, right-of-way or easement acquisitions, and construction.

Each restoration project contains several BMPs and providing exact expenditures for each individual BMP is not possible. Estimated expenditures for individual BMPs have been derived by dividing the overall project cost by the impervious restoration credit provided by each project. Tables in **Appendix H** list BMPs built for each project (ordered by MDOT SHA project or FMIS number) and the impervious restoration acres provided by each. The expenditures per credit acre for each project can be multiplied by the credit each BMP is providing to derive an estimated per BMP cost. This cost data is not included in **Table 1-31**, but is added to the IMPL_COST field in the RestBMP (RST) feature class. This calculation is only performed for projects that have completed construction and are listed with all the BMPs built.

MDOT SHA has provided BMP cost information for completed projects through FY18 (restoration BMPs) using the following feature classes as specified in the May 2017 MDE Geodatabase Guideline format:

- Restoration BMP feature class (RST)
- Alternate BMP Polygon feature class (APY)
- Alternate BMP Line feature class (ALN)

Additionally, a comprehensive list of restoration practices completed from 2011 to June 30, 2017, broken down by FMIS contract, is included in **Appendix H**. Each entry includes location information and estimated impervious runoff treatment acreages.

Local TMDL Implementation Costs

Lists of proposed BMPs and estimated costs are included in Part IV of the *Interim Review Draft* of the MDOT SHA Implementation Plan and the separate plans subsequently developed and submitted to MDE.

E.4.d Cost Estimates for Completing Restoration

MDOT SHA has programmed capital funding through the Fund 82 TMDL Restoration fund to meet the impervious restoration target and fund the MS4 program in the amounts indicated in **Table 1-30** below. Planning through this timeframe is accomplished accompanied by continuous project delivery assessments to adjust as necessary.

Table 1-30: Fund 82 Allocations (Capital Funds)

Fiscal Year	Allocations (Millions)
2019	$98.5
2020	$92.3
2021	$64.1
2022	$53.6
2023	$53.6
2024	$67.5
Total 2019 - 2024	**$429.6**

E.4.e Gap-Filling Watershed Action Plan

The MDOT SHA OED staff and funding resources are functioning at capacity to develop and implement the 20 percent restoration plan. Part of that effort is focused on developing more efficient ways to deliver projects for credit or reduce the restoration requirement through methods to reduce the impervious baseline. Baseline reduction methods have been fully realized for the 2020 permit term and will be used in developing the 2019 impervious accounting for the next permit. An excess of potential implementation projects has been identified and evaluated for implementation. Many of these projects are currently under design or shelved at strategic milestones that will enable them to be reactivated if needed.

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
AA0825182	Streams	STREAM RESTORATION TARNANS BRANCH	$0	$0	$97,991	$97,991	1	0	35.96	0
AA0825282	Streams	STREAM RESTORATION BACON RIDGE	$0	$0	$301,185	$301,185	1	0	174.6	0
AA1665182	Streams	I-97 SB WEST OF EAST-WEST BOULEVARD	$227,446	$1,781,399	$584,893	$2,593,738	2	2	7.5	7.5
AA7955282	SWM	AT VARIOUS LOCATSION - GROUP 1	$859,762		$1,036,470	$1,896,232	9	6	4.83	2.44
AA8955182	Streams	SRI - BROAD CREEK STREAM RESTORATION	$314,269		$1,902,841	$2,217,110	1	1	24.14	24.14
AT0415182	Trees	SRI-TREE PLANT-VAR LOC IN DISTRICT 3	$953,766		$1,684,666	$2,638,432	89	89	18.92	18.92
AT0425182	Trees	TREE PLANTING IN WASHINGTON COUNTY	$178,807		$1,455,691	$1,634,498	82	82	19.5	19.5
AT0445182	Swales	GRASS SWALE, ATTENUATION SWALE OR DRY SWALE	$199,503		$5,390,192	$5,589,695	37	37	20.67	20.67
AT0685282	Trees	SRI-TREE PLANTING-VAR LOC BALTIMORE CO	Separate PP/PE Task		$1,618,230	$1,618,230	129	129	30.52	30.52

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
AT0685382	Trees	SRI-AT VARIOUS LOCATION - D4	Separate PP/PE Task		$1,964,073	$1,964,073	102	102	29.96	29.96
AT0685482	Trees	TREE PLANTING-VAR LOC IN AA AND CH	Separate PP/PE Task		$1,413,044	$1,413,044	87	87	19.65	19.65
AT0685582	Trees	SRI-TREE PLANTING-VAR LOC IN CECIL CO	Separate PP/PE Task		$687,263	$687,263	34	34	8.57	8.57
AT0865182	Retrofits	DRAINAGE IMPROVEMENTS AT VARIOUS LOCATIONS IN DISTRICT 3	$30,000	$10,265	$5,509,083	$5,549,349	14	14	56.06	56.06
AT0875182	Retrofits	TMDL STORMWATER FACILITY ENHANCEMENT IN DISTRICT 5 - DESIGN BUILD		$425,044	$4,752,939	$5,177,983	11	11	64.77	64.77
AT0875282	Retrofits	AT VARIOUS LOCATIONS IN AA COUNTY	$12,572		$776,142	$788,714	1	1	6.03	6.03
AT0885182	SWM	TC56-TMDL AT VARIOUS LOCATIONS IN DIST 7	$1,048,097		$5,397,060	$6,445,157	69	69	32.93	32.93
AT0895182	SWM	TC56-AT VARIOUS LOCATIONS IN DIST 5	$500,038		$1,737,127	$2,237,165	24	24	12.91	12.91
AT4285282	Impervious Removal	AT VARIOUS LOCATIONS-DISTRICT 7-GROUP 1	$686,641		$2,135,272	$2,821,913	8	8	1.84	1.84
AT5025182	Trees	TC70-CHESAPEAKE BAY WATERSHED PROGRAM-D4	Separate PP/PE Task		$1,568,585	$1,568,585	111	111	38.91	38.91

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
AT5025282	Trees	TC70-CHESAPEAKE BAY WATERSHED PROGRAM D7	Separate PP/PE Task		$2,912,940	$2,912,940	143	143	75.57	75.57
AT5025382	Trees	TC70-CHESAPEAKE BAY WATERSHED PROG D-3,5	Separate PP/PE Task		$729,320	$729,320	47	47	23.61	23.61
AT5025482	Trees	TC70-CHESAPEAKE BAY WATERSHED PROGRAM-D6	Separate PP/PE Task		$1,212,257	$1,212,257	56	56	31.37	31.37
AT7995382	SWM	TC70-SWM AT VARIOUS LOCATIONS IN DIST 5	$166,191		$3,332,757	$3,498,948	47	47	18.86	18.86
AW0435182	Trees	TREE PLANTING AT VARIOUS LOC - DIST 4	$817,782	$0	$106,886	$924,668	53	0	13.68	0
AW0435382	Trees	TREE PLANTING ON DNR IN DISTRICT 4	$0	$0	$9,527	$9,527	10	6	22.81	17.77
AW0445282	Trees	AT VARIOUS LOCATIONS IN DISTRICT 7-CL CO	$165,598	$0	$415,711	$581,309	58	12	22.39	14.04
AW0445182	Trees	TREE PLANTING AT VARIOUS LOC - DIST 7	$836,125		$324,573	$1,160,698	85	10	30.43	2.83
AW0465182	Trees	TREE PLANTING AT VARIOUS LOC - DIST 3	$243,364		$382,025	$625,389	13	13	3.29	3.29
AW0475182	Trees	AT VARIOUS LOCATIONS IN ANNE ARUNDEL CO	$923,781		$971,801	$1,895,582	92	92	22.82	22.82

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
AW0825282	Trees	SRI-TREE PLANTING AT VAR LOC IN D-7	Separate PP/PE Task		$2,679,952	$2,679,952	193	193	53.2	53.2
AX0335182	Streams	PATAPSCO VALLEY ST PK-STREAM RESTORATION	$415,006	$0	$629,372	$1,044,377	1	1	2.38	2.38
AX2645182	SWM	TC11-LEGACY PAVEMENT IMP-DIST 2/DIST 4	$1,245,680		$4,995,307	$6,240,987	60	60	30.48	30.48
AX2645282	SWM	TC11-LEGACY PAVEMENT IMP-DISTRICT 3	$419,335		$2,771,928	$3,191,263	17	17	6.02	6.02
AX2645382	SWM	TC11-LEGACY PAVEMENT IMP-DISTRICT 5	Separate PP/PE Task		$1,263,859	$1,263,859	13	13	5.11	5.11
AX2645482	SWM	LEGACY PAVEMENT IMP-DIST 7/SOME DIST 6	$327,282		$3,283,794	$3,611,076	55	55	23.4	23.4
AX3765360	Streams	RESTORATION OF NW-170	Breakdown Unknown, Cost Estimated - Part of Larger Effort			$0	1	1	60.11	60.11
AX3765560	Streams	RESTORATION OF NB-1	Breakdown Unknown, Cost Estimated - Part of Larger Effort			$0	2	2	91.99	91.99
AX3765D60	Streams	RESTORATION OF PB-85	Breakdown Unknown			$0	1	1	64.5	64.5
AX3765E60	Streams	RESTORATION OF PB-37, PB-108, PB-8	Breakdown Unknown, Cost			$0	3	3	53.61	53.61

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
			Estimated - Part of Larger Effort							
AX3765F60	Streams	RESTORATION OF PB-119, PB-109	Breakdown Unknown, Cost Estimated - Part of Larger Effort			$0	2	2	27.26	27.26
AX3765K60	Streams	RESTORATION OF IC-62	Breakdown Unknown			$0	1	1	12.09	12.09
AX3765L60	Streams	STREAM RESTORATION OF CRICKET LAND TRIBUTARY (NW-4)	Breakdown Unknown			$0	1	1	51.71	51.71
AX3765N60	Streams	RESTORATION OF SC-2 - GOSHAN BRANCH	Breakdown Unknown			$0	1	1	39.91	39.91
AX3765U60	Streams	RESTORATION OF RC-2	Breakdown Unknown			$0	1	1	48.54	48.54
AX3785R60	Streams	STREAM RESTORATION OF PB-12A, PB-12B AT HOLLYWOOD BRANCH	Breakdown Unknown		$3,753,209	$3,753,209	2	2	63.61	63.61
AX7665482	Retrofit	AT VARIOUS LOC IN AA COUNTY-GROUP 1	$2,320,673	$8,423	$1,145,250	$3,474,346	5	0	21.39	0
AX7665682	Retrofit	AT VARIOUS LOCATIONS IN DIST 3-GROUP 1	$1,735,767	$0	$208,581	$1,944,347	8	0	16.93	0
AX7665C82	Retrofit	AT VARIOUS LOCATIONS IN D-7, GROUP 2	$0	$0	$653,854	$653,854	5	1	19.12	2.59

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
AX7665182	Retrofits	SRI-AT VARIOUS LOCATIONS IN DISTRICT 4	$1,494,480		$4,275,856	$5,770,336	12	12	19.08	19.08
AX7665282	Retrofits	TC94-SWM AT VARIOUS LOCATIONS - GROUP 1	$2,533,710		$15,017	$2,548,727	12	0	37.75	0
AX7665582	Retrofits	AT VARIOUS LOCATIONS IN WA CO - GROUP 1	$754,373		$1,828,542	$2,582,915	5	5	16.72	16.72
AX7665B82	Retrofits	AT VAR LOCATIONS IN AA COUNTY-GROUP 1A			$6,316	$6,316	3	0	11.92	0
AX9295182	SWM	TC70-SWM AT VARIOUS LOCATION IN DIST 3	$161,555		$2,474,194	$2,635,749	17	17	11.26	11.26
BA2015482	Outfalls	WHITE MARSH TRIBUTARY AT MD 43	$329,122	$0	$280,217	$609,339	1	0	5.3	0
BA2015582	Retrofit	AT VARIOUS LOCATIONS - SWM GROUP 1B	$1,218,497	$0	$1,559,227	$2,777,725	13	8	11.17	3.56
BA2015382	SWM	SWM-AT VARIOUS LOCATIONS - GROUP 1	$675,745		$1,787,982	$2,463,727	16	4	12.35	4.32
BA4415182	Streams	STREAM RESTORATION MARDELLA BRANCH	$0	$0	$63,088	$63,088	1	0	24.5	0
BA4415382	Streams	STREAM RESTORATION FOURTH MINE	$0	$0	$28,932	$28,932	1	0	19.2	0

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
BA4415482	Streams	STREAM RESTORATION LONG GREEN CREEK	$0	$0	$214,743	$214,743	1	0	87.65	0
BA4415582	Streams	STREAM RESTORATION UT PATAPSCO CREEK	$0	$0	$54,720	$54,720	1	0	18.24	0
BA4415682	Streams	STREAM RESTORATION ROLLING RIDGE	$0	$0	$109,093	$109,093	1	0	34.36	0
CE2175182	Streams	STREAM RESTORATION NE CREEK	$0	$0	$301,275	$301,275	1	0	133.9	0
CE2175282	Streams	STREAM RESTORATION LITTLE ELK CREEK	$0	$0	$856,688	$856,688	1	0	380.75	0
CE2705182	Trees	TREE PLANTING AT VARIOUS LOCATIONS	$399,452	$0	$729,915	$1,129,367	31	30	11.78	11.78
CE2725282	SWM	AT VARIOUS LOCATIONS - GROUP 1	$1,026,042	$52,745	$1,847,647	$2,926,435	10	10	4.99	4.99
CE2865182	Streams	GRAMIES RUN	$1,613,124	$43,740	$993,411	$2,650,275	1	0	54.73	0
CH2985182	SWM	SMALLWOOD STATE PARK	$526,071		$641,752	$1,167,823	5	5	6.3	6.3
CL4185282	Streams	STREAM RESTORATION MUDDY CREEK	$0	$0	$267,287	$267,287	1	0	78.04	0
DNR - Million Tree	Trees	TREE PLANTINGS FOR MILLION TREE INITIATIVE	PE Unknown		$1,389,650	$1,389,650	100	100	146.31	146.31

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
		(PARTNERSHIP WITH DNR)								
FR5975182	Streams	LITTLE CATOCTIN CREEK	$564,250	$146,278	$1,005,254	$1,715,782	1	0	30.63	0
FR6635382	SWM	AT VARIOUS LOCATIONS - GROUP 1A	$725,782		$1,546,832	$2,272,613	9	9	6.31	6.31
FR6985182	Streams	STREAM RESTORATION MUDDY CREEK	$0	$0	$156,410	$156,410	1	0	78.04	0
FR6985282	Streams	STREAM RESTORATION UT BROAD RUN	$0	$0	$122,967	$122,967	1	0	49.65	0
FR6985382	Streams	STREAM RESTORATION UT TALBOT BRANCH	$0	$0	$94,618	$94,618	1	0	30.77	0
FR6985482	Streams	STREAM RESTORATION BUSH CREEK	$0	$0	$89,613	$89,613	1	0	27.76	0
HA1925282	Retrofit	AT VARIOUS LOCATIONS - GROUP 1A	$1,219,624	$20,518	$1,096,004	$2,336,146	8	3	6.85	4.01
HA4075182	Streams	PLUMTREE RUN STREAM RESTORATION	$127,012		$1,365,433	$1,492,445	1	1	21	21
HA4095182 SBR	Streams	MD 23 MAGNESS FARM STREAM RESTORATION AT TRIBUTARY OF DEER CREEK	$107,549		$97,408	$204,957	1	1	11.6	11.6

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
HA6025182	Streams	STREAM RESTORATION MARYLEA FARM	$0	$0	$196,390	$196,390	1	0	82	0
HO1095182	Streams	STREAM RESTORATION SOUTH BRANCH PATAPSCO	$0	$0	$65,368	$65,368	1	0	50.86	0
HO1095282	Streams	STREAM RESTORATION LITTLE PATUXENT	$0	$0	$111,024	$111,024	1	0	66.91	0
HO1695182	Streams	FURNACE AVENUE TRIBUTARY	$179,360		$543,395	$722,756	1	1	3	3
HO2065182	Streams	UPPER LITTLE PATUXENT - TC 12	$239,689		$2,072,751	$2,312,440	1	1	45	45
HO3255124	Streams	DORSEY RUN	$766,658		$303,050	$1,069,708	1	1	19.73	19.73
HO4085174	Streams	MD 100 RED HILL BRANCH BRAMPTON HILLS	Breakdown Unknown			$0	1	1	4.17	4.17
MO0375182	Streams	STREAM RESTORATION NORTH CREEK	$0	$0	$36,922	$36,922	1	0	26.32	0
PG0585182	SWM	ROSARYVILLE STATE PARK	$448,210		$626,470	$1,074,681	3	3	3.36	3.36
PG0735182	Outfalls	SRI-ALONG MD 210	$882,753	$61,868	$2,416,035	$3,360,656	6	6	10.89	10.89
PG1085182	SWM	WATER QUALITY SITES ON MD 4 AND MD 214	$133,304		$2,068,379	$2,201,683	2	2	9.91	9.91
PG8325182	Outfalls	AT VARIOUS LOCATIONS-GROUP 2	$1,573,419	$59,392	$528	$1,633,339	10	0	15.15	0

Table 1-31: FY 11 to FY18 Itemized Costs for Advertised Projects

FMIS	BMP Type	Project Name	Planning and Design	ROW	Construction	Total Expenditures	No. of BMPs in Project	No. of BMPs Constructed to Date	Impervious Treatment for Project (AC)	Impervious Treated to Date (AC)
Various	Trees	TREE PLANTINGS ASSOCIATED WITH VARIOUS LANDSCAPE/SUSTAIN ABILITY PROJECTS	Exact Cost Unknown, Part of Larger Planting Contracts			$0	173	173	61.54	61.54
WA2445182	SWM	SRI-PA STATE LINE TO FREDERICK COUNTY LI	$107,190		$4,903,456	$5,010,646	70	70	31.98	31.98
WA2655382	Retrofit	AT VARIOUS LOCATIONS WA COUNTY-GROUP 1A	$1,147,565	$0	$1,118,680	$2,266,245	14	1	13.22	0.93
WA2655682	Streams	LITTLE TONOLOWAY CREEK AT KIRKWOOD PARK	$404,766	$0	$293,163	$697,929	1	0	19.79	0
WA2655482	SWM	AT VARIOUS LOCATIONS - GROUP 1B	$1,420,415	$8,106	$2,198,603	$3,627,124	12	6	6.08	3.65
WA2775182	Trees	TREE PLANTING AT VARIOUS LOCATIONS	$458,542		$2,032,237	$2,490,779	11	11	41.87	41.87
					Totals:	**$154,565,710**	**2,356**	**2,069**	**3,465**	**1,745**

F. Assessment of Controls

SHA and ten other municipalities in Maryland have been conducting discharge characterization monitoring since the early 1990s. From this expansive monitoring, a statewide database has been developed that includes hundreds of storms across numerous land uses. Analyses of this dataset and other research performed nationally effectively characterize stormwater runoff in Maryland for NPDES municipal stormwater purposes. To build on the existing information and to better track progress toward meeting TMDLs, better data are needed on ESD performance and BMP efficiencies and effectiveness.

Assessment of controls is critical for determining the effectiveness of the NPDES stormwater management program and progress toward improving water quality. SHA shall use chemical, biological, and physical monitoring to assess watershed restoration efforts, document BMP effectiveness, or calibrate water quality models for showing progress toward meeting any applicable WLAs developed under EPA approved TMDLs identified above. Additionally, SHA shall propose a stream monitoring site to assess the implementation of the latest version of the 2000 Maryland Stormwater Design Manual.

F.1 Watershed Restoration Assessment

SHA is required to continue monitoring in the Montgomery County Seneca Creek watershed, or, select and submit for MDE's approval a new watershed restoration project for monitoring. Monitoring activities shall occur where the cumulative effects of watershed restoration activities can be assessed. One outfall and an associated in-stream station, or other locations based on a study design approved by MDE, shall be monitored. The minimum criteria for chemical, biological, and physical monitoring are as follows:

a) <u>Chemical Monitoring</u>:

i) Twelve (12) storm events shall be monitored per year at each monitoring location with at least three occurring per quarter. Quarters shall be based on the calendar year. If extended dry weather periods occur, baseflow samples shall be taken at least once per month at the monitoring stations if flow is observed;

ii) Discrete samples of stormwater flow shall be collected at the monitoring stations using automated or manual sampling methods. Measurements of pH and water temperature shall be taken;

iii) At least three (3) samples determined to be representative of each storm event shall be submitted to a laboratory for analysis according to methods listed under 40 CFR Part 136 and event mean concentrations (EMC) shall be calculated for:

1. Biochemical Oxygen Demand

2. Total Kjeldahl Nitrogen (TKN)

3. Nitrate plus Nitrite

4. Total Suspended Solids

5. Petroleum Hydrocarbons (TPH)

6. E. coli or enterococcus

7. Total Lead

8. Total Copper

9. Total Zinc

10. Total Phosphorus

11. Hardness

iv) Continuous flow measurements shall be recorded at the in-stream monitoring station or other practical locations based on the approved study design. Data collected shall be used to estimate annual and seasonal pollutant loads and reductions, and for the calibration of watershed assessment models. Pollutant load estimates shall be reported according to any EPA approved TMDLs with stormwater WLAs.

b) <u>Biological Monitoring</u>:

i) Benthic macroinvertebrate samples shall be gathered each Spring between the outfall and in-stream stations or other practical locations based on an MDE approved study design; and

ii) SHA shall use the EPA Rapid Bioassessment Protocols (RBP), Maryland Biological Stream Survey (MBSS), or other similar method approved by MDE.

c) <u>Physical Monitoring</u>:

i) A geomorphologic stream assessment shall be conducted between the outfall and *in-stream monitoring locations or in a reasonable area based on the approved study design. This assessment shall include an annual comparison of permanently monumented stream channel cross-sections and the stream profile;*

ii) A stream habitat assessment shall be conducted using techniques defined by the EPA's RBP, MBSS, or other similar method approved by MDE; and

iii) A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-2, HEC-RAS, HSPF, SWMM, etc.) in the fourth year of the permit to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.

d) <u>Annual Data Submittal:</u>

i) EMCs submitted on MDE's long-term monitoring database as specified in PART V below;

ii) Chemical, biological, and physical monitoring results and a combined analysis for the approved monitoring locations; and

iii) Any requests and accompanying justifications for proposed modifications to the monitoring program

Stream Restoration at Little Catoctin Creek Watershed

Notice to proceed on the Stream Restoration of Little Catoctin Creek at MD 340 – Frederick County Project (MDOT SHA contract number FR5975182) was issued on January 2, 2018. Construction activities were initiated in February 2018, and project completion is anticipated in March of 2019.

Over the past year MDOT SHA implemented the monitoring plan by continuing to establish baseline pre-construction conditions for chemical, biological, and physical changes. Monitoring efforts during the first year through December 2017 represent baseline pre-restoration conditions; while monitoring efforts from January 2018 through June 2018 represent construction phase conditions.

This reporting period includes results from both pre-construction and construction monitoring phases, which are discussed in detail within **Appendix I** of this annual report. Pre-construction monitoring, which falls under phases CHEM 1, BIO 1, and PHYS 1, has been completed. The construction phase monitoring began in January 2018 and falls under phase CHEM 2. As noted in the MDE approved monitoring plan, biological monitoring (BIO 2) and physical monitoring (PHYS 2) are not to be performed during the construction phase.

CHEM 1 and CHEM 2 include data for stage, discharge, velocity, continuous water quality measurements, and discrete water quality measurements. BIO 1 includes pre-construction monitoring of benthic invertebrates, fish, and stream habitat assessments. PHYS 1 includes geomorphic assessments to establish a baseline for the pre-restoration project area. This assessment was performed at six cross sections throughout the project reach as well as upstream and downstream of the project limits. The cross-sections were monumented for future reference and comparison. Longitudinal profiles were also established upstream and downstream of each cross-section from riffle crest to riffle crest at a minimum of 60 feet.

Catastrophic Flood Event

It is important to note that the FY18 monitoring period included a locally catastrophic flood event that occurred on May 15, 2018 causing extensive damage to MDOT SHA infrastructure and USGS gauging equipment (see **Figure 1-55** and **Figure 1-56**). During this event, areas west of Frederick, MD and the city of Frederick, observed upwards of 7 inches of rainfall, with an official total of 6.56 inches near Frederick, MD. As rain fell at excessively high rates, water levels in Little Catoctin Creek flashed upwards rapidly.

Maximum velocities within monitored cross-sections of the Little Catoctin Creek at USGS monitoring locations 01636845 and 01636846 exceeded 6 feet per second, jumping 4-times the observed velocity in less than 5 minutes from approximately 1.5 feet per second to over 6 feet per second. This locally catastrophic flood event quickly engulfed the MD 180 bridge crossing ripping the guardrail from its mounts, tearing asphalt from the surface; entraining 200 – 400-pound riprap boulders; and washing a vehicle downstream.

Unfortunately, most of the monitoring equipment at 01636845 and 01636846 failed under the debris-flow style conditions of the flood event. A rain gauge typically 5 – 7 feet above normal creek levels was quickly inundated 30 minutes into the event; the radar gauge collecting stage from atop a 12-foot-high mast was compromised and snapped soon after. The water quality sonde and instream velocity units ceased to fully function during the event, as they were broken and smashed by the massive cobbles and boulders transported by raging floodwaters. Remarkably, a turbidity probe at the 01636845 location and the velocity meter at 01636846 collected observations throughout the entire event. Automatic samplers were manually triggered in an attempt to collect as many samples as possible.

In the days and months following this event, time-series for various parameters (temperature, turbidity, instream velocity) were stitched together, and indirect discharge values were computed. USGS StreamStats software was used to model the significance of this flood. Modeled results from StreamStats returned an estimate that eclipses the maximum modeled 500 Year Peak Flood statistic at 5,940 cubic feet per second. The 500 Year Peak Flood statistic is the upper limit of this model run. The estimated official maximum peak flow, by way of indirect techniques and methods modeling, is 9,630 cubic feet per second at 01636846.

Damage estimates for equipment losses at 01636845 and 01646846 are greater than $100,000. It took approximately three weeks for basic service to return, with some components of monitoring requiring 2-3 months before they were completely restored. Impacts on the monitoring equipment at 01636845 are still being observed as the system conveys an abundance of newly transportable sediment within upstream channel sections, past the monitoring locations, and ultimately into the Potomac River.

Figure 1-55: Storm damage at MD 180 and Little Catoctin Creek Near Rosemont, MD

Figure 1-56: Storm damage at U.S. Geological Survey Site 01636845

F.1.a Chemical Monitoring

In September 2016, the U.S. Geological Survey Site 01636845 (Little Catoctin Creek Near Rosemont, MD; upstream) was established, which included a radar stage sensor and acoustic doppler velocity meter (ADVM) for continuous flow measurements. Since the installation of the equipment, a total of 54 discharge measurements have been recorded with a range of 0.49 cubic feet per second to 300 cubic feet per second. In December 2016, sondes were installed at both locations to continuously measure water quality data; Temperature, Specific Conductivity, pH, and

Turbidity on a 5-minute interval. Current and historic observations can be found here:

https://nwis.waterdata.usgs.gov/md/nwis/uv/?site_no=01636845

Pre-restoration Period at 01636845

Observed Maximum and Minimum values, with associated dates, obtained from continuous monitoring equipment at station 01636845:

- SPECIFIC CONDUCTANCE: Maximum, 2470 microsiemens per centimeter (µS/cm), February 07, 2018; minimum, 135 µS/cm, April 06, 2017.
- WATER TEMPERATURE: Maximum, 29.6°C, July 20, 2017*; minimum, ICE -0.2°C, on January 03, 2018*.
- pH: Maximum, 8.8 standard units, April 15, 2017; minimum, 6.9 standard units, May 19, 2017*.
- TURBIDITY: Maximum, 2010 formazin nephelometric units (FNU), January 12, 2018; minimum, ICE 1.3 FNU, January 02, 2018.
- MEAN VELOCITY (FROM 1500kHz ACOUSTIC UNIT): Maximum, 2.92 feet per second, January 12, 2018; minimum, ICE -0.84 feet per second, on January 08, 2018.

** Multiple occurrences of the same extreme in selected dataset. First occurrence listed. ICE Flow at Station affected by ice*

Period of approved data to date at 01636845

Observed Maximum and Minimum values, with associated dates, obtained from continuous monitoring equipment at station 01636845:

- SPECIFIC CONDUCTANCE: Maximum, 2470 µS/cm, February 07, 2018; minimum, 54 µS/cm, May 05, 2018.
- WATER TEMPERATURE: Maximum, 31.2°C, July 03, 2018; minimum, ICE -0.2°C, on January 03, 2018*.
- pH: Maximum, 9.4* standard units, May 01, 2018*; minimum, 5.3 standard units, May 15, 2018*.
- TURBIDITY: Maximum, 2260 FNU, May 15, 2018; minimum, ICE 1.3 FNU, January 02, 2018.
- MEAN VELOCITY: Maximum, 7.28 feet per second, May 15, 2018**; minimum, ICE -0.84 feet per second, on January 08, 2018.

** Multiple occurrences of the same extreme in selected dataset. First occurrence listed.*

*** Provisional data at this time ICE Flow at Station affected by ice*

In December 2016, U.S. Geological Survey Site 01636846 (Little Catoctin Creek at Rosemont, MD; downstream) was established and instrumented with an ADVM to measure stream velocity. In September 2017, continuous monitoring at USGS site 01636846 was expanded to include continuous measures of stage for the computation of discharge by way of a bubbler-style unit.

A move to measure discharge observations for this location was chosen in anticipation of the reconnection of groundwater flow-cells with the active channel bottom. This newly restored communication is a function of a floodplain-reconnection style restoration in an area with springs and seeps like that in and around the Little Catoctin Creek watershed.

These additional inputs are quite capable of significantly increasing discharge between monitoring locations. Spatial and temporal inconsistency of these channel inputs renders future modeling for discharge values at 01636846 inappropriate. Since the installation of monitoring equipment at this location, 34 discharge measurements have been recorded with a range of 0.45 cubic feet per second to 108 cubic feet per second. Current and historic observations can be found here:

https://waterdata.usgs.gov/nwis/inventory/?site_no=01636846&agency_cd=USGS

Figure 1-57: Storm flow at U.S. Geological Survey Site 01636845 (Little Catoctin Creek Near Rosemont, MD; Upstream)

Pre-restoration Period at 01636846

Observed Maximum and Minimum values, with associated dates, obtained from continuous monitoring equipment at station 01636846:

- SPECIFIC CONDUCTANCE: Maximum, 2070 µS/cm, February 07, 2018*; minimum, 51 µS/cm, January 12, 2018.
- WATER TEMPERATURE: Maximum, 30.3°C, July 19, 2017; minimum, ICE -0.2°C, on January 04, 2018*.
- pH: Maximum, 9.4 standard units, April 18, 2017*; minimum, 7.1 standard units, July 06, 2017*.
- TURBIDITY: Maximum, 2040 FNU, January 12, 2018; minimum, 1.3 FNU, October 04, 2017*
- MEAN VELOCITY (FROM 3000kHz ACOUSTIC UNIT - Deactivated 8/01/2017): Maximum, 3.63 feet per second, July 06, 2017; minimum, -0.21 feet per second, on July 21, 2017*.
- MEAN VELOCITY (FROM 1500kHz ACOUSTIC UNIT - Active 8/01/2017): Maximum, 1.08 feet per second, August 18, 2017; minimum, -0.21 feet per second, on August 27, 2017.

** Multiple occurrences of the same extreme in selected dataset. First occurrence listed.*
ICE Flow at Station affected by ice

Period of approved data to date at 01636846

Observed Maximum and Minimum values, with associated dates, obtained from continuous monitoring equipment at station 01636846:

- SPECIFIC CONDUCTANCE: Maximum, 2070 µS/cm, February 07, 2018*; minimum, 47 µS/cm, May 15, 2018.
- WATER TEMPERATURE: Maximum, 31.5°C, July 03, 2018; minimum, ICE -0.2°C, on January 04, 2018*.
- pH: Maximum, 9.8 standard units, May 01, 2018*; minimum, 6.8 standard units, August 12, 2018*.
- TURBIDITY: Maximum, 2170 FNU, May 16, 2018; minimum, 1.3 FNU, October 04, 2017.
- MEAN VELOCITY (FROM 3000kHz ACOUSTIC UNIT – Deactivated 8/01/2017): Maximum, 3.63 feet per second, July 06, 2017; minimum, -0.21 feet per second, on July 21, 2017.
- MEAN VELOCITY (FROM 1500kHz ACOUSTIC UNIT - Active 8/01/2017): Maximum, 7.1 feet per second, May 15, 2017**; minimum, -0.95 feet per second, on August 12, 2018**.

** Multiple occurrences of the same extreme in selected dataset. First occurrence listed.*
*** Provisional data at this time*
ICE Flow at Station affected by ice

From the period 01/23/2017 through 05/22/2018, a total of 19 complete sets of discrete storm samples were collected. Samples have been analyzed for nutrients, metals, VOC's, bacteria and 5-day biological oxygen demand. Upon completion of analyses, results are loaded into the U.S. Geological Survey's National Water Information Service (NWIS) and are available online here:

https://www.waterqualitydata.us/

For site 01636845, data are also available online here:

https://waterdata.usgs.gov/nwis/uv?format=gif_default&site_no=01636845

For site 01636846, data are also available online here:

https://waterdata.usgs.gov/nwis/uv?format=gif_default&site_no=01636846

Chemical monitoring methods, monitoring plan site map, and monitoring results can be found in **Appendix I**, Section 2. Preliminary results of supplemental (optional) monitoring efforts are included below:

Floodplain Monitoring and Assessment

Only 26 tiles showed measurable accumulation for the period 01/01/2017-01//29/2018, with no deposition observed outside the active channel. A lack of measurable accretion outside the active channel supports the notion that this reach of Little Catoctin Creek is functioning as a transport/throughflow reach and not a depositional zone for sediment.

Bank Erosion Monitoring

Measures of exposed bank-pin surfaces were made throughout the period 01/01/2017 – 02/15/2018 to estimate rates of erosion and explore spatial variability associated with erosion rates. Measurements were made throughout the period with collection typically occurring after notable storm-flows; for example, flows peaking around 90-100 cubic feet per second or greater. Qualitatively, the lower sections of the reach are experiencing the largest amounts of overall erosion.

F.1.b Biological Monitoring

Three stream reaches were identified for biological monitoring and are located within the restoration project area, upstream of the project area (control reach), and downstream of the project reach. Two sites were allocated at each reach and, when possible, coincide with the physical and chemical monitoring locations.

All the biological sampling and associated physical habitat monitoring was performed by Maryland Department of Natural Resources using the Maryland Biological Stream Survey (MBSS) sampling protocols. A total of 78 benthic macroinvertebrate taxa were collected in the 100-organism subsamples in Little Catoctin Creek. Taxa richness at each site ranged from 12 to 32, with taxa richness generally decreasing in an upstream direction throughout the study reaches.

Benthic Index of Biotic Integrity (BIBI) scores ranged from 1.25 to 2.25 in the three study reaches, indicating Very Poor to Poor conditions. BIBI scores observed during the same time period at the reference sites ranged from Fair to Good. A total of 23 different fish species were collected from the study area over the two-year period. Fish species richness at each site ranged from 13 to 18. Fish assemblages were comparable to those found in the reference sites during the study period.

Physical habitat index scores for each site showed a downstream to upstream pattern of decreasing habitat quality with highest index scores measured in the downstream reach and lowest scores measured in the upstream control reach. Eroded stream bank area measurements were the highest within the restoration reach below MD-180. Fine sediments eroding from stream banks and other sources are found throughout the depositional areas within the study area – especially within the restoration and control reaches.

Depositional bar formation ranged from severe (downstream reach) to minimal (control reach). However, both epifaunal substrate quality, a qualitative measure of habitat available to benthic macroinvertebrates, and instream habitat quality, a qualitative measure of habitat available for stream fishes, ranged from Sub-optimal to Optimal within the study area.

Biological monitoring methods, monitoring plan site map, monitoring results, photo log of sampling locations, and a discussion of next steps can be found in **Appendix I**, Section 3.

F.1.c Physical Monitoring

Physical monitoring began by setting a baseline for observing geomorphic changes in channel cross section and profile to determine energy/friction slope through the observed cross section (both in water surface elevations and riffle-to-riffle), and bed material. Monumented cross sections were established and surveyed along with longitudinal profiles. Wolman pebble counts were also performed at each site. Photo documentation and field notes are kept along with the recorded data.

The monumented cross sections were established and surveyed initially in September 2017 and subsequently in January/February 2018, at the end of the pre-construction phase. An additional round of surveys were conducted in July/August 2018 to evaluate changes to the channel resulting from a 1000-year return interval storm event that occurred on May 14, 2018, since construction had not yet impacted the cross section monitoring locations.

The channel was classified using the Rosgen classification technique as type 'F' channel due to its low gradient, incised channel (see **Figure 1-58**), and entrenchment ratio. Preliminary analysis of these results demonstrates the restoration reach is unstable with receding banks (especially at monitoring location P-4). Further discussion can be found in **Appendix I**, Section 4.

Figure 1-58: Exposed Bank at Section P-4 of the Physical Monitoring Locations

Preliminary findings of the physical monitoring, including comparisons of the cross-section data collected in 2018 with the topographical surveys performed in 2015 and 2017 can be found in **Appendix I**, Section 4.

F.1.d Annual Data Submittal

Pre-restoration chemical, biological, and physical monitoring, as well as chemical monitoring during construction, has been completed at Little Catoctin Creek. MDOT SHA has prepared an implementation document, included with this annual report as **Appendix I**. This appendix describes in detail these monitoring activities. MDOT SHA has provided the monitoring program information in the following feature classes and tables as specified in the May 2017 MDE Geodatabase Guideline format.

- Monitoring Site feature class (MSI)
- Monitoring Drainage Area feature class (MDA)
- Chemical Monitoring table (CHE)
- Biological Monitoring (BIO)

F.2 Stormwater Management Assessment

MDOT SHA is required to select a site to monitor, develop a monitoring plan, and submit for MDE's approval within 1 year of permit issuance for determining the effectiveness of stormwater management practices for stream channel protection as implemented under the latest stormwater regulations. Physical stream monitoring protocols shall include:

a) *An annual stream profile and survey of permanently monumented cross-sections at the approved monitoring site to evaluate channel stability in conjunction with surrounding and on-going development;*
b) *A comparison of the annual stream profile and survey of the permanently monumented cross-sections with baseline conditions for assessing areas of aggradation and degradation; and*
c) *A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-2, HEC- RAS, HSPF, SWMM, etc.) in the fourth year of the permit to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.*

I-70 at Marriottsville Road in Little Patuxent River Watershed

On August 30, 2017, MDE granted MDOT SHA conditional approval to conduct ESD monitoring at this site contingent upon MDOT SHA submitting a revised monitoring plan to MDE that includes the combined plan with Howard County and TR-20 results for the existing and proposed conditions with and without proposed BMPs at the I-70/ Marriottsville Interchange as well as with and without all BMPs in the watershed. In response, MDOT SHA included an updated assessment of controls monitoring plan in the FY17 annual report fulfilling these requirements. MDE provided approval of the revised monitoring plan on September 19, 2018.

In order to meet this permit condition, MDOT SHA has initiated monitoring along Interstate 70 (I-70) at the Marriottsville Road bridge in Howard County, Maryland. MDOT SHA has proposed stormwater controls along I-70 within the Marriottsville Road interchange and include: two grass swales, three bioswales, and one bioretention. Additionally, Howard County has proposed additional stormwater controls on a bridge replacement and road widening project on Marriottsville Road crossing over I-70 and include: two bioswales, and a micro-bioretention. All facilities are located within the Little Patuxent River (LPR) watershed (see Figure 1-59).

MDOT SHA has been coordinating with Howard County to include the design and construction of the MDOT SHA proposed BMPs into the County's bridge replacement project. Including the proposed MDOT SHA BMPs into the County project has several benefits, including lower overall design and construction costs and physical impacts to the BMPs by the bridge construction are avoided.

MDOT SHA has prepared a draft Project Task Agreement (PTA), which details the responsibilities of both parties (including design, permitting, construction of the BMPs, maintenance, funding, credit, and data sharing) has been submitted to the County for review. The construction schedule of the MDOT SHA BMPs is dependent on the County's bridge replacement project schedule, which is the following currently:

- Design and permitting of the MDOT SHA BMPs and bridge replacement project: Completed in 2021, and
- Construction: Start in 2022 and End in 2024 (2-year duration).

As a result of the longer than anticipated County schedule, the pre-construction monitoring period will be extended by MDOT SHA so that there are no gaps in the monitoring data. The construction monitoring period will also be extended for an additional year. Subsequently, no post-construction monitoring will occur within this permit term but will be performed during the next permit term following completion of construction activities.

This reporting period includes results of Year 1 pre-construction monitoring, and baseline monitoring results are discussed in detail within **Appendix J** of this annual report. Physical stream monitoring includes a geomorphic assessment to establish a baseline for channel stability downstream of the project area. This assessment was performed at two permanently monumented cross sections located below the SHA ROW outfall. The cross-sections were monumented for future reference and comparison.

A longitudinal profile reach is also downstream of the outfall, which contains both cross section locations. Wolman pebble counts were performed at both cross section locations and were used in the sediment mobility assessment.

MDOT SHA has been implementing the monitoring plan by establishing baseline physical stream conditions to evaluate channel stability in conjunction with surrounding and on-going development. MDOT SHA has prepared an implementation document, included with this annual report as **Appendix J**. This appendix describes in detail these monitoring activities.

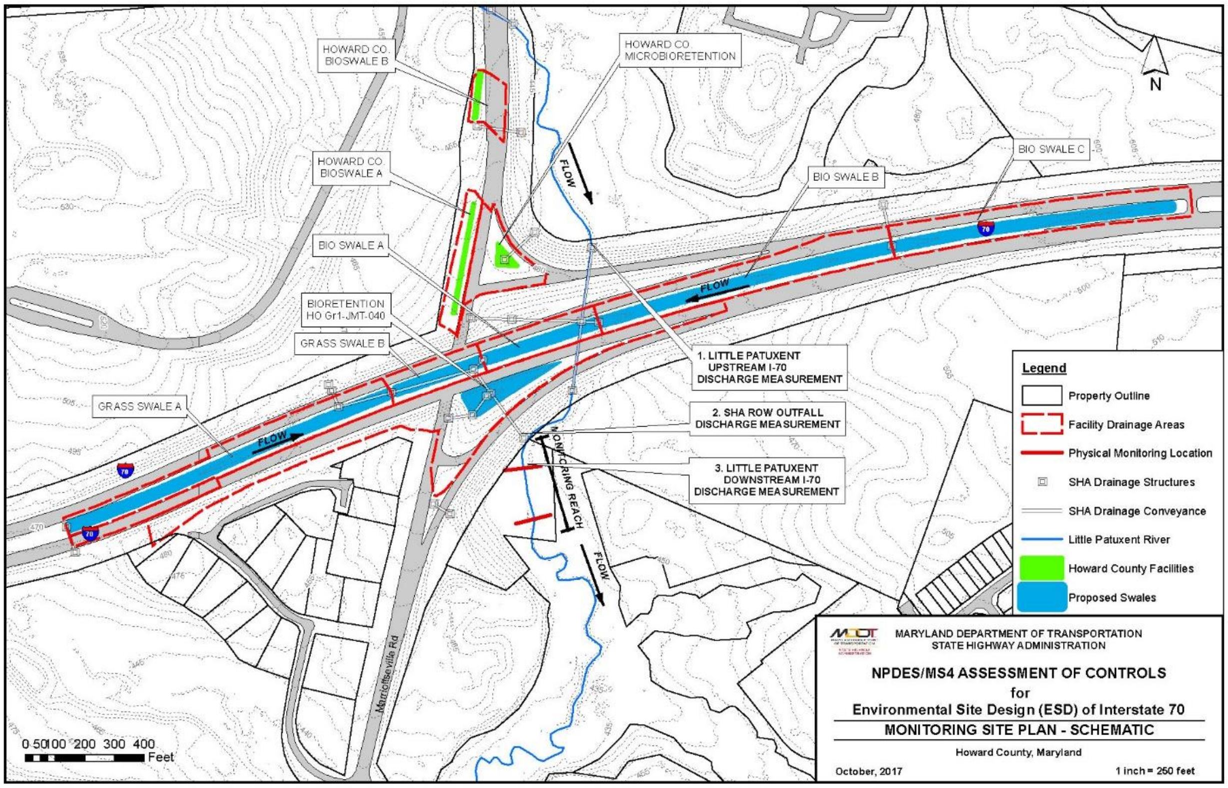


Figure 1-59: MDOT SHA and HO County ESD Facilities and Monitoring Sites

F.2.a Annual Physical Monitoring

Physical monitoring began by setting a baseline for observing geomorphic changes in the channel cross section and profile site to evaluate channel stability in conjunction with surrounding and on-going development. Two monumented cross-sections were established and surveyed along with a longitudinal profile reach and Wolman pebble counts at each cross-section location. Photo documentation and field notes are kept along with the recorded data. The cross-sections and profile reach were established and surveyed on June 13, 2018 and Wolman pebble counts were performed on June 14, 2018.

F.2.b Monitoring Comparisons and Reporting

The monitoring efforts during the first year represent baseline conditions. A more thorough analysis of baseline, pre-construction conditions will be completed in 2019, once Year-2 monitoring has concluded. This analysis will be submitted along with next year's monitoring activities update. A comparison of the annual stream profile and survey of the permanently monumented cross-sections with baseline conditions for assessing areas of aggradation and degradation will occur after construction has been completed.

F.2.c Discharge Monitoring

MDOT SHA has opted to conduct additional continuous flow monitoring at three locations, as well as rainfall gauging on site, to analyze the effects of rainfall, discharge rates, stage, and continuous flow on channel geometry given that the hydrologic and/or hydraulic modeling will not be performed until the final year of monitoring. Flow Station 1 is the northern-most monitoring location and is located upstream of the other continuous flow monitoring sites and I-70 at a double box culvert. Flow Station 2 is located at the outfall of the proposed infiltration facilities (includes discharge from the median bioswales). Flow Stations 3 is located at the receiving LPR stream channel (assessment reach) downstream of I-70. Flow gauging devices and data loggers were installed in early June 2018; thus, Year 1 discharge data is limited. Year 2 discharge has been ongoing since July 1, 2018 and will be used to further develop the baseline conditions, which will be discussed in next year's report.

G. Program Funding

The MS4 permit requires a fiscal analysis of capital and operations expenditure and budgets as well as watershed protection and restoration funds generated through stormwater fees or other means. MDOT SHA does not impose stormwater fees or generate funding for watershed protection and restoration outside of the State Transportation Trust Fund. This permit condition also requires that adequate program funding be made available to ensure compliance for the next fiscal year. MDOT SHA is committed to appropriating the full funding amount necessary to meet these permit requirements. Funding needs to meet all the permit requirements are split between capital and operations funding as described below.

Capital Funding

Capital funds are programmed to meet the needs of the MS4 program listed below. MDOT SHA OED currently maintains adequate capacity in architectural/engineering consultant contracts to support these activities. Additional procurements were brought on line during FY17 that total $72 Million for engineering and $4 Million for SWM BMP remediation.

Operations and Maintenance Funding

Operations and maintenance funds are budgeted for routine maintenance of structural stormwater control structures; street sweeping, inlet cleaning, chemical application and winter deicing training, and other activities to foster minimization; litter removal, and education. As restoration practices increase, enhancements to the operations budget are sought through the legislature. During FY17 an additional $2.4 Million for operations and maintenance activities to be available in FY19 was approved for enhanced inlet cleaning.

Delivered Data

MDOT SHA has provided the fiscal program information in the Fiscal Analyses table (FIS) as specified in the May 2017 MDE Geodatabase Guideline format. The geodatabase documents budget and cost for operations and capital funding. These values are also summarized in **Table 1-32** below. The FIS table includes a mandatory field for watershed protection and restoration funds generated for the current fiscal year. Since MDOT SHA does not generate these funds, this field is not applicable.

Table 1-32: MS4 Funding Budget and Expenditures

Fund	FY18 Expenditures (Millions)	FY19 Budget (Millions)*
Fund 82 – TMDL/MS4	$78.7	$98.5
Fund 74 – Drainage	$19.4	$19.6
Fund 49 – Industrial	$5.5	$0.8
Operations/ Maintenance	$12.0	$14.4
Totals	$115.6	$133.3
Note Funding numbers are rounded to nearest $0.1 Million		

H. Research Activity

By employing improvements to practices, MDOT SHA can ensure the most effective use of right-of-way, funding, and other resources. On-going research activities performed during the permit term are discussed below. MDOT SHA has determined that progress and draft reports will not be submitted with MS4 annual reports. Discussions of project objectives and schedule will be included here and when final reports have been received, analyzed, and approved by MDOT SHA, analysis of the results will be provided in MS4 annual reports and the final study report made available.

Assessment of Stream Restoration Projects

As discussed in the MDOT SHA 2017 Annual Report, Dr. R. P. Morgan and his students at UMCES continue to assess and monitor completed and proposed MDOT SHA stream restoration projects. This assessment provides a framework and historical database of recommendations for future MDOT SHA stream restoration projects, and for the assessment and potential revitalization of existing MDOT SHA restoration projects throughout the state of Maryland. A draft of the 2018 Report has been received, and MDOT SHA is currently reviewing the report to interpret the results relative to the MDOT SHA MS4 program and to determine next steps. Once this review is complete, MDOT SHA will include analysis of the study and a copy of the final study report will be made available with the next annual report.

The following sites were monitored in FY18:

- Israel Creek (Frederick County)
- South Branch Gunpowder Falls (Carrol County)
- Unnamed Tributary to Little Gunpowder River (Baltimore County)
- Mill Creek (Calvert County)
- Sullivan Branch (Calvert County)

Meeting Local TMDLs for PCBs

In July 2016, MDOT SHA initiated a generalized literature search and research study on polychlorinated biphenyls (PCBs) in urban stormwater. The study is focused on types of PCBs, PCB concentrations, the relationship to sediment concentrations and sediment grain sizes, the relationship between PCB removal and sediment removal, and effective removal mechanisms. The research is being performed by Dr. Davis, Dr. Kjellerup, and their students from the University of Maryland, College Park. A draft of the draft Final Report was received September 2018 and MDOT SHA is currently reviewing the report to interpret the results relative to the MDOT SHA MS4 program and to determine next steps. Once this review is complete, MDOT SHA will include analysis of the study and a copy of the final study report will be made available with the next annual report.

Inlet Cleaning Pollutant Characterization Study for TMDL Compliance

A primary challenge of meeting TMDL requirements is the mandate to quantify the pollutants captured and removed from inlets and road surfaces. The ability for MDOT SHA to characterize the captured solids is of major interest for compliance planning, implementation, and reporting. In March 2016, MDOT SHA contracted with Morgan State University in partnership with the Center for Watershed Protection, Inc. (MSU/CWP. 2018) to evaluate its inlet cleaning operations and recommend how MDOT SHA may optimize their inlet cleaning operations. A final study report was received June 2018 and MDOT SHA is currently reviewing the report to interpret the results relative to the MDOT SHA MS4 program and to determine next steps. Once this review is complete, MDOT SHA will include analysis of the study and a copy of the final study report will be made available with the next annual report.

Assessment of Bioswale Performance

Bioswales, bioretention facilities, and other stormwater management techniques are becoming common practices to treat roadway runoff. MDOT SHA identified a need to understand their short- and long-term efficiency as well as their service life expectancy, especially under real life field conditions. As discussed in the 2016 Annual

Report Update, Dr. R. P. Morgan and his students at the Appalachian Laboratory of the University of Maryland Center for Environmental Science (UMCES) continue to evaluate the effectiveness of bioswales and their pollutant removal efficiency in Phase II of their Assessment of Bioswale Performance.

There are four distinct project objectives for this project:

- Develop field procedures employed in this study to monitor the ability of the designed bioswale facilities to infiltrate storm water flowing into the facilities over an extended period, as well as to characterize the bioswale filter soil to determine its long-term efficiency.

- Understand the dynamics of water movement through the bioswales to determine whether these systems have been optimally designed.

- Examine the potential recharge capacity of unlined bioswales at the interface of the bioswale and the underlying soil.

- Assess reductions in base pollutant levels (primarily focusing on TSS, TN and TP) as roadway stormwater runoff passes through MDOT SHA bioswale design facilities (both lined and unlined), with a corollary objective to examine selected heavy metal concentrations, or other important roadway pollutants associated with roads, in both runoff and bioswale soil samples.

Progress reports discussing activity during the reporting period were received and when MDOT SHA receives, analyzes, and approves the final report, it will be made available with the next annual report along with an analysis of the findings.

Use of Compost to Establish Permanent Vegetation

MDOT SHA is working with UMD College Park on a research project to evaluate the performance of select compost products in establishing permanent vegetation as part of construction site SWM systems. By using compost to amend the soil, MDOT SHA would be able to eliminate the use of additional fertilizer when establishing grass and meadow. Specific objectives of the research project include:

- Identify and document the optimum compost-to-top soil ratio to evaluate the performance of compost blankets for establishing permanent vegetation and reducing soil erosion

- Install compost blankets as well as control units (i.e., top soil) at two construction sites in central Maryland Counties.

- Evaluate the performance of compost blankets installed at these sites through visual and imaging monitoring, collected field data, and focused greenhouse investigations. The application of performance standards will be focused on rapid establishment of vegetation growth and sediment and erosion control.

The application of performance standards will be focused on rapid establishment of vegetation, vegetation growth, reduced nutrient loss, reduced runoff, and minimum sediment mobilization and erosion. The findings of this research, on the potential use of compost-based BMPs in highway construction applications, will be immediately implementable.

This research project began in June 2016 and has an anticipated end date of November 2018. Quarterly reports discussing progress during the reporting period are received and when MDOT SHA receives, analyzes, and approves the final report, it will be made available with the next annual report along with an analysis of the findings.

Identification of Low Growing, Salt Tolerant Turfgrass Species Suitable for Use along Highway Right of Way – Experimental Field Trials

MDOT SHA maintains turfgrasses along highway rights-of-way to provide sight distance and an aesthetic landscape to motorists. However, the turfgrass seed mixtures currently used in Maryland require frequent mowing in often narrow and congested areas, elevating maintenance costs, and placing maintenance staff in danger. Further, seed mixtures often fail to establish persistent turf along roadsides, leading to erosion, nutrient leaching, and unsightly roadside environments.

MDOT SHA is working with UMD's Appalachian Lab on a research project to test the efficacy of planting alternative roadside grasses and seed mixtures that require less maintenance but that will establish rapidly, be resilient in the harsh roadside environment, have neutral or positive effects on ecosystems and watersheds, and are available and affordable through commercial growers.

Following an extensive literature search and discussion with turfgrass experts, MDOT SHA identified the following alternative grass species for study in field trials along Maryland roads: Sporobolus, side-oats grama, purple lovegrass, weeping lovegrass, hard fescue, little bluestem, upland bentgrass, tufted hairgrass, and red fescue. Specific objectives of the research project include:

- Select at least one potential field site within each of the three climatic regions within Maryland corresponding to western Maryland, central Maryland, and southern Maryland (including the Eastern Shore).
- Quantify environmental conditions at each potential field site, including slope and aspect, soil compaction, soil pH, soil salinity, soil nutrients, and light availability. These data will help in prioritizing the final selection of one field site within each of the three climatic regions.
- Establish field experiments (1 per region) in collaboration with MDOT SHA. MDOT SHA will provide equipment and equipment operators for spraying herbicides and moving and grading topsoil. Specifically, existing vegetation will be killed with herbicides, topsoil will be removed to be 10 cm (4 inches) below grade, 10 cm of MDOT SHA-approved topsoil will be applied to each experimental site, and species treatments will be sown by hand into plots. Species treatments will include sowing species or cultivars in monoculture as well as establishing mixed species treatments.
- Monitor each field experiment through the first establishment year and for 2 subsequent years. This will include measuring germination, survival, and growth within the first 6 weeks after sowing, as well as quantifying density, cover, and height of sown species, and weed cover.

This research project began in January 2017 and has an anticipated end date of December 2019. Quarterly reports discussing progress during the reporting period are received and when MDOT SHA receives, analyzes, and approves the final report, it will be made available with the next annual report along with an analysis of the findings.

Evaluating Integrated Roadside Vegetation Management (IRVM) Techniques to Improve Pollinator Habitat

A research project with the University of Maryland Department of Entomology Bee Lab at College Park continued through 2018 to evaluate current MDOT SHA IRVM practices and potentially improve pollinator habitat along roadsides. This research project began in January 2017 and has an anticipated end date of December 2018. Quarterly reports discussing progress during the reporting period are received and when MDOT SHA receives, analyzes, and approves the final report, it will be made available with the next annual report along with an analysis of the findings.

Salt Management Planning

MDOT SHA has completed a study geared toward reducing long term salt use. Results of the study have been integrated into the MDOT SHA snow removal and deicing strategies discussed in **Section D.5.b.iv**.

Targeting Sediment, Nitrogen, and Phosphorus for TMDLs with SPARROW

During the reporting period, MDOT SHA entered an agreement with USA Department of the Interior (DOI) – USGS to employ a nutrient and sediment data collection and analysis approach called Sediment Fingerprinting designed to determine optimal areas for impervious area treatment based on the USGS SPARROW surface water-quality modeling tool. Investigation to determine if this is a viable alternative approach to determining locations for effective restoration efforts within the impaired Chesapeake Bay is forthcoming. The effort is currently on hold in anticipation of reinitiating site selection efforts for the next MS4 permit term.

Part Two

Part Two

Drainage and Stormwater Asset Program

PART TWO

2. Drainage and Stormwater Asset Program

Introduction

The Drainage and Stormwater Asset Management Program primary function is to oversee design, construction, inventory, tracking and needed repairs of the drainage and stormwater (SWM) assets that belong to the Maryland Department of Transportation State Highway Administration (MDOT SHA.) The extensive roadway network is served by a complex and expanding drainage and stormwater system. The program goal is to systematize the inventory of all drainage and stormwater assets, analyze the inspection results, to prioritize and provide ongoing preventive and remedial solutions for any functional deficiencies that occur through routine operations. As of June 30, 2018, MDOT SHA manages nearly 8,500 permanent stormwater management facilities and ESD practices, nearly 168,500 hydraulic structures, and over 141,000 conveyance features (over 9 million linear feet) statewide. Within the MS4 coverage area, this includes over 7,800 permanent stormwater management facilities and ESD practices, nearly 123,000 hydraulic structures and almost 100,000 conveyances (nearly 7 million linear feet). The GIS inventory database is continuously updated to include newly constructed SWM facilities and the delineation of accurate drainage areas. Data clean up from engineering records, research and good database practices continue to refine the information provided and may show those fluctuations as a result. The ongoing inspections and maintenance of the data continues to make the information more accurate over time. The comprehensive asset management program at MDOT SHA has had to locate, inspect, evaluate, and remediate these assets to sustain their functionality, improve water quality and stability, protect sensitive water resources, and provide an aesthetic and safe transportation systems Since 1999. MDOT SHA has developed a detailed inspection rating and work order development system to track, prioritize and plan the necessary activities for extending the life expectancy of drainage and stormwater assets.

The objective of the program is support providing a positive contribution to the water quality of the Chesapeake Bay. Additionally, the Program has a secondary goal of strategically enhancing the overall function of existing facilities to meet the latest SWM design standards and regulatory requirements.

The Program is divided into five major components:

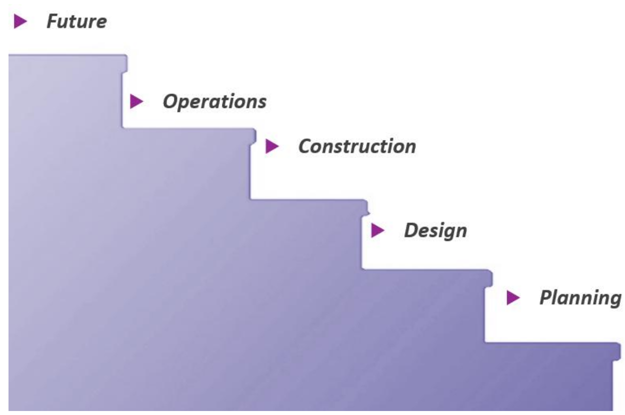


Figure 2-1: Drainage and SWM Asset Management Program Components

- Planning – Includes inventory, inspections, performance ratings, data management and system building.
- Design – Includes remediation/action ratings, work order generation, retrofit design and coordination with permitting agencies
- Construction – Includes area wide contracts across various MDOT SHA offices, Bid Build contracts, Innovative Contracting such as design build and immediate response

- Operations – Includes coordinating efforts for minor maintenance, routine maintenance and inspection support
- Future Focus – Includes business process improvement such as technology upgrades, new tools, software, standard procedures, continued permitting and design coordination and research

MDOT SHA is continually working to improve the efficiency of the program as the inventory continues to grow. The business practices have been evolving especially over the last couple years in order to keep up with aging infrastructure and position the program to manage more recently built and accepted BMPs. In addition to the increase in inventory, MDOT SHA is also navigating increasingly strict regulatory requirements to permit remediation activities that require additional time for the design and construction of maintenance activities.

While working through the new challenges, MDOT SHA continues to focus on public service and the SWM assets impact on the transportation network and the community. Many of these aspects are illustrated in **Figure 2-2**.

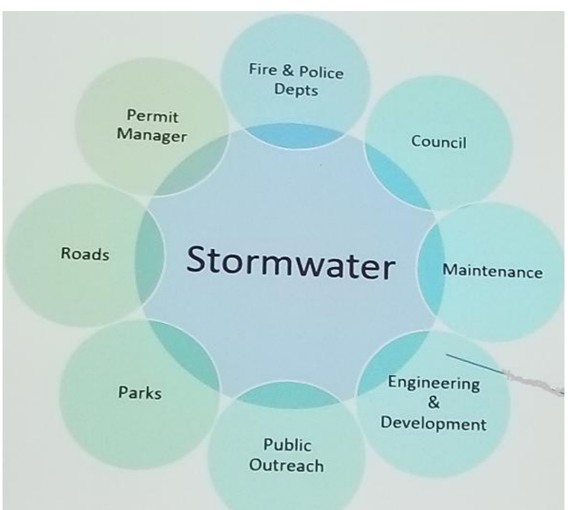


Figure 2-2: Stormwater Connections to Other Public Service Entities

It is helpful to remember this holistic connection when considering planning, design, construction, operations and the future.

A. Planning

The NPDES Municipal Separate Storm Sewer System (MS4) permit requires MDOT SHA to identify all storm drainage infrastructure that captures, treats and conveys stormwater runoff from MDOT SHA properties in the designated NPDES areas of the State. MDOT SHA inspects and inventories drainage assets (pipes, channels, inlets and manholes) and stormwater management assets (ponds, swales, infiltration and ESD facilities) for functionality. The overall goal is to have the most current inventory, conduct inspections and perform rating assessments based on the *MD SHA Stormwater NPDES Program Standard Procedures Manual.* This enables MDOT SHA to prioritize the repair, remediation and retrofit of MDOT SHA-owned SWM facilities and drainage infrastructure.

MDOT SHA has expanded its program to cover all areas of the State within its right-of-way. During this year, MDOT SHA performed the final Drainage and SWM inventory and inspections in Garrett County which was the final remaining county to have this data gathered. The drainage system asset inventory and inspection program includes hydraulic structures, pipe conveyances, and outfalls.

Performance ratings are assigned by inspectors in the field once inspections have been performed. Inspections are then catalogued to the database and office staff follows up, reviews inspection records and assigns a Remediation (Action) Rating. These remediation (action) ratings have previously been reported in this report as part of commitment dates for actions needed on older facilities, however they are not what is designated in the permit as the guiding determination. The permit specifies that performance ratings are to be used to set priorities, therefore the performance ratings have been used for the reporting in this report. Remediation Ratings are used internally to create action lists, priority contracts and be used internally at MDOT SHA for planning purposes as well as budget projections. Drainage system assets, such as pipes and outfalls are rated based on structural integrity, while SWM assets are rated based on the specific facility type and functionality.

A.1. Inventory

The MDOT SHA drainage system assets and SWM facility inventory includes all hydraulic structures, pipe conveyances, outfalls and SWM facilities that intercept and manage runoff from the MDOT SHA highway network and roadway-related assets. It includes SWM facilities not owned or maintained by MDOT SHA, but by other entities including but not limited to counties, municipalities, other state agencies, and private entities. These facilities treat MDOT SHA pavement and are therefore tracked in our inventory through the Access Permitting Process.

The facility inventory database is updated on an ongoing basis as new facilities are brought online. Updates occur statewide for MDOT SHA's entire infrastructure in each Maryland county; including all Phase I and II MS4 locations, as well as locations outside these areas. Routine inspections and inventory assure that these new structures are integrated quickly into the system.

The apparent number of SWM Facilities has fluctuated over the past couple years in this report we have resolved these discrepancies and show further details and steady growth. In FY 2016, approximately 2800 grass swales were loaded to the database as the result of desktop studies and MDE coordination. During the following reporting period, a detailed review took place which resulted in a net loss of 913 of these swales due to quality control evaluations of the data, additional baseline computations and MDE comments on the 2016 Annual Report. The adjustments were delivered in MDOT SHA's July 31, 2017 submission to MDE (*MDOT SHA Response to MDE Impervious Area Assessment Report Comments*). In last year's report, 628 of these swales are shown as proposed additional analysis of the facilities this year recovered credit and placed them back in the database along with other additional facilities.

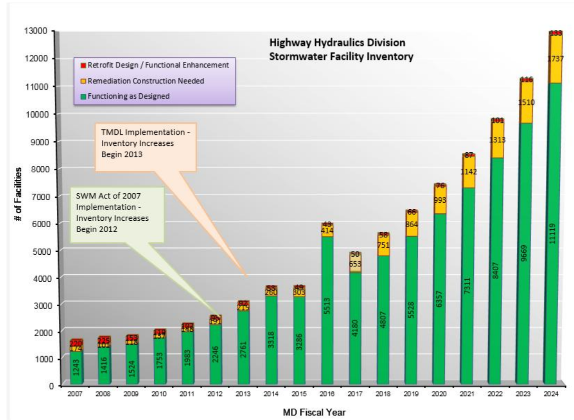


Figure 2-3: Previous Annual Report Summary BMP Facility Chart, showing inventory trend

New developments adjacent to MDOT SHA roadways, construction of major highway improvement projects and safety improvement / system preservations projects all serve to add to the drainage and SWM inventory. There has been an exponential increase in the SWM Facility inventory in recent years. Often, to meet regulatory requirements, these projects implement Environmental Site Design to the Maximum Extent Practicable (ESD to MEP) as well as require SWM treatment of any additional or reconstructed impervious surfaces. System preservation projects are ongoing, as MDOT SHA continually strives to provide a high-quality transportation system to all.

A.2. SWM Facility Inspections and Performance Ratings

Drainage system and SWM facility field inventories and inspections are performed every year and have been completed over the last several for all counties, both MS4 and non-MS4. Priorities are set based on previous inspections and locations as well as newly constructed facilities in all areas. The information is used to verify existing data in the MDOT SHA database as well as to determine the SWM facilities functional rating and serve as the foundation to recommend any necessary remedial actions. The inspection data is also used to research ownership records of many BMPs, as some were mis-identified as SHA owned in years prior. A tracking system is in place and under constant improvement with emerging technologies to streamline planning efforts for future inspections for all counties in the state.

The inspection protocol is documented in Chapter 3 of *Maryland State Highway Administration Stormwater NPDES Program, Standard Procedures – Best Management Practice Field Inspections & Data Collection Procedures* and in upcoming years, the new procedures will be outlined in detail in this reference guide.

During initial field assessments, individual parameters of each SWM facility are scored on a scale of 1 to 5. Scores are then used to establish an overall SWM facility performance rating as follows:

A **No Issues.** The SWM facility is functioning as designed with no adverse conditions identified. There are no signs of impending deterioration and no maintenance is needed at this time.

Figure 2-4: Pond Riser Rated "A"

B **Minor Problems:** The SWM facility functions as designed, but minor issues are observed that may worsen to the next rating level if not repaired in a reasonable timeframe. Issues noted are determined to be easily corrected thru routine maintenance performed by MDOT SHA maintenance forces and their available equipment.

Figure 2-5: Pond and Riser Rated "B"

C **Moderate Problems:** The SWM facility functions as designed, but efficiency, performance, and function are at risk or somewhat compromised and may worsen to the next rating level if not repaired in a reasonable timeframe. Repairs needed require equipment beyond that available to MDOT SHA maintenance forces

Figure 2-6: Pond Riser Rated "C"

Figure 2-7: Pond Embankment Animal Holes Rated "C"

D **Major Problems:** The SWM facility no longer functions as designed, and efficiency has been compromised. Repair or remediation should be performed, larger equipment and possibly permits may be required to perform work.

Figure 2-8: Pond Low Flow in Riser Rated "D"

E **Severe Problems:** The SWM facility no longer functions as designed and efficiency as well as several critical parameters have been significantly compromised. The SWM facility shows signs of deterioration and/or failure, requiring immediate remedial action. Facility parameter may also be causing a threat to the roadway and public safety.

During FY 2018, MDOT SHA performed 1192 inspections of unique SWM facilities most of which occurred across Anne Arundel, Baltimore, Carroll, Montgomery, Prince Georges, and Washington Counties. To a lesser degree inspections were also performed in Cecil, Frederick and Howard Counties. Inspection efforts also continued to include specially trained personnel to enter and inspect confined space, so all underground confined utilities that were due were also inspected. Inspections in some of these areas will continue into FY 2018 as part of the effort to launch updated inspection tools. All updates are included in this report.

The inventory inspections are used to develop action ratings and prioritize remediation efforts. The remedial inspection protocol describing field assessment methodologies used for determining the observed functionality of a SWM facility and providing guidance for remedial actions is included in Chapter 7 of the *Maryland State Highway Administration Stormwater NPDES Program Standard Procedures - Best Management Practice Assessment Guidelines for Maintenance and Remediation.* The assessments and recommended action ratings provide data that enables MDOT SHA to adequately allocate sufficient resources to ensure an appropriate schedule of remediation activities. The two-tiered rating system is used to prioritize maintenance activities, initiate remedial design, permitting and environmental clearance processes, develop and justify fiscal budget to requests for appropriate funding and to sufficiently plan areawide contracts procurement. Expenditures for Planning Efforts during FY 18 are listed in **Table 2-1** below and engineering and construction expenditures are listed in **Table 2-4** and **Table 2-6** later in this report.

Table 2-1: Planning Expenditures FY18

Description	Expenditure
Source ID and BMP Inspections	$1,940,845

A.3. Drainage Asset Inspection Tools and Training

Drainage assets consist of a wide variety of structures, from Stormwater management facilities of all types, to the pipes that convey the water to and from the facilities to the outfalls that ultimately release clean water back into the natural channels. The Drainage and SWM Asset Management team has been working diligently over the last couple years to expand the tracking, inspection and upkeep of all of these structures. The NPDES database has been going through many changes in structure to keep up with the increasing demand to follow all aspects of the system through their lifetime and plan for continued life cycle needs.

SWM Facility Inspection and Training

In 2018 SHA rolled out a field inspection tool in-order-to streamline the process. Instead of using a Toughbook and proprietary software or for underground facilities, filling out hard copies of inspection reports, inspections are now performed electronically using tablets, smartphones or laptops. This has greatly improved the efficiency of inspections as faster and more user friendly technology allows inspectors to move more quickly in the field.

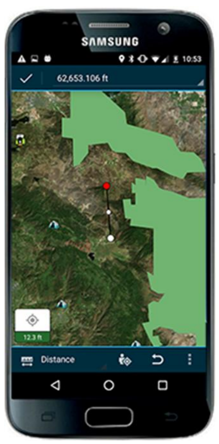


Figure 2-9: Example use of Cell Phone with Inspection Tool

In addition, the configuration of data transfer is very different and now allows teams to upload small batches of reports, instead of submitting several hundred at a time. This change in business processes will have a large impact, as stated in Part 1, on the organization and planning for inspections. Each county will be inspected to some degree annually. This also allows remediation (action) ratings to occur more frequently with multiple, smaller submissions occurring throughout the year as opposed to a one time, large submission of data once the entire county has been inspected. The tool was beta tested by a control team throughout the spring and summer and will be rolled out to additional firms in the spring of 2019. Early feedback has been encouraging and the field teams were able to work with the software developers to discover bugs and find solutions. Details, timelines and specifics follow.

MDOT SHA has added additional consultant staff resources during the past couple years. This new staff brought both experience in the field along with fresh ideas to the team. The consultant staff played a pivotal role in the Inspector Training outlined in last year's annual report. While developing the training materials, rating teams created a brief visual guide to supplement the specific items called out in the Standard Operating Procedures. This visual guide and related Standard Operating Procedures from the *Maryland State Highway Administration Stormwater NPDES Program, Standard Procedures – Best Management Practice Field Inspections & Data Collection Procedures* has been incorporated into the new Inspection Field Tool to provide inspectors immediate access to proper inspection techniques.

The new Inspection tool began development during the last reporting period and continued until 1/2018. The new tool leveraged Esri Configurable Off The Shelf (COTS) solutions to enhance the workflow for Drainage and Stormwater Inventory Editing, Facility, IDDE and Underground Inspections. The development team also worked to develop a backend process that allows for a seamless synchronization and transformation of data which is integral to the increased efficiency previously mentioned.

The tool uses two major components married together to provide all needed aspects for the operation, these include Collector and Survey 1-2-3 for ArcGIS. Collector is a web map based tool for viewing and editing mobile GIS data that allows for both attribute and geometry updates and editing to inventory in the field. The application can provide real-time data updates to ArcGIS Online where it can be monitored, edited and have QAQC in both the desktop and mobile environments.

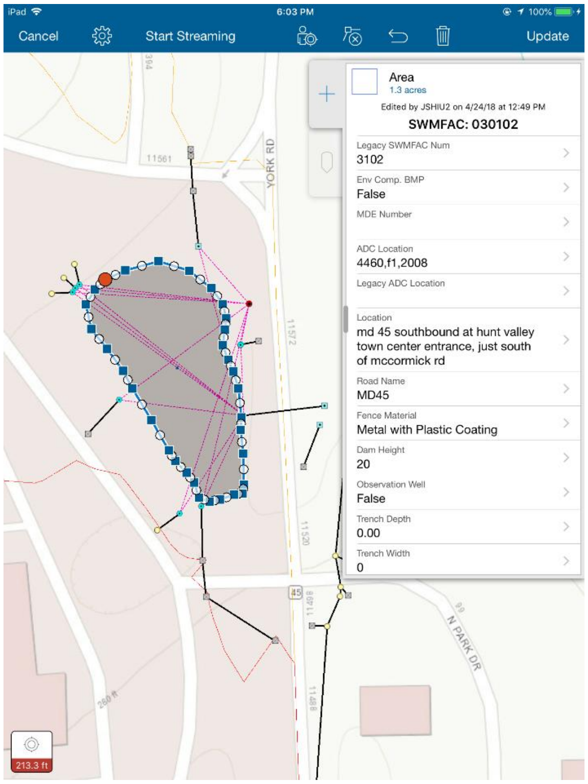


Figure 2-10: Example use of Collector for attribute editing and inventory

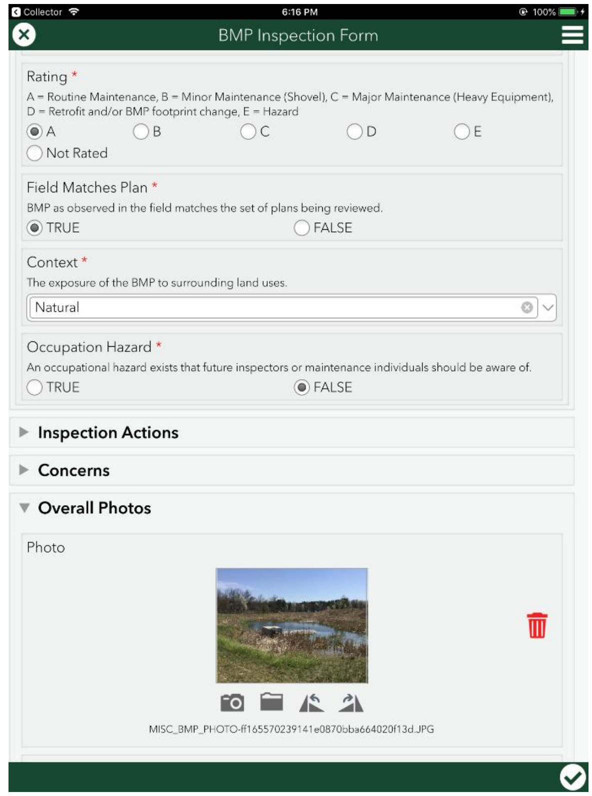


Figure 2-11: Example use of Survey 1-2-3 photo inclusion functions

Collector is also used to launch the BMP Inspection form via Survey123. This is a form based tool that Uses conditional logic, constraints, and verification to improve data entry for entering and editing inspection records. The forms were configured to follow the original inspection forms as laid out in the Standard Operating Procedures. Here is where the image guide was loaded, and for inspection components that receive a lower grade (3, 4 or 5) the logic of the tool requires a photo be included with the item record. This will allow office personnel doing the Action Ratings to have more detailed information to follow for more accurate assessment.

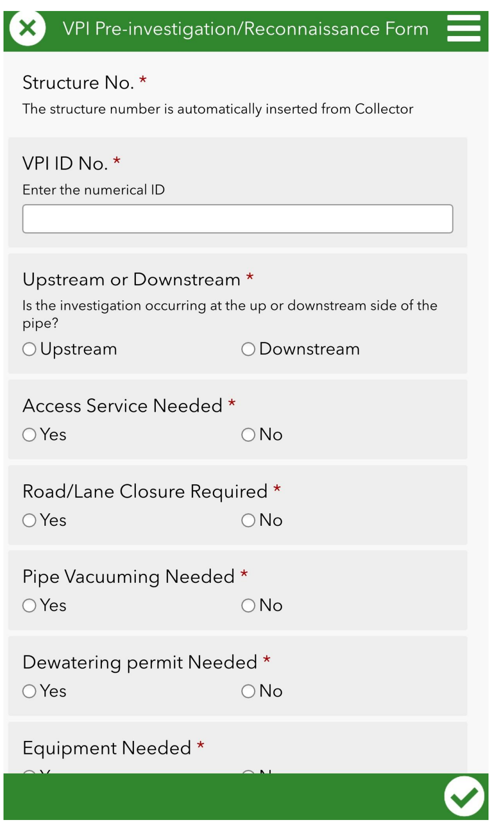
The development process was not without unexpected challenges along the way so the development team requested that rather than a full-scale launch it be scaled back to far fewer teams in order to continue working on the processes for integration. This is part of why the number of completed inspection dropped from the previous year. The tool development schedule continued as follows:

- User testing and acceptance continued until late 1/18
- Beta testing launched 2/18
- Launch in field 3/18
- Trainings troubleshooting all summer in order to create updates to data, processes
- Underground tools that were started 10/17 are still in process

Troubleshooting and training was continuous through the process. In addition, the development team began to work on updated Standard Operating Procedures for use of the new tool. Many adjustments to the interface from the inspection tools to the desktop and database environment had to be made and are outlined in the Data Management section.

Video Pipe Inspection (VPI) Program

Over the past 12 months, MDOT SHA has implemented a pilot program for the Video Pipe Inspection Program. The pilot consists of MDOT SHA partnering with KCI Technologies and Maryland Environmental Service (MES) to inspect all existing corrugated metal pipes along the 1-68 corridor. MES performs the video inspections using CUES equipment that operates Granit XP software. Prior to each video inspection, MES performs an initial site visit in which inspection needs are identified and each pipe is given a field rating. The initial site visit reports are documented using Survey123 and are instantly transmitted, using the software, from the field user to the desktop user for review. KCI in conjunction with MES developed the template for the initial site visit report within ESRI. Upon video inspection, MES again uses Survey123 to input inspection data, including asset rating and comments.


VPI Pre-investigation/Reconnaissance Form

Structure No. *
The structure number is automatically inserted from Collector

VPI ID No. *
Enter the numerical ID

Upstream or Downstream *
Is the investigation occurring at the up or downstream side of the pipe?
○ Upstream ○ Downstream

Access Service Needed *
○ Yes ○ No

Road/Lane Closure Required *
○ Yes ○ No

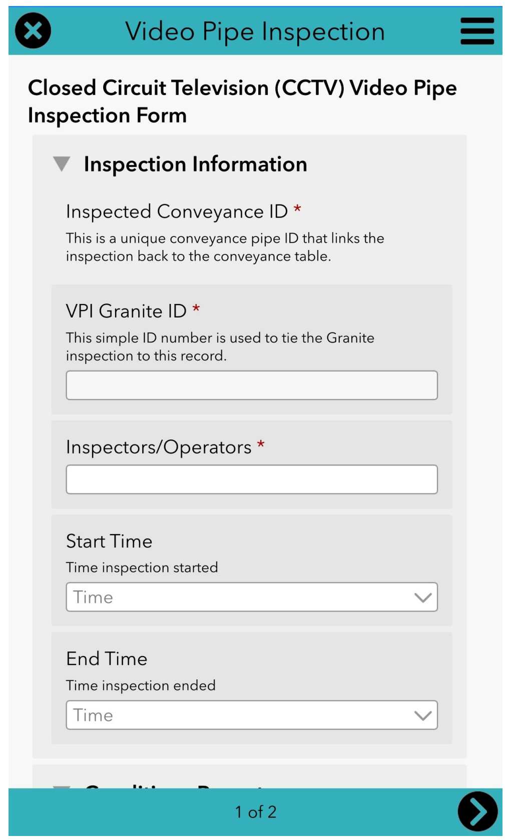
Pipe Vacuuming Needed *
○ Yes ○ No

Dewatering permit Needed *
○ Yes ○ No

Equipment Needed *

Figure 2-12:VPI Pre Investigation Sample

The inspection data and videos are linked the initial inspection report within the Survey123 software. The desktop user can search the asset within Survey123 using GIS location or by asset I.D. Each asset, when identified will contain the initial site visit reports as well as the inspection data and reports. Upon completion of the pilot, Survey123 will be integrated with ProjectWise and the desktop user will be able to access all asset information within ProjectWise.


Video Pipe Inspection

Closed Circuit Television (CCTV) Video Pipe Inspection Form

Inspection Information

Inspected Conveyance ID *
This is a unique conveyance pipe ID that links the inspection back to the conveyance table.

VPI Granite ID *
This simple ID number is used to tie the Granite inspection to this record.

Inspectors/Operators *

Start Time
Time inspection started
Time

End Time
Time inspection ended
Time

1 of 2

Figure 2-13: VPI Inspection Sample Form

MDOT SHA Outfall Inspection Application

Following meetings with HHD employees and the WPD team, a new MDOT SHA outfall inspection application is being developed. This tool uses Survey 123. All future MDOT SHA outfall inspections will be performed using this tool. The inspection tool is an application which can be downloaded to cell phones or tablets. The inspection can be performed by inspectors using phone or tablet even when Wi-Fi is not available. Inspection data and pictures can be immediately uploaded to MDOT SHA server as soon as Wi-Fi becomes available to an inspector. Therefore, in the future, all outfall inspection data and photos will be available to MDOT SHA the day inspections are performed. This will enable the HHD outfall program and TMDL program to prioritize outfall stabilization and restoration candidates based on dynamic data instead of static data. The application will allow the previous pen and paper inspection data to be added to database, so comparison can be made of outfall condition from old inspection data to current inspection data collected.

This application will be an essential tool for initiating drainage stabilization and restoration projects. The tool includes old-form (pen and paper) fields in addition to the newly added fields so data collected can be filtered efficiently, and outfall stabilization priorities can be based on several factors, e.g., permitting requirements, safety concerns, MOT concerns, accessibility to site, TMDL credits, etc. It will also assist the TMDL outfall program to identify potential TMDL credit sites versus outfall restoration and stabilization sites. The traditional outfall restoration and stabilization site design goal is to protect MDOT SHA assets and keep roadway user safe. We expect outfall inspection application field trials to start in the winter of this year. The current application version is v0.2 (prototype 2).

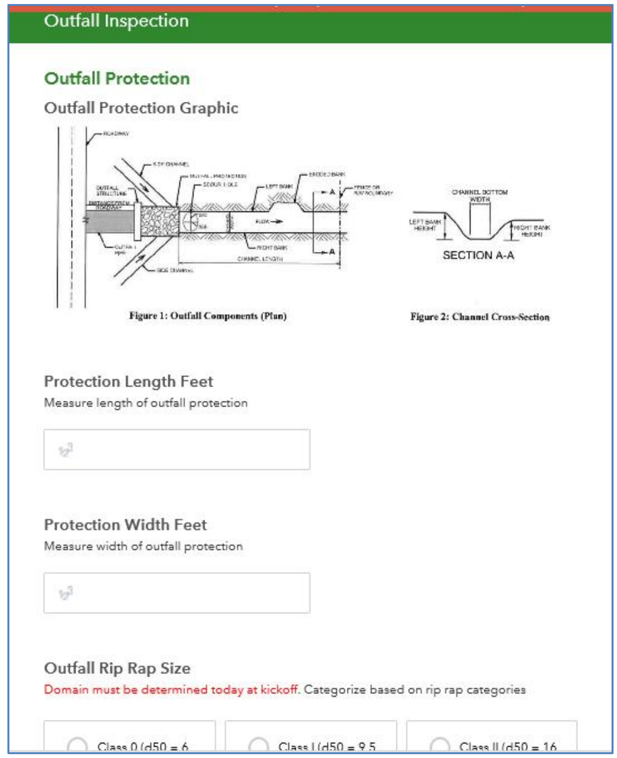


Figure 2-14: Outfall Inspection Application Program User Interface

Outfall inspection application is being developed so that all MDOT SHA offices and division can use it. Outfalls inspected will be linked to MDOT SHA spatial database (GIS maps). The outfall inspection tool will be an excellent resource during drainage investigations, monitoring stability of outfalls over years, addressing public concerns and project delivery. See **Table 2-14** for outfall inspection application user interface.

Outfall Stabilization and Restoration Projects

HHD has several outfall stabilization and restoration projects in stages of design and construction. Some noteworthy outfall stabilization and restoration projects in construction this year are: a project with 13 outfalls in MDOT SHA District 5 (**Figure 2-15** and **Figure 2-16**), a project with 15 outfalls spread across Anne Arundel county, a project with 8 outfalls in Prince Georges county, I-270 at Montrose Road project. These outfalls needed to be stabilized as they were threatening MDOT SHA assets and causing erosion.

Figure 2-15: Site No.2 Outfall Failure.

Upper picture shows channel erosion and lower picture shows the outfall failure

Site No. 2 of the 13 outfalls in District 5 is a good representation of a typical outfall stabilization and restoration project. Site No.2 is located in St. Mary's County along Northbound MD 5 near the intersection of Point Lookout Road just South of Mechanicsville, MD. It had severe washout and downstream channel erosion for approximately 100 feet. The existing CMP was lined and drop manhole was added to allow a controlled vertical drop in elevation from the existing pipe invert to the existing channel bed elevation. The existing downstream channel was regraded and lined with 78 linear feet of riprap

Figure 2-16: Site No.2 Near Construction Completion. Upper picture shows area stabilized (outfall failure use to be near the wooden pole) and lower picture shows the stabilized downstream channel

At I-270 at Montrose Road the upstream head cut at the outfall was extremely unstable and was likely to continue to erode and it threatened the stability of the I-270 southbound ramp, while contributing undesirable sediment and nutrients downstream. The combination of a storm drain network with stream restoration techniques was proposed to stabilize the outfall at the I-270 Southbound ramp from Montrose Road Eastbound (see **Figure 2-17** for pre-construction and **Figure 2-18** for post-construction)

Figure 2-17: I-270 at Montrose Road Outfall Failure. Upper picture shows outfall failure and lower picture shows the sediment accumulated in the channel

Figure 2-18: I-270 at Montrose Road Outfall Stabilization. Upper picture is of stabilized outfall at I-270 at Montrose Road. Lower picture is of restored downstream channel at I-270 at Montrose Road.

A.4. Data Management

MDOT SHA has an extensive inventory of all SWM drainage infrastructure in all twenty-three counties. The data collection effort is on-going in all the counties statewide, and involves continuous updates of the GIS data for source identification and database records of inspection and remediation activities. As business processes change not only with the data of field inventory, but also permitting requirements for remediation and maintenance efforts, the NPDES database and integrated ArcGIS tools continue to grow.

MDOT SHA is completed an upgrade to the servers, the structure of the ESRI geodatabase and detailed schema early this year. As result, many new cells to data tables were created to better track project progress, data coordination efforts and inspection schedules. The structure allows for the establishment and enforcement of topologic and/or network rules as well as unique data entry while still helping project management with a comprehensive approach. The database format resulted in improved data intelligence and integrity. MDOT SHA integrates the geodatabase with other organizational applications for data sharing and viewing, such as eGIS, the new HHD Web Research App and ArcGIS On Line (AGOL) to improve communication, efficiency and tracking. This is an ongoing process that continues to improve and long term will serve to provide detailed and accurate data that will be used to plan for long term upgrades to facilities that have reached the end of their useful life, or that no longer function properly due to changing conditions outside MDOT SHA control.

Database and System Upgrades

MDOT SHA was extremely busy in the past year implementing several upgrades to the GIS database and system. These upgrades included a new platform for the database and more web based capabilities, updates to the inspection tables, new functionality in the enterprise GIS (eGIS) system for maintenance tracking, additional tracking for access permits, facility types and dam breech analysis data.

To start the transitions, in 10/2017 a database planform upgrade was performed. The upgrade transitioned the database from an Oracle to a SQL platform as part of server upgrades performed system wide. This upgrade is now used in concert with the ArcGIS On Line (AGOL) platform which supports the interface from the inspection tools in the field to office data for processing because it is a platform for publishing and sharing GIS data. It provides access to the field inspection database using secure user permissions through a high availability software as a service platform. This platform facilitates web based editing and QAQC in the office environment, without the need for ArcGIS Desktop software. Web maps and applications can be shared to members within groups for better control of data access. In addition, teams also have a web application available to them to view, edit and QAQC stormwater (NPDES) inventory and inspections in a web browser.

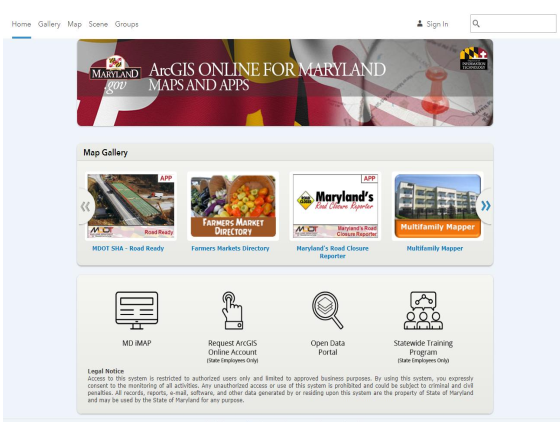


Figure 2-19: Splash Page for ArcGIS On Line for Maryland

Beginning in 11/2017, several updates were made to various tables within the database and additional tables were added. With new requests from MDE to include an inspection record with each rating record in the database, a new system for inspections was implemented to include Abbreviated Inspections (Inspection lite) and Remediation Verification/As Built Inspections at the end of construction in addition to the Triennial inspections previously loaded. This has resulted in some inspections now being present without ratings to match as the team catches up with ratings. At the same time, upgrades to enterprise GIS (eGIS) were also planned for. A Maintenance table that would be read thru the application to allow the team to track maintenance activities was also added. The updated eGIS application launched in 2/2018 and included all the updates. Users immediately began to apply the application to tracking activities on the large AX929 contract for the upcoming season.

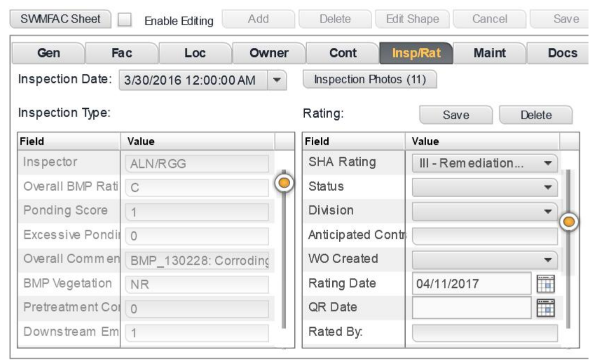


Figure 2-20: New Inspection/Rating Tab in eGIS showing area for inspection type, internal engineering rating and other new data

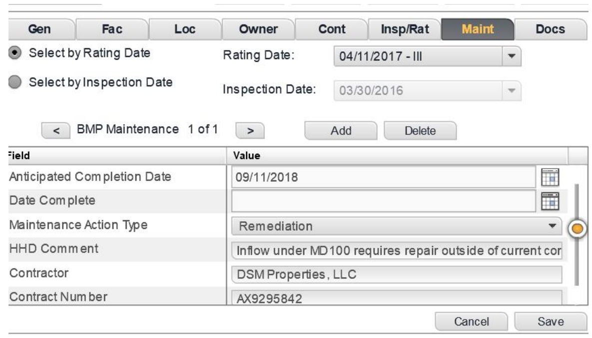


Figure 2-21: New Maintenance Tab in eGIS showing integration of inspection and rating information, anticipated date & contractor

Through the balance of the rest of the year additional tables and inspection criteria were developed. The Video Pipe Inspection Program began discussing addition to the database in 1/2018. Access permit data was added to the tracking table in 3/2018. Through special agreement with MDOT SHA PRD, new facility types were added to the database to follow the limited number allowed per year of enhanced grass swales for example. The final tables that are in development are the dam breech analysis tables which will work in conjunction with an MDE Pilot Program for remediation activities on facilities with embankments. This effort was begun in 6/2018 and continues into the future.

The final part of the Data Management upgrades that were completed is the NPDES Field Data Manager which is used to execute back end processes that transform data to and from the production database schema for use with the field tools for inspection. This service provides live updates of backend processes and status as inspections are taking place. It enforces business rules and logic for inventory updates and inspections as laid out by the Standard Operating Procedures and then pushes data to the MDOT SHA NPDES Production database. The use of the tool is enforced by versioning and reconcile and post is then performed by MDOT SHA Data Administrator. The full functionality of this manager was a highly coordinated and iterative process between field inspectors and office staff to find the best solutions for many unanticipated problems. Many unique scripts were written to execute inside the system in order to make the data transfer work as intended and on a more continuous basis rather than large scale database blocks at a time. This update will now allow the team to perform inspections anywhere in the state and provide nearly live updates back to the database. This will eliminate the need for checking out data and locking it by County annually. The updated scheduling summary can be found in Part 1 of this report. Future planning for these efforts are more likely to follow a corridor approach for inspection teams to gain additional efficiency in their work.

The updated system provides a much more integrated functionality that includes interaction not only thru eGIS inside the MDOT SHA servers, but also the ArcGIS on Line platform available through the state-wide Department of IT. Data standards for the NPDES MS4 Stormwater Program Geodatabase are updated to reflect these changes and will continue to finalize thru more planning, testing and integration. Overall the team looks forward to the continued process and business improvements to provide better overall results for the entire program.

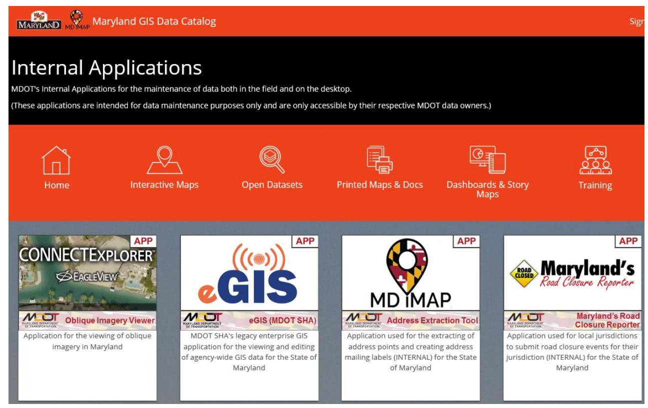


Figure 2-22: Updated Splash Page for Maryland GIS Data Catalog including eGIS

HHD Web Research Application

A new tool available to all MDOT SHA business units has been implemented in 2017 and its use grew significantly in the past year thru some public presentations and many one-on-one meetings with HHD employees. The HHD Web Research Application leverages the power of AGOL Web Apps which are an Esri platform for publishing specially configured apps that uses out of the box widgets to perform analysis and editing. This versatility has allowed the HHD Web App to be reconfigured quickly upon requests for new data and integrates many GIS database layers into a single map viewer showing additional environmental features, planning projects, and public flooding information to enhance planning efforts. Additional fields were added to this application as real-world users found a need and provided feedback to staff. The growing application has been a successful collaboration between different MDOT SHA offices and disciplines. All MDOT SHA outfalls within MS4 counties have been identified and captured in the spatial database and displayed here. Efforts beyond the MS4 counties continue to identify outfalls within MDOT SHA ROW. The stormwater and drainage assets database is an excellent resource during drainage investigations, when addressing public flooding issues, or during assessment of outfall channel stability. It is an essential tool for initiating drainage improvement projects-, stormwater retrofits, major remediation, and outfall stabilization planning, as well as rapidly addressing any emergency repairs.

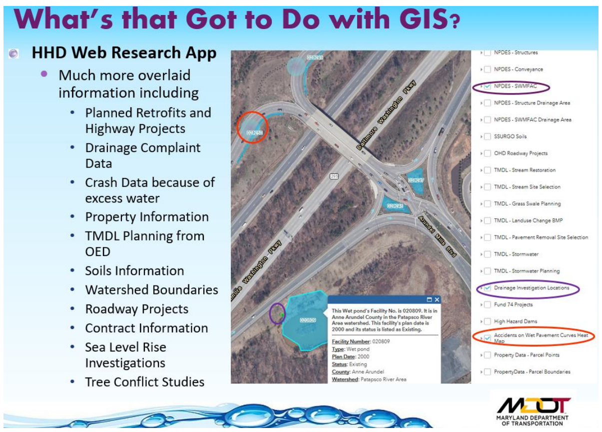


Figure 2-23: HHD Research Web App Presentation

B. Engineering

Assets with major deficiencies that entail more than minor maintenance require a detailed remedial assessment to determine specific causes of deficiencies and to develop a remedial action plan. Procedures have been created that assist with decisions on minor maintenance, remediation or full retrofit of drainage and SWM assets. These assessment guidelines document the methodologies to be used in the field for assessing and determining remedial actions necessary for restoring stability and functionality. In addition, the procedures provide information on field preparation, data management of collected information, as well as development of remedial assessment reports and work orders for contracting crews.

B.1. Remediation Rating System

Response actions are divided into various categories of activities: no response required, minor maintenance, major remediation, retrofit design, emergency response or abandonment. The following outlines the official ratings that help determine the next steps in the process.

I **No Response Required -** The facility is functioning as designed, with no maintenance needed at this time. Re-schedule for the next multi-year inspection assessment period or put on low priority minor maintenance list.

Figure 2-24: Pond Rated "I"

II **Minor Maintenance -** The asset is functioning as designed, but routine and preventative action should be performed to sustain effective performance. All actions needed are within the abilities of the MDOT SHA Maintenance Shops and only require general permitting coordination available to the shops.

Figure 2-25: Pond Rated "II" Requiring Invasive Vegetation Management

III **Major Remediation -** The asset has some compromised functionality and significant remediation is necessary to restore original condition. The facility work cannot be performed by MDOT SHA Maintenance shop forces, however can be performed within the existing facility footprint. Facility type will not be changed. Environmental and Construction Permitting required, historically feel under General Approval, currently working on MDE Pilot Study.

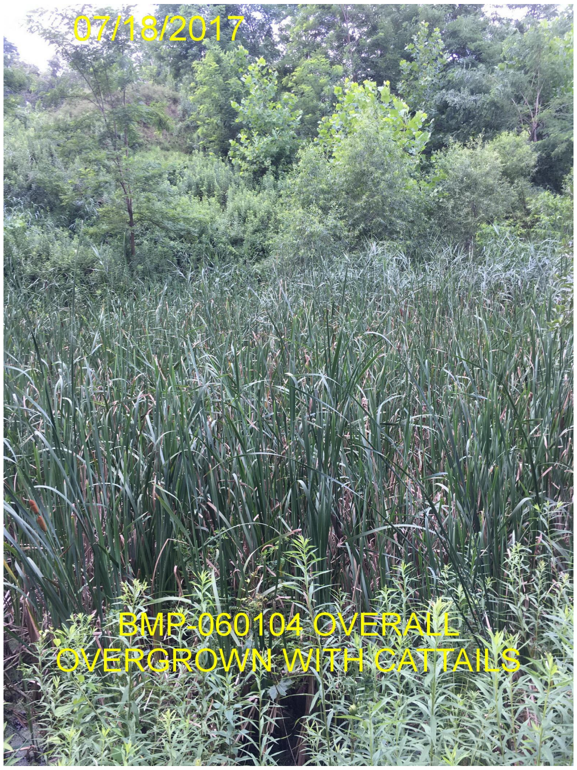


Figure 2-26: Pond Rated "III" (overgrowth of cattails, woody vegetation growth on embankment, and additional sediment removal likely needed)

IV Retrofit Design - The asset is no longer functioning as designed and cannot be restored to the original function without a complete re-design and re-construction of the facility with a larger footprint. Full project development and permitting will be required for all work needed on the facility. Often reconstruction will also require a new facility type.

Figure 2-27: Pond Rated "IV" (excessive erosion of inflow requiring embankment rebuilding)

Figure 2-28: Pond Rated "IV" (severe corrosion of outflow pipe will require pipe to be replaced thru pond embankment)

V Immediate Response - The SWM facility has catastrophically failed and public safety hazards exist that require immediate corrective action. Typically these are permitted as emergency repairs.

Figure 2-29: Infiltration Trench Rated "V" (severe erosion near inflow threatens roadway)

Figure 2-30: Pond Rated "VI" (Abandoned due to difficult access making routine and/or major maintenance not feasible)

VI Abandonment - The SWM facility is unsustainable and no longer provides sufficient benefit to warrant remedial design. Factors that may contribute to this include excess repairs, minimal or no treatment of MDOT SHA pavement and serious difficulty with access and long term maintenance of the facility.

During FY17, the remedial action rating system was expanded. As planning efforts for facility remediation expand it became clear that some inspections previously performed were inadequate because key attributes of facilities could not be accessed for rating purposes. MDOT SHA coordination efforts to get minor maintenance performed on a facility, usually in the form of brush clearing was needed to complete the inspection. The rating value of 'R' for 'Re-inspection' was created so the database could easily and quickly be sorted to find any inspections that still needed priority for the year. This method was continued during FY18, however it's success in 2017 made it far less necessary this year.

See **Table 2-2** below for a summary of the Stormwater Asset Management Program Remediation (Action) ratings to categorize corrective actions within MS4 Counties.

Table 2-2: Stormwater Asset Management Remediation (Action) Ratings Summary in MS4 Jurisdictions

County	No Action	Routine	Major Remedial	Retrofit Design	% Funct.	Rated Invent.	Grass Swale Programming
Anne Arundel	108	341	172	29	69.1%	650	275
Baltimore	71	122	74	9	69.9%	276	376
Carroll	17	47	42	1	59.8%	107	128
Cecil	11	36	13	0	78.3%	124	268
Charles	60	105	33	3	82.1%	201	515

Table 2-2: Stormwater Asset Management Remediation (Action) Ratings Summary in MS4 Jurisdictions

County	No Action	Routine	Major Remedial	Retrofit Design	% Funct.	Rated Invent.	Grass Swale Programming
Frederick	28	69	25	3	77.6%	125	606
Harford	42	38	59	9	54.1%	148	141
Howard	56	256	77	15	77.2%	404	613
Montgomery	19	147	160	9	49.6%	335	397
Prince George's	21	153	108	5	60.6%	287	881
Washington	17	13	8	1	88.9%	39	343
Salisbury	5	6	0	0	100%	11	0
Cumberland	0	0	0	0	100%	0	0
Cambridge	0	1	0	0	100%	1	0
Totals	**455**	**1334**	**771**	**84**	**68.70%**	**2604**	**4543**

B.2. Work Order Generation

In response to identified deficiencies of SWM facilities that require more robust maintenance but can be done so within the facility foot print, simplified plans are developed. These plans are called work orders and their scope for the program is outlined in Chapter 7 of the *Maryland State Highway Administration Stormwater NPDES Program, Standard Procedures – Best Management Practice Field Inspections & Data Collection Procedures*, however during FY 2017 significant changes to this template occurred. These remedial work orders are then executed through areawide contracts.

SWM facilities that require major remedial work are assigned an action rating of "III" by MDOT SHA and prioritized by urgency, which is analyzed based on previous MDE reporting and the total amount of baseline credit they treat, and location. Based on this ranking, construction activities are organized so that prescriptive work orders that have been marked on the original design plans for the contractor to address identified issues can be executed in an efficient manner.

For manty years, work order development and format was guided by the General Approval for Erosion & Sediment control (ESC) that had been granted to MDOT SHA. The previous General Approval has expired and MDOT SHA applied for a new General Approval for Statewide Stormwater Facility Maintenance General Statewide Erosion and Sediment Control Approval in 2015. Additional efforts to get a general approval for maintenance activities from MDE have continued in that time. All comments have been addressed and resubmittals made and gone unanswered by MDE since Sept 2017. Despite multiple attempts to get more communication on the project, MDE has not responded to the submittal. As noted in Part 1 of this report, until General Approval is received, major remediation efforts that disturb over 5,000 SF and 100 Cu. yards of earth movement will require individual ESC approval for each site. This requires additional time and coordination to perform required major remedial work. The more cumbersome permitting process put in place during FY 16, which included additional screening for environmental features, has continued. The screening verifies the need for a Joint Permit Application under the regulations of MDE for natural environmental features. This screening process can take several months to complete and has been added to the work order development process during subsequent years. In order to complete the process MDOT SHA added several additional consultant staff to the Asset Management team during FY17. During FY 2018, the Asset Management Team continued to develop more efficient tracking for contract and permitting activities. Multiple remediation contracts were opened and more team members become involved in the program. The BMP Master List that was created in FY17, to track BMPs for priority, work order details such as limit of disturbance, dates of design and review activities, status, wetland permitting needs and several other aspects of the process became more heavily utilized. The team began an integration process of the Master List into the NPDES Database and tools. The maintenance tab upgrades that began in FY 2017 to SHAs internal database, and enterprise GIS (eGIS) system were launched.

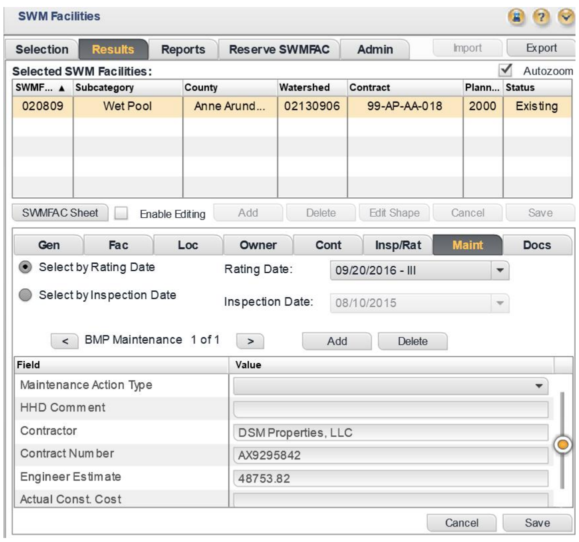


Figure 2-31: New Tab Added to eGIS to track Remediation

The extra staff and efficiency of new tracking systems can only expedite the work order process to a certain degree, however the ability to perform needed remediation by a contractor rests on the speed with which permits are granted. The MDOT SHA PRD continued to work with the Asset Management team to determine the most efficient system possible under the current MDE regulations. The changes began taking shape when the team submitted the first work order that included tree removal to a facility with an embankment on it in November 2017. MDE responded to this and other JPA activities with a request to include the MDE 378 flow chart which was submitted in early February 2018. At the end of March, MDE PRD responded by introducing a Phase by Phase approach to remediating larger facilities with embankments (i.e. wet ponds, dry ponds, surface sand filter and bioretention) because of concerns that tree removal could cause instability. The asset management team met with both MDE PRD and MDOT SHA PRD to review and revamp the work order format, adding several pages of standard regulatory sheets including several sediment control sheets, additional scaled blow up sheets and a heavily vetted Sediment Control Sequence of Construction and Remediation Action list for all actions needed to complete the reconstruction tasks.

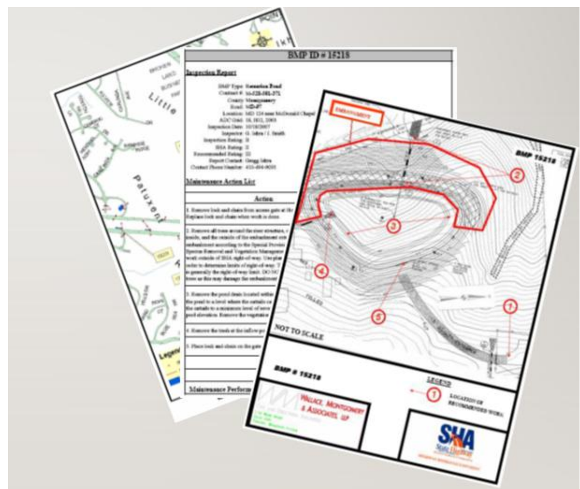


Figure 2-32: Work Order Package prior to FY16

Figure 2-33: Current Work order Package Sample Pages including Table of Contents showing a minimum of 12 sheets, plus figures, plus an appendix with inspection forms

The updated format was submitted to MDE for review and comment in early April for the embankment facility. Simultaneously, the Asset Management Team held a training of all sub consultants working on the Workorder design to present the new format as all workorders in progress would have to be updated to accommodate the expansion. The training was well received and presented a unique opportunity to also provide cross training on MDOT SHA CADD standards and create additional consistency in work products. Smaller facilities were updated to a similar format and submitted for approval as the kick off of the remediation contract AX929 took place. Smaller facilities began reconstruction efforts. At the end of May, MDE PRD provided comments and a meeting of all involved was held to review and resolve various aspects of the process. MDE PRD provided a framework for the proposed phases for the tree removal effort. Phases I and II involve the removal of trees up to 4" located on engineered embankments and then conducting a dam inspection to assess the remaining trees. The report is to be sent to MDE PRD which will then conduct their own inspection and determine the necessary approach to removing the remaining trees to bring the facility to a functional level. This new process, referred to as the Pilot Program, has the potential to impede MDOT SHA from meeting commitment dates presented hence forth. A timeline for after MDOT SHA relinquishes the dam inspection reports to MDE has not yet been established. At the end of FY18, the Asset Management Team was adding final edits to the work order template for the embankment facilities but did not yet have the authority to approve any larger facilities for the ongoing contract. With the current statewide contract structure, there are also potential fiscal repercussions that arise when a contractor has to mobilize to a site more than one time during the life of the contract. The General Approval process acknowledges the need for efficiency in both design and construction and builds upon the fact that these sites have been previously permitted for all applicable regulations.

Since some these implementations during FY 2016 MDOT SHA expenditures dropped from approximately $1.4 million to perform major remediation to closer to $460,000 in FY17 and have begun to increase with FY18 to near $744,000. A summary of all expenditures on remediation and retrofit efforts is shown in **Table 2-3** and **Table 2-4** at the end of Section B. An example of one of these projects follows in **Figure 2-34**.

Figure 2-34: Remediation of BMP 020036 – Infiltration Trench - MD-32 (Patuxent Parkway) EB, 0.4 mile West of Sappington Road Overpass (Anne Arundel County)

Before – Overgrowth, Standing Water & Media Replacement Needed

During - Remediation Activities, Brush Clearing

During –Remediation Activities, Stone Backfilling

After – Stabilized with Matting and Seed, Media in Place

B.3. Retrofit Design for Functional Enhancement and Remediation Projects

During the past year, Retrofit activities were slowed in order to provide resources to remediation activities the Asset Management Team is working on future planning for a more systematized approach to retrofit design for the upcoming year. SWM facilities not currently functioning as originally intended and requiring major repair that cannot remain in the original design footprint or location, are assigned an action rating of "IV" by MDOT SHA and are placed on a list for retrofitting. Full engineering design solutions need to be developed to restore the treatment levels that had been provided by the original facility. These retrofitted facilities often require a change in SWM facility type and completely new environmental permits. These permits do not fall under the general permit; therefore, it can take years to get projects fully designed, permitted and constructed. The projects will involve detailed engineering design and coordination. In addition to SWM facilities, drainage assets deemed in need of major remediation must also be addressed. During the year, several facilities from the FY17 commitment list for remediation had to be reclassified into this category. Design and in some cases construction activities revealed damage in excess to what was originally perceived to be present. In addition, the more strict regulatory requirements of remediation activities has also prompted some borderline facilities to be moved to retrofit.

MDOT SHA continuously plans, designs and constructs functional enhancements and retrofits for SWM facilities. Projects are funded using state and federal funds. Site selection for enhancement projects are evaluated using several factors, including feasibility, permitting process complexity, and benefit analysis. MDOT SHA plans to improve the efficiencies of older SWM facilities that currently provide only minimum water quality treatment with some of these designs. This provides greater reduction of pollutant loads from highway runoff.

As a part of MDOT SHA's improvement efforts, projects to improve water quality can result in treatment of additional impervious areas as well as provide replacement or an upgrade to the existing drainage infrastructure. This approach maximizes the MDOT SHA investment in SWM facility maintenance efforts. Projects also include rehabilitation of degraded outfalls, channel restoration, and slope stabilization. Retrofit projects may include reconstruction of a facility to restore function based on the most recent design criteria or to replace the older facility with modern SWM BMP or ESD. For example, a non-functional infiltration trench may be retrofitted to a bioretention facility with an enhanced filter to increase pollutant removal efficiency. The team anticipates with the improved function of the Asset Management Database and tracking software that these projects will be instrumental in systematically replacing facilities that have lost functionality because of outside circumstances. The Remediation Verification requirement now placed on remediation contractors allows for them to document field issues that demonstrate the loss of functionality of a specific facility type in a remediated location.

Figure 2-35: Post Remediation of Infiltration Trench – still holding water, contractor noted that with no recent rains trench held water for 3 days

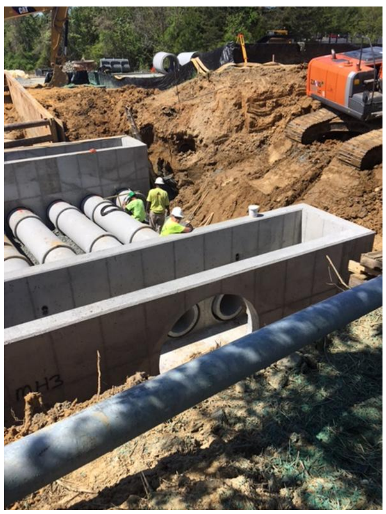
The Asset Management team coordinates closely with the permit restoration team to choose sites ideal for retrofitting. The permit restoration sites are the first to be screened out of the list. These sites will offer maximum benefit to permit restoration efforts and these candidate sites are considered for the design, permit and construction efforts. Remaining sites in disrepair are kept on the Asset Management team and processed as described.

A notable retrofit that was completed this year was outside the MS4 counties, however it involved very complex permitting for Code 378 issues and overtopping the roadway. The project included a stormwater management facility retrofit and storm drain upgrade, for a site adjacent to MD 235 in Mary's County. Area residents observed flooding conditions on MD 235 and an initial assessment indicated that an old undersized culvert was possibly causing tailwater to back up through the storm drain. The project retrofitted the existing wet pond to provide water quality management, convey the proposed 10-yr peak discharge and detain the proposed 100-year volume with adequate freeboard. All work was completed under contract SM3565174. In addition retrofit projects may fall under TMDL efforts and failed SWM Facilities are retrofitted to improve both water quality and TMDL quantities. A summary of all non-TMDL expenditures on remediation and retrofit efforts is shown in

Table 2-3 and **Table 2-4** at the end of Section B.

Figure 2-36: Retrofit of BMP 180086 – Shallow Marsh located west of intersection of MD 235 and Shady Mile Dr. in severe disrepair and not functional

Before – Overgrowth, Standing Water, Excess trash, also deemed possible Public Safety Concern



During – Installing Principle Spillway Pipes For Safe Passage of Large Storms

During –Installation of Matting, Stone Backfill for Forbay weir

After – Stabilized with vegetative growth and various landscaping

Table 2-3: SWM Facility Remediation and Retrofit Summary

County	Remediate or Retrofit	SWM Facilities Requiring Work	BMPs Remediated or Retrofit FY18
Anne Arundel	Remediate	172	8
Baltimore	Remediate	74	4
Saint Mary's	Retrofit	1	1
Total		**247**	**13**

Table 2-4: SWM Facility Remediation and Retrofit Design Expenditures

Description	Expenditures
Preliminary Engineering SWM Remedial Design	$1,159,637
Preliminary Engineering SWM Retrofit Design	$730,246
Preliminary Engineering Outfall/Stream Stability Design	$1,475,031
Total Costs	**$3,364,914**

C. Construction

Major remediation and retrofit activities are performed to address significant deficiencies of SWM facilities. During FY18, MDOT SHA Office of Highway Development, which houses the Drainage SWM Asset Management Program, followed up on significant changes in recent years to the policy for Remediation contracts. The contracting mechanisms previously set up to expedite repair activities that had been eliminated during the FY17 construction season were systematically replaced thru contracts administered by District Construction or Maintenance teams and other avenues.

Activity schedules are determined by an internal priority list based on the last inspection date, the length of time the function of the facility has been at risk and the amount of water quality or TMDL credit that may be added thru activities. This decision matrix has been an ongoing evolution with the growth of the program. In addition, geospatial data is also used to help combine activities so they can be performed on multiple facilities in proximity to one another when possible. This allows work to be completed with greater efficiency and lower cost. The purpose of the construction activities is to restore the performance of the asset as well as prevent failure of specific functional elements. Actions may include dredging, sediment removal, and obstruction removal within pipes. Work also may include removal of sediment from facilities to maintain the required water volume. Often larger scale activities include total reconstruction to upgrade a facility in an attempt to enhance function and increase treatment capacity. Additional tracking of many of the permitting and construction activities are being added to the NPDES database to provide enhanced planning tools in upcoming years. The MDOT SHA Administration has placed a higher priority on these activities as well as the MDOT Secretary's Office. All activities must be prioritized as construction activities often require more funding than may be available to complete all desired tasks. The Asset Management Team continues to work with many offices and agencies to secure more creative ways to finance activities to the benefit of all.

Figure 2-37: Various Construction Activities on AX929 Areawide Contract

BMP 020143 Stone Backfill for Infiltration Trench

BMP 020354 Excavate Spent Material and Excess Sediment from Infiltration Trench

C.1. Area Wide Contracts

Many drainage system and stormwater facility remediation activities are performed through open-end construction contracts. Historically MDOT SHA OHD administered concurrently 2-4 area wide (AW) contracts to address deficiencies of stormwater facilities, drainage system repairs or outfall channel stabilization. Over the years, Time and Materials style contracts had been proven to be the most efficient and effective construction method to address urgent drainage needs in a timely way. These contracts were less successful in addressing SWM facility remediation however as the time to remediate facilities was in excess of engineering estimates with no repercussion on contractor performance. During FY 17 the Contract XX1675274 would regularly have weeks for reconstruction of an infiltration trench that under a Bid Item Contract is complete in days.

Because of the changes to MDOT SHA Contracting mechanisms previously mentioned, the Asset Management team supported each District in procuring their own contract to be used for these needs. Funding came from the team and contracts were designated primarily for addressing drainage needs. SWM facility remediations were added to these contracts in small numbers for higher priority facilities. In addition, two specialty contracts were also procured to support efforts. One through the Office of Environmental Design for the High Priority Sites listed in the 2017 Annual Report and one in conjunction with facility upgrades at The MDOT Secretary's Office. Both contracts are Bid Build Contracts. A summary of all contracts is listed in **Table 2-5**.

Table 2-5: Areawide Contracts for Drainage and SWM Remediation

Contract No.	Contract Description	Approximate Number of SWM Facilities in Contract
XX1725174	Anne Arundel County Stormwater Management Remediation managed in D5 Construction	50
AX9295482	OED Areawide High Priority Sites Remediation managed in by LOD	75
AW4655274	D2 managed in D2 Construction	3

Table 2-5: Areawide Contracts for Drainage and SWM Remediation

Contract No.	Contract Description	Approximate Number of SWM Facilities in Contract
XX1675174	D3 managed in D3 Maintenance	5
XX1675274	D4 managed in D4 Construction	4
XX1675574	D5 managed in D5 Maintenance	3
XY1695174	D6 Memorandum of Understanding with Maryland Environmental Services for full program support	9
XX1675374	D7 managed in D7 Maintenance	3

In the past year, MDOT SHA performed major remediation of 8 stormwater management facilities in Anne Arundel County. The total construction cost of SWM facilities major remediation under areawide contracts was $744,000. Design work for the above listed contracts is currently underway and it is anticipated that FY19 will show an increase in productivity output for remediation activities. This will still hinge on design and specifically permitting activities as outlined in Section B.2. of this Part.

C.2. Immediate Response

Roadway emergencies are an unfortunate common occurrence. In the event of a drainage related emergency, MDOT SHA immediately performs work to ensure public safety. MDOT SHA responds to any outfall, pipe or SWM facility failure that requires immediate repair and remediation. These situations are rarely found during routine inspections and instead often rely on reports from citizens directly to the administration. They can be more prevalent with drainage structures which have a closer proximity to the roadway than SWM facilities generally do. Roadways are closed as necessary and detour routes are implemented as needed. Maintenance crews out of the nearest shop usually perform emergency stabilization immediately. Site assessment and investigation occurs at the subject location within hours by a multi-disciplinary team. Plan development is initiated within 24-hours and a contractor is mobilized within a few days. For emergency situations, permitting is completed retroactively to keep all projects in compliance with statewide MDE requirements.

An example of this project is the failure of a 60-inch CMP on the southeast side of the MD 450 onramp to eastbound US 50 resulted in the overlying soils washing out downstream. The washout resulted in accelerated degradation of the roadway embankment. When the erosion exposed the traffic barrier and began to compromise the edge of pavement causing a threat to public safety, this project required an emergency declaration and repair. Proposed emergency improvements included replacing the failed pipe network, adding a manhole structure, and backfilling over the system to provide more gradual stabilized slopes. Before and after photos are shown in **Figure 2-38**.

Figure 2-38: Emergency Response to 60-inch CMP Failure

Before: Excess Erosion Threatens Roadway and Guardrail

After: Stabilized Slopes, Vegetation Beginning, Rip Rap added for additional protection

C.3. Design-Build & Bid-Build Contracts

Most of the SWM major retrofit projects have been implemented through traditional bid-build contracts. Through FY18 contracts begun in the previous year continued. They include the following:

- In Anne Arundel County a project to restore the functionality of 3 facilities.
- In Montgomery County, one project under design continued forward.
- Baltimore has a project that recently advertised for upgrades.
- Previously featured in this report is the completion of a pond upgrade in St. Mary's County

MDOT SHA continues to search for potential SWM sites to provide treatment of currently untreated impervious surface and maintain positive balance in the MDOT SHA Water Quality Bank. Several suitable sites have been identified, retrofit projects are in the planning stage and the design will be initiated in the upcoming years. The upcoming year staff has been added to the Asset Management Team to start spearheading a more systematic approach that uses much of the same logic applied to remediation projects to bundle, plan, design and permit retrofit projects under this type of contract.

In addition, FY18 also found a new innovation for contracting mechanisms as a result of work with the MDOT Secretary's Office. A Design-Build Contract planning process was put together by the Asset Management team. The conditions of the contract included a complete turn key solution to be provided by the Design-Builder. As a result, a filtering process of the data was used in a slightly different manner to target sites that will not fall out of compliance in this permit term, but rather in the future. The Design-Builder will have the option to choose any sites of the list of approximately 125 that they were presented to accomplish the required credit of the contract. The team spent time developing a safe list to release from any work for the next couple years during the life of the contract. The results will be monitored closely to evaluate if this is a potential solution to increased efficiency and effectiveness for both repair and remediation. The contract will include both types of facility work.

Table 2-6: SWM Facility Remediation and Retrofit Construction Expenditures

Description	Expenditures
SWM Remediation Construction	$743,814
SWM Retrofit Construction	$3,022,949
Outfall/Stream Stabilization Construction	$8,771,596
Total Costs	**$12,538,359**

D. Operations

The key to long term sustainability of assets rests in preventive maintenance of the SWM facilities which is performed by District operations. A systematic approach over time is continually being developed as both communication and data management become more automatic. The long term goal is to shift the overall approach from one of reaction to drainage complaints and emergencies to one of proactive asset management. Regular maintenance with additional knowledge on the part of staff will make catching problems before they arise or become severe more common. IN turn this will reduce costs, allows planning for better spending and ensure higher degrees of public safety. The Asset Management Team saw the result of FY17 increased coordination efforts as a positive trend in the increase in awareness as well as training about the maintenance of drainage and SWM assets.

D.1. Minor Maintenance

Routine upkeep or minor and preventive repairs are generally activities that address minor deficiencies and may include actions such as mowing, brush cutting, vegetative thinning, unwanted woody vegetation removal, invasive weed removal, and trash or debris removal. When SWM facilities require minor upkeep they are assigned a "II" rating by MDOT SHA. Minor repair activities are performed by District Operational staff or their contractors to help ensure that facilities remain functioning as designed. These activities are the first line of defense in preventing the loss of functionality associated with a “III” rating and requiring remediation activities. All minor maintenance activities can be performed without plans or permits because they fall under the blanket permits Districts have to maintain roadway assets. The purpose of the maintenance activities is to maintain the performance of the SWM facilities and prevent or eliminate conditions that deteriorate function. SWM facilities that are functioning as designed are kept on a schedule with District Maintenance in order to maintain their assigned “I” rating.

D.2. Minor Maintenance Procedures

MDOT SHA completed an operational manual for stormwater and drainage assets during FY16. The manual was completed and distributed to all shops within MDOT SHA during the following 2 years. By early in FY17 all shops had their own manual. Several presentations to introduce the manual helped draw attention to it and increased communication between the shops and the Asset Management Team.

Figure 2-39: Sample Slide from Operations Manual Presentation

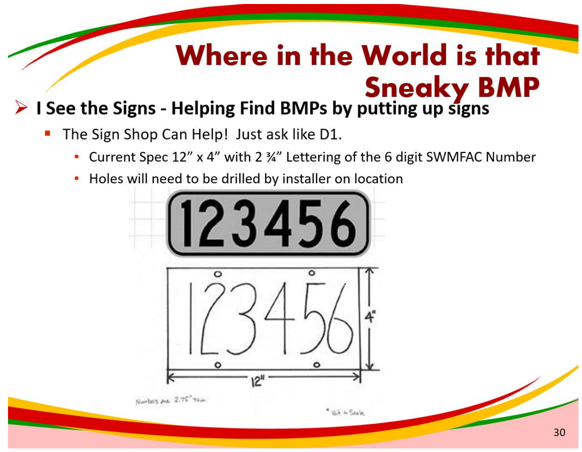


Figure 2-40: Sample Slide showing SWM Facility Signage Design by District 1

The practices outlined in each manual are specific to facility type and input from several offices and divisions was pooled to provide valuable information on the proper procedures and equipment needed. The manuals contain maps of the locations of all SWM facilities within the area of influence of the shop. With the rapid growth in the number of SWM Facilities the team is preparing to begin new updates to the manuals in FY19. In addition to adding maps a new format is being proposed as MDOT SHA moves more towards paperless operations and technicians are encouraged to use iPad technology to manage their tasks.

The MDOT SHA Office of Maintenance provides excellent training for their staff which includes an annual immersive conference for all management level maintenance staff. The Asset Management team was invited to participate in this seminar early in FY18. The team used to opportunity to present on several asset related topics including the role of the Asset Management Team in determining work needs, location of BMPs and the various available web tools to find them, ongoing coordination efforts and feedback. In addition District 1 had taken initiative to add signage to all SWM facilities in their jurisdiction and an example was presented to all to help in location of facilities.

The final portion of the presentation, CD copies of the Operations Manual were presented to the Resident Maintenance Engineers of each shop to be stored on site for printing as needed. Throughout the remainder of the year, maintenance staff kept in closer contact with the Asset Management team, several shops ordered additional copies of the manuals for all field personnel and others called to review best practices with the team prior to executing maintenance contracts. As data exchanges accelerates the team looks forward to more cooperation with maintenance.

E. Future Focus

The design and management of the Drainage and SWM Asset Management program is pushed to continually improve by ongoing changes in environmental regulations and an expanding inventory. Accomplishing this requires that the program is always focused on the future and undergoes continuous planning efforts which include business process improvement, research and additional program support.

Future inspection activities for SWM facilities, IDDE screenings and Source ID are ongoing as part of this effort. Planning efforts based on inspection records, retention of baseline credit and geospatial components continue to evolve as the program grows. A summary of this decision-making process is included in **Table 2-7** below. These decisions are then grouped geospatially to begin project planning processes. Additional teams are becoming involved in this process as the program moves into the future. The results will be tracked for effective project delivery moving forward. Various innovative contracting mechanisms are underway and as results are determined efficient systems will be planned accordingly for programmatic success.

Table 2-7: Example Triennial Inspection Ratings and MDOT SHA Actions

SWM BMP Rated	Inspection Dates 1/15/2004	1/15/2007	1/15/2010	Scheduled Remediation Completion Date	Actual Remediation Completion Date
I	**PASS**– WQ treatment kept in reported data	**FAIL** – Minor remediation or major maintenance needed, WQ treatment kept in reported data	**PASS** – WQ treatment kept in reported data		
II	**PASS**– WQ treatment kept in reported data	**FAIL** -- Initial failed rating, WQ treatment kept in reported data	**FAIL** -- Major remediation needed; Remediation schedule provided to MDE, WQ treatment kept in reported data	**PASS** – WQ treatment kept in reported data	
III	**PASS**– WQ treatment kept in reported data	**FAIL** -- Initial failed rating, WQ treatment kept in reported data	**FAIL** -- Major remediation needed; Remediation schedule provided to MDE, WQ treatment kept in reported data	**FAIL** – WQ treatment removed from baseline treatment or restoration credit	**PASS** – WQ treatment added back into reported data

E.1. Business Process Improvement

The past year saw the fruition of many of the strategic plans put in place the previous. Data improvements, communication and coordination efforts all expanded and were well supported by many. As a result, business processes continue to evolve and many involved are motivated to add to these efforts and improvements. The following includes plans for future development, improvement and expansion of the existing program.

Database and Technical Upgrades for Program Integration

The BMP Master List featured the previous year was broken down by county and the fields and values were reorganized for a more complete life cycle look at individual SWM Facilities. Things like remediation contract, number of submittals, roadside tree permit tracking, as well as others were added. A complete build of this new, live tracking database is planned for the end of the calendar year 2018 and will help facilitate timely remediation of all necessary SWM Facilities. Teams met to expand upon the existing Maintenance tab featured in eGIS to plan for the expansion. This will allow for migration out of separated spreadsheets into the database format for more secure and reliable data management. The use of the NPDES database to house this information will also provide added functionality for data sorting and reporting on progress of specific contracts, permitting and completion.

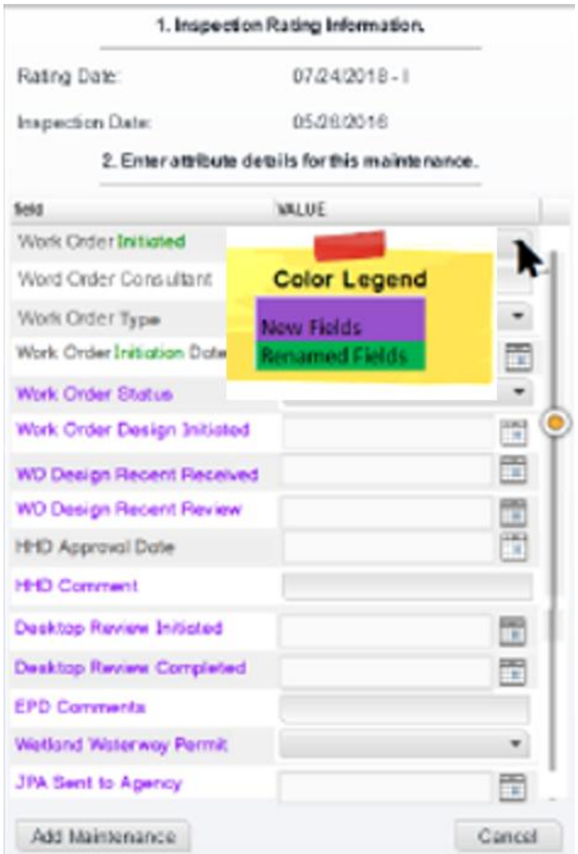


Figure 2-41: Proposed eGIS upgrades to Maintenance Tab

The long term success of water quality restoration efforts depends not just on the maintenance of facilities previously built, but equally on good design and tracking of new facilities. The longevity of the MDOT SHA Drainage and SWM Management Asset Program provides the agency with a solid foundation for understanding long term design impacts. Design teams are working closely with the Asset Management Team to improve business processes. Design teams are meeting with the Asset Management Team to integrate their processes into the NPDES database as well.

The first step of this integration is in 8/2018 when the team responsible for As-Built coordination and approval will look to improve data quality. In coordination, the two teams are looking at adding an As-Built Tracking Table to the NPDES database. This very simple table will allow both teams and future inspectors to efficiently determine if all design criteria was met and if design rules applied at the time may cause longevity issues to the facility. The functionality of a SWM facility can depend not only on its design, but accessibility, proximity to other structures such as rail roads and changing nearby landscape. Development of this application will continue into FY19 and further support planning efforts of the Asset Management Team.

Another step taken toward integration of data across programs came from the Water Quality Team. This team tracks and uses the Water Quality banking system for project development. The data for this bank has long been houses on a separate permit tracker. As upgrades and additional geospatial information became available through program efforts and the HHD Web Research App, the Water Quality Team began in 8/2018 to coordinate with the Asset Management Team as subject matter experts on transitioning Water Quality Data into geospatial and real time data that could also be available through a similar Esri supported Web App. Development of this functionality will continue into FY19 and will be integral in project planning for MDOT SHA projects to provide high quality environmentally responsible projects to support watershed restoration and development.

The final upgrades to the information systems used by the Asset Management Team were proposed by the research team responsible for digitization and storage of all project design documents. This team spends extensive time gathering, cataloguing and storing design plans, design reports, memos of understanding, updated retrofit plans and many other documents associated with a SWM facility. Under present circumstances, research to gather all this historic data for others involved in the program is overwhelming and difficult. The team must rely heavily on the research team for support when inspection documentation is needed. This documentation is often needed rapidly because people are in the field working at the time of the request. The research team developed an internal application to rapidly search and catalogue information related to SWM Facilities, that can be cross referenced by contract, plan type and a host of other search criteria. This search capability is extremely valuable not only to field personnel, but to data management as well as the database continues to grow. Plans are forming to create an MDOT SHA internal version of this data search capability that the entire team will be able to use at any time to find documents related to a SWM BMP.

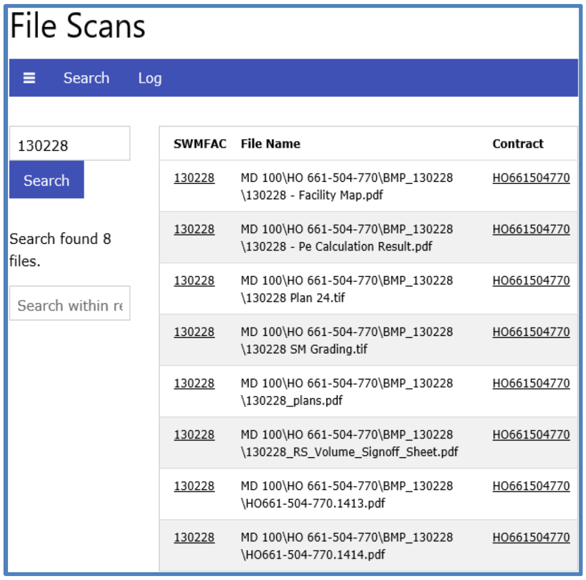


Figure 2-42: Sample Search for All related Documents for SWM Facility 130228

E.2. Additional Program Support

The continued success of the Drainage and SWM Assets Management Program is best assured through cooperation and collaboration with other teams, offices and agencies. As cooperation continues to grow the program keeps pace with the acceleration of demands for results. Some examples on additional data tracking and internal cooperation were given previously.

Other partnerships that benefit the program include working with various universities and research groups to better understand the benefits and impacts of SWM facilities, stream restoration activities and drainage structure rehabilitation. In the upcoming year the program is expanding its sponsorship of research in SWM. The first study is a continuation of bioswale efficiency that is being conducted to compare pollutant removal efficiencies during the aging of bioretention facilities to the efficiency provided in simpler grass channels. Preliminary study results show significantly higher pollutant removal rates than design computations indicate. In addition, thermal impacts of the use of various types of facilities have little documented information. Design specifications for appropriate facilities in temperature sensitive watersheds are limited and unreliable. A request for proposal was released to encourage research in this area of expertise. The proposals received will be reviewed and a kickoff to the research is expected in the upcoming year.

PRD Support while Awaiting Approval of MDE General Permit for Remediation

Section B.2 of this Part outlined some information on the MDE Pilot Program for removal of trees during remediation activities on SWM facilities with an engineered embankment. In continuation of those efforts additional submittals to MDE PRD and MDOT SHA PRD stretched through July and August. The Asset Management Team continued to meet regularly with the regulators on several topics for the work order development. The result is included here as an approved Letter of Authorization to allow MDOT SHA PRD to approve larger facilities under the AX929 Remediation Contract for repair.

Maryland
Department of
the Environment

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

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

August 30, 2018

Ms. Dana Havlik, P.E.
State Highway Administration
Highway Hydraulics Division, Mailstop C-128
707 North Calvert St.
Baltimore, MD 21202

Re: MDE No. 18-SF-0704
Contract No. AX9295482
Pilot Program for Pond Remediation

Dear Ms. Havlik:

In accordance with Section 5-503 of the Environment Article, Annotated Code of Maryland with regard to small ponds, the Maryland Department of the Environment (MDE) authorizes the Maryland Department of Transportation – State Highway Administration (SHA) to perform maintenance remediation on 35 stormwater management best management practices (BMPs) in accordance with the attached "*Acceptable Preliminary Pond/Dam Maintenance Remediation Activities for SHA Pilot Program – August 30, 2018*" and "*Phased Pond Remediation Pilot Program Outline – August 30, 2018.*"

The BMPs with the following SHA pond identification numbers are authorized by MDE for maintenance remediation under this pilot program: 020013, 020110, 020112, 020115, 020124, 020240, 020248, 020250, 020436, 020479, 020487, 020809, 030287, 080081, 080091, 100034, 100065, 130167, 130175, 130178, 130204, 130225, 130228, 130230, 130267, 130268, 130292, 130293, 130294, 130323, 130325, 130346, 130349, 130369, and 130377. These BMPs potentially include 378 ponds, Class a, b, and c dams, and ponds located in Use III and IV Watersheds. None of the BMPs are currently listed on MDE Dam Safety's inventory of significant or high hazard dams.

The Pilot Program allows SHA to proceed with specified maintenance activities that do not impact the pond embankment (i.e. dam) prior to determining the design category and hazard class of the pond/dam. The acceptable maintenance activities, including cutting trees with 4 inch and smaller diameters at breast height (DBH), have been agreed upon by SHA and MDE and are defined in the "*Acceptable Preliminary Pond/Dam Maintenance Remediation Activities for SHA Pilot Program – August 29, 2018.*" The SHA Highway Hydraulics Division (SHA-HHD) will use this document to develop a specific *Remedial Action List* for each BMP that will be included in contractor work orders. The *Remedial Action List* together with the sediment control plan for each BMP will be approved by the SHA Plan Review Division (SHA-PRD).

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

After preliminary maintenance (i.e. Remedial Action Items) has been performed for each BMP, SHA shall submit to MDE's Sediment, Stormwater, and Dam Safety Program the following information:

- Results and photos before/after Remedial Action Items are performed
- Tree Location Report
- Dam Inspection Report
- Remediation Design Report including Code 378 Flow Chart
- Dam Breach Analysis and Determination of Hazard Classification

After MDE reviews the reports and provides SHA with direction on removing the indentified trees larger than 4 inches DBH and other observed maintenance items, SHA shall restore all pond/dam embankments to acceptable condition. An acceptable time frame for performing these larger maintenance activities will be decided during the November 2018 progress meeting between MDE and SHA.

Apart from this authorization to perform maintenance remediation on the 35 stormwater BMPs listed above, SHA is also required to have approved sediment control plans for any maintenance activity resulting in an earth disturbance. Additionally, ponds/dams located in Use III or IV watersheds or ponds impacting wetlands or waterways shall follow the normal Joint Permit Application process. The Dam Safety Division will coordinate its review internally with the Plan Review Division.

MDE appreciates this opportunity to work with SHA on this pilot project to improve efficiencies for BMP maintenance work that will benefit both of our agencies, the environment, and the citizens of Maryland. If you have further questions or comments, please call Jennifer Smith at (410) 537-3561 or me at (410) 537-3551.

Sincerely,

Amanda P. Malcolm

Amanda P. Malcolm, P.E., Chief
Sediment and Stormwater Plan Review Division
Water and Science Administration

APM

cc: Jennifer Smith, Program Manager, SSDS, MDE
Raymond Bahr, Deputy Program Manager, SSDS, MDE
Hal Van Aller, Division Chief, Dam Safety Division, SSDS, MDE
Sonal Ram, Director, Office of Environmental Design, SHA
Laura Ridler, Deputy Director, Office of Highway Development, SHA
Jason Ferner, Assistant Division Chief, Plan Review Division, SHA
Kiona Leah, Highway Hydraulics Division, SHA
Brandon Scott, Highway Hydraulics Division, SHA
Matthew Keenan, Highway Hydraulics Division, SHA
Tyler Riecke, Highway Hydraulics Division SHA
Kristin Langway, Office of Environmental Design, SHA

Acceptable Preliminary Pond/Dam Maintenance Remediation Activities for SHA Pilot Program – August 30, 2018

1. **Vegetation Removal**
   a. Trees – cut all shrubs and trees with 4 inch or smaller diameter at breast height (DBH) flush with ground and treat as approved. Trees larger than 4 inch DBH shall not be cut down when they are located in the following zones:
      i. on the delineated limits of pond/dam embankment;
      ii. within 15 feet of end sections, endwalls, and outfall pipes of principal or emergency spillway;
      iii. within 25-foot radius from control structure;
      iv. or within 15 feet of the toe of embankment.

      It is permissible to remove larger trees outside the zones of concern when the "non buffer zone" has been delineated on the plan and approved by SHA-PRD.
   b. Vines – removes vines and cut base of plant flush with ground and treat as approved. Vine stumps larger than 8 inches in diameter shall be identified for future removal subject to approval from SSDS.
   c. Stabilization – surfaces removed of vegetative growth shall be stabilized with topsoil, seed, and mulch.
2. **Trash and Debris Removal**
   Remove trash and debris from inlets, outlets, slopes, and within pond.
3. **Removal of Accumulated Sediment in Pond**
   Remove accumulated sediment and restore pond bottom to its original constructed dimensions in accordance with approved erosion and sediment control plan. Dispose of sediment in an approved location. Do not re-grade pond or excavate any soil other than accumulated sediment.
4. **Cleaning of Inlets, Inflow pipes, Riser, and Spillway Pipes and Weirs**
   Remove accumulated sediment from inlets, pipes, and riser in accordance with approved erosion and sediment control plan and dispose of in an approved location.
5. **Replacing Media**
   Replace filter media such as that used for infiltration basins, sand filters, bioretention facilities, or submerged gravel wetlands.
6. **Trash Racks**
   Re-attach or replace broken trash racks in kind.
7. **Draw-Down Device/Pond Drain**
   Repair draw-down device/pond drain by removing sediment, repairing/replacing geotextile, cleaning or replenishing stone, repairing or replacing pipe and valve in kind, as needed. Remove draw-down device if record drawings indicate it was for temporary sediment control measures only.

8. **Riprap Inflow and Outfall Protection**

    Repair inflow and outflow protection by removing sediment, repairing/replacing geotextile, returning riprap to its original position, and replenishing riprap as needed.

9. **Inflow Pipes/Channels**

    Repair or replace damaged inflow pipes, inflow channels, endwalls, and end sections located outside the delineated limits of the embankment.

10. **Access Maintenance**

    Clear growth from access ways and access roads. Restore gravel surfaces and aggregate within cellular confinement as needed.

11. **Fencing Maintenance**

    Repair or replace non-post portions of fence in all areas. Replacement or installation of fence posts will be allowed in non-buffer zones but those located within delineated limits of embankment and buffer zones require approval from SSDS.

12. **Signage Maintenance**

    Repair or replace non-post portions of signs in all areas. Replacement or installation of sign posts will be allowed in non-buffer zones but those located within delineated limits of embankment and buffer zones require approval from SSDS.

13. **Traffic Barrier Maintenance**

    Repair or replace non-post portions of traffic barriers in all areas. Replacement or installation of traffic barrier posts will be allowed in non-buffer zones but those located within delineated limits of embankment and buffer zones require approval from SSDS.

MAINTENCE ITEMS THAT REQUIRE MDE- SSDS APPROVAL

1. Altering in any way the original shape or function of the existing pond or embankment.
2. Grading within the limits of the pond, its side slopes, embankment, or within 15 feet of toe of embankment.
3. Earthwork beyond activities listed above.
4. Repair or replacement of any structural components associated with pond/dam such as manholes, inlets, pipes, headwalls, endwalls, risers, underdrains, etc. The exceptions are trash racks, riprap, dewatering device/pond drain and inflow pipes/channels located outside the delineated limits of the embankment.
5. Stabilization of eroded embankments or channels downgrade of delineated limits of the embankment (since this can be an indication of more symptomatic problems).
6. Grubbing on delineated limits of the embankment or in buffer zones.
7. Digging post holes within delineated limits of the embankment and in buffer zones.
8. Replacing liners or geotextile in pond or along embankment except geotextile under riprap inflow and outflow protection.

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Larry Hogan
Governor
Boyd K. Rutherford
Lt. Governor
Pete K. Rahn
Secretary
Gregory Slater
Administrator

Phased Pond Remediation Pilot Program Outline–August 30, 2018

Phase 0–Work Order Plan Packages Compilation
(Estimated Time Frame: Present–October 2018)

1. Coordination among SHA-HHD, SHA-PRD and MDE-PRD for structure of Pilot Program
2. Approval from MDE-PRD for Pilot Program based on Model Remediation Work Order
3. Development of Remediation Work Orders, to be approved by SHA-PRD and delivered to the contractor, containing information below:
    - Location Map
    - Erosion and Sediment Control Notes including General Notes and Sequence of Construction
    - Erosion and Sediment Control Exhibit (aerial plan of BMP)
    - Erosion and Sediment Control Blowup (Buffer Zone and Non-Buffer Zone Determinations)
    - Remedial Action List for contractor execution in Phase 1 - per coordinated menu of approved items for all facility types. Specific attention given to embankment facilities (i.e. those with height of embankment ≥ 4 feet), but menu items may also include non-embankment facilities and other nearby work not related to this Pilot Program
    - Remediation Action Figures
        - As-built Plans or Record Drawings with facility structures and action items identified
        - Original Existing Conditions Plan with "Embankment Justification" to delineate limits of embankment
        - Profiles
        - Original Landscape Plans
    - Maintenance of Traffic Notes
    - Appendix of Preliminary Inspection
        - Summary of [Preliminary Inspection] Findings which includes BMP Summary, General Observations, and Inspector Recommendations for Remediation
        - Location of Photos Map
        - Photos
4. Approval of Work Order Plan Packages by SHA-PRD (anticipated to take until 10/15/2018)

Phase 1 – Remedial Action and Reporting (Preliminary Maintenance Items)
(Estimated Time Frame: Present–12/31/2019)

1. Execute Remedial Work Orders based on the guidance in the attached *Acceptable Preliminary Pond/Dam Maintenance Remediation Activities for SHA Pilot Program – August 30, 2018.*
2. Complete SWM Facility Remediation Verification Photo Checklist as individual sites are completed. At a minimum, provide photos of inflow points, riser, spillways, outlets, and the upstream and downstream sides of the embankment.
   (Estimated Time Frame for Steps 1 and 2: 8/30/2018-9/15/2019)

707 North Calvert St., Baltimore, MD 21202 | 410.545.8814 | 1.888.228.6971 | Maryland Relay TTY 800.735.2258 | roads.maryland.gov

3. Prepare Tree Location Report on individual sites with location, number, and size of all trees larger than 4 inch identified. Report to include:
   - Photos of facility showing remaining trees
   - Photo map showing location and direction of photos
   - GIS overview of location with hatch work indicating certain groves of trees as follows:
     i. Individual trees located more than 20 feet from all surrounding trees
     ii. 1 tree per 400 sf
     iii. 1 tree per 225 sf
     iv. 1 tree per 100 sf
     v. 1 tree per 25 sf
     vi. 2 trees per 25 sf
     vii. 3 trees per 25 sf
4. Perform dam inspection on individual sites using Code 378 Dam Inspection Checklist or other comparable checklist that MDE finds acceptable
5. Prepare Remediation Design Report on individual sites including a determination of dam category using Code 378 Flow Chart *(MDE may be modifying chart in near future)* (Estimated Time Frame for Steps 3, 4, and 5: 9/15/2018-12/31/2019)

Phase 2–SHA Submits Findings to MDE
(Estimated Time Frame: 10/31/2018-3/15/2020)

1. Submit reports to MDE on individual ponds as they are completed including the following:
   - Results and photos after Remedial Action Items are performed
   - Tree Location Report
   - Dam Inspection Report
   - Remediation Design Report including Code 378 Flow Chart
   - Dam Breach Analysis and Determination of Hazard Classification
2. November Progress Meeting including MDE, SHA-PRD, SHA-HHD, SHA-QC, SHA-OED, Design Consultants and Contractor. Purpose of the meeting will be to evaluate the progress of the program, talk about what is working and what may not be, and evaluate overall efficacy after the completion of Phases 1 & 2 for the first facility. Estimated time frames for Phases 3-5 will also be discussed.

Phase 3–MDE Categorizes Trees Based on Location/Density and Provides SHA with Direction on Tree Removal
(Estimated Time Frame: TBD)

1. Time frame relies on ongoing and overlapping activities with other phases as individual sites are reported upon and evaluated.

Phase 4–SHA Performs Large Tree Removal and Large Maintenance Items
(Estimated Time Frame: TBD)

Phase 5–SHA and MDE meet to discuss outcome of Pilot Program and to determine how to proceed with other facilities
(Estimated Time Frame: TBD)

F. Summary

The NPDES MS4 permit requires MDOT SHA to identify all infrastructure that captures, treats, and conveys stormwater runoff from all its facilities including hydraulic structures and stormwater management facilities that fall within the 11 designated MS4 jurisdictions. The program saw huge growth during FY18, and is poised to continue to increase productivity in all aspects of the program with adequate and appropriate funding. The inspection, tracking, ranking, sorting and data management functions of the program all saw an upgrade in preparation for the continued growth. Cooperation among many increased as a result and are expected to continue into the future. **Figure 2-43** below shows the historic remedial (action) ratings and the impact recent grass swale protocols have had on the SWM Facility inventory. The chart also includes the projected overall SWM inventory growth and trend of both grass swales and the additional BMPs. This information is presented for statewide trends so when new MS4 counties are added in 2020 the program is already planning for their inclusion.

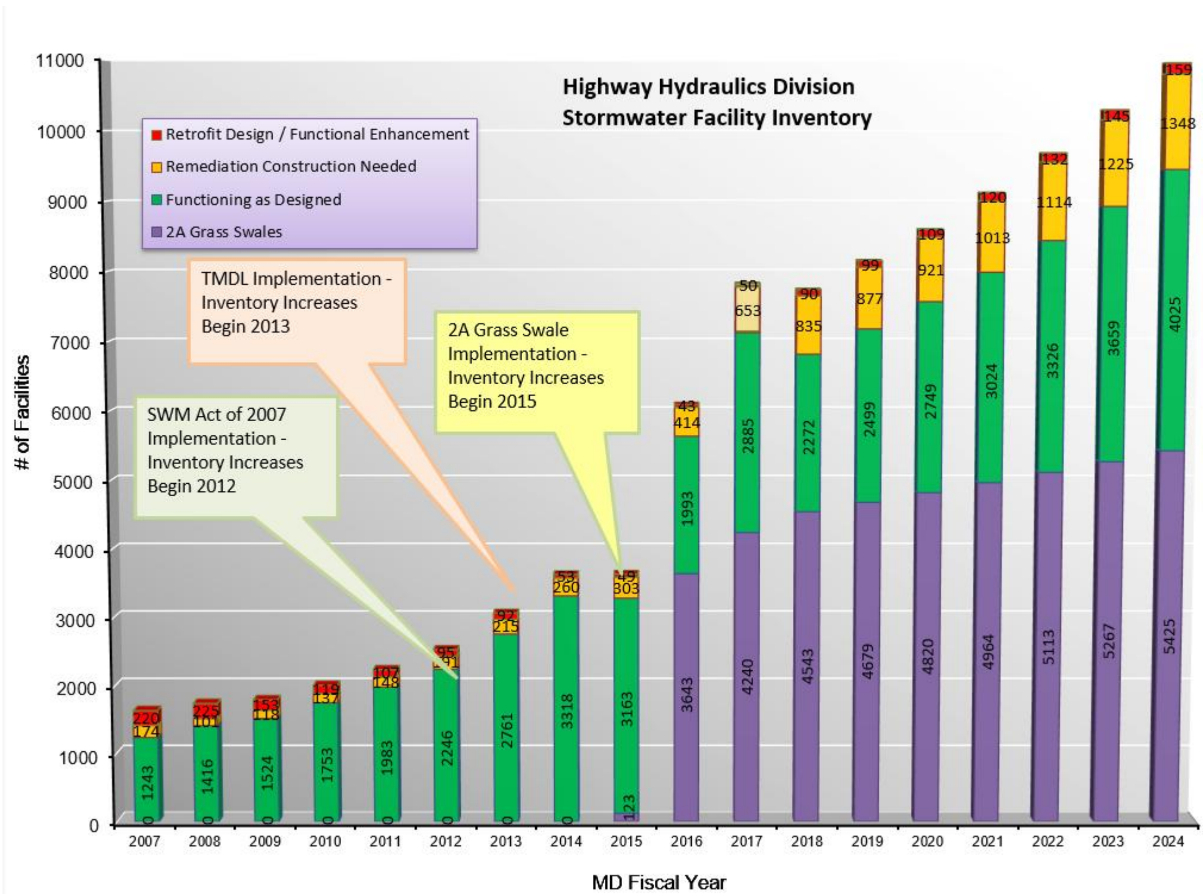


Figure 2-43: Statewide SWM Inventory Remedial (Action) Rating, Grass Swale Inventory Impact and Projected Trend

While certain aspects of the program were seeing a temporary slowdown because of changes, preparation for expansion in capacity to remediate, maintain and retrofit facilities as well as organization and data management for both facility action rating and work order development proved success thus far. This expansion in resources led to several improvements in the overall process including the launch of a new inspection tool that incorporates many of the lessons learned of recent years, resulting in higher quality inspection data submittals enabling improvements to future planning activities. This accompanied by major data management changes that occurred and are continuing is setting the program up for continued success.

As the internal processes of the program were expanding, it was also reaching out to other Offices within MDOT SHA and expanding in those areas as well. Meetings, presentations for staff education and coordination on the part of many involved in the MS4 permit compliance teams resulted in a much higher degree of communication for minor maintenance activities and also brought some notoriety to the program. During 11/2017 team members from both the Asset Management Team and the TMDL Team were invited to present at a Domestic Scan on Nationwide SWM Practices and at a more localized EPA District 3 MS4 Conference. Looking to the future the team will next be presenting for the Center for Environmental Excellence for AASHTO on SWM BMP Maintenance and Operation. The continued learning opportunities to share with others around the country can only continue to make the program stronger.

In conclusion, the program is poised for ongoing changes in the upcoming year. All plans are subject to change, delay and update, but team members remain optimistic about reaching these goals.

Appendix A

MDOT SHA Plan Review Division Fiscal Year 2018 Annual Report

Appendix A

Appendix A

MDOT SHA Plan Review Division Fiscal Year 2018 Annual Report

Note:

Electronic data, accompanying this MDOT SHA PRD Annual Report, has been submitted to MDE via an external hard drive.

The external hard drive includes the following:

- PRD data table that includes project data, approvals, waivers, and variances
- Agency Meeting Materials
- Representative Projects
- Guidelines, Administrative Procedures, and Technical Procedures
- Erosion and sediment control inspections, non-compliant inspections, and enforcement actions

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Covering July 1, 2017 through June 30, 2018

ANNUAL REPORT

FY 2018

Delegation of Sediment and Stormwater Approval Authority

Prepared by:
Maryland Department of Transportation
State Highway Administration

Submitted to:
Maryland Department of the Environment

October 9, 2018

Jennifer M. Smith, P.E., Manager
Sediment, Stormwater & Dam Safety Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 400
Baltimore MD 21230

Dear Ms. Smith:

We are pleased to submit our annual report, covering fiscal year 2018. This report is in accordance with our July 8, 2014 Memorandum of Understanding and your February 24, 2015 Letter of Authorization. This program will continue to be funded by the Maryland Department of Transportation State Highway Administration (MDOT SHA).

We look forward to continuing our collaborative working relationship with the Maryland Department of the Environment (MDE) to successfully and effectively carry out the activities and responsibilities included in our delegated authority agreement. We are committed to working with MDE to ensure that our processes exceed MDE expectations. We welcome your input to modify or expand future reports to meet MDE requirements. If you have any questions or comments regarding this report, please contact Angela Smith, P.E., MDOT SHA Office of Highway Development Deputy Director, at (410) 545-8790, or via email at ASmith@sha.state.md.us.

Sincerely,

Eric Marabello, P.E.
Director, MDOT SHA Office of Highway Development

cc: Jason Ferner, P.E., Assistant Division Chief, Plan Review Division, MDOT SHA
Sonal Ram, P.E., Director, Office of Environmental Design, MDOT SHA
Angela Smith, P.E., Deputy Director, Office of Highway Development, MDOT SHA

TABLE OF CONTENTS

Section 1

SECTION 2

1.1 MDOT SHA Response to MDE FY 2017 Review Comments

Reporting Requirement	MDOT SHA Response
Reporting	This MDOT SHA response covers MDE comment letters dated May 17, 2018 (Annual Report). The reporting dates, deadlines, and format for future annual reports are noted. This current report covers FY 2018 (July 1, 2017 through June 30, 2018). This report is included as Appendix C of the MDOT SHA MS4 Annual Report. As requested, E&SC and SWM statistics have been included in the MS4 geodatabase.
Project Status Reports	As requested, example plans are not included with this report except for 16-PR-0081 and the MD 404 project (15-PR-0097). Approved SWM plans will be available on-site during future field audits. Comments regarding the representative projects submitted with the FY 2017 annual report were reviewed, and responses are listed below: <u>15-PR-0023</u> The previous wet pond located in Use III waters was redesigned as a bioretention facility. The modification was reviewed and received approval on March 14, 2018. <u>15-PR-0073</u> The previously designed rain garden has been changed to a micro-bioretention facility to ensure compliance with drainage area limitations. The project received final approval on April 19, 2018 and is currently under construction. <u>15-PR-0097</u> This design-build project is currently under construction with the bulk of the construction already completed. The project replaced several undersized roadway culverts that were known to create flooding issues. Stormwater management requirements that resulted from the project's impervious area and enlarged roadway culverts are being addressed with ESD facilities, stormwater management ponds, and weir walls located adjacent to the culverts. At some culvert enlargement locations, 2-year quantity management requirements were waived under a 3.3.B.3. waiver if the waiver was sufficiently justified and concurrence was provided from the local jurisdiction. A specific drainage complaint for the project was received from a property owner downstream of Access Road 2. Further details on this specific complaint can be found in the Investigations of Citizen Complaints and Inquiries section of this Annual Report. <u>16-PR-0081</u> This project received Concept Approval in January 2017, Site Development Approval in January 2018, and Final Approval on March 16, 2018. PRD concerns regarding material for shoulder-edge drop off backfill were addressed by providing topsoil rather than an impervious material. Removal of existing concrete ditches for water quality credit was not pursued for this project. <u>16-PR-0125</u> It is PRD's understanding that a 3.3.A waiver applies to an activity which disturbs an impervious area, not for a POI as is the case for 3.3.B waivers. The 3.3.A waiver does not

	necessarily negate a Qp requirement at the POI resulting from an enlarged culvert. In this case, the disturbance due to replacement of a pipe does not alter the roadway surface in such a way that quality or quantity treatment would be required for that impervious surface and a 3.3.A waiver for that surface is appropriate. In the latest site development review, PRD requested documentation that the culvert change does not increase discharges at the POI. We have not received a response to this comment at this time. However, based on photographs of the culvert, there is little upstream storage that would attenuate the flow before overtopping the roadway. In that case, considering both culvert and overtopping flows, we do not expect a change in peak flow. 17-PR-0023 This project was an MDE transfer project and PRD used the same consultant reviewer as MDE. It appears specific justification was never provided in any of the comment letters. However, upon review the use of Chapter 3 facilities is justified due to limited right-of-way and topography. Moving forward, PRD will ensure appropriate discussion is included in approvals to document justification for use of Chapter 3 facilities.
QA/QC Activities and Summary of Site Inspections	MDOT SHA ensures quality assurance and quality control (QA/QC) of approved erosion and sediment control plans through inspections of MDOT SHA construction projects for compliance with the approved Erosion and Sediment Control Plans. During the FY18 reporting period: • The QA Program grew to 18 total representatives and the program formalized a Progressive Schedule Protocol in effort to ensure maximum resource coverage with a priority review to critical/sensitive environmental projects. Statewide Implementation is expected in the first part of FY19. • MDOT SHA performed 5278 inspections (3723 QA-1 and 1555 QA-2 reports) on 422 projects. A record number of thirty-six non-compliances were issues to thirty-two unique and different projects. A leading cause of non-compliance shutdowns is due to repeating items. • The QA Program also received and addressed nine (9) related Erosion and Sediment Control or Storm Water Management environmental complaints/inquiries from MDE, counties, and/or citizens. • A Stormwater Management As-Built electronic submittal and approval program was launched statewide utilizing the recent improvements in the QA Toolkit.
ESD to the MEP Design Elements	PRD agrees with MDE regarding TMDL compliance projects and how SWM requirements are addressed. Starting in this reporting period, PRD stopped requiring waivers for these projects. Other projects noted as “secondary” and “intersection capacity” are typically larger projects for which SWM is mostly provided but there may be small POI’s without much work and for which providing treatment is impractical. PRD will evaluate individual categories to determine if a general approval would be appropriate.
Changes to the Approved Standard Operating Procedures	Several changes to the Guidelines and Procedures have been made during this reporting period. Word files are included on the data drive. Changes are tracked in the documents showing revisions since the previous annual report. Technical Procedures have been finalized and are submitted on the data drive with this

(SOPs)	report for review and approval by MDE. Several sections have changed from the previous version due to MDE's issuance of Technical Memoranda and PRD's subsequent discussions and interpretations of those memoranda.
Changes to Staff	Significant staffing changes during FY 2018 are reported in Section 1.6
Local Agency Comments	MDE comments regarding formal local agency stormwater management comments are noted. Most coordination with local agencies occurs informally through email or phone conversations. During the reporting period, three agency meetings were held on two projects under review at PRD. Summaries of agency meetings are located in Section 2.3. Copies of the meeting materials are located on the enclosed data drive.
Public Outreach Meetings	Per MDE request, reporting of public outreach meetings is no longer provided. The information will still be available upon MDE request.
Citizen Complaints and Inquiries	MDOT SHA will continue to provide specific and focused information of citizen complaints and inquiries in relation to the projects being reviewed by PRD with respect to Sediment and Stormwater topics in the annual reports. The current annual report contains summaries of ten projects in Section 1.8.
Plan Review Program Activity Findings	Plan review program activity findings will continue to be reported in Section 1.9.

1.2 Introduction

The Maryland Department of Transportation State Highway Administration (MDOT SHA) and the Maryland Department of the Environment (MDE) signed a Memorandum of Understanding (MOU), dated July 8, 2014, designating MDOT SHA as an approving authority for erosion and sediment control and stormwater management plans for MDOT SHA projects in accordance with the applicable sections of the Code of Maryland (COMAR). This authority was given by a letter of authorization from MDE on February 24, 2015. This report serves to satisfy the MOU condition to report on relevant activities on an annual basis after the first year of delegated authority. This report covers fiscal year 2018 (FY 2018) and includes the time period from July 1, 2017 through June 30, 2018. This annual report includes:

- Project status reports detailing the progress of design, review, approval, and construction activity achieved to date
- Findings related to plan review program activities
- Explanations and justifications for any design elements not meeting Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP) according to the Design Manual or the 2011 Standards
- Changes or modifications to the Guidelines and Administrative Procedures
- Significant staffing changes
- Summaries of site inspections conducted
- Comments received and written responses provided to local agencies
- Findings related to quality assurance and quality control activities
- Investigations of citizen complaints and inquiries

1.3 PROJECT STATUS

The Plan Review Division maintains a database to track submittals and approval progress on all projects. The majority of the active projects during the reporting period were Design-Bid-Build (86%). The second most common project type was MDE approved projects (13%) submitted to PRD for approval extensions, modifications, or SWM as-built approval. The smallest group of projects, Design-Build, were only 1% of the active projects, however, they represented 11% of the overall submissions. Overall submissions to PRD increased slightly from FY 2017 to FY 2018.

Project status reports included in Section 2.1 show the progress of design, review, approval, and construction activity achieved during the reporting period. The reports are separated by project type (DBB, DB, MDE). Summaries of Plan Review Division review and approval activity and SWM BMP as-built approvals are included below:

FY 2018 Review and Approval Activity

	Design-Bid- Build Projects (DBB)	Design-Build Projects (DB)	MDE Approved Projects (MDE)	Total
FY 2018 Active Projects	407 (88%)	6 (1%)	50 (11%)	463
Submissions Received	1107 (82%)	110 (8%)	137 (10%)	1354
Comment Letters Issued	596 (85%)	78 (11%)	26 (4%)	700
Concept Approvals	156 (99%)	2 (1%)	0 (0%)	158
Site Development Approvals	109 (95%)	6 (5%)	0 (0%)	115
Final Approvals	115 (94%)	7 (6%)	0 (0%)	122
Modification Approvals	54 (61%)	16 (18%)	18 (21%)	88
Final Approval Extensions	25 (63%)	1 (2%)	14 (35%)	40
As-built Structural Acceptance	52 (40%)	0 (0%)	79 (60%)	131

Representative Projects

Electronic copies of submissions, comment letters, and approvals were submitted for fifteen representative projects with the FY 2017 annual report. Per MDE request, only electronic data for two of these projects is being submitted with the FY 2018 annual report:

- 15-PR-0097, AW8965170, MD 404
- 16-PR-0081, AA1795177, MD 295 from MD 175 to MD 100

1.4 QA/QC Activities and Summaries of Site Inspections

The MDOT SHA ensures quality assurance and quality control (QA/QC) of approved erosion and sediment control plans through inspections of MDOT SHA construction projects for compliance with the approved Erosion and Sediment Control Plans, utilizing a checklist and rating system. The MDOT SHA's quality assurance inspections are performed by Regional Environmental Coordinators (REC). The MDOT SHA utilizes a real-time inspection and reporting system called the QA Toolkit. The QA Program grew to 18 total representatives in FY18 and program formalized a Progressive Schedule Protocol in effort to ensure maximum resource coverage with a priority review to critical/sensitive environmental projects. Statewide Implementation is expected in the first part of FY19.

During this FY18 period, MDOT SHA performed 5278 inspections (3723 QA-1 and 1555 QA-2 reports) on 422 projects. A record number of thirty-six non-compliances were issued to thirty-two unique and different projects. Thirty-one "D" and "F" ratings were issued during this reporting period. The non-compliances were subsequently corrected. Thirteen projects had their grading operations shut down until corrective actions were completed. Eighteen projects were shut down completely until corrective actions were completed. Shutdowns cause significant financial impacts to the contractor as all deployed material, equipment and construction laborers become inactive until the deficiencies are addressed. This is one of the largest sanctions that promotes contractor attention and greatly reduces chances of repeat non-compliance. Additionally, liquidated damages are deployed to recover MDOT SHA's financial impact. Liquidated damages resulted from 28 different incidents totaling $200,955 per the contract documents. Currently three violations have resulted in LD's withdrawn in the amount of $24,360, 14 violations are pending ($106,747) and 11 violations have not been started ($69,864).

Revocation of contractor Erosion Sediment Control Manager (ESCM) and Contractor Superintendent are a separate sanction that impacts the contractor because such certification is a requirement for those personnel to be employed on an MDOT SHA project. Revocation is activated for a period of six months upon two ratings of 'F'. Certification revocations are listed in each project inspection report. There were 6 Yellow Card revocation during this reporting period. Details of the non-compliance findings and the actions taken, a summary of Quality Assurance Inspections by district, and bi-weekly inspection reports for 6 representative projects are included with the electronic data.

During this period, the total number of project inspections stopped or placed on hold was 76. A list of the projects placed on hold and the reasons for the hold status is included with the electronic data. The QA Program also received and addressed nine (9) related Erosion and Sediment Control or Storm Water Management environmental complaints/inquires in FY 18 from MDE/Counties and/or citizens.

1.5 Design Elements Not Meeting ESD to the MEP

The Maryland Legislature enacted the Stormwater Management Act of 2007 which established stringent requirements to implement Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP). MDOT SHA's Plan Review Division reviews each project submission in relation to the requirements, Guidelines, and Procedures. Stormwater Management reports are required for each project. The majority of projects include plans. At concept stage, SWM requirements are reviewed for management required and conceptual management provided as well as the appropriateness of any waivers and variances requested. Site development and final stage submissions are reviewed for engineering design, consistency, and completeness. Waivers and variances are granted only at final approval once all applicable documentation and local agency approvals are provided.

MDOT SHA-PRD has utilized the language in COMAR Section 26.17.02.06.A(2) as a basis to determine whether a project meets ESD to the MEP:

> "The MEP standard is met when channel stability and 100 percent of the average annual predevelopment groundwater recharge are maintained, nonpoint source pollution is minimized, and structural stormwater management practices are used only if determined to be absolutely necessary."

This statement is further explained in the MDOT SHA Guidelines Section 4.1 and 4.2 as minimum control requirements for new development and redevelopment.

The majority of waivers and variances granted by PRD are for maintenance or redevelopment projects (funds 30, 33, 74, 76, 77, 79, 80, 88). Many of these projects are located in developed corridors with limited opportunities for ESD facilities. They often include small amounts of additional impervious scattered throughout the project (funds 76, 77, 80) or narrow strips of additional impervious along the corridor (funds 33, 79). These project types use the Water Quality Bank to meet WQv requirements when ESD facilities are not practicable.

PRD granted variances for 27 projects within FY 2018. The majority of variances were for redevelopment projects such as Bridge Replacement and Rehabilitation (7 projects) and Resurfacing and Rehabilitation (7 projects). The table below shows waivers and variances accepted in FY 2018 by fund type.

FY 2018 Granted Waivers and Variances by MDOT SHA Fund Type

Fund	Description	No. of Waivers	No. of Projects with Waivers	No. of Variances	No. of Projects with Variances
26	Sound Barriers	1	1	0	0
29	Facilities & Equipment	2	1	1	1
30	Crash Prevention	0	0	4	2
33	ADA Retrofit	51	3	3	1
70	Primary Roadways	10	1	18	1
71	Secondary Roadways	3	1	13	3
74	Drainage	42	10	2	1
75	Emergency	3	1	0	0
76	Safety & Spot Improvements	6	3	5	1
77	Resurfacing & Rehabilitation	88	15	22	7
79	Sidewalks	3	1	3	1
80	Bridge Replacement & Rehabilitation	39	17	31	7
81	Park and Ride	7	1	0	0
82	TMDL Compliance	0	0	0	0
84	Community Safety & Enhancements	1	1	2	1
85	Traffic Management	9	3	0	0
87	CHART	2	1	0	0
88	Bicycle Retrofit	0	0	3	1
	Totals	267	60	107	27

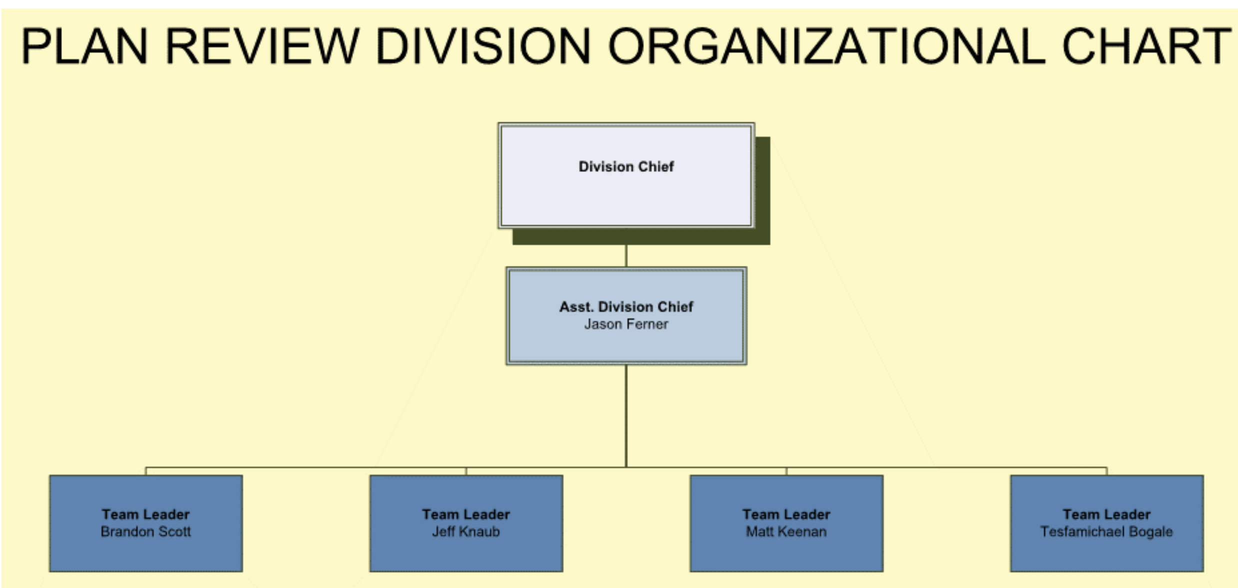
The MDOT SHA Office of Highway Development (OHD) process to ensure ESD to the MEP begins with a project concept design presentation to the OHD Director (Director's Review). Any concerns or issues noted during the Director's Review are addressed before the initial concept submission is made to PRD. This process provides leadership-level commitment to project needs and a focus on ESD to the MEP at a very early stage in the design process.

1.6 Significant Staffing Changes

The Plan Review Division had several significant staffing changes during this reporting period. Effective May 9, 2018, Laura Ridler, PE became Deputy Director of the Office of Highway Development, leaving the PRD Division Chief position vacant. The position was vacant as of the end of this reporting period.

Matt Keenan, PE was hired on October 11, 2017 to fill the vacant team leader position.

The updated organizational chart for the Plan Review Division is included below.



1.7 Local Agency Comments and Responses

No local agencies reached out to PRD during the reporting period. MDE requested examples of comment and response letters with other government agencies. There are no current examples because most coordination with local agencies occurs informally through email or phone conversations. In relation to specific projects being reviewed by PRD and its coordination with local agencies, MDOT SHA remains committed to being very responsive to requests received. During this reporting period, agency meetings were held for:

- 16-PR-0134, FR1325180, MD 355 bridge over Bennett Creek
- 17-PR-0090, HO7565370, MD 32: Linden Church Road to I-70 Phase 2

A meeting summary is included in Section 2.3.

1.8 Investigations of Citizen Complaints and Inquiries

MDOT SHA strives to provide outstanding customer service. The Highway Hydraulics Division utilizes a tracking tool to assist in providing this. Additionally, MDOT SHA uses an on-line customer care reporting and communication system. Both systems receive a wide variety of concerns associated with Highway Operations. MDOT SHA will continue to provide specific and focused information of citizen complaints and inquiries related to Sediment and Stormwater topics for projects being reviewed by PRD.

Background information and updates are included below for the projects previously reported on, along with one new project received by PRD during FY 2018:

- 10-SF-0402, FR5715170, US 15 at Monocacy Boulevard Interchange, is a major highway project constructing a new interchange at US 15 and Monocacy Boulevard. The MDOT SHA received a complaint from the Walkersville Southern Railroad regarding flooding concerns and impacts to the railroad property due to the May 2018 excessive rainfall events from the 15th through the 17th. Investigations are currently under way to determine the cause and any potential remediation to address the complaint.

- 15-PR-0074, BA1445174, I-795 Maintenance Repairs to Painters Mill Levee, was initiated to comply with FEMA requirements for levee certification and involves raising the levee from its original elevation to meet the current regulatory requirements based on the most recent hydraulic models. Due to deficiencies, the levee was decertified, which affected the adjacent property value. The property owner submitted a complaint on September 24, 2012 regarding this issue and brought it to the attention of elected officials. MDOT SHA initiated a design project to mitigate the deficiencies by raising the levee. No highway improvement work has occurred in this area since 1989 and the levee system relating to this complaint was built in 1989. The project received final approval from PRD on August 26, 2016. Construction of the levee was completed and the application to FEMA for final certification was obtained on May 7, 2018.

- 15-PR-0097, AW8965170, MD 404 from US 50 to Holly Road, is a major highway project that involves 9 miles of dualization of MD 404. A specific complaint was received from a property owner downstream of Access Road 2 (now known as Twin Ponds Lane) as reported in the FY 2017 Annual Report. Additionally, it was discovered that due to an error in the development of the stormwater management plan, ESDv requirements were not satisfied at the project outfall upstream of the property owner.

MDOT SHA has redesigned the stormwater management provided for Twin Ponds Lane to exceed the ESDv requirement. Additionally, the redesigned stormwater management will reduce the peak discharges and runoff volumes from the 2- and 10-year frequency storm events from existing conditions to address the property owner complaints. The stormwater treatment method has been changed from the originally approved grass swales to a greatly enlarged bioswale facility. Plans are currently being developed and reviewed for the replacement of the stormwater management facilities in this area. Construction is anticipated to begin in the fall of 2018 and to be completed shortly thereafter before the end of the 2018 construction season. MDOT SHA has been providing the downstream property owner with updates on the progress of the stormwater redesign in this area on a bi-weekly basis.

- 15-PR-0100, BA7125174, I-695 at Cromwell Bridge Road Minebank Run Restoration and Water Quality Improvements, was initiated to address public safety concerns. A degrading outfall and a major head cut formed directly adjacent to a townhome community. This issue was reported to MDOT SHA in December 2007, again in April 2008, and then was raised to the elected officials. The original I-695 highway project was built in 1962 with additional improvements in 1987. No highway improvement work has occurred in this area since 1987 and the drainage system relating to the complaint was built in 1962. This project was initiated to address not only the safety issues but also water quality issues in the area. The project includes stormwater management water quality facilities in the interchange in I-695 and Cromwell Bridge Road, stabilization of several drainage outfalls, and restoration of the Minebank Run main channel. The stream restoration portion will be used to meet mitigation requirements for the I-695 Southwest outer loop widening project. The outfall stabilization will address the safety issues as well as provide opportunities for water quality improvement. The stormwater design was initiated to provide water quality treatment of currently untreated impervious surfaces and will provide MS4 TMDL Restoration credit. The project received final approval on August 30, 2017 and is currently under construction.

- 16-PR-0005, AT6885274, Outfall Stabilization/Restoration at various locations, was initiated after MDOT SHA's District 5 presented eleven sites in need of erosion and drainage remediation/preservation. This project was included in the previous annual report; however, the project did not result from a citizen complaint. For this reason, updates are not provided in this annual report and this project will not be included in the next annual report.

- 16-PR-0010, MO2805174, Long Draught Branch between MD 117 and In-Stream SWM Structure was initiated in the early 2000's when MDOT SHA proposed rehabilitating the degraded channel as stormwater management for a MD 117 widening project. That widening project was completed without the need for the stream restoration, and Long Draught Branch (LDB) was not revisited until 2008 when MDOT SHA attempted to restore the reach as a water quality bank project. That iteration of the project was cancelled due tree impacts and the project was placed on hold until the failure of the in-stream SWM structure necessitated removal of the dam. Incorporating the dam removal into a redesign of the stream channel alignment allowed for minimization of tree impacts. The current design involves rehabilitation of approximately 2500 linear feet of stream channel, removal of the in-stream SWM structure, and addressing degraded outfalls entering the stream channel. The project received final approval from PRD on February 10, 2017 and advertised on June 13, 2017. Construction is currently under way. This project was not initiated as a result of a citizen drainage complaint but was included in the previous annual report. Since the project did not originate from a citizen complaint, the next annual report will not include this project.

- 16-PR-0039, WA2805174, MD 804 Flood Abatement at Chewsville, was initiated after drainage concerns were raised by residents on January 1, 1999, particularly those living along MD 804. Primarily, two properties have experienced issues. These are located at 21113 and 21223 Twin Springs Drive. MDOT SHA investigated and the issues are a result of undersized and clogged storm drain systems, as well as drainage patterns that carry flow through the town. MDOT SHA is proposing to solve the flooding issue by re-routing flow around the town and upgrading storm drain systems. Stormwater management is needed to meet quantity requirements at the point of investigation as well as at intermediate locations. This will be met by constructing two stormwater management ponds to attenuate peak flows. The project originally received concept approval from PRD on December 30, 2016 and made one site development submission with comments issued on April 7, 2017. Since then, citizen concerns necessitated a design change and the original concept was modified. The revised concept has had two submittals. The project is on the production schedule with a projected advertisement date of January 18, 2019.

- 16-PR-0075, Site 1, MD 312 Culvert Replacement/Enhancement project was initiated after a drainage issue was reported on March 19, 2013 by the downstream property owner located at 13009 Oakland Road, regarding water failing to drain from his property. The issue was attributed to an undersized MDOT SHA 24" RCP under MD 312 which frequently overtops during storm events. MDOT SHA proposes replacing the existing culvert with twin 24"x38" HERCP culverts and a 10-foot wide outfall channel with 2:1 side slopes, stabilized with sod. No highway improvement work has occurred in this area since 1967. The drainage system relating to this complaint was built in 1964. The project received concept approval on February 2, 2018 but no Site Development submissions have been made.

- 17-PR-0055, Emergency Culvert Replacement. Flooding was reported on October 19, 2016 by an upstream property owner. The flooding was caused by backwater from undersized pipes located downstream of his property. One of the pipes is proposed to be replaced with a larger diameter pipe. The work was declared an emergency and construction began after PRD granted Concept Approval on April 21, 2017. Work was completed in June and Final Approval was granted on June 21, 2017.

- 17-PR-0120, I-95 South near Patapsco River – Outfall Repair. MDOT SHA was contacted by the property owner at 6159 River Road in Howard County about extensive erosion and debris resulting from I-95 drainage that accumulated and closed his driveway. The situation was declared an emergency and the project was completed using a statewide open-end contract. Concept Approval was granted on August 17, 2017 and Final Approval was granted on January 22, 2018.

1.9 Plan Review Program Activity Findings

The number of submissions to PRD increased slightly from FY 2017 to FY 2018. In addition, some consultant reviewers discontinued their services necessitating additional consultant reviewers. PRD interviewed additional candidates from the same resume pool and selected the following four reviewers to supplement the current pool of MDE/PRD approved reviewers:

- Amanda Barrett, PE
- Natalie DeColli, PE
- Burt English, PE
- Ryan Thomas, PE

MDOT SHA also initiated several programmatic initiatives during the past fiscal year that affect PRD, including:

- New title sheet with updated PRD approval block.
- Updated ESC general notes sheet.
- Updated Special Provision Insert 317 SWM Facility As-Builts as well as updated as-built tables on plans.
- New 2017 Standard Specifications for Construction and Materials available as an online document.

In addition to the above Administration-wide efforts, PRD also undertook specific initiatives, including:

- Formatting changes to all approval documents.
- Format changes to comments that now utilizes a matrix with comment/response space to keep an accurate track of comments.
- Pre-submission reviews for small ponds prior to submission to MDE. PRD is using the same MDE expedited reviewers to perform these reviews at PRD. PRD will review for an initial classification concurrence and, when ready, submit to MDE. After obtaining MDE concurrence on the classification, PRD will then review the final design of the small ponds. Once PRD's final review is complete, the project is at the "recommended for final approval" level at MDE.
- Preliminary strategizing in preparation of small pond approval delegated authority.
- A meeting with the Department of Natural Resources on April 17, 2018 to discuss thermal impacts.
- A SWM training workshop for MDOT SHA employees and consultants held on May 9, 2018.
- Published PRD Current Technical Practices documenting technical clarifications.
- A pilot program for enhanced grass swales. These swales include a section of bioretention soil mix in the bottom of the swale and are intended to be used in locations where groundwater is too high for bioswales but too low for wet swales. MDOT SHA will monitor the effectiveness of these facilities and adjust as necessary if issues arise. To date, two projects have proposed their use:
    - 16-PR-0104 – Six enhanced grass swales are proposed.
    - 17-PR-0133 – Two enhanced grass swales are proposed.

1.10 Modifications to the Guidelines and Procedures

Changes to the Guidelines and Procedures have been made as a result of:

- Clarifications and corrections based on MDE Technical Memoranda

Copies of the Word documents are included on the data drive transmitted with this report. Changes are tracked in the documents to show what has changed since the last updates were submitted to MDE on October 6, 2017.

The Technical Procedures have been finalized and a copy is included on the data drive for MDE review and approval. This document formalizes PRD current practices.

1.11 Electronic Data

As referenced in the previous sections, electronic data is located on the data drive submitted with this report. The following electronic data is included:

- PRD data table that includes project data, approvals, waivers, and variances

- Agency Meeting Materials
- Representative Projects
- Guidelines, Administrative Procedures, and Technical Procedures
- Erosion and sediment control inspections, non-compliant inspections, and enforcement actions:
    - QA Non-compliance Findings (1B.1 QANonComplFind.pdf)
    - Projects on hold (1B.2 QAInspectionHold.pdf)
    - Quality Assurance Inspections by District (1B.3 QA_InspectionPerDistrict.pdf)
    - E&S Statistics are included in the MS-4 geodatabase

2.1 Project Status Reports

Three Project Status Reports are included starting on the following page:

1. MDOT SHA Design-Bid-Build Projects
2. MDOT SHA Design-Build Projects (post award)
3. MDE SF Projects

MDOT SHA Design Bid Build Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
15-PR-0001	1	Tesfamichael Bogale	Patrick Nadeau	Patrick Nadeau	OHD	CE4035174		MD 272	MD 272, North of Rogues Harbor Rd				
						FIN	1	12/15/2015	12/18/2015			12/18/2015	
						SITE	3	11/16/2015	12/04/2015		12/04/2015		
						SITE	2	10/13/2015	10/26/2015				
						SITE	1	09/03/2015	09/16/2015				
						CON	2	04/21/2015	05/14/2015	05/14/2015			
						CON	1	01/07/2015	02/24/2015				
15-PR-0002	1	Sonja Hardman	Glen Helms	Lindsay Bobian	OHD	BA5155184		US 1	BALTIMORE CITY LINE TO I-695				
						SITE	2	03/17/2016	04/06/2016				
						SITE	1	01/29/2016	02/04/2016				
						CON	3	05/15/2015	05/21/2015	05/21/2015			
						CON	2	04/22/2015	04/29/2015				
						CON	1	01/21/2015	03/06/2015				
15-PR-0003	1	Tesfamichael Bogale		Jason Solicny	OHD	BA7295470		MD 140	MD 140, Culvert Break-out				
						FIN-EXT	1	05/24/2017	06/08/2017				
						FIN	2	06/05/2015	06/08/2015			06/08/2015	
						FIN	1	05/20/2015	05/28/2015				
						SITE	2	04/30/2015	05/08/2015		05/08/2015		
						SITE	1	04/21/2015	04/27/2015				
						CON	2	03/13/2015	03/19/2015	03/19/2015			
						CON	1	02/13/2015	02/24/2015				
15-PR-0004	1	Tesfamichael Bogale	Junaid Khan	Jared Paper-Evers	OHD	CE2915279		MD 267	MD 267, Market St to W. Old Philadelphia Rd, Sidewalk Retrofit				
						FIN	3	05/31/2016	06/01/2016			06/01/2016	
						FIN	2	05/18/2016	05/23/2016				
						FIN	1	04/05/2016	04/19/2016				
						SITE	5	03/22/2016	03/25/2016		03/25/2016		
						SITE	4	03/15/2016	03/16/2016				
						SITE	3	03/03/2016	03/10/2016				
						SITE	2	02/04/2016	02/25/2016				
						SITE	1	01/12/2016	01/14/2016				
						CON	5	12/16/2015	12/22/2015	12/22/2015			
						CON	4	11/04/2015	11/23/2015				
						CON	3	09/14/2015	09/18/2015				
						CON	2	06/25/2015	07/09/2015				
						CON	1	01/23/2015	02/24/2015				
15-PR-0005	1	Sonja Hardman		Sarah Gentner	D3	PG8235177		I 95	From I-495 to 1000' N of Old Gunpowder Road				
						FIN-EXT	1	05/18/2017	06/09/2017				
						FIN	1	06/18/2015	06/22/2015			06/22/2015	
						SITE	3	06/11/2015	06/12/2015		06/12/2015		
						SITE	2	05/15/2015	05/21/2015				
						SITE	1	03/23/2015	03/25/2015				
						CON	2	03/13/2015	03/13/2015	03/13/2015			
						CON	1	01/30/2015	03/06/2015				
15-PR-0006	1	Tesfamichael Bogale	Craig Lynch	Angela Strevig	D3	PG5115177		MD 210	MD 210, from MD 373 (Livingston Road) to Farmington Road				
						FIN	2	05/20/2015	05/26/2015			05/26/2015	
						FIN	1	04/20/2015	05/06/2015				
						SITE	1	04/14/2015	04/16/2015		04/16/2015		

MDOT SHA Design Bid Build Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
						CON	2	04/08/2015	04/09/2015	04/09/2015			
						CON	1	01/30/2015	02/24/2015				
15-PR-0007	1	Sonja Hardman	Polly Solliday	David Yang	D4	BA5415277	I 695	I-695, W of Stevenson Rd Br to W of Greenspring Ave (withdrawn)					
						CON	1	01/30/2015	02/24/2015				
15-PR-0008	1	Tesfamichael Bogale		Kim Livezey	D4	BA0365177	MD 7	MD 7, From Golden Ring Rd to Rossville Blvd					
						FIN-EXT	1	05/24/2017	06/09/2017				
						FIN	3	07/31/2015	08/03/2015			08/03/2015	
						FIN	2	06/19/2015	06/25/2015				
						FIN	1	06/03/2015	06/15/2015				
						SITE	1	05/21/2015	05/26/2015		05/26/2015		
						CON	2	05/06/2015	05/14/2015	05/14/2015			
						CON	1	01/30/2015	02/24/2015				
15-PR-0009	1	Sonja Hardman		James Umekwe	OOTS	PG4675223	I 95	I-95/I-495 College Park Truck Weigh and Inspection Station					
						FIN-EXT	1	05/18/2017	06/09/2017				
						FIN	2	07/27/2015	07/28/2015			07/28/2015	
						FIN	1	07/14/2015	07/20/2015				
						SITE	2	06/29/2015	07/02/2015		07/02/2015		
						SITE	1	06/05/2015	06/09/2015				
						CON	2	04/27/2015	04/30/2015	04/30/2015			
						CON	1	02/10/2015	03/06/2015				
15-PR-0010	1	Sonja Hardman	Polly Solliday	Sutapa Samanta	D4	BA6855176	US 40	US 40, Chesaco Ave to Todds Lane, Safety & Spot Improvements					
						FIN-EXT	1	05/18/2017	06/09/2017				
						M1	1	06/13/2016	06/16/2016				06/16/2016
						FIN	1	07/17/2015	07/20/2015			07/20/2015	
						SITE	2	07/10/2015	07/10/2015		07/10/2015		
						SITE	1	06/19/2015	07/01/2015				
						CON	2	04/17/2015	04/21/2015	04/21/2015			
						CON	1	02/11/2015	03/06/2015				
15-PR-0011	1	Tesfamichael Bogale	Cornelius Barmer	Steven Collins	OED	AX7665582	VAR	AT VARIOUS LOCATIONS IN WASHINGTON COUNTY - GROUP 1					
						FIN	1	01/19/2017	01/23/2017			01/23/2017	
						SITE	4	12/22/2016	12/23/2016		12/23/2016		
						SITE	3	11/25/2016	12/08/2016				
						SITE	2	10/31/2016	11/10/2016				
						SITE	1	08/25/2016	09/20/2016				
						CON	3	06/10/2016	06/27/2016	06/27/2016			
						CON	2	04/08/2016	05/06/2016				
						CON	1	02/11/2015	02/24/2015				
15-PR-0013	1	Tesfamichael Bogale	Johathan Brown	Patrick Nadeau	OHD	WO1645174	MD 589	MD 346 AND MD 589					
						SITE	2	04/21/2016	05/12/2016		05/12/2016		
						SITE	1	08/26/2015	09/10/2015				
						CON	2	04/27/2015	05/07/2015	05/07/2015			
						CON	1	02/12/2015	02/26/2015				
15-PR-0013	2	Tesfamichael Bogale		Meridith LeDue	OHD	WO1645174	MD 346	MD 346 AND MD 589					
						SITE	2	04/21/2016	05/12/2016		05/12/2016		
						SITE	1	08/26/2015	08/27/2015				
						CON	2	04/24/2015	04/27/2015	04/27/2015			

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						CON	1	02/12/2015	03/06/2015				
15-PR-0014	1	Doug Roys		Jason Alwine	OED	AT0445182	VAR	TMDL Grass Swales, Anne Arundel Co					
						FIN-EXT	1	05/18/2017	06/09/2017				
						AB	1	01/13/2017	01/13/2017				
						FIN	2	07/15/2015	07/17/2015			07/17/2015	
						FIN	1	06/09/2015	06/23/2015				
						SITE	1	05/20/2015	05/26/2015		05/26/2015		
						CON	2	04/08/2015	04/14/2015	04/14/2015			
						CON	1	02/13/2015	02/26/2015				
15-PR-0015	1	Tesfamichael Bogale		Kim Livezey	D4	HA4265177	MD 924	MD 924, Holly Wreath Drive to St. Clair Dr					
						FIN-EXT	1	05/18/2017	06/09/2017				
						M1	4	11/30/2015	12/01/2015				12/01/2015
						M1	3	11/16/2015	11/19/2015				
						M1	2	11/04/2015	11/05/2015				
						M1	1	11/02/2015	11/03/2015				
						FIN	3	07/17/2015	07/24/2015			07/24/2015	
						FIN	2	07/02/2015	07/07/2015				
						FIN	1	06/22/2015	06/25/2015				
						SITE	2	06/01/2015	06/12/2015		06/12/2015		
						SITE	1	04/21/2015	05/08/2015				
						CON	4	04/10/2015	04/16/2015	04/16/2015			
						CON	3	03/19/2015	03/25/2015				
						CON	2	03/06/2015	03/09/2015				
						CON	1	02/19/2015	02/24/2015				
15-PR-0016	1	Sonja Hardman	Polly Solliday	James Umekwe	OOTS	WA2815123	I 81	I-81 SB Escort Vehicle Area Geometric Improvements					
						AB	2	08/15/2016	09/13/2016				
						AB	1	04/22/2016	04/25/2016				
						FIN	1	08/14/2015	08/21/2015			08/21/2015	
						SITE	3	07/23/2015	07/24/2015		07/24/2015		
						SITE	2	06/01/2015	06/09/2015				
						SITE	1	05/26/2015	05/26/2015				
						CON	1	02/25/2015	02/26/2015	02/26/2015			
15-PR-0017	1	Tesfamichael Bogale	Glen Helms	Moreshwar Kulkarni	OHD	PG3335172	I 95	IHB - BALTIMORE WASHINGTON PARKWAY TO US 1 (GREENBELT METRO ACCESS)					
						SITE	3	05/17/2017	06/12/2017				
						SITE	2	02/14/2017	03/10/2017				
						SITE	1	03/03/2016	04/26/2016				
						CON	3	08/27/2015	08/28/2015	08/28/2015			
						CON	2	07/08/2015	08/11/2015				
						CON	1	02/25/2015	03/20/2015				
15-PR-0017	2	Tesfamichael Bogale	Glen Helms		OED	PG3335172	I 95	IHB - BALTIMORE WASHINGTON PARKWAY TO US 1 (GREENBELT METRO ACCESS)					
						SITE	3	05/23/2017	05/31/2017				
						SITE	2	02/01/2017	02/23/2017				
						SITE	1	12/13/2016	12/30/2016				
						CON	1	09/08/2016	09/22/2016	09/22/2016			
15-PR-0018	1	Doug Roys	Craig Lynch	Jim Hade	OED	WO1915174	US 113	Critical Area Mitagation at Firehouse wetland site					
						FIN	1	06/03/2015	06/03/2015			06/03/2015	
						SITE	1	05/28/2015	05/28/2015		05/28/2015		

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						CON	2	04/07/2015	04/09/2015	04/09/2015			
						CON	1	03/03/2015	03/06/2015				
15-PR-0019	1	Doug Roys	Joseph Bartell	Larry Trout	OED	AA7955282	VAR	AT VARIOUS LOCATIONS - GROUP 1					
						M1	1	05/16/2017	06/16/2017				
						FIN	1	03/06/2017	03/07/2017			03/07/2017	
						SITE	3	02/02/2017	02/07/2017		02/07/2017		
						SITE	2	12/15/2016	12/29/2016				
						SITE	1	10/06/2016	10/24/2016				
						CON	2	08/05/2016	08/16/2016	08/16/2016			
						CON	1	03/03/2015	03/23/2015				
15-PR-0020	1	Tesfamichael Bogale	Craig Lynch	Sarah Gentner	D3	MO1665187	I 270	SOUTH OF GUDE DRIVE (SPUR FROM C/D LANE SB)					
						CON	2	05/13/2015	06/15/2015				
						CON	1	03/13/2015	04/08/2015				
15-PR-0021	1	Sonja Hardman	Armand de Rosset	Rod Thorton	OOS	XX1115180	MD 950	Emergency Replacement of Str. 16097X0 MD 950 over Beaverdam Cr					
						SITE	2	02/01/2016	02/02/2016		02/02/2016		
						SITE	1	04/23/2015					
						CON	2	03/19/2015	03/19/2015	03/19/2015			
						CON	1	03/13/2015	03/13/2015				
15-PR-0022	1	Sonja Hardman	Craig Lynch	Angela Strevig	D3	PG5105177	MD 210	IHB - FARMINGTON ROAD TO OLD FORT ROAD					
						FIN	3	04/12/2016	04/14/2016			04/14/2016	
						FIN	2	03/29/2016	04/06/2016				
						FIN	1	03/08/2016	03/11/2016				
						SITE	4	02/10/2016	02/26/2016		02/26/2016		
						SITE	3	01/07/2016	01/14/2016				
						SITE	2	12/09/2015	12/23/2015				
						SITE	1	11/04/2015	11/12/2015				
						CON	2	08/26/2015	09/04/2015	09/04/2015			
						CON	1	03/23/2015	03/26/2015				
15-PR-0023	1	Brandon Scott	Kiona Leah	Chris Weber	OHD	AA4365471	MD 175	WEST OF REECE ROAD TO EAST OF DISNEY ROAD					
						FIN	2	11/10/2016	11/14/2016			11/14/2016	
						FIN	1	10/19/2016	10/25/2016				
						SITE	7	09/16/2016	09/21/2016		09/21/2016		
						SITE	6	08/05/2016	08/19/2016				
						SITE	5	07/12/2016	07/15/2016				
						SITE	4	06/09/2016	07/05/2016				
						SITE	3	04/01/2016	04/04/2016				
						SITE	2	03/04/2016	03/11/2016				
						SITE	1	12/30/2015	01/04/2016				
						CON	4	08/10/2015	08/14/2015	08/14/2015			
						CON	3	06/18/2015	06/23/2015				
						CON	2	05/29/2015	06/04/2015				
						CON	1	03/23/2015	04/08/2015				
15-PR-0024	1	Sonja Hardman	Craig Lynch	Linda Zerbee	D6	WA2515176	I 68	0.9 Miles East of Mountain Rd to Sideling Hill Rest Area					
						SITE	1	11/18/2015	11/23/2015		11/23/2015		
						CON	2	09/18/2015	09/21/2015	09/21/2015			
						CON	1	03/25/2015	03/30/2015				

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15-PR-0025	1	Tesfamichael Bogale	Alicia Brandys	Meridith LeDue	OHD	CE3395176	MD 272	IHB - SOUTH OF US 40 TO ROGERS ROAD					
						M2	1	03/21/2017	03/22/2017				
						M1	1	02/27/2017	02/28/2017				02/28/2017
						FIN	2	02/13/2017	02/24/2017			02/24/2017	
						FIN	1	01/31/2017	02/10/2017				
						SITE	5	01/12/2017	01/18/2017		01/18/2017		
						SITE	4	12/23/2016	12/28/2016				
						SITE	3	11/22/2016	12/08/2016				
						SITE	2	08/26/2016	09/13/2016				
						SITE	1	06/08/2016	06/30/2016				
						CON	4	03/14/2016	03/17/2016	03/17/2016			
						CON	3	01/06/2016	01/14/2016				
						CON	2	07/08/2015	07/30/2015				
						CON	1	03/31/2015	04/22/2015				
15-PR-0026	1	Sonja Hardman	Polly Solliday	David Mitchell	D6	AL2735177	MD 51	Pack Horse Road to Town Creek					
						FIN	1	06/24/2015	06/30/2015			06/30/2015	
						SITE	3	06/11/2015	06/11/2015		06/11/2015		
						SITE	2	05/18/2015	05/26/2015				
						SITE	1	05/11/2015	05/12/2015				
						CON	1	04/06/2015	04/09/2015	04/09/2015			
15-PR-0027	1	Tesfamichael Bogale	Joseph Bartell	Scott Dutrow	D7	CL3045130	MD 26	AT OAKLAND MILLS ROAD					
						FIN	3	06/08/2017	06/09/2017			06/09/2017	
						FIN	2	05/30/2017	06/01/2017				
						FIN	1	05/17/2017	05/23/2017				
						SITE	3	02/13/2017	02/22/2017		02/22/2017		
						SITE	2	01/25/2017	02/07/2017				
						SITE	1	01/17/2017	01/18/2017				
						CON	6	12/13/2016	12/30/2016	12/30/2016			
						CON	5	10/18/2016	11/16/2016				
						CON	4	07/11/2016	08/05/2016				
						CON	3	02/18/2016	03/18/2016				
						CON	2	11/02/2015	11/30/2015				
						CON	1	04/06/2015	04/22/2015				
15-PR-0028	1	Sonja Hardman	Daniel Sharar-Salgado	Huqin Zhang	OHD	FR3905184	MD 180	MD 383 (BROAD RUN ROAD) TO OLD HOLTER ROAD					
						FIN	2	04/21/2017	05/08/2017			05/08/2017	
						FIN	1	04/12/2017	04/12/2017				
						SITE	7	03/27/2017	03/27/2017		03/27/2017		
						SITE	6	03/03/2017	03/10/2017				
						SITE	5	01/17/2017	01/17/2017				
						SITE	4	10/03/2016	10/04/2016				
						SITE	3	05/31/2016	06/07/2016				
						SITE	2	04/25/2016	04/26/2016				
						SITE	1	01/29/2016	02/04/2016				
						CON	4	11/24/2015	11/25/2015	11/25/2015			
						CON	3	09/16/2015	09/18/2015				
						CON	2	07/01/2015	07/15/2015				
						CON	1	04/15/2015	04/17/2015				

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15-PR-0029	1		Shreemal Perera	Colbert Stephen	OHD	HO1905181		I 95	Welcome Center Truck Parking Expansion - Project Canceled				
						CON	1	04/17/2015	04/17/2015				
15-PR-0030	1	Doug Roys	Rahul Kesarkar	Barry Ritchie	D6	WA2785187		I 81	IHB- I-70 to Halfway Blvd				
						FIN	2	04/25/2016	04/28/2016			04/28/2016	
						FIN	1	04/04/2016	04/12/2016				
						SITE	2	03/09/2016	03/17/2016		03/17/2016		
						SITE	1	02/24/2016	02/26/2016				
						CON	3	01/13/2016	01/14/2016	01/14/2016			
						CON	2	11/10/2015	11/16/2015				
						CON	1	04/27/2015	04/30/2015				
15-PR-0031	1	Tesfamichael Bogale	Rahul Kesarkar	Tara Ryan	OED	BA5005249		NA	Hereford Shop-Storage Tank Removal and Replacement				
						FIN	2	07/21/2015	07/23/2015			07/23/2015	
						FIN	1	07/14/2015	07/17/2015				
						SITE	1	06/25/2015	07/01/2015		07/01/2015		
						CON	1	04/27/2015	05/13/2015	05/13/2015			
15-PR-0032	1	Sonja Hardman	Alicia Brandys	Mike Steiner	D2	CO2795177		MD 404 BU	IHB - 1ST STREET TO 9TH STREET or MD 404 BU from 1st St to 9th St				
						FIN	3	10/03/2016	10/04/2016			10/04/2016	
						FIN	2	09/23/2016					
						FIN	1	09/02/2016	09/06/2016				
						SITE	3	06/03/2016	06/07/2016		06/07/2016		
						SITE	2	02/19/2016	02/26/2016				
						SITE	1	12/08/2015	12/08/2015				
						CON	2	10/02/2015	10/02/2015	10/02/2015			
						CON	1	05/07/2015	05/12/2015				
15-PR-0033	1	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	PG8945177		MD 201	EDMONSTON ROAD TO PATTERSON ROAD				
						FIN	2	05/01/2017	05/02/2017			05/02/2017	
						FIN	1	03/17/2017	03/31/2017				
						SITE	3	08/05/2016	08/25/2016		08/25/2016		
						SITE	2	06/06/2016	06/15/2016				
						SITE	1	04/20/2016	05/10/2016				
						CON	1	05/21/2015	05/27/2015	05/27/2015			
15-PR-0034	1	Matt Keenan	Armand de Rosset	Chad Thornton	OHD	PG3645184		MD 500	DC LINE TO MD 208				
						FIN	1	05/30/2017	06/17/2017				
						SITE	5	02/16/2017	02/17/2017		02/17/2017		
						SITE	4	01/17/2017	01/30/2017				
						SITE	3	11/16/2016	11/30/2016				
						SITE	2	09/16/2016	10/13/2016				
						SITE	1	07/05/2016	07/12/2016				
						CON	2	12/15/2015	12/16/2015	12/16/2015			
						CON	1	05/18/2015	05/20/2015				
15-PR-0035	1	Doug Roys	Michael Weber	Steve Collins	OED	AX7665482		VAR	AT VARIOUS LOCATIONS IN ANNE ARUNDEL COUNTY - GROUP 1				
						SITE	4	03/01/2017	03/09/2017		03/09/2017		
						SITE	3	01/19/2017	02/07/2017				
						SITE	2	10/18/2016	11/17/2016				
						SITE	1	08/26/2016	09/15/2016				
						CON	2	04/28/2016	06/08/2016	06/08/2016			

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						CON	1	06/01/2015	07/08/2015				
15-PR-0036	1	Jeff Knaub	Johathan Brown	Jonathan Brown	OHD	XX1605174	I 270	I-270 N prior to MD 28, washout					
						FIN	4	12/15/2016	01/03/2017			01/03/2017	
						FIN	3	09/08/2016	09/19/2016				
						FIN	2	08/10/2015	08/28/2015				
						FIN	1	06/24/2015	06/30/2015				
						CON	1	05/30/2015	06/22/2015	06/22/2015			
15-PR-0037	1	Jeff Knaub	Tyler Bazan	Dipa Patel	OOS	GA2085180	MD 546	Bridge 1101200 Over I-68					
						FIN	1	03/14/2016	03/29/2016			03/29/2016	
						SITE	3	03/03/2016	03/08/2016		03/08/2016		
						SITE	2	02/18/2016	02/26/2016				
						SITE	1	12/30/2015	01/11/2016				
						CON	3	11/18/2015	12/01/2015	12/01/2015			
						CON	2	07/29/2015	08/17/2015				
						CON	1	06/05/2015	06/25/2015				
15-PR-0038	1	Sonja Hardman	Johathan Brown	Jonathan Brown	OHD	XX1625174	MD 28	713 W. Montgomery Ave Drainage Improvement					
						FIN	1	03/18/2016	03/22/2016			03/22/2016	
						SITE	2	09/15/2015	09/15/2015		09/15/2015		
						SITE	1	08/10/2015	08/11/2015				
						CON	2	07/08/2015	07/21/2015	07/21/2015			
						CON	1	06/08/2015	06/12/2015				
15-PR-0039	1		Michael Weber	Roger Windschitl	OED	HO1695182	NA	Furnace Ave Tributary					
						M1	1	11/19/2015	11/23/2015				11/23/2015
						FIN	1	09/30/2015	10/01/2015			10/01/2015	
						SITE	2	09/23/2015	09/24/2015		09/24/2015		
						SITE	1	08/05/2015	08/14/2015				
						CON	1	06/25/2015	07/21/2015	07/21/2015			
15-PR-0040	1	Jeff Knaub	Joseph Bartell	Jordan Howard	D3	MO3755277	US 29	MD 97 TO ST ANDREWS WAY					
						SITE	4	12/05/2016	12/22/2016		12/22/2016		
						SITE	3	09/19/2016	09/22/2016				
						SITE	2	05/10/2016	06/29/2016				
						SITE	1	12/22/2015	01/15/2016				
						CON	2	08/24/2015	08/27/2015	08/27/2015			
						CON	1	06/29/2015	07/21/2015				
15-PR-0041	1	Brandon Scott	Rahul Kesarkar	Barry Ritchie	D6	WA2495176	I 81	IHB-MD 58 to US 40					
						FIN	1	06/14/2016	06/16/2016			06/16/2016	
						SITE	2	05/02/2016	05/05/2016		05/05/2016		
						SITE	1	04/04/2016	04/04/2016				
						CON	4	11/16/2015	11/17/2015	11/17/2015			
						CON	3	09/28/2015	09/30/2015				
						CON	2	08/18/2015	08/19/2015				
						CON	1	06/29/2015	07/07/2015				
15-PR-0042	1	Tesfamichael Bogale	Armand de Rosset	Virginia Keenan	OHD	WA1065184	MD 845A	SOUTH CORPORATE LIMITS OF KEEDYSVILLE TO NORTH CORPORATE TOWN LIMITS					
						SITE	4	05/17/2017	05/30/2017				
						SITE	3	12/16/2016	12/30/2016				
						SITE	2	10/24/2016	11/25/2016				

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						SITE	1	09/21/2016	09/28/2016				
						CON	6	08/02/2016	08/25/2016	08/25/2016			
						CON	5	07/05/2016	07/20/2016				
						CON	4	06/06/2016	06/16/2016				
						CON	3	01/27/2016	03/03/2016				
						CON	2	10/08/2015	10/22/2015				
						CON	1	07/02/2015	07/13/2015				
15-PR-0043	1	Sonja Hardman	Daniel Sharar-Salgado	Vivian Berra-Figuereo	OHD	PG6915170		MD 197	KENHILL DRIVE TO MD 450 (ANNAPOLIS ROAD)				
						CON	3	12/11/2015	12/16/2015	12/16/2015			
						CON	2	11/27/2015	11/30/2015				
						CON	1	07/06/2015	07/10/2015				
15-PR-0044	1	Jeff Knaub	Joseph Bartell	Dana Morse	OOS	QA2405180		US 301	IHB-Bridge 1701101 over MD 290 and Bridge 1701201 over Red Lion				
						FIN	1	01/19/2016	01/21/2016			01/21/2016	
						SITE	2	12/14/2015	01/07/2016		01/07/2016		
						SITE	1	10/16/2015	11/19/2015				
						CON	1	07/09/2015	07/29/2015	07/29/2015			
15-PR-0045	1	Tesfamichael Bogale	Shreemal Perera	Charles Edwards	OOM	AA3925629		NA	HANOVER COMPLEX AREA - PAVEMENT RESURFACING AND DRAINAGE IMPROVEMENTS				
						FIN	3	04/27/2017	05/03/2017			05/03/2017	
						FIN	2	03/01/2017	03/07/2017				
						FIN	1	01/06/2017	01/09/2017				
						SITE	2	08/03/2016	08/18/2016		08/18/2016		
						SITE	1	07/08/2016	07/14/2016				
						CON	3	05/12/2016	05/19/2016	05/19/2016			
						CON	2	01/07/2016	01/28/2016				
						CON	1	07/10/2015	07/28/2015				
15-PR-0046	1	Jeff Knaub	Alicia Brandys	Charlene Thayer	OOM	TA2955129		NA	EASTON MAINTENANCE FACILITY REPLACEMENT				
						FIN	3	08/26/2016	09/01/2016			09/01/2016	
						FIN	2	08/10/2016	08/18/2016				
						FIN	1	06/13/2016	07/12/2016				
						SITE	2	03/18/2016	04/12/2016		04/12/2016		
						SITE	1	12/14/2015	01/13/2016				
						CON	2	10/02/2015	10/20/2015	10/20/2015			
						CON	1	07/23/2015	08/11/2015				
15-PR-0047	1	Tesfamichael Bogale	Gina Goettler	Meridith LeDue	OHD	CL8415184		MD 31	LAMBERT AVENUE TO EAST OF CHURCH STREET				
						SITE	1	05/23/2017	06/02/2017				
						CON	5	01/28/2016	02/12/2016	02/12/2016			
						CON	4	12/17/2015	01/08/2016				
						CON	3	10/28/2015	11/12/2015				
						CON	2	08/21/2015	09/17/2015				
						CON	1	07/27/2015	08/03/2015				
15-PR-0048	1	Jeff Knaub	Rahul Kesarkar	Hicham Baassiri	D1	WI2005176		US 50	WARD STREET TO MAIN STREET or US 50 Business, Ward Street to Main Street				
						FIN	1	11/28/2016	12/02/2016			12/02/2016	
						SITE	3	10/20/2016	10/31/2016		10/31/2016		
						SITE	2	09/23/2016	10/12/2016				
						SITE	1	06/06/2016	07/22/2016				
						CON	3	02/18/2016	03/14/2016	03/14/2016			
						CON	2	11/23/2015	12/22/2015				

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						CON	1	07/28/2015	08/14/2015				
15-PR-0049	1	Sonja Hardman	Rahul Kesarkar	Angela Strevig	D3	MO1885177	I 495	IHB-I-270Y to Seminary Road - Inner Loop					
						M1	3	04/12/2017	04/12/2017				04/12/2017
						M1	2	03/17/2017	03/17/2017				
						M1	1	03/09/2017	03/09/2017				
						FIN	2	03/14/2016	03/17/2016			03/17/2016	
						FIN	1	02/17/2016	02/24/2016				
						SITE	2	02/01/2016	02/02/2016		02/02/2016		
						SITE	1	11/20/2015	11/23/2015				
						CON	1	07/28/2015	07/30/2015	07/30/2015			
15-PR-0050	1	Sonja Hardman	Joseph Bartell	Angela Strevig	D3	PG0525177	MD 410	TO MD 450					
						CON	1	07/28/2015	07/30/2015	07/30/2015			
15-PR-0051	1	Tesfamichael Bogale	Michael Weber	Dorey Uong	D3	MO1655187	I 495	AT MD 190					
						CON	4	05/22/2017	05/23/2017	05/23/2017			
						CON	3	10/26/2016	11/28/2016				
						CON	2	11/12/2015	11/30/2015				
						CON	1	07/28/2015	08/14/2015				
15-PR-0052	1	Jeff Knaub	Joseph Bartell	Karen Fiasco	D5	AA1595177	MD 980B	Full Depth Reclamation from WRIGHTON ROAD TO TALBOT ROAD					
						FIN	1	04/14/2016	04/29/2016			04/29/2016	
						SITE	2	02/10/2016	02/12/2016		02/12/2016		
						SITE	1	12/24/2015	01/19/2016				
						CON	1	07/29/2015	08/14/2015	08/14/2015			
15-PR-0053	1	Doug Roys	Michael Weber	Jason Alwine	OED	PG0585182	NA	TMDL SWM DNR ROSARYVILLE STATE PARK					
						FIN	2	08/30/2016	09/22/2016			09/22/2016	
						FIN	1	06/23/2016	07/13/2016				
						SITE	3	03/28/2016	04/19/2016		04/19/2016		
						SITE	2	03/08/2016	03/17/2016				
						SITE	1	01/05/2016	02/01/2016				
						CON	2	10/21/2015	11/04/2015	11/04/2015			
						CON	1	07/29/2015	08/18/2015				
15-PR-0054	1	Sonja Hardman	Joseph Bartell	Tara Ryan	OED	CL1895149	NA	Westminster Shop-Storage Tank Removal and Replacement					
						FIN	1	08/31/2015	09/02/2015			09/02/2015	
						SITE	1	08/14/2015	08/14/2015		08/14/2015		
						CON	1	07/29/2015	08/03/2015	08/03/2015			
15-PR-0055	1	Jeff Knaub	Junaid Khan	Jeff Robert	OOS	FR1305180	US 15	IHB-Bridge 1616205 and 1616206 over Suitland Road					
						M2	1	06/20/2017	06/28/2017				
						M1	3	02/16/2017	03/02/2017				03/02/2017
						M1	2	01/31/2017	02/10/2017				
						M1	1	12/28/2016	01/06/2017				
						FIN	4	05/12/2016	05/18/2016			05/18/2016	
						FIN	3	04/22/2016	05/02/2016				
						FIN	2	04/15/2016	04/20/2016				
						FIN	1	03/14/2016	03/31/2016				
						SITE	4	02/05/2016	02/08/2016		02/08/2016		
						SITE	3	01/22/2016	02/01/2016				
						SITE	2	01/08/2016	01/14/2016				

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						SITE	1	12/09/2015	12/22/2015				
						CON	3	11/02/2015	11/12/2015	11/12/2015			
						CON	2	09/24/2015	10/16/2015				
						CON	1	08/04/2015	08/26/2015				
15-PR-0056	1	Tesfamichael Bogale	Ryan Doheny	Luis Gonzalez	OHD	SM2025171	MD 5	IHB - AT ABELL/MOAKLEY (PHASE 1B)					
						CON	5	11/23/2016	12/08/2016	12/08/2016			
						CON	4	10/06/2016	11/01/2016				
						CON	3	03/31/2016	04/12/2016				
						CON	2	11/10/2015	12/03/2015				
						CON	1	08/05/2015	08/19/2015				
15-PR-0057	1	Sonja Hardman	Joseph Bartell	John Vranish	OHD	AA1805179	MD 424	DUKE OF KENT DRIVE TO MD 450 (DEFENSE HIGHWAY) - PHASE 2					
						SITE	1	03/23/2017	03/31/2017				
						CON	4	02/02/2017	02/08/2017	02/08/2017			
						CON	3	03/18/2016	03/31/2016				
						CON	2	11/02/2015	11/03/2015				
						CON	1	08/06/2015	08/10/2015				
15-PR-0058	1	Jeff Knaub	Joseph Bartell	Chris Strain	OOTS	HO1505185	US 29	IHB-MD 32 to MD 175					
						FIN	2	01/20/2016	02/01/2016			02/01/2016	
						FIN	1	01/11/2016	01/12/2016				
						SITE	2	11/06/2015	11/09/2015		11/09/2015		
						SITE	1	10/19/2015	11/04/2015				
						CON	2	09/22/2015	09/24/2015	09/24/2015			
						CON	1	08/06/2015	08/20/2015				
15-PR-0059	1	Tesfamichael Bogale	Joseph Bartell	Michelle Vrikkis	OOTS	XY2395185	I 70	Partial Interchange Lighting					
						FIN	1	03/04/2016	03/09/2016			03/09/2016	
						SITE	1	01/11/2016	02/02/2016		02/02/2016		
						CON	1	08/07/2015	08/13/2015	08/13/2015			
15-PR-0060	1	Matt Keenan	Armand de Rosset	Marrisa Lampart	OHD	CA4135370	MD 2/4	IHB - FOX RUN BOULEVARD TO MD 231 (PHASE 2)					
						SITE	7	06/14/2017	06/21/2017		06/21/2017		
						SITE	6	06/07/2017	06/08/2017				
						SITE	5	05/23/2017	05/30/2017				
						SITE	4	04/11/2017	04/21/2017				
						SITE	3	03/20/2017	03/24/2017				
						SITE	2	09/26/2016	10/13/2016				
						SITE	1	07/20/2016	08/04/2016				
						CON	1	08/10/2015	08/28/2015	08/28/2015			
15-PR-0061	1	Jeff Knaub	Joseph Bartell	Holly Shipley	OOM	AA1025129	NA	HANOVER COMPLEX BLDG 1-OOM OOTS SOC ROOF/GUTTER REPAIR REPLACEMENT					
						FIN	2	03/31/2017	04/05/2017			04/05/2017	
						FIN	1	03/09/2017	03/21/2017				
						SITE	3	07/11/2016	07/28/2016		07/28/2016		
						SITE	2	02/22/2016	03/07/2016				
						SITE	1	01/20/2016	02/09/2016				
						CON	1	08/10/2015	09/02/2015	09/02/2015			
15-PR-0062	1	Sonja Hardman		Jay Thaker	OOTS	BA9885285	I 795	IHB-I-795 and Franklin, I-795 at MD 140					
						FIN-EXT	1	05/18/2017	06/09/2017				
						FIN	1	09/10/2015	09/11/2015			09/11/2015	

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						SITE	1	08/24/2015	08/25/2015		08/25/2015		
						CON	1	08/10/2015	08/12/2015	08/12/2015			
15-PR-0063	1	Jeff Knaub	Shreemal Perera	Dipa Patel	OOS	MO5805180	I 495	BRIDGE 1512900 OVER I-495					
						FIN	1	03/01/2017	03/10/2017			03/10/2017	
						SITE	2	02/09/2017	02/16/2017		02/16/2017		
						SITE	1	01/17/2017	02/01/2017				
						CON	3	11/23/2016	12/14/2016	12/14/2016			
						CON	2	05/12/2016	06/29/2016				
						CON	1	08/10/2015	08/31/2015				
15-PR-0064	1	Sonja Hardman	Joseph Bartell	Sarah Gentner	D3	XX1645176	MD 202	Site 1: Largo Road at Town Farm Road					
						FIN	1	06/06/2016	06/07/2016			06/07/2016	
						SITE	1	10/15/2015	10/15/2015		10/15/2015		
						CON	1	08/10/2015	08/12/2015	08/12/2015			
15-PR-0064	2	Brandon Scott		Dorey Uong	D3	XX1645176	MD 185	Site 2: Knowles Ave to DuPont Ave					
						FIN	1	11/17/2016	11/29/2016			11/29/2016	
						SITE	2	11/17/2016	11/29/2016		11/29/2016		
						SITE	1	10/19/2016	11/10/2016				
						CON	1	08/25/2016	09/22/2016	09/22/2016			
15-PR-0064	3	Sonja Hardman	Joseph Bartell	Dorey Uong	D3	XX1645176	MD 214	MD214 SITE 3: MADISON RD METRO ENTRANCE INTERSECTION IMPROVEMENTS					
						FIN	2	04/11/2017	04/11/2017			04/11/2017	
						FIN	1	03/28/2017	04/05/2017				
						CON	1	03/06/2017	03/07/2017	03/07/2017			
15-PR-0065	1	Jeff Knaub	Joseph Bartell	Jason Pollock	OOS	WA2435180	I 70	Bridge 2112900 over Beaver Creek					
						FIN	1	12/22/2015	12/23/2015			12/23/2015	
						SITE	2	11/23/2015	12/03/2015		12/03/2015		
						SITE	1	10/19/2015	11/04/2015				
						CON	2	09/14/2015	10/01/2015	10/01/2015			
						CON	1	08/10/2015	09/03/2015				
15-PR-0066	1	Tesfamichael Bogale	Joseph Bartell	Andrew Radcliffe	D7	CL2435130	MD 31	AT TAHOMA FARM ROAD					
						FIN	2	12/05/2016	12/19/2016			12/19/2016	
						FIN	1	08/12/2016	09/20/2016				
						SITE	2	04/01/2016	04/14/2016		04/14/2016		
						SITE	1	02/12/2016	03/10/2016				
						CON	4	02/01/2016	02/08/2016	02/08/2016			
						CON	3	12/22/2015	12/23/2015				
						CON	2	11/12/2015	12/04/2015				
						CON	1	08/14/2015	08/31/2015				
15-PR-0067	1	Sonja Hardman	Joseph Bartell	David Mitchell	D6	GA1825174	MD 135	UPPER SAVAGE WOOD YARD ENTRANCE					
						FIN	1	05/06/2016	05/11/2016			05/11/2016	
						SITE	3	04/18/2016	04/19/2016		04/19/2016		
						SITE	2	02/26/2016	03/03/2016				
						SITE	1	11/20/2015	11/23/2015				
						CON	1	08/14/2015	08/17/2015	08/17/2015			
15-PR-0068	1	Jeff Knaub	Jessica Lain	Ralph Manna	OOS	BA0845180	MD 146	03189X0 AND 03190X0 OVER DRAINAGE DITCHES					
						CON	1	08/14/2015	09/03/2015	09/03/2015			

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15-PR-0069	1	Tesfamichael Bogale	Gina Goettler	Jared Paper-Evers	OHD	BA5525226	I 695	NOISE BARRIER 03596N0 FROM NOISE BARRIER 03592N0 TO 100 FT NORTH OF DOGWOOD					
						SITE	9	05/19/2017	05/22/2017		05/22/2017		
						SITE	8	04/25/2017	05/11/2017				
						SITE	7	03/30/2017	04/12/2017				
						SITE	6	02/17/2017	03/07/2017				
						SITE	5	08/25/2016					
						SITE	4	07/27/2016	08/11/2016				
						SITE	3	06/13/2016	07/07/2016				
						SITE	2	05/20/2016	06/01/2016				
						SITE	1	04/08/2016	05/02/2016				
						CON	3	12/17/2015	01/12/2016	01/12/2016			
						CON	2	10/16/2015	10/28/2015				
						CON	1	08/17/2015	09/17/2015				
15-PR-0070	1	Sonja Hardman	Joseph Bartell	Dorey Uong	D3	MO7735177	MD 117	IHB - Longdraft Road to I-279					
						M1	3	01/27/2017	01/30/2017				01/30/2017
						M1	2	01/20/2017	01/23/2017				
						M1	1	01/11/2017					
						FIN	2	03/07/2016	03/10/2016			03/10/2016	
						FIN	1	02/18/2016	03/03/2016				
						SITE	3	02/01/2016	02/03/2016		02/03/2016		
						SITE	2	12/22/2015	12/30/2015				
						SITE	1	11/09/2015	11/12/2015				
						CON	1	08/17/2015	08/18/2015	08/18/2015			
15-PR-0071	1	Tesfamichael Bogale	Joseph Bartell	Dorey Uong	D3	PG0835130	MD 3	IHB - AT FOREST DRIVE					
						CON	4	05/17/2017	05/31/2017	05/31/2017			
						CON	3	04/07/2017	04/19/2017				
						CON	2	12/05/2016	12/23/2016				
						CON	1	08/17/2015	09/01/2015				
15-PR-0072	1	Sonja Hardman	Polly Solliday	Nicolas Saavedra	OHD	MO5935870	MD 185	AT JONES BRIDGE ROAD/KENSINGTON PARKWAY - PHASE 3					
						SITE	1	11/09/2016	11/18/2016				
						CON	2	09/10/2015	09/14/2015	09/14/2015			
						CON	1	08/19/2015	08/25/2015				
15-PR-0073	1	Sonja Hardman	Christie Minami	Aimee Zhang	OHD	MO7465171	MD 97	IHB - SOUTH OF BROOKEVILLE TO MD 97 NORTH OF BROOKEVILLE					
						SITE	7	06/15/2017	07/07/2017		07/07/2017		
						SITE	6	05/01/2017	05/18/2017				
						SITE	5	03/28/2017	04/06/2017				
						SITE	4	01/25/2017	02/08/2017				
						SITE	3	12/19/2016	01/11/2017				
						SITE	2	08/05/2016	08/26/2016				
						SITE	1	04/08/2016	04/15/2016				
						CON	3	01/07/2016	01/07/2016	01/07/2016			
						CON	2	09/29/2015	10/02/2015				
						CON	1	08/19/2015	08/26/2015				
15-PR-0074	1	Tesfamichael Bogale	Abdul Wakil	AJ de Rosset	OHD	BA1445174	I 795	Maintenance Repairs to Painters Mill Levee at I-795 and Painters Mill Road					
						FIN	1	08/04/2016	08/26/2016			08/26/2016	
						SITE	2	05/04/2016	05/06/2016		05/06/2016		
						SITE	1	03/17/2016	04/11/2016				

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						CON	1	08/27/2015	09/09/2015	09/09/2015			
15-PR-0075	1	Brandon Scott	Patrick Nadeau	Chau Chiem	D5	AA1945130	MD 174	1000 FT SOUTH TO 700 FT NORTH OF SEVERN ROAD					
						SITE	3	05/02/2017	05/12/2017		05/12/2017		
						SITE	2	03/06/2017	03/22/2017				
						SITE	1	01/23/2017	02/07/2017				
						CON	4	09/15/2016	10/05/2016	10/05/2016			
						CON	3	06/21/2016	08/01/2016				
						CON	2	04/08/2016	05/02/2016				
						CON	1	08/28/2015	09/09/2015				
15-PR-0076	1	Brandon Scott	Joseph Bartell	Cathy Spady	D1	DO3025130	MD 16	IHB-At Woods Road					
						FIN	1	03/25/2016	04/11/2016			04/11/2016	
						SITE	2	03/10/2016	03/16/2016		03/16/2016		
						SITE	1	02/01/2016	02/17/2016				
						CON	3	01/06/2016	01/08/2016	01/08/2016			
						CON	2	11/25/2015	12/11/2015				
						CON	1	08/31/2015	09/16/2015				
15-PR-0077	1	Sonja Hardman	Joseph Bartell	Dorey Uong	D3	MO0805177	MD 355	From Hubbard Drive to Templeton Place					
						FIN	1	01/29/2016	02/02/2016			02/02/2016	
						SITE	1	12/14/2015	12/16/2015		12/16/2015		
						CON	2	10/16/2015	10/19/2015	10/19/2015			
						CON	1	09/03/2015	09/08/2015				
15-PR-0078	1	Brandon Scott	Joseph Bartell	Dan Beck	OOS	FR5365180	MD 140	BRIDGE 1006200 REPLACEMENT OVER FLAT RUN					
						M1	1	12/12/2016	12/28/2016				12/28/2016
						FIN	1	08/30/2016	09/02/2016			09/02/2016	
						SITE	2	07/19/2016	08/02/2016		08/02/2016		
						SITE	1	04/25/2016	05/05/2016				
						CON	2	02/12/2016	02/18/2016	02/18/2016			
						CON	1	09/04/2015	09/21/2015				
15-PR-0079	1	Jeff Knaub	Joseph Bartell	Edwin Young	D6	AL2665130	MD 935	IHB - AT RAILROAD STREET or Intersection Improvement at S. Railroad Street					
						FIN	1	01/23/2017	01/30/2017			01/30/2017	
						SITE	3	11/18/2016	12/07/2016		12/07/2016		
						SITE	2	09/23/2016	10/12/2016				
						SITE	1	07/18/2016	08/12/2016				
						CON	2	11/20/2015	12/09/2015	12/09/2015			
						CON	1	09/04/2015	09/18/2015				
15-PR-0080	1	Sonja Hardman	Joseph Bartell	Cathy Spady	D1	SO1925130	MD 413	AT TULLS CORNER ROAD					
						FIN	2	02/10/2017	02/10/2017			02/10/2017	
						FIN	1	01/09/2017	01/11/2017				
						SITE	5	05/16/2016	05/23/2016		05/23/2016		
						SITE	4	04/25/2016	05/02/2016				
						SITE	3	03/11/2016	03/17/2016				
						SITE	2	01/19/2016	01/20/2016				
						SITE	1	12/18/2015	12/21/2015				
						CON	2	11/02/2015	11/02/2015	11/02/2015			
						CON	1	09/04/2015	09/11/2015				

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15-PR-0081	1	Tesfamichael Bogale	Joseph Bartell	Richard Wilke	OED	AX0265124R		VAR	Landscape Sustainability Improvements at Various Locations				
						FIN	2	10/31/2016	11/04/2016			11/04/2016	
						FIN	1	10/04/2016	10/24/2016				
						SITE	3	09/06/2016	09/22/2016		09/22/2016		
						SITE	2	07/11/2016	08/04/2016				
						SITE	1	04/18/2016	05/11/2016				
						CON	1	09/10/2015	09/24/2015	09/24/2015			
15-PR-0082	1	Brandon Scott	Joseph Bartell	Teresa Bondi	D3	MO9445177		MD 185	NORTH OF MD 410 TO MANOR ROAD				
						SITE	1	11/10/2015	11/19/2015				
						CON	1	09/14/2015	09/24/2015	09/24/2015			
15-PR-0083	1	Tesfamichael Bogale	Glen Helms	Lindsay Bobian	OHD	BA7275572		I 695	SOUTH OF SHADYNOOK AVENUE TO US 40				
						CON	1	09/15/2015	10/05/2015				
15-PR-0084	1	Brandon Scott	Daniel Sharar-Salgado	Marcus Tadros	OHD	MO8915170		US 29	MUSGROVE ROAD TO FAIRLAND ROAD				
						CON	3	11/24/2015	12/03/2015	12/03/2015			
						CON	2	11/03/2015	11/17/2015				
						CON	1	09/16/2015	09/29/2015				
15-PR-0085	1	Doug Roys	Garvin Guide	Colin Hill	OED	AX0335182		NA	PATAPSCO VALLEY STATE PARK (AVALON) - STREAM RESTORATION				
						FIN	1	05/09/2017	06/09/2017			06/09/2017	
						SITE	4	04/04/2017	04/05/2017		04/05/2017		
						SITE	3	03/15/2017	03/23/2017				
						SITE	2	06/13/2016	07/14/2016				
						SITE	1	04/12/2016	05/10/2016				
						CON	3	12/15/2015	12/31/2015	12/31/2015			
						CON	2	11/23/2015	12/11/2015				
						CON	1	09/16/2015	10/09/2015				
15-PR-0086	1	Doug Roys	Michael Weber	Rahul Kesarkar	OED	AX7665282		VAR	SWM AT VARIOUS LOCATIONS IN DISTRICT 7 - GROUP 1				
						SITE	5	03/09/2017	03/09/2017		03/09/2017		
						SITE	4	01/25/2017	02/13/2017				
						SITE	3	11/18/2016	12/05/2016				
						SITE	2	10/18/2016	11/01/2016				
						SITE	1	08/29/2016	09/08/2016				
						CON	2	03/29/2016	04/01/2016	04/01/2016			
						CON	1	09/16/2015	09/22/2015				
15-PR-0087	1	Tesfamichael Bogale	Joseph Bartell	Cathy Spady	D1	AT0245130		US 13	IHB-Jones Road to North of Eden Road				
						FIN	2	05/18/2016	05/20/2016			05/20/2016	
						FIN	1	04/11/2016	04/19/2016				
						SITE	2	03/23/2016	03/31/2016		03/31/2016		
						SITE	1	02/22/2016	03/02/2016				
						CON	3	12/22/2015	12/22/2015	12/22/2015			
						CON	2	11/16/2015	12/11/2015				
						CON	1	09/23/2015	10/06/2015				
15-PR-0088	1	Brandon Scott	Johathan Brown	Jonathan Brown	OHD	XX1605174		I 83	I-83 NB Drainage Issue near Structure 03400X0				
						FIN	1	08/25/2016	09/28/2016			09/28/2016	
						SITE	1	06/02/2016	06/24/2016		06/24/2016		
						CON	1	09/24/2015	10/01/2015	10/01/2015			

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15-PR-0089	1	Jeff Knaub	Joseph Bartell	Jim Hade	OED	PG3515224		MD 769D	ANACOSTIA GATEWAY PARK				
						FIN	2	04/14/2016	04/14/2016			04/14/2016	
						FIN	1	03/29/2016	04/13/2016				
						SITE	2	02/10/2016	03/01/2016		03/01/2016		
						SITE	1	11/17/2015	12/01/2015				
						CON	1	09/28/2015	10/06/2015	10/06/2015			
15-PR-0090	1	Sonja Hardman	Joseph Bartell	Teresa Bondi	D3	PG0415177		MD 5	IHB - Surratts Road to MD 223				
						FIN	1	03/14/2016	03/17/2016			03/17/2016	
						SITE	1	02/18/2016	02/23/2016		02/23/2016		
						CON	1	09/28/2015	09/30/2015	09/30/2015			
15-PR-0091	1	Tesfamichael Bogale	Joseph Bartell	Dorey Uong	D3	MO0815177		MD 190	MD 614 TO DC LINE				
						M1	1	08/12/2016	08/19/2016				
						FIN	1	07/21/2016	07/25/2016			07/25/2016	
						SITE	2	06/13/2016	06/22/2016		06/22/2016		
						SITE	1	05/31/2016	06/01/2016				
						CON	2	01/04/2016	02/01/2016	02/01/2016			
						CON	1	10/02/2015	10/14/2015				
15-PR-0092	1	Brandon Scott	Joseph Bartell	Cathy Spady	D1	WI1985187		US 13 BU	IHB - Dogwood Drive to West College Avenue				
						FIN	1	04/08/2016	04/15/2016			04/15/2016	
						SITE	3	03/25/2016	03/31/2016		03/31/2016		
						SITE	2	03/04/2016	03/17/2016				
						SITE	1	01/22/2016	02/09/2016				
						CON	3	01/11/2016	01/11/2016	01/11/2016			
						CON	2	12/17/2015	12/24/2015				
						CON	1	10/02/2015	10/08/2015				
15-PR-0093	1	Brandon Scott	Meredith Wilson	Michael Osborne	OOTS	PG3195285		MD 202/21	IHB - MD 202 & MD 214 W/APS/CPS				
						M1	1	02/01/2017	02/10/2017				02/10/2017
						FIN	1	06/20/2016	06/20/2016			06/20/2016	
						SITE	2	04/27/2016	05/19/2016		05/19/2016		
						SITE	1	03/15/2016	04/04/2016				
						CON	4	02/05/2016	02/12/2016	02/12/2016			
						CON	3	01/06/2016	01/22/2016				
						CON	2	11/16/2015	12/03/2015				
						CON	1	10/02/2015	10/29/2015				
15-PR-0094	1	Sonja Hardman	Joseph Bartell	Teresa Bondi	D3	PG0365177		US 301	PEERLESS AVENUE TO MSP WEIGH STATION				
						SITE	1	09/02/2016	09/06/2016		09/06/2016		
						CON	2	05/31/2016	06/01/2016	06/01/2016			
						CON	1	10/02/2015	10/06/2015				
15-PR-0095	1	Tesfamichael Bogale	Joseph Bartell	Angela Strevig	D3	MO1835177		MD 650	MILESTONE DRIVE TO SHAW AVENUE				
						SITE	3	10/17/2016	11/01/2016				
						SITE	2	04/04/2016	05/10/2016				
						SITE	1	03/11/2016	03/17/2016				
						CON	2	11/06/2015	12/07/2015	12/07/2015			
						CON	1	10/05/2015	10/14/2015				
15-PR-0096	1	Brandon Scott	Joseph Bartell	Jordan Howard	D3	PG0395177		MD 5	IHB - MOORES ROAD TO SURRATTS ROAD				
						FIN	1	12/22/2016	01/10/2017			01/10/2017	

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						SITE	3	10/31/2016	11/17/2016		11/17/2016		
						SITE	2	09/26/2016	10/06/2016				
						SITE	1	06/20/2016	07/11/2016				
						CON	1	10/05/2015	10/14/2015	10/14/2015			
15-PR-0098	1	Doug Roys	Kiona Leah	Steve Collins	OED	AX7665682		NA	AT VARIOUS LOCATIONS IN DISTRICT 3 - GROUP 1				
						SITE	1	12/19/2016	12/29/2016		12/29/2016		
						CON	2	05/25/2016	06/21/2016	06/21/2016			
						CON	1	10/06/2015	11/03/2015				
15-PR-0099	1	Sonja Hardman	Joseph Bartell	Teresa Bondi	D3	MO0825177		MD 124	SPUR TO CHRISTOPHER AVENUE TO MIDCOUNTY HIGHWAY				
						CON	1	10/07/2015	10/16/2015	10/16/2015			
15-PR-0100	1	Jeff Knaub	Garvin Guide	Lindsay Bobian	OHD	BA7125174		I 695	AT CROMWELL BRIDGE ROAD				
						SITE	4	05/26/2017	06/08/2017		06/08/2017		
						SITE	3	05/01/2017	05/10/2017				
						SITE	2	03/31/2017	04/07/2017				
						SITE	1	03/03/2017	03/15/2017				
						CON	3	09/20/2016	10/04/2016	10/04/2016			
						CON	2	08/04/2016	09/06/2016				
						CON	1	10/08/2015	10/30/2015				
15-PR-0101	1	Brandon Scott	Joseph Bartell	Yinka Olagoke	OOS	SO2015180		US 13	Bridge 1900302 over Kings Creek				
						M1	1	07/18/2016	08/02/2016				08/02/2016
						FIN	1	01/20/2016	02/01/2016			02/01/2016	
						SITE	1	11/25/2015	12/03/2015		12/03/2015		
						CON	1	10/09/2015	10/09/2015	10/09/2015			
15-PR-0102	1	Sonja Hardman	Gina Goettler	Lauren Baker	OOM	PG0555129		NA	GREENBELT SALT BARN FACILITY				
						FIN	1	03/10/2017	03/13/2017			03/13/2017	
						SITE	4	12/13/2016	12/16/2016		12/16/2016		
						SITE	3	09/26/2016	09/29/2016				
						SITE	2	06/24/2016	07/01/2016				
						SITE	1	04/15/2016	04/25/2016				
						CON	1	10/16/2015	10/19/2015	10/19/2015			
15-PR-0103	1	Tesfamichael Bogale	Joseph Bartell	Kaitlyn Duncan	OOS	XX1635380		MD 349	EmergencyReplacement of CMP at Tyaskin Creek				
						SITE	1	04/25/2016	05/05/2016				
						CON	1	10/16/2015	10/16/2015	10/16/2015			
15-PR-0104	1	Sonja Hardman		Teresa Bondi	D3	MO9465177		MD 586	IHB - STRUCTURE 15063 TO MD 185 AND MD 193 TO MD 97				
						FIN	2	03/13/2017	08/02/2018			08/02/2018	
						FIN	1	03/13/2017	03/15/2017			03/15/2017	
						SITE	1	01/27/2017	01/31/2017		01/31/2017		
						CON	1	10/19/2015	10/19/2015	10/19/2015			
15-PR-0105	1	Jeff Knaub	Abdul Wakil	Justin Mohr	OOS	FR1845180		MD 383	SMALL STRUCTURES 10399X0 AND 10401X0				
						SITE	1	04/26/2016	06/10/2016				
						CON	1	10/26/2015	11/16/2015	11/16/2015			
15-PR-0106	1	Sonja Hardman	Joseph Bartell	Mike Steiner	D2	XY2335277		MD 272	Roney Ave to Cecil Ave - Sidewalk Improvements				
						FIN	1	06/07/2016	06/16/2016			06/16/2016	
						SITE	1	12/15/2015	12/16/2015		12/16/2015		
						CON	2	11/17/2015	11/23/2015	11/23/2015			

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						CON	1	10/27/2015	10/28/2015				
15-PR-0106	2	Sonja Hardman	Joseph Bartell	Mike Steiner	D2	XY2335277 MD 314 Granby St to MD 480 - Sidewalk Improvements							
						FIN	1	06/21/2016	06/22/2016			06/22/2016	
						SITE	1	12/17/2015	12/18/2015		12/18/2015		
						CON	2	11/17/2015	11/23/2015	11/23/2015			
						CON	1	10/27/2015	10/28/2015				
15-PR-0106	4	Sonja Hardman	Joseph Bartell	Thomas Revelle	D2	XY2335277 MD 18 Harbor Lane to Wharf Lane							
						FIN	2	08/23/2016	08/24/2016			08/24/2016	
						FIN	1	07/12/2016	07/14/2016				
						SITE	2	06/15/2016	06/21/2016		06/21/2016		
						SITE	1	03/25/2016	03/30/2016				
						CON	1	02/18/2016	02/22/2016	02/22/2016			
15-PR-0106	5	Sonja Hardman	Joseph Bartell	Thomas Revelle	D2	XY2335277 MD 213 Howard Street to Railroad Ave							
						FIN	1	10/19/2016	10/27/2016			10/27/2016	
						SITE	1	07/19/2016	07/20/2016		07/20/2016		
						CON	2	06/16/2016	07/05/2016				
						CON	1	03/08/2016	03/14/2016	03/14/2016			
15-PR-0106	6	Sonja Hardman	Joseph Bartell	Thomas Revelle	D2	XY2335277 MD 273 Harrington Drive to MD 274							
						FIN	4	09/08/2016	09/08/2016			09/08/2016	
						FIN	3	08/16/2016	08/19/2016				
						FIN	2	07/29/2016	08/01/2016				
						FIN	1	07/12/2016	07/14/2016				
						SITE	1	06/16/2016	06/24/2016		06/24/2016		
						CON	1	03/08/2016	03/14/2016	03/14/2016			
15-PR-0107	1	Sonja Hardman	Meredith Wilson	Jonathan Brown	OHD	AW730A21 US 301 Area 6 Slope Stabilization							
						FIN	1	11/10/2015	11/12/2015			11/12/2015	
						SITE	1	11/02/2015	11/02/2015		11/02/2015		
						CON	1	10/28/2015	10/28/2015	10/28/2015			
15-PR-0108	1	Sonja Hardman	John Vranish	Jason Ferner	OHD	XX3145133 MD 26 Site 1 Frenbrook Drive to North Rolling Road							
						FIN	4	08/26/2016	08/29/2016			08/29/2016	
						FIN	3	08/24/2016	08/25/2016				
						FIN	2	08/16/2016	08/17/2016				
						FIN	1	07/05/2016	07/14/2016				
						SITE	2	05/31/2016	06/02/2016		06/02/2016		
						SITE	1	05/05/2016	05/06/2016				
						CON	3	04/20/2016	04/22/2016	04/22/2016			
						CON	2	03/22/2016	03/31/2016				
						CON	1	10/28/2015	10/28/2015				
15-PR-0108	2	Sonja Hardman	John Vranish	Jason Ferner	OHD	XX3145133 MD 702 Site 2 Southeast Blvd							
						FIN	2	03/17/2016	03/18/2016			03/18/2016	
						FIN	1	03/08/2016	03/10/2016				
						SITE	2	02/10/2016	02/11/2016		02/11/2016		
						SITE	1	01/27/2016	01/29/2016				
						CON	1	01/13/2016	01/19/2016	01/19/2016			
15-PR-0108	3	Sonja Hardman		Jason Ferner	OHD	XX3145133 MD 542 Site 3Loch Hill Road to Yakona Road							
						FIN	1	01/05/2017	01/09/2017			01/09/2017	

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						SITE	3	12/12/2016	12/13/2016		12/13/2016		
						SITE	2	11/29/2016	12/01/2016				
						SITE	1	10/18/2016	10/28/2016				
						CON	1	10/03/2016	10/04/2016	10/04/2016			
15-PR-0108	4	Sonja Hardman	John Vranish	Jason Ferner	OHD	XX3145133		MD 26	Site 4 Rolling Road to I-695				
						FIN	1	04/12/2017	04/12/2017			04/12/2017	
						SITE	1	02/08/2017	02/08/2017		02/08/2017		
						CON	1	09/29/2016	10/04/2016	10/04/2016			
15-PR-0108	5	Sonja Hardman		Jason Ferner	OHD	XX3145133		MD 26	Site 5 Deer Park Road to Pikeswood Drive				
						FIN	1	04/24/2017	05/03/2017			05/03/2017	
						SITE	1	02/24/2017	02/28/2017		02/28/2017		
						CON	1	02/06/2017	02/08/2017	02/08/2017			
15-PR-0109	1	Brandon Scott	Joseph Bartell	Tara Ryan	OED	TA2805149		NA	Buried Drum Removal10877 Lewistown Road, Cordova				
						FIN	4	01/12/2017	01/19/2017			01/19/2017	
						FIN	3	09/29/2016	10/18/2016				
						FIN	2	04/20/2016	05/02/2016				
						FIN	1	03/11/2016	03/31/2016				
						SITE	1	12/15/2015	01/07/2016		01/07/2016		
						CON	1	11/02/2015	11/04/2015	11/04/2015			
15-PR-0110	1	Tesfamichael Bogale	Joseph Bartell	Teresa Bondi	D3	MO1575177		MD 187	JOHNSON AVENUE TO I-495				
						SITE	3	09/16/2016	10/04/2016		10/04/2016		
						SITE	2	06/14/2016	07/07/2016				
						SITE	1	04/25/2016	05/13/2016				
						CON	1	11/02/2015	11/17/2015	11/17/2015			
15-PR-0111	1	Jeff Knaub	Joseph Bartell	Dorey Uong	D3	PG0515177		MD 202	US 50 TO MD 450 (ANNAPOLIS ROAD)				
						FIN	2	05/06/2016	05/26/2016			05/26/2016	
						FIN	1	03/25/2016	04/22/2016				
						SITE	1	12/07/2015	12/22/2015		12/22/2015		
						CON	1	11/02/2015	11/16/2015	11/16/2015			
15-PR-0112	1	Sonja Hardman	Tyler Bazan	Joseph Gentile	OHD	FR1715184		US 15	US 15 BU at MD 140				
						M2	1	06/28/2017	06/30/2017				06/30/2017
						M1	4	01/09/2017	01/10/2017				01/10/2017
						M1	3	01/03/2017	01/05/2017				
						M1	2	12/13/2016	12/16/2016				
						M1	1	11/22/2016	12/01/2016				
						FIN	1	10/05/2016	10/24/2016			10/24/2016	
						SITE	2	08/26/2016	08/31/2016		08/31/2016		
						SITE	1	06/09/2016	06/16/2016				
						CON	3	01/13/2016	01/14/2016	01/14/2016			
						CON	2	11/18/2015	11/23/2015				
						CON	1	11/02/2015	11/04/2015				
15-PR-0113	1	Brandon Scott	Joseph Bartell	James Hade	OED	QA1965124		MD 544	0.14 MILES EAST OF JIM JUNGLE ROAD TO JIM JUNGLE ROAD, Jim Jungle Road, Critical Area Mitigation				
						FIN	1	11/01/2016	11/14/2016			11/14/2016	
						SITE	2	10/12/2016	10/19/2016		10/19/2016		
						SITE	1	08/17/2016	08/29/2016				
						CON	1	11/04/2015	11/10/2015	11/10/2015			

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15-PR-0114	1	Tesfamichael Bogale	Meredith Wilson	John Narer	OOS	FR1025180	MD 478	BRIDGE 1008900 OVER BRANCH OF POTOMAC RIVER					
						FIN	1	04/21/2017	05/04/2017				
						SITE	5	03/17/2017	03/27/2017		03/27/2017		
						SITE	4	02/14/2017	02/28/2017				
						SITE	3	01/24/2017	02/06/2017				
						SITE	2	10/24/2016	11/14/2016				
						SITE	1	09/06/2016	09/16/2016				
						CON	3	02/26/2016	03/18/2016	03/18/2016			
						CON	2	12/30/2015	01/13/2016				
						CON	1	11/05/2015	11/17/2015				
15-PR-0115	1	Jeff Knaub	Joseph Bartell	Yasin Gregg	OED	BA6135149	NA	Golden Ring Maintenance Shop - UST System					
						FIN	1	04/08/2016	04/25/2016			04/25/2016	
						SITE	2	02/29/2016	03/17/2016		03/17/2016		
						SITE	1	01/11/2016	02/11/2016				
						CON	1	11/06/2015	12/04/2015	12/04/2015			
15-PR-0116	1	Sonja Hardman	Joseph Bartell	Michelle Berkel	D3	MO1855177	MD 355	MD 28 TO MANNAKEE STREET					
						SITE	2	04/15/2016	04/18/2016		04/18/2016		
						SITE	1	02/19/2016	02/26/2016				
						CON	1	11/09/2015	11/13/2015	11/13/2015			
15-PR-0117	1	Brandon Scott	Joseph Bartell	John Narer	OOS	AL4795180	MD 51	BRIDGE 01092 OVER CSX AND CANAL PARKWAY					
						SITE	1	02/09/2017	03/01/2017				
						CON	3	09/12/2016	09/27/2016	09/27/2016			
						CON	2	06/14/2016	07/15/2016				
						CON	1	11/10/2015	11/23/2015				
15-PR-0118	1	Tesfamichael Bogale	Joseph Bartell	Teresa Bondi	D3	MO9455177	MD 320	MD 193 to MD 650					
						FIN	1	05/19/2016	05/24/2016			05/24/2016	
						SITE	1	04/13/2016	04/26/2016		04/26/2016		
						CON	2	02/09/2016	02/25/2016	02/25/2016			
						CON	1	11/10/2015	11/30/2015				
15-PR-0119	1	Jeff Knaub	Joseph Bartell	Teresa Bondi	D3	PG0355177	US 301	MD 214 TO 45O FEET SOUTH OF EXCALIBUR ROAD					
						SITE	1	06/29/2016	08/04/2016				
						CON	2	01/29/2016	02/17/2016	02/17/2016			
						CON	1	11/10/2015	12/08/2015				
15-PR-0120	1	Sonja Hardman	Joseph Bartell	April Stitt	D7	FR1985177	US 340	IHB - MD 17 to Lander Road					
						FIN	1	06/02/2016	06/07/2016			06/07/2016	
						SITE	2	05/20/2016	05/23/2016		05/23/2016		
						SITE	1	02/02/2016	02/03/2016				
						CON	2	12/09/2015	12/14/2015	12/14/2015			
						CON	1	11/12/2015	11/13/2015				
15-PR-0121	1	Sonja Hardman	Joseph Bartell	Daniel Beck	OOS	PG6985180	I 95/495	IHB - BRIDGE 1616205 AND 1616206 OVER SUITLAND ROAD					
						FIN	2	07/25/2016	07/26/2016			07/26/2016	
						FIN	1	06/17/2016	06/24/2016				
						SITE	2	03/18/2016	03/18/2016		03/18/2016		
						SITE	1	03/10/2016	03/15/2016				
						CON	2	12/04/2015	12/09/2015	12/09/2015			
						CON	1	11/13/2015	11/17/2015				

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15-PR-0122	-9999		Joseph Bartell			MISSING		NA	VOID - Number not used				
						CON	1	01/01/1900					
15-PR-0123	1	Sonja Hardman	Matt Alisch	Derrick Dickerson	OOTS	MO8695285		VAR	IHB - MD 185/MD 187/MD 355 with APS/CPS				
						FIN	4	05/18/2016	05/20/2016			05/20/2016	
						FIN	3	04/20/2016	04/25/2016				
						FIN	2	04/15/2016	04/19/2016				
						FIN	1	04/06/2016	04/12/2016				
						SITE	2	03/22/2016	03/28/2016		03/28/2016		
						SITE	1	03/02/2016	03/03/2016				
						CON	1	11/17/2015	11/23/2015	11/23/2015			
15-PR-0124	1	Brandon Scott	Joseph Bartell	David Mitchell	D6	AL2915187		MD 51	IHB - AT VIRGINIA AVENUE				
						M1	1	12/19/2016	12/21/2016				12/21/2016
						FIN	1	07/22/2016	08/04/2016			08/04/2016	
						SITE	2	06/13/2016	06/24/2016		06/24/2016		
						SITE	1	04/29/2016	05/24/2016				
						CON	2	02/26/2016	03/03/2016	03/03/2016			
						CON	1	11/20/2015	12/08/2015				
15-PR-0125	1	Tesfamichael Bogale	Joseph Bartell	Sarah Gentner	D3	MO9475177		MD 124	Orchard Ridge Road to MD 355				
						FIN	2	04/14/2016	04/15/2016			04/15/2016	
						FIN	1	03/31/2016	04/08/2016				
						SITE	2	03/16/2016	03/17/2016		03/17/2016		
						SITE	1	02/16/2016	03/08/2016				
						CON	1	11/24/2015	12/14/2015	12/14/2015			
15-PR-0126	1	Brandon Scott	Johathan Brown	Jonathan Brown	OHD	TBD		US 301	Phase 2 Drainage and Slope Repairs				
						SITE	3	11/03/2016	11/17/2016		11/17/2016		
						SITE	2	09/29/2016	10/13/2016				
						SITE	1	05/12/2016	06/01/2016				
						CON	1	11/25/2015	12/21/2015	12/21/2015			
15-PR-0127	1	Sonja Hardman	Johathan Brown	Jonathan Brown	OHD	XX1605174		MD 175	Outfall Repair Near MP 11.00				
						FIN	1	09/29/2016	09/29/2016			09/29/2016	
						SITE	2	07/27/2016	07/28/2016		07/28/2016		
						SITE	1	07/12/2016	07/14/2016				
						CON	3	06/16/2016	06/21/2016	06/21/2016			
						CON	2	03/25/2016	03/29/2016				
						CON	1	11/25/2015	11/27/2015				
15-PR-0128	1	Jeff Knaub	Joseph Bartell	John Jenkins	D7	HO1775177		I 70	Marriottsville Road to Baltimore County Line				
						FIN	2	04/08/2016	04/22/2016			04/22/2016	
						FIN	1	02/17/2016	03/09/2016				
						SITE	1	12/30/2015	02/05/2016		02/05/2016		
						CON	1	12/01/2015	12/14/2015	12/14/2015			
15-PR-0129	1	Tesfamichael Bogale	Joseph Bartell	Thomas Revelle	D2	CE2665187		US 40	At Nottingham Road/Old Neck Road				
						CON	5	12/05/2016	12/20/2016				
						CON	4	07/21/2016	08/15/2016				
						CON	3	06/09/2016	06/16/2016				
						CON	2	02/12/2016	03/17/2016				
						CON	1	12/04/2015	12/22/2015				

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PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
15-PR-0131	1	Brandon Scott	Michael Weber	Huqin Zhang	OHD	KE4385184		MD 291	WEST OF SCHOOL STREET TO EAST OF CRANE STREET				
						CON	6	05/22/2017	05/26/2017	05/26/2017			
						CON	5	03/23/2017	04/06/2017				
						CON	4	11/09/2016	11/18/2016	11/18/2016			
						CON	3	09/26/2016	10/13/2016				
						CON	2	06/20/2016	07/15/2016				
						CON	1	12/11/2015	01/05/2016				
15-PR-0132	1	Jeff Knaub	Mike Weber	Larry Trout	OED	WA2655282		VAR	*VOID* Combined with PR-000PR-0028 SWM BMPs at Various Locations in Washington Co, Group 2				
						CON	1	12/11/2015	02/03/2016				
15-PR-0133	1	Tesfamichael Bogale	Joseph Bartell	Jason Pollock	OOS	BA0805180		MD 137	IHB - BRIDGE 03050 OVER I-83				
						M1	2	06/19/2017	06/23/2017				06/23/2017
						M1	1	06/12/2017	06/14/2017				
						FIN	1	03/13/2017	03/23/2017			03/23/2017	
						SITE	3	03/01/2017	03/07/2017		03/07/2017		
						SITE	2	02/09/2017	02/17/2017				
						SITE	1	01/17/2017	01/31/2017				
						CON	6	01/05/2017	01/05/2017	01/05/2017			
						CON	5	12/08/2016	12/23/2016				
						CON	4	10/03/2016	10/21/2016				
						CON	3	09/28/2016					
						CON	2	06/29/2016	07/22/2016				
						CON	1	12/17/2015	01/12/2016				
15-PR-0134	1	Sonja Hardman	Joseph Bartell	Karen Fiasco	D5	AA1965177		MD 295	Hanover Road to Winterson Road, Hammonds Ferry Road to Baltimore County Line				
						FIN	1	12/08/2016	12/13/2016			12/13/2016	
						SITE	2	10/20/2016	10/24/2016		10/24/2016		
						SITE	1	06/29/2016	06/30/2016				
						CON	1	12/17/2015	12/18/2015	12/18/2015			
15-PR-0136	1	Brandon Scott	Tyler Bazan	Lauren Baker	OOM	HA4605129		MD 152	FALLSTON - SALT BARN REPLACEMENT				
						SITE	2	12/01/2016	12/14/2016		12/14/2016		
						SITE	1	07/28/2016	08/18/2016				
						CON	3	04/21/2016	05/12/2016	05/12/2016			
						CON	2	02/26/2016	03/08/2016				
						CON	1	12/28/2015	01/15/2016				
15-PR-GA03	1	Sonja Hardman				NA		VAR	General Approval for Landscape Installation, Establishment, and Maintenance				
						FIN	1	01/06/2017	02/09/2017			02/09/2017	
16-PR-0001	1	Jeff Knaub	Meredith Wilson	Yasin Gregg	OED	FR2595149		NA	FREDERICK SHOP WASHBAY				
						FIN	1	08/17/2016	08/23/2016			08/23/2016	
						SITE	2	08/05/2016	08/08/2016		08/08/2016		
						SITE	1	07/06/2016	07/28/2016				
						CON	3	05/18/2016	06/20/2016	06/20/2016			
						CON	2	04/11/2016	05/10/2016				
						CON	1	01/04/2016	02/08/2016				
16-PR-0002	1	Tesfamichael Bogale	Regina Kennedy	Regina Kennedy	OHD	MO1065174		I 270	*VOID* Withdrawn and Submitted to MDE Functional Enhancement BMP 150556				
						CON	1	01/11/2016					

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16-PR-0003	1	Doug Roys	Michael Weber	Nimish Desai	OED	BA2015382		VAR	SWM AT VARIOUS LOCATIONS IN BALTIMORE COUNTY - GROUP 1				
						FIN	1	11/25/2016	12/12/2016			12/12/2016	
						SITE	4	11/03/2016	11/09/2016		11/09/2016		
						SITE	3	10/18/2016	10/28/2016				
						SITE	2	08/24/2016	09/07/2016				
						SITE	1	06/14/2016	06/28/2016				
						CON	1	01/11/2016	02/22/2016	02/22/2016			
16-PR-0004	1	Doug Roys	Michael Weber	Mark Thayer	OED	CH2985182		NA	DNR Smallwood State Park				
						FIN	1	02/14/2017	02/22/2017			02/22/2017	
						SITE	4	01/17/2017	01/27/2017		01/27/2017		
						SITE	3	12/09/2016	12/22/2016				
						SITE	2	10/26/2016	11/18/2016				
						SITE	1	09/12/2016	09/26/2016				
						CON	3	04/04/2016	04/11/2016	04/11/2016			
						CON	2	02/25/2016	03/28/2016				
						CON	1	01/14/2016	02/08/2016				
16-PR-0005	1	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	5	06/14/2017	06/19/2017		06/19/2017		
						SITE	4	04/18/2017	05/09/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/14/2016	01/09/2017				
						CON	2	08/02/2016	08/18/2016	08/18/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	2	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	4	04/18/2017	05/09/2017		05/09/2017		
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/14/2016	01/09/2017				
						CON	2	08/02/2016	08/18/2016	08/18/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	3	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	4	04/26/2017	05/04/2017		05/04/2017		
						SITE	3	02/28/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/22/2016	01/11/2017				
						CON	2	08/29/2016	09/15/2016	09/15/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	4	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	4	04/18/2017	05/09/2017		05/09/2017		
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/14/2016	01/09/2017				
						CON	2	08/02/2016	08/18/2016	08/18/2016			
						CON	1	01/19/2016	02/25/2016				

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16-PR-0005	5	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	5	06/14/2017	06/19/2017		06/19/2017		
						SITE	4	04/18/2017	05/09/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/14/2016	01/09/2017				
						CON	2	08/02/2016	08/18/2016	08/18/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	6	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	2	02/03/2017	02/17/2017		02/17/2017		
						SITE	1	12/15/2016	01/02/2017				
						CON	2	07/26/2016	08/09/2016	08/09/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	7	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	4	04/26/2017	05/04/2017		05/04/2017		
						SITE	3	02/28/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/22/2016	01/11/2017				
						CON	1	09/12/2016	09/22/2016	09/22/2016			
16-PR-0005	8	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	6	06/28/2017	07/10/2017				
						SITE	5	06/07/2017	06/19/2017				
						SITE	4	04/17/2017	04/27/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/15/2016	01/02/2017				
						CON	2	07/27/2016	08/09/2016	08/09/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	9	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	6	06/28/2017	07/10/2017		07/10/2017		
						SITE	5	06/07/2017	06/19/2017				
						SITE	4	04/17/2017	04/27/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/15/2016	01/02/2017				
						CON	2	07/27/2016	08/09/2016	08/09/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	10	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	6	06/28/2017	07/10/2017				
						SITE	5	06/07/2017	06/19/2017				
						SITE	4	04/17/2017	04/27/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/15/2016	01/02/2017				
						CON	2	07/27/2016	08/09/2016	08/09/2016			
						CON	1	01/19/2016	02/25/2016				

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16-PR-0005	11	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	6	06/28/2017	07/10/2017		07/10/2017		
						SITE	5	06/07/2017	06/19/2017				
						SITE	4	04/17/2017	04/27/2017				
						SITE	3	02/27/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/15/2016	01/02/2017				
						CON	2	07/27/2016	08/09/2016	08/09/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	12	Tesfamichael Bogale		Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	6	06/28/2017	07/10/2017		07/10/2017		
						SITE	5	06/15/2017	06/19/2017				
						SITE	4	04/26/2017	05/05/2017				
						SITE	3	02/28/2017	03/20/2017				
						SITE	2	02/03/2017	02/17/2017				
						SITE	1	12/22/2016	01/11/2017				
						CON	2	08/29/2016	09/15/2016	09/15/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	13	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	2	02/03/2017	02/17/2017		02/17/2017		
						SITE	1	12/22/2016	01/11/2017				
						CON	2	08/29/2016	09/15/2016	09/15/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0005	14	Tesfamichael Bogale	Junaid Khan	Junaid Kahn	OHD	AT6885274		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL CALVERT CHARLES & ST MARY'S COUNTY				
						SITE	2	02/03/2017	02/17/2017		02/17/2017		
						SITE	1	12/22/2016	01/11/2017				
						CON	2	08/29/2016	09/15/2016	09/15/2016			
						CON	1	01/19/2016	02/25/2016				
16-PR-0006	1	Sonja Hardman	Joseph Bartell	Andrew Radcliffe	D7	HO1535277		MD 32	IHB - North of MD 108 to Structure 13114 Over Middle Patuxent River				
						FIN	1	03/01/2016	03/02/2016			03/02/2016	
						SITE	1	02/09/2016	02/10/2016		02/10/2016		
						CON	1	01/19/2016	01/20/2016	01/20/2016			
16-PR-0007	1	Brandon Scott	Joseph Bartell	Mike Helenius	OED	MO0645124		MD 190	Intersection at MD 190 and MD 188				
						FIN	1	04/14/2016	04/20/2016			04/20/2016	
						SITE	1	03/16/2016	03/28/2016		03/28/2016		
						CON	1	02/03/2016	02/09/2016	02/09/2016			
16-PR-0008	1	Brandon Scott		Jonathan Brown	OHD	XY1685174		MD 2/4	SITE 2, Statewide Stormwater Facility Maintenance				
						FIN	1	11/21/2016	12/05/2016			12/05/2016	
						SITE	1	11/21/2016	12/05/2016		12/05/2016		
						CON	1	11/04/2016	11/04/2016	11/04/2016			
16-PR-0008	2	Sonja Hardman	Johathan Brown	Jonathan Brown	OHD	XY1685174		VAR	Statewide Stormwater Facility Maintenance, Group 1BMP 130172, 1300225, 130230, 160377				
						CON	1	02/09/2016	02/09/2016	02/09/2016			
16-PR-0009	1	Jeff Knaub	Johathan Brown	Jonathan Brown	OHD	PG0705174		VAR	IHB - AT VARIOUS LOCATIONS IN PRINCE'S GEORGE COUNTY				
						FIN	1	02/14/2017	02/24/2017			02/24/2017	
						SITE	6	01/23/2017	01/24/2017		01/24/2017		

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						SITE	5	01/06/2017	01/09/2017				
						SITE	4	12/07/2016	12/22/2016				
						SITE	3	10/31/2016	11/18/2016				
						SITE	2	09/15/2016	09/28/2016				
						SITE	1	06/20/2016	07/22/2016				
						CON	1	02/09/2016	03/07/2016	03/07/2016			
16-PR-0010	1	Tesfamichael Bogale	Armand de Rosset	AJ de Rosset	OHD	MO2805174	MD 117	IHB - BETWEEN MD 117 AND IN-STREAM STORMWATER MANAGEMENT STRUCTURE					
						FIN	2	06/05/2017	06/07/2017			06/07/2017	
						FIN	1	05/23/2017	05/30/2017				
						SITE	5	04/12/2017	04/21/2017		04/21/2017		
						SITE	4	03/23/2017	04/05/2017				
						SITE	3	01/25/2017	02/10/2017				
						SITE	2	12/14/2016	12/30/2016				
						SITE	1	08/11/2016	09/07/2016				
						CON	1	02/10/2016	03/24/2016	03/24/2016			
16-PR-0011	1	Brandon Scott	Johathan Brown	Jonathan Brown	OHD	TBD	MD 760	Outfall Stabilization and Repair					
						CON	1	02/11/2016	02/25/2016	02/25/2016			
16-PR-0012	1	Sonja Hardman	Joseph Bartell	Sutapa Samanta	D4	BA5325277	I 695	MD 140 TO STEVENSON ROAD - OUTER AND INNER LOOP					
						FIN	1	06/02/2016	06/06/2016			06/06/2016	
						SITE	1	04/20/2016	04/22/2016		04/22/2016		
						CON	1	02/18/2016	02/23/2016	02/23/2016			
16-PR-0013	1	Jeff Knaub	Joseph Bartell		OOS	FR1145180	US 40	BRIDGE 1014600 AT US 40 RAMP F					
						M1	2	03/24/2017	04/04/2017				04/04/2017
						M1	1	03/15/2017	03/17/2017				
						FIN	1	09/07/2016	09/08/2016			09/08/2016	
						SITE	2	08/24/2016	08/25/2016		08/25/2016		
						SITE	1	07/26/2016	08/09/2016				
						CON	2	05/18/2016	06/03/2016	06/03/2016			
						CON	1	02/18/2016	03/14/2016				
16-PR-0014	1	Tesfamichael Bogale	Joseph Bartell		OOS	BA0135180	I 695	IHB - BRIDGE 0312500 OVER I-695					
						FIN	1	05/09/2017	05/10/2017			05/10/2017	
						SITE	5	04/21/2017	04/24/2017		04/24/2017		
						SITE	4	03/27/2017	04/05/2017				
						SITE	3	03/13/2017	03/13/2017				
						SITE	2	02/23/2017	02/28/2017				
						SITE	1	01/19/2017	02/06/2017				
						CON	4	11/23/2016	12/08/2016	12/08/2016			
						CON	3	10/20/2016	11/16/2016				
						CON	2	07/18/2016	07/28/2016				
						CON	1	02/19/2016	03/18/2016				
16-PR-0015	1	Brandon Scott	Polly Solliday	David Mitchell	D6	GA1845177	US 40 A	IHB - US 219 to Green Lantern Road					
						FIN	1	05/02/2016	05/11/2016			05/11/2016	
						SITE	2	04/18/2016	04/21/2016		04/21/2016		
						SITE	1	03/28/2016	04/12/2016				
						CON	1	02/26/2016	03/02/2016	03/02/2016			

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16-PR-0016	1	Doug Roys	Michael Weber	Jason Alwine	OED	CH1885282		VAR	AT VARIOUS LOCATIONS - GROUP 1A				
						SITE	2	01/31/2017	02/08/2017		02/08/2017		
						SITE	1	11/09/2016	11/22/2016				
						CON	1	02/29/2016	03/02/2016	03/02/2016			
16-PR-0017	1	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	WA4445177		US 40	NOTTINGHAM DRIVE TO CANNON AVENUE				
						FIN	1	05/26/2016	06/22/2016			06/22/2016	
						SITE	1	05/05/2016	05/23/2016		05/23/2016		
						CON	2	03/24/2016	04/18/2016	04/18/2016			
						CON	1	03/01/2016	03/17/2016				
16-PR-0018	1	Tesfamichael Bogale	Joseph Bartell	Jay Thaker	OOTS	BA2435185		I 83	I-695 I-795 AT MD 940 (OWINGS MILLS BOULEVARD) , MD 940 at Painters Mill Road				
						FIN	1	05/31/2016	06/02/2016			06/02/2016	
						SITE	2	04/25/2016	05/04/2016		05/04/2016		
						SITE	1	03/09/2016	03/18/2016				
						CON	1	03/02/2016	03/02/2016	03/02/2016			
16-PR-0019	1	Brandon Scott	Alicia Brandys	Nicolas Saavedra	OHD	AA5105271		MD 198	RUSSET GREEN EAST TO MD 295 NB RAMP - PHASE 1				
						SITE	3	04/06/2017	04/21/2017				
						SITE	2	11/22/2016	12/15/2016				
						SITE	1	09/01/2016	10/04/2016				
						CON	3	05/05/2016	05/27/2016	05/27/2016			
						CON	2	04/01/2016	04/12/2016				
						CON	1	03/03/2016	03/17/2016				
16-PR-0020	1	Sonja Hardman	Joseph Bartell	Erica Rigby	D3	N/A		NA	Gradall Equipment Training at Fairland Road and Old Columbia Pike				
						FIN	1	04/14/2016	04/18/2016			04/18/2016	
						SITE	1	03/31/2016	03/31/2016		03/31/2016		
						CON	1	03/03/2016	03/08/2016	03/08/2016			
16-PR-0021	1	Jeff Knaub	Joseph Bartell	Yasin Gregg	OED	QA2815249		NA	CENTREVILLE SHOP - REPLACEMENT OF FUEL SYSTEM				
						FIN	1	10/26/2016	11/02/2016			11/02/2016	
						SITE	5	10/17/2016	10/18/2016		10/18/2016		
						SITE	4	10/06/2016	10/11/2016				
						SITE	3	09/28/2016	09/29/2016				
						SITE	2	08/04/2016	08/29/2016				
						SITE	1	06/07/2016	06/29/2016				
						CON	2	04/21/2016	05/16/2016	05/16/2016			
						CON	1	03/09/2016	04/04/2016				
16-PR-0022	1	Tesfamichael Bogale	Joseph Bartell		OOTS	PG1155285		MD 214	Central Avenue at I-94/I-495 AND MD 202				
						FIN	2	11/10/2016	11/14/2016			11/14/2016	
						FIN	1	11/01/2016	11/07/2016				
						SITE	2	09/29/2016	10/12/2016		10/12/2016		
						SITE	1	07/12/2016	08/05/2016				
						CON	1	03/09/2016	03/17/2016	03/17/2016			
16-PR-0023	1	Brandon Scott	Joseph Bartell	Dorey Uong	D3	MO9485177		MD 28	QUINCE ORCHARD ROAD TO ARGOSY DRIVE				
						FIN	2	10/26/2016	11/17/2016			11/17/2016	
						FIN	1	09/21/2016	09/28/2016				
						SITE	1	08/17/2016	08/23/2016		08/23/2016		
						CON	2	06/08/2016	06/24/2016	06/24/2016			
						CON	1	03/09/2016	03/25/2016				

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16-PR-0024	1	Sonja Hardman	Junaid Khan	Chris Weber	OHD	HA4335174	MD 623	IHB - FRANKLIN CHURCH ROAD TO GLEN COVE ROAD					
						M2	1	06/28/2017	06/30/2017				06/30/2017
						M1	2	04/14/2017	05/02/2017				05/02/2017
						M1	1	03/31/2017	04/03/2017				
						FIN	2	01/31/2017	02/06/2017			02/06/2017	
						FIN	1	12/12/2016	12/16/2016				
						SITE	4	10/21/2016	10/31/2016		10/31/2016		
						SITE	3	10/04/2016	10/05/2016				
						SITE	2	08/31/2016	09/07/2016				
						SITE	1	06/24/2016	06/28/2016				
						CON	2	04/12/2016	04/13/2016	04/13/2016			
						CON	1	03/10/2016	03/15/2016				
16-PR-0025	1	Jeff Knaub	Tyler Bazan	Jeff Robert	OOS	CL2395180	MD 86	IHB - BRIDGE 0601900 OVER SOUTH BRANCH OF GUNPOWDER FALLS					
						SITE	1	05/30/2017	06/16/2017				
						CON	2	02/01/2017	02/22/2017	02/22/2017			
						CON	1	03/11/2016	04/08/2016				
16-PR-0026	1	Brandon Scott	Joseph Bartell	Jay Thaker	OOTS	BA0155185	I 95	AT I-695					
						FIN	1	07/18/2016	07/22/2016			07/22/2016	
						SITE	2	06/22/2016	07/08/2016		07/08/2016		
						SITE	1	05/02/2016	06/01/2016				
						CON	1	03/14/2016	03/31/2016	03/31/2016			
16-PR-0027	1	Tesfamichael Bogale	Gina Goettler	Jeff Robert	OOS	PG0465180R	MD 381	BRIDGE 1630500 OVER TIMOTHY BRANCH					
						FIN	2	11/18/2016	11/18/2016			11/18/2016	
						FIN	1	10/21/2016	11/14/2016				
						SITE	2	07/18/2016	07/18/2016		07/18/2016		
						SITE	1	05/31/2016	06/03/2016				
						CON	1	03/16/2016	03/17/2016	03/17/2016			
16-PR-0028	1	Doug Roys	Michael Weber	Larry Trout	OED	WA2655382	VAR	AT VARIOUS LOCATIONS IN WASHINGTON COUNTY - GROUP 1A					
						FIN	1	05/11/2017	06/09/2017				
						SITE	2	03/01/2017	03/02/2017		03/02/2017		
						SITE	1	11/18/2016	12/13/2016				
						CON	2	07/01/2016	07/25/2016	07/25/2016			
						CON	1	03/17/2016	04/11/2016				
16-PR-0029	1	Brandon Scott	Shreemal Perera	Kelly Nash	OOS	FR5595180	MD 355	IHB - BRIDGE 1008400 OVER CSX					
						FIN	1	03/23/2017	03/24/2017			03/24/2017	
						SITE	3	02/28/2017	03/08/2017		03/08/2017		
						SITE	2	02/09/2017	02/17/2017				
						SITE	1	01/09/2017	01/24/2017				
						CON	4	12/01/2016	12/14/2016	12/14/2016			
						CON	3	11/07/2016	11/22/2016				
						CON	2	08/23/2016	09/13/2016				
						CON	1	03/29/2016	04/21/2016				
16-PR-0030	1	Sonja Hardman	Gina Goettler	Dana Morse	OOS	KE2945180	US 301	BRIDGE 1400501 OVER MD 290					
						FIN	2	01/11/2017	01/11/2017			01/11/2017	
						FIN	1	12/09/2016	12/12/2016				
						SITE	3	09/06/2016	09/09/2016		09/09/2016		

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						SITE	2	08/25/2016	08/29/2016				
						SITE	1	07/12/2016	07/15/2016				
						CON	3	05/12/2016	05/18/2016	05/18/2016			
						CON	2	04/21/2016	04/25/2016				
						CON	1	03/29/2016	03/31/2016				
16-PR-0031	1	Tesfamichael Bogale	Patrick Nadeau	Dorey Uong	D3	MO9125130	MD 198	IHB - AT RIDING STABLE ROAD					
						FIN	3	04/28/2017	05/03/2017			05/03/2017	
						FIN	2	02/06/2017	02/10/2017				
						FIN	1	12/12/2016	12/28/2016				
						SITE	4	10/31/2016	11/21/2016		11/21/2016		
						SITE	3	10/06/2016	10/19/2016				
						SITE	2	09/14/2016	09/28/2016				
						SITE	1	08/02/2016	08/18/2016				
						CON	3	06/13/2016	07/07/2016	07/07/2016			
						CON	2	05/20/2016	05/26/2016				
						CON	1	04/01/2016	05/06/2016				
16-PR-0032	1	Jeff Knaub	Joseph Bartell	Joseph Navarra	OOS	AA7765180	MD 450	BRIDGE 02243X0 02335X0 02288XO 02244X0					
						CON	2	07/06/2016	08/23/2016	08/23/2016			
						CON	1	04/06/2016	05/12/2016				
16-PR-0033	1	Sonja Hardman	Joseph Bartell	Henry Teets	D2	N/A	US 301	Gradall Equipment Training at US 301 / Bay County Rest Area, D2					
						FIN	1	05/05/2016	05/05/2016			05/05/2016	
						SITE	1	04/26/2016	05/02/2016		05/02/2016		
						CON	1	04/07/2016	04/13/2016	04/13/2016			
16-PR-0034	1	Doug Roys	Michael Weber	Mark Thayer	OED	CE2725282	VAR	AT VARIOUS LOCATIONS IN CECIL COUNTY - GROUP 1					
						M1	1	05/19/2017	06/13/2017				06/13/2017
						FIN	1	02/21/2017	02/28/2017			02/28/2017	
						SITE	3	01/13/2017	01/24/2017		01/24/2017		
						SITE	2	12/05/2016	12/16/2016				
						SITE	1	10/19/2016	11/07/2016				
						CON	2	07/19/2016	08/03/2016	08/03/2016			
						CON	1	04/08/2016	05/06/2016				
16-PR-0035	1	Tesfamichael Bogale	Jeremy Ash		OHD	BA1445374	I 83	ALONG I-83 AND I-695					
						CON	2	09/29/2016	10/24/2016				
						CON	1	04/08/2016	05/11/2016				
16-PR-0036	1	Jeff Knaub	Regina Kennedy	Regina Kennedy	OHD	MO1605174	I 270	IHB - MONTROSE ROAD RAMP TO SB I-270 CD LANES					
						FIN	1	03/23/2017	03/24/2017			03/24/2017	
						SITE	2	03/08/2017	03/16/2017		03/16/2017		
						SITE	1	02/09/2017	02/23/2017				
						CON	3	11/21/2016	12/08/2016	12/08/2016			
						CON	2	08/24/2016	09/15/2016				
						CON	1	04/18/2016	05/10/2016				
16-PR-0037	1	Brandon Scott		Armando Henriquez	OHD	WO1685177	MD 528	62ND STREET TO 26TH STREET					
						M1	2	05/01/2017	05/04/2017				05/04/2017
						M1	1	04/12/2017	04/26/2017				
						FIN	1	11/17/2016	11/22/2016			11/22/2016	
						SITE	2	10/21/2016	10/31/2016		10/31/2016		

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						SITE	1	09/08/2016	09/20/2016				
						CON	2	07/27/2016	08/12/2016	08/12/2016			
						CON	1	04/18/2016	05/10/2016				
16-PR-0038	1	Tesfamichael Bogale	Jeremy Ash		OHD	GA1575174	I 68	ALONG I-68 AND US 219					
						CON	2	09/29/2016	10/24/2016				
						CON	1	04/18/2016	05/13/2016				
16-PR-0039	1	Jeff Knaub	Johathan Brown	Jeremy Ash	OHD	WA2805174	MD 64	LITTLE ANTIETAM ROAD TO MD 804B					
						SITE	2	05/30/2017					
						SITE	1	03/27/2017	04/07/2017				
						CON	4	12/12/2016	12/30/2016	12/30/2016			
						CON	3	10/11/2016	11/07/2016				
						CON	2	07/27/2016	09/08/2016				
						CON	1	04/25/2016	06/10/2016				
16-PR-0040	1	Brandon Scott	Joseph Bartell	John Jenkins	D7	CL2145187	MD 97	SOUTH OF AIRPORT DRIVE TO PLEASANT VALLEY ROAD					
						FIN	1	04/11/2017	04/24/2017			04/24/2017	
						SITE	3	03/27/2017	03/31/2017		03/31/2017		
						SITE	2	03/09/2017	03/20/2017				
						SITE	1	02/08/2017	02/17/2017				
						CON	3	12/07/2016	12/20/2016	12/20/2016			
						CON	2	09/19/2016	10/13/2016				
						CON	1	04/25/2016	06/02/2016				
16-PR-0041	1	Tesfamichael Bogale	Abdul Wakil	John Narer	OOS	GA1975280	MD 39	IHB - BRIDGE 1100200 OVER YOUGHIOGHENY RIVER - STAGE 1					
						CON	4	02/09/2017	02/24/2017	02/24/2017			
						CON	3	12/20/2016	01/10/2017				
						CON	2	10/19/2016	11/21/2016				
						CON	1	04/26/2016	05/18/2016				
16-PR-0041	2	Tesfamichael Bogale				GA1975180	MD 39	IHB - BRIDGE 1100200 OVER YOUGHIOGHENY RIVER (STAGE 2)					
						CON	1	02/09/2017	02/24/2017	02/24/2017			
16-PR-0042	1	Jeff Knaub	Patrick Nadeau		OOS	CH2265180	MD 254	IHB - BRIDGE 0803800 OVER NEALE SOUND					
						SITE	2	01/27/2017	02/16/2017		02/16/2017		
						SITE	1	11/09/2016	11/22/2016				
						CON	3	09/19/2016	10/03/2016	10/03/2016			
						CON	2	07/20/2016	08/18/2016				
						CON	1	04/26/2016	05/26/2016				
16-PR-0043	1	Brandon Scott		Jeff Robert	OOS	CL4035180	MD 496	IHB - BRIDGE 0603800 OVER BIG PIPE CREEK					
						FIN	1	02/16/2017	02/24/2017			02/24/2017	
						SITE	4	02/16/2017	02/24/2017		02/24/2017		
						SITE	3	01/19/2017	02/03/2017				
						SITE	2	11/16/2016	12/01/2016				
						SITE	1	10/12/2016	10/28/2016				
						CON	2	07/15/2016	07/26/2016	07/26/2016			
						CON	1	04/26/2016	05/25/2016				
16-PR-0044	1	Tesfamichael Bogale	Garvin Guide	Thomas Revelle	D2	CE2925130	MD 213	IHB - AT FRENCHTOWN ROAD					
						FIN	1	01/27/2017	02/13/2017			02/13/2017	
						SITE	1	01/06/2017	01/06/2017		01/06/2017		
						CON	4	12/15/2016	12/27/2016	12/27/2016			

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						CON	3	10/18/2016	11/21/2016				
						CON	2	06/10/2016	06/22/2016				
						CON	1	05/05/2016	05/18/2016				
16-PR-0045	1	Jeff Knaub	Meredith Wilson		OHD	FR1115179		MD 17	B STREET TO CENTER STREET				
						M1	1	05/22/2017	06/06/2017				06/06/2017
						FIN	1	05/01/2017	05/09/2017			05/09/2017	
						SITE	4	02/15/2017	02/28/2017		02/28/2017		
						SITE	3	11/29/2016	12/16/2016				
						SITE	2	10/21/2016	11/18/2016				
						SITE	1	09/16/2016	10/06/2016				
						CON	2	07/18/2016	09/02/2016	09/02/2016			
						CON	1	05/06/2016	06/17/2016				
16-PR-0046	1	Doug Roys	Armand de Rosset	Ashby Strassburger	OED	PG9535182		VAR	CHARLES BRANCH TRIBUTARIES				
						SITE	3	12/22/2016	01/05/2017		01/05/2017		
						SITE	2	11/21/2016	12/06/2016				
						SITE	1	09/29/2016	10/19/2016				
						CON	2	08/01/2016	08/18/2016	08/18/2016			
						CON	1	05/09/2016	06/03/2016				
16-PR-0048	1	Tesfamichael Bogale	Meredith Wilson		OHD	FR1115279		MD 464	MD 17 TO 9TH AVENUE				
						CON	3	03/01/2017	03/07/2017	03/07/2017			
						CON	2	11/04/2016	11/30/2016				
						CON	1	05/10/2016	05/26/2016				
16-PR-0049	1	Jeff Knaub	Joseph Bartell	Tobi Kester	OED	AW0465182		VAR	TREE PLANTING AT VARIOUS LOCATIONS IN DISTRICT 3				
						FIN	1	08/05/2016	08/15/2016			08/15/2016	
						SITE	2	07/22/2016	07/26/2016		07/26/2016		
						SITE	1	06/24/2016	06/30/2016				
						CON	1	05/12/2016	05/13/2016	05/13/2016			
16-PR-0050	1	Brandon Scott	Gina Goettler	Virginia Keenan	OHD	SM7745171		MD 5	IHB - THE CAUSEWAY TO SOUTH OF CAMP BROWN ROAD				
						SITE	1	04/13/2017	05/05/2017				
						CON	2	07/18/2016	08/18/2016	08/18/2016			
						CON	1	05/12/2016	06/13/2016				
16-PR-0051	1	Tesfamichael Bogale	Joseph Bartell		OOM	CA1435129		MD 231	PRINCE FREDERICK FACILITY - LIFE CODE/FIRE SAFETY IMPROVEMENTS PHASE 2				
						FIN	1	03/13/2017	03/16/2017			03/16/2017	
						SITE	3	12/05/2016	12/21/2016		12/21/2016		
						SITE	2	11/04/2016	11/16/2016				
						SITE	1	09/06/2016	09/22/2016				
						CON	1	05/16/2016	05/16/2016	05/16/2016			
16-PR-0052	1	Jeff Knaub	Joseph Bartell		OED	AW0765182		VAR	D3 Tree Establishment				
						FIN	1	02/01/2017	02/10/2017			02/10/2017	
						SITE	2	12/08/2016	12/12/2016		12/12/2016		
						SITE	1	11/16/2016	11/23/2016				
						CON	1	05/16/2016	05/16/2016	05/16/2016			
16-PR-0053	1	Brandon Scott	Sonia Hossain	Yasin Gregg	OED	WA4455149		NA	Hagerstown Shop Wash Bay				
						FIN	1	10/26/2016	10/31/2016			10/31/2016	
						SITE	2	09/27/2016	10/03/2016		10/03/2016		
						SITE	1	08/26/2016	09/08/2016				

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						CON	2	07/20/2016	08/10/2016	08/10/2016			
						CON	1	05/16/2016	06/13/2016				
16-PR-0054	1	Tesfamichael Bogale	Tyler Bazan	Dorey Uong	D3	PG6265176	MD 223	AT PISCATAWAY DRIVE					
						CON	4	03/03/2017	03/27/2017	03/27/2017			
						CON	3	12/09/2016	12/27/2016				
						CON	2	10/11/2016	11/01/2016				
						CON	1	05/18/2016	06/01/2016				
16-PR-0055	1	Jeff Knaub	Joseph Bartell		OED	AW0775482	NA	Tree Establishment at Various Locations in Howard and Carroll Counties					
						SITE	2	02/02/2017					
						SITE	1	11/17/2016	11/23/2016				
						CON	1	05/18/2016	05/19/2016	05/19/2016			
16-PR-0056	1	Brandon Scott	Joseph Bartell	Dorey Uong	D3	PG0445177	US 301	SOUTH OSBORNE ROAD TO MD 381 (OLD CRAIN HIGHWAY)					
						FIN	1	03/13/2017	03/23/2017			03/23/2017	
						SITE	2	10/19/2016	11/16/2016		11/16/2016		
						SITE	1	09/08/2016	09/22/2016				
						CON	1	05/19/2016	06/15/2016	06/15/2016			
16-PR-0057	1	Jeff Knaub	Joseph Bartell		OED	AW0775182	NA	Tree Establishment at Various Locations in Baltimore County					
						SITE	1	02/01/2017					
						CON	1	05/20/2016	05/20/2016	05/20/2016			
16-PR-0058	1	Tesfamichael Bogale	Joseph Bartell	Teresa Bondi	D3	MO1865177	I 495	I-270 Y to Seminary Rd - OL					
						FIN	2	04/05/2017	04/07/2017			04/07/2017	
						FIN	1	03/21/2017	04/04/2017				
						SITE	3	01/12/2017	01/18/2017		01/18/2017		
						SITE	2	11/30/2016	12/19/2016				
						SITE	1	10/05/2016	11/01/2016				
						CON	1	05/25/2016	06/08/2016	06/08/2016			
16-PR-0059	1	Brandon Scott	Joseph Bartell	John Jenkins	D7	FR6735177	MD 26	IHB - Safety and Resurfacing from US 15 TO EAST OF MD 194					
						FIN	1	01/25/2017	02/08/2017			02/08/2017	
						SITE	2	10/27/2016	10/31/2016		10/31/2016		
						SITE	1	09/07/2016	09/26/2016				
						CON	1	05/26/2016	06/16/2016	06/16/2016			
16-PR-0060	1	Doug Roys	Daniel Sharar-Salgado	Eric Freidly	OED	CO1415170	MD 404	Wetland Mitigation at Smith Farm					
						FIN	1	08/01/2016	08/02/2016			08/02/2016	
						SITE	2	07/18/2016	07/18/2016		07/18/2016		
						SITE	1	06/14/2016	06/16/2016				
						CON	1	05/31/2016	06/02/2016	06/02/2016			
16-PR-0061	1	Jeff Knaub	Joseph Bartell	John Narer	OOS	CH2205180	MD 224	STRUCTURE 08021X0 OVER BRANCH OF POTOMAC RIVER					
						CON	1	05/31/2016	06/29/2016	06/29/2016			
16-PR-0062	1	Tesfamichael Bogale	Joseph Bartell	Andrew Radcliffe	D7	HO1535177	MD 32	IHB - STRUCTURE 13114 OVER MIDDLE PATUXENT RIVER TO NORTH OF MD 108					
						FIN	1	02/01/2017	02/13/2017			02/13/2017	
						SITE	4	12/07/2016	12/23/2016		12/23/2016		
						SITE	3	11/01/2016	11/14/2016				
						SITE	2	09/21/2016	10/06/2016				
						SITE	1	07/21/2016	08/09/2016				
						CON	1	05/31/2016	06/15/2016	06/15/2016			

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16-PR-0063	1	Brandon Scott	Tyler Bazan	Jane Lee	OOM	MO5245129	MD 185	CONNECTICUT AVENUE - SALT BARN REPLACEMENT					
						FIN	1	06/27/2017	07/13/2017			07/13/2017	
						SITE	3	05/23/2017	05/26/2017		05/26/2017		
						SITE	2	04/13/2017	04/26/2017				
						SITE	1	02/08/2017	02/24/2017				
						CON	3	08/15/2016	09/02/2016	09/02/2016			
						CON	2	07/15/2016	08/11/2016				
						CON	1	06/02/2016	06/24/2016				
16-PR-0064	1	Doug Roys	Michael Weber	Rahul Kesarkar	OED	CH1885382	VAR	MD 5, US 301 Retrofit Existing SWM BMP's to meet TMDL					
						CON	1	06/03/2016	07/06/2016				
16-PR-0065	1	Tesfamichael Bogale	Johathan Brown		HHD	XX1605174	US 50/301	Emergency repair for a stormdrain and slope stabilization					
						SITE	1	07/29/2016	08/03/2016				
						CON	1	06/06/2016	06/23/2016	06/23/2016			
16-PR-0066	1	Brandon Scott	Joseph Bartell	Barry Ritchie	D6	GA1855177	MD 38	IHB - Vindex Road to MD 135					
						FIN	1	09/13/2016	09/16/2016			09/16/2016	
						SITE	2	08/30/2016	09/06/2016		09/06/2016		
						SITE	1	07/26/2016	08/08/2016				
						CON	1	06/06/2016	06/24/2016	06/24/2016			
16-PR-0067	1	Doug Roys	Junaid Khan	Colin Hill	OED	FR5975182	US 340	LITTLE CATOCTIN CREEK AT US 340					
						M1	1	05/12/2017	05/24/2017				05/24/2017
						FIN	1	03/27/2017	04/06/2017			04/06/2017	
						SITE	3	02/01/2017	02/17/2017		02/17/2017		
						SITE	2	11/23/2016	12/16/2016				
						SITE	1	08/29/2016	09/19/2016				
						CON	1	06/07/2016	07/08/2016	07/08/2016			
16-PR-0068	1	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 355	MD 117 to Lakeforest Boulevard					
						CON	1	06/07/2016	06/24/2016				
16-PR-0068	2	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 27	Oak Drive to Sunset Drive					
						CON	2	02/07/2017	02/22/2017	02/22/2017			
						CON	1	06/14/2016	07/07/2016				
16-PR-0068	3	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 547	Flanders Ave to Weymouth Street					
						SITE	1	11/16/2016	11/25/2016				
						CON	1	08/23/2016	09/16/2016	09/16/2016			
16-PR-0068	4	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 192	Plyers Mill Road to MD 97					
						CON	2	01/25/2017	02/06/2017	02/06/2017			
						CON	1	11/16/2016	11/25/2016				
16-PR-0068	5	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 117	MD 119 to Entrance of Seneca Creek State Park					
						CON	1	01/27/2017	02/07/2017	02/07/2017			
16-PR-0068	6	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 28	South Van Buren Street to Monroe Street					
						CON	1	01/27/2017	02/03/2017	02/03/2017			
16-PR-0068	7	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377	MD 410	50' East of S. Boston Ave to 50' West of Park Ave					
						FIN	1	04/19/2017	04/25/2017				
						SITE	1	03/02/2017	03/10/2017		03/10/2017		

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						CON	1	01/30/2017	02/16/2017	02/16/2017			
16-PR-0068	8	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377		MD 332	DC Line to MD 214 (E. Capitol St)				
						SITE	1	03/31/2017	04/12/2017				
						CON	1	02/01/2017	02/14/2017	02/14/2017			
16-PR-0068	9	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377		MD 191	MD 191, MCCLEAN DRIVE TO WEST AVENUE				
						CON	1	02/08/2017	02/17/2017	02/17/2017			
16-PR-0068	10	Tesfamichael Bogale	Joseph Bartell	Jordan Howard	D3	XY2425377		MD 190	MD190 Gary road to Harrington Drive				
						CON	1	02/08/2017	02/17/2017	02/17/2017			
16-PR-0069	1	Brandon Scott	Jessica Lain	Toria Lassiter	OHD	GA6715184		US 219	MD 135 TO 325 FEET NORTH OF EAST ORCHID STREET				
						CON	3	09/07/2016	09/22/2016	09/22/2016			
						CON	2	08/05/2016	08/22/2016				
						CON	1	06/07/2016	06/24/2016				
16-PR-0070	1	Jeff Knaub	Polly Solliday		OHD	BA7295170		MD 140	NORTH OF PAINTERS MILL ROAD TO NORTH OF OWINGS MILLS OVERPASS (PHASE 2)				
						SITE	1	12/27/2016	01/11/2017				
						CON	2	09/12/2016	09/22/2016	09/22/2016			
						CON	1	06/09/2016	07/15/2016				
16-PR-0071	1	Tesfamichael Bogale	Joseph Bartell	Scott Dutrow	D7	AT8235117		MD 97	Gradall Equipment Training, D7				
						SITE	1	07/18/2016	07/25/2016		07/25/2016		
						FIN	1	07/18/2016	07/25/2016			07/25/2016	
						CON	1	06/13/2016	06/15/2016	06/15/2016			
16-PR-0072	1	Brandon Scott	Joseph Bartell	Sarah Gentner	D3	MO4055176		MD 108	MD 650 (NEW HAMPSHIRE AVE) TO ENTRANCE TO SHARP STREET UNITED METHODIST CHURCH				
						CON	1	06/14/2016	07/07/2016				
16-PR-0073	1	Tesfamichael Bogale	Joseph Bartell	Karen Fiasco	D5	AX0475114		NA	Gradall Equipment Training, D5				
						FIN	1	07/19/2016	07/27/2016			07/27/2016	
						SITE	1	07/07/2016	07/14/2016		07/14/2016		
						CON	1	06/15/2016	06/15/2016	06/15/2016			
16-PR-0074	1	Doug Roys	Tyler Bazan	Jason Alwine	OED	HA1925282		NA	AT VARIOUS LOCATIONS IN HARFORD COUNTY - GROUP 1A				
						FIN	1	04/10/2017	04/10/2017			04/10/2017	
						SITE	3	03/30/2017	04/05/2017		04/05/2017		
						SITE	2	03/21/2017	03/27/2017				
						SITE	1	02/07/2017	02/23/2017				
						CON	3	09/20/2016	09/28/2016	09/28/2016			
						CON	2	08/22/2016	09/09/2016				
						CON	1	06/16/2016	07/11/2016				
16-PR-0075	1	Jeff Knaub	Garvin Guide		OHD	AW4655274		MD 312	AT VARIOUS LOCATIONS IN DISTRICT 2				
						CON	2	06/13/2017	06/23/2017				
						CON	1	07/12/2016	08/12/2016				
16-PR-0076	1	Doug Roys	Michael Weber	Nimish Desai	OED	BA2015582		NA	AT VARIOUS LOCATIONS IN BALTIMORE COUNTY - GROUP 1B				
						FIN	1	04/10/2017	04/10/2017			04/10/2017	
						SITE	2	03/06/2017	03/08/2017		03/08/2017		
						SITE	1	01/25/2017	02/10/2017				
						CON	3	11/10/2016	12/01/2016	12/01/2016			
						CON	2	09/15/2016	10/13/2016				
						CON	1	06/16/2016	07/13/2016				

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16-PR-0077	1	Brandon Scott	Joseph Bartell	Andrew Radcliffe	D7	FR1625177		MD 26	WEST SOUTH STREET TO MD 31				
						FIN	1	03/02/2017	03/15/2017			03/15/2017	
						SITE	1	02/09/2017	02/15/2017		02/15/2017		
						CON	3	12/22/2016	01/05/2017	01/05/2017			
						CON	2	10/12/2016	10/28/2016				
						CON	1	06/21/2016	07/16/2016				
16-PR-0078	1	Jeff Knaub	Joseph Bartell	Jordan Vogt	D4	BA9825277		MD 45	TOWSON ROUNDABOUT TO CAVAN DRIVE				
						SITE	2	04/13/2017	04/24/2017				
						SITE	1	03/03/2017	03/13/2017				
						CON	3	11/21/2016	12/14/2016	12/14/2016			
						CON	2	09/26/2016	10/13/2016				
						CON	1	06/24/2016	07/20/2016				
16-PR-0079	1	Tesfamichael Bogale	Glen Helms	Marrisa Lampart	OHD	AA2315176		MD 4	FISHER STATION ROAD TO MD 258				
						CON	2	11/29/2016	12/16/2016	12/16/2016			
						CON	1	06/27/2016	07/14/2016				
16-PR-0080	1	Brandon Scott	Glen Helms	Lindsay Bobian	OHD	MO4195287		I 495	I-495 at MD 650 - Ramp from Inner Loop to Southbound MD 650				
						FIN	1	12/19/2016	01/03/2017			01/03/2017	
						SITE	3	11/14/2016	11/22/2016		11/22/2016		
						SITE	2	10/25/2016	11/04/2016				
						SITE	1	09/30/2016	10/14/2016				
						CON	2	09/07/2016	09/12/2016	09/12/2016			
						CON	1	06/28/2016	08/08/2016				
16-PR-0081	1	Jeff Knaub	Joseph Bartell	Karen Fiasco	D5	AA1975177		MD 295	MD 175 TO MD 100				
						CON	2	01/18/2017	01/27/2017	01/27/2017			
						CON	1	06/29/2016	07/29/2016				
16-PR-0082	1	Doug Roys	Tyler Bazan		OED	FR6635382		VAR	AT VARIOUS LOCATIONS IN FREDERICK COUNTY - GROUP 1A				
						FIN	1	03/23/2017	03/24/2017			03/24/2017	
						SITE	2	03/13/2017	03/15/2017		03/15/2017		
						SITE	1	02/16/2017	03/02/2017				
						CON	2	11/29/2016	12/16/2016	12/16/2016			
						CON	1	07/01/2016	08/05/2016				
16-PR-0083	1	Brandon Scott	Johathan Brown	Jonathan Brown	OHD	TBD		MD 349	Emergency Repair Riawalkin Dam				
						FIN	1	01/10/2017	01/25/2017			01/25/2017	
						CON	1	07/05/2016	07/05/2016	07/05/2016			
16-PR-0084	1	Jeff Knaub	Ryan Doheny	Mekdes Tabor	OHD	FR6785171		MD 180	WEST OF SWALLOWTAIL DRIVE TO I-70 RAMP STRUCTURE 10140				
						SITE	1	02/15/2017	03/09/2017				
						CON	3	11/16/2016	12/07/2016	12/07/2016			
						CON	2	09/29/2016	11/01/2016				
						CON	1	07/05/2016	07/29/2016				
16-PR-0085	1	Tesfamichael Bogale	Joseph Bartell	Kim Livezey	D4	BA0445177		US 1	IHB - NORTH OF I-695 TO DUNFIELD ROAD				
						FIN	2	05/12/2017	05/16/2017			05/16/2017	
						FIN	1	04/18/2017	04/25/2017				
						SITE	2	03/13/2017	03/27/2017		03/27/2017		
						SITE	1	01/31/2017	02/22/2017				
						CON	3	12/20/2016	01/06/2017	01/06/2017			

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						CON	2	09/29/2016	10/13/2016				
						CON	1	07/05/2016	07/22/2016				
16-PR-0086	1	Brandon Scott	Joseph Bartell	Michelle Berkel	D3	MO9755187	MD 650	AT OAKVIEW DRIVE					
						CON	2	11/16/2016	12/01/2016				
						CON	1	07/06/2016	08/10/2016				
16-PR-0087	1	Doug Roys	Tyler Bazan	Jason Alwine	OED	WA2655482	VAR	AT VARIOUS LOCATION IN WASHINGTON COUNTY - GROUP 1B					
						FIN	1	03/30/2017	04/05/2017			04/05/2017	
						SITE	2	03/02/2017	03/02/2017		03/02/2017		
						SITE	1	01/31/2017	02/16/2017				
						CON	2	10/18/2016	11/10/2016	11/10/2016			
						CON	1	07/07/2016	07/29/2016				
16-PR-0089	1	Brandon Scott	Kiona Leah	Chris Dalton	OED	WA2775182	VAR	Tree Planting at Various Locations					
						FIN	1	09/01/2016	09/14/2016			09/14/2016	
						SITE	1	08/09/2016	08/18/2016		08/18/2016		
						CON	1	07/19/2016	07/20/2016	07/20/2016			
16-PR-0090	1	Brandon Scott	Joseph Bartell	Sheila Mahoney	OED	AW0475182	VAR	At Various Locations in District 5					
						FIN	1	10/05/2016	10/27/2016			10/27/2016	
						SITE	2	09/01/2016	09/09/2016		09/09/2016		
						SITE	1	08/09/2016	08/18/2016				
						CON	1	07/19/2016	07/20/2016	07/20/2016			
16-PR-0091	1	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	XY1755677	US 40	Project withdrawn 9/12/16 Clear Spring (contract = 16-PR-0103)					
						CON	3	09/12/2016					
						CON	2	08/24/2016	08/24/2016				
						CON	1	07/20/2016	08/12/2016				
16-PR-0092	1	Sonja Hardman	Meredith Wilson	Hicham Baassiri	D1	WO2375188	US 50	MD 611 TO BRIDGE OVER SINEPUXENT BAY					
						SITE	4	06/19/2017	06/30/2017		06/30/2017		
						SITE	3	04/14/2017	04/24/2017				
						SITE	2	02/09/2017	02/22/2017				
						SITE	1	12/07/2016	12/16/2016				
						CON	2	08/17/2016	08/23/2016	08/23/2016			
						CON	1	07/22/2016	07/28/2016				
16-PR-0093	1	Tesfamichael Bogale	Joseph Bartell	Yinka Olagoke	OOS	PG1275280	I 495	BRIDGE 1615305 1615306 ON I-495/95 OVER MD 214					
						CON	2	01/17/2017	01/30/2017	01/30/2017			
						CON	1	07/25/2016	08/15/2016				
16-PR-0094	1	Jeff Knaub	Joseph Bartell	Kim Livezey	D4	BA2605277	MD 150	BACK RIVER BRIDGE TO RIVERSIDE DRIVE					
						SITE	1	06/22/2017	07/12/2017				
						CON	2	12/08/2016	12/22/2016	12/22/2016			
						CON	1	07/26/2016	09/01/2016				
16-PR-0095	1	Tesfamichael Bogale	Joseph Bartell	April Stitt	D7	FR1945177	US 340	IHB - WASHINGTON COUNTY LINE TO MD 17					
						FIN	1	02/16/2017	03/07/2017			03/07/2017	
						SITE	1	01/25/2017	01/31/2017		01/31/2017		
						CON	3	12/15/2016	12/27/2016	12/27/2016			
						CON	2	11/09/2016	11/30/2016				
						CON	1	07/27/2016	08/09/2016				

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16-PR-0096	1	Brandon Scott	Joseph Bartell	Sutapa Samanta	D4	BA7505277		I 695	Greenspring Ave to MD 25 (Falls Road)				
						CON	1	07/27/2016	08/18/2016	08/18/2016			
16-PR-0097	1	Jeff Knaub	Alicia Brandys	Virginia Keenan	OHD	XX1725174		NA	ANNE ARUNDEL COUNTY STORMWATER MANAGEMENT REMEDIATION				
						M1	1	05/10/2017	05/15/2017				05/15/2017
						FIN	1	03/07/2017	03/10/2017			03/10/2017	
						SITE	2	02/16/2017	02/21/2017		02/21/2017		
						SITE	1	02/03/2017	02/07/2017				
						CON	2	09/30/2016	10/13/2016	10/13/2016			
						CON	1	07/29/2016	08/23/2016				
16-PR-0098	1	Tesfamichael Bogale	Joseph Bartell	Karen Fiasco	D5	SO1925187		MD 235	ACCESS ROAD TO WOODLAND ACRES				
						SITE	2	06/07/2017	06/15/2017				
						SITE	1	05/18/2017	05/24/2017				
						CON	3	03/23/2017	04/12/2017	04/12/2017			
						CON	2	10/17/2016	11/03/2016				
						CON	1	08/05/2016	08/25/2016				
16-PR-0099	1	Brandon Scott	Joseph Bartell	April Stitt	D7	FR1155130		MD 26	AT OLD ANNAPOLIS ROAD/WATER STREET ROAD				
						CON	4	06/02/2017	06/23/2017	06/23/2017			
						CON	3	02/06/2017	02/24/2017				
						CON	2	10/20/2016	11/10/2016				
						CON	1	08/09/2016	09/01/2016				
16-PR-0100	1	Jeff Knaub	Joseph Bartell	Sutapa Samanta	D4	BA1285177		I 83	Shawan Road to Mt Carmel Road				
						FIN	1	01/27/2017	02/10/2017			02/10/2017	
						SITE	2	01/17/2017	01/19/2017		01/19/2017		
						SITE	1	01/06/2017	01/09/2017				
						CON	2	10/17/2016	11/15/2016	11/15/2016			
						CON	1	08/09/2016	08/31/2016				
16-PR-0101	1	Tesfamichael Bogale	Joseph Bartell	Teresa Bondi	D3	MO1625177		I 270	MD 121 TO FREDERICK COUNTY LINE				
						FIN	2	03/08/2017	03/10/2017			03/10/2017	
						FIN	1	03/03/2017	03/07/2017				
						SITE	2	01/23/2017	01/24/2017		01/24/2017		
						SITE	1	11/18/2016	12/07/2016				
						CON	2	10/17/2016	11/01/2016	11/01/2016			
						CON	1	08/12/2016	09/15/2016				
16-PR-0102	1	Doug Roys	Joseph Bartell	Ashby Strassburger	OED	CE2865182		NA	GRAMIES RUN				
						SITE	2	05/08/2017	05/24/2017		05/24/2017		
						SITE	1	02/22/2017	02/22/2017				
						CON	1	08/15/2016	09/15/2016	09/15/2016			
16-PR-0103	1	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	XY1755677		MD 144	Withdrawn 9/12/16 Hancock ADA Compliance Upgrades				
						CON	1	08/16/2016	08/16/2016				
16-PR-0103	2	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	XY1755677		MD 36	Withdrawn 9/12/16 Seldom Seen Road to Park Street				
						CON	1	08/25/2016	09/07/2016				
16-PR-0103	3	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	XY1755677		MD 135	Withdrawn 9/12/16 Victory Post Road to River Road Drive				
						CON	1	08/25/2016	09/07/2016				

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16-PR-0103	4	Jeff Knaub	Joseph Bartell	Barry Ritchie	D6	XY1755677		MD 135	Withdrawn 9/12/16 Lonaconing Street to Paradise Street				
						CON	1	09/08/2016	09/08/2016				
16-PR-0104	1	Tesfamichael Bogale	Joseph Bartell	Cathy Spady	D1	WO1785176		US 50	AT MD 589				
						SITE	1	02/03/2017	02/22/2017				
						CON	2	10/27/2016	11/22/2016	11/22/2016			
						CON	1	08/22/2016	09/09/2016				
16-PR-0105	1	Brandon Scott	Joseph Bartell	Dorey Uong	D3	XX1645476		MD 185	Same as 15-PR-0064, Site 2 Median Beautification - Project appears to be VOID				
						CON	2	10/19/2016	10/19/2016				
						CON	1	08/25/2016	09/22/2016				
16-PR-0106	1	Tesfamichael Bogale	Alicia Brandys	Nafiseh Bozorgi	OHD	BA4515172		I 795	AT DOLFIELD BOULEVARD - SOUTH OF OWINGS MILLS BOULEVARD TO FRANKLIN BOULEVARD				
						CON	3	06/13/2017	06/28/2017	06/28/2017			
						CON	2	03/02/2017	03/23/2017				
						CON	1	08/30/2016	10/13/2016				
16-PR-0107	1	Brandon Scott	Meredith Wilson		OOS	AA2215170		US 50	IHB - MD 70 TO MD 2 (NORTH)				
						M1	1	05/01/2017	05/05/2017				05/05/2017
						FIN	1	04/10/2017	04/20/2017			04/20/2017	
						SITE	3	04/03/2017	04/06/2017		04/06/2017		
						SITE	2	03/16/2017	03/30/2017				
						SITE	1	02/06/2017	02/21/2017				
						CON	2	11/16/2016	11/30/2016	11/30/2016			
						CON	1	08/31/2016	09/19/2016				
16-PR-0108	1	Jeff Knaub	Shreemal Perera	Jared Paper-Evers	OHD	TA2865184		MD 33	YACHT CLUB ROAD TO PEA NECK ROAD				
						CON	3	02/14/2017	03/02/2017	03/02/2017			
						CON	2	11/18/2016	12/13/2016				
						CON	1	09/02/2016	09/15/2016				
16-PR-0109	1	Tesfamichael Bogale	Joseph Bartell	Sutapa Samanta	D4	BA2635277		I 95	Baltimore County/City Line to US 1				
						FIN	2	01/19/2017	01/23/2017			01/23/2017	
						FIN	1	01/06/2017	01/11/2017				
						SITE	2	11/23/2016	12/08/2016		12/08/2016		
						SITE	1	10/20/2016	11/14/2016				
						CON	1	09/08/2016	09/16/2016	09/16/2016			
16-PR-0110	1	Jeff Knaub	Joseph Bartell	Sheila Mahoney	OED	AW0435182		NA	TREE PLANTING AT VARIOUS LOCATIONS IN DISTRICT 4				
						CON	1	09/12/2016	09/20/2016	09/20/2016			
16-PR-0111	1	Brandon Scott	Armand de Rosset	Dipa Patel	OOS	BA6095180		US 40	IHB-BRIDGE 03034 & BRIDGE 03035 OVER LITTLE GUNPOWDER FALLS AND GUNPOWDER FALLS				
						SITE	5	05/26/2017					
						SITE	4	05/10/2017	05/19/2017				
						SITE	3	04/21/2017	04/28/2017				
						SITE	2	03/24/2017	04/04/2017				
						SITE	1	02/13/2017	03/03/2017				
						CON	3	12/15/2016	12/30/2016	12/30/2016			
						CON	2	11/04/2016	11/22/2016				
						CON	1	09/12/2016	09/30/2016				
16-PR-0112	1	Tesfamichael Bogale	Daniel Sharar-Salgado		D3	MO2105326		I 270	NORTH OF MD 28 (MONTGOMERY AVENUE)				
						CON	3	11/30/2016	12/08/2016	12/08/2016			
						CON	2	10/18/2016	11/14/2016				

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						CON	1	09/15/2016	09/27/2016				
16-PR-0113	1	Brandon Scott			D6	AT693A21	NA	D6 Gradall Training					
						FIN	1	09/22/2016	09/22/2016			09/22/2016	
						SITE	1	09/21/2016	09/22/2016		09/22/2016		
						CON	1	09/16/2016	09/19/2016	09/19/2016			
16-PR-0114	1	Tesfamichael Bogale	Joseph Bartell		D5	XY2425577	US 301	Site 1 Centennial Street to MD 225 (Hawthorne Road)					
						CON	2	10/31/2016	11/22/2016	11/22/2016			
						CON	1	09/19/2016	10/06/2016				
16-PR-0114	2	Tesfamichael Bogale	Joseph Bartell	Karen Fiasco	D5	XY2425577	MD 170	Site 2 10th Avenue to MD 2					
						SITE	1	06/12/2017	06/23/2017				
						CON	1	10/03/2016	10/27/2016	10/27/2016			
16-PR-0114	3	Tesfamichael Bogale	Joseph Bartell		D5	XY2425577	MD 5	Site 3 MD 246 to Chingville Road					
						SITE	1	11/29/2016	12/08/2016		12/08/2016		
						CON	1	10/17/2016	11/04/2016	11/04/2016			
16-PR-0114	4	Tesfamichael Bogale	Joseph Bartell	Chau Chiem	D5	XY2425577	MD 235	Site 4, MD235 , Old Rolling Road to Town Creek Drive					
						FIN	1	06/07/2017	06/07/2017				
						SITE	2	05/30/2017	05/31/2017		05/31/2017		
						SITE	1	05/15/2017	05/24/2017				
						CON	1	04/26/2017	05/03/2017	05/03/2017			
16-PR-0114	5	Tesfamichael Bogale	Joseph Bartell	Karen Fiasco	D5	XY2425577	MD 435	Site 5 MD 435 from Rosedale St to Herbert Sachs Blvd					
						CON	1	06/12/2017	06/22/2017				
16-PR-0115	1	Jeff Knaub	Joseph Bartell	John Narer	OOS	WA2635180	US 522	BRIDGE 2109000 OVER I-70 EASTBOUND					
						CON	2	11/29/2016	12/20/2016	12/20/2016			
						CON	1	09/26/2016	10/25/2016				
16-PR-0116	1	Sonja Hardman	Johathan Brown	Jonathan Brown	OHD	XX1685174	NA	BMP Maintenance for 030050, 030225, 030226, 030227, 030228, 030229					
						M1	1	05/15/2017	05/18/2017				05/18/2017
						FIN	1	03/02/2017	03/02/2017			03/02/2017	
						SITE	2	03/01/2017	03/02/2017		03/02/2017		
						SITE	1	12/28/2016	12/29/2016				
						CON	1	09/26/2016	10/05/2016	10/05/2016			
16-PR-0117	1	Brandon Scott	Jessica Lain	Mekdes Tabor	OHD	AA6915184	MD 648	MD 2 TO MD 10					
						CON	2	12/14/2016	12/29/2016	12/29/2016			
						CON	1	09/27/2016	10/18/2016				
16-PR-0118	1	Doug Roys	Junaid Khan		OED	HA4235182	NA	HOLLANDS BRANCH AT TRAPPE CHURCH ROAD					
						SITE	1	02/10/2017	02/15/2017				
						CON	1	09/30/2016	10/27/2016	10/27/2016			
16-PR-0119	1	Jeff Knaub	Ryan Doheny		D6	GA1695130	US 219	AT MOSSER ROAD					
						CON	2	06/07/2017	06/20/2017				
						CON	1	09/30/2016	10/31/2016				
16-PR-0120	1	Doug Roys	Joseph Bartell	Dan Beck	OED	WA2655682	NA	LITTLE TONOLOWAY CREEK AT KIRKWOOD PARK - STREAM RESTORATION					
						SITE	2	06/30/2017	07/19/2017				
						SITE	1	03/29/2017	03/30/2017				
						CON	2	01/20/2017	02/01/2017	02/01/2017			

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						CON	1	10/06/2016	10/31/2016				
16-PR-0121	1	Sonja Hardman	Joseph Bartell	Michelle Berkel	D3	MO3595223		I 270	Southbound Acceleration Lane Improvements				
						CON	3	01/03/2017	01/05/2017	01/05/2017			
						CON	2	11/18/2016	12/01/2016				
						CON	1	10/11/2016	10/24/2016				
16-PR-0122	1	Tesfamichael Bogale	Alicia Brandys	John Jenkins	D7	HO1765176		US 1	AT KIT KAT ROAD				
						SITE	2	06/13/2017	06/23/2017				
						SITE	1	05/22/2017	05/25/2017				
						CON	2	01/20/2017	02/07/2017	02/07/2017			
						CON	1	10/12/2016	11/01/2016				
16-PR-0123	1	Jeff Knaub	Joseph Bartell	Thomas Revelle	D2	TA2895176		US 50	Dutchman's Lane to Lomax St				
						CON	2	02/09/2017	02/28/2017				
						CON	1	10/13/2016	11/09/2016				
16-PR-0124	1	Brandon Scott	Joseph Bartell	Sutapa Samanta	D4	BA0215177		MD 140	IHB - ROSEWOOD LANE TO EAST PLEASANT HILL ROAD				
						FIN	1	05/23/2017	05/30/2017				
						SITE	3	04/19/2017	04/28/2017		04/28/2017		
						SITE	2	02/10/2017	03/02/2017				
						SITE	1	12/19/2016	12/29/2016				
						CON	2	11/04/2016	11/17/2016	11/17/2016			
						CON	1	10/13/2016	10/28/2016				
16-PR-0125	1	Tesfamichael Bogale	Johathan Brown	John Jenkins	D7	AT6885174		NA	Areawide Drainage Improvements in Carroll and Frederick County				
						CON	3	05/26/2017	06/06/2017				
						CON	2	04/07/2017	04/19/2017				
						CON	1	10/13/2016	11/04/2016				
16-PR-0126	1	Sonja Hardman	Joseph Bartell	Yasin Gregg	OED	FR6685149		I 70	I-70 WELCOME CENTER - WASTEWATER TREATMENT PLANT OUTFALL RELOCATION				
						FIN	1	06/02/2017	06/06/2017			06/06/2017	
						SITE	3	04/24/2017	05/02/2017		05/02/2017		
						SITE	2	03/31/2017					
						SITE	1	12/15/2016	12/16/2016				
						CON	1	10/17/2016	11/01/2016	11/01/2016			
16-PR-0127	1	Sonja Hardman	Joseph Bartell	John Narer	OOS	BA5345180		US 1	IHB - BRIDGE 0300800 OVER CSX				
						SITE	2	06/21/2017	07/11/2017				
						SITE	1	05/08/2017	05/26/2017				
						CON	3	02/14/2017	02/16/2017	02/16/2017			
						CON	2	12/20/2016	12/27/2016				
						CON	1	10/17/2016	11/10/2016				
16-PR-0128	1	Jeff Knaub	Joseph Bartell	Sheila Mahoney	OED	AW0445282		NA	TREE PLANTING AT VARIOUS LOCATIONS IN CARROLL COUNTY				
						CON	2	01/11/2017	01/12/2017	01/12/2017			
						CON	1	10/19/2016	11/16/2016				
16-PR-0129	1	Brandon Scott	Patrick Nadeau	Rebecca Lichtenstein	D2	CE2805176		US 40	AT MALONEY ROAD				
						CON	2	02/14/2017	03/01/2017	03/01/2017			
						CON	1	10/21/2016	11/16/2016				
16-PR-0130	1	Tesfamichael Bogale	Joseph Bartell	Kim Livezey	D4	XY5125277		MD 23	Overlay, installation of metal barrier, and associated grading				
						FIN	2	03/06/2017	03/10/2017				
						FIN	1	03/03/2017					

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						SITE	2	01/17/2017	02/13/2017		02/13/2017		
						SITE	1	12/15/2016	12/30/2016				
						CON	1	11/02/2016	11/22/2016	11/22/2016			
16-PR-0131	1	Sonja Hardman	Gina Goettler	Jordan Vogt	D4	HA5005187	MD 543	AT MD 136 (CALVARY ROAD)					
						SITE	1	06/08/2017	07/07/2017				
						CON	3	01/18/2017	01/18/2017	01/18/2017			
						CON	2	12/15/2016	12/29/2016				
						CON	1	11/03/2016	11/18/2016				
16-PR-0132	1	Doug Roys	Michael Weber		OED	AX7665B82	NA	AT VARIOUS LOCATIONS IN ANNE ARUNDEL COUNTY - GROUP 1A					
						SITE	4	03/17/2017	03/27/2017		03/27/2017		
						SITE	3	01/25/2017	02/16/2017				
						SITE	2	11/14/2016	12/07/2016				
						SITE	1	08/26/2016	09/15/2016				
						CON	2	04/28/2016	06/08/2016	06/08/2016			
						CON	1	06/01/2015	07/08/2015				
16-PR-0133	1	Jeff Knaub	Joseph Bartell	Sarah Gentner	D3	PG8115187	MD 410	At US 50 Diverging Diamond Interchange					
						CON	3	02/13/2017	02/28/2017				
						CON	2	11/18/2016	12/08/2016				
						CON	1	11/14/2016					
16-PR-0134	1	Brandon Scott	Joseph Bartell	Jason Pollock	OOS	FR1325180	MD 355	IHB - BRIDGE 1008600 OVER BENNETT CREEK					
						CON	3	06/08/2017	06/15/2017	06/15/2017			
						CON	2	04/17/2017	05/12/2017				
						CON	1	11/17/2016	12/08/2016				
16-PR-0135	1	Sonja Hardman	Joseph Bartell	Dorey Uong	D3	PG0405177	MD 4	MD 458 TO DC LINE AND FORESTVILLE ROAD TO I-495 BRIDGE					
						SITE	1	01/30/2017	01/30/2017		01/30/2017		
						CON	1	11/18/2016	11/21/2016	11/21/2016			
16-PR-0136	2	Tesfamichael Bogale	Joseph Bartell	Joseph Navarra	OOS	WI2225180	US 13 BU	BRIDGE 2200400 OVER EAST BRANCH WICOMICO RIVER					
						SITE	1	05/30/2017	06/12/2017				
						CON	2	01/11/2017	01/24/2017	01/24/2017			
						CON	1	11/21/2016	12/07/2016				
16-PR-0137	1	Jeff Knaub	Joseph Bartell	John Narer	OOS	QA1835180	MD 544	STRUCTURE 17068X0 OVER TRIBUTARY TO FOREMAN BRANCH					
						FIN	2	04/24/2017	05/04/2017			05/04/2017	
						FIN	1	04/07/2017	04/17/2017				
						SITE	2	02/14/2017	03/02/2017		03/02/2017		
						SITE	1	01/23/2017	02/01/2017				
						CON	1	11/21/2016	12/15/2016	12/15/2016			
16-PR-0138	1	Doug Roys	Michael Weber	Ryan Cole	OED	BA2015482	NA	WHITE MARSH TRIBUTARY AT MD 43 (SILVER HILL FARM)					
						SITE	2	03/13/2017	03/13/2017		03/13/2017		
						SITE	1	02/09/2017	02/10/2017				
						CON	1	11/25/2016	12/08/2016	12/08/2016			
16-PR-0139	1	Tesfamichael Bogale	Joseph Bartell	Barry Ritchie	D6	WA4475177	MD 68	BOTTOM ROAD TO INNER CORP LIMITS OF WILLIAMSPORT					
						FIN	1	05/17/2017	05/23/2017			05/23/2017	
						SITE	3	04/12/2017	04/21/2017		04/21/2017		
						SITE	2	03/08/2017	03/24/2017				
						SITE	1	02/09/2017	02/24/2017				

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						CON	1	11/28/2016	12/21/2016	12/21/2016			
16-PR-0140	1	Sonja Hardman	Joseph Bartell		D3	PG8085187		MD 4	Dower House Road Intersection Improvements				
						CON	2	03/30/2017	04/05/2017	04/05/2017			
						CON	1	11/29/2016	12/13/2016				
16-PR-0141	1	Sonja Hardman	Meredith Wilson	Jonathan Brown	OHD	XX1605174		I 270	Emergency Drainage Repair				
						FIN	1	05/09/2017	05/23/2017			05/23/2017	
						CON	1	11/30/2016	12/01/2016	12/01/2016			
16-PR-0142	1	Jeff Knaub	Joseph Bartell	Sutapa Samanta	D4	BA5385177		MD 45	IHB - 400 FT SOUTH OF PADONIA TO WIGHT AVENUE - 24" WATERLINE REPLACEMENT				
						FIN	1	03/28/2017	04/10/2017			04/10/2017	
						SITE	1	02/08/2017	02/16/2017		02/16/2017		
						CON	1	12/01/2016	12/16/2016	12/16/2016			
16-PR-0143	1	Brandon Scott	Joseph Bartell	David Yang	D4	BA9035176		MD 43	AT HONEYGO BOULEVARD				
						CON	2	06/15/2017	06/28/2017				
						CON	1	12/01/2016	12/19/2016				
16-PR-0144	1	Tesfamichael Bogale	Junaid Khan		OHD	AA1695174		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL COUNTY				
						SITE	5	06/13/2017	06/29/2017				
						SITE	4	05/16/2017	05/25/2017				
						SITE	3	04/13/2017	05/03/2017				
						SITE	2	03/09/2017	03/24/2017				
						SITE	1	01/27/2017	02/17/2017				
						CON	1	12/02/2016	12/14/2016	12/14/2016			
16-PR-0144	2	Tesfamichael Bogale	Junaid Khan		OHD	Closed		VAR	IHB - AT VARIOUS LOCATIONS IN ANNE ARUNDEL COUNTY				
						CON	1	12/15/2016	01/02/2017	01/02/2017			
16-PR-0145	1	Jeff Knaub	Michael Weber	Heather Hunt	OHD	DO5775174		MD 16	MD 335 TO BRANNOCKS NECK ROAD				
						CON	2	01/25/2017	02/03/2017	02/03/2017			
						CON	1	12/05/2016	12/22/2016				
16-PR-0146	1	Brandon Scott	Joseph Bartell	John Jenkins	D7	HO1375177		I 70 WB	STRUCTURE 13054 TO BALTIMORE COUNTY LINE				
						CON	2	01/09/2017	01/11/2017	01/11/2017			
						CON	1	12/05/2016	12/15/2016				
16-PR-0147	1	Tesfamichael Bogale	Joseph Bartell	Chau Chiem	D5	AA0985174		MD 32	At Samford Road, Drainage Remediation				
						CON	1	12/08/2016	12/27/2016	12/27/2016			
16-PR-0148	1	Sonja Hardman	Tyler Bazan		OHD	AA1725279		MD 214	MD 2 (SOLOMONS ISLAND ROAD) TO MD 253 (MAYO ROAD)				
						CON	2	04/25/2017	05/10/2017	05/10/2017			
						CON	1	12/13/2016	12/23/2016				
16-PR-0149	0	Brandon Scott	Joseph Bartell	April Stitt	D7	CL2255187		MD 26	Formerly 11-SF-0302, CA 9/1/16. Emerald Lane to Calvert Way - Eastbound and Westbound				
						FIN	2	01/10/2017	01/27/2017			01/27/2017	
						FIN	1	12/20/2016	12/23/2016				
16-PR-0150	1	Sonja Hardman		Yinka Olagoke	OOS	HA5215180		US 1	SOUTH OF CONOWINGO DAM				
						SITE	1	06/16/2017	06/27/2017				
						CON	1	12/16/2016	12/19/2016	12/19/2016			
16-PR-0151	1	Jeff Knaub	Joseph Bartell	Teresa Bondi	D3	PG0425177		MD 201	DC LINE TO LAWRENCE STREET				
						FIN	1	06/28/2017	06/30/2017			06/30/2017	
						SITE	3	06/15/2017	06/16/2017		06/16/2017		

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						SITE	2	06/02/2017	06/08/2017				
						SITE	1	03/07/2017	03/20/2017				
						CON	2	02/06/2017	02/17/2017	02/17/2017			
						CON	1	12/19/2016	01/05/2017				
16-PR-0152	1	Tesfamichael Bogale	Joseph Bartell	Teresa Bondi	D3	PG0475177	US 1	NORTH OF ICC TO OAK STREET					
						FIN	1	04/26/2017	05/02/2017			05/02/2017	
						SITE	1	03/29/2017	04/10/2017		04/10/2017		
						CON	2	01/30/2017	02/22/2017	02/22/2017			
						CON	1	12/19/2016	01/02/2017				
16-PR-0153	1	Jeff Knaub	Joseph Bartell	Chau Chiem	D5	AA4115177	US 50	SEVERN RIVER BRIDGE TO END SHA MAINTENANCE					
						FIN	2	05/24/2017	05/24/2017			05/24/2017	
						FIN	1	05/18/2017	05/23/2017				
						SITE	3	05/03/2017	05/10/2017		05/10/2017		
						SITE	2	04/07/2017	04/18/2017				
						SITE	1	02/10/2017	02/28/2017				
						CON	1	12/22/2016	01/05/2017	01/05/2017			
16-PR-0154	0	Brandon Scott	Joseph Bartell	April Stitt	D7	HO4615176	US 29	AT MD 175					
						FIN	2	02/08/2017	02/16/2017			02/16/2017	
						FIN	1	01/18/2017	01/23/2017				
						CON	1	12/27/2016	01/06/2017	01/06/2017			
16-PR-0155	1	Doug Roys	Tyler Bazan		OED	BA2015682	MD 165	Little Gunpowder Falls Tributary at MD 165 - Stream Restoration					
						SITE	1	04/17/2017	04/28/2017				
						CON	1	12/27/2016	12/29/2016	12/29/2016			
16-PR-0156	1	Tesfamichael Bogale	Joseph Bartell	Barry Ritchie	D6	AL2525176	I 68	AT GREENE STREET					
						SITE	1	06/06/2017	06/23/2017				
						CON	2	04/26/2017	05/10/2017	05/10/2017			
						CON	1	12/28/2016	01/12/2017				
17-PR-0001	1	Jeff Knaub	Jessica Lain		OHD	TA2735179	MD 565	HOMERUNBAKER PARK TO WHITE MARSH ROAD					
						CON	2	03/27/2017	04/14/2017	04/14/2017			
						CON	1	01/05/2017	01/19/2017				
17-PR-0003	1	Sonja Hardman			D4	BA1425277	MD 140	IHB - MILFORD MILL ROAD TO THE BALTIMORE COUNTY/CITY LINE					
						SITE	2	04/10/2017	04/10/2017		04/10/2017		
						SITE	1	04/04/2017	04/05/2017				
						CON	3	03/17/2017	03/20/2017	03/20/2017			
						CON	2	02/03/2017	02/08/2017				
						CON	1	01/06/2017	01/12/2017				
17-PR-0004	0	Brandon Scott			OHD	FR3885171	MD 85	IHB - S OF DISTRICT 7 OFFICE ENTRANCE TO N OF SPECTRUM DRIVE (PHASE 1) AT I-270					
						M1	1	05/30/2017	06/05/2017				06/05/2017
						FIN	3	04/05/2017	04/19/2017			04/19/2017	
						FIN	2	03/22/2017	03/29/2017				
						FIN	1	01/24/2017	02/07/2017				
17-PR-0005	1	Brandon Scott		Michael Lloyd	D7	CL2295130	MD 27	GILLIS FALLS ROAD AND HARRISVILLE ROAD					
						CON	1	01/27/2017	02/10/2017				
17-PR-0006	1	Tesfamichael Bogale	Joe Bartell	Jeff Robert	OOS	SO2125180	MD 364	BRIDGE 1901000 OVER DIVIDING CREEK					
						CON	1	01/09/2017	01/18/2017	01/18/2017			

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17-PR-0007	1	Brandon Scott	Joseph Bartell	Dorey Uong	D3	PG0435177		US 301	BERRY STREET TO US 301 SOUTH BOUND RAMP				
						CON	1	01/17/2017	02/01/2017				
17-PR-0008	1	Jeff Knaub	Patrick Nadeau	John Jenkins	D7	FR6725130		MD 355	1000 SOUTH OF DOCTOR PERRY ROAD/BIG WOODS ROAD TO 1000 NORTH				
						CON	3	05/16/2017	06/01/2017	06/01/2017			
						CON	2	04/13/2017	05/01/2017				
						CON	1	01/18/2017	02/01/2017				
17-PR-0009	0	Brandon Scott	Joe Bartell	Dorey Uong	D3	MO1685187		MD 97	IHB - AT MD 28 (Formerly 15-SF-0100, CA)				
						FIN	3	04/04/2017	04/07/2017			04/07/2017	
						FIN	2	03/16/2017	03/27/2017				
						FIN	1	02/22/2017	03/08/2017				
						CON	1	01/31/2017	02/06/2017	02/06/2017			
17-PR-0010	1	Tesfamichael Bogale	Ryan Doheny		OOS	HO1525180		US 40 WB	BRIDGE 13055 OVER I-70				
						CON	1	01/18/2017	01/18/2017	01/18/2017			
17-PR-0011	1	Jeff Knaub	Joseph Bartell	Kim Livezey	D4	HA4625130		MD 23	AT GRAFTON SHOP ROAD				
						FIN	2	06/27/2017	07/11/2017			07/11/2017	
						FIN	1	06/07/2017	06/14/2017				
						SITE	1	05/19/2017	05/22/2017		05/22/2017		
						CON	3	03/23/2017	04/07/2017	04/07/2017			
						CON	2	02/16/2017	03/09/2017				
						CON	1	01/19/2017	01/27/2017				
17-PR-0012	1	Tesfamichael Bogale	Joseph Bartell	John Narer	OOS	WA4435180		I 70	BRIDGE 21112 ON I-70/US 11 AND BRIDGE 21113 ON I-70/NORFOLK SOUTHERN RAILROAD				
						CON	1	01/19/2017	02/07/2017	02/07/2017			
17-PR-0013	0	Brandon Scott	Joseph Bartell	April Stitt	D7	CL2125130		MD 27	2300 FT SOUTH OF WESTMINSTER STREET TO 1300 FT NORTH OF WESTMINSTER STREET				
						FIN	2	02/22/2017	03/10/2017				
						FIN	1	01/23/2017	02/08/2017				
17-PR-0014	1	Sonja Hardman		Chau Chiem	D5	BW316M84		MD 231	Roadway Widening				
						SITE	2	05/12/2017	05/26/2017				
						SITE	1	03/03/2017	03/08/2017				
						CON	1	01/25/2017	01/25/2017	01/25/2017			
17-PR-0015	0	Brandon Scott	Joseph Bartell	Sutapa Samanta	D4	BA1055277		US 1	Formerly 15-SF-0037, CA Howard / Baltimore County line to 550 feet South of CSX Railroad Tracks				
						M1	2	06/16/2017	06/22/2017				06/22/2017
						M1	1	05/24/2017	05/31/2017				
						FIN	2	02/14/2017	02/21/2017			02/21/2017	
						FIN	1	01/25/2017	02/06/2017				
17-PR-0016	1	Sonja Hardman		Jonathan Brown	OHD	CH2415174		MD 225	EAST OF PRESWICKE LANE				
						SITE	1	06/06/2017	06/14/2017				
						CON	1	01/25/2017	02/06/2017	02/06/2017			
17-PR-0017	1	Doug Roys			OED	PG8315182		VAR	AT VARIOUS LOCATIONS IN PRINCE GEORGE'S COUNTY - GROUP 1				
						SITE	1	06/15/2017	07/13/2017				
						CON	1	01/27/2017	01/31/2017	01/31/2017			
17-PR-0018	0	Brandon Scott	Joseph Bartell		D7	CL4515130		MD 482	Formerly MDE No. 13-SF-0045. Gorsuch Road and Cape Horn Road				
						FIN	3	04/10/2017	04/12/2017			04/12/2017	
						FIN	2	03/03/2017	03/10/2017				

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						FIN	1	02/21/2017	02/28/2017				
						CON	1	01/27/2017	02/09/2017	02/09/2017			
17-PR-0019	1	Jeff Knaub		John Jenkins	D7	FR6795177		I 70	EAST OF MD 75 TO STRUCTURE 10183 OVER MONOCACY RIVER				
						CON	2	04/20/2017	05/02/2017	05/02/2017			
						CON	1	01/27/2017	02/03/2017				
17-PR-0020	1	Jeff Knaub	Joseph Bartell	John Narer	OOS	FR1295180		MD 17	BRIDGE 1001900 OVER MIDDLE CREEK				
						CON	2	02/21/2017	03/09/2017	03/09/2017			
						CON	1	01/31/2017	02/10/2017				
17-PR-0021	1	Doug Roys			OED	BA2015782		MD 145	LITTLE GUNPOWDER FALLS TRIBUTARY AT MD 145 & MD 165 - STREAM RESTORATION				
						SITE	1	06/14/2017	07/05/2017				
						CON	1	02/02/2017	02/08/2017	02/08/2017			
17-PR-0022	1	Jeff Knaub	Joe Bartell	John Narer	OOS	WA8835180		MD 56	BRIDGE 2109600 OVER MD I-70				
						CON	2	03/22/2017	04/05/2017	04/05/2017			
						CON	1	02/02/2017	02/24/2017				
17-PR-0023	0	Brandon Scott		Chris Weber	OHD	AA4365371		MD 175	IHB - NATIONAL BUSINESS PARKWAY TO MCCARRON COURT				
						CON	2	03/08/2017	03/21/2017	03/21/2017			
						CON	1	02/06/2017	02/15/2017				
17-PR-0024	1	Doug Roys	Joseph Bartell	Colin Hill	OED	FR6715182		MD 550	ISRAEL CREEK AT MD 550				
						CON	1	02/06/2017	02/08/2017	02/08/2017			
17-PR-0025	1	Tesfamichael Bogale	Joseph Bartell	Kim Livezey	D4	HA5025187		MD 147	Intersection Improvement				
						CON	2	05/12/2017	05/22/2017				
						CON	1	02/06/2017	02/24/2017				
17-PR-0026	1	Jeff Knaub		John Narer	OOS	AL4655180		I 68	BRIDGE 0109300 OVER MD 639				
						CON	3	05/16/2017	06/05/2017	06/05/2017			
						CON	2	03/30/2017	04/13/2017				
						CON	1	02/06/2017	02/24/2017				
17-PR-0027	1	Jeff Knaub	Joseph Bartell	Joseph Navarra	OOS	BA0145180		I 695	BRIDGE 0312400 OVER US 40				
						CON	3	05/26/2017	06/09/2017	06/09/2017			
						CON	2	05/05/2017	05/15/2017				
						CON	1	02/07/2017	03/15/2017				
17-PR-0028	1	Sonja Hardman	Joseph Bartell	Yinka Olagoke	OOS	BA0385180		I 83	IHB - BRIDGE 03062 OVER PADONIA ROAD				
						CON	2	04/13/2017	04/21/2017	04/21/2017			
						CON	1	02/07/2017	02/09/2017				
17-PR-0029	1	Tesfamichael Bogale	Joseph Bartell	Kim Livezey	D4	HA5015187		MD 24	AT MD 755				
						SITE	1	05/18/2017	05/30/2017				
						CON	2	03/28/2017	04/10/2017	04/10/2017			
						CON	1	02/08/2017	02/24/2017				
17-PR-0030	1	Jeff Knaub		Dipa Patel	OOS	AL2975180		MD 36	IHB - BRIDGE 0100800 OVER JENNINGS RUN				
						CON	3	04/13/2017	04/19/2017	04/19/2017			
						CON	2	03/17/2017	03/31/2017				
						CON	1	02/08/2017	02/24/2017				
17-PR-0031	1	Jeff Knaub			OOS	XX1665180		US 50	EMERGENCY REPLACEMENT OF STRUCTURE 20032XO OVER A BRANCH OF MILES CREEK				
						FIN	1	04/06/2017	04/18/2017				

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						CON	1	02/10/2017	02/14/2017	02/14/2017			
17-PR-0032	0	Brandon Scott	Junaid Khan	Lindsay Bobian	OHD	PG6245171	MD 924	IHB - COLLEGE AVENUE/REGENTS DRIVE TO MD 193 (UNIVERSITY BOULEVARD)					
						CON	1	02/14/2017	03/03/2017	03/03/2017			
17-PR-0033	1	Tesfamichael Bogale	Patrick Nadeau		OHD	CE2475179	MD 222	CEDAR CORNER ROAD TO ST MARKS CHURCH ROAD					
						CON	2	03/13/2017	03/24/2017	03/24/2017			
						CON	1	02/14/2017	02/24/2017				
17-PR-0034	1	Jeff Knaub	Ryan Doheny	Rob Marchetti	OOS	QA1555180	MD 309	MD 309 OVER SEVERAL SMALL STREAMS - REPLACE 5 SMALL STRUCTURES (PIPES)					
						CON	1	02/15/2017	03/03/2017	03/03/2017			
17-PR-0035	1	Doug Roys	Junaid Khan	Karen Coffman	OED	PG8325182	VAR	AT VARIOUS LOCATIONS - GROUP 2					
						SITE	1	04/26/2017	06/09/2017				
						CON	1	02/16/2017	02/17/2017	02/17/2017			
17-PR-0036	0	Brandon Scott		Jared Paper-Evers	OHD	MO5365187	MD 355	IHB - AT WEST OLD BALTIMORE ROAD					
						CON	2	05/08/2017	05/26/2017				
						CON	1	02/17/2017	03/20/2017				
17-PR-0037	1	Brandon Scott		Sutapa Samanta	D4	BA1465176	MD 147	AT JOPPA ROAD					
						FIN	2	06/30/2017	07/12/2017			07/12/2017	
						FIN	1	04/12/2017	04/26/2017				
						CON	1	02/27/2017	03/13/2017	03/13/2017			
17-PR-0037	2	Brandon Scott	Ayende Thomas	Sutapa Samanta	D4	BA1465176	MD 147	AT JOPPA ROAD					
						FIN	1	03/02/2017	03/16/2017				
17-PR-0038	1	Doug Roys		Karen Coffman	OED	AX7665C82	VAR	AT VARIOUS LOCATIONS IN DISTRICT 7 - GROUP 2					
						SITE	4	05/09/2017	05/24/2017		05/24/2017		
						SITE	3	04/13/2017	05/02/2017				
						SITE	2	03/30/2017	04/07/2017				
						SITE	1	02/27/2017	03/15/2017				
						CON	2	03/29/2016	04/01/2016	04/01/2016			
						CON	1	09/16/2015	09/22/2015				
17-PR-0039	1	Doug Roys	Joseph Bartell	Karen Coffman	OED	MO2965182	NA	AT TRIBUTARY TO CABIN JOHN CREEK (TOWER OAKS)					
						SITE	1	05/01/2017	05/15/2017		05/15/2017		
						CON	1	03/03/2017	03/07/2017	03/07/2017			
17-PR-0040	1	Tesfamichael Bogale			D7	CL2355130	MD 32	AT BENNETT ROAD AND JOHNSVILLE ROAD					
						CON	2	05/24/2017	05/30/2017				
						CON	1	03/06/2017	03/24/2017				
17-PR-0041	1	Jeff Knaub	Joseph Bartell	Sutapa Samanta	D4	AT9265276	I 795	FRANKLIN BLVD EB TO I795 NB LEFT TURN LANE					
						CON	1	03/06/2017	03/17/2017				
17-PR-0042	0	Brandon Scott		Ayende Thomas	OHD	AA8225174	US 50	IHB - MD 665 TO SEVERN RIVER					
						FIN	3	06/26/2017	07/07/2017				
						FIN	2	05/11/2017	05/23/2017				
						FIN	1	03/13/2017	04/04/2017				
17-PR-0043	1	Tesfamichael Bogale	Polly Solliday	Toria Lassiter	OHD	MO1255176	MD 24	AT RUSSELL AVENUE					
						CON	1	03/13/2017	03/30/2017				

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17-PR-0044	1	Sonja Hardman		Sutapa Samanta	D4	BA2625177		MD 140	EAST PLEASANT HILL ROAD TO STOCKSDALE AVENUE				
						CON	3	06/20/2017	06/28/2017	06/28/2017			
						CON	2	05/02/2017	05/12/2017				
						CON	1	03/15/2017	03/23/2017				
17-PR-0045	1	Tesfamichael Bogale		Toria Lassiter	OHD	FR5665181		MD 140	MD140 PARK & RIDE				
						CON	3	05/16/2017	05/24/2017	05/24/2017			
						CON	2	04/21/2017	05/01/2017				
						CON	1	03/21/2017	04/05/2017				
17-PR-0046	1	Jeff Knaub		Justin Mohr	OOS	AA1245280		MD 255	STRUCTURE 02025X0 OVER BRANCH OF LERCH CREEK				
						CON	2	05/10/2017	06/02/2017				
						CON	1	03/22/2017	04/05/2017				
17-PR-0047	1	Jeff Knaub		Jeff Robert	OOS	BA0505180		I 695	BRIDGE 0324800 OVER MD 695				
						CON	2	04/27/2017	05/08/2017	05/08/2017			
						CON	1	03/27/2017	04/11/2017				
17-PR-0048	0	Brandon Scott	Joseph Bartell	John Narer	OOS	CH2395180		MD 224	BRIDGE 0801900 OVER THORNE GUT AND BRIDGE 0802000 OVER BRANCH THORNE GUT				
						FIN	2	04/25/2017	05/02/2017			05/02/2017	
						FIN	1	03/28/2017	04/14/2017				
17-PR-0049	1	Doug Roys	Samuel Kane	Karen Coffman	OED	AT4285382		VAR	TMDL IMPERVIOUS AREA REMOVAL, DISTRICT 3				
						CON	2	05/05/2017	05/16/2017	05/16/2017			
						CON	1	03/30/2017	04/05/2017				
17-PR-0050	1	Doug Roys	Samuel Kane	Karen Coffman	OED	AT4285482		VAR	TMDL IMPERVOUS AREA REMOVAL,L DISTRICT 5				
						CON	2	05/05/2017	05/16/2017	05/16/2017			
						CON	1	03/30/2017	04/05/2017				
17-PR-0051	1	Tesfamichael Bogale	Joseph Bartell	Jason Pollock	OOS	WO1655180		US 13	BRIDGE 2301601 AND 2301602 ON US 13 OVER POCOMOKE RIVER				
						SITE	1	05/11/2017	05/22/2017		05/22/2017		
						CON	1	04/03/2017	04/12/2017	04/12/2017			
17-PR-0052	1	Jeff Knaub		John Narer	OOS	KE2335180		MD 298	STRUCTURE 14074X0 OVER BRANCH OF FAIRLEE LAKE				
						CON	1	04/04/2017	04/18/2017	04/18/2017			
17-PR-0053	1	Brandon Scott	Joseph Bartell		OOS	AA1245180		MD 468	STRUCTURE 02016X0 OVER LERCH CREEK				
						CON	2	06/16/2017	07/07/2017	07/07/2017			
						CON	1	04/04/2017	04/17/2017				
17-PR-0054	1	Jeff Knaub			OOS	PG5725280		VAR	BRIDGE 1616600 OVER I-95/495				
						CON	3	05/09/2017	05/11/2017	05/11/2017			
						CON	2	04/27/2017	05/04/2017				
						CON	1	04/07/2017	04/20/2017				
17-PR-0055	1	Tesfamichael Bogale	Ryan Doheny		OHD	TBD		MD 346	Emergency Culvert Replacement				
						M1	1	06/30/2017	07/10/2017				07/10/2017
						FIN	1	06/21/2017	06/21/2017			06/21/2017	
						SITE	1	06/21/2017	06/21/2017		06/21/2017		
						CON	1	04/21/2017	04/21/2017	04/21/2017			
17-PR-0056	1	Jeff Knaub			OHD	XX5355233		MD 331	AT VARIOUS LOCATIONS IN DISTRICT 2				
						CON	2	06/30/2017	07/14/2017	07/14/2017			
						CON	1	04/10/2017	04/21/2017				

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17-PR-0056	2	Jeff Knaub	Joseph Bartell		OHD	XX5355233		MD 331	AT VARIOUS LOCATIONS IN DISTRICT 2				
						SITE	1	06/29/2017	07/14/2017		07/14/2017		
						CON	1	05/18/2017	06/07/2017	06/07/2017			
17-PR-0057	1	Tesfamichael Bogale	Joseph Bartell		D3	PG3685187		MD 193	AT RHODE ISLAND AVENUE				
						CON	1	04/12/2017	04/24/2017				
17-PR-0058	1	Jeff Knaub			D3	MO9785130		MD 119	MD119 at High Gables Drive				
						CON	3	05/30/2017	06/12/2017	06/12/2017			
						CON	2	05/12/2017	05/19/2017				
						CON	1	04/12/2017	04/21/2017				
17-PR-0059	1	Tesfamichael Bogale		John Delaney	OHD	CA1485184		MD 261	9TH STREET TO ANNE ARUNDEL COUNTY LINE				
						CON	2	06/27/2017	07/10/2017				
						CON	1	04/13/2017	05/10/2017				
17-PR-0060	1	Jeff Knaub	Meredith Willson	Cathy Spady	D1	WI1685176		US 50	AT WHITE LOWE ROAD				
						CON	1	04/14/2017	04/25/2017	04/25/2017			
17-PR-0061	1	Tesfamichael Bogale	Jessica Lain		D6	GA4145177		MD 450	MD 135 TO CRABTREE CREEK				
						CON	1	04/17/2017	04/25/2017				
17-PR-0062	1	Jeff Knaub	Joseph Bartell	Ben Hokuf	OOS	CE2835180		MD 273	BRIDGE 0704400 OVER BIG ELK CREEK				
						CON	2	06/14/2017	06/23/2017				
						CON	1	04/18/2017	04/27/2017				
17-PR-0063	1	Brandon Scott			OED	CH1875149		NA	LaPlata Training Site				
						SITE	1	05/30/2017	06/07/2017				
						CON	1	04/18/2017	04/24/2017	04/24/2017			
17-PR-0064	1	Tesfamichael Bogale	Patrick Nadeau		D1	WI1675176		US 50	AT SIXTY FOOT ROAD				
						CON	1	04/19/2017	05/12/2017				
17-PR-0065	1	Jeff Knaub		John Vranish	OHD	XX5345133		MD 253	ADA SIDEWALKS IN DISTRICT 5				
						SITE	1	06/22/2017	07/13/2017				
						CON	2	05/25/2017	06/13/2017	06/13/2017			
						CON	1	04/20/2017	05/02/2017				
17-PR-0065	3	Sonja Hardman	Joseph Bartell	John Vranish	OHD	XX5345133		MD 435	ADA SIDEWALKS IN DISTRICT 5				
						CON	2	06/30/2017	07/14/2017	07/14/2017			
						CON	1	05/12/2017	05/19/2017				
17-PR-0065	5	Jeff Knaub	Joseph Bartell	John Vranish	OHD	XX5345133		MD 435	ADA SIDEWALKS IN DISTRICT 5				
						CON	2	06/30/2017	07/14/2017	07/14/2017			
						CON	1	05/12/2017	05/30/2017				
17-PR-0066	1	Tesfamichael Bogale	Joseph Bartell		OOS	CL1725180		MD 91	BR 06020 OVER NORTH BRANCH PATAPSCO RIVER AND BR 06047 OVER MD MIDLAND RAILROAD				
						CON	1	04/20/2017	05/12/2017				
17-PR-0067	1	Jeff Knaub		April Stitt	D7	FR0935177		I 70	WASHINGTON COUNTY LINE TO GRINDSTONE RUN STRUCTURE 10135				
						CON	2	06/06/2017	06/23/2017				
						CON	1	04/20/2017	05/04/2017				
17-PR-0068	1	Brandon Scott	Joseph Bartell	John Narer	OOS	PG0675180		MD 382	BRIDGE 1606100 OVER CHARLES BRANCH				
						CON	3	06/21/2017	07/03/2017	07/03/2017			

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						CON	2	06/06/2017	06/15/2017				
						CON	1	04/21/2017	05/10/2017				
17-PR-0069	1	Tesfamichael Bogale			OHD	CL1535188	MD 27	BALTIMORE BOULEVARD TO HOLLOW ROCK AVENUE					
						CON	3	06/14/2017	06/23/2017				
						CON	2	05/23/2017	05/31/2017				
						CON	1	04/26/2017	05/12/2017				
17-PR-0070	1	Jeff Knaub	Ayende Thomas	Erin Markel	OED	XX1675274	I 95	CULVERT DEBRIS REMOVAL AND SLOPE REPAIR					
						SITE	1	05/25/2017	06/09/2017				
						CON	1	05/02/2017	05/12/2017	05/12/2017			
17-PR-0071	1	Brandon Scott	James Farkas	Vladimir Jean-Pierre	OHD	HO1625181	MD 32	EXPANSION OF BROKEN LAND PARKWAY PARK AND RIDE NORTH LOT					
						CON	2	06/05/2017	06/09/2017	06/09/2017			
						CON	1	05/04/2017	05/16/2017				
17-PR-0072	0	Brandon Scott		Luis Gonzalez	OHD	MO1505388	MD 124	DOSH DRIVE TO MD 117					
						FIN	2	06/20/2017	07/07/2017				
						FIN	1	05/08/2017	05/23/2017				
17-PR-0073	1	Tesfamichael Bogale	James Farkas		OHD	AL2535176	I 68	US 40 ALT (BALTIMORE AVENUE) TO MARYLAND AVENUE					
						CON	1	05/09/2017	05/19/2017				
17-PR-0074	1	Tesfamichael Bogale		Luis Gonzalez	OHD	SM2025271	MD 5	IHB - AT ABELL/MOAKLEY (PHASE 1A - ADVANCED GRADING CONTRACT)					
						SITE	2	04/28/2017	05/09/2017				
						SITE	1	04/06/2017					
						CON	1	11/23/2016	12/08/2016	12/08/2016			
17-PR-0076	1	Jeff Knaub	Garvin Guide		OHD	CO5585184	VAR	TALBOT COUNTY LINE TO HILLSBORO EASTERN TOWN LIMIT					
						CON	1	05/12/2017	05/24/2017				
17-PR-0077	1	Tesfamichael Bogale		Barry Ritchie	D6	GA1545177	VAR	FRIENDSVILLE GRANTSVILLE AND ACCIDENT					
						CON	2	06/14/2017	06/23/2017	06/23/2017			
						CON	1	05/17/2017	05/30/2017				
17-PR-0078	1	Brandon Scott	Johathan Brown	Jonathan Brown	OHD	TBD	NA	EMERGENCY DRAINAGE REPAIR NEAR MD 336					
						CON	1	06/05/2017	06/07/2017	06/07/2017			
17-PR-0079	1	Jeff Knaub		AJ de Rosset	OHD	AX1675174	MD 382	SLOPE AND DRAINAGE REPAIR AT TANYARD ROAD					
						CON	1	05/19/2017	06/08/2017	06/08/2017			
17-PR-0080	1	Tesfamichael Bogale			D3	PG7935176	MD 769C	QUINCY STREET TO KENILWORTH TOWERS					
						CON	1	05/24/2017	06/02/2017				
17-PR-0081	1	Brandon Scott				AT823A17	MD 144	Re-Establish Ditches					
						FIN	1	06/28/2017	06/28/2017			06/28/2017	
						SITE	1	06/20/2017	06/28/2017		06/28/2017		
						CON	1	05/26/2017	06/13/2017	06/13/2017			
17-PR-0082	1	Tesfamichael Bogale	Joseph Bartell		OOS	FR7245180	MD 17	STRUCTURE 10236X0 OVER BRANCH OF MIDDLE CREEK					
						CON	2	06/07/2017	06/07/2017	06/07/2017			
						CON	1	05/30/2017	06/02/2017				
17-PR-0083	1	Jeff Knaub		Dipa Patel	OOS	FR1335180	MD 28	IHB - BRIDGE 1002900 OVER MONOCACY RIVER					
						CON	1	06/02/2017	06/16/2017				

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17-PR-0084	1	Brandon Scott		Joseph Navarra	OOS	BA0485180		US 1	BRIDGE 0300300 OVER GUNPOWDER FALLS				
						CON	2	06/30/2017	07/13/2017	07/13/2017			
						CON	1	06/02/2017	06/12/2017				
17-PR-0085	1	Tesfamichael Bogale	Joseph Bartell	Holly Shipley	OOM	HA5055129		US 40	ABERDEEN SALT DOME - BRINE PRODUCTION				
						CON	1	06/05/2017	06/15/2017				
17-PR-0086	1	Jeff Knaub		John Jenkins	D7	CL1755130		MD 140	AT MAYBERRY ROAD				
						CON	1	06/05/2017	06/21/2017				
17-PR-0087	0	Brandon Scott	Armand de Rosset	Kurt Walcott	OHD	PG1065184		MD 212	PINE STREET TO US 1 INTERSECTION				
						FIN	1	06/07/2017	07/11/2017				
						CON	1	07/28/2016					
17-PR-0088	1	Tesfamichael Bogale	Tyler Bazan	Nafiseh Bozorgi	OHD	SM2105171		MD 5	MD 246 TO MD 471				
						CON	1	06/07/2017	06/29/2017				
17-PR-0089	1	Doug Roys		Karen Coffman	OED	BA2705182		I 83	AT VARIOUS LOCATIONS IN BALTIMORE COUNTY - GROUP 1				
						CON	1	06/16/2017	07/14/2017				
17-PR-0090	1	Matt Keenan	Daniel Sharar-Salgado	Jason Solicny	OHD	HO7565370		MD 32	LINDEN CHURCH ROAD TO I-70				
						CON	1	06/22/2017	07/07/2017				
17-PR-0091	1	Brandon Scott	Joseph Bartell		OIT	N/A		NA	Table Rock Communication Tower				
						CON	1	06/22/2017	06/30/2017				
17-PR-0092	1	Jeff Knaub		Dorey Uong	D3	MO1705176		US 29	LOCKWOOD DRIVE TO BURNT MILLS AVENUE				
						CON	1	06/22/2017	07/13/2017				
17-PR-0093	1	Sonja Hardman		Dorey Uong	D3	MO1715176		MD 28	MD 97 TO BAILEYS LANE				
						CON	1	06/23/2017	07/07/2017				
17-PR-0094	1	Tesfamichael Bogale			OHD	AX081		MD 140	Enbankment and Slope Repair				
						CON	1	06/29/2017	07/05/2017	07/05/2017			
17-PR-0095	1	Sonja Hardman	James Farkas	Michael Lloyd	D7	FR5835380		MD 77	PRYOR ROAD TO STOTTLEMEYER ROAD				
						CON	1	06/30/2017	07/10/2017				
17-PR-0192	0	Brandon Scott		April Stitt	D7	FR5105130		US 15	SOUTH OF ORNDORFF ROAD TO NORTH OF COLLEGE LANE				
						CON	1	06/01/2016					
18-PR-0054	1	Brandon Scott		John Jenkins	D7	HO2275187		MD 103	MD 103 from US 29 to Long Gate Parkway				
						CON	1	12/29/2015					

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15-PR-0097	1	Matt Keenan		Jeff Folden	OHD	AW8965170	MD 404	Design-BuildIHB - US 50 to East of Holly RoadPackage 1: Overall Project					
						FIN-EXT	1	04/12/2018	04/12/2018				
						CON	6	02/29/2016	03/11/2016	03/11/2016			
						CON	7	02/29/2016	03/11/2016				
						CON	5	02/04/2016	02/05/2016				
						CON	4	12/30/2015	12/31/2015				
						CON	3	12/17/2015	12/21/2015				
						CON	2	11/16/2015	12/03/2015				
						CON	1	10/02/2015	10/07/2015				
15-PR-0097	2	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 2: Utilites, Clearing, Grubbing					
						M1	1	06/14/2016	06/16/2016				06/16/2016
						FIN	5	05/13/2016	05/16/2016			05/16/2016	
						FIN	4	05/10/2016	05/11/2016				
						FIN	3	05/02/2016	05/05/2016				
						FIN	2	04/05/2016	04/18/2016				
						FIN	1	02/18/2016	02/24/2016				
						SITE	2	01/21/2016	01/26/2016		01/26/2016		
						SITE	1	01/12/2016	01/13/2016				
						CON	2	12/14/2015	12/15/2015	12/15/2015			
						CON	1	12/02/2015	12/04/2015				
15-PR-0097	3	Matt Keenan		Jeff Folden	OHD	AW8965170	MD 404	Package 3: Stream Diversion and Temporary Grading at Norwich Creek					
						MOD	3	12/08/2016	12/09/2016				12/09/2016
						MOD	2	11/30/2016	12/02/2016				
						MOD-R	2	10/24/2016	10/26/2016				10/26/2016
						MOD-R	1	10/06/2016	10/13/2016				10/13/2016
						MOD	1	07/20/2016	07/27/2016				07/27/2016
						FIN	3	05/18/2016	05/26/2016			05/26/2016	
						FIN	2	05/09/2016	05/11/2016				
						FIN	1	04/06/2016	04/18/2016				
						SITE	3	02/17/2016	02/17/2016		02/17/2016		
						SITE	2	01/15/2016	01/21/2016				
						SITE	1	12/24/2015	12/29/2015				
						CON	2	12/14/2015	12/23/2015	12/23/2015			
						CON	1	12/03/2015	12/04/2015				
15-PR-0097	4	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 4: Seg. A - Sta 127 to 231 Grading					
						MOD-R	2	12/02/2016	12/06/2016				12/06/2016
						MOD-R	1	10/20/2016	11/03/2016				
						MOD	4	08/29/2016	08/31/2016				08/31/2016
						MOD	3	08/15/2016	08/23/2016				
						MOD	2	07/19/2016	08/01/2016				
						MOD	1	06/07/2016	06/21/2016				
15-PR-0097	5	Matt Keenan		Jeff Folden	OHD	AW8965170	MD 404	Package 5: Segment A, Str S7 TS&L / Stream Diversion					
						MOD-R	2	01/04/2017	01/05/2017				01/05/2017
						MOD-R	1	09/21/2016	09/22/2016				09/22/2016
						MOD	5	09/02/2016	09/02/2016				09/02/2016
						MOD	4	08/29/2016	08/31/2016				08/31/2016
						MOD	3	08/10/2016	08/23/2016				
						MOD	2	07/18/2016	08/01/2016				

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						MOD	1	06/06/2016	06/20/2016				
15-PR-0097	6	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 6: Seg. A - Sta 127 to 231 Grading				
						MOD-R	3	09/27/2016	09/27/2016				09/27/2016
						MOD-R	2	09/15/2016	09/16/2016				09/16/2016
						MOD-R	1	09/07/2016	09/07/2016				09/07/2016
						MOD	4	08/22/2016	08/24/2016				
						MOD	3	08/03/2016	08/10/2016				08/10/2016
						MOD	2	07/15/2016	07/26/2016				
						MOD	1	06/02/2016	06/17/2016				
15-PR-0097	7	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 7: Seg. B - Sta 231 to 317 Grading				
						MOD	5	11/22/2016	11/28/2016				11/28/2016
						MOD	4	09/20/2016	09/22/2016				09/22/2016
						MOD	3	08/19/2016	09/07/2016				
						MOD	2	07/27/2016	08/09/2016				
						MOD	1	06/20/2016	07/01/2016				
15-PR-0097	8	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 8: Seg. C - Structure S3 (05061X0) TS&L/Stream Diversion				
						MOD	6	12/08/2016	12/09/2016				12/09/2016
						MOD	5	11/30/2016	12/02/2016				
						MOD	4	09/29/2016	10/04/2016				10/04/2016
						MOD	3	09/19/2016	09/22/2016				
						MOD	2	08/08/2016	08/30/2016				
						MOD	1	07/05/2016	07/15/2016				
15-PR-0097	9	Matt Keenan		Jeff Folden	OHD	AW8965170		MD 404	Package 9: Seg. B - Sta 542 to 658 Grading				
						MOD-R	6	02/02/2017	02/02/2017				02/02/2017
						MOD-R	5	01/17/2017	01/20/2017				01/20/2017
						MOD-R	4	12/19/2016	12/21/2016				12/21/2016
						MOD-R	3	10/17/2016	10/18/2016				10/18/2016
						MOD-R	2	10/06/2016	10/06/2016				10/06/2016
						MOD-R	1	09/13/2016	09/15/2016				
						MOD	4	09/08/2016	09/08/2016				09/08/2016
						MOD	3	08/29/2016	09/02/2016				
						MOD	2	08/03/2016	08/18/2016				
						MOD	1	06/27/2016	07/11/2016				
15-PR-0097	10	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 10: Seg. B - Str S9 TS&L/ Stream Diversion				
						MOD	3	09/15/2016	09/22/2016				09/22/2016
						MOD	2	08/25/2016	09/08/2016				
						MOD	1	07/29/2016	08/12/2016				
15-PR-0097	11	Matt Keenan		Jeff Folden	OHD	AW8965170		MD 404	Package 11: Seg. C - Sta 542 to Sta 658 Grading				
						M2	1	09/26/2017	10/17/2017				10/17/2017
						MOD-R	1	03/24/2017	04/06/2017				04/06/2017
						MOD	4	01/17/2017	01/27/2017				01/27/2017
						MOD	3	12/09/2016	12/21/2016				
						MOD	2	11/02/2016	11/10/2016				
						MOD	1	08/12/2016	08/31/2016				
15-PR-0097	12	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 12: Seg. B - Sta 231 to Sta 305 Grading				
						MOD-R	2	03/23/2017	03/30/2017				03/30/2017

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						MOD-R	1	03/08/2017	03/10/2017				
						MOD	3	10/11/2016	10/12/2016				10/12/2016
						MOD	2	09/15/2016	09/22/2016				
						MOD	1	08/12/2016	08/26/2016				
15-PR-0097	13	Matt Keenan		Jeff Folden	OHD	AW8965170	MD 404	Package 13: Seg. A - Sta 129 to Sta 231 Final SWM					
						MOD	7	04/20/2018	05/09/2018				
						MOD-R	1	07/18/2017	08/09/2017				08/09/2017
						MOD	6	05/23/2017	06/16/2017				06/16/2017
						MOD	5	04/05/2017	04/20/2017				
						MOD	4	03/03/2017	03/15/2017				
						MOD	3	11/07/2016	11/21/2016				
						MOD	2	10/17/2016	10/28/2016				
						MOD	1	08/12/2016	08/31/2016				
15-PR-0097	14	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 14: Seg. C - Sta 466 to Sta 554 Grading					
						MOD-R	2	03/03/2017	03/10/2017				03/10/2017
						MOD-R	1	11/22/2016	11/23/2016				11/23/2016
						MOD	3	10/21/2016	10/25/2016				10/25/2016
						MOD	2	10/11/2016	10/13/2016				
						MOD	1	09/16/2016	09/26/2016				
15-PR-0097	15	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 15: Seg. C - Final EB & WB Roadway Sta. 526 to Sta. 655					
						MOD-R	1	02/24/2017	04/06/2017				04/06/2017
						MOD	3	01/12/2017	01/23/2017				01/23/2017
						MOD	2	12/09/2016	12/21/2016				
						MOD	1	11/02/2016	11/16/2016				
15-PR-0097	16	Matt Keenan		Jeff Folden	OHD	AW8965170	MD 404	Package 16: Seg. A - Final WB Roadway Sta. 129 to Sta. 231					
						MOD-R	4	07/18/2017	08/01/2017				
						MOD-R	3	05/02/2017	05/18/2017				05/18/2017
						MOD-R	2	04/05/2017	04/20/2017				
						MOD-R	1	03/03/2017	03/15/2017				
						MOD	2	11/09/2016	11/16/2016				11/16/2016
						MOD	1	10/17/2016	10/28/2016				
15-PR-0097	17	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 17: Seg. C - Str. S2 (05018X0)					
						MOD	2	09/20/2016	09/22/2016				09/22/2016
						MOD	1	08/25/2016	09/09/2016				09/09/2016
15-PR-0097	18	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Design/Build IHB-US 50 to East of Holly road					
						MOD	2	11/29/2016	12/02/2016				12/02/2016
						MOD	1	10/20/2016	11/03/2016				
15-PR-0097	19	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 19: Seg. C - Str. S20 TS&L/Stream Diversion					
						MOD	4	12/08/2016	12/19/2016				12/19/2016
						MOD	3	11/23/2016	12/02/2016				
						MOD	2	11/03/2016	11/09/2016				
						MOD	1	09/29/2016	10/04/2016				
15-PR-0097	20	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170	MD 404	Package 20: Seg. A Str S10 Stream Diversion					
						MOD	2	02/13/2017	02/15/2017				02/15/2017
						MOD	1	01/20/2017	01/30/2017				

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15-PR-0097	21	Matt Keenan		Jeff Folden	OHD	AW8965170		MD 404	Package 21: Seg A-Sta 76 to Sta 129 Grading				
						MOD-R	2	04/03/2017	04/05/2017				04/05/2017
						MOD-R	1	03/23/2017	03/27/2017				
						MOD	3	01/24/2017	01/31/2017				01/31/2017
						MOD	2	12/23/2016	01/05/2017				
						MOD	1	12/01/2016	12/07/2016				
15-PR-0097	22	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 22: Sylvester Driveway HHD				
						MOD	1	09/12/2016	09/13/2016				09/13/2016
15-PR-0097	23	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 23: Seg A-Str S12 TSL/Stream Diversion				
						MOD	2	12/16/2016	12/28/2016				12/28/2016
						MOD	1	10/31/2016	11/09/2016				
15-PR-0097	24	Matt Keenan	Daniel Sharar-Salgado	Jeff Folden	OHD	AW8965170		MD 404	Package 24: Seg B-Sta 305 to sta 340 Grading				
						MOD-R	4	04/20/2017	04/26/2017				
						MOD-R	3	03/31/2017	04/14/2017				
						MOD-R	2	03/24/2017	04/06/2017				
						MOD-R	1	03/10/2017	03/22/2017				
						MOD	3	01/24/2017	02/08/2017				02/08/2017
						MOD	2	12/22/2016	01/05/2017				
						MOD	1	11/22/2016	12/02/2016				
15-PR-0097	25	Matt Keenan		Jeff Folden	OHD	AW8965170		MD 404	Package 25: Mass Grading EB Roadway Sta. 129 to Sta 231				
						MOD-R	1	06/16/2017	06/22/2017				06/22/2017
						MOD	2	02/01/2017	02/10/2017				02/10/2017
						MOD	1	01/13/2017	01/20/2017				
15-PR-0097	26	Matt Keenan		Jeff Folden	OHD	AW8965170		MD 404	Package 26: Seg C - Sta 466+ Sta 526+ Roadway plans				
						MOD-R	1	05/30/2017	06/16/2017				
						MOD	3	03/10/2017	03/24/2017				
						MOD	2	02/15/2017	02/21/2017				
						MOD	1	01/19/2017	02/01/2017				
15-PR-0097	27	Matt Keenan		Jeff Folden	OHD	AW8965170		US 50	PACKAGE 27: SEGMENT C-STA. 466+ TO STA. 526+ FINAL SWM REPORT				
						MOD-R	2	09/19/2017	09/27/2017				09/27/2017
						MOD-R	1	05/30/2017	06/16/2017				
						MOD	4	04/12/2017	04/26/2017				04/26/2017
						MOD	3	03/10/2017	03/24/2017				
						MOD	2	02/15/2017	02/21/2017				
						MOD	1	01/19/2017	02/01/2017				
15-PR-0097	28	Matt Keenan		Jeff Folden	OHD	AW8965170		US 50	PACKAGE 28: SEBMENT B STA.231+ TO STA315+; FINAL ROADWAY				
						MOD	2	04/14/2017	05/08/2017				05/08/2017
						MOD	1	03/16/2017	03/29/2017				
15-PR-0097	29	Matt Keenan		Jeff Folden	OHD	AW8965170		US 50	PACKAGE 29: SEGMENT B STA 231+ TO STA 315+ FINAL SWM				
						MOD	2	04/14/2017	05/08/2017				05/08/2017
						MOD	1	03/16/2017	03/28/2017				
15-PR-0130	1	Matt Keenan		Kelly Nash	OOS	WI2145180		US 13	Package A, Design-BuildUS 13 Business to South of US 50				
						FIN	1	07/15/2016	07/15/2016			07/15/2016	
						SITE	3	07/12/2016	07/15/2016		07/15/2016		
						SITE	2	06/14/2016	06/22/2016				

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						SITE	1	05/20/2016	05/24/2016				
						CON	1	12/08/2015	12/09/2015	12/09/2015			
15-PR-0130	2	Matt Keenan		Kelly Nash	OOS	WI2145180	US 13	Package A, Design-BuildUS 13 Business to South of US 50					
						M1	5	10/17/2016	10/19/2016				10/19/2016
						M1	4	09/29/2016	10/05/2016				
						M1	3	09/19/2016	09/20/2016				
						M1	2	07/26/2016	07/29/2016				
						M1	1	06/07/2016	06/15/2016				
15-PR-0130	3	Matt Keenan		Kelly Nash	OOS	WI2145180	US 13	MISSING					
						SITE	3	10/17/2016	10/19/2016				
						M2	4	09/29/2016	10/05/2016				
						M2	3	09/19/2016	09/20/2016				
						M3	1	08/08/2016	08/15/2016				08/15/2016
						M2	2	07/26/2016	07/29/2016				
						SITE	2	07/12/2016	07/15/2016		07/15/2016		
						SITE	4	06/14/2016	09/18/2017				
						M2	1	06/07/2016	06/15/2016				
						SITE	1	05/20/2016	05/24/2016				
						CON	1	12/08/2015	12/09/2015	12/09/2015			
15-PR-0135	0	Matt Keenan	Garvin Guide	David Phillips	OHD	WO6355170	US 113	Design-Build - IHB - NORTH OF MD 365 TO NORTH OF FIVE MILE BRANCH ROAD - PHASE 4					
						CON	5	01/18/2017	02/02/2017				
						CON	4	11/17/2016	12/01/2016				
						CON	3	08/30/2016	09/20/2016				
						CON	2	06/10/2016	07/12/2016				
						CON	1	12/24/2015	12/29/2015				
15-PR-0135	1	Matt Keenan			OHD	WO6355170	US 113	US 113: Pkg 27 - Structure S-7					
						M1	1	10/05/2017	10/26/2017				
15-PR-0135	5	Matt Keenan			OHD	WO6355170	US 113	US 113 from MD 365 to Five Mile Branch Road - Pagkage 5					
						CON	4	08/25/2017	08/30/2017	08/30/2017			
						CON	3	08/09/2017	08/15/2017				
						CON	2	07/05/2017	07/13/2017				
						CON	1	05/05/2017	06/01/2017				
15-PR-0135	6	Matt Keenan		David Phillips	OHD	WO6355170	US 113	Pkg 6 - Clearing and Grubbing					
						FIN	1	08/30/2017	08/30/2017			08/30/2017	
						SITE	3	08/14/2017	08/30/2017		08/30/2017		
						SITE	2	07/18/2017	07/26/2017				
						SITE	1	05/31/2017	06/13/2017				
15-PR-0135	7	Matt Keenan			OHD	WO6355170	US 113	US 113 Phase 4 Package 7 - Section 1 Rough Grading					
						M1	8	04/20/2018	05/01/2018				05/01/2018
						M1	7	04/05/2018	04/13/2018				
						M1	6	03/02/2018	03/05/2018				
						M1	5	02/05/2018	02/12/2018				
						M1	4	01/10/2018	01/24/2018				
						M1	3	11/21/2017	12/11/2017				
						M1	2	09/19/2017	09/29/2017				
						M1	1	08/15/2017	08/17/2017				

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15-PR-0135	9	Matt Keenan			OHD	WO6355170	US 113	Structure S-1 Bridge 2302900					
						M1	1	11/03/2017	11/17/2017				11/17/2017
						SITE	2	08/08/2017	08/17/2017				
						SITE	1	06/13/2017	06/29/2017				
15-PR-0135	16	Matt Keenan			OHD	WO6355170	US 113	US 113 - Package 16 - Section 2 Rough Grading					
						M1	6	03/23/2018	03/30/2018				03/30/2018
						M1	5	03/06/2018	03/19/2018				
						M1	4	02/13/2018	02/21/2018				
						M1	3	01/17/2018	01/25/2018				
						M1	2	11/20/2017	12/08/2017				
						M1	1	10/05/2017	10/18/2017				
15-PR-0135	23	Matt Keenan			OHD	WO6355170	US 113	Design Build: Rough Grading Sta. 1369 + 50 to Sta. 1430+00					
						M1	2	02/13/2018	02/26/2018				02/26/2018
						M1	1	10/05/2017					
						SITE	1	07/26/2017	08/10/2017				
15-PR-0135	27	Matt Keenan			OHD	WO6355170	US 113	US 113 - Package 27 Structure S7					
						M1	1	11/07/2017	12/01/2017				12/01/2017
15-PR-0135	32	Matt Keenan			OHD	WO6355170	US 113	P-32: Structure S-9; US 113 from MD 365 to Five Mile Branch					
						FIN	1	11/03/2017	11/17/2017			11/17/2017	
						SITE	2	08/21/2017	09/05/2017				
						SITE	1	07/05/2017	07/17/2017				
15-PR-0135	34	Matt Keenan			OHD	WO6355170	US 113	Pkg 34 Structure S10 - US 113 Phase 4					
						M1	3	12/22/2017	01/04/2018				
						M1	2	12/07/2017	12/11/2017				
						M1	1	11/14/2017	11/22/2017				
						SITE	2	08/30/2017	09/05/2017				
						SITE	1	07/06/2017	07/17/2017				
15-PR-0135	39	Matt Keenan			OHD	WO6355170	US 113	Package 39 - Section 1 Final Grading					
						M1	6	06/01/2018	06/13/2018				06/13/2018
						M1	5	05/16/2018	05/24/2018				
						M1	4	04/23/2018	05/10/2018				
						M1	3	03/01/2018	03/22/2018				
						M1	2	12/22/2017	01/18/2018				
						M1	1	11/03/2017	11/30/2017				
15-PR-0135	42	Matt Keenan		David Phillips	OHD	WO6355170	US 113	Section 2 Final					
						M1	5	06/07/2018	06/20/2018				
						M1	4	05/01/2018	05/16/2018				
						M1	3	03/29/2018	04/12/2018				
						M1	2	02/21/2018	03/12/2018				
						M1	1	12/22/2017	01/22/2018				
15-PR-0135	45	Matt Keenan		David Phillips	OHD	WO6355170	US 113	US 113 Phase 4 Pkg 45 - Section 3 Final Grading					
						FIN	1	05/08/2018	05/21/2018				
						M1	3	03/28/2018	04/12/2018				
						M1	2	01/26/2018	02/12/2018				
						M1	1	11/24/2017	12/19/2017				

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16-PR-0047	0	Matt Keenan		Yugiong Bai	OHD	HO1415170		MD 32	Design-Build - MD 108 TO LINDEN CHURCH ROAD INTERCHANGE				
						FIN	8	05/31/2018	06/05/2018			06/05/2018	
						FIN	7	04/30/2018	05/02/2018				
						FIN	6	04/23/2018	04/26/2018				
						FIN	5	04/04/2018	04/16/2018				
						FIN	4	03/16/2018	03/30/2018				
						FIN	3	02/16/2018	03/08/2018				
						FIN	2	11/07/2017	11/22/2017				
						FIN	1	08/09/2017	08/23/2017				
						CON	5	04/11/2017	04/13/2017	04/13/2017			
						CON	4	03/08/2017	03/20/2017				
						CON	3	10/21/2016	11/01/2016				
						CON	2	08/15/2016	09/19/2016				
						CON	1	05/09/2016	05/20/2016				
16-PR-0047	1	Matt Keenan			OHD	HO1415170		MD 32	Design-Build - MD 108 TO LINDEN CHURCH ROAD INTERCHANGE - Zone 1 (See Package 0 for Concept				
						M7	1	04/25/2018	04/26/2018				04/26/2018
						M6	1	03/19/2018	03/30/2018				03/30/2018
						M5	1	02/13/2018	02/14/2018				02/14/2018
						M2	1	11/21/2017					
						M1	1	09/18/2017	09/20/2017				09/20/2017
						FIN	1	07/19/2017	07/21/2017			07/21/2017	
						SITE	5	07/17/2017	07/18/2017		07/18/2017		
						SITE	4	06/28/2017	07/07/2017				
						SITE	3	06/07/2017	06/19/2017				
						SITE	2	05/16/2017	05/18/2017				
						SITE	1	04/03/2017	04/13/2017				
16-PR-0047	2	Matt Keenan			OHD	HO1415170		MD 32	Design-Build - MD 108 TO LINDEN CHURCH ROAD INTERCHANGE - Zone 2 (See Package 0 for Concept reviews)				
						M3	1	04/20/2018	05/10/2018				05/10/2018
						M2	1	01/12/2018	01/26/2018				01/26/2018
						M1	1	10/26/2017	10/30/2017				10/30/2017
						SITE	5	09/08/2017	09/08/2017		09/08/2017		
						SITE	4	08/18/2017	08/25/2017				
						SITE	3	07/26/2017	08/03/2017				
						SITE	2	06/13/2017	06/27/2017				
						SITE	1	05/01/2017	05/03/2017				
17-PR-0075	1	Matt Keenan		Michael Baird	OHD	GA6465270		US 219	US 219 from I-68 to Old Salisbury Road Design-Build - Package 1 SWM Plan				
						CON	4	06/20/2018	07/17/2018				
						CON	3	04/12/2018	05/03/2018				
						CON	2	07/21/2017	08/15/2017				
						CON	1	05/12/2017	06/23/2017				
17-PR-0075	2	Matt Keenan		Michael Baird	OHD	GA6465270		US 219	US 219 from I-68 to Old Salisbury Road Design-Build - Package 2 ESC Plan				
						SITE	1	06/20/2018	06/28/2018				
17-PR-0075	3	Matt Keenan		Michael Baird	OHD	GA6465270		US 219	US 219 from I-68 to Old Salisbury Road Design-Build - Package 3 Utility ESC Plan				
						CON	1	06/20/2018	06/27/2018				
17-PR-0154	1	Matt Keenan			OHD	MO0695172		I 270	I-270 ICM - Package 1, Concept POIs SB-1 POI 1, SB-2 POI 1, SB-2 POI 2, NB-5 POI 1				
						CON	1	10/16/2017	11/01/2017	11/01/2017			

MDOT SHA Design Build Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
17-PR-0154	2	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - Package 2 Concept				
						CON	3	02/26/2018	02/26/2018				
						CON	2	11/24/2017	12/14/2017				
						CON	1	10/16/2017	11/01/2017				
17-PR-0154	3	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - Site 3				
						FIN	1	05/11/2018	05/17/2018			05/17/2018	
						SITE	3	04/17/2018	05/03/2018		05/03/2018		
						SITE	2	03/27/2018	04/12/2018				
						SITE	1	02/12/2018	02/27/2018				
17-PR-0154	4	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM Package 4 SB-2				
						SITE	4	05/18/2018	05/24/2018		05/24/2018		
						SITE	3	05/04/2018	05/17/2018				
						SITE	2	04/04/2018	04/19/2018				
						SITE	1	02/14/2018	03/08/2018				
17-PR-0154	5	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM				
						SITE	4	06/12/2018	06/27/2018		06/27/2018		
						SITE	3	05/21/2018	06/01/2018				
						SITE	2	04/05/2018	04/25/2018				
						SITE	1	02/26/2018					
17-PR-0154	6	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM				
						FIN	1	04/16/2018	05/02/2018			05/02/2018	
						SITE	1	03/28/2018	04/12/2018				
17-PR-0154	7	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM				
						CON	1	03/27/2018	04/11/2018				
17-PR-0154	8	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - Package 8				
						SITE	2	06/07/2018	06/26/2018				
						SITE	1	03/29/2018	04/19/2018				
17-PR-0154	9	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM Package 9				
						CON	2	06/06/2018	06/26/2018				
						CON	1	03/29/2018	04/16/2018				
17-PR-0154	10	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 NB4				
						SITE	1	04/23/2018	05/14/2018				
17-PR-0154	11	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - NB 5				
						SITE	2	06/06/2018	06/20/2018				
						SITE	1	04/23/2018	05/14/2018				
17-PR-0154	12	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - Package 12				
						SITE	1	05/29/2018	06/18/2018				
17-PR-0154	13	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 ICM - Package 13				
						SITE	1	06/28/2018	07/18/2018				
17-PR-0154	14	Matt Keenan		David Phillips	OHD	MO0695172		I 270	I-270 Innovative Congestion Management Contract - Progressive Design-Build				
						FIN	1	04/11/2018	05/17/2018			05/17/2018	

MDE SF Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
08-SF-0042	0	Brandon Scott		UNK	OHD	PG6185170		MD 4	MD 4 at Suitland Parkway Interchange Improvements				
						M4	2	06/14/2018					
						M4	1	05/29/2018	06/08/2018				
						M2	3	11/14/2017	11/21/2017				11/21/2017
						M2	2	09/27/2017	10/13/2017				
						M2	1	09/06/2017	09/12/2017				
						M1	2	08/01/2017	08/15/2017				08/15/2017
						M1	1	06/02/2017	06/05/2017				
						M3	1	02/09/2015	02/09/2015				02/09/2015
09-SF-0187	0	Brandon Scott			OHD	BA7295270		MD 140	MD 140 from N. of Painters Mill to S. of Garrison View				
						M3	1	02/02/2018	02/16/2018				
						M2	1	08/15/2017	08/22/2017				08/22/2017
						M1	2	07/26/2017	07/31/2017				07/31/2017
						M1	1	06/26/2017	07/14/2017				
09-SF-0200	0	Brandon Scott				BA4655187		MD 147	Glen Arm Rd / Mt Vista Rd Roundabout				
						IN-EX	1	11/16/2017	02/15/2018				
						M1	1	01/09/2017	01/19/2017				01/19/2017
10-SF-0099	0	Brandon Scott				PG3975172		MD 210	New Bald Eagle Road Improvements				
						IN-EX	1	09/23/2015	12/16/2015				
10-SF-0402	0	Brandon Scott		Chad Thornton	OHD	FR5715170		US 15	Monacacy Blvd Interchange				
						M3	2	04/12/2018	04/27/2018				04/27/2018
						M3	1	03/12/2018	04/04/2018				
						M2	1	06/20/2017	06/23/2017				06/23/2017
						M1	2	05/09/2017	06/01/2017				06/01/2017
						M1	1	03/28/2017	04/17/2017				
11-SF-0104	0	Brandon Scott				PG1085182		MD 4	Formerly PG1085174				
						IN-EX	1	12/07/2017	12/07/2017				
11-SF-0189	0	Brandon Scott				PG1755170		MD 5	MD 5 at Brandywine Road and MD 373				
						M4	1	06/22/2018	07/16/2018				
						IN-EX	1	05/08/2018	05/08/2018				
						M3	1	04/18/2018	05/10/2018				05/10/2018
						M2	3	01/18/2018	02/05/2018				02/05/2018
						M2	2	12/14/2017	01/03/2018				
						M2	1	10/16/2017	10/31/2017				
						M1	1	10/10/2017	10/31/2017				
11-SF-0368	0	Brandon Scott				BA4625280		I 695	Over Milford Mill Road				
						M2	1	06/09/2017	06/13/2017				06/13/2017
						M1	2	04/24/2017	04/26/2017				04/26/2017
						M1	1	04/11/2017	04/20/2017				
12-SF-0079	0	Brandon Scott				CL3415184R		MD 30	Hampstead Streetscape				
						M1	2	01/17/2018	01/19/2018				01/19/2018
						M1	1	01/08/2018	01/10/2018				
12-SF-0091	0	Brandon Scott				HO4745130		MD 97	Burntwoods Road				
						M1	1	05/01/2017	05/15/2017				05/15/2017

MDE SF Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
12-SF-0211	0	Brandon Scott		Chau Chiem	D5	SM2235187		MD 234	Clements Roundabout MD 234 at MD 242				
						M1	2	10/31/2017	11/16/2017				11/16/2017
						M1	1	09/28/2017	10/10/2017				
12-SF-0306	0	Brandon Scott				HA3485770R		US 40	At MD 7 and MD 159				
						IN-EX	1	02/20/2018	06/28/2018				
						M1	1	08/03/2017	08/07/2017				08/07/2017
12-SF-0332	0	Brandon Scott				HA3415187		MD 22	MD 22 (Churchville Road) from Prospect Mill Road to Thomas Run Road (Site 1) and Thomas Run Road to MD				
						IN-EX	1	01/09/2018	02/01/2018				
12-SF-0335	0	Brandon Scott				PG7805270		MD 337	South of I-95/I-495 to North of Suitland Parkway				
						IN-EX	1	05/11/2017	05/18/2017				
12-SF-0372	0	Brandon Scott				AA2265130		MD 258	MD 258 at MD 794 Intersection Improvements				
						IN-EX	1	02/20/2018	05/17/2018				
13-SF-0068	0	Brandon Scott		Ryan Doran	OED	AT0875282		VAR	TMDL Retrofits in Anne Arundel County				
						M1	1	03/14/2018	03/28/2018				03/28/2018
13-SF-0071	0	Brandon Scott				MO3515172R		I 270	At Watkins Mill Road Extended				
						M1	2	08/22/2017	08/29/2017				08/29/2017
						M1	1	08/02/2017	08/11/2017				
13-SF-0080	0	Brandon Scott				CE4465280		MD 272	Replacement of Bridge 7036 on MD 272 over Amtrak				
						M1	1	01/24/2017	01/27/2017				01/27/2017
13-SF-0190	0	Brandon Scott				BA8165284		US 40	At Mohrs Lane				
						IN-EX	1	05/18/2017	06/09/2017				
						M1	1	05/08/2017	05/19/2017				05/19/2017
13-SF-0264	0	Brandon Scott				FR3505184		US 40A	Ivy Hill Dr to Middletown Pkwy				
						M4	1	04/06/2018	04/27/2018				04/27/2018
						IN-EX	1	02/14/2018	02/15/2018				
						M3	1	07/31/2017	08/15/2017				08/15/2017
						M2	1	02/10/2017	02/13/2017				02/13/2017
						M1	1	01/12/2017	02/02/2017				02/02/2017
13-SF-0331	0	Brandon Scott				CL4355187		MD 140	WMC Drive to Meadow Branch/Royer Road				
						M2	1	05/01/2017	05/12/2017				05/12/2017
						M1	2	04/21/2017	04/25/2017				04/25/2017
						M1	1	03/09/2017	03/20/2017				
14-SF-0011	0	Brandon Scott				FR1245187		MD 180	MD 180 / MD 351 from Crestwood Blvd to Structure No. 10149 - Geometric Improvements in Frederick County				
						IN-EX	1	02/21/2018	02/22/2018				
14-SF-0016	0	Brandon Scott				CE3865176		MD 273	MD 273 and Blue Ball Road Roundabout				
						IN-EX	1	02/28/2018	05/03/2018				
						M1	1	11/03/2017	11/27/2017				11/27/2017
14-SF-0043	0	Brandon Scott				MO1505188		MD 187	Lincoln Drive to Charles Street, Bethesda Trolley Trail				
						IN-EX	1	05/18/2017	06/09/2017				
						M1	2	03/24/2017	03/30/2017				03/30/2017
						M1	3	03/13/2017	03/30/2017				
						M1	1	02/07/2017	02/28/2017				

MDE SF Projects - Reporting Period July 1, 2017 through June 30, 2018

PRD#	Phase	PRD TL	HHD Liaison	SHA PM	Lead Office	Stage	Sub	Received	Comment/ Approval	Concept Approved	Site Dev Approved	Final Approved	Mod Approved
14-SF-0060	0	Brandon Scott				BA4585172		I 695	MD 41 to MD 147				
						M2	1	05/08/2017	05/09/2017				05/09/2017
						M1	2	03/30/2017	04/18/2017				04/18/2017
						M1	1	03/16/2017	03/22/2017				
14-SF-0092	0	Brandon Scott				AA0935174		MD 450	Near War Memorial				
						M1	1	02/02/2017	02/14/2017				02/14/2017
14-SF-0126	0	Brandon Scott				MO2405180		MD 195	Bridge 1503300				
						FIN-EXT	1	05/11/2017	05/11/2017				
14-SF-0129	0	Brandon Scott				BA3665170		I 695	Inner Loop over Benson Ave, Leeds Ave, AMTRAK, and US 1				
						M2	1	01/25/2018	02/07/2018				02/07/2018
						M1	2	07/21/2017	07/25/2017				07/25/2017
						M1	1	06/29/2017	07/14/2017				
14-SF-0142	0	Brandon Scott				CE4495176		MD 281	MD 281 at Muddy Branch in Cecil County - Proposed Geometric Improvements - Roundabout				
						FIN-EXT	1	04/28/2017	05/09/2017				
14-SF-0242	0	Brandon Scott				CE3875176		MD 273	MD 273 at Appleton Roundabout				
						FIN-EXT	1	04/28/2017	05/09/2017				
14-SF-0317	0	Brandon Scott				CE2915379		MD 272	MD 272 from Irishtown Road to Church Street - Sidewalk Project in Cecil County				
						FIN-EXT	1	02/20/2018	02/22/2018				
14-SF-GA02	0	Brandon Scott				XX6675133		Varies Varies	MD 648 ADA upgrades from MD 3 to MD 2				
						M1	1	01/13/2017	01/13/2017				
15-SF-0053	0	Brandon Scott				PG9795277		I 595	I-595 WB from South of Lottsford Vista Road to the Anne Arundel County Line Resurfacing and Rehabilitation				
						FIN-EXT	1	04/11/2018	04/12/2018				
15-SF-0083	0	Brandon Scott				BA2635377		I 95	I-95 Howard County Line to US 1 (Southwestern Boulevard) Safety and Resurfacing in Baltimore County				
						FIN-EXT	1	01/03/2018	02/22/2018				
15-SF-0084	0	Brandon Scott				BA0235177		MD 122	MD 122 (Security Boulevard) from I-695 (Baltimore Beltway) to Baltimore City Line Safety and Resurfacing				
						FIN-EXT	1	05/17/2018	06/21/2018				
15-SF-0103	0	Brandon Scott				BA7275172		I 695	I-695 Outer Loop Widening Phase 2B - From MD 144 to South of US 40				
						M1	3	05/17/2018	05/23/2018				05/23/2018
						M1	2	03/30/2018	04/16/2018				
						M1	1	10/03/2017	10/17/2017				
						FIN-EXT	1	06/13/2017	06/13/2017				
15-SF-0106	0	Brandon Scott				AX7665182		Varies Varies	TMDL				
						FIN-EXT	1	06/01/2017	06/09/2017				
						M1	1	05/18/2017	05/22/2017				
15-SF-0115	0	Brandon Scott				BA8105180		MD 25	Bridge 0301900				
						FIN-EXT	1	05/11/2017	05/11/2017				
15-SF-0156	0	Brandon Scott				HO4885126		I 95	Noise Abatement Barrier I-95 NB from Montgomery Road to I-895				
						FIN-EXT	1	10/10/2017	10/19/2017				
15-SF-0188	0	Brandon Scott				PG0735182		MD 210	MD 210 Outfall Structure and Channel Stabilization for TMDL				
						FIN-EXT	1	05/24/2017	06/09/2017				

2.2 Water Quality Bank Debits

FY 2018 - Debits to the WQ Bank

PRD No.	Phase/Site /Package	Contract No.	Fund	Route	Name	Debit (ac)	Justification
15-PR-0013	2	WO1645174	74	MD 346	MD 346 AND MD 589	-0.05	Minor Imp Surf Increase
15-PR-0040	1	MO3755277	77	US 29	MD 97 TO ST ANDREWS WAY	-0.07	Minor Imp Surf Increase
15-PR-0042	1	WA1065184	84	MD 845A	SOUTH CORPORATE LIMITS OF KEEDYSVILLE TO NORTH CORPORATE TOWN LIMITS	-0.62	ESD facilities insufficient
15-PR-0057	1	AA1805179	79	MD 424	DUKE OF KENT DRIVE TO MD 450 (DEFENSE HIGHWAY) - PHASE 2	-0.07	ESD facilities insufficient
15-PR-0057	1	AA1805179	79	MD 424	DUKE OF KENT DRIVE TO MD 450 (DEFENSE HIGHWAY) - PHASE 2	-0.14	ESD facilities insufficient
15-PR-0060	1	CA4135370	70	MD 2/4	IHB - FOX RUN BOULEVARD TO MD 231 (PHASE 2)	-1.18	ESD facilities insufficient
15-PR-0082	1	MO9445177	77	MD 185	NORTH OF MD 410 TO MANOR ROAD	-0.07	Minor Imp Surf Increase
15-PR-0094	1	PG0365177	77	US 301	PEERLESS AVENUE TO MSP WEIGH STATION	-0.01	Minor Imp Surf Increase
15-PR-0114	1	FR1025180	80	MD 478	BRIDGE 1008900 OVER BRANCH OF POTOMAC RIVER	-0.18	ESD facilities insufficient
16-PR-0098	1	SO1925187	87	MD 235	ACCESS ROAD TO WOODLAND ACRES	-0.01	ESD facilities insufficient
16-PR-0134	1	FR1325180	80	MD 355	IHB - BRIDGE 1008600 OVER BENNETT CREEK	-0.86	Temporary debit
16-PR-0146	1	HO1375177	77	I 70 WB	STRUCTURE 13054 TO BALTIMORE COUNTY LINE	-0.06	Minor Imp Surf Increase
16-PR-0146	1	HO1375177	77	I 70 WB	STRUCTURE 13054 TO BALTIMORE COUNTY LINE	-0.11	Minor Imp Surf Increase
17-PR-0003	1	BA1425277	77	MD 140	IHB - MILFORD MILL ROAD TO THE BALTIMORE COUNTY/CITY LINE	-0.02	Minor Imp Surf Increase
17-PR-0006	1	SO2125180	80	MD 364	BRIDGE 1901000 OVER DIVIDING CREEK	-0.05	Minor Imp Surf Increase
17-PR-0011	1	HA4625130	30	MD 23	AT GRAFTON SHOP ROAD	-0.02	Minor Imp Surf Increase
17-PR-0019	1	FR6795177	77	I 70	EAST OF MD 75 TO STRUCTURE 10183 OVER MONOCACY RIVER	-0.08	Minor Imp Surf Increase

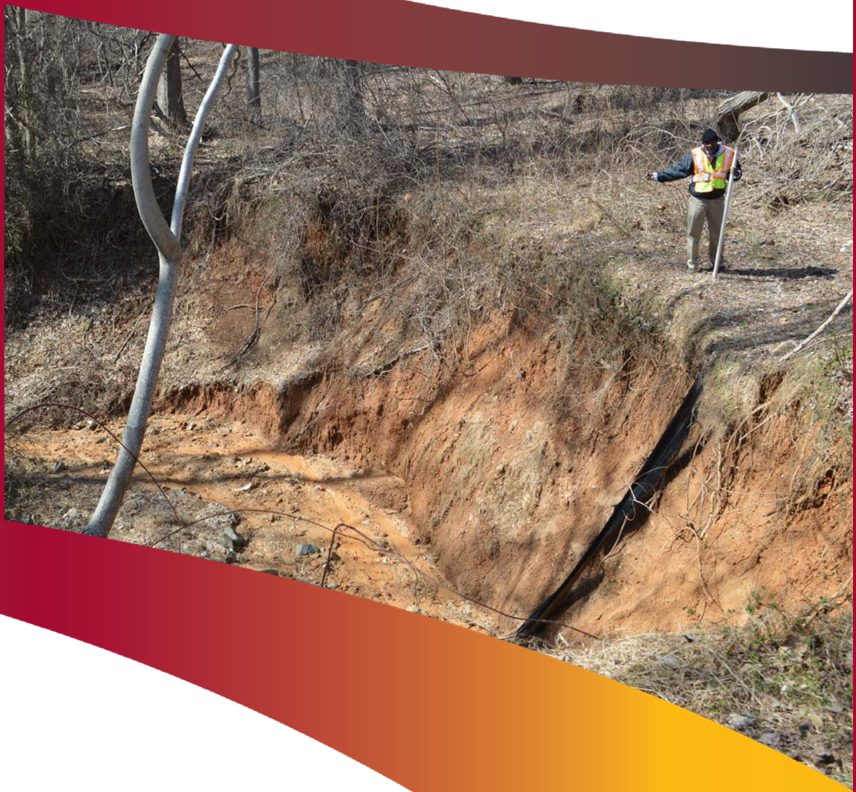
PRD No.	Phase/Site /Package	Contract No.	Fund	Route	Name	Debit (ac)	Justification
17-PR-0028	1	BA0385180	80	I 83	IHB - BRIDGE 03062 OVER PADONIA ROAD	-0.81	Temporary debit
17-PR-0030	1	AL2975180	80	MD 36	IHB - BRIDGE 0100800 OVER JENNINGS RUN	-0.02	Minor Imp Surf Increase
17-PR-0032	0	PG6245171	71	US 1	IHB - COLLEGE AVENUE/REGENTS DRIVE TO MD 193 (UNIVERSITY BOULEVARD)	-0.75	ESD facilities insufficient
17-PR-0054	1	PG5725280	80		BRIDGE 1616600 OVER I-95/495	-0.03	Minor Imp Surf Increase
17-PR-0064	1	WI1675176	76	US 50	AT SIXTY FOOT ROAD	-0.16	ESD facilities insufficient
17-PR-0065	1	XX5345133	33	MD 253	Sidewalk Improvements from MD 253 to MD 2	-0.09	Minor Imp Surf Increase
17-PR-0072	0	MO1505388	88	MD 124	DOSH DRIVE TO MD 117	-0.11	ESD facilities insufficient
17-PR-0083	1	FR1335180	80	MD 28	IHB - BRIDGE 1002900 OVER MONOCACY RIVER	-0.03	Temporary debit
17-PR-0107	1	PG0505177	77	US 1	OAK STREET TO HOWARD COUNTY LINE	-0.04	Minor Imp Surf Increase
17-PR-0112	1	PG6985280	80	I 95	IHB - BRIDGE 1616005 AND 1616006 OVER SUITLAND PARKWAY	-5.38	Temporary debit
17-PR-0122	1	XX5355133	33	MD 528	ADA Sidewalk Improvements from 16th Street to 30th Street	-0.04	Minor Imp Surf Increase
17-PR-0145	1	QA2915180	80	MD 213	BRIDGES OVER GRAVEL RUN AND OLD MILL STREAM	-0.06	Minor Imp Surf Increase
17-PR-0197	1	XY2425277	77	MD 333	from MD 322 (Easton Parkway) to Idlewild Avenue	-0.01	Minor Imp Surf Increase
					Total Debits for FY 2018	-11.13	

2.3 Agency Meeting Summary

PRD/MDE No.	Contract No. Road Description	Meeting Date	Meeting Summary (See Data Drive for copies of meeting materials)
16-PR-0134	FR1325180 MD 355: Br 1008600 over Bennett Creek	9/20/17	An agency update meeting was held on September 20, 2017. Approximately 34 people attended, including representatives from MDP, DNR, MDE, MNCPPC, MHT, FHWA, EPA, USACE and USFWS. The presentation provided an update on the project, specifically the redesign/relocation of proposed SWM facilities to minimize the overall environmental impacts. MDE requested that the further detail be included in the environmental document discussing all SWM alternatives considered for the project and why individual alternatives were rejected. This would help justify the decision and the permanent wetland impacts from the stormwater facility locations would go into the mitigation requirement. MDE also the plans be revised to clearly define areas within the LOD that are only considered as temporary impacts so the mitigation requirements are clear. EPA asked if the northern section of the project was considered for implementing SWM facilities. The project team stated that the area was considered, but eliminated due to steep slopes. USACE and MDE initiated discussion on the project's mitigation ratio. It was not determined yet whether a 2:1 or 4:1 ratio would be required for the project. MDOT SHA plans to move forward with the assumption of a 4:1 mitigation ratio.
17-PR-0090	HO7565370 MD 32: Linden Church Rd to I-70 Phase 2	9/20/17	An agency update meeting was held on September 20, 2017. Approximately 34 people attended, including representatives from MDP, DNR, MDE, MNCPPC, MHT, FHWA, EPA, USACE and USFWS. The update included discussion on wetland/waterway impacts and proposed culvert work. USFWS asked about the size of the drainage areas to the culverts. MDOT SHA stated that H&H modeling is not yet finalized, but the most significant structure has a ½ mile DA. It was noted by MDE and DNR that any update to impact numbers would need to go back on public notice. There was also discussion between MDOT SHA and USACE regarding proposed stream restoration of 1,000 linear feet of Terrapin Branch that is included in the MD 32 Corridor study. MDOT SHA proposes to defer this construction to be included with the I-70 / MD 32 interchange. USACE agreed to review this request with respect to the Corridor study permit.

PRD/MDE No.	Contract No. Road Description	Meeting Date	Meeting Summary (See Data Drive for copies of meeting materials)
17-PR-0090	HO7565370 MD 32: Linden Church Rd to I-70 Phase 2	11/15/17	An agency update meeting was held on November 15, 2017. Approximately 35 people attended, including representatives from MDP, DNR, MDE, MNCPPC, MHT, FHWA, EPA, and USFWS. The presentation focused on updates to the wetland / waterway impacts from the approved corridor permit, including the proposed Middle Patuxent River relocation. MDOT SHA noted that a new wetland delineation resulted in additional wetlands being identified in the corridor, which results in an increase of potential impacts. MDOT SHA discussed the potential relocation of the Middle Patuxent River from the edge of the floodplain to a location closer to the center of the floodplain. This design is intended to be beneficial for both the proposed structure (less shear stress) and the environment (near the natural low point). MDE noted that they have not yet verified if all the new wetlands that were delineated are regulated, so impacts may not increase as much as currently shown. MDE also suggested that any new mitigation sites be discussed separately with MDE before the design progresses too far. USFWS asked if the concept of the stream relocation was a floodplain reconnect or more of a transport system. MDOT SHA that there seems to be a sediment supply problem and that the channel will be sized to allow for sufficient floodplain to manage accumulation of woody debris, but not scour the bridge. The project team will also look for opportunities to create additional habitats. USFWS also asked if a goal of the channel relocation was to create a low enough floodplain to create a low enough bench but maintain sediment transport through the channel. MDOT SHA concurred.

Appendix B



Restoration Accounting Methodology

Appendix B

Appendix B

Restoration Accounting Methodology

MARYLAND DEPARTMENT OF TRANSPORTATION™

STATE HIGHWAY ADMINISTRATION

Table of Contents

1.0 Introduction

1.1 Purpose

The vision of this document is to detail the technical process of calculating restoration impervious area credit (IAC) using the MDE MS4 geodatabase, so that MDOT SHA can provide a clear basis of understanding for how the IAC value is calculated for restoration treatment across each of the implemented strategies. The MDE MS4 geodatabase does not explicitly provide a method to report the IAC *and* all core input values for each strategy.

The process and methodology to calculate IAC for each strategy, based on parameters reported within the MDE MS4 geodatabase, is the subject of this document.

1.2 Restoration Treatment Timeframe Determination

MDOT SHA's jurisdiction is linear in nature, which means that it crosses many other jurisdictions and watershed. This limits the ability to have consistency in the imagery and datasets used to compile the impervious surface data because the information available for each jurisdiction varies by date and quality. For this reason, the year for MDOT SHA impervious baseline varies across the geographic jurisdictions. The MDOT SHA impervious baseline years range from 2002 to 2005 and are presented in Table 1 for each MS4 county. MDOT SHA restoration credit is represented by any restoration BMP implemented on or after October 21, 2010.

Table 1: Impervious Baseline Dates by County

County	Baseline Date
Anne Arundel	12/31/2005
Baltimore	12/31/2005
Carroll	12/31/2005
Cecil	12/31/2005
Charles	12/31/2004
Frederick	12/31/2005
Harford	12/31/2004
Howard	12/31/2002
Montgomery	12/31/2004
Prince George's	12/31/2005
Washington	12/31/2005

MDOT SHA determined restoration treatment provided after the baseline year based upon the following fields within the MDE MS4 geodatabase for each strategy that MDOT SHA has implemented:

Strategy	MDE MS4 Geodatabase Feature Class	Baseline/Restoration Determining Field
Outfall Stabilization	AltBMPLine	IMPL_COMP_YR
Stream Restoration*	AltBMPLine	IMPL_COMP_YR
Tree Planting*	AltBMPPoly	IMPL_COMP_YR
Impervious Removal	AltBMPPoly	IMPL_COMP_YR
Street Sweeping	AltBMPPoly	IMPL_COMP_YR
Inlet Cleaning	AltBMPPoly	IMPL_COMP_YR
Stormwater*	BMP_POI RestBMP	BMP.BUILT_DATE RestBMP.INSTALL_DATE

**By nature of the MDE MS4 geodatabase entity in which it is located, a Stormwater BMP, Stream Restoration and Tree Planting BMP can be determined to be baseline or restoration. The focus of this document will be on the RestBMP feature class.*

To quickly identify restoration treatment for each BMP in the MDE MS4 geodatabase, MDOT SHA has used comment and description fields available within the MDE MS4 geodatabase to insert text that identifies the feature as restoration. The process to identify restoration credit and calculate the impervious credit provided is detailed for each strategy below.

1.3 Restoration Impervious Accounting

In June 2018, MDOT SHA delivered to MDE a complete reassessment of the baseline impervious accounting, 20 percent impervious restoration goal, and detailed responses to the specific comments included in MDE Attachment II. MDOT SHA tracks restoration progress achieved by implementation strategy and reports the impervious treatment credit (acres) accomplished during the reporting period in the Annual Report and the MDE MS4 geodatabase. The restoration progress is tracked annually in accordance with compliance to the MDOT SHA 2016 Implementation Plan.

The restoration treatment (acres) accomplished by strategy type for the timeframes between the variable baseline year though FY2018 is presented in Table 1-27 in Section E.4.a within Part One of the Third Annual Report dated October 9, 2018. The table is provided below for reference. The goal of this document will be to guide MDE to replicate each of the impervious credit numbers presented below using the MDE MS4 Geodatabase and GIS step-by-step procedures to generate the same results.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

Note: This Table can be found in Section E.4.a within Part One of MDOT SHA's 2018 MS4 Annual Report as Table 1-27

The procedures for performing this restoration impervious accounting are detailed below.

2.0 Restoration Stormwater BMPs

Calculating the impervious treatment credit for Stormwater BMPs requires three (3) primary inputs:

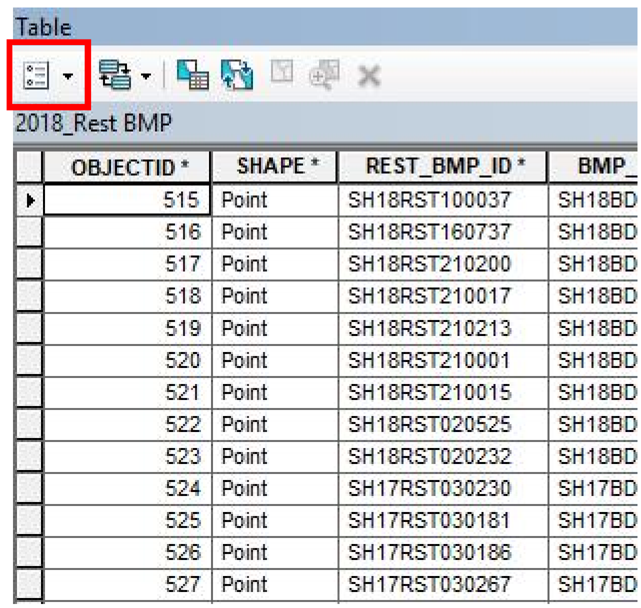
- Impervious acres, from within the MDE MS4 geodatabase (RestBMP feature class' IMP_ACRES field)
- PE treated factor, from within the MDE MS4 geodatabase (RestBMP feature class' PE_ADR field)
- Impervious Area equivalent factor, from Table 7 of MDE's August 2014 guidance (1.0 for stormwater BMPs)

2.1 Stormwater BMPs - Restoration IAC Calculation

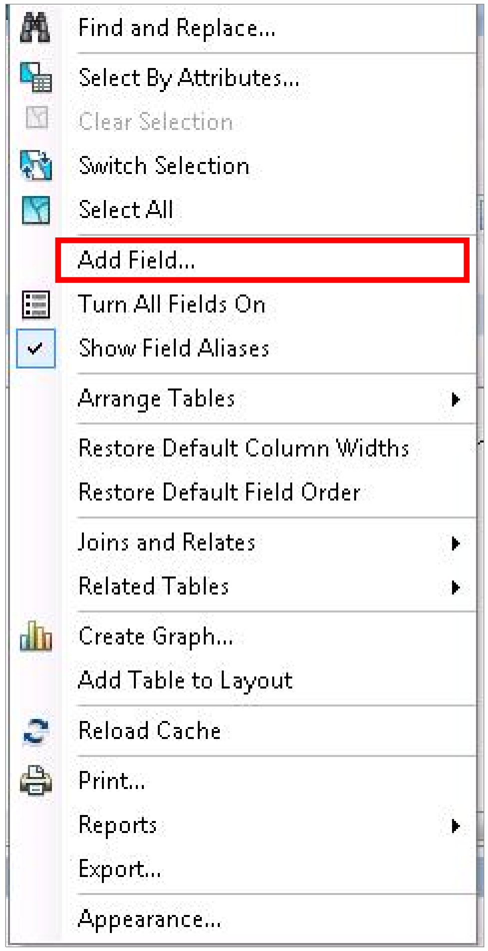
Because multiple inputs and a complex equation are required to calculate IAC for restoration stormwater BMPs, this example will add a new, temporary field to the RestBMP feature class. This process could also be done in Excel after exporting the RestBMP feature class (the calculation of IAC in Excel is not described within this document).

2.1.1 Add New IAC Field

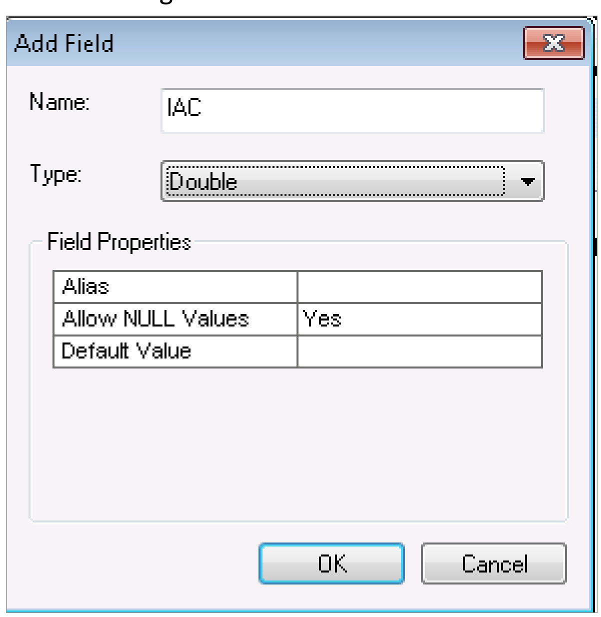
- Within the RestBMP attribute table, click the Table Options button, and select "Add Field…"



OBJECTID *	SHAPE *	REST_BMP_ID *	BMP_
515	Point	SH18RST100037	SH18BD
516	Point	SH18RST160737	SH18BD
517	Point	SH18RST210200	SH18BD
518	Point	SH18RST210017	SH18BD
519	Point	SH18RST210213	SH18BD
520	Point	SH18RST210001	SH18BD
521	Point	SH18RST210015	SH18BD
522	Point	SH18RST020525	SH18BD
523	Point	SH18RST020232	SH18BD
524	Point	SH17RST030230	SH17BD
525	Point	SH17RST030181	SH17BD
526	Point	SH17RST030186	SH17BD
527	Point	SH17RST030267	SH17BD



- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK".



2.1.2 Calculate IAC Where Pe <= 1

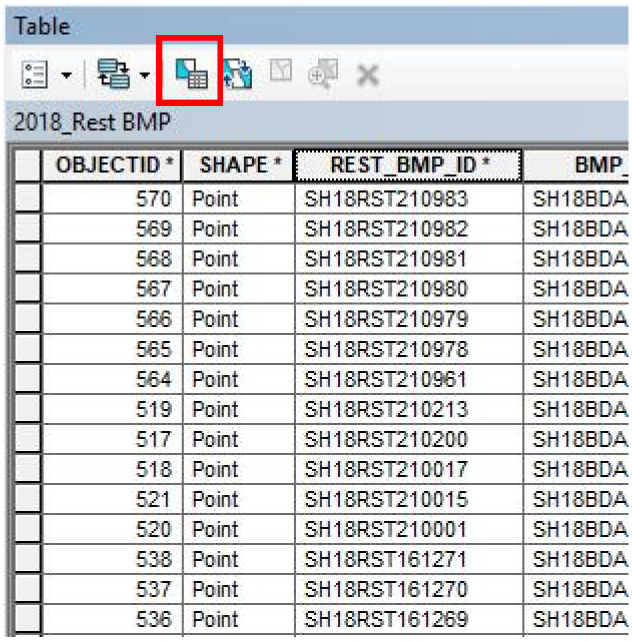
For new stormwater and grass swale projects deriving the IAC is performed through a series of calculations. Because the IAC calculation differs where the Pe value is less than or equal to 1, from when the Pe value is greater than 1, the calculation of IAC will be performed twice – once for each Pe range. This section will serve to calculate the IAC for all features, however, the next section will allow for a breakdown by strategy and year to determine the total

The IAC formula where Pe <= 1 is as follows:

IAC = Pe x IA

Select where Pe <= 1

- Within the RestBMP attribute table, click the Select by Attributes button. The Select Attributes window will appear.



Table

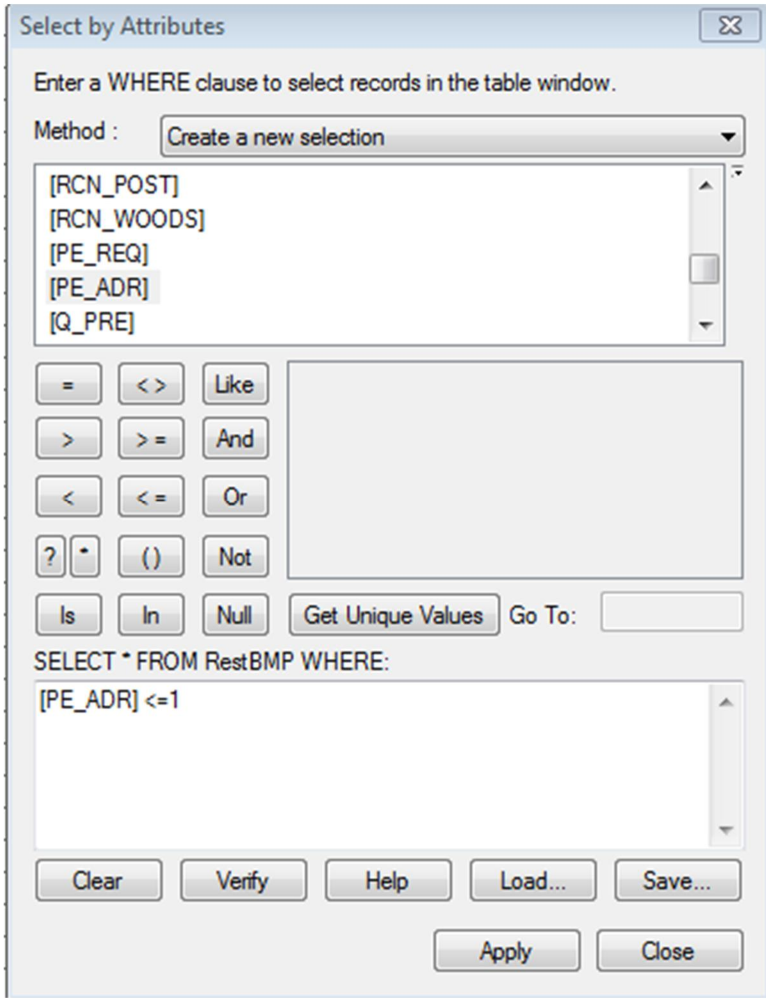
2018_Rest BMP

OBJECTID *	SHAPE *	REST_BMP_ID *	BMP_
570	Point	SH18RST210983	SH18BDA
569	Point	SH18RST210982	SH18BDA
568	Point	SH18RST210981	SH18BDA
567	Point	SH18RST210980	SH18BDA
566	Point	SH18RST210979	SH18BDA
565	Point	SH18RST210978	SH18BDA
564	Point	SH18RST210961	SH18BDA
519	Point	SH18RST210213	SH18BDA
517	Point	SH18RST210200	SH18BDA
518	Point	SH18RST210017	SH18BDA
521	Point	SH18RST210015	SH18BDA
520	Point	SH18RST210001	SH18BDA
538	Point	SH18RST161271	SH18BDA
537	Point	SH18RST161270	SH18BDA
536	Point	SH18RST161269	SH18BDA

- Within the Select by Attributes dialog window, enter the following selection statement to identify BMPs where the Pe addressed is less than or equal to 1, and click “Apply”:

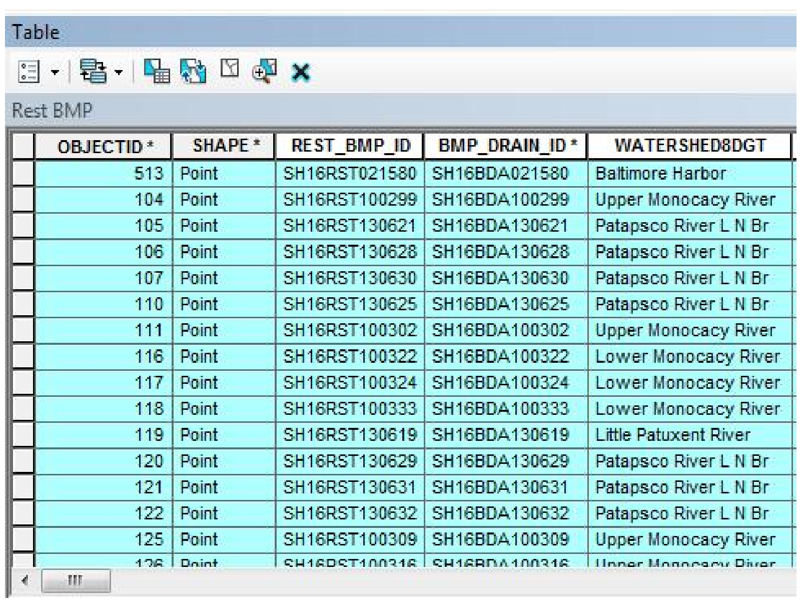
  [PE_ADR] <= 1

  Selecting these records will ensure that when the IAC calculation is applied, it is done so for the correct BMPs, based upon Pe value.

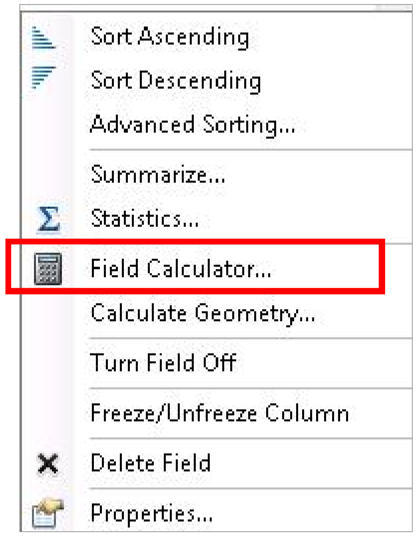


Calculate IAC for Pe <= 1

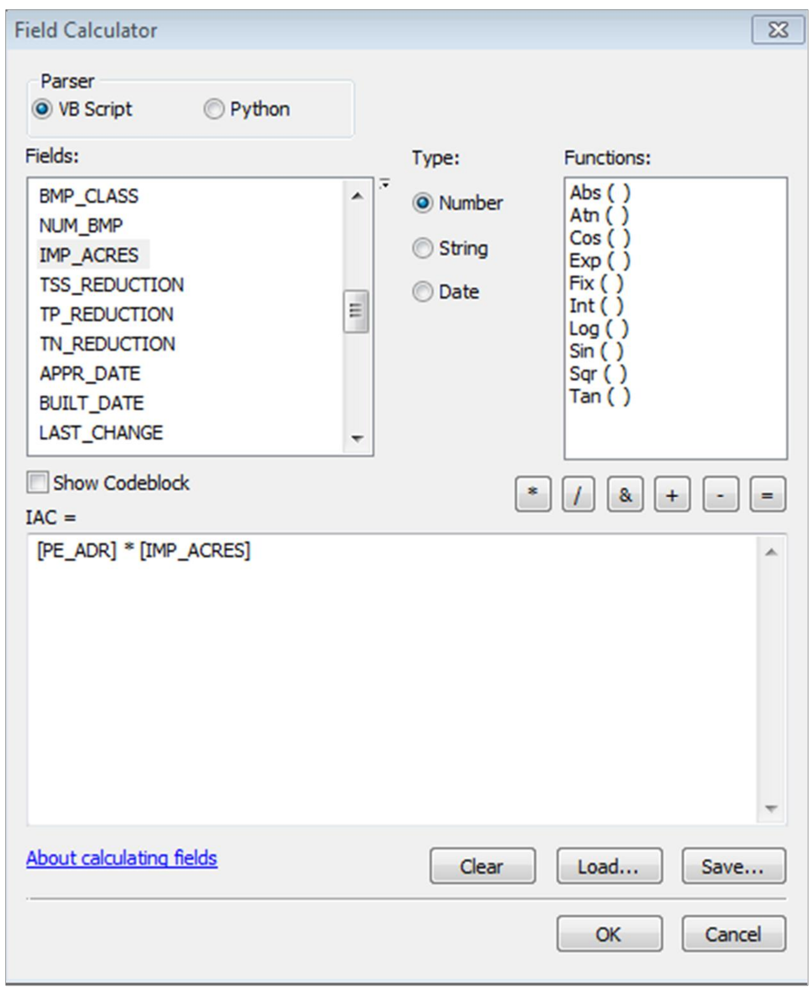
- Ensuring that the selection is retained, right click on the new IAC field, and select “Field Calculator…”



OBJECTID *	SHAPE *	REST_BMP_ID	BMP_DRAIN_ID *	WATERSHED8DGT
513	Point	SH16RST021580	SH16BDA021580	Baltimore Harbor
104	Point	SH16RST100299	SH16BDA100299	Upper Monocacy River
105	Point	SH16RST130621	SH16BDA130621	Patapsco River L N Br
106	Point	SH16RST130628	SH16BDA130628	Patapsco River L N Br
107	Point	SH16RST130630	SH16BDA130630	Patapsco River L N Br
110	Point	SH16RST130625	SH16BDA130625	Patapsco River L N Br
111	Point	SH16RST100302	SH16BDA100302	Upper Monocacy River
116	Point	SH16RST100322	SH16BDA100322	Lower Monocacy River
117	Point	SH16RST100324	SH16BDA100324	Lower Monocacy River
118	Point	SH16RST100333	SH16BDA100333	Lower Monocacy River
119	Point	SH16RST130619	SH16BDA130619	Little Patuxent River
120	Point	SH16RST130629	SH16BDA130629	Patapsco River L N Br
121	Point	SH16RST130631	SH16BDA130631	Patapsco River L N Br
122	Point	SH16RST130632	SH16BDA130632	Patapsco River L N Br
125	Point	SH16RST100309	SH16BDA100309	Upper Monocacy River
126	Point	SH16RST100316	SH16BDA100316	Upper Monocacy River



- Within the Field Calculator dialog window, enter the following calculation, and click "OK":
  [PE_ADR] * [IMP_ACRES]



2.1.3 Calculate IAC Where Pe > 1

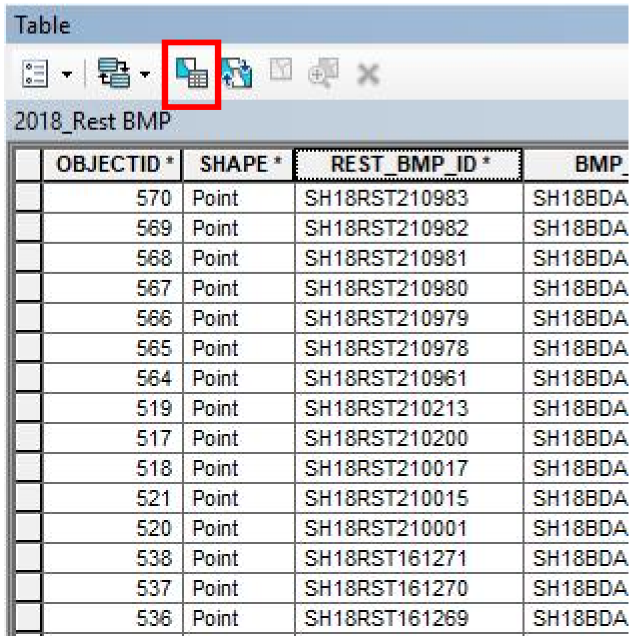
Because the IAC calculation differs where the Pe value is less than or equal to 1, from when the Pe value is greater than 1, the calculation of IAC will be performed twice – once for each Pe range.

The IAC formula where Pe > 1 is as follows:

IAC = IA x [((Pe – 1)/0.4) x 0.1] + IA

Select where Pe > 1

- Within the RestBMP attribute table, click the Select by Attributes button.



Table

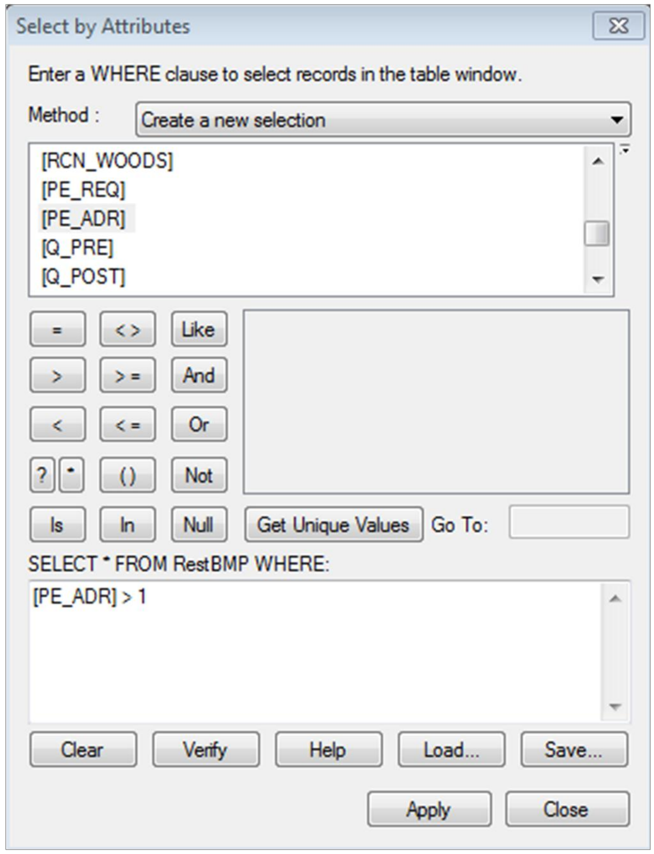
2018_Rest BMP

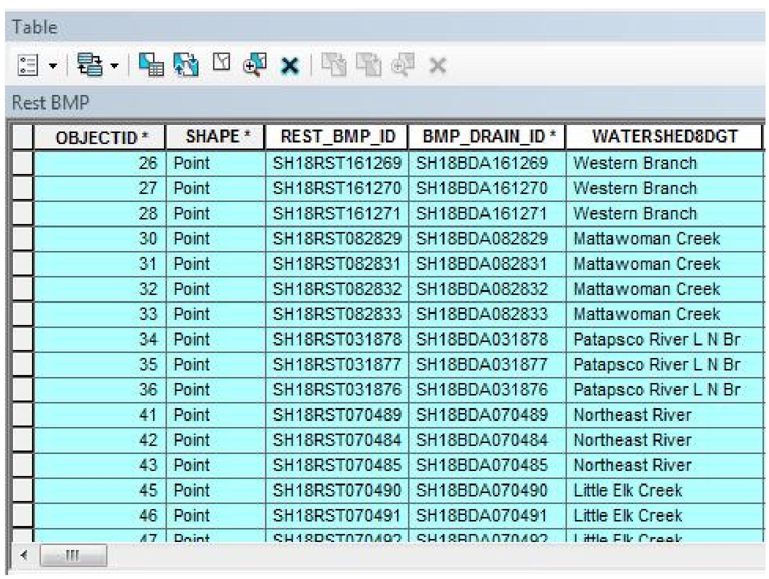
OBJECTID *	SHAPE *	REST_BMP_ID *	BMP_
570	Point	SH18RST210983	SH18BDA
569	Point	SH18RST210982	SH18BDA
568	Point	SH18RST210981	SH18BDA
567	Point	SH18RST210980	SH18BDA
566	Point	SH18RST210979	SH18BDA
565	Point	SH18RST210978	SH18BDA
564	Point	SH18RST210961	SH18BDA
519	Point	SH18RST210213	SH18BDA
517	Point	SH18RST210200	SH18BDA
518	Point	SH18RST210017	SH18BDA
521	Point	SH18RST210015	SH18BDA
520	Point	SH18RST210001	SH18BDA
538	Point	SH18RST161271	SH18BDA
537	Point	SH18RST161270	SH18BDA
536	Point	SH18RST161269	SH18BDA

- Within the Select by Attributes dialog window, enter the following selection statement to identify BMPs where the Pe addressed is greater than 1, and click “Apply”:

  [PE_ADR] > 1

  Selecting these records will ensure that when the IAC calculation is applied, it is done so for the correct BMPs, based upon Pe value.





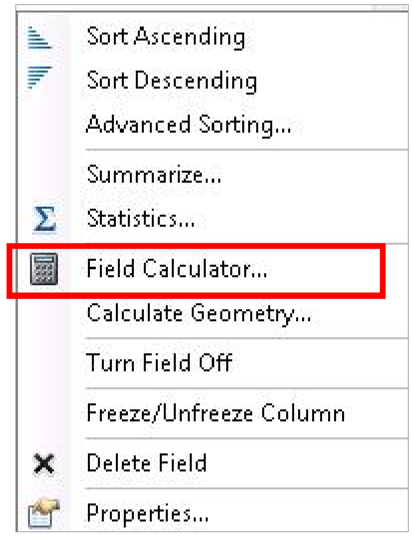
Table

Rest BMP

OBJECTID *	SHAPE *	REST_BMP_ID	BMP_DRAIN_ID *	WATERSHED8DGT
26	Point	SH18RST161269	SH18BDA161269	Western Branch
27	Point	SH18RST161270	SH18BDA161270	Western Branch
28	Point	SH18RST161271	SH18BDA161271	Western Branch
30	Point	SH18RST082829	SH18BDA082829	Mattawoman Creek
31	Point	SH18RST082831	SH18BDA082831	Mattawoman Creek
32	Point	SH18RST082832	SH18BDA082832	Mattawoman Creek
33	Point	SH18RST082833	SH18BDA082833	Mattawoman Creek
34	Point	SH18RST031878	SH18BDA031878	Patapsco River L N Br
35	Point	SH18RST031877	SH18BDA031877	Patapsco River L N Br
36	Point	SH18RST031876	SH18BDA031876	Patapsco River L N Br
41	Point	SH18RST070489	SH18BDA070489	Northeast River
42	Point	SH18RST070484	SH18BDA070484	Northeast River
43	Point	SH18RST070485	SH18BDA070485	Northeast River
45	Point	SH18RST070490	SH18BDA070490	Little Elk Creek
46	Point	SH18RST070491	SH18BDA070491	Little Elk Creek

Calculate IAC for Pe > 1

- Ensuring that the selection is retained, right click on the new IAC field, and select "Field Calculator…"



- Within the Field Calculator dialog window, enter the following calculation, and click "OK":

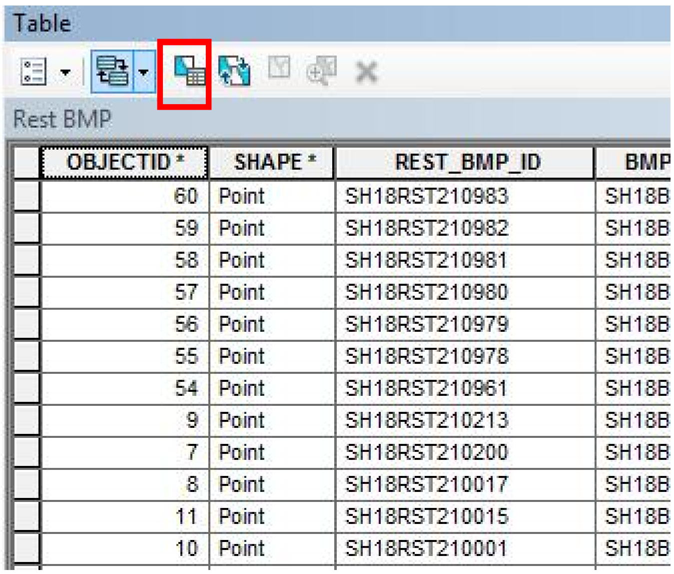
  ([IMP_ACRES] * ((([PE_ADR] - 1)/0.4) * 0.1)) + [IMP_ACRES]

2.1.4 Restoration BMPS IAC by Fiscal Year and Strategy

The IAC values for stormwater restoration BMPs by fiscal year and strategy can be summed using the process below.

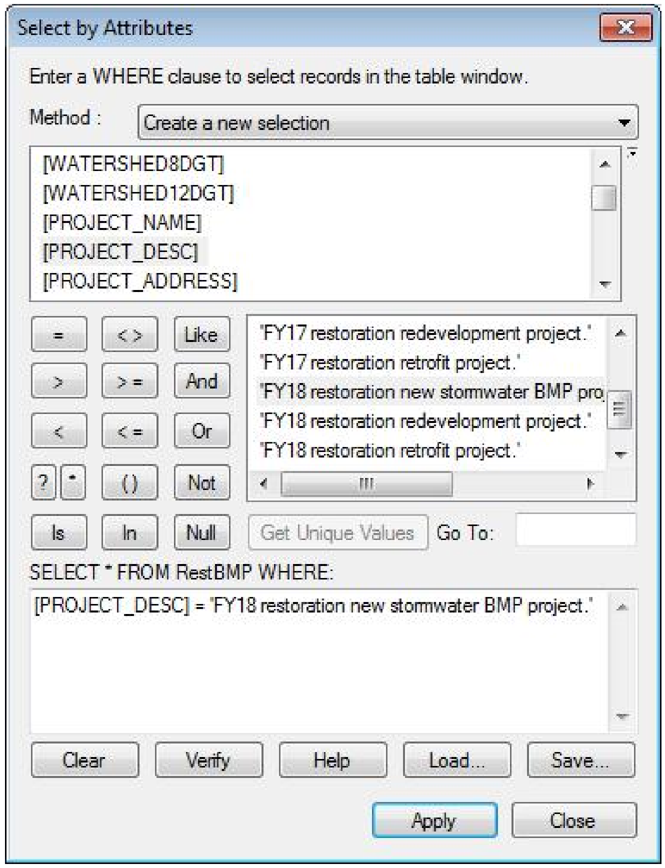
2.1.4.1 Restoration BMPS IAC for New Stormwater FY 2018

- Within the RestBMP attribute table, click the Select by Attributes button.

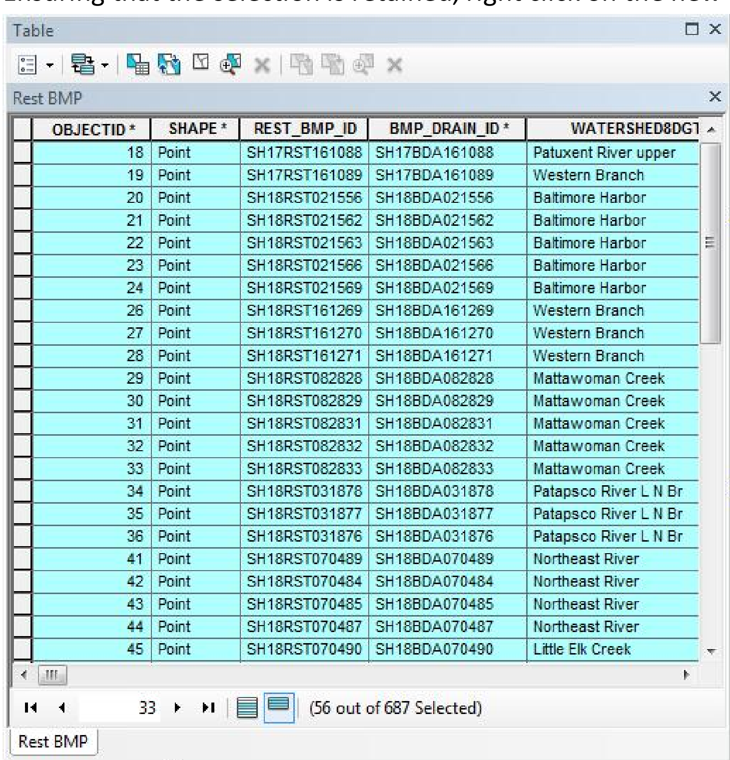


OBJECTID *	SHAPE *	REST_BMP_ID	BMP
60	Point	SH18RST210983	SH18B
59	Point	SH18RST210982	SH18B
58	Point	SH18RST210981	SH18B
57	Point	SH18RST210980	SH18B
56	Point	SH18RST210979	SH18B
55	Point	SH18RST210978	SH18B
54	Point	SH18RST210961	SH18B
9	Point	SH18RST210213	SH18B
7	Point	SH18RST210200	SH18B
8	Point	SH18RST210017	SH18B
11	Point	SH18RST210015	SH18B
10	Point	SH18RST210001	SH18B

- Within the Select by Attributes dialog window, enter the following selection statement to identify New Stormwater BMPs for FY 18, and click “Apply”:
  [PROJECT_DESC] = 'FY18 restoration new stormwater BMP project.'

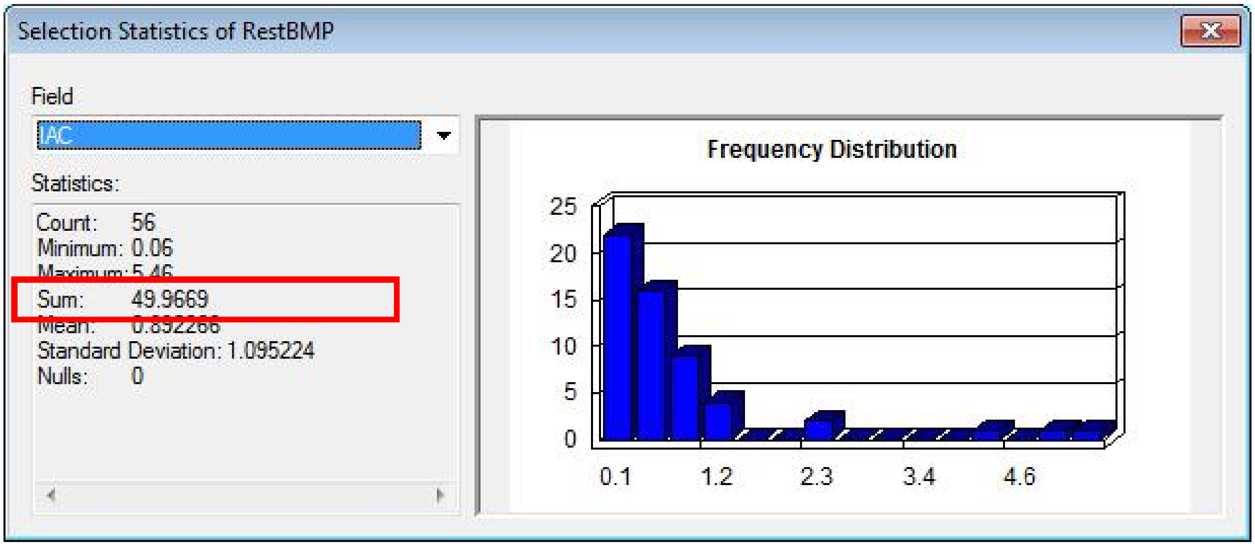


- Ensuring that the selection is retained, right click on the new IAC field, and select "Statistics…"



OBJECTID *	SHAPE *	REST_BMP_ID	BMP_DRAIN_ID *	WATERSHED8DGT
18	Point	SH17RST161088	SH17BDA161088	Patuxent River upper
19	Point	SH17RST161089	SH17BDA161089	Western Branch
20	Point	SH18RST021556	SH18BDA021556	Baltimore Harbor
21	Point	SH18RST021562	SH18BDA021562	Baltimore Harbor
22	Point	SH18RST021563	SH18BDA021563	Baltimore Harbor
23	Point	SH18RST021566	SH18BDA021566	Baltimore Harbor
24	Point	SH18RST021569	SH18BDA021569	Baltimore Harbor
26	Point	SH18RST161269	SH18BDA161269	Western Branch
27	Point	SH18RST161270	SH18BDA161270	Western Branch
28	Point	SH18RST161271	SH18BDA161271	Western Branch
29	Point	SH18RST082828	SH18BDA082828	Mattawoman Creek
30	Point	SH18RST082829	SH18BDA082829	Mattawoman Creek
31	Point	SH18RST082831	SH18BDA082831	Mattawoman Creek
32	Point	SH18RST082832	SH18BDA082832	Mattawoman Creek
33	Point	SH18RST082833	SH18BDA082833	Mattawoman Creek
34	Point	SH18RST031878	SH18BDA031878	Patapsco River L N Br
35	Point	SH18RST031877	SH18BDA031877	Patapsco River L N Br
36	Point	SH18RST031876	SH18BDA031876	Patapsco River L N Br
41	Point	SH18RST070489	SH18BDA070489	Northeast River
42	Point	SH18RST070484	SH18BDA070484	Northeast River
43	Point	SH18RST070485	SH18BDA070485	Northeast River
44	Point	SH18RST070487	SH18BDA070487	Northeast River
45	Point	SH18RST070490	SH18BDA070490	Little Elk Creek

▪ View the “Sum” field to view the total stormwater restoration treatment credit claimed for new stormwater FY18.



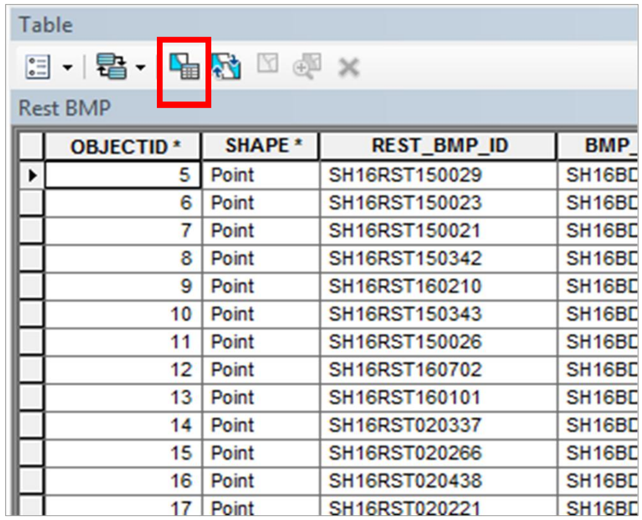
Note: This calculation method generates a slightly different result due to rounding.

The total restoration new stormwater treatment credit for FY18 is 49.75 acres.

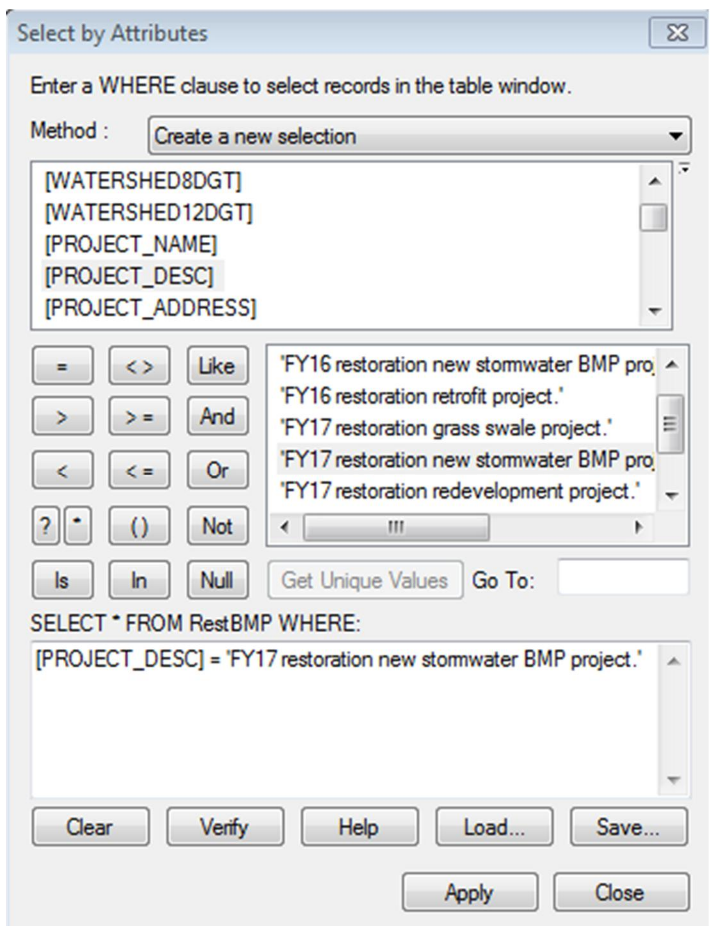
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

2.1.4.2 Restoration BMPS IAC for New Stormwater FY 2017

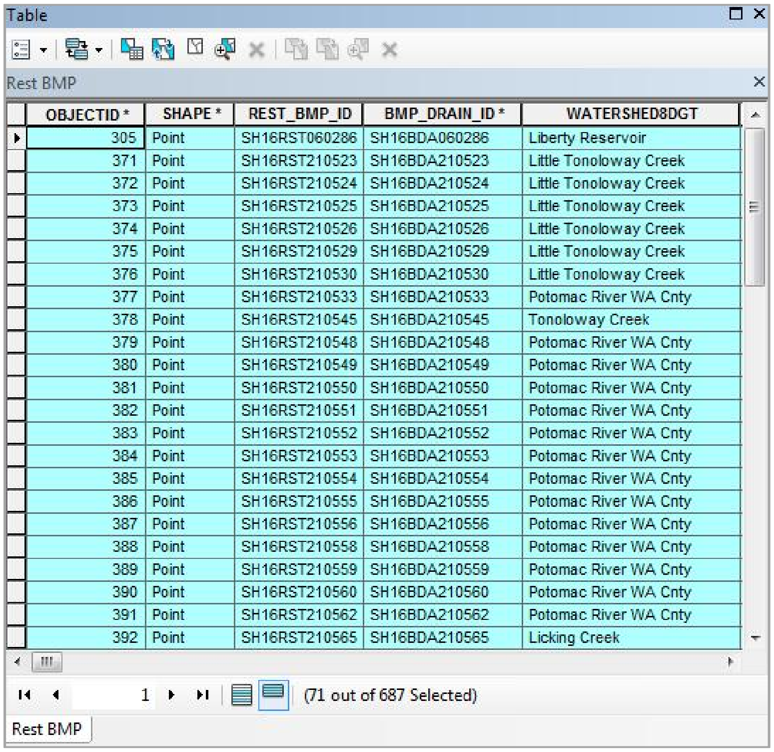
▪ Within the RestBMP attribute table, click the Select by Attributes button.



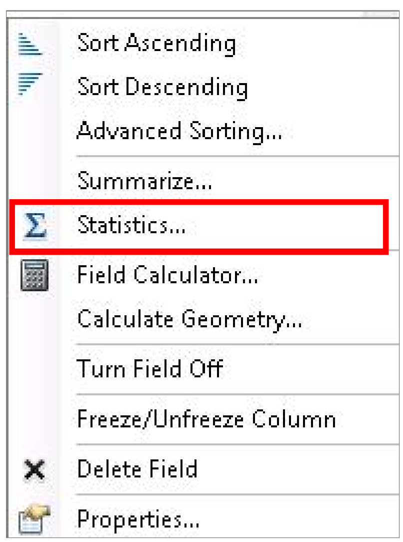
- Within the Select by Attributes dialog window, enter the following selection statement to identify New Stormwater BMPs for FY 17, and click "Apply":
  [PROJECT_DESC] = 'FY17 restoration new stormwater BMP project.'



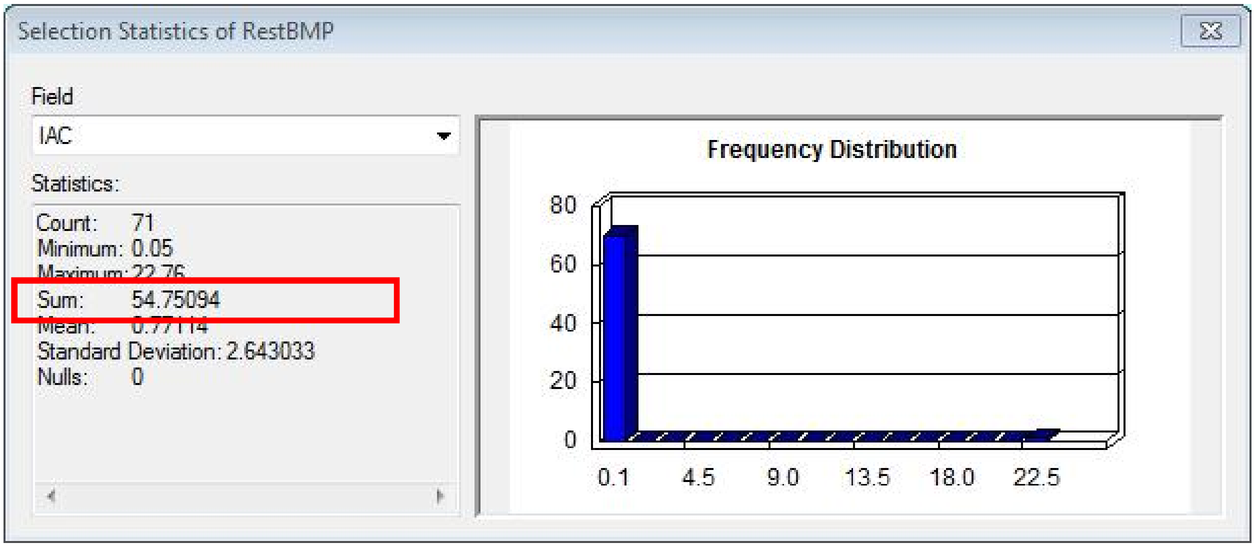
- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



OBJECTID *	SHAPE *	REST_BMP_ID	BMP_DRAIN_ID *	WATERSHED8DGT
305	Point	SH16RST060286	SH16BDA060286	Liberty Reservoir
371	Point	SH16RST210523	SH16BDA210523	Little Tonoloway Creek
372	Point	SH16RST210524	SH16BDA210524	Little Tonoloway Creek
373	Point	SH16RST210525	SH16BDA210525	Little Tonoloway Creek
374	Point	SH16RST210526	SH16BDA210526	Little Tonoloway Creek
375	Point	SH16RST210529	SH16BDA210529	Little Tonoloway Creek
376	Point	SH16RST210530	SH16BDA210530	Little Tonoloway Creek
377	Point	SH16RST210533	SH16BDA210533	Potomac River WA Cnty
378	Point	SH16RST210545	SH16BDA210545	Tonoloway Creek
379	Point	SH16RST210548	SH16BDA210548	Potomac River WA Cnty
380	Point	SH16RST210549	SH16BDA210549	Potomac River WA Cnty
381	Point	SH16RST210550	SH16BDA210550	Potomac River WA Cnty
382	Point	SH16RST210551	SH16BDA210551	Potomac River WA Cnty
383	Point	SH16RST210552	SH16BDA210552	Potomac River WA Cnty
384	Point	SH16RST210553	SH16BDA210553	Potomac River WA Cnty
385	Point	SH16RST210554	SH16BDA210554	Potomac River WA Cnty
386	Point	SH16RST210555	SH16BDA210555	Potomac River WA Cnty
387	Point	SH16RST210556	SH16BDA210556	Potomac River WA Cnty
388	Point	SH16RST210558	SH16BDA210558	Potomac River WA Cnty
389	Point	SH16RST210559	SH16BDA210559	Potomac River WA Cnty
390	Point	SH16RST210560	SH16BDA210560	Potomac River WA Cnty
391	Point	SH16RST210562	SH16BDA210562	Potomac River WA Cnty
392	Point	SH16RST210565	SH16BDA210565	Licking Creek



- View the “Sum” field to view the total stormwater restoration treatment credit claimed for new stormwater FY17.



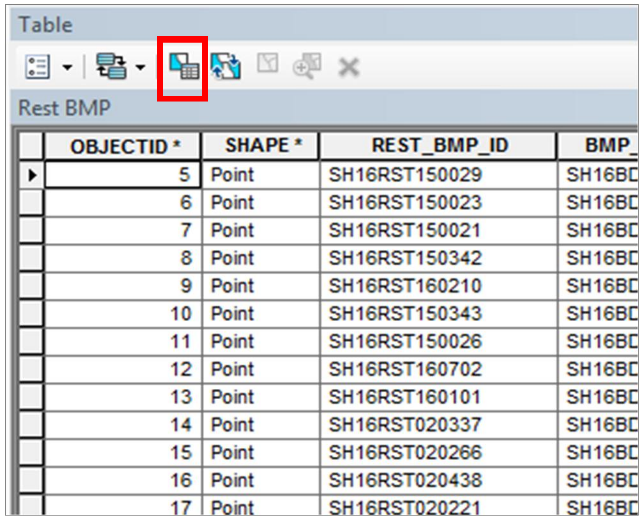
Note: This calculation method generates a slightly different result due to rounding.

The total restoration new stormwater treatment credit for FY17 is 54.73 acres.

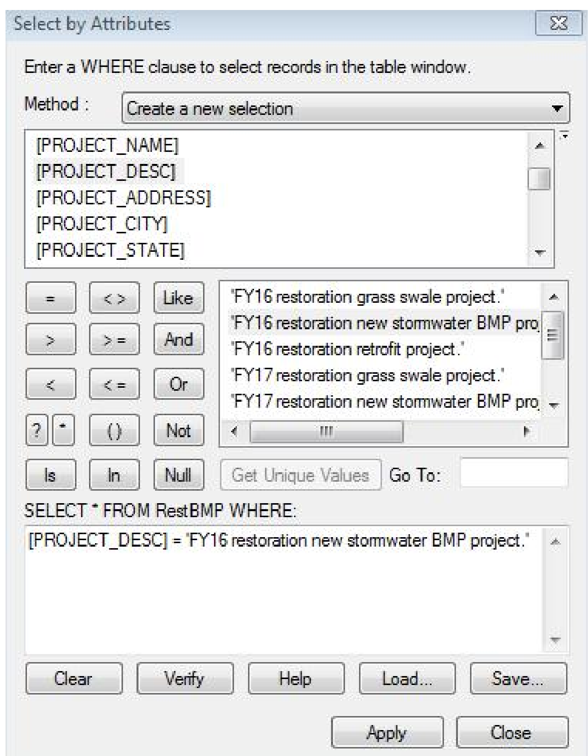
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

2.1.4.3 Restoration BMPS IAC for New Stormwater FY 2016

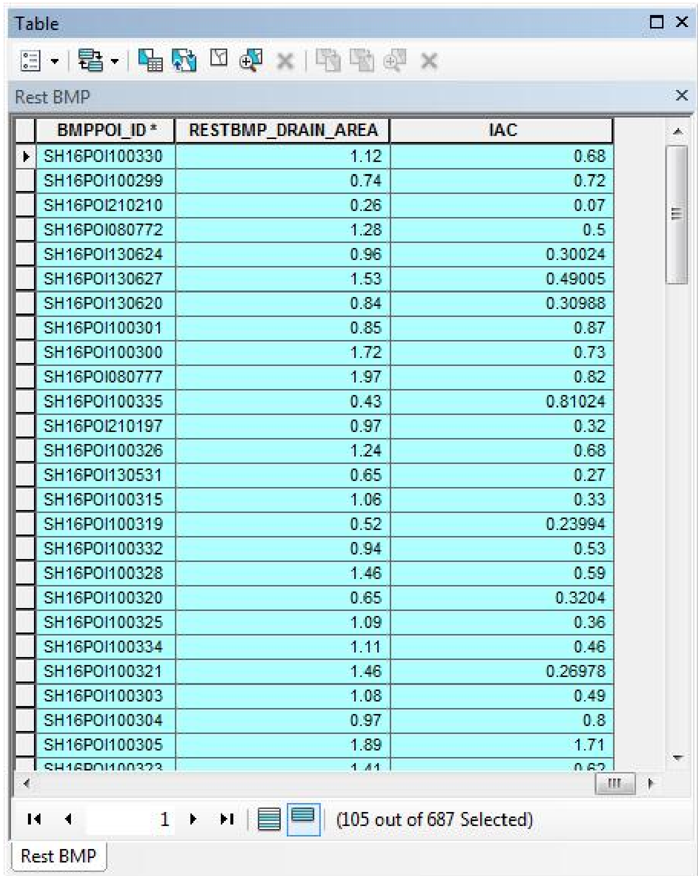
- Within the RestBMP attribute table, click the Select by Attributes button.



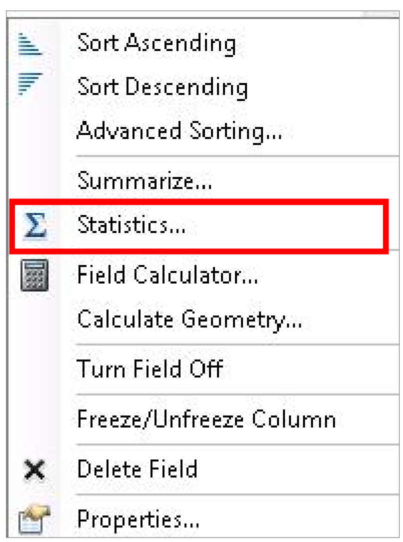
- Within the Select by Attributes dialog window, enter the following selection statement to identify New Stormwater BMPs for FY 16, and click "Apply":
  [PROJECT_DESC] = 'FY16 restoration new stormwater BMP project.'



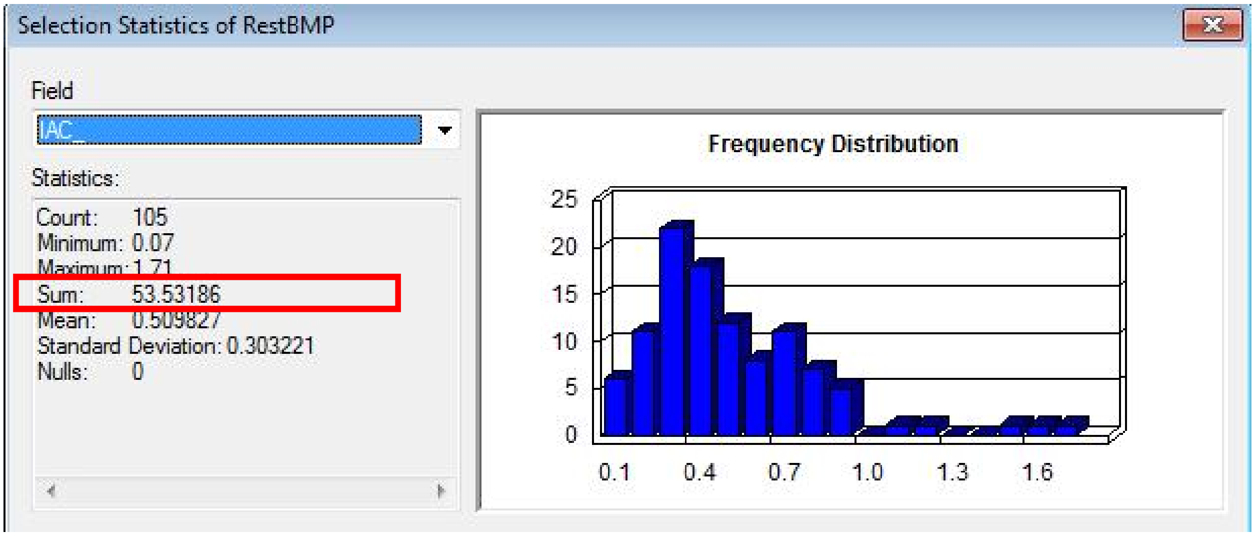
- Ensuring that the selection is retained, right click on the new IAC field, and select "Statistics…"



	BMPPOI_ID *	RESTBMP_DRAIN_AREA	IAC
	SH16POI100330	1.12	0.68
	SH16POI100299	0.74	0.72
	SH16POI210210	0.26	0.07
	SH16POI080772	1.28	0.5
	SH16POI130624	0.96	0.30024
	SH16POI130627	1.53	0.49005
	SH16POI130620	0.84	0.30988
	SH16POI100301	0.85	0.87
	SH16POI100300	1.72	0.73
	SH16POI080777	1.97	0.82
	SH16POI100335	0.43	0.81024
	SH16POI210197	0.97	0.32
	SH16POI100326	1.24	0.68
	SH16POI130531	0.65	0.27
	SH16POI100315	1.06	0.33
	SH16POI100319	0.52	0.23994
	SH16POI100332	0.94	0.53
	SH16POI100328	1.46	0.59
	SH16POI100320	0.65	0.3204
	SH16POI100325	1.09	0.36
	SH16POI100334	1.11	0.46
	SH16POI100321	1.46	0.26978
	SH16POI100303	1.08	0.49
	SH16POI100304	0.97	0.8
	SH16POI100305	1.89	1.71



- View the “Sum” field to view the total stormwater restoration treatment credit claimed for new stormwater FY16.

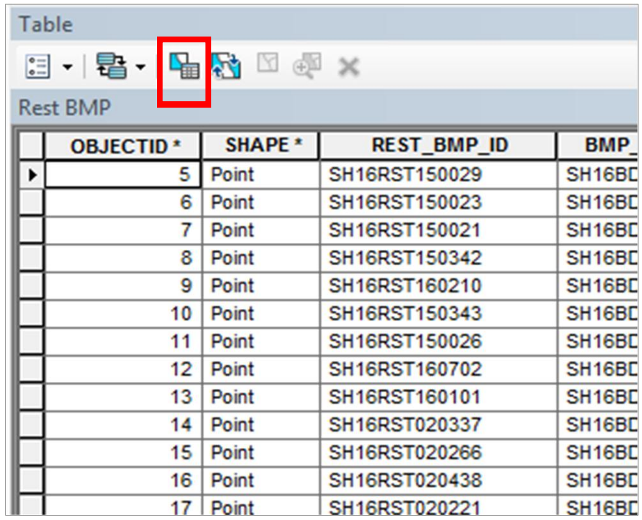


The total restoration new stormwater treatment credit for FY16 is 53.53 acres.

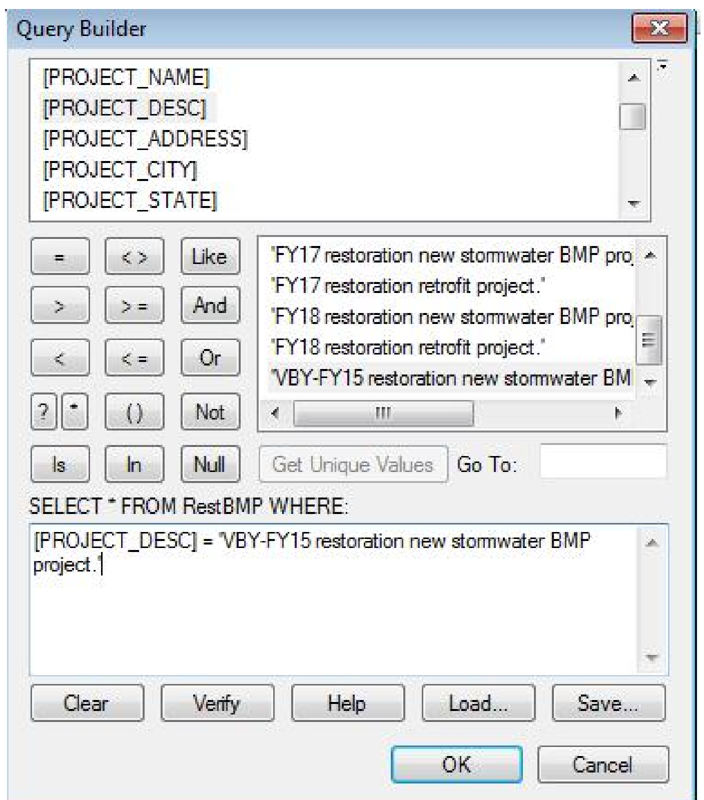
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

2.1.4.4 Restoration BMPS IAC for New Stormwater VBY-2015

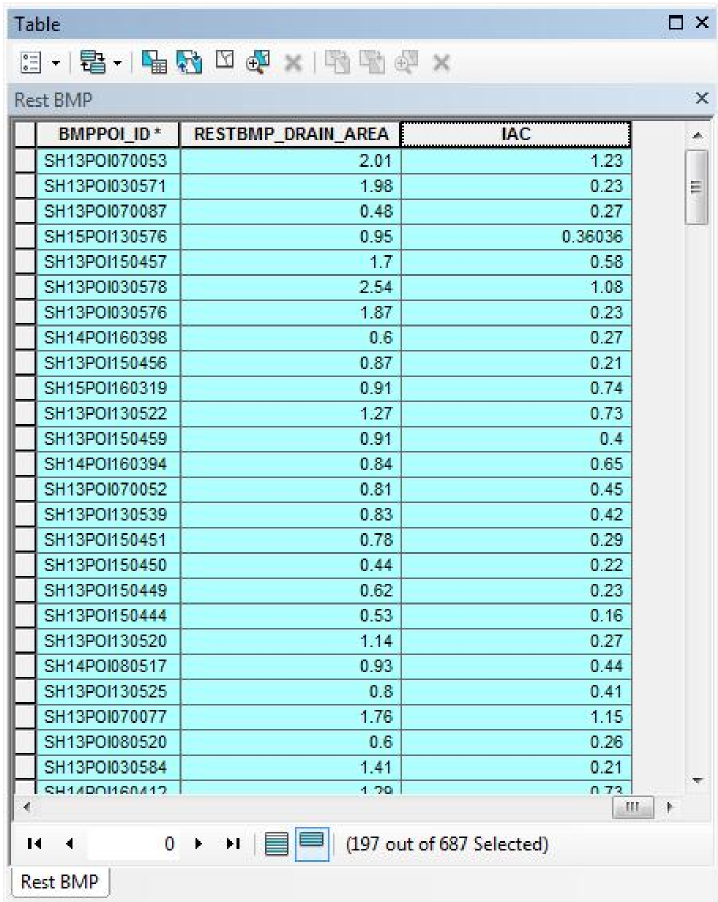
- Within the RestBMP attribute table, click the Select by Attributes button.



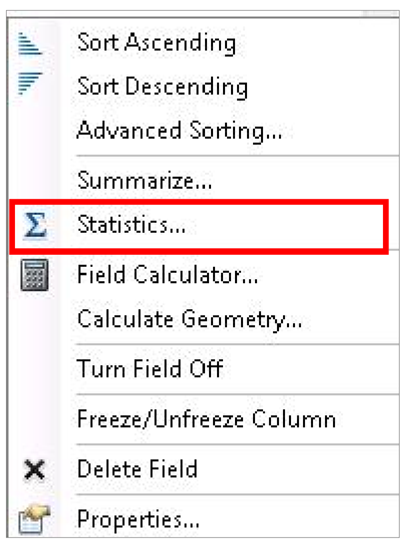
- Within the Select by Attributes dialog window, enter the following selection statement to identify New Stormwater BMPs for VBY-2015, and click “Apply”:
  [PROJECT_DESC] = 'VBY-FY15 restoration new stormwater BMP project.'



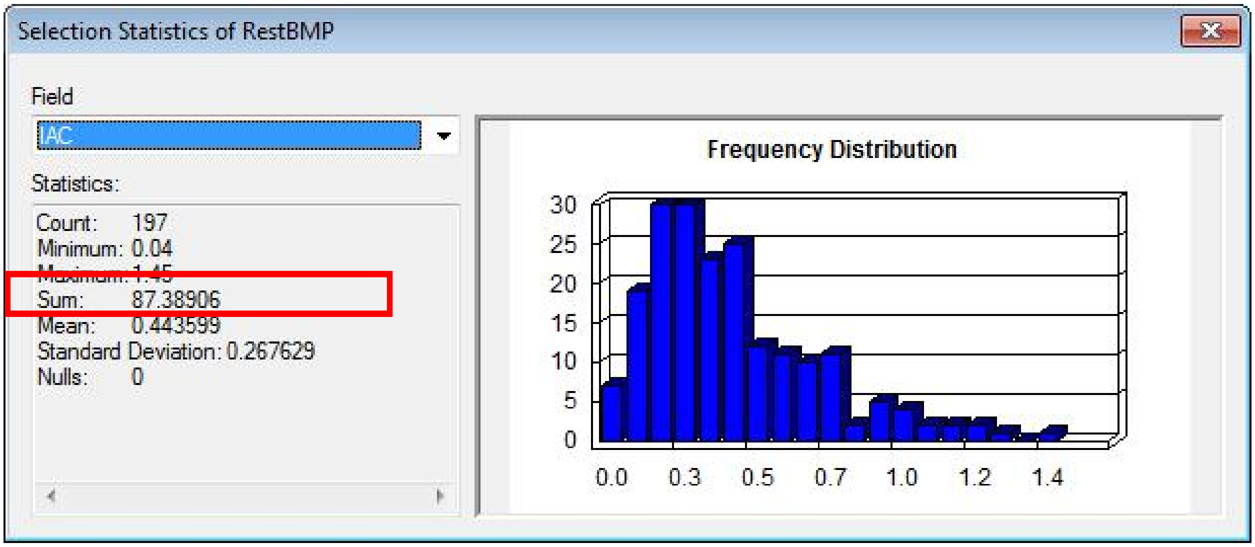
- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



BMPPOI_ID *	RESTBMP_DRAIN_AREA	IAC
SH13POI070053	2.01	1.23
SH13POI030571	1.98	0.23
SH13POI070087	0.48	0.27
SH15POI130576	0.95	0.36036
SH13POI150457	1.7	0.58
SH13POI030578	2.54	1.08
SH13POI030576	1.87	0.23
SH14POI160398	0.6	0.27
SH13POI150456	0.87	0.21
SH15POI160319	0.91	0.74
SH13POI130522	1.27	0.73
SH13POI150459	0.91	0.4
SH14POI160394	0.84	0.65
SH13POI070052	0.81	0.45
SH13POI130539	0.83	0.42
SH13POI150451	0.78	0.29
SH13POI150450	0.44	0.22
SH13POI150449	0.62	0.23
SH13POI150444	0.53	0.16
SH13POI130520	1.14	0.27
SH14POI080517	0.93	0.44
SH13POI130525	0.8	0.41
SH13POI070077	1.76	1.15
SH13POI080520	0.6	0.26
SH13POI030584	1.41	0.21



- View the "Sum" field to view the total stormwater restoration treatment credit claimed for new stormwater VBY-2015.



Note: This calculation method generates a slightly different result due to rounding

The total restoration new stormwater treatment credit for VBY-2015 is 87.41 acres.

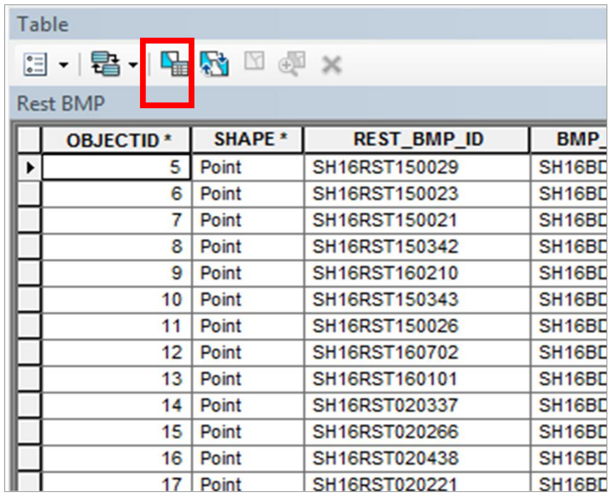
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

2.1.4.5 Restoration BMPS IAC for Grass Swales FY 2018

There are no Grass Swales for FY18

2.1.4.6 Restoration BMPS IAC for Grass Swales FY 2017

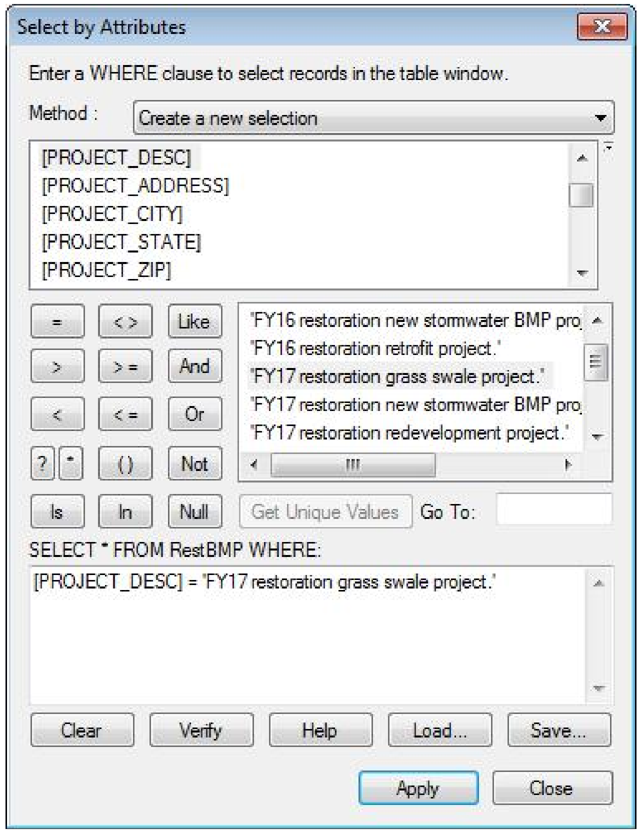
- Restoration BMPS IAC for Grass Swales FY 2017 Within the RestBMP attribute table, click the Select by Attributes button.

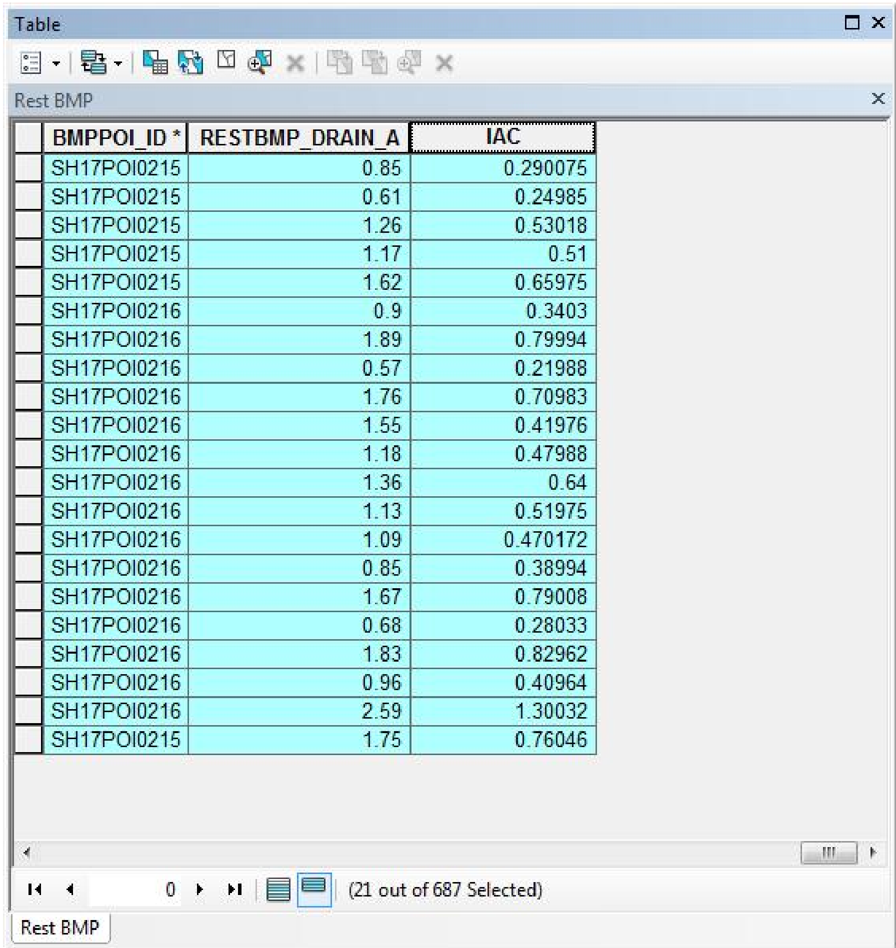


OBJECTID *	SHAPE *	REST_BMP_ID	BMP_
5	Point	SH16RST150029	SH16BD
6	Point	SH16RST150023	SH16BD
7	Point	SH16RST150021	SH16BD
8	Point	SH16RST150342	SH16BD
9	Point	SH16RST160210	SH16BD
10	Point	SH16RST150343	SH16BD
11	Point	SH16RST150026	SH16BD
12	Point	SH16RST160702	SH16BD
13	Point	SH16RST160101	SH16BD
14	Point	SH16RST020337	SH16BD
15	Point	SH16RST020266	SH16BD
16	Point	SH16RST020438	SH16BD
17	Point	SH16RST020221	SH16BD

- Within the Select by Attributes dialog window, enter the following selection statement to identify Grass Swales for FY 17, and click “Apply”:

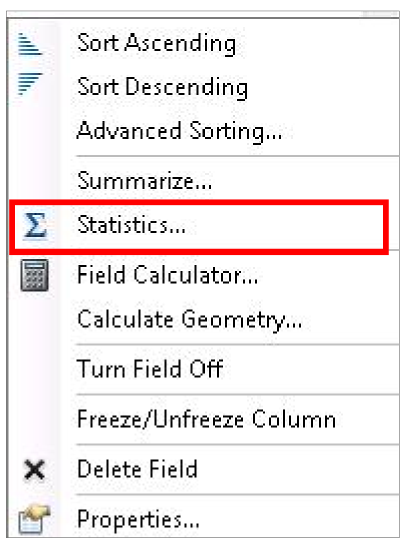
  [PROJECT_DESC] = 'FY17 restoration grass swale project.'


Select by Attributes
Enter a WHERE clause to select records in the table window.
Method :
Create a new selection
[PROJECT_DESC]
[PROJECT_ADDRESS]
[PROJECT_CITY]
[PROJECT_STATE]
[PROJECT_ZIP]
=
< >
Like
>
> =
And
<
< =
Or
?
*
( )
Not
Is
In
Null
'FY16 restoration new stormwater BMP pro
'FY16 restoration retrofit project.'
'FY17 restoration grass swale project.'
'FY17 restoration new stormwater BMP pro
'FY17 restoration redevelopment project.'
Get Unique Values
Go To:
SELECT * FROM RestBMP WHERE:
[PROJECT_DESC] = 'FY17 restoration grass swale project.'
Clear
Verify
Help
Load...
Save...
Apply
Close

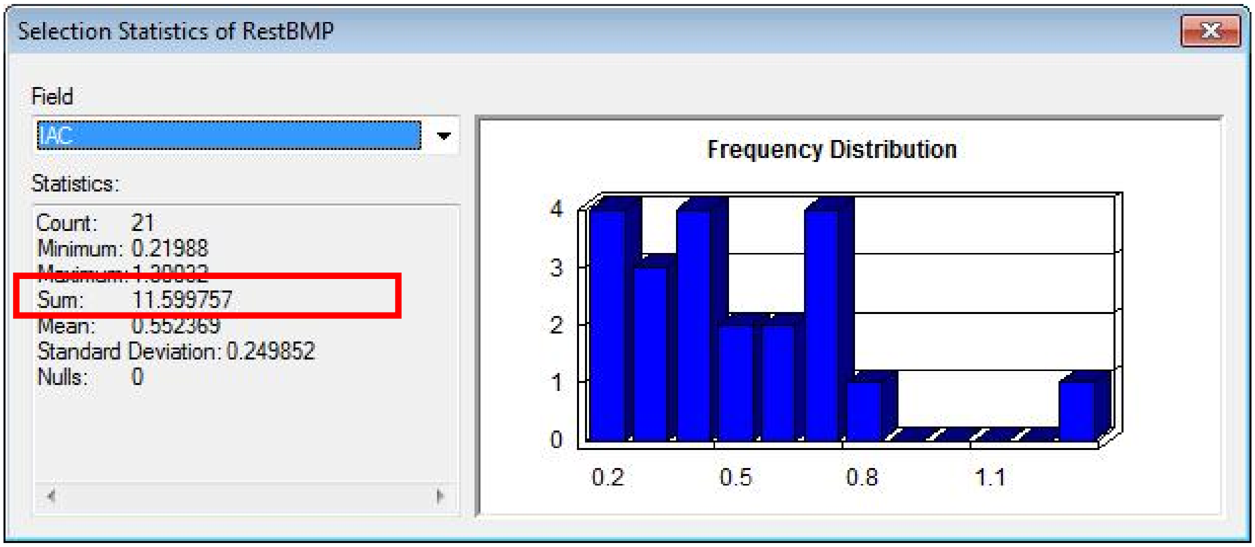


BMPPOI_ID *	RESTBMP_DRAIN_A	IAC
SH17POI0215	0.85	0.290075
SH17POI0215	0.61	0.24985
SH17POI0215	1.26	0.53018
SH17POI0215	1.17	0.51
SH17POI0215	1.62	0.65975
SH17POI0216	0.9	0.3403
SH17POI0216	1.89	0.79994
SH17POI0216	0.57	0.21988
SH17POI0216	1.76	0.70983
SH17POI0216	1.55	0.41976
SH17POI0216	1.18	0.47988
SH17POI0216	1.36	0.64
SH17POI0216	1.13	0.51975
SH17POI0216	1.09	0.470172
SH17POI0216	0.85	0.38994
SH17POI0216	1.67	0.79008
SH17POI0216	0.68	0.28033
SH17POI0216	1.83	0.82962
SH17POI0216	0.96	0.40964
SH17POI0216	2.59	1.30032
SH17POI0215	1.75	0.76046

- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



- View the “Sum” field to view the total restoration treatment credit claimed for grass swales FY 17

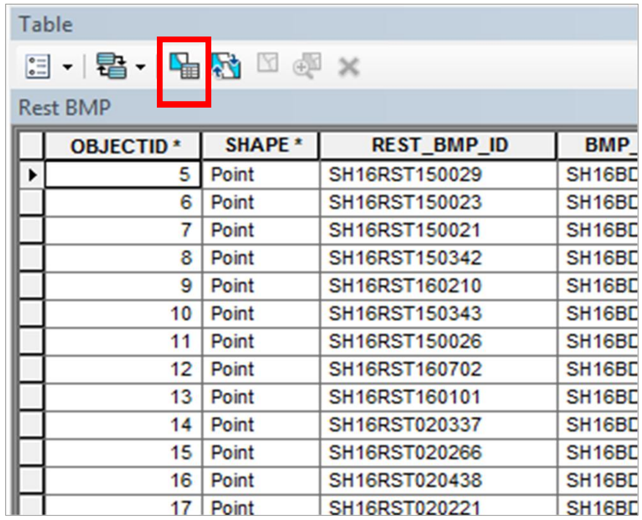


The total restoration grass swale treatment credit for FY17 is 11.60 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

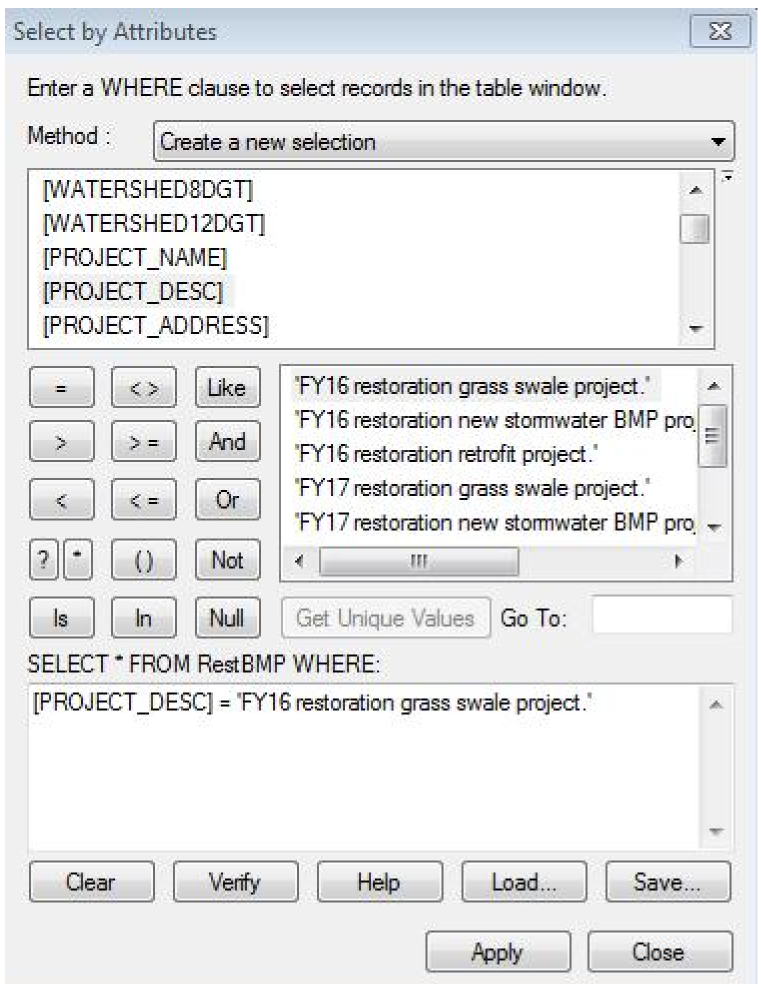
2.1.4.7 Restoration BMPS IAC for Grass Swales FY 2016

- Within the RestBMP attribute table, click the Select by Attributes button.

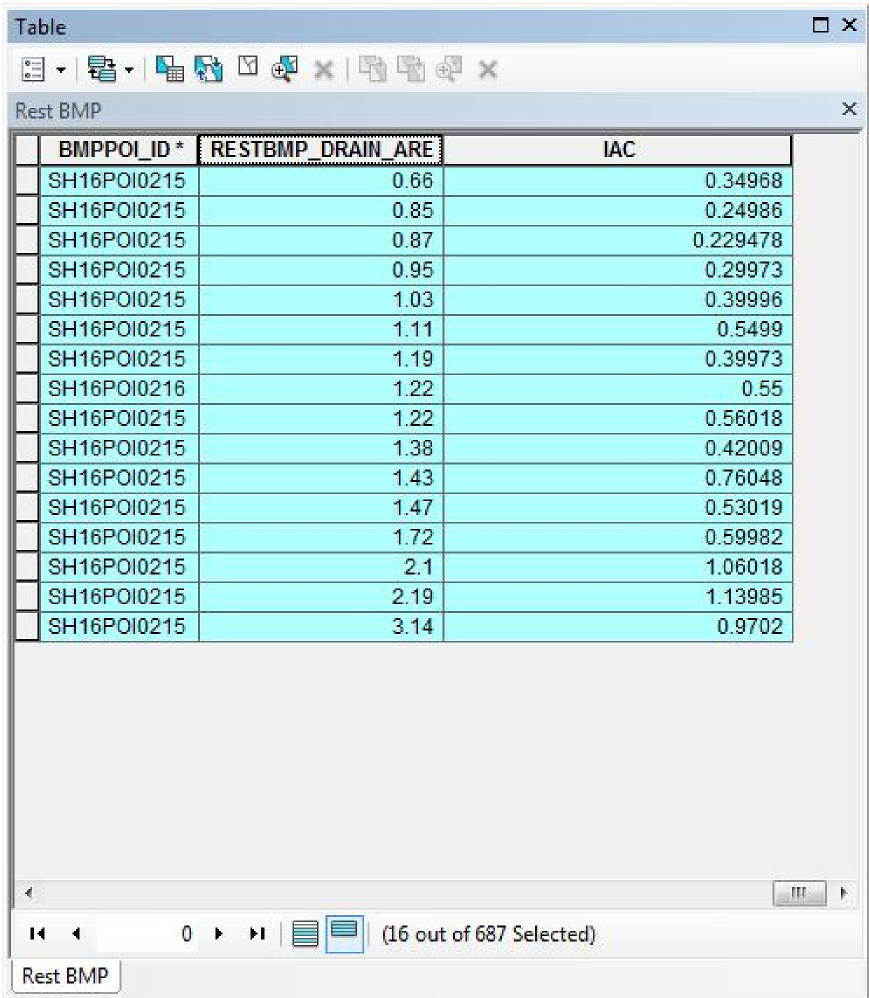


- Within the Select by Attributes dialog window, enter the following selection statement to identify Grass Swales for FY 16, and click "Apply":

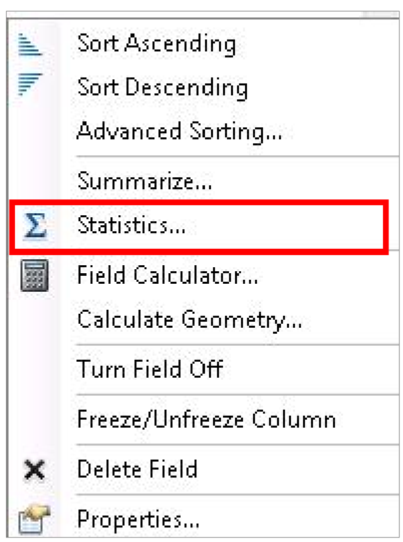
  [PROJECT_DESC] = 'FY16 restoration grass swale project.'



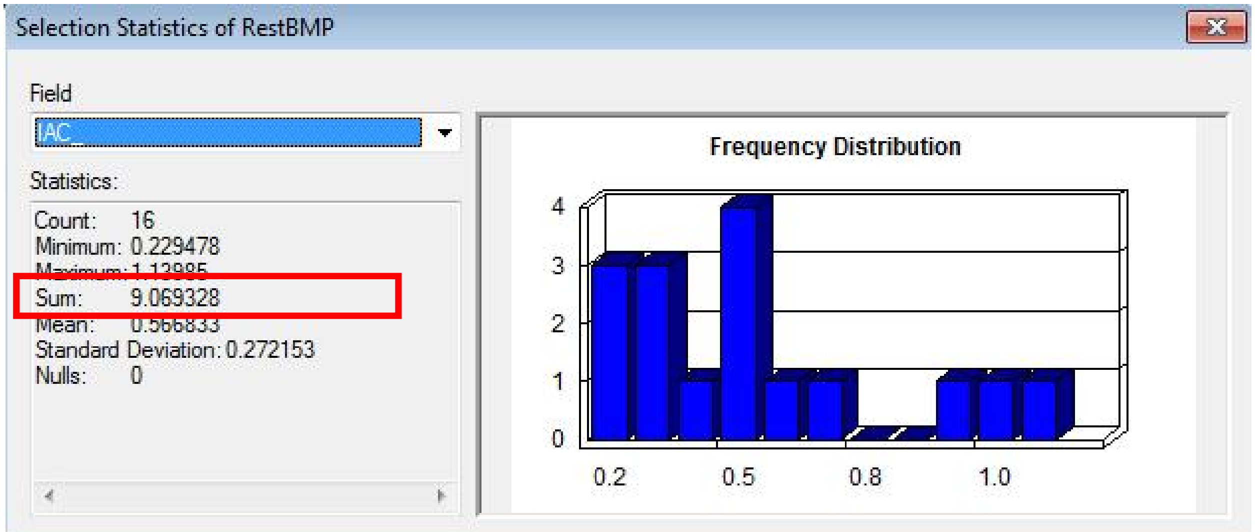
- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



BMPPOI_ID *	RESTBMP_DRAIN_ARE	IAC
SH16POI0215	0.66	0.34968
SH16POI0215	0.85	0.24986
SH16POI0215	0.87	0.229478
SH16POI0215	0.95	0.29973
SH16POI0215	1.03	0.39996
SH16POI0215	1.11	0.5499
SH16POI0215	1.19	0.39973
SH16POI0216	1.22	0.55
SH16POI0215	1.22	0.56018
SH16POI0215	1.38	0.42009
SH16POI0215	1.43	0.76048
SH16POI0215	1.47	0.53019
SH16POI0215	1.72	0.59982
SH16POI0215	2.1	1.06018
SH16POI0215	2.19	1.13985
SH16POI0215	3.14	0.9702



- View the “Sum” field to view the total restoration treatment credit claimed for grass swales FY 16.



The total restoration grass swale treatment credit for FY16 is 9.07 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

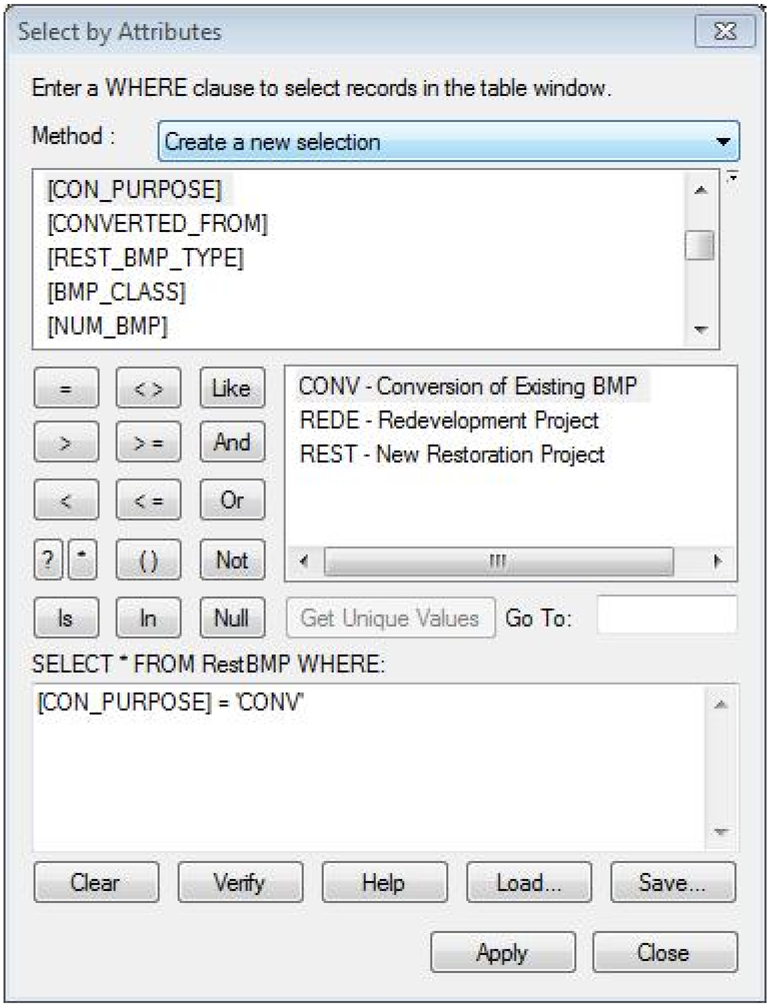
2.1.4.8 Restoration BMPS IAC for Grass Swales VBY-2015

There are no grass swale BMPS for VBY-2015

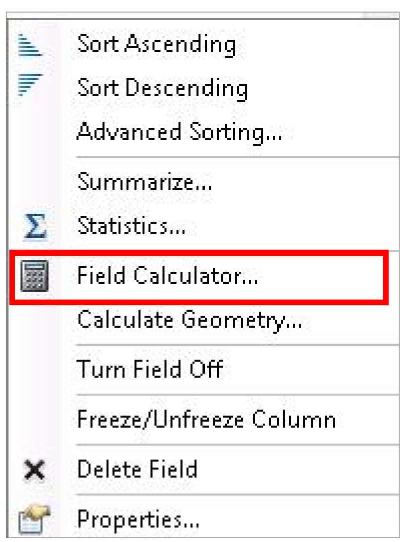
Restoration BMPS for Retrofits

The values for retrofit projects are contained within the GEN_COMMENTS field. To extract those values the functions below will need to be performed.

Select retrofit projects.

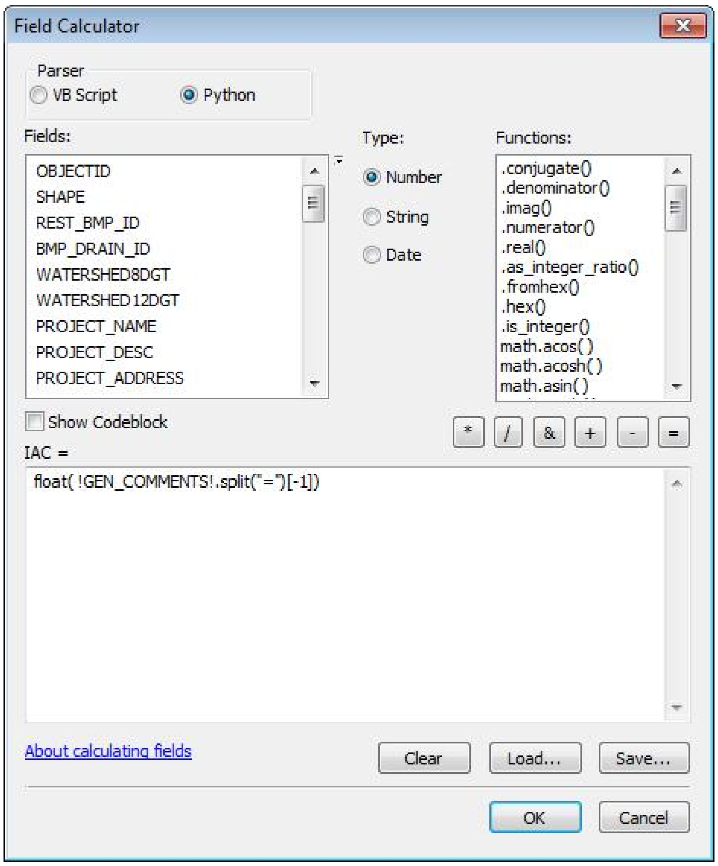


Ensuring that the selection is retained, right click on the new IAC field, and select “Field Calculator…”



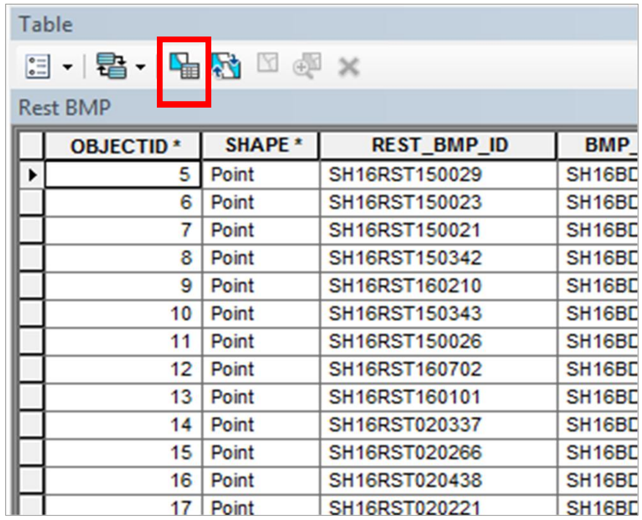
- Within the Field Calculator dialog window, enter the following calculation and click "OK":
  float(!GEN_COMMENTS!.split("=")[-1])

This formula will extract the text acres from the GEN_COMMENTS field and convert it to a number in one step.



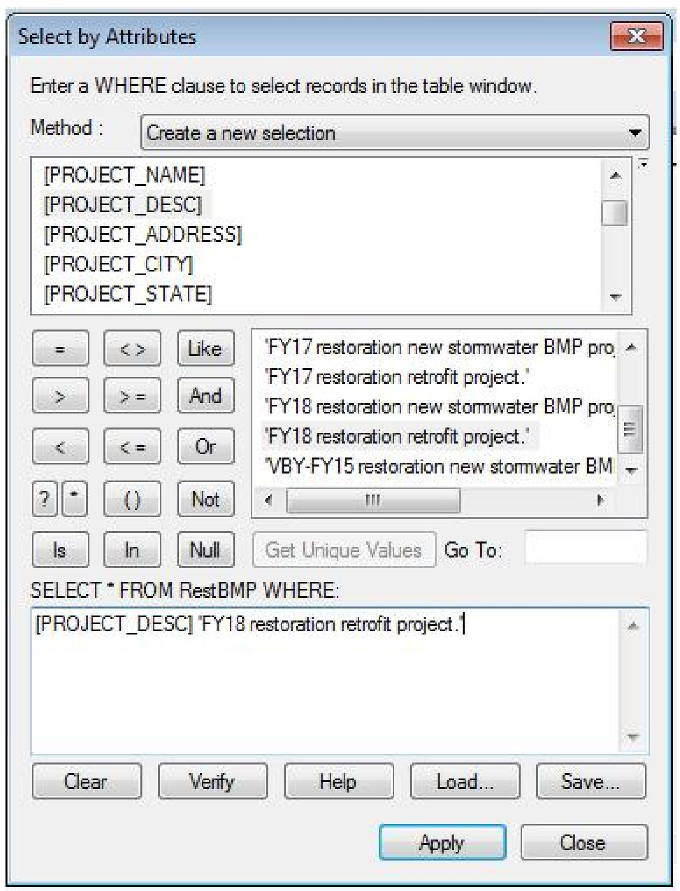
2.1.4.9 Restoration BMPS IAC for Retrofits FY 2018

1.0 Within the RestBMP attribute table, click the Select by Attributes button.

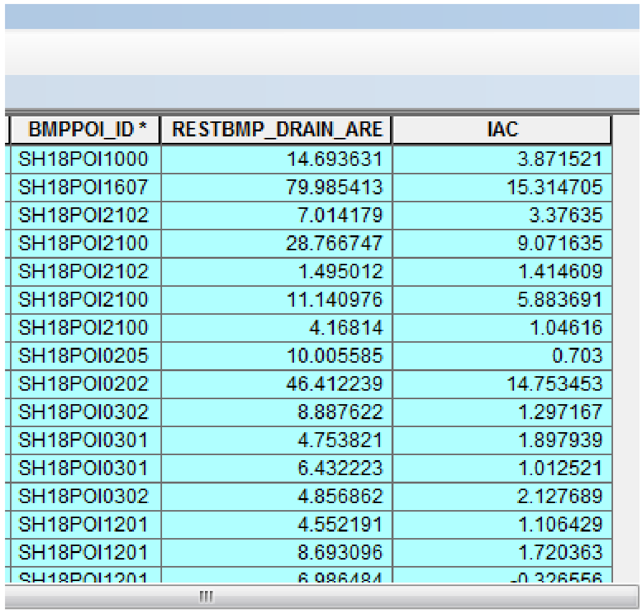


2.0 Within the Select by Attributes dialog window, enter the following selection statement to identify Retrofit BMPs for FY18, and click "Apply":

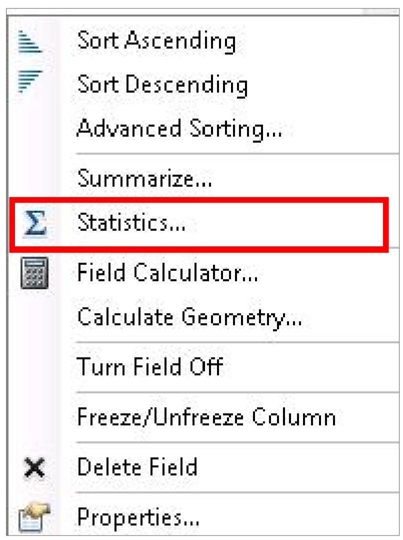
[PROJECT_DESC] = 'FY18 restoration retrofit project.'



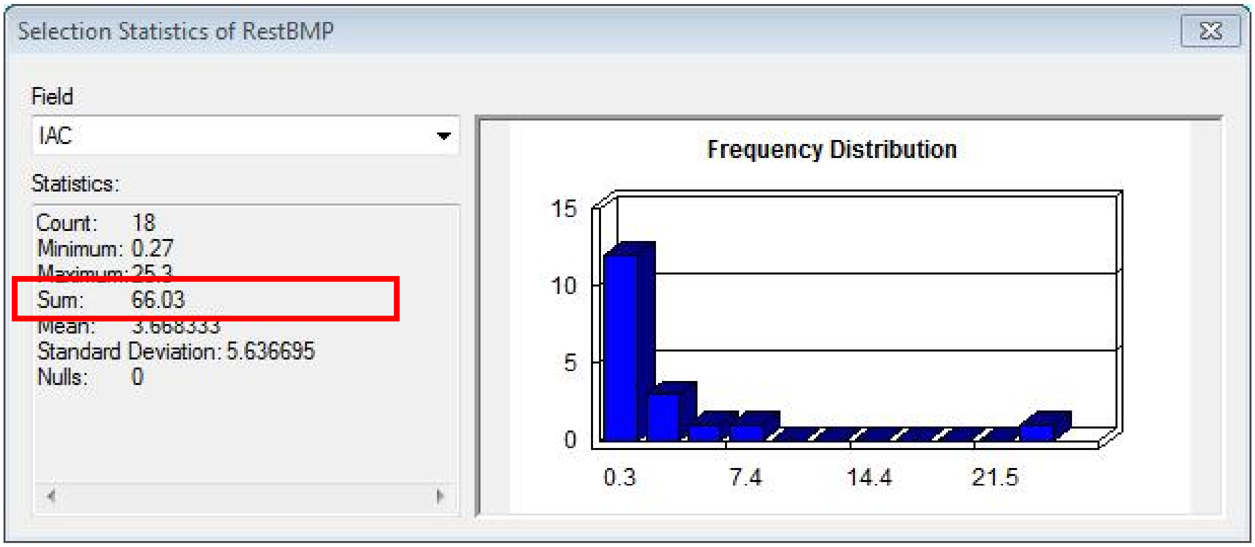
3.0 Ensuring that the selection is retained, right click on the new IAC field, and select "Statistics…"



BMPPOI_ID *	RESTBMP_DRAIN_ARE	IAC
SH18POI1000	14.693631	3.871521
SH18POI1607	79.985413	15.314705
SH18POI2102	7.014179	3.37635
SH18POI2100	28.766747	9.071635
SH18POI2102	1.495012	1.414609
SH18POI2100	11.140976	5.883691
SH18POI2100	4.16814	1.04616
SH18POI0205	10.005585	0.703
SH18POI0202	46.412239	14.753453
SH18POI0302	8.887622	1.297167
SH18POI0301	4.753821	1.897939
SH18POI0301	6.432223	1.012521
SH18POI0302	4.856862	2.127689
SH18POI1201	4.552191	1.106429
SH18POI1201	8.693096	1.720363
SH18POI1201	6.986484	-0.326556



4.0 View the “Sum” field to view the total restoration treatment credit claimed for retrofits FY18.

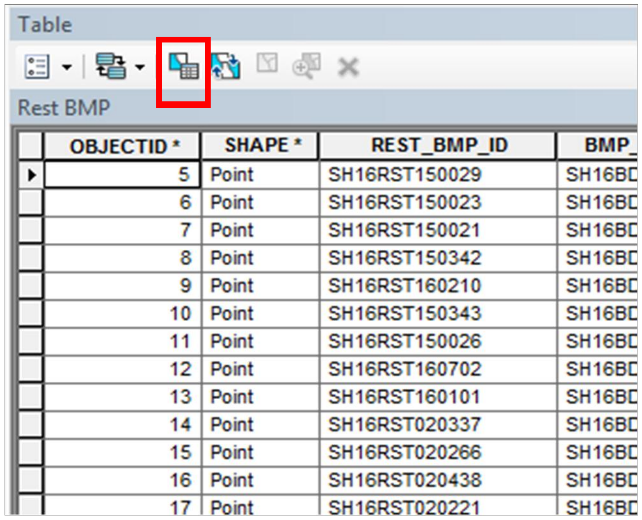


The total restoration retrofit treatment credit for FY18 is 66.03 acres.

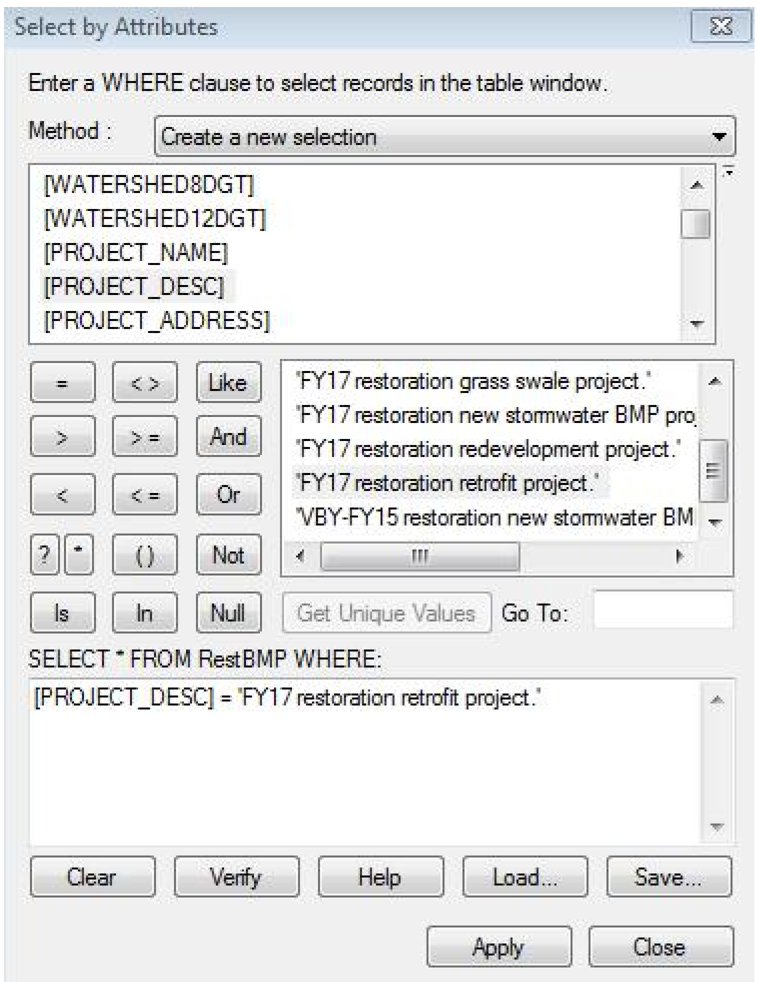
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

2.1.4.10 Restoration BMPS IAC for Retrofits FY 2017

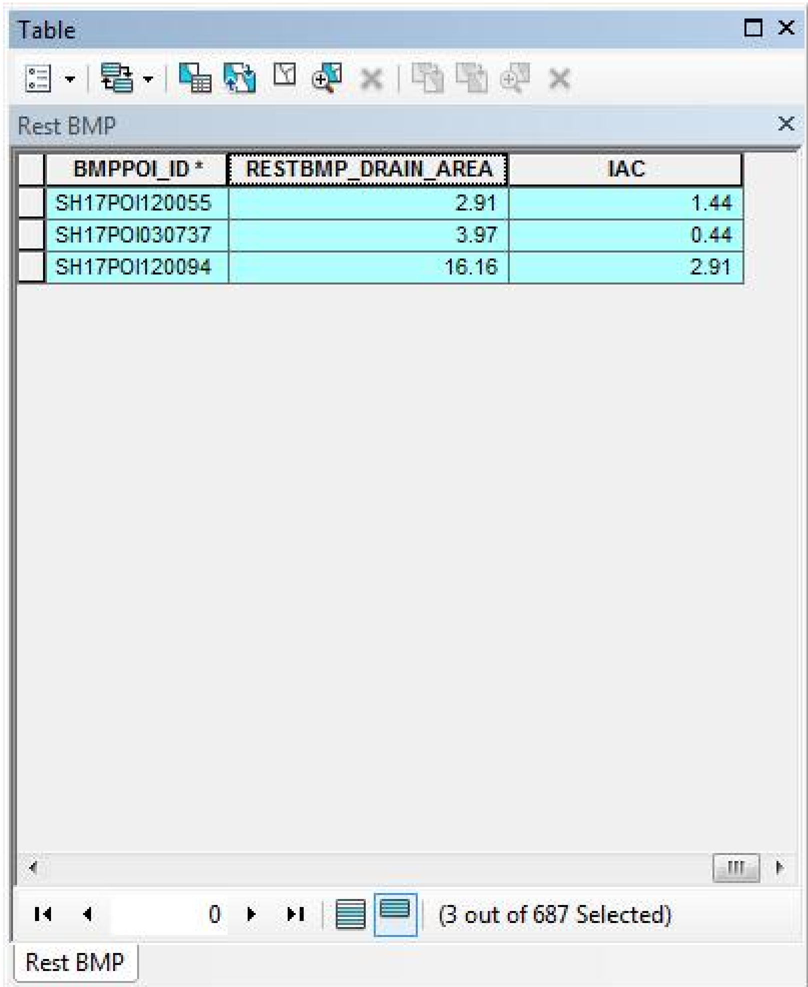
- Within the RestBMP attribute table, click the Select by Attributes button.

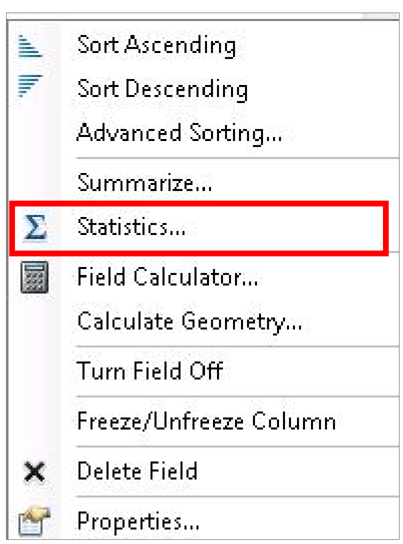


- Within the Select by Attributes dialog window, enter the following selection statement to identify Retrofit BMPs for FY17, and click “Apply”:
  [PROJECT_DESC] = 'FY17 restoration retrofit project.'

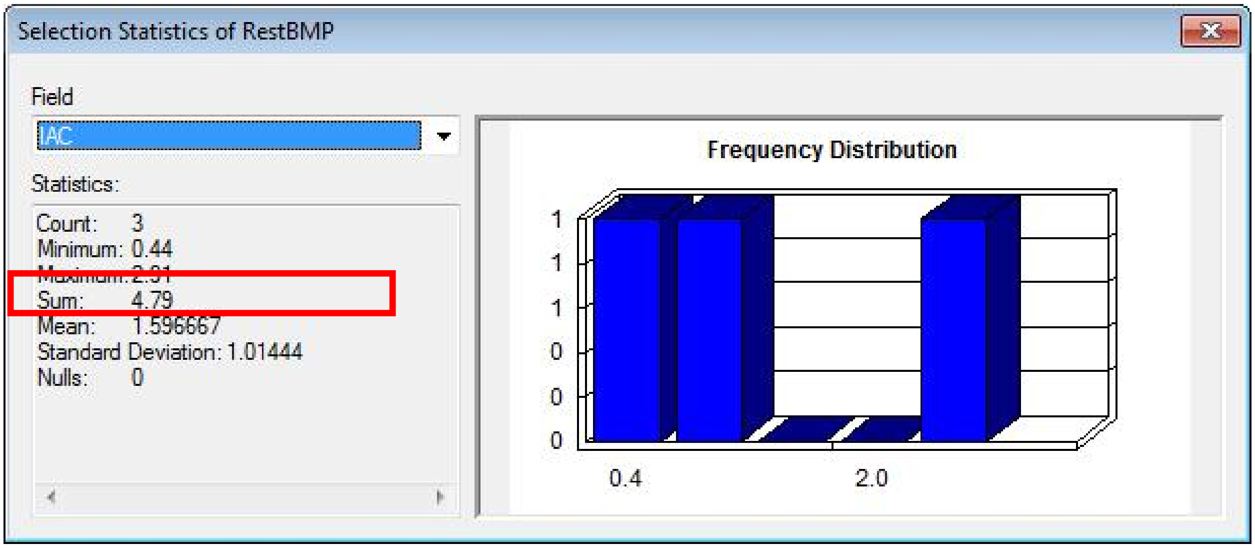


- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”





- View the “Sum” field to view the total restoration treatment credit claimed for retrofits FY17.



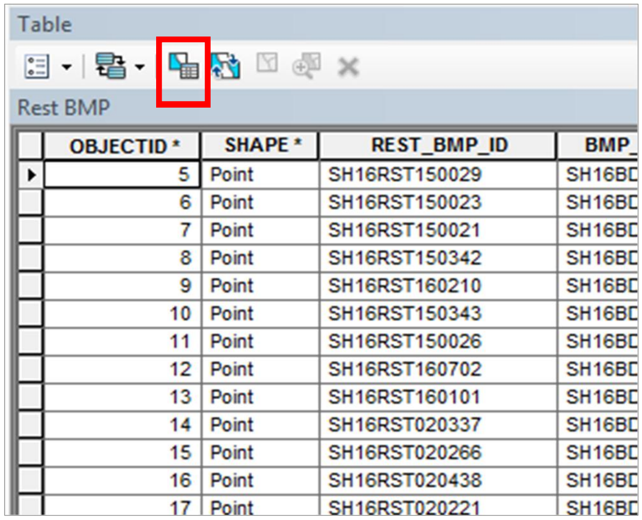
Note: This calculation method generates a slightly different result due to rounding.

The total restoration retrofit treatment credit for FY17 is 4.78 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

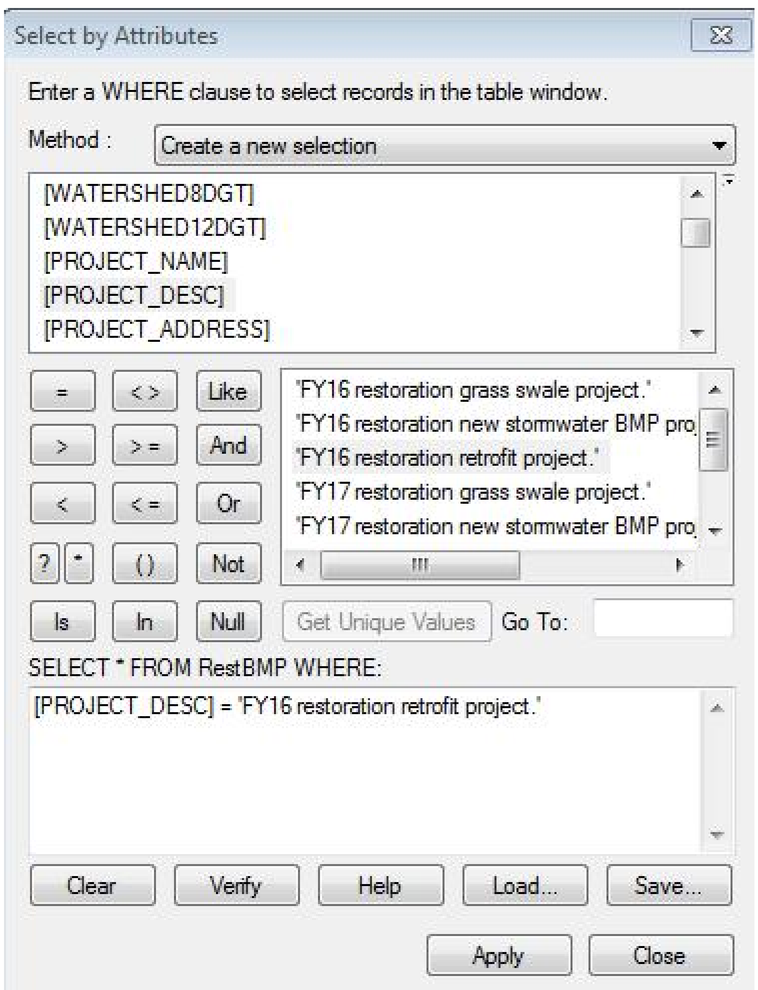
2.1.4.11 Restoration BMPS IAC for Retrofits FY 2016

- Within the RestBMP attribute table, click the Select by Attributes button.

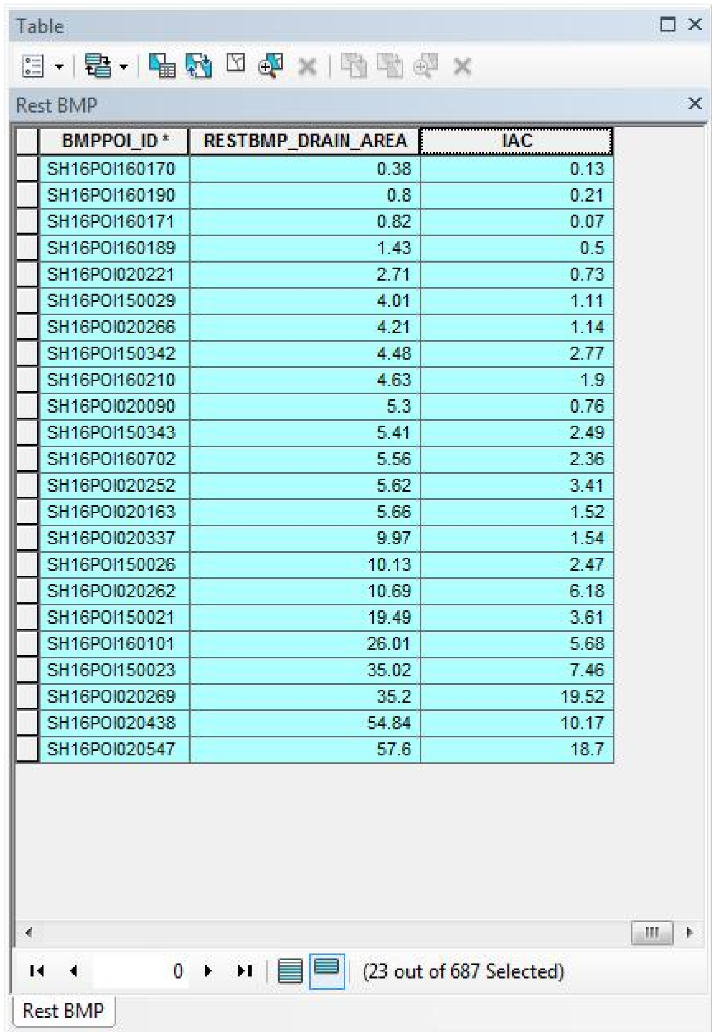


- Within the Select by Attributes dialog window, enter the following selection statement to identify Retrofits for FY 16, and click "Apply":

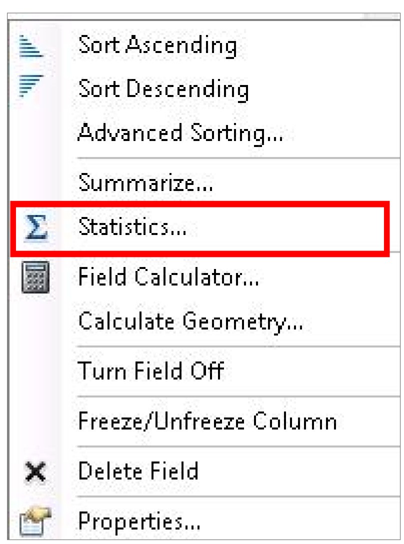
  [PROJECT_DESC] = 'FY16 restoration retrofit project.'



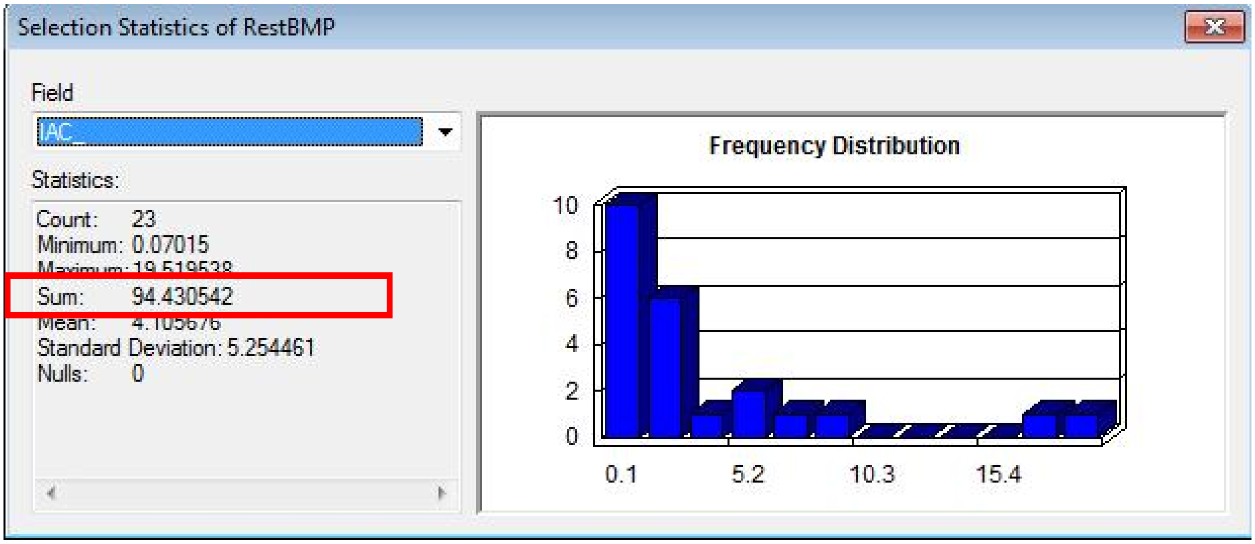
- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



BMPPOI_ID *	RESTBMP_DRAIN_AREA	IAC
SH16POI160170	0.38	0.13
SH16POI160190	0.8	0.21
SH16POI160171	0.82	0.07
SH16POI160189	1.43	0.5
SH16POI020221	2.71	0.73
SH16POI150029	4.01	1.11
SH16POI020266	4.21	1.14
SH16POI150342	4.48	2.77
SH16POI160210	4.63	1.9
SH16POI020090	5.3	0.76
SH16POI150343	5.41	2.49
SH16POI160702	5.56	2.36
SH16POI020252	5.62	3.41
SH16POI020163	5.66	1.52
SH16POI020337	9.97	1.54
SH16POI150026	10.13	2.47
SH16POI020262	10.69	6.18
SH16POI150021	19.49	3.61
SH16POI160101	26.01	5.68
SH16POI150023	35.02	7.46
SH16POI020269	35.2	19.52
SH16POI020438	54.84	10.17
SH16POI020547	57.6	18.7



- View the “Sum” field to view the total restoration treatment credit claimed for retrofits FY16.



The total restoration retrofit treatment credit for FY16 is 94.43 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

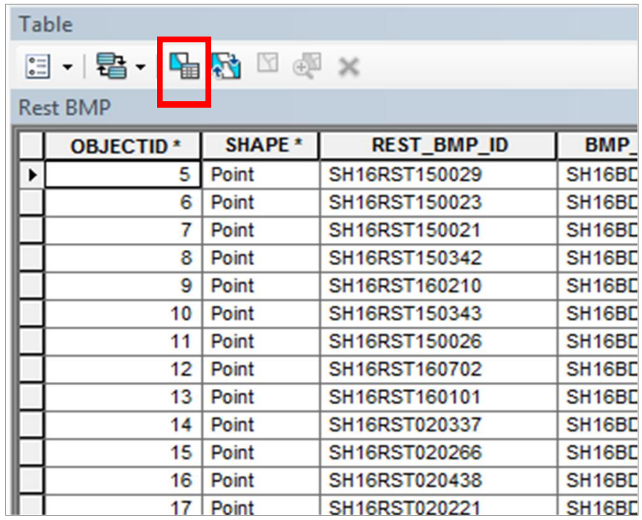
2.1.4.12 Restoration BMPS IAC for Retrofits VBY-2015

There are no retrofit BMPS for VBY-2015.

2.2 Total Stormwater Restoration BMPs IAC Sum

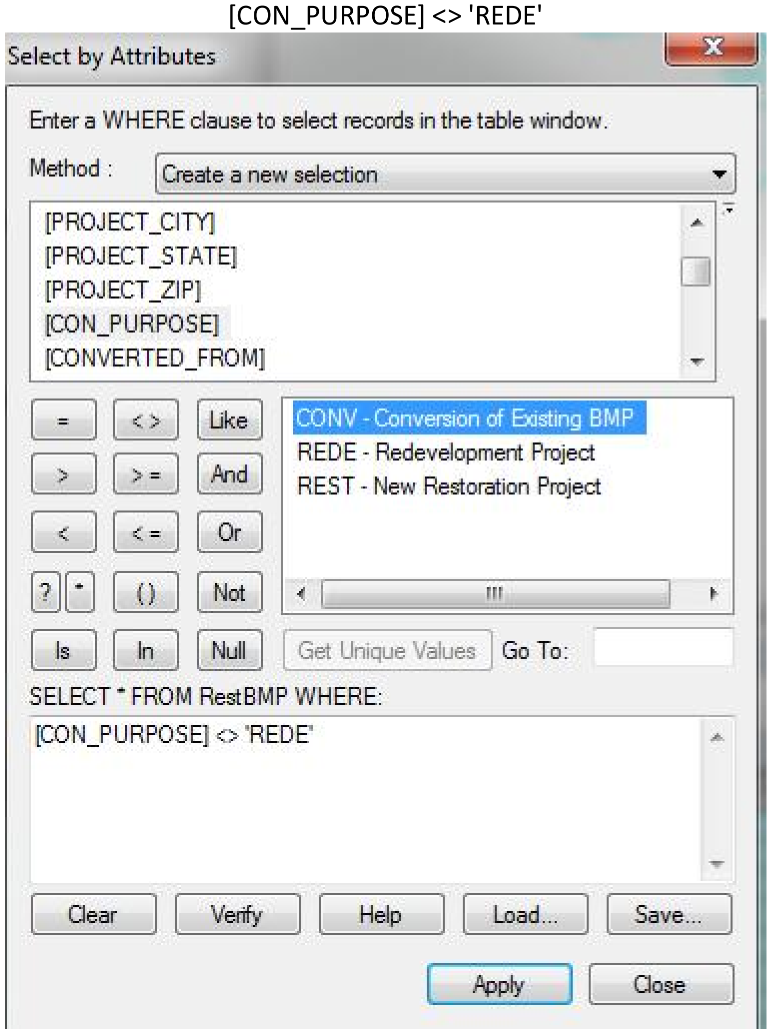
The IAC values for restoration BMPs can be summed using the process below.

- Within the RestBMP attribute table, click the Select by Attributes button.

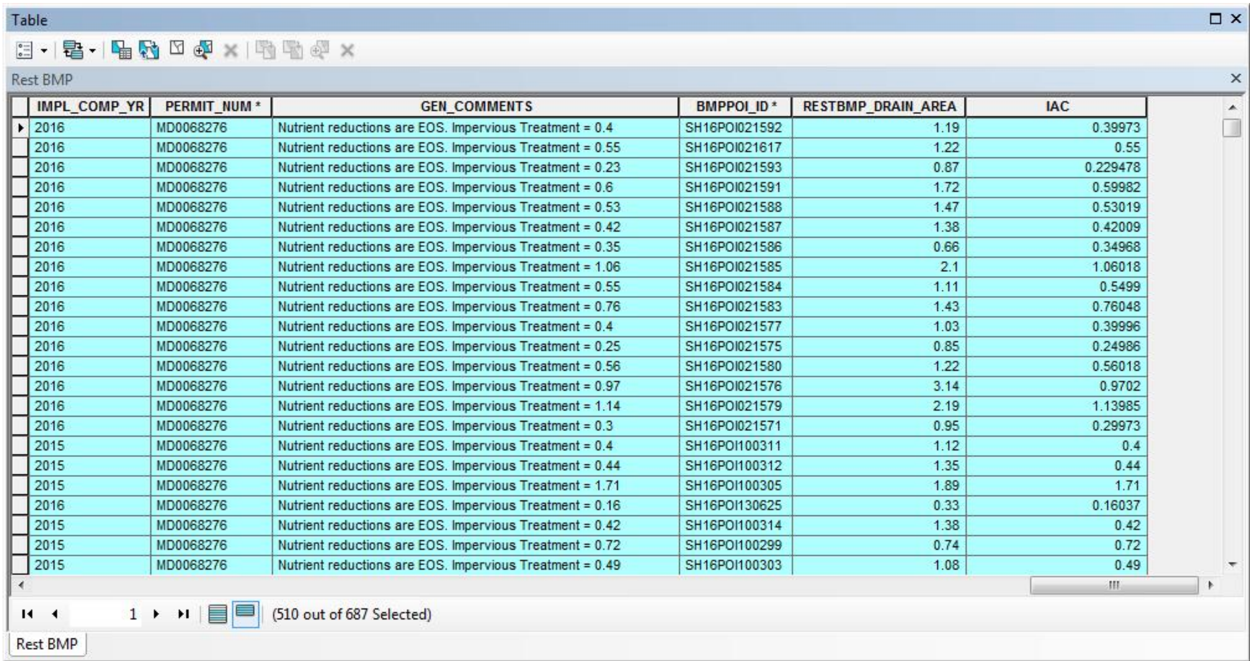


- Within the Select by Attributes dialog window, enter the following selection statement to identify all stormwater projects across all years, and click "Apply":

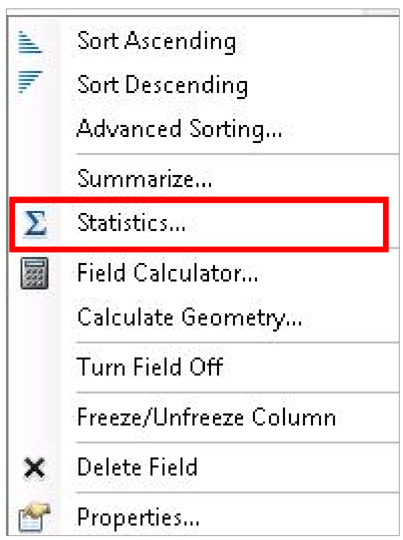
[CON_PURPOSE] <> 'REDE'



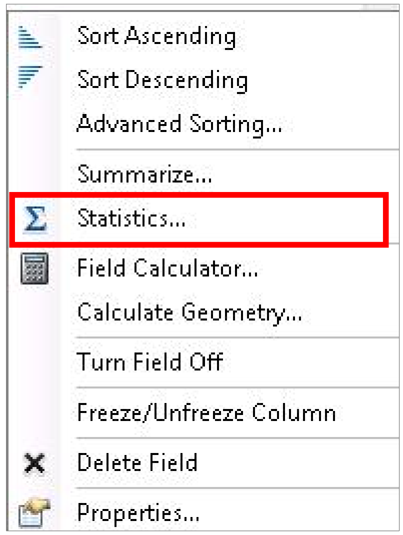
- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”



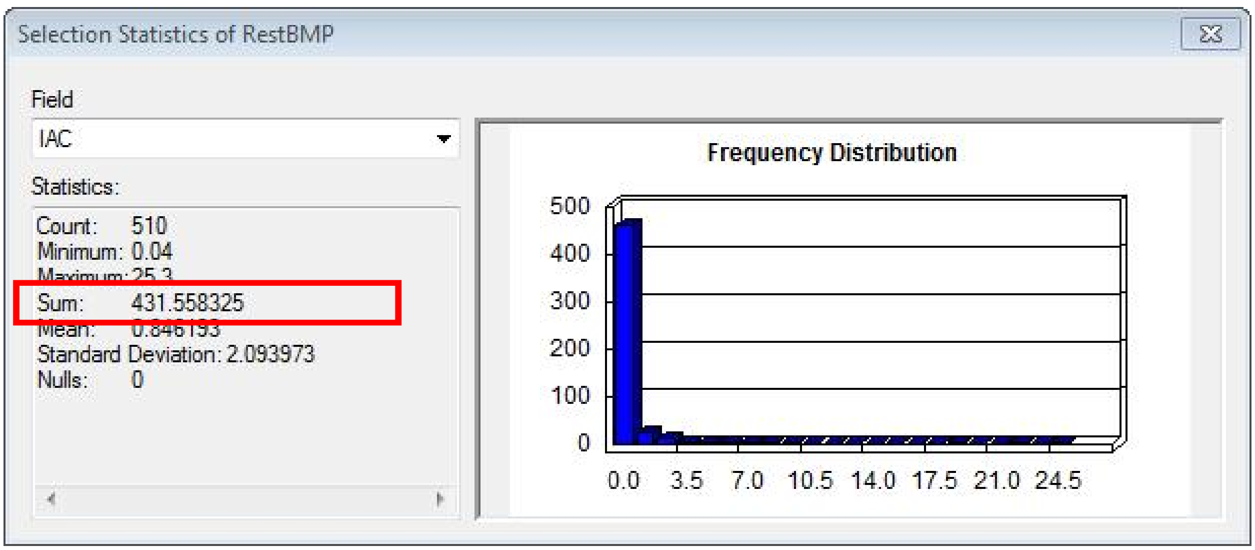
IMPL_COMP_YR	PERMIT_NUM *	GEN_COMMENTS	BMPPOI_ID *	RESTBMP_DRAIN_AREA	IAC
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.4	SH16POI021592	1.19	0.39973
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.55	SH16POI021617	1.22	0.55
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.23	SH16POI021593	0.87	0.229478
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.6	SH16POI021591	1.72	0.59982
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.53	SH16POI021588	1.47	0.53019
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.42	SH16POI021587	1.38	0.42009
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.35	SH16POI021586	0.66	0.34968
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 1.06	SH16POI021585	2.1	1.06018
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.55	SH16POI021584	1.11	0.5499
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.76	SH16POI021583	1.43	0.76048
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.4	SH16POI021577	1.03	0.39996
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.25	SH16POI021575	0.85	0.24986
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.56	SH16POI021580	1.22	0.56018
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.97	SH16POI021576	3.14	0.9702
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 1.14	SH16POI021579	2.19	1.13985
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.3	SH16POI021571	0.95	0.29973
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.4	SH16POI100311	1.12	0.4
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.44	SH16POI100312	1.35	0.44
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 1.71	SH16POI100305	1.89	1.71
2016	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.16	SH16POI130625	0.33	0.16037
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.42	SH16POI100314	1.38	0.42
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.72	SH16POI100299	0.74	0.72
2015	MD0068276	Nutrient reductions are EOS. Impervious Treatment = 0.49	SH16POI100303	1.08	0.49



- Right click on the new IAC field, and select “Statistics…”



- View the “Sum” field to view the total stormwater restoration treatment credit claimed.



The total restoration stormwater treatment credit is 431.33 acres. This will match the sum of the values in the *Total (acres*) field for New Storwmwater, Grass Swales, and Retrofit.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

3.0 Stream Restoration

Calculating the impervious treatment credit for Stream Restoration requires two (2) primary inputs:

- Length of Restoration, from within the MDE MS4 geodatabase (AltBMPLine feature class' LENGTH_REST field)
- Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance (0.01 for stream restoration)

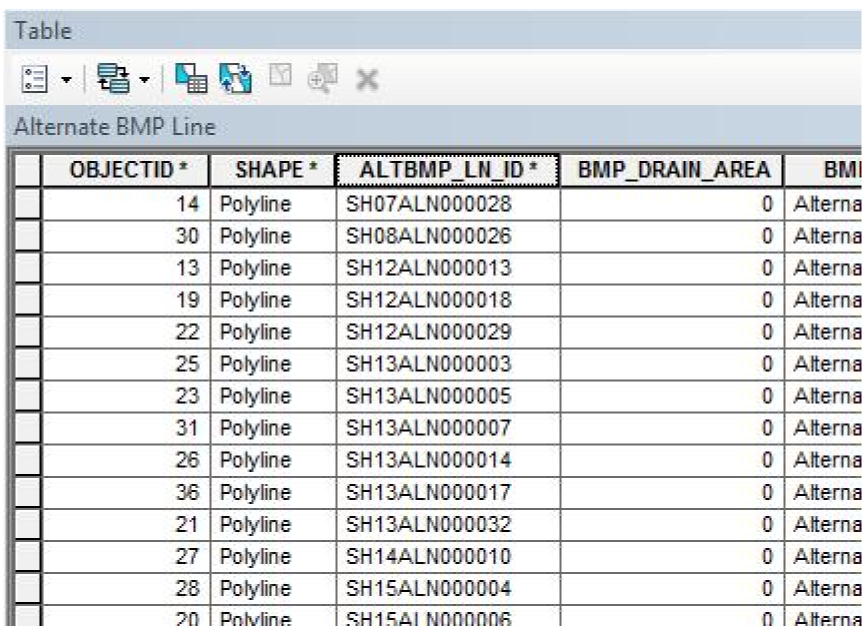
3.1 Stream Restoration IAC Calculation

The AltBMPLine feature class contains a field to explicitly capture IAC ("EQU_IMP_ACR"). To verify the IAC, this example will add a new, temporary field to the AltBMPLine feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

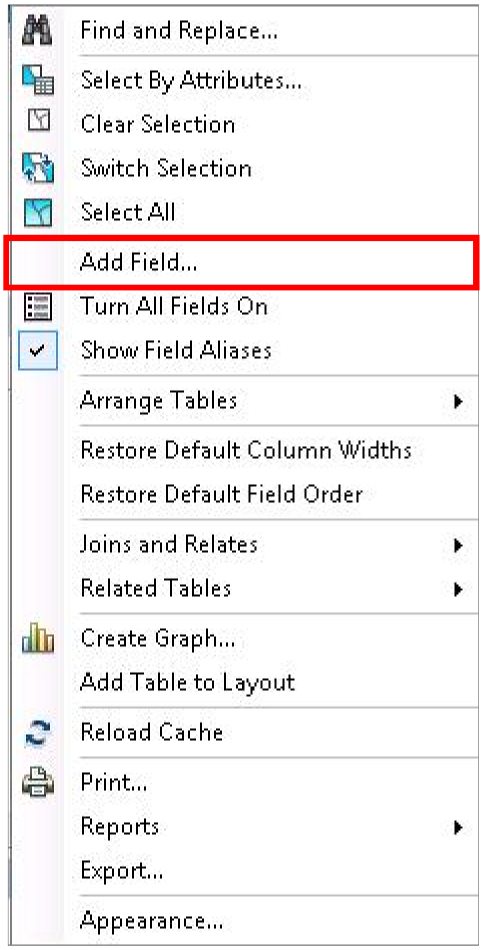
This process could also be done in Excel after exporting the AltBMPLine feature class (the calculation of IAC in Excel is not described within this document).

3.1.1 Add New IAC Field

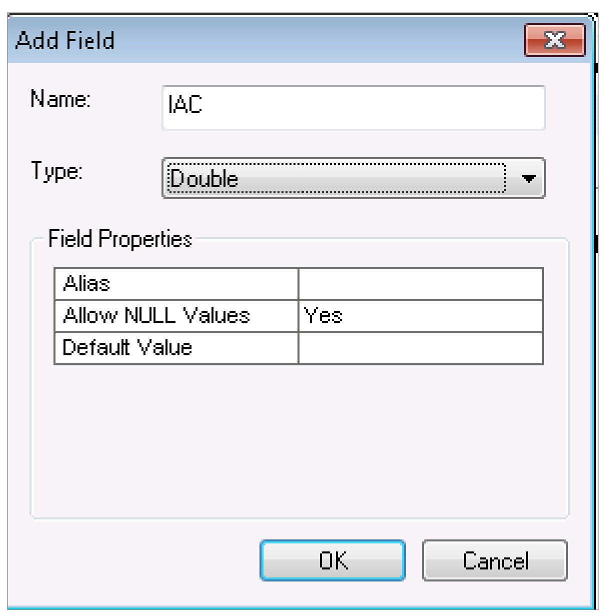
Within the AltBMPLine attribute table, click the Table Options button, and select "Add Field…"



OBJECTID *	SHAPE *	ALTBMP_LN_ID *	BMP_DRAIN_AREA	BMI
14	Polyline	SH07ALN000028	0	Alterna
30	Polyline	SH08ALN000026	0	Alterna
13	Polyline	SH12ALN000013	0	Alterna
19	Polyline	SH12ALN000018	0	Alterna
22	Polyline	SH12ALN000029	0	Alterna
25	Polyline	SH13ALN000003	0	Alterna
23	Polyline	SH13ALN000005	0	Alterna
31	Polyline	SH13ALN000007	0	Alterna
26	Polyline	SH13ALN000014	0	Alterna
36	Polyline	SH13ALN000017	0	Alterna
21	Polyline	SH13ALN000032	0	Alterna
27	Polyline	SH14ALN000010	0	Alterna
28	Polyline	SH15ALN000004	0	Alterna
20	Polyline	SH15ALN000006	0	Alterna

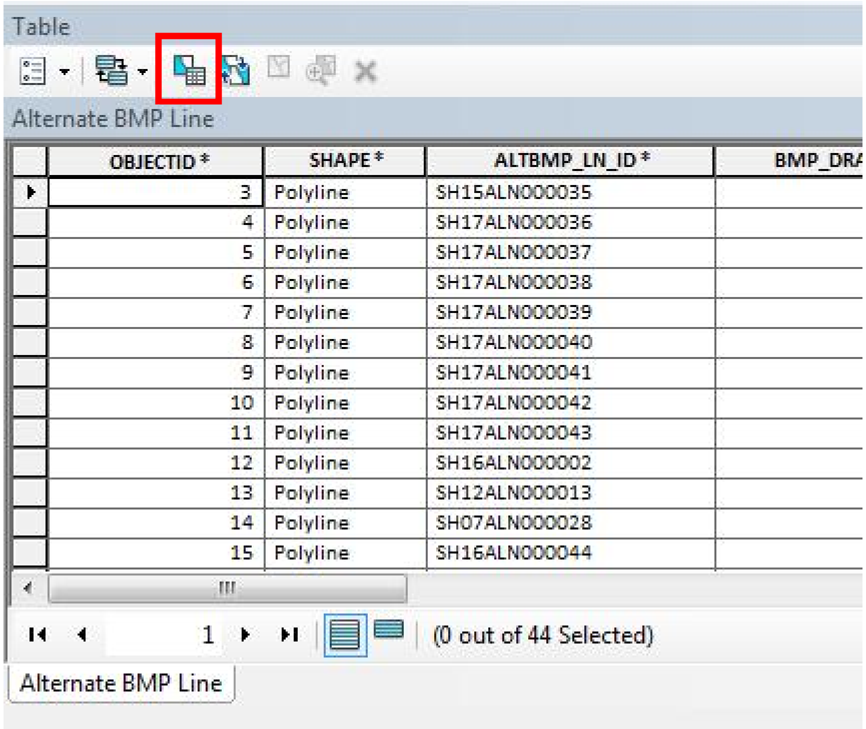


- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK".



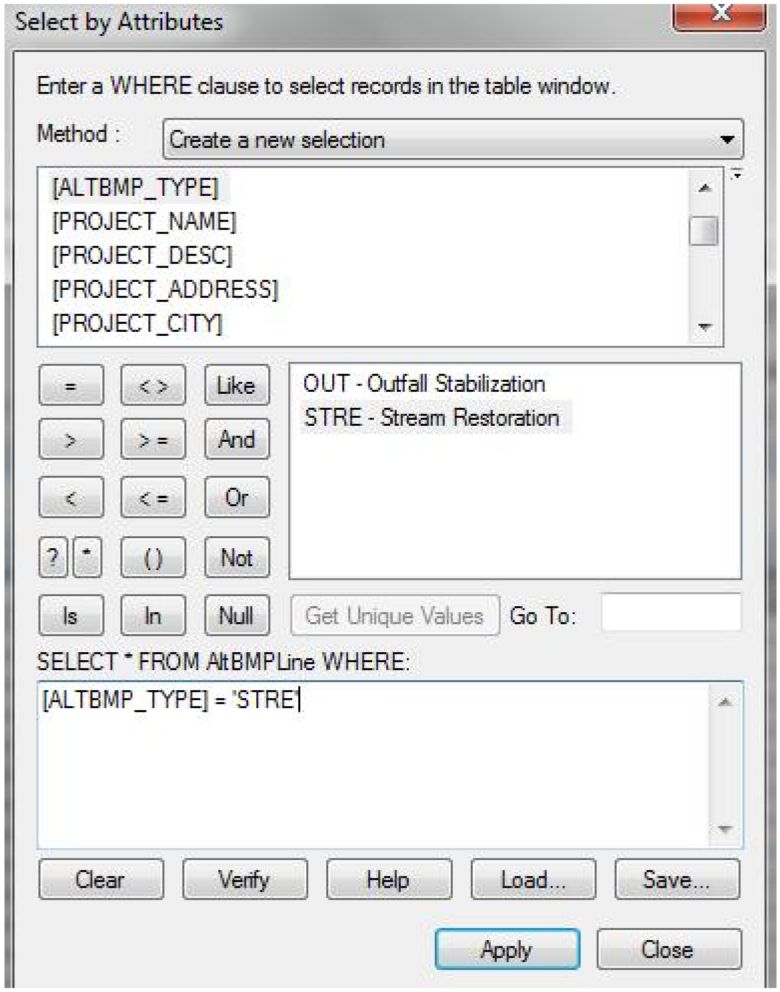
3.1.2 Calculate IAC

- Because several strategies are contained within the AltBMPLine feature class, it is necessary to select Stream Restoration strategy features first.
- Within the AltBMPLine attribute table, click the Select by Attributes button.

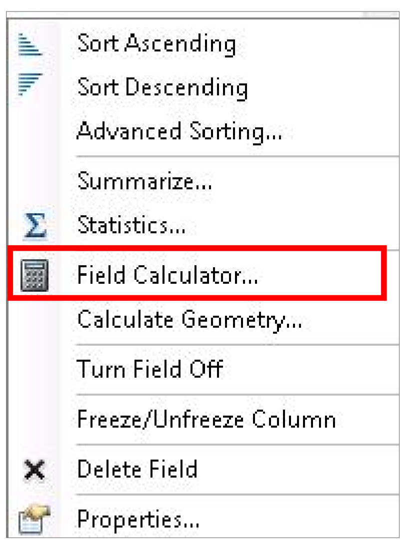


- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration projects, and click “Apply”:

  [ALTBMP_TYPE] = 'STRE'

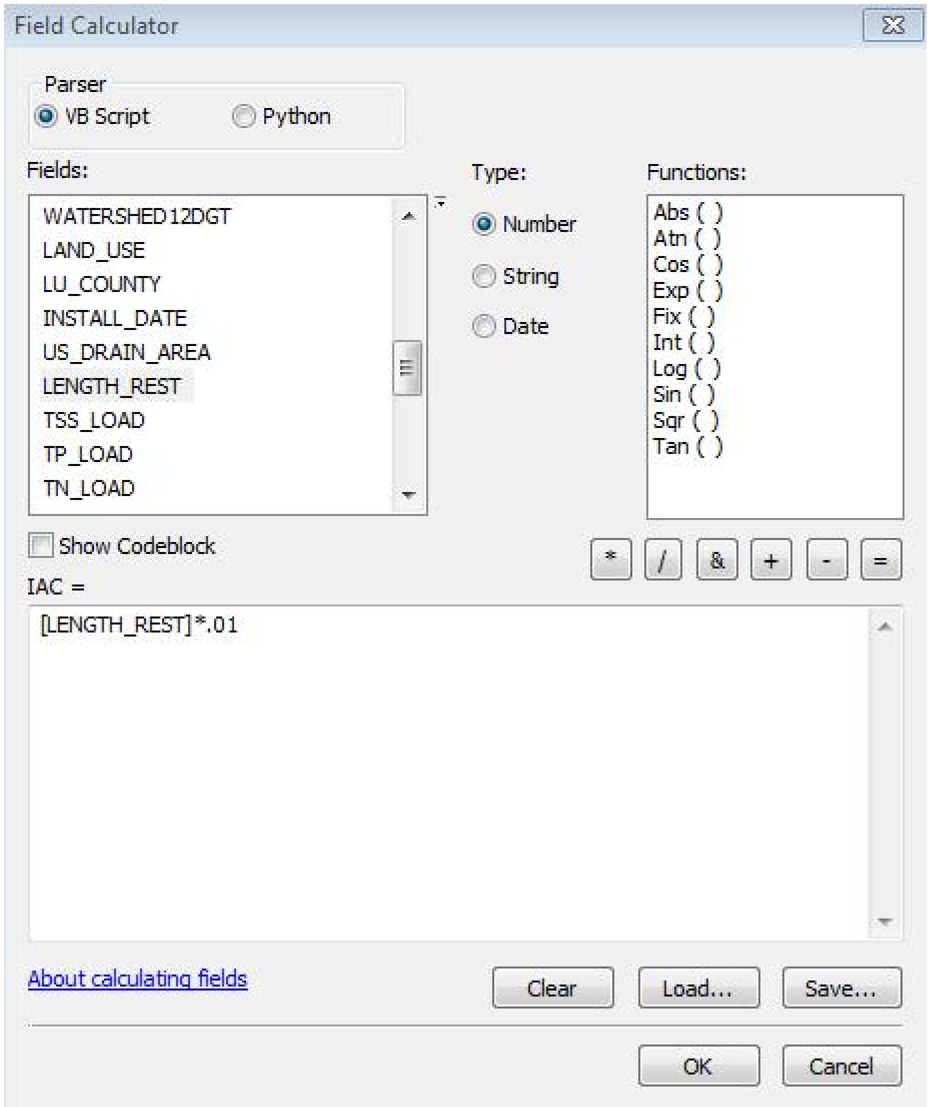


- Ensuring that the selection is retained, right click on the new IAC field, and select "Field Calculator…"



- Within the Field Calculator dialog window, enter the following calculation and click "OK":

[LENGTH_REST] * 0.01

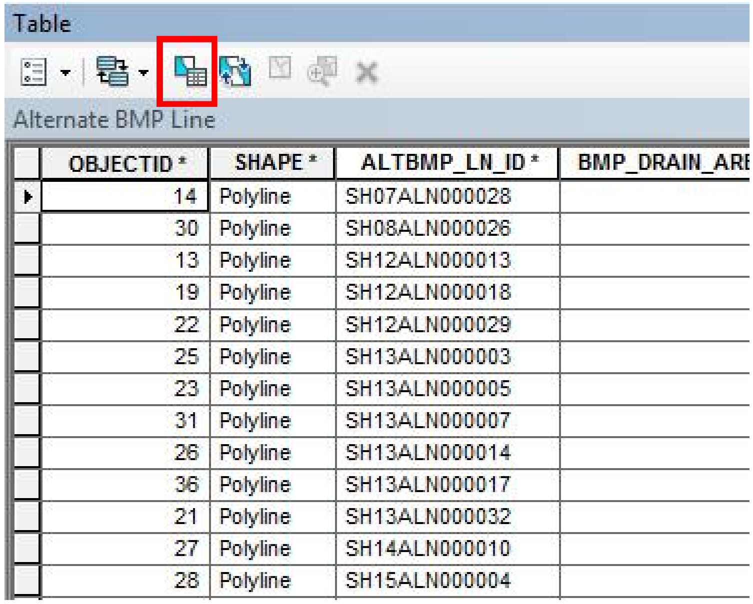


3.1.3 Stream Restoration IAC by Fiscal Year

The IAC values for stream restoration by fiscal year and strategy can be summed using the process below.

3.1.3.1 Stream Restoration IAC for FY 2018

- Within the AltBMPLine attribute table, click the Select by Attributes button.

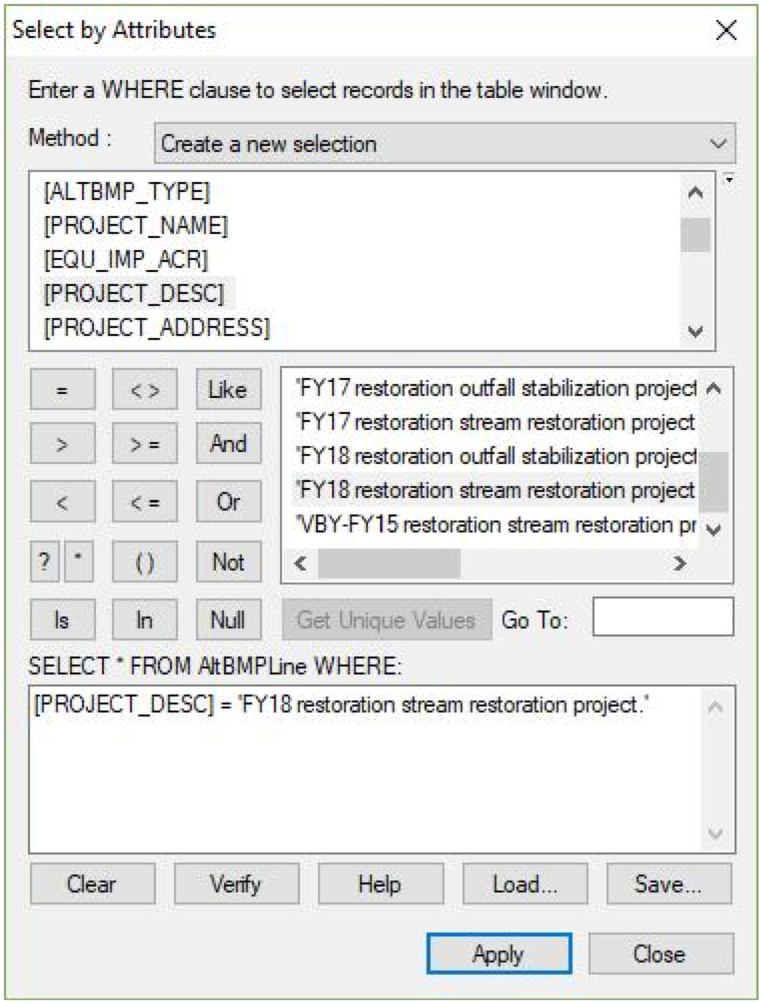


Table

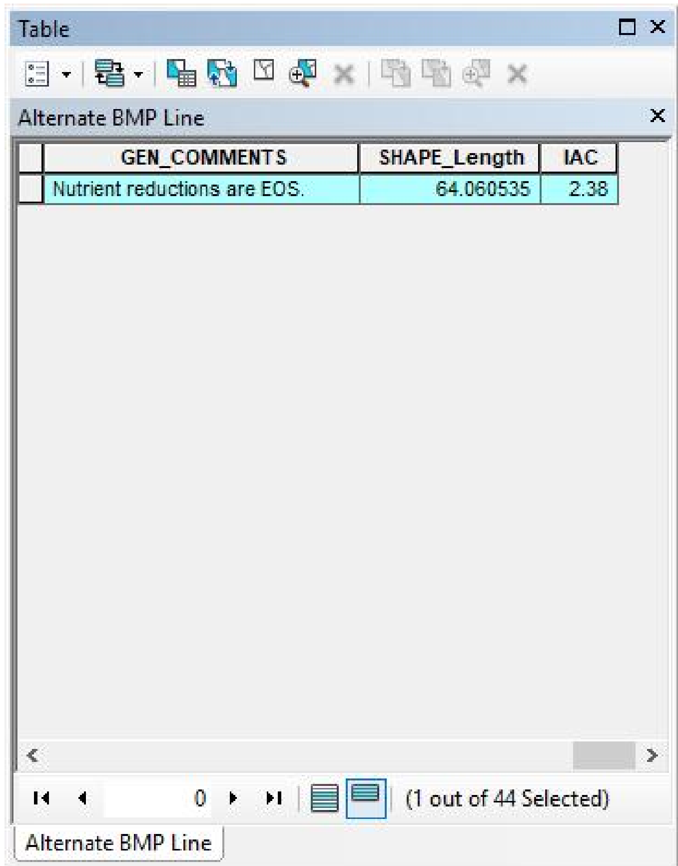
Alternate BMP Line

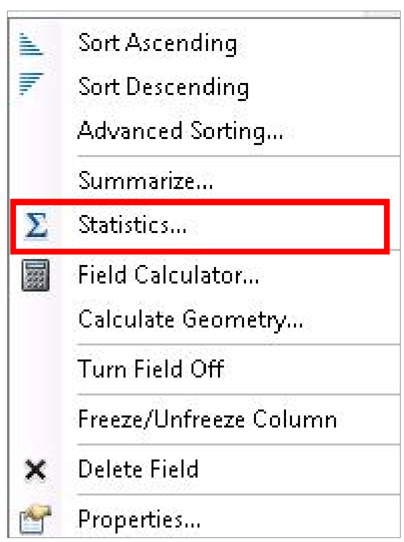
	OBJECTID *	SHAPE *	ALTBMP_LN_ID *	BMP_DRAIN_ARE
▸	14	Polyline	SH07ALN000028	
	30	Polyline	SH08ALN000026	
	13	Polyline	SH12ALN000013	
	19	Polyline	SH12ALN000018	
	22	Polyline	SH12ALN000029	
	25	Polyline	SH13ALN000003	
	23	Polyline	SH13ALN000005	
	31	Polyline	SH13ALN000007	
	26	Polyline	SH13ALN000014	
	36	Polyline	SH13ALN000017	
	21	Polyline	SH13ALN000032	
	27	Polyline	SH14ALN000010	
	28	Polyline	SH15ALN000004	

- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY18, and click “Apply”:
  [PROJECT_DESC] = 'FY18 restoration stream restoration project.'

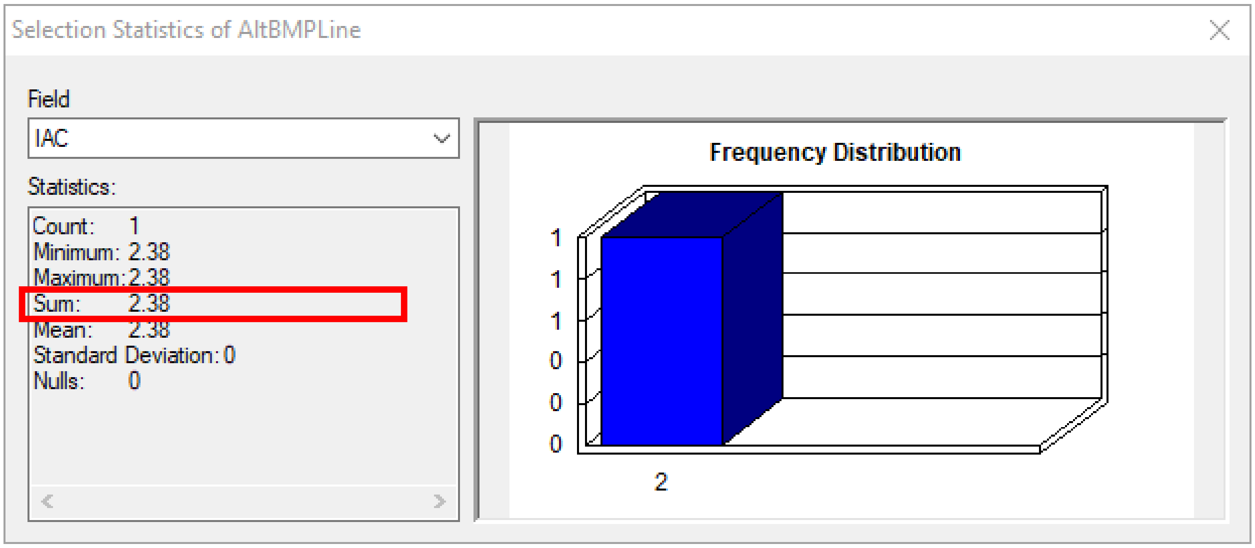


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





- View the "Sum" field to view the total restoration treatment credit claimed for stream restoration FY 18.

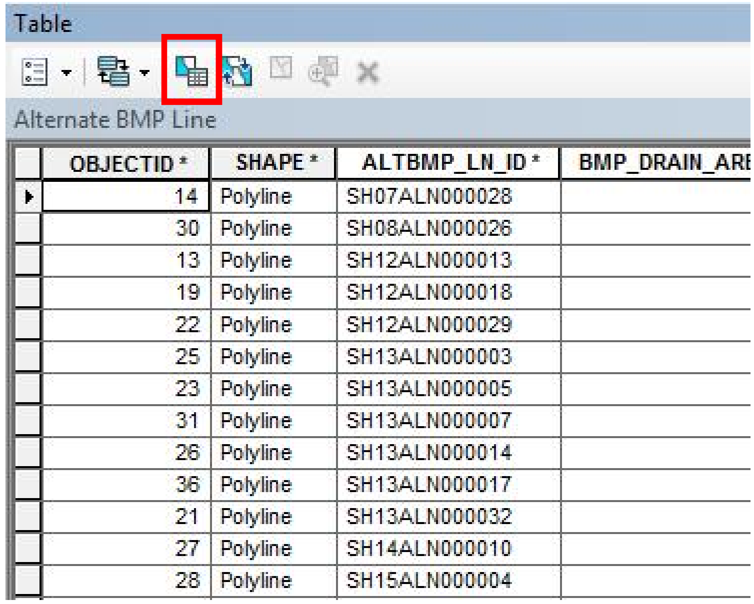


The total stream restoration treatment credit for FY18 is 2.38 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

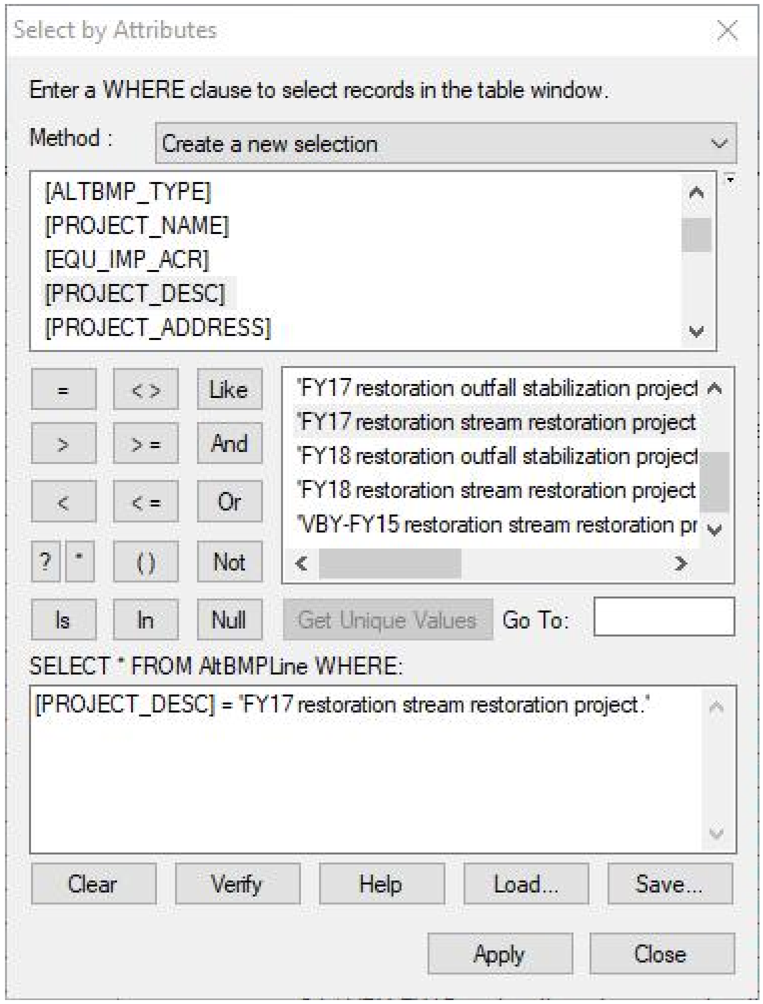
3.1.3.2 *Stream Restoration IAC for FY 2017*

- Within the AltBMPLine attribute table, click the Select by Attributes button.

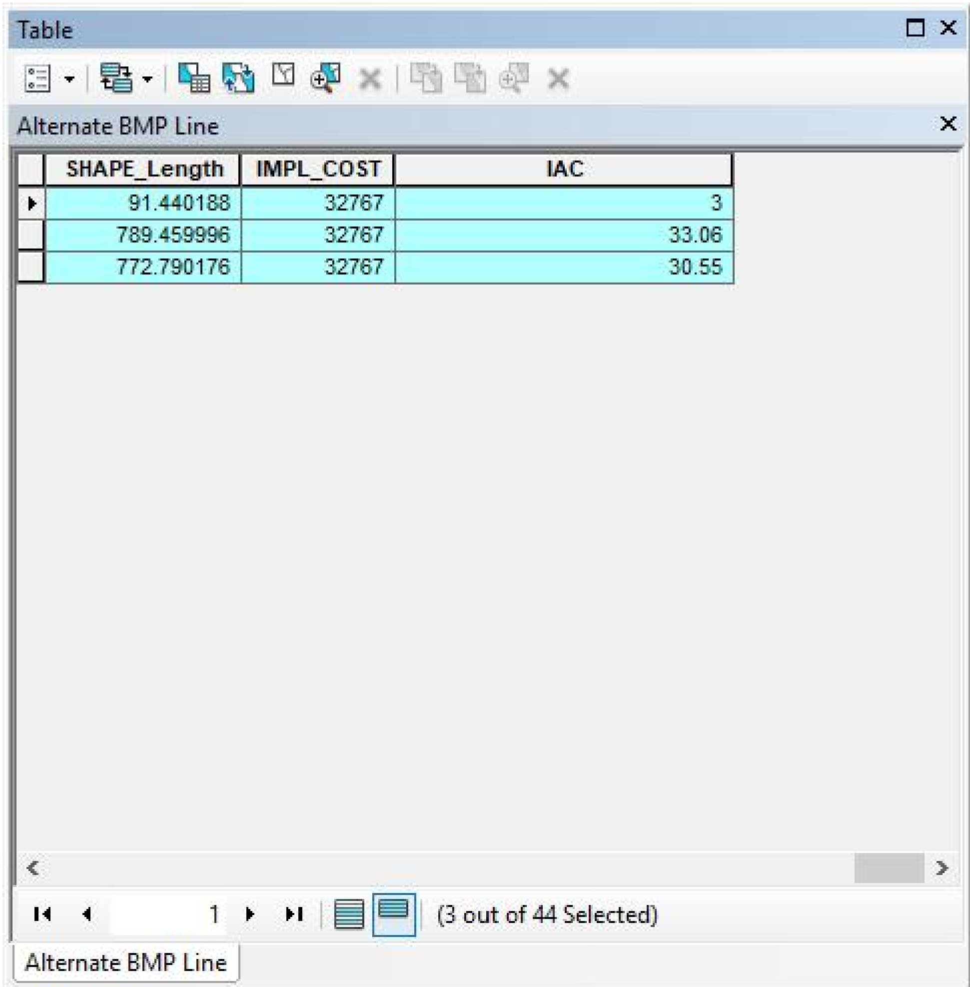


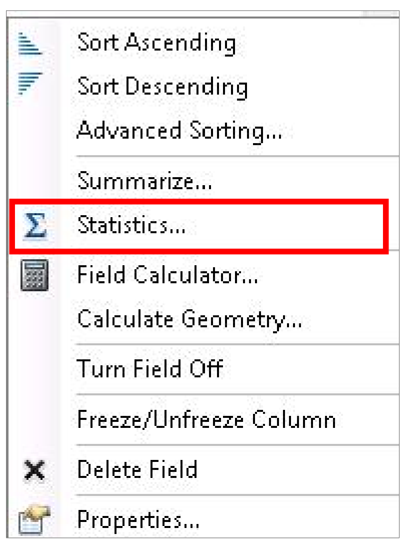
OBJECTID *	SHAPE *	ALTBMP_LN_ID *	BMP_DRAIN_ARE
14	Polyline	SH07ALN000028	
30	Polyline	SH08ALN000026	
13	Polyline	SH12ALN000013	
19	Polyline	SH12ALN000018	
22	Polyline	SH12ALN000029	
25	Polyline	SH13ALN000003	
23	Polyline	SH13ALN000005	
31	Polyline	SH13ALN000007	
26	Polyline	SH13ALN000014	
36	Polyline	SH13ALN000017	
21	Polyline	SH13ALN000032	
27	Polyline	SH14ALN000010	
28	Polyline	SH15ALN000004	

- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY 17, and click “Apply”:
  [PROJECT_DESC] = 'FY17 restoration stream restoration project.'

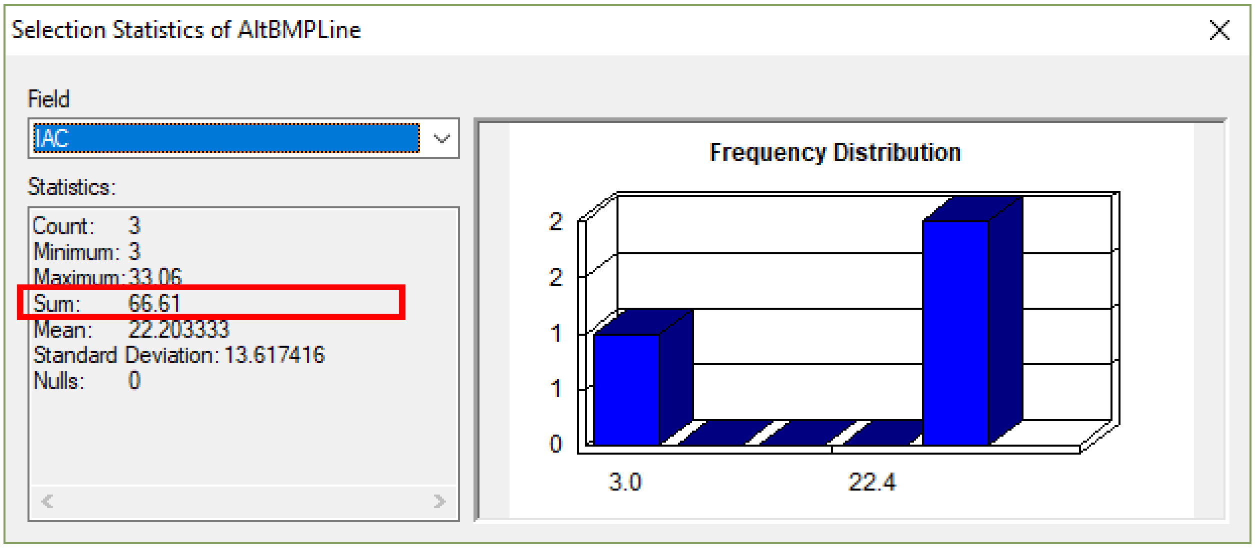


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





- View the "Sum" field to view the total restoration treatment credit claimed for stream restoration FY 17.

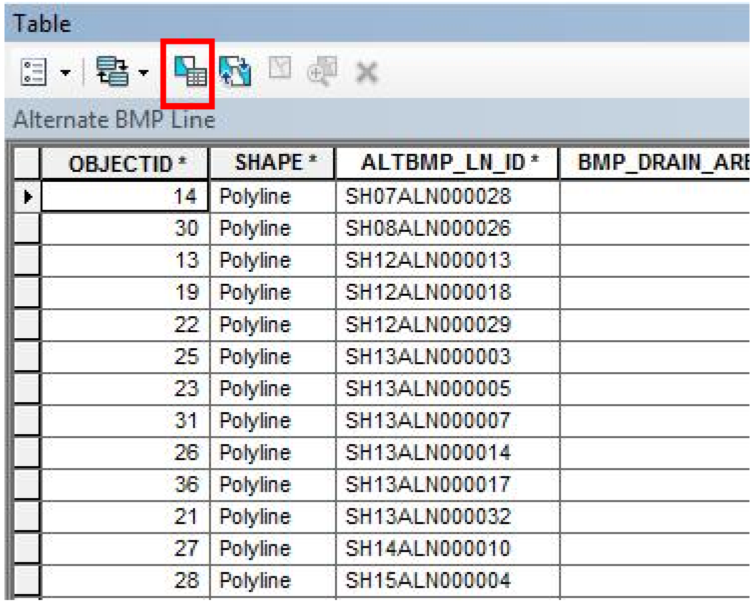


The total stream restoration treatment credit for FY17 is 66.61 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

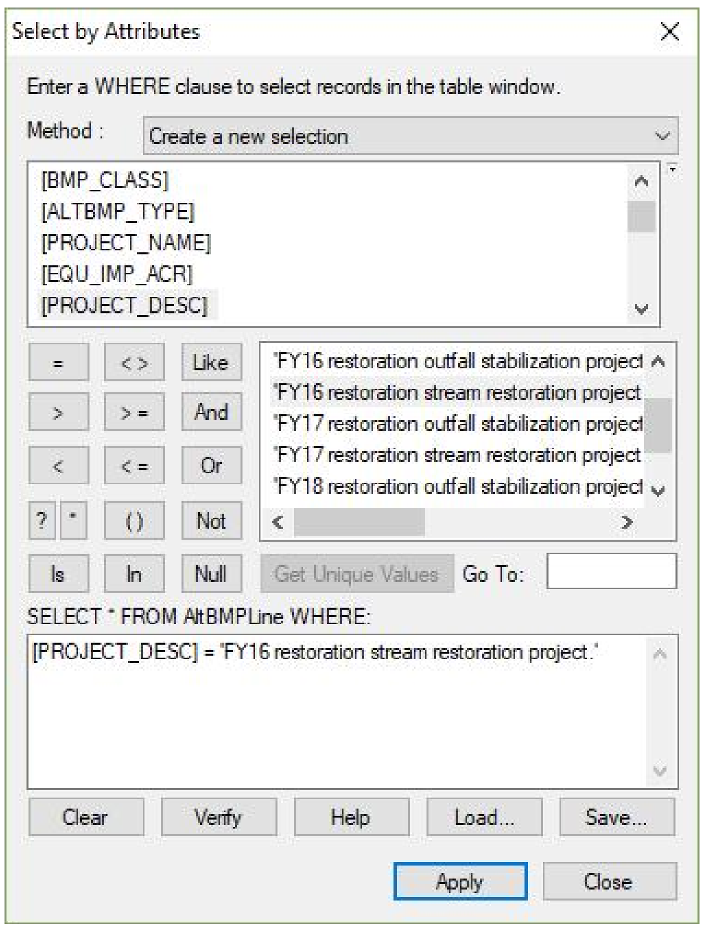
3.1.3.3 Stream Restoration IAC for FY 2016

- Within the AltBMPLine attribute table, click the Select by Attributes button.

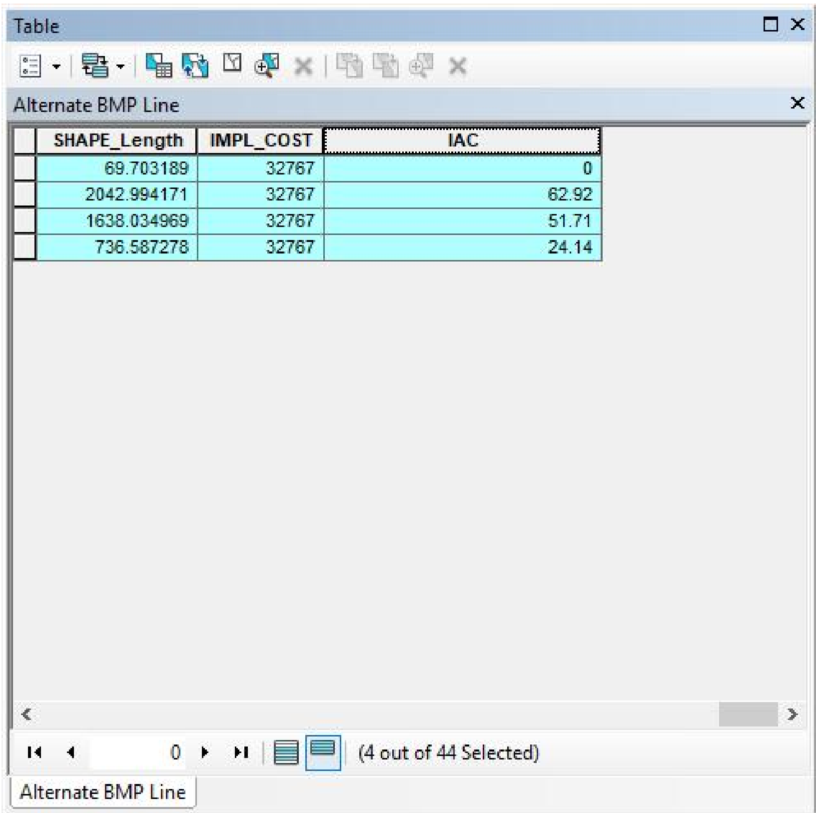


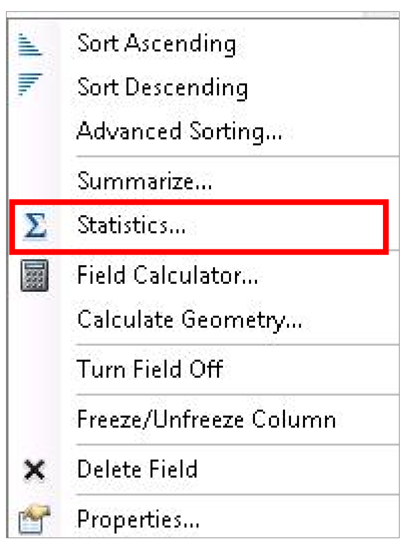
- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY 16, and click "Apply":

  [PROJECT_DESC] = 'FY16 restoration stream restoration project.'

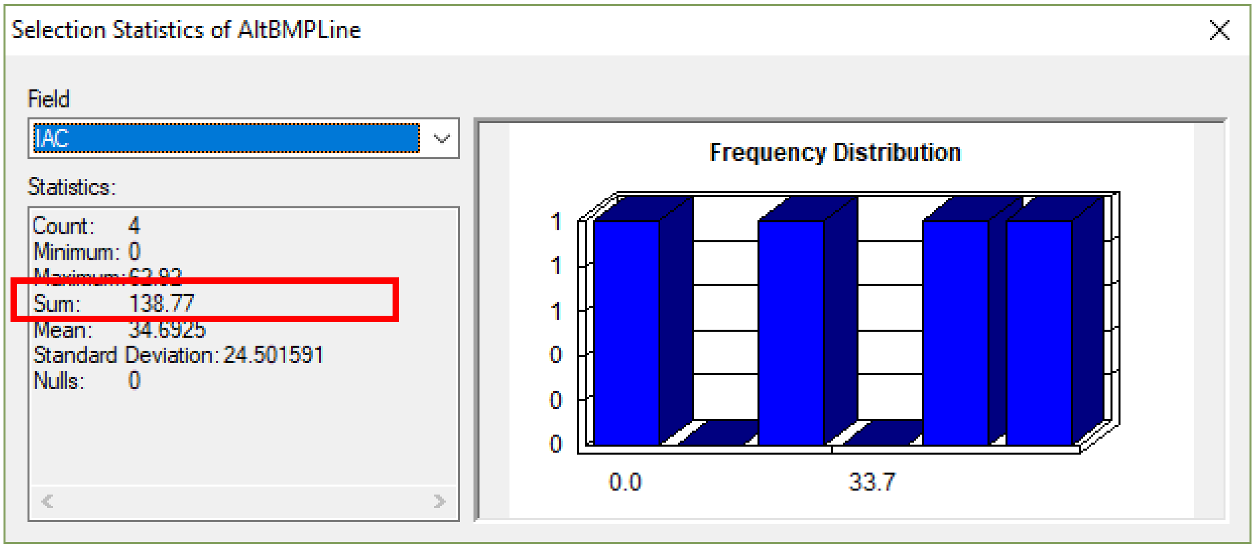


▪ Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





▪ View the "Sum" field to view the total restoration treatment credit claimed for stream restoration FY 16.

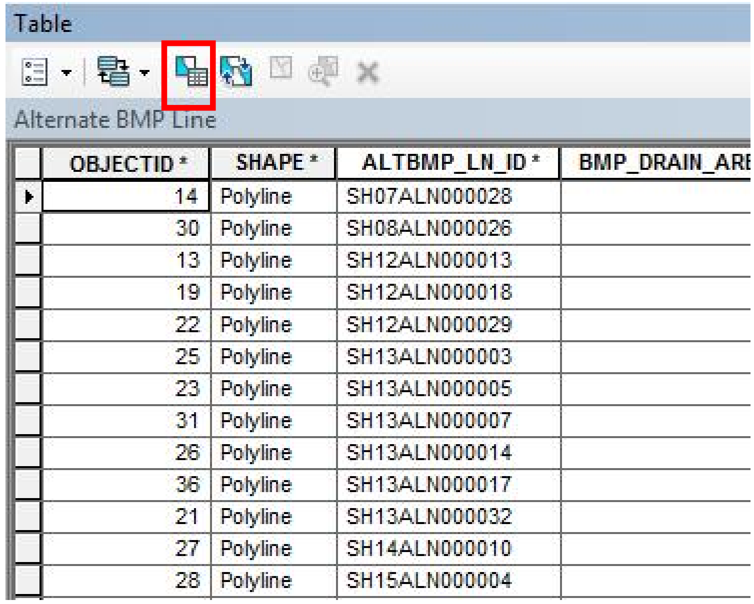


The total stream restoration treatment credit for FY16 is 138.77 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

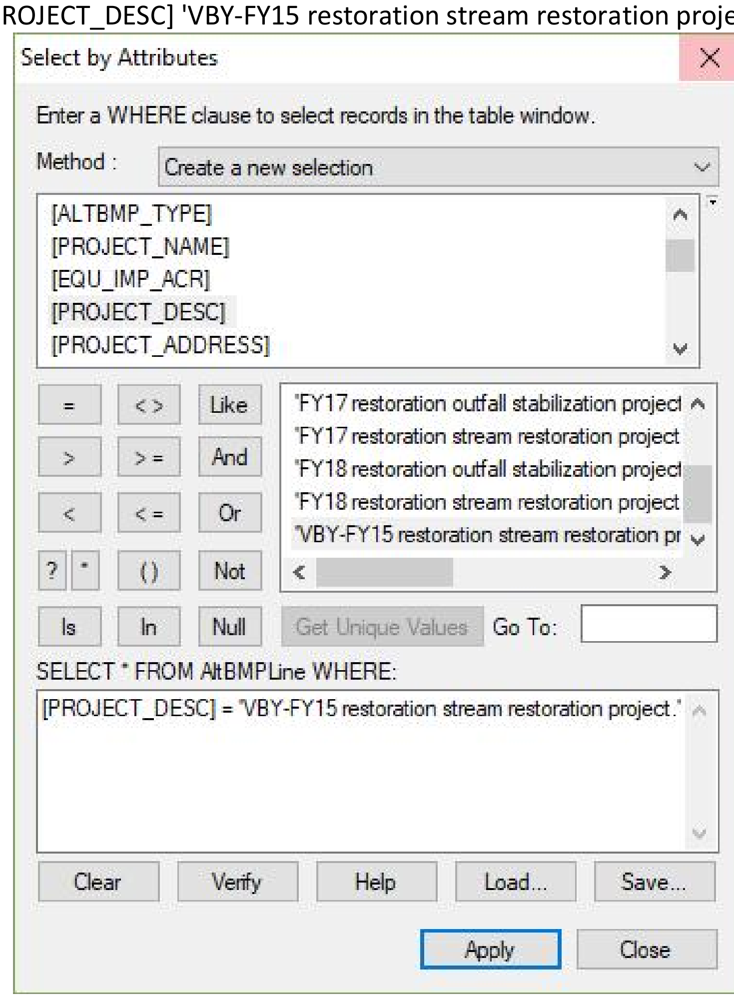
3.1.3.4 *Stream Restoration IAC for VBY-2015*

- Within the AltBMPLine attribute table, click the Select by Attributes button.

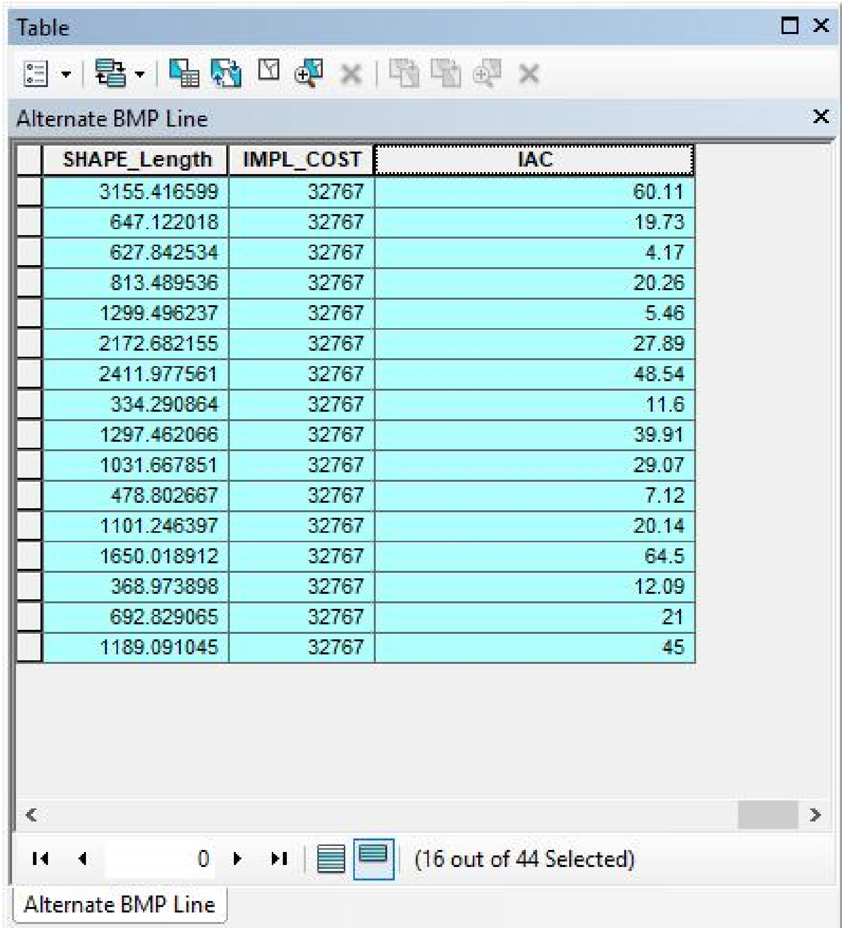


- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for VBY-2015, and click “Apply”:

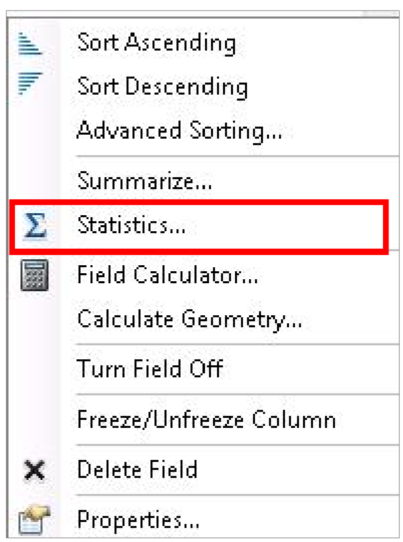
  [PROJECT_DESC] 'VBY-FY15 restoration stream restoration project.'



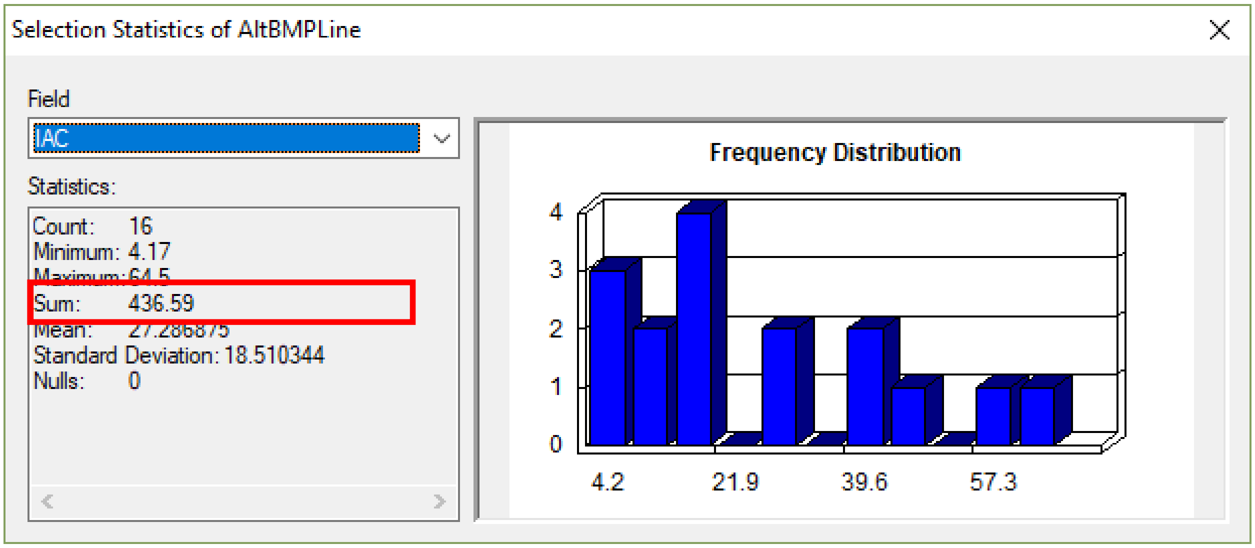
- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select “Statistics…”



SHAPE_Length	IMPL_COST	IAC
3155.416599	32767	60.11
647.122018	32767	19.73
627.842534	32767	4.17
813.489536	32767	20.26
1299.496237	32767	5.46
2172.682155	32767	27.89
2411.977561	32767	48.54
334.290864	32767	11.6
1297.462066	32767	39.91
1031.667851	32767	29.07
478.802667	32767	7.12
1101.246397	32767	20.14
1650.018912	32767	64.5
368.973898	32767	12.09
692.829065	32767	21
1189.091045	32767	45



- View the “Sum” field to view the total restoration treatment credit claimed for stream restoration VBY-2015.



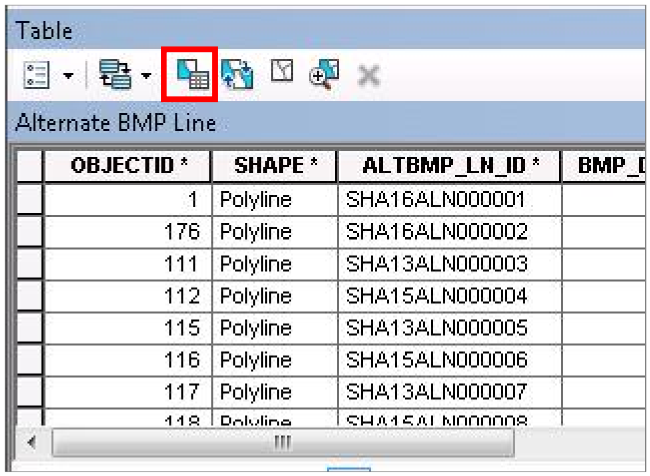
The total stream restoration treatment credit for VBY-2015 is 436.59 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

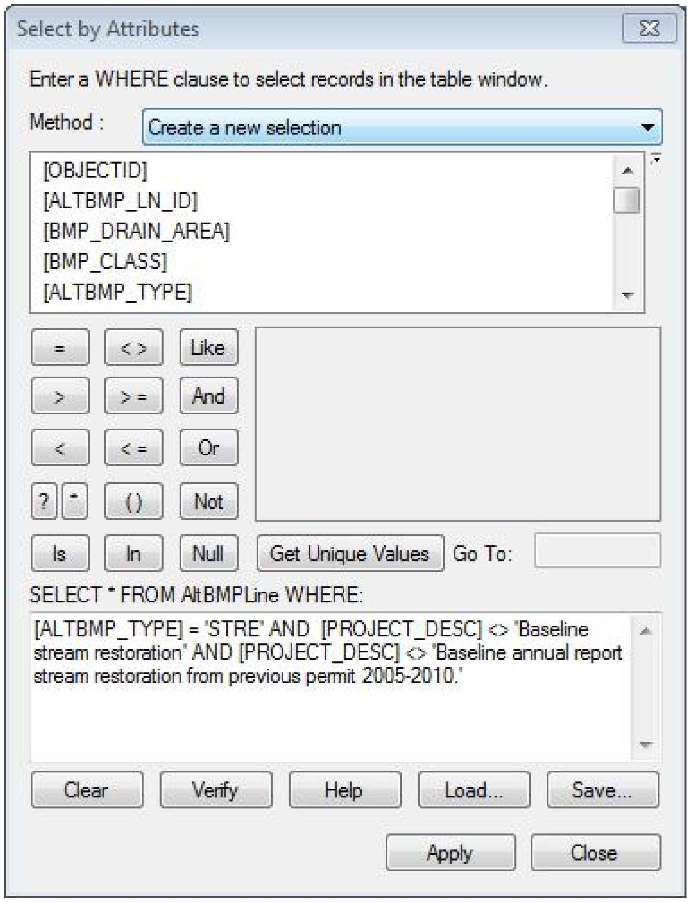
3.2 Total Stream Restoration IAC Sum

Baseline streams are also included in the stream restoration data. To determine restoration stream restoration IAC that does include baseline, select stream restorations, and sum the EQU_IMP_ACR:

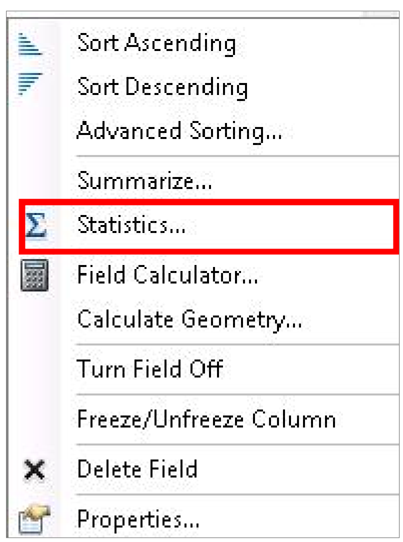
- Within the AltBMPLine feature class, click the Select by Attributes tool.



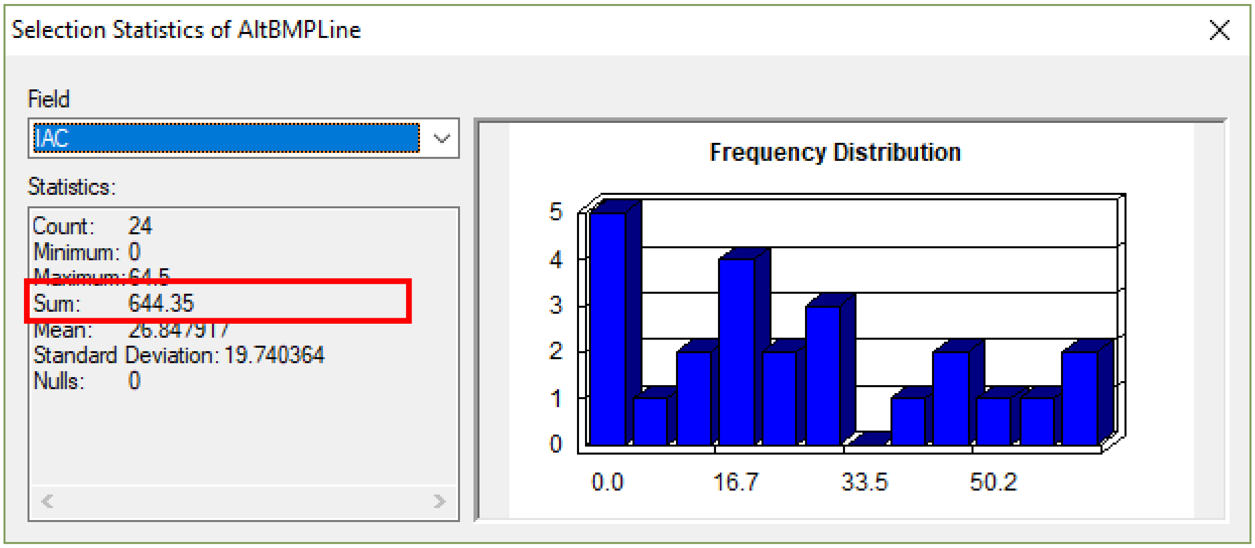
- In the statement box, enter the following selection statement and click “Apply”: [[ALTBMP_TYPE] = 'STRE' AND [PROJECT_DESC] <> 'Baseline stream restoration' AND [PROJECT_DESC] <> 'Baseline annual report stream restoration from previous permit 2005-2010.'



- Ensuring that the selection is retained, right click on the EQV_IMP_ACR, and select “Statistics…”



- View the “Sum” field to view the total restoration treatment credit claimed for Stream Restoration.



The total stream restoration treatment credit 644.35 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

4.0 Outfall Stabilizations

Calculating the impervious treatment credit for Outfall Stabilizations requires two (2) primary inputs:

- Length of Restoration, from within the MDE MS4 geodatabase (AltBMPLine feature class' LENGTH_REST field)
- Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance (0.01 for outfall stabilizations)

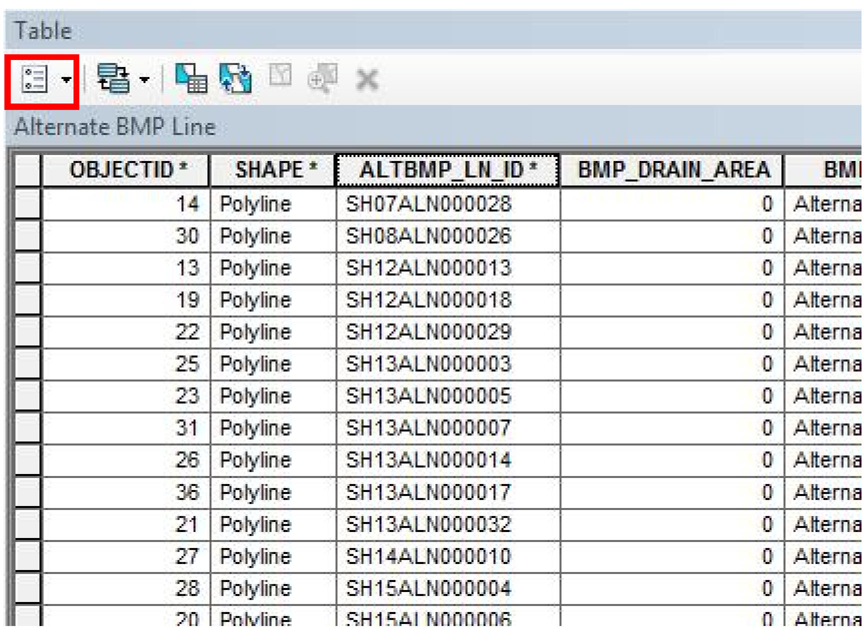
4.1 Outfall Stabilization IAC Calculation

The AltBMPLine feature class contains a field to explicitly capture IAC ("EQU_IMP_ACR"). To verify the IAC, this example will add a new, temporary field to the AltBMPLine feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

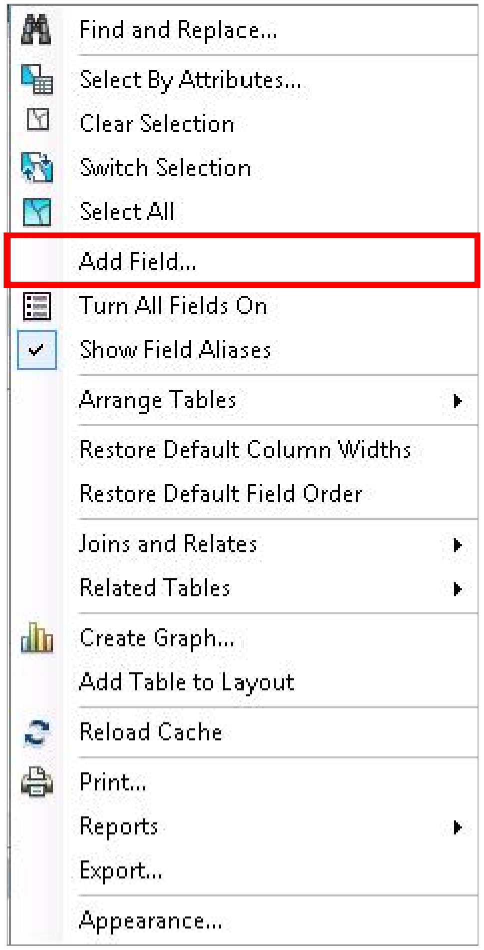
This process could also be done in Excel after exporting the AltBMPLine feature class (the calculation of IAC in Excel is not described within this document).

4.1.1 Add New IAC Field

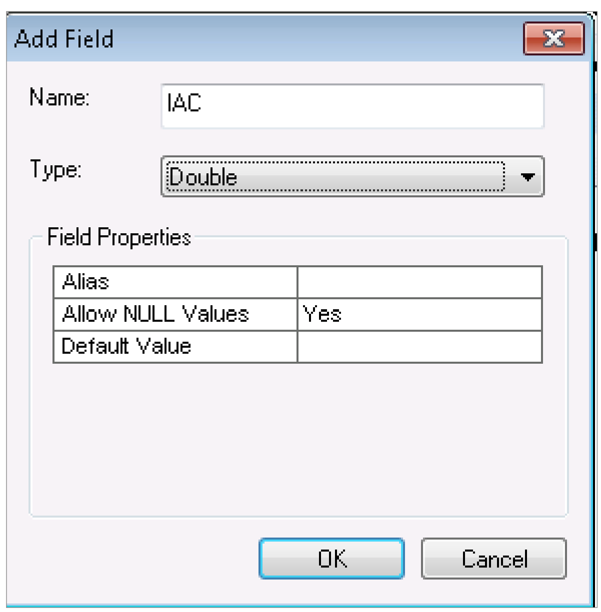
Within the AltBMPLine attribute table, click the Table Options button, and select "Add Field…"



OBJECTID *	SHAPE *	ALTBMP_LN_ID *	BMP_DRAIN_AREA	BMI
14	Polyline	SH07ALN000028	0	Alterna
30	Polyline	SH08ALN000026	0	Alterna
13	Polyline	SH12ALN000013	0	Alterna
19	Polyline	SH12ALN000018	0	Alterna
22	Polyline	SH12ALN000029	0	Alterna
25	Polyline	SH13ALN000003	0	Alterna
23	Polyline	SH13ALN000005	0	Alterna
31	Polyline	SH13ALN000007	0	Alterna
26	Polyline	SH13ALN000014	0	Alterna
36	Polyline	SH13ALN000017	0	Alterna
21	Polyline	SH13ALN000032	0	Alterna
27	Polyline	SH14ALN000010	0	Alterna
28	Polyline	SH15ALN000004	0	Alterna
20	Polyline	SH15ALN000006	0	Alterna

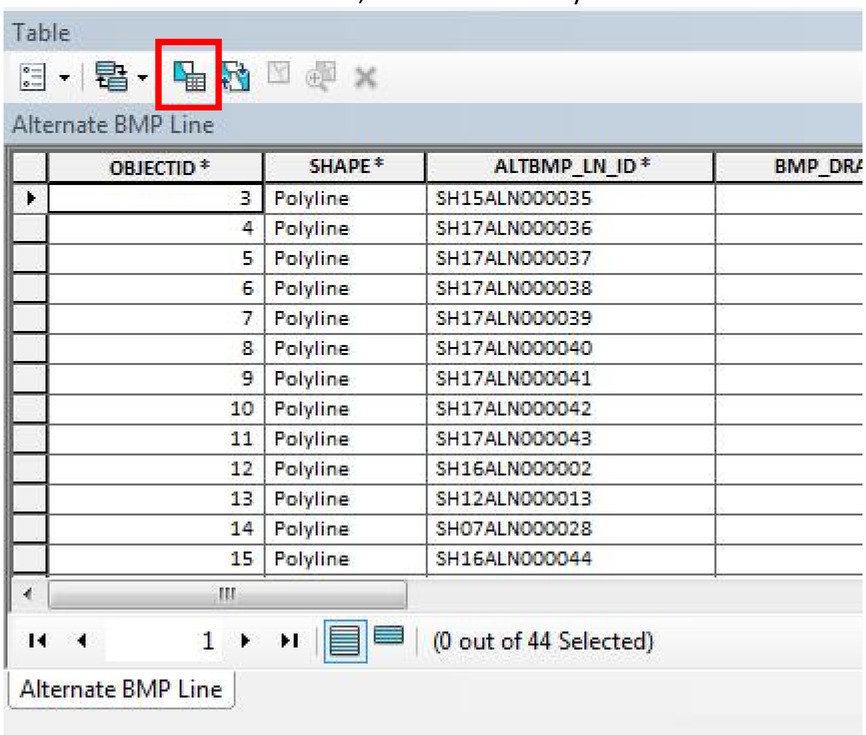


- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK".



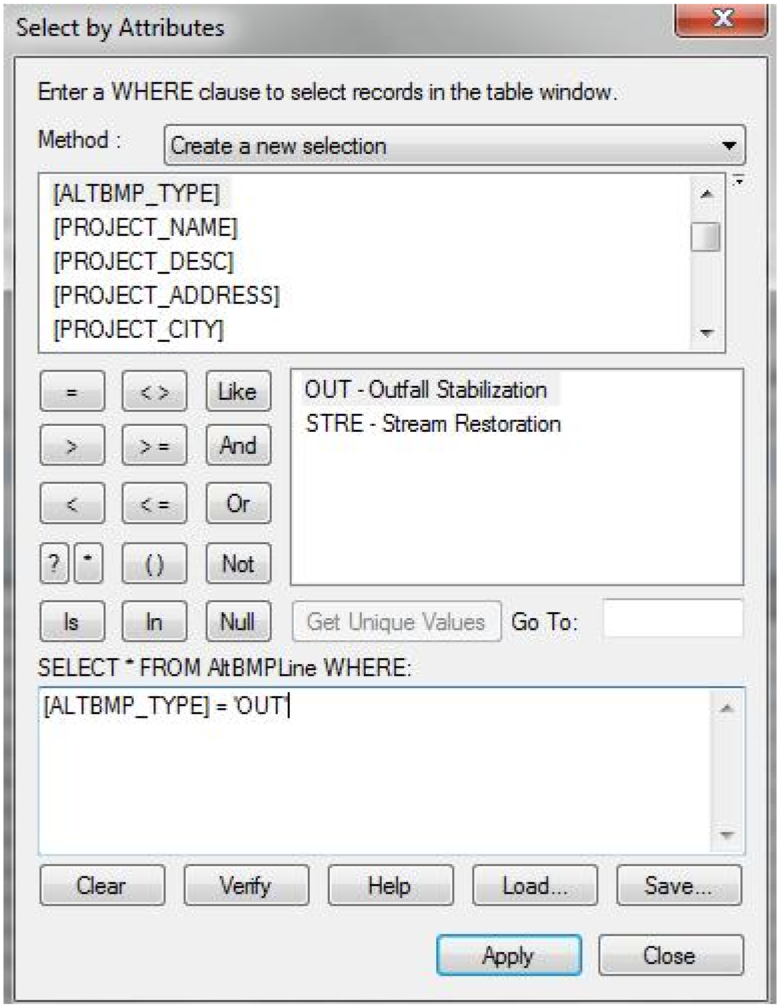
4.1.2 Calculate IAC

- Because several strategies are contained within the AltBMPLine feature class, it is necessary to select Outfall Stabilization strategy features first.
- Within the AltBMPLine attribute table, click the Select by Attributes button.

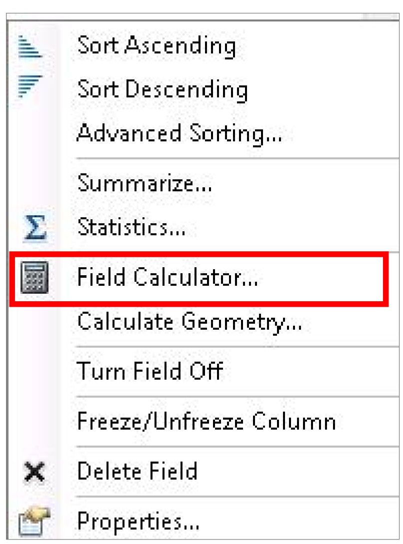


- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration projects, and click “Apply”:

  [ALTBMP_TYPE] = ‘OUT’

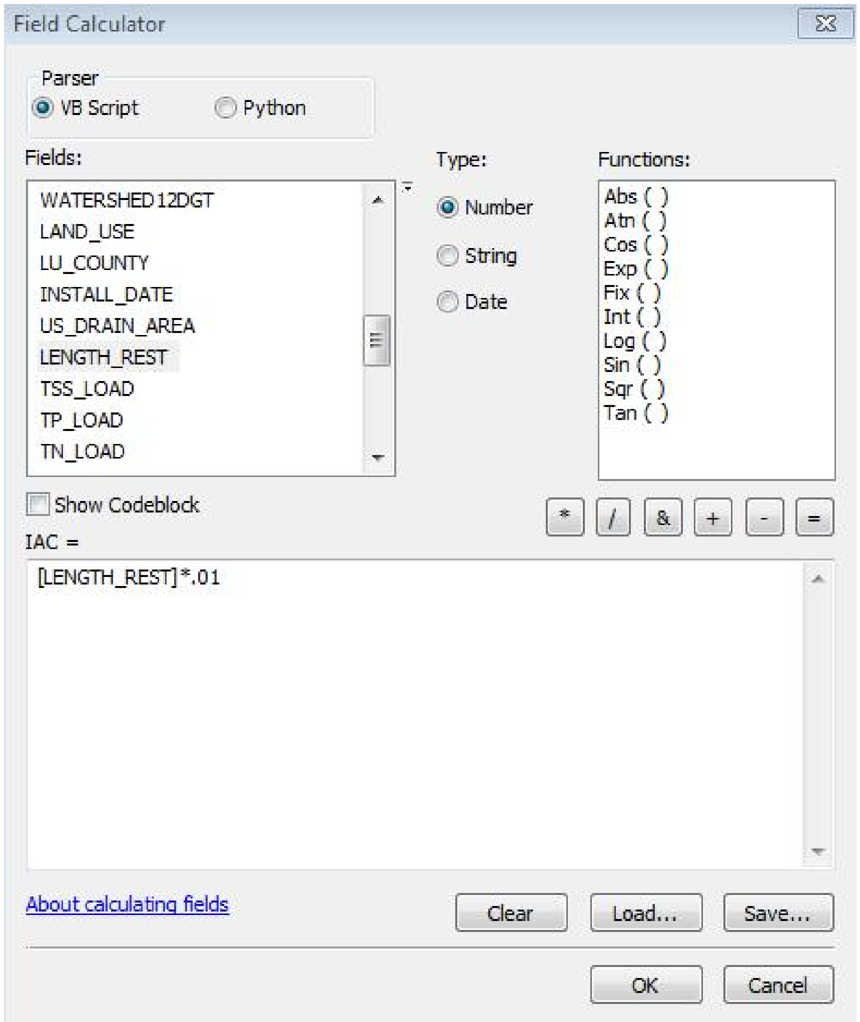


- Ensuring that the selection is retained, right click on the new IAC field, and select "Field Calculator…"



- Within the Field Calculator dialog window, enter the following calculation and click “OK”:

  [LENGTH_REST] * 0.01

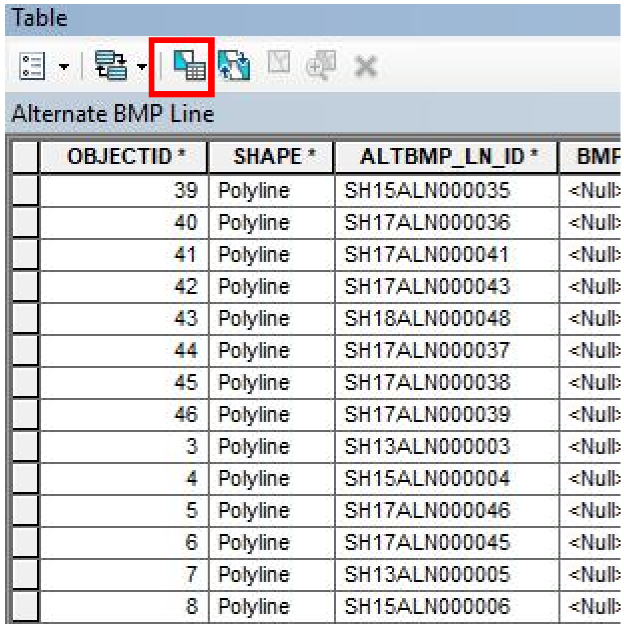


4.1.3 Outfall Stabilization IAC by Fiscal Year

The IAC values for Outfall Stabilization by fiscal year and strategy can be summed using the process below.

4.1.3.1 Outfall Stabilization IAC for FY 2018

Within the AltBMPLine attribute table, click the Select by Attributes button.



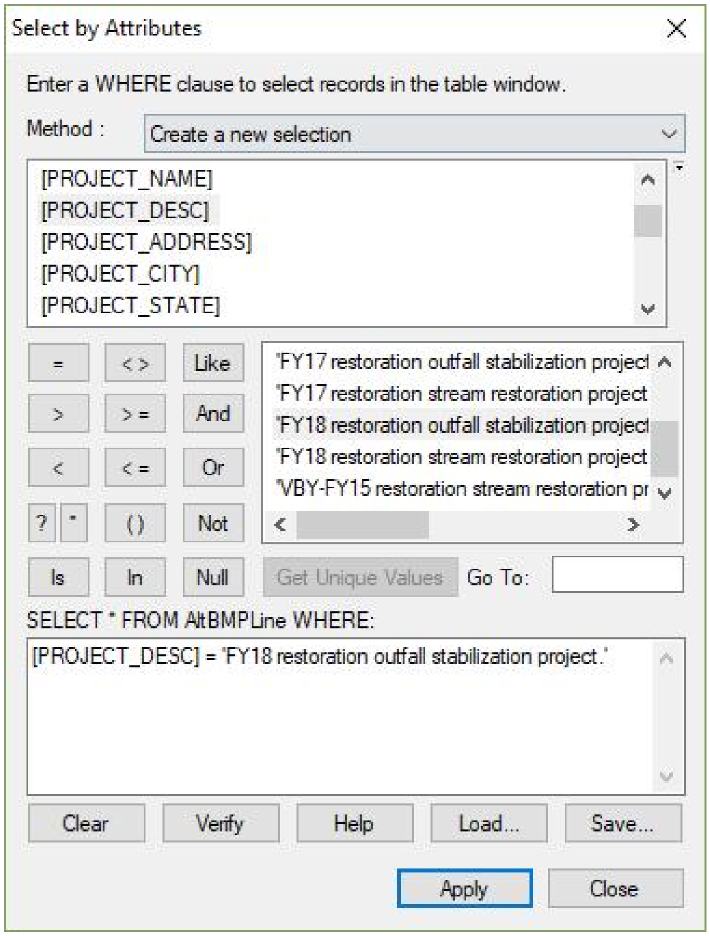
Table

Alternate BMP Line

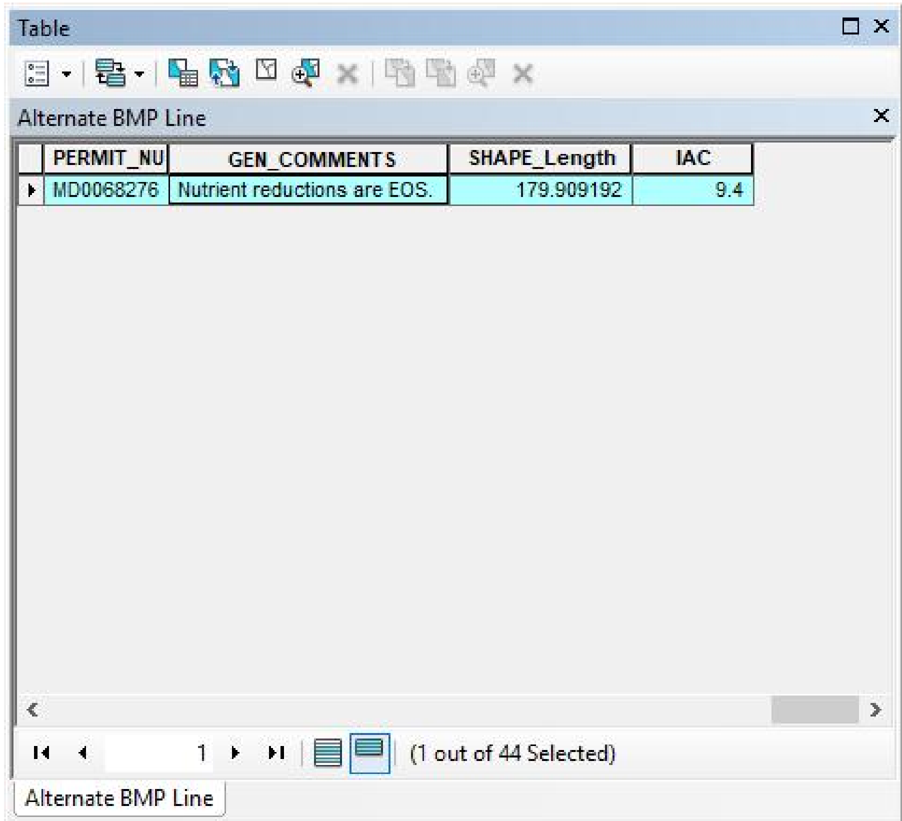
OBJECTID *	SHAPE *	ALTBMP_LN_ID *	BMP
39	Polyline	SH15ALN000035	<Null>
40	Polyline	SH17ALN000036	<Null>
41	Polyline	SH17ALN000041	<Null>
42	Polyline	SH17ALN000043	<Null>
43	Polyline	SH18ALN000048	<Null>
44	Polyline	SH17ALN000037	<Null>
45	Polyline	SH17ALN000038	<Null>
46	Polyline	SH17ALN000039	<Null>
3	Polyline	SH13ALN000003	<Null>
4	Polyline	SH15ALN000004	<Null>
5	Polyline	SH17ALN000046	<Null>
6	Polyline	SH17ALN000045	<Null>
7	Polyline	SH13ALN000005	<Null>
8	Polyline	SH15ALN000006	<Null>

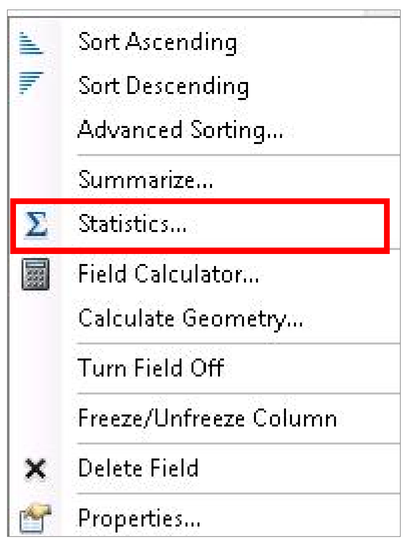
Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY 18, and click “Apply”:

[PROJECT_DESC] = 'FY18 restoration outfall stabilization project.'

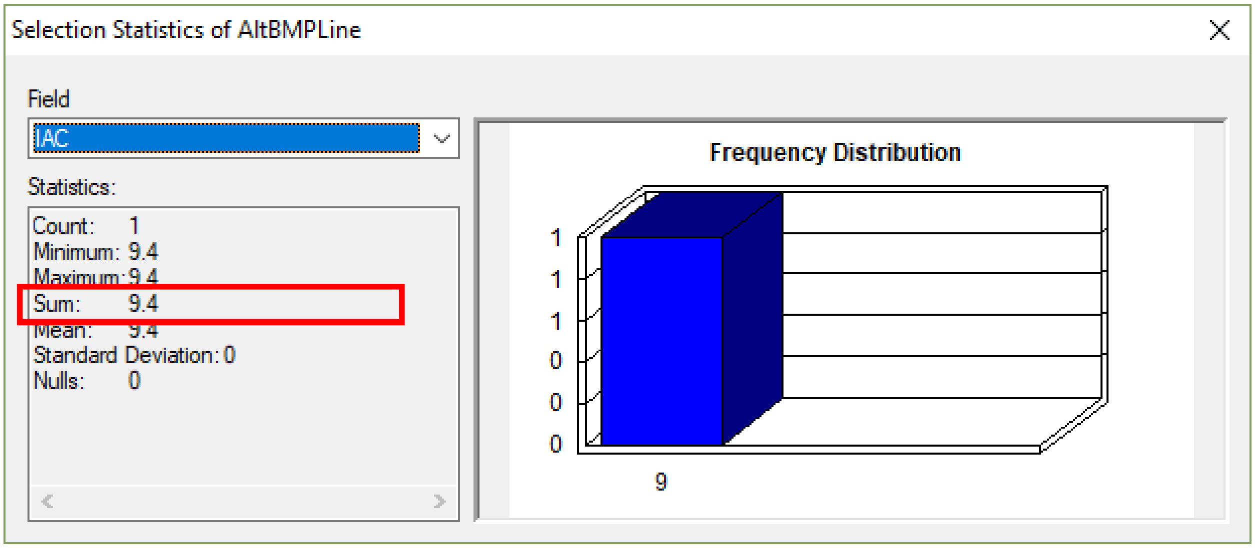


Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select “Statistics…”





View the “Sum” field to view the total restoration treatment credit claimed for outfall stabilization restoration FY18.

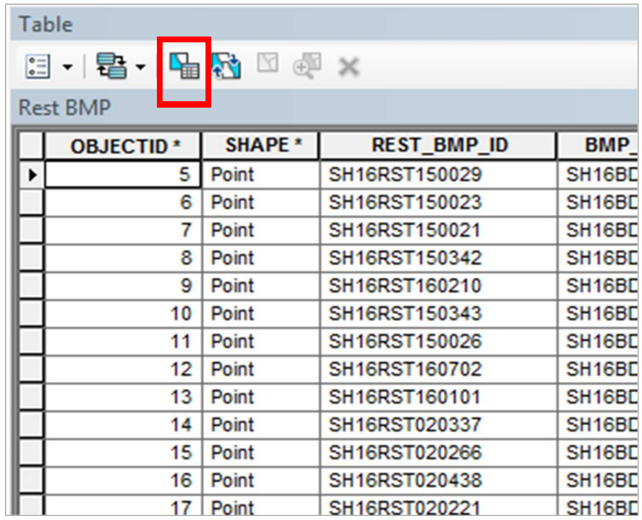


The total outfall stabilization treatment credit for FY18 is 9.40 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

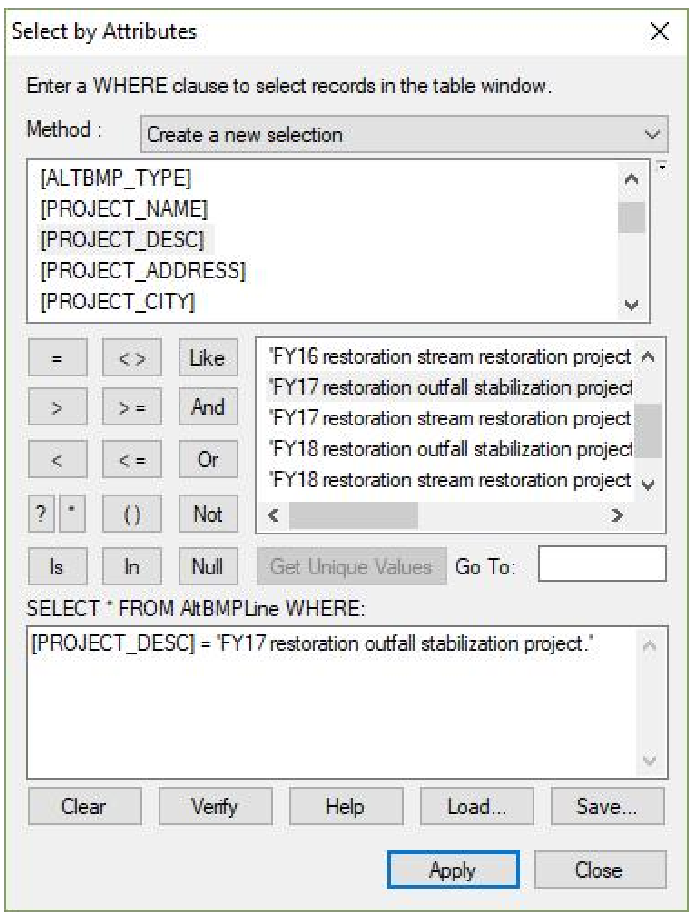
4.1.3.2 Outfall Stabilization IAC for FY 2017

- Within the AltBMPLine attribute table, click the Select by Attributes button.

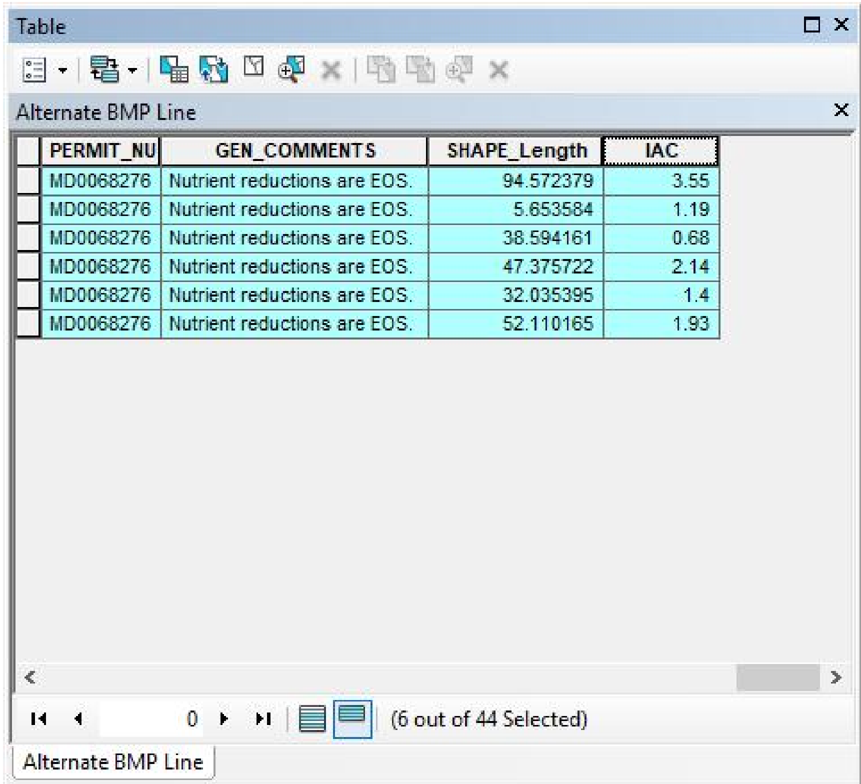


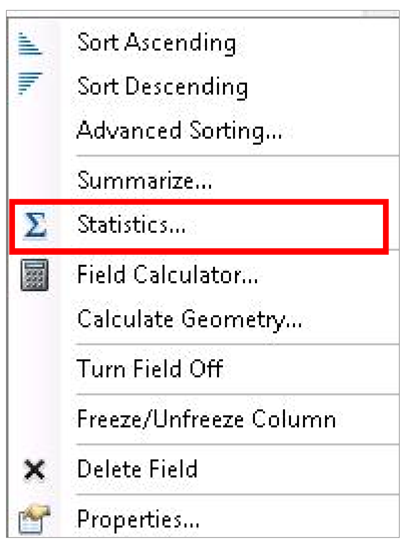
- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY 17, and click "Apply":

[PROJECT_DESC] = 'FY17 restoration outfall stabilization project.'

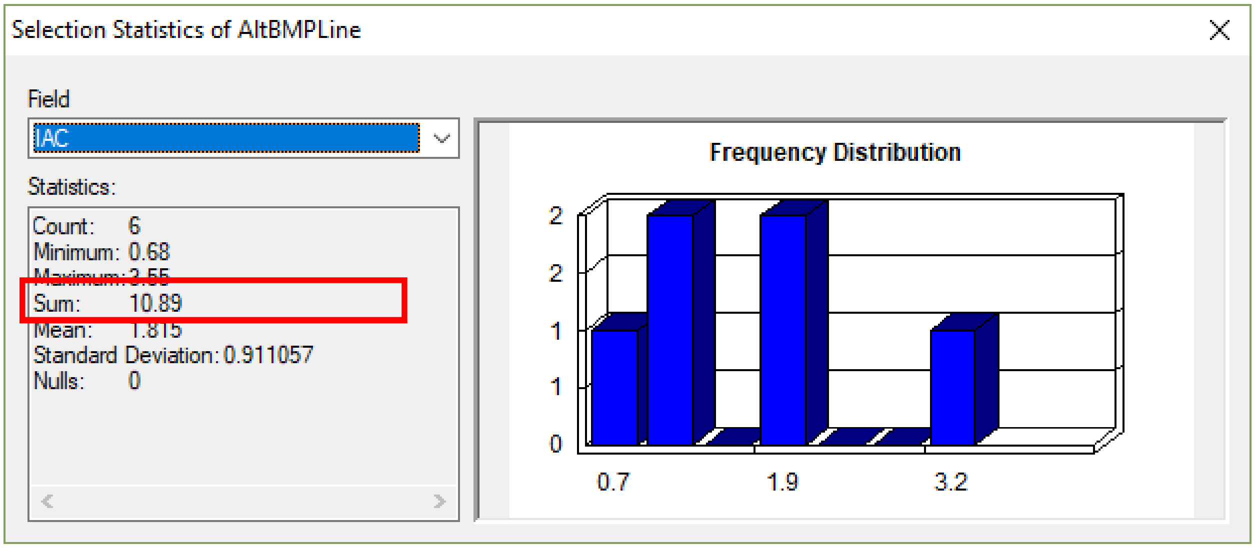


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





- View the "Sum" field to view the total restoration treatment credit claimed for outfall stabilization restoration FY 17.

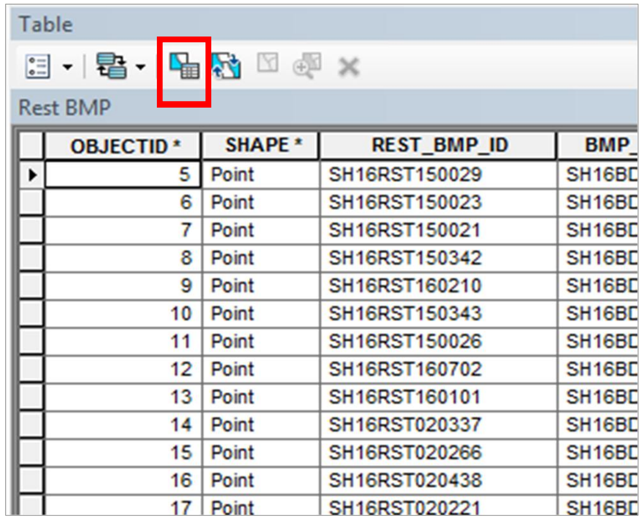


The total outfall stabilization treatment credit for FY17 is 10.89 acres.

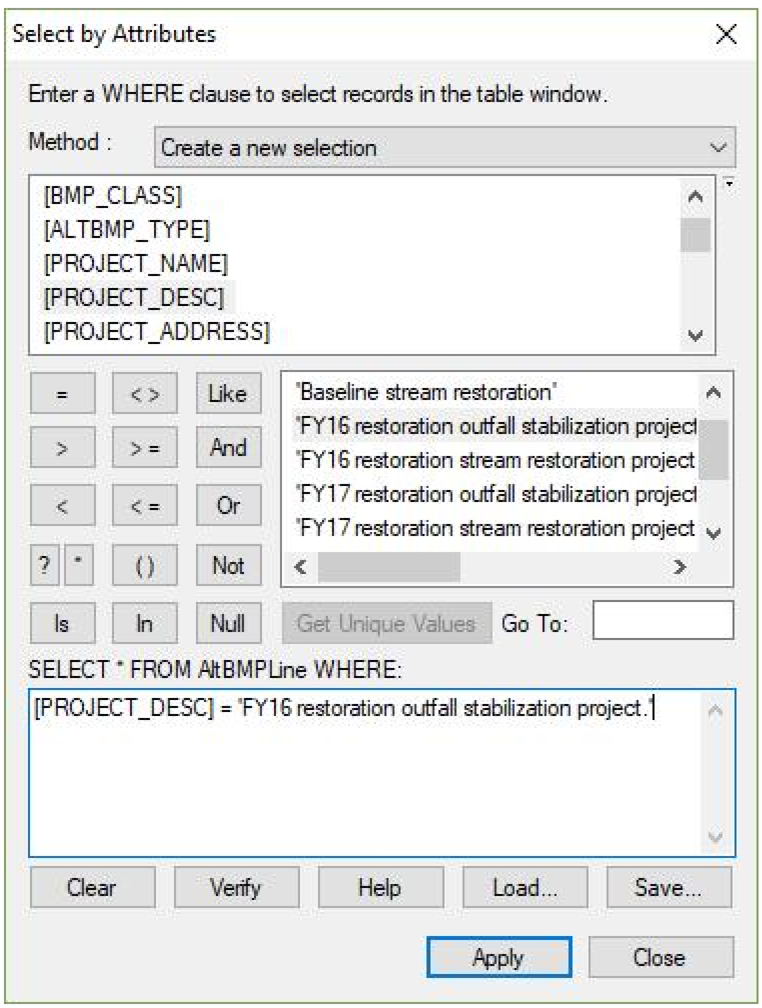
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

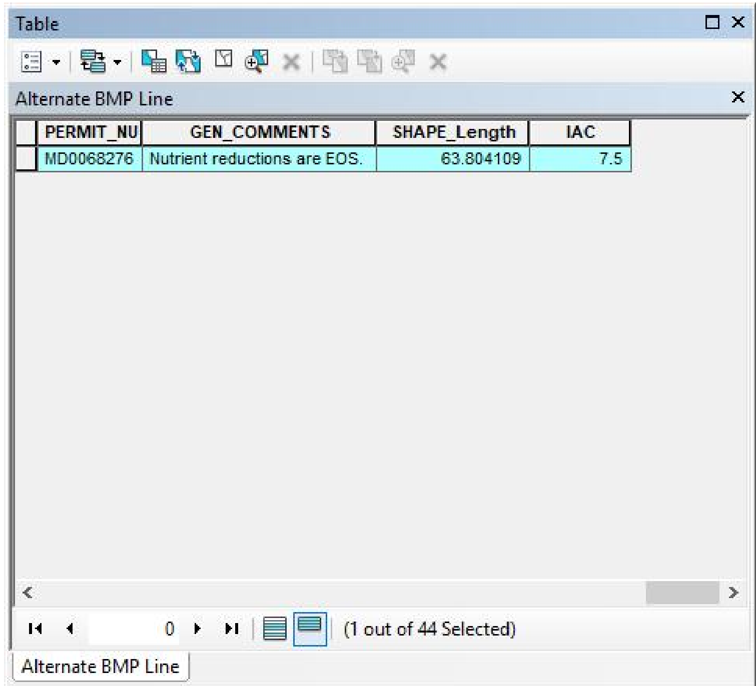
4.1.3.3 Outfall Stabilization IAC for FY 2016

- Within the AltBMPLine attribute table, click the Select by Attributes button.

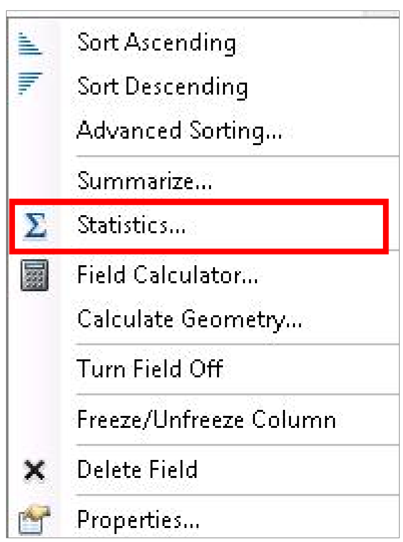


- Within the Select by Attributes dialog window, enter the following selection statement to identify stream restoration for FY 16, and click "Apply":
  [PROJECT_DESC] = 'FY16 restoration outfall stabilization project.'

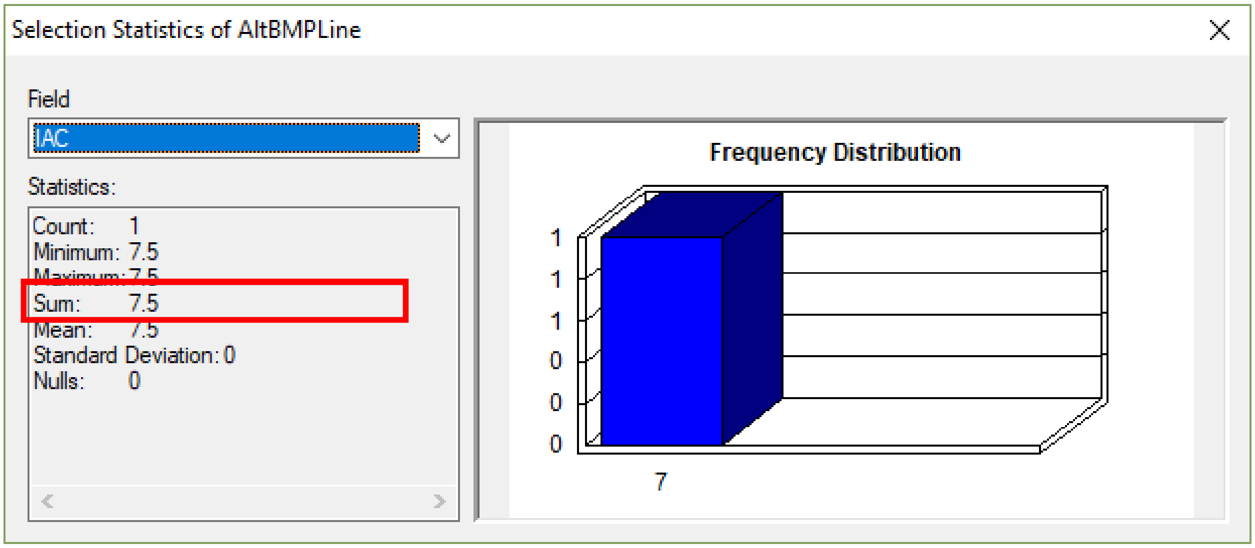




- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select “Statistics…”



- View the “Sum” field to view the total restoration treatment credit claimed for outfall stabilization FY 16.



The total outfall stabilization treatment credit for FY16 is 7.5 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

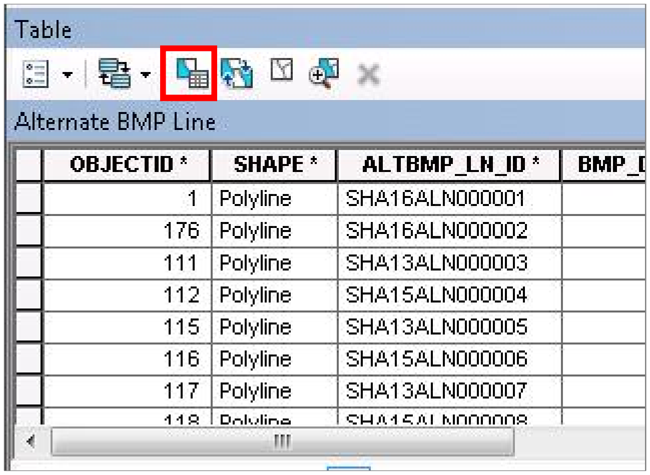
4.1.3.4 Outfall Stabilization IAC for VBY-2015

There are no restoration outfall stabilizations for VBY-2015

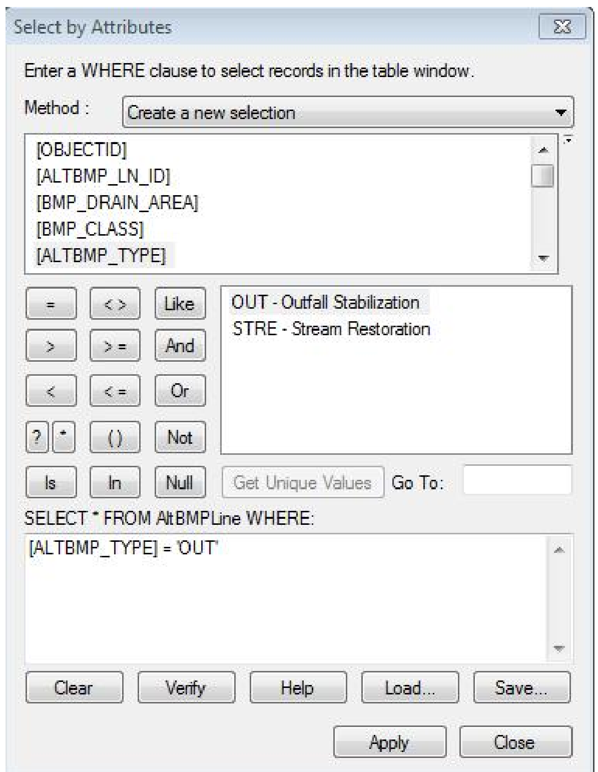
4.2 Total Outfall Stabilization IAC Sum

To determine restoration outfall stabilization IAC, select outfall stabilization, and sum the EQU_IMP_ACR:

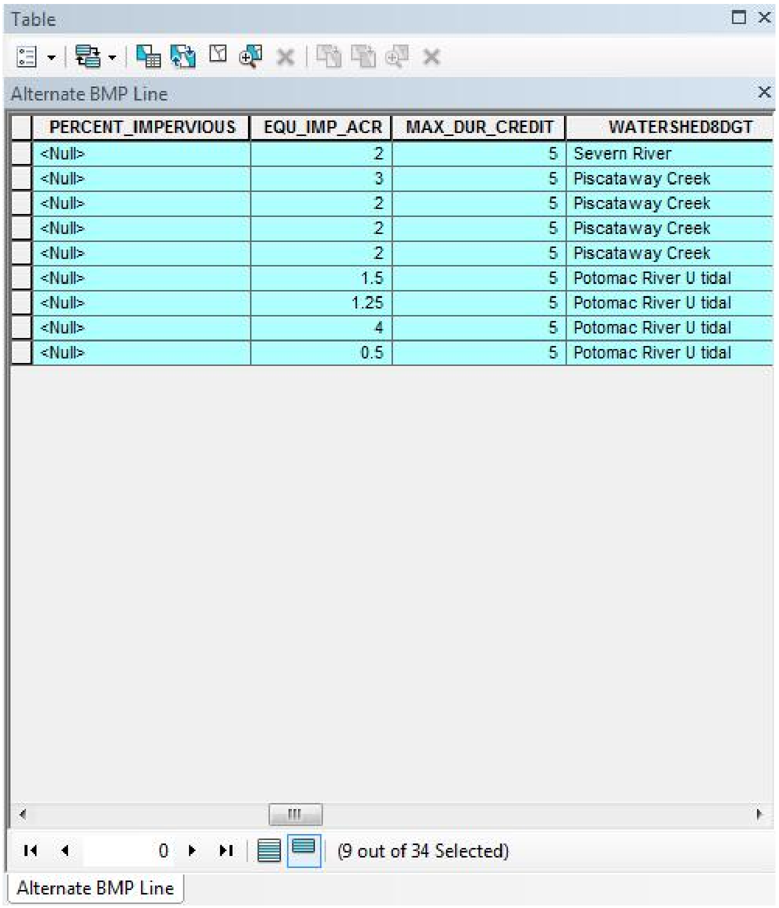
- Within the AltBMPLine feature class, click the Select by Attributes tool.

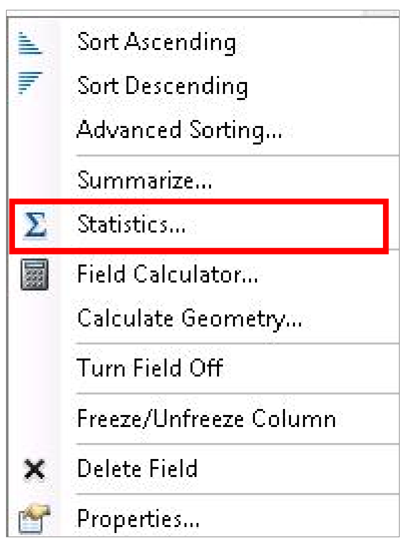


- In the statement box, enter the following selection statement and click "Apply":
  [ALTBMP_TYPE] = 'OUT'

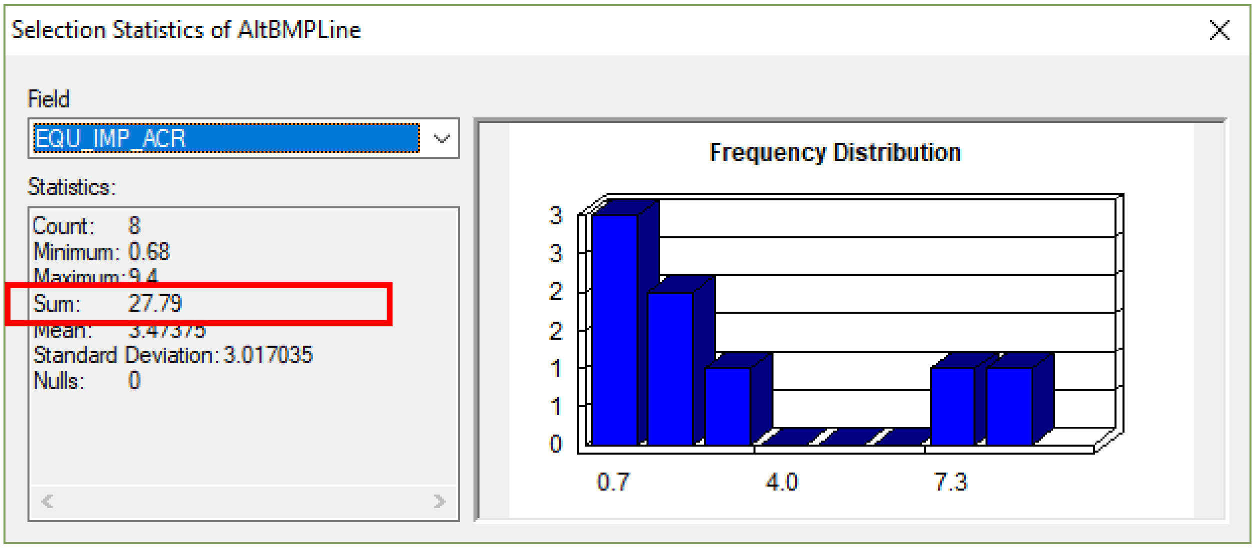


- Ensuring that the selection is retained, right click on the new IAC field, and select "Statistics…"





- View the “Sum” field to view the total restoration treatment credit claimed for outfall stabilization.



The total outfall stabilization treatment credit 27.79 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

5.0 Tree Plantings

Calculating the impervious treatment credit for Tree Plantings requires two (2) primary inputs:

- Acres Planted, from within the MDE MS4 geodatabase (AltBMPPoly feature class' ACRES_PLANTED field).

  ***Note: Because the field type of this field is Short Integer, it cannot accurately capture the actual acres planted. Therefore, this input value must be calculated elsewhere.*
- Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance (0.38 for Reforestation on Pervious Urban)

5.1 Tree Planting IAC Calculation

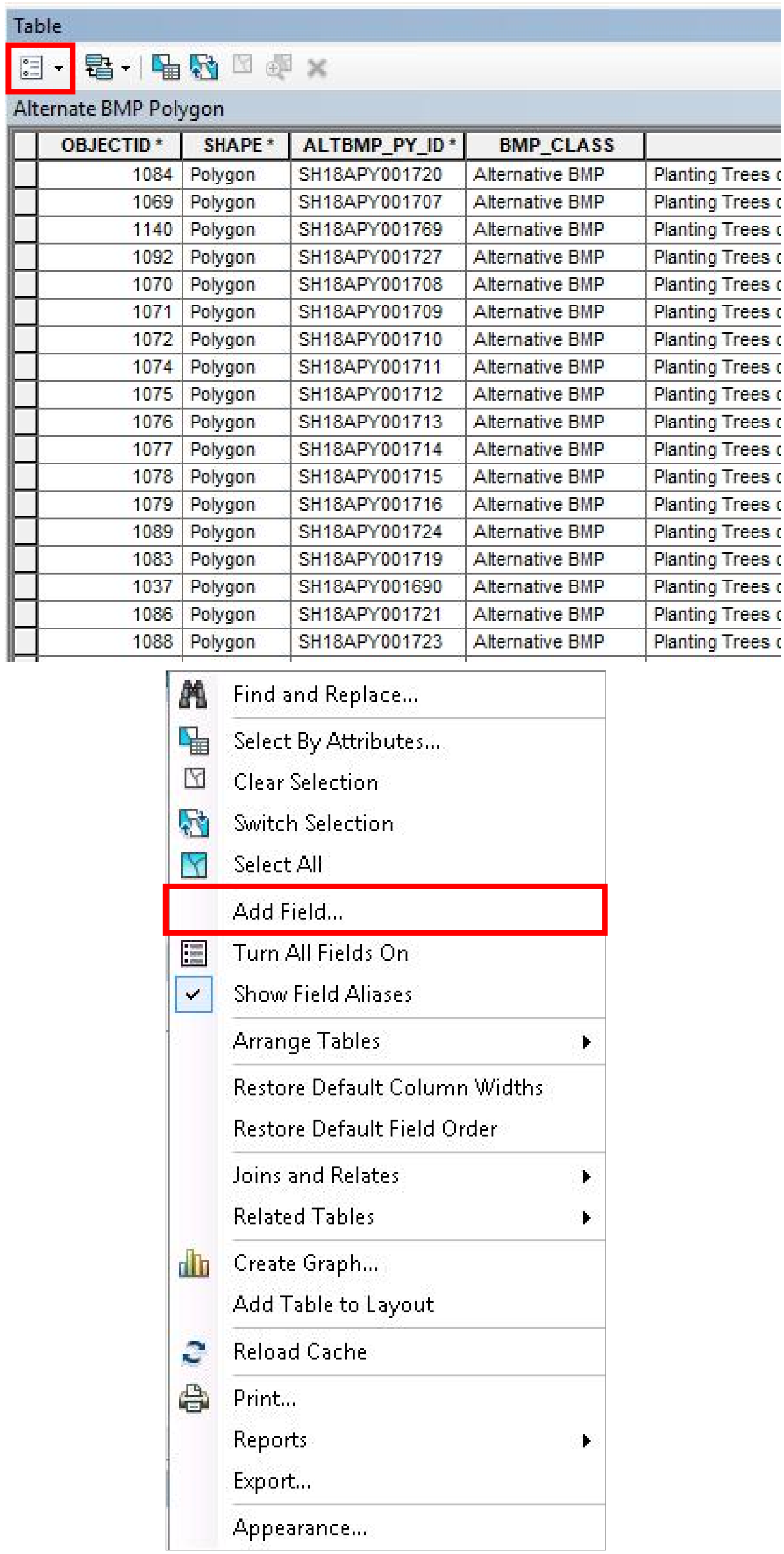
The AltBMPPolygon feature does contain a field to capture acres planted, but because the field type of this field is Short Integer, it cannot accurately capture the actual acres planted. Therefore, this input value must be calculated elsewhere. This example will add a new, temporary field to the AltBMPPolygon feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

This process could also be done in Excel after exporting the AltBMPPolygon feature class (the calculation of IAC in Excel is not described within this document).

5.1.1 Add New Fields

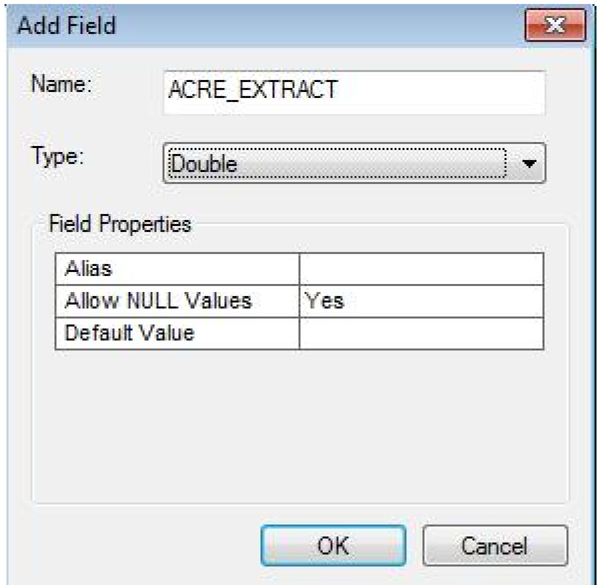
Two new fields will need to be added, one to extract the acres planted and one to run the impervious area equivalent formula.

- Within the AltBMPPolygon attribute table, click the Table Options button, and select "Add Field…"

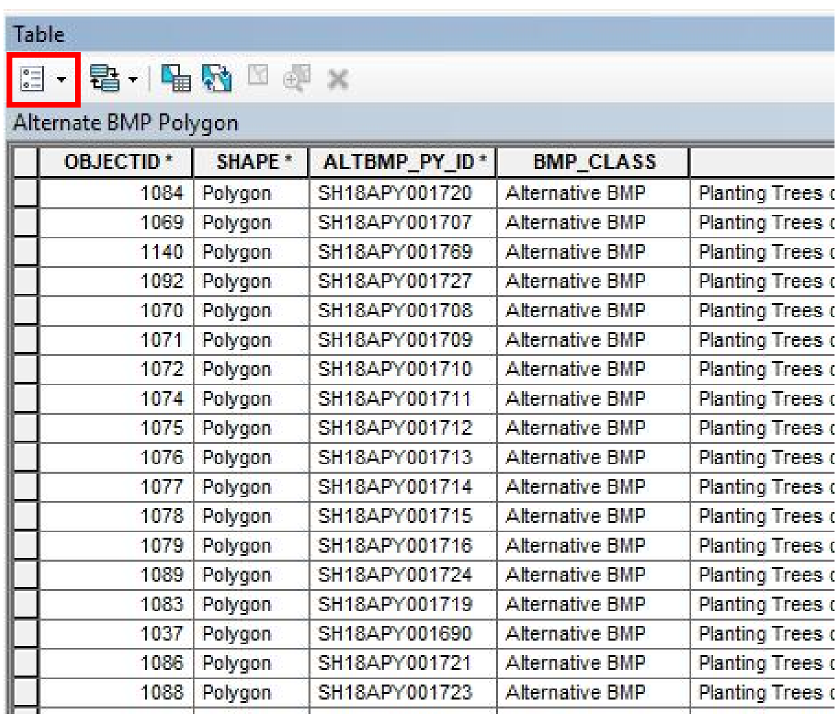


	OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
	1084	Polygon	SH18APY001720	Alternative BMP	Planting Trees c
	1069	Polygon	SH18APY001707	Alternative BMP	Planting Trees c
	1140	Polygon	SH18APY001769	Alternative BMP	Planting Trees c
	1092	Polygon	SH18APY001727	Alternative BMP	Planting Trees c
	1070	Polygon	SH18APY001708	Alternative BMP	Planting Trees c
	1071	Polygon	SH18APY001709	Alternative BMP	Planting Trees c
	1072	Polygon	SH18APY001710	Alternative BMP	Planting Trees c
	1074	Polygon	SH18APY001711	Alternative BMP	Planting Trees c
	1075	Polygon	SH18APY001712	Alternative BMP	Planting Trees c
	1076	Polygon	SH18APY001713	Alternative BMP	Planting Trees c
	1077	Polygon	SH18APY001714	Alternative BMP	Planting Trees c
	1078	Polygon	SH18APY001715	Alternative BMP	Planting Trees c
	1079	Polygon	SH18APY001716	Alternative BMP	Planting Trees c
	1089	Polygon	SH18APY001724	Alternative BMP	Planting Trees c
	1083	Polygon	SH18APY001719	Alternative BMP	Planting Trees c
	1037	Polygon	SH18APY001690	Alternative BMP	Planting Trees c
	1086	Polygon	SH18APY001721	Alternative BMP	Planting Trees c
	1088	Polygon	SH18APY001723	Alternative BMP	Planting Trees c

- Within the Add Field dialog window, enter the new field name – “ACRE_EXTRACT”. Set Type = Double. Accept the default Allow Nulls setting. Click “OK”.

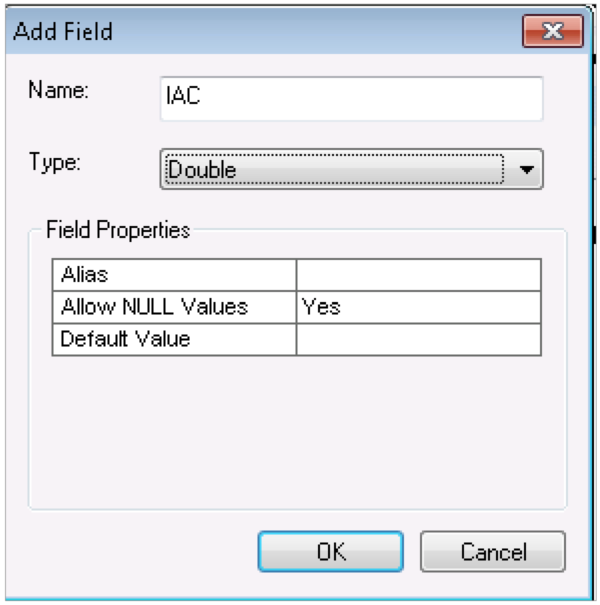


- Within the AltBMPPolygonattribute table, click the Table Options button, and select “Add Field…”



OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1084	Polygon	SH18APY001720	Alternative BMP	Planting Trees c
1069	Polygon	SH18APY001707	Alternative BMP	Planting Trees c
1140	Polygon	SH18APY001769	Alternative BMP	Planting Trees c
1092	Polygon	SH18APY001727	Alternative BMP	Planting Trees c
1070	Polygon	SH18APY001708	Alternative BMP	Planting Trees c
1071	Polygon	SH18APY001709	Alternative BMP	Planting Trees c
1072	Polygon	SH18APY001710	Alternative BMP	Planting Trees c
1074	Polygon	SH18APY001711	Alternative BMP	Planting Trees c
1075	Polygon	SH18APY001712	Alternative BMP	Planting Trees c
1076	Polygon	SH18APY001713	Alternative BMP	Planting Trees c
1077	Polygon	SH18APY001714	Alternative BMP	Planting Trees c
1078	Polygon	SH18APY001715	Alternative BMP	Planting Trees c
1079	Polygon	SH18APY001716	Alternative BMP	Planting Trees c
1089	Polygon	SH18APY001724	Alternative BMP	Planting Trees c
1083	Polygon	SH18APY001719	Alternative BMP	Planting Trees c
1037	Polygon	SH18APY001690	Alternative BMP	Planting Trees c
1086	Polygon	SH18APY001721	Alternative BMP	Planting Trees c
1088	Polygon	SH18APY001723	Alternative BMP	Planting Trees c

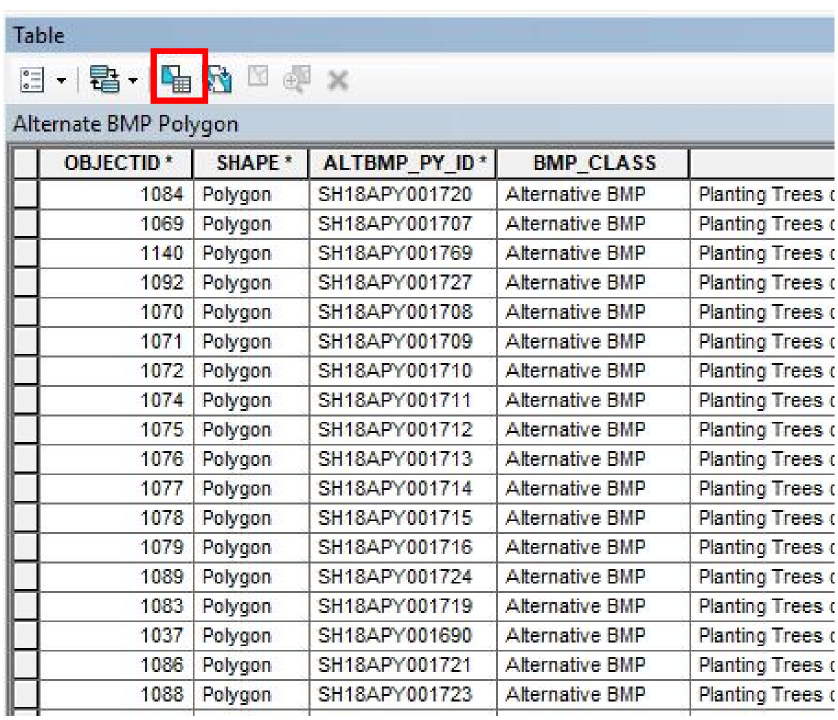
- Within the Add Field dialog window, enter the new field name – “IAC”. Set Type = Double. Accept the default Allow Nulls setting. Click “OK”.



5.1.2 Calculate Acres Planted and IAC

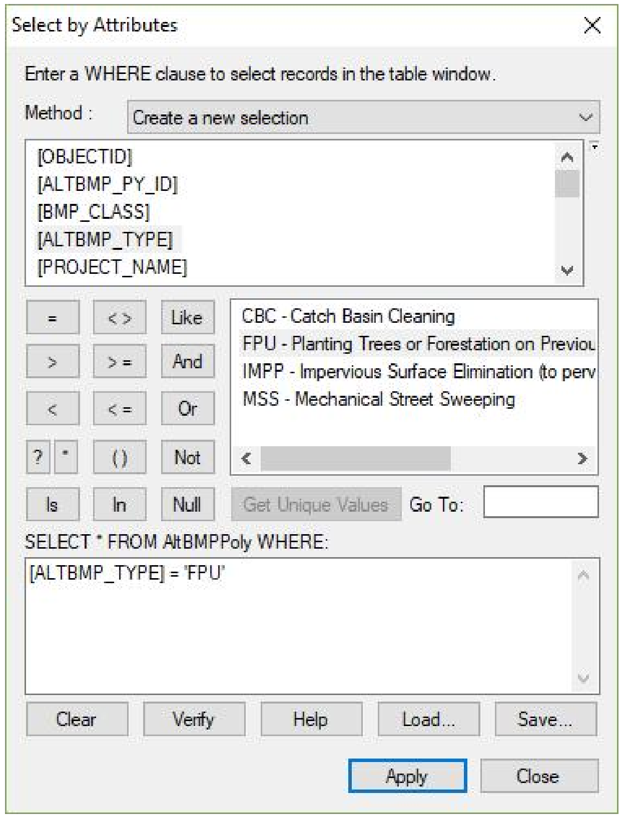
Because multiple strategies exist within the AltBMPPolygon feature class, select the targeted strategy prior to obtain the acres planted and the sum of IAC.

- Within the AltBMPPolygon attribute table, click the Select by Attributes button.



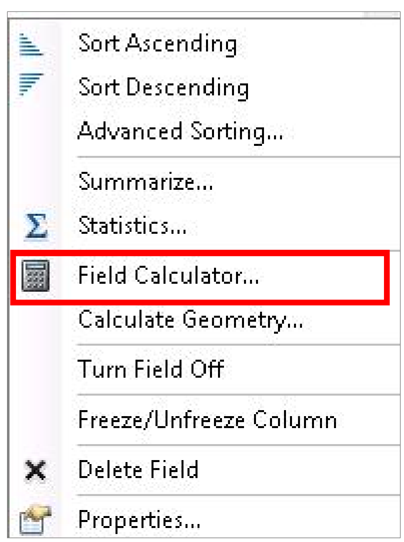
OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1084	Polygon	SH18APY001720	Alternative BMP	Planting Trees c
1069	Polygon	SH18APY001707	Alternative BMP	Planting Trees c
1140	Polygon	SH18APY001769	Alternative BMP	Planting Trees c
1092	Polygon	SH18APY001727	Alternative BMP	Planting Trees c
1070	Polygon	SH18APY001708	Alternative BMP	Planting Trees c
1071	Polygon	SH18APY001709	Alternative BMP	Planting Trees c
1072	Polygon	SH18APY001710	Alternative BMP	Planting Trees c
1074	Polygon	SH18APY001711	Alternative BMP	Planting Trees c
1075	Polygon	SH18APY001712	Alternative BMP	Planting Trees c
1076	Polygon	SH18APY001713	Alternative BMP	Planting Trees c
1077	Polygon	SH18APY001714	Alternative BMP	Planting Trees c
1078	Polygon	SH18APY001715	Alternative BMP	Planting Trees c
1079	Polygon	SH18APY001716	Alternative BMP	Planting Trees c
1089	Polygon	SH18APY001724	Alternative BMP	Planting Trees c
1083	Polygon	SH18APY001719	Alternative BMP	Planting Trees c
1037	Polygon	SH18APY001690	Alternative BMP	Planting Trees c
1086	Polygon	SH18APY001721	Alternative BMP	Planting Trees c
1088	Polygon	SH18APY001723	Alternative BMP	Planting Trees c

- Within the Select by Attributes dialog window, enter the following selection statement and click "Apply": [ALTBMP_TYPE] = 'FPU'



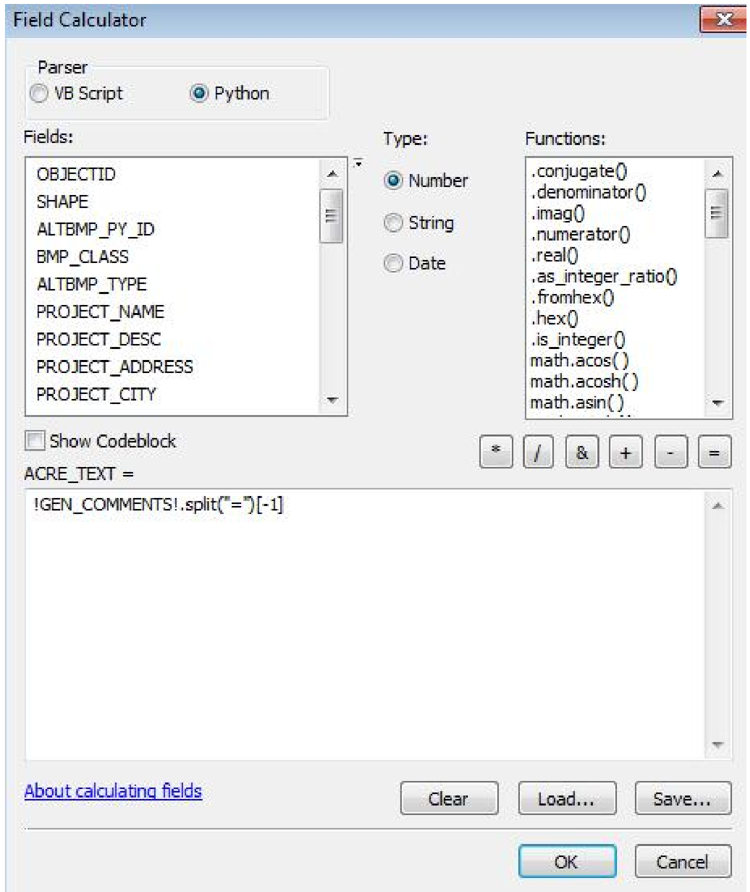
The values for acres planted are contained within the GEN_COMMENTS field. To extract those values the function below will need to be performed.

- Right click on the new ACRE_EXTRACT field, and select “Field Calculator…”

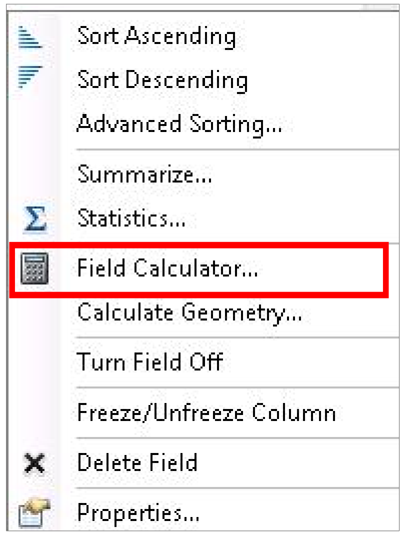


- Within the Field Calculator dialog window, enter the following calculation and click “OK”:
  float(!GEN_COMMENTS!.split("=")[-1])

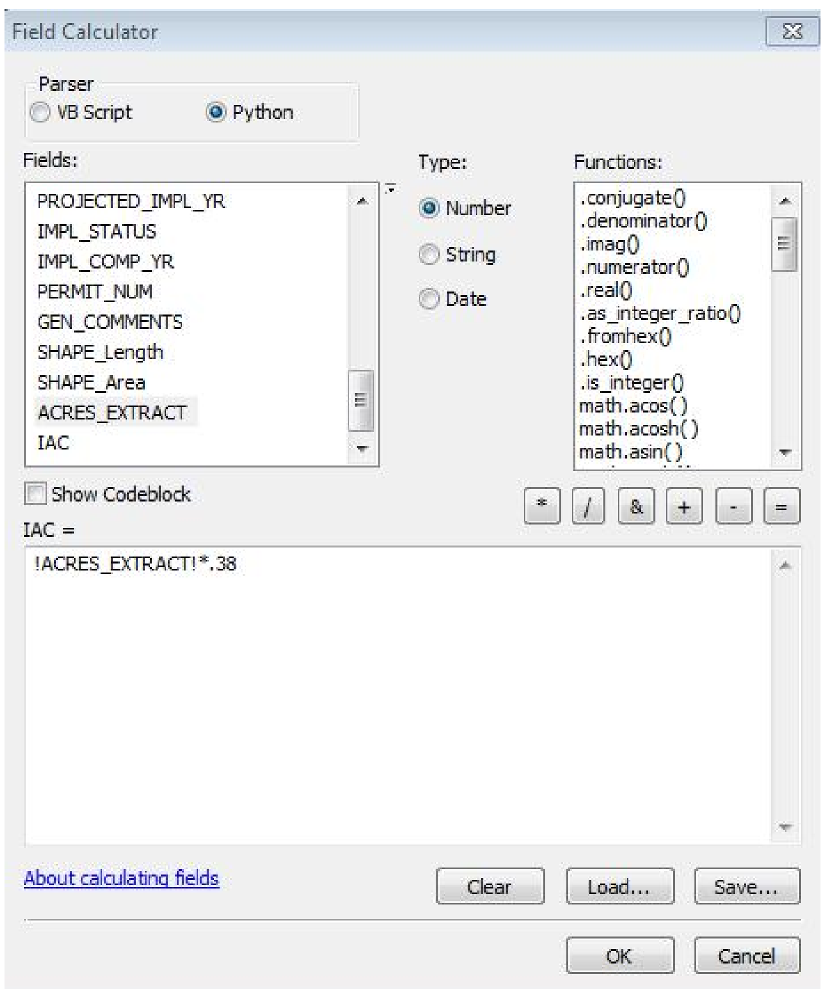
This formula will extract the text acres from the GEN_COMMENTS field and convert it to a number in one step.



- Right click on the new IAC field, and select "Field Calculator…"



- Within the Field Calculator dialog window, enter the following calculation and click "OK":
  [ACRES_EXTRACT]*.38

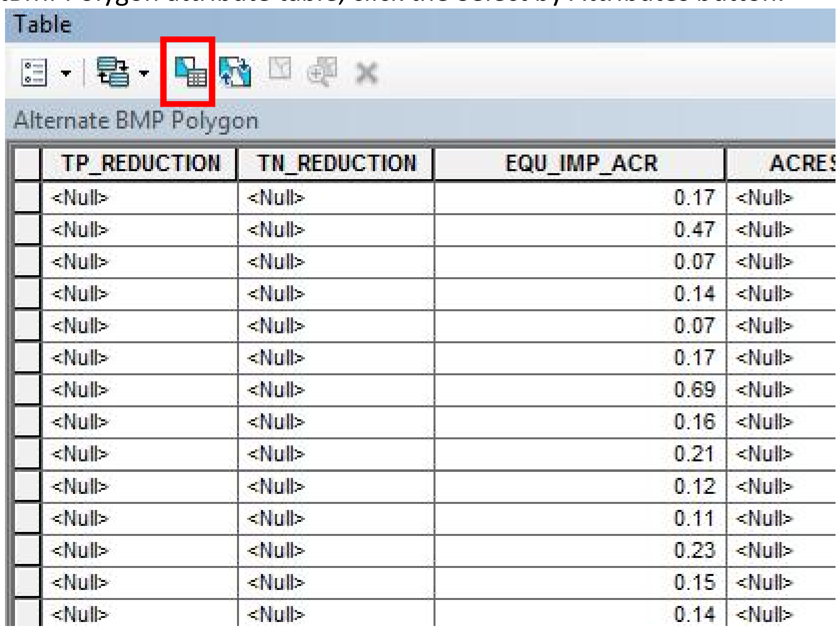


5.1.3 Tree Planting IAC by Fiscal Year

The IAC values for Tree Planting by fiscal year and strategy can be summed using the process below.

5.1.3.1 Tree Planting IAC for FY 2018

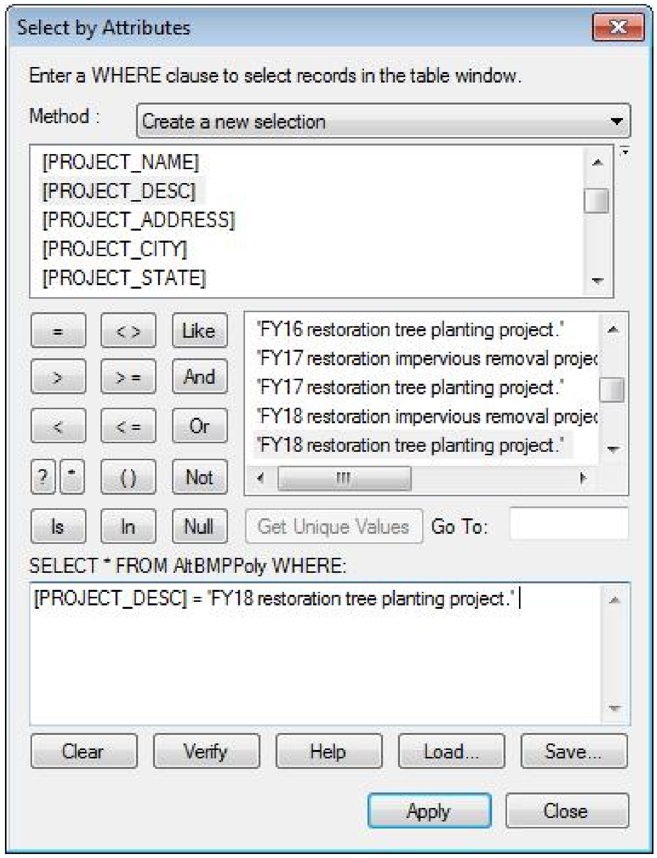
- Within the AltBMPPolygon attribute table, click the Select by Attributes button.



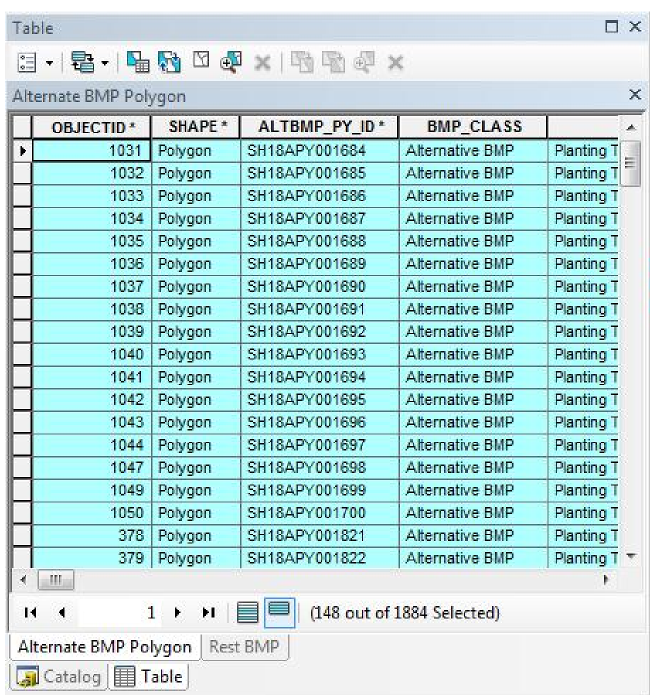
TP_REDUCTION	TN_REDUCTION	EQU_IMP_ACR	ACRES
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.47	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.14	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.69	<Null>
<Null>	<Null>	0.16	<Null>
<Null>	<Null>	0.21	<Null>
<Null>	<Null>	0.12	<Null>
<Null>	<Null>	0.11	<Null>
<Null>	<Null>	0.23	<Null>
<Null>	<Null>	0.15	<Null>
<Null>	<Null>	0.14	<Null>

- Within the Select by Attributes dialog window, enter the following selection statement to identify tree planting for FY18, and click “Apply”:

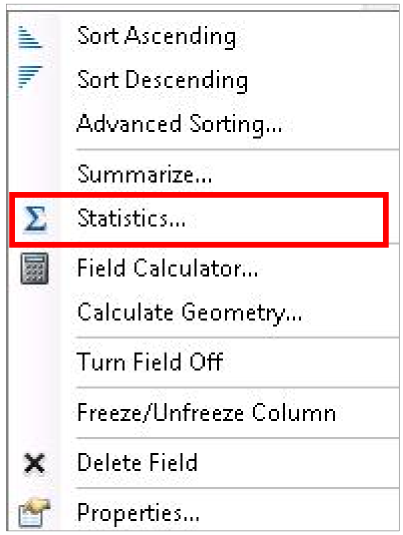
  [PROJECT_DESC] = 'FY18 restoration tree planting project.'



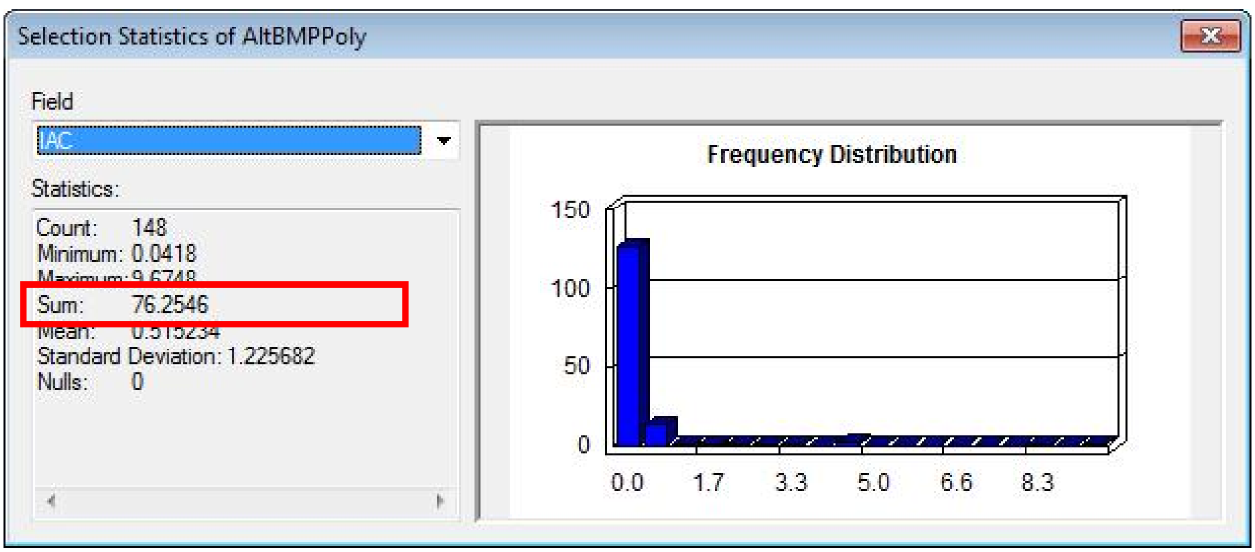
- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"



OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1031	Polygon	SH18APY001684	Alternative BMP	Planting T
1032	Polygon	SH18APY001685	Alternative BMP	Planting T
1033	Polygon	SH18APY001686	Alternative BMP	Planting T
1034	Polygon	SH18APY001687	Alternative BMP	Planting T
1035	Polygon	SH18APY001688	Alternative BMP	Planting T
1036	Polygon	SH18APY001689	Alternative BMP	Planting T
1037	Polygon	SH18APY001690	Alternative BMP	Planting T
1038	Polygon	SH18APY001691	Alternative BMP	Planting T
1039	Polygon	SH18APY001692	Alternative BMP	Planting T
1040	Polygon	SH18APY001693	Alternative BMP	Planting T
1041	Polygon	SH18APY001694	Alternative BMP	Planting T
1042	Polygon	SH18APY001695	Alternative BMP	Planting T
1043	Polygon	SH18APY001696	Alternative BMP	Planting T
1044	Polygon	SH18APY001697	Alternative BMP	Planting T
1047	Polygon	SH18APY001698	Alternative BMP	Planting T
1049	Polygon	SH18APY001699	Alternative BMP	Planting T
1050	Polygon	SH18APY001700	Alternative BMP	Planting T
378	Polygon	SH18APY001821	Alternative BMP	Planting T
379	Polygon	SH18APY001822	Alternative BMP	Planting T



- View the "Sum" field to view the total restoration treatment credit claimed for Tree Planting restoration FY18.



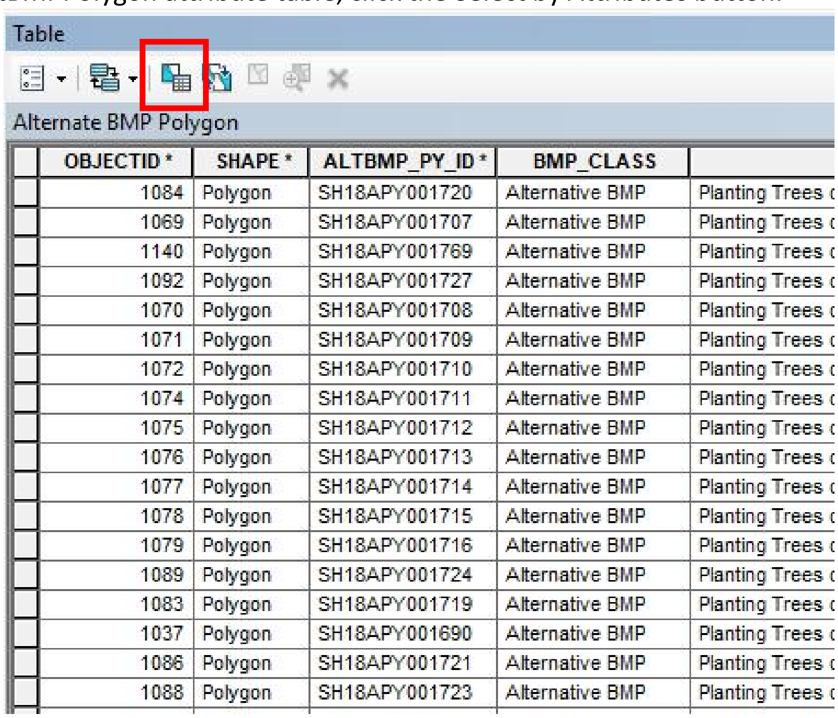
Note: This calculation method generates a slightly different result due to rounding

The total tree planting treatment credit for FY18 is 76.27 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

5.1.3.2 Tree Planting IAC for FY 2017

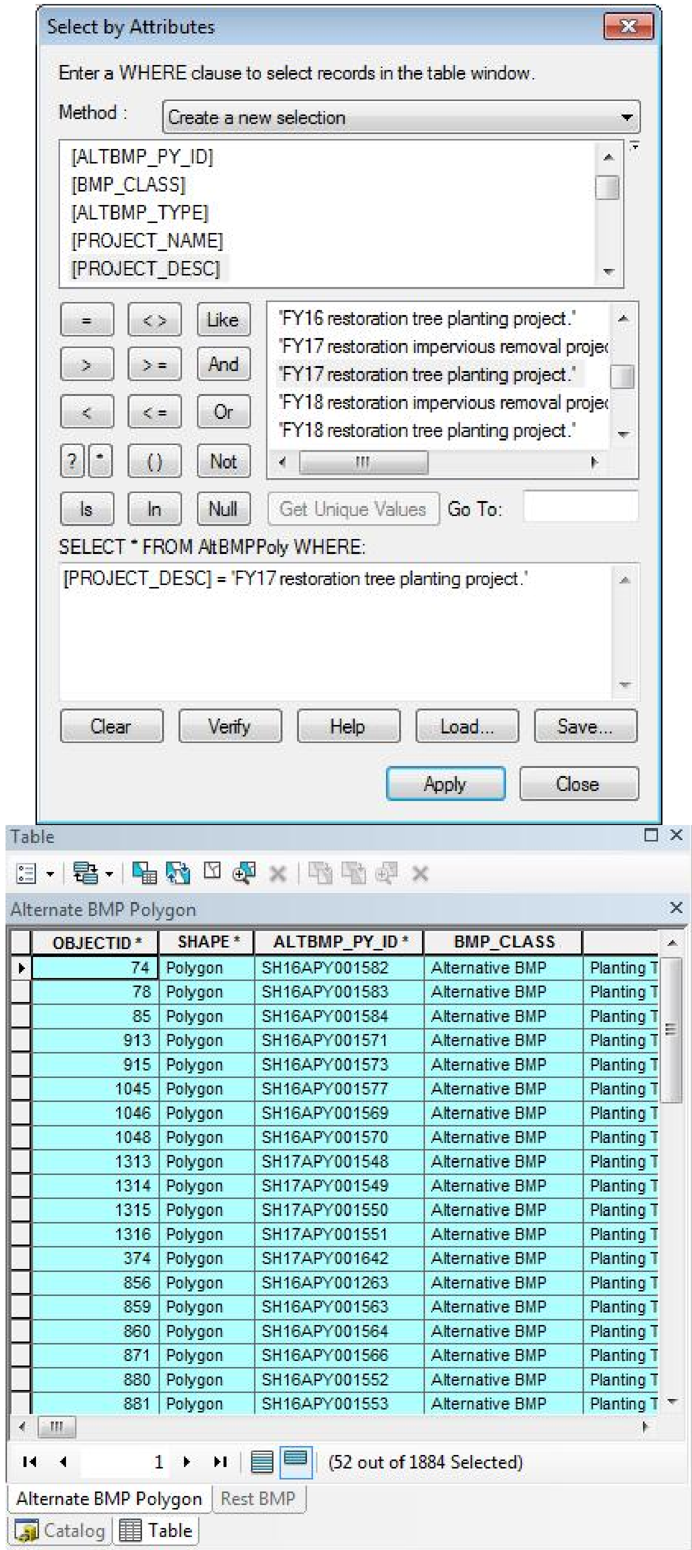
- Within the AltBMPPolygon attribute table, click the Select by Attributes button.



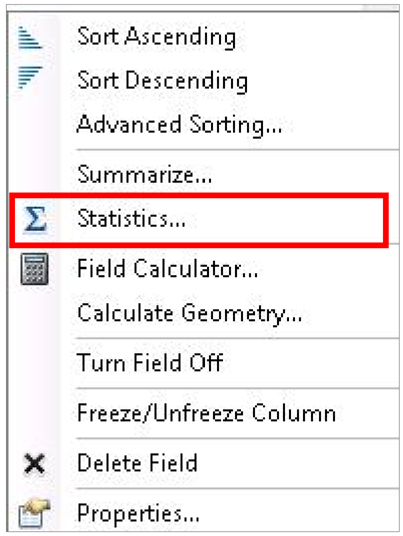
OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1084	Polygon	SH18APY001720	Alternative BMP	Planting Trees
1069	Polygon	SH18APY001707	Alternative BMP	Planting Trees
1140	Polygon	SH18APY001769	Alternative BMP	Planting Trees
1092	Polygon	SH18APY001727	Alternative BMP	Planting Trees
1070	Polygon	SH18APY001708	Alternative BMP	Planting Trees
1071	Polygon	SH18APY001709	Alternative BMP	Planting Trees
1072	Polygon	SH18APY001710	Alternative BMP	Planting Trees
1074	Polygon	SH18APY001711	Alternative BMP	Planting Trees
1075	Polygon	SH18APY001712	Alternative BMP	Planting Trees
1076	Polygon	SH18APY001713	Alternative BMP	Planting Trees
1077	Polygon	SH18APY001714	Alternative BMP	Planting Trees
1078	Polygon	SH18APY001715	Alternative BMP	Planting Trees
1079	Polygon	SH18APY001716	Alternative BMP	Planting Trees
1089	Polygon	SH18APY001724	Alternative BMP	Planting Trees
1083	Polygon	SH18APY001719	Alternative BMP	Planting Trees
1037	Polygon	SH18APY001690	Alternative BMP	Planting Trees
1086	Polygon	SH18APY001721	Alternative BMP	Planting Trees
1088	Polygon	SH18APY001723	Alternative BMP	Planting Trees

- Within the Select by Attributes dialog window, enter the following selection statement to identify tree planting for FY 17, and click “Apply”:

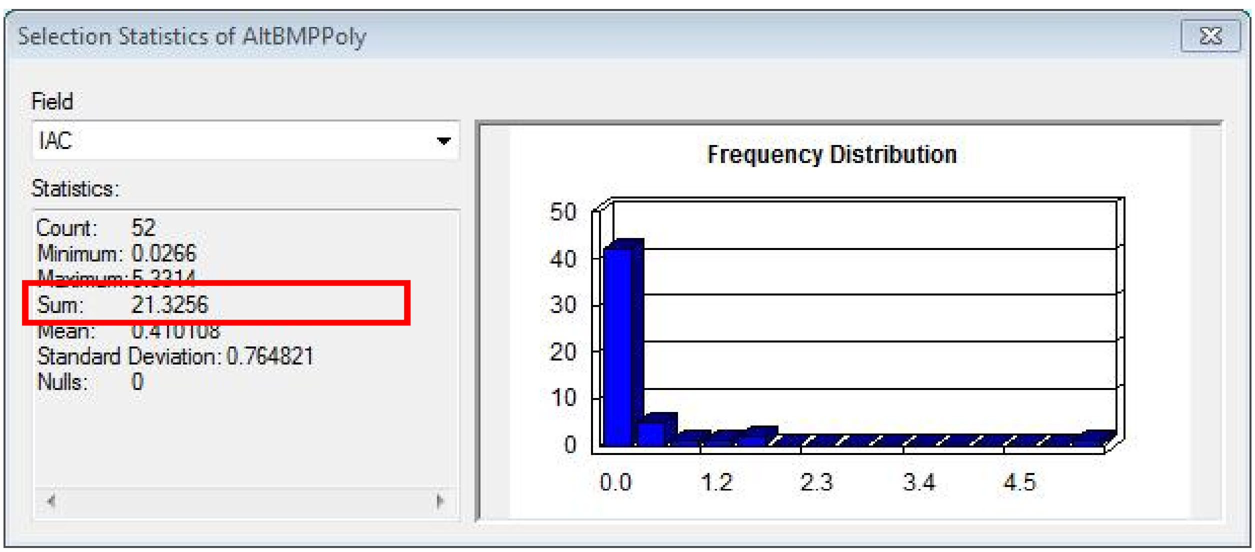
[PROJECT_DESC] = 'FY17 restoration tree planting project.'



▪ Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"



- View the "Sum" field to view the total restoration treatment credit claimed for Tree Planting restoration FY 17.

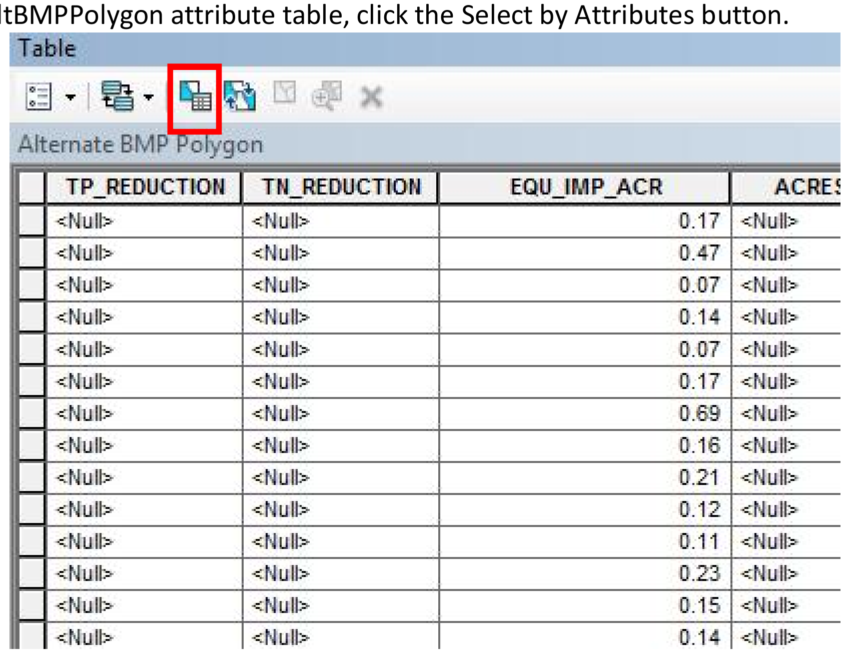


The total tree planting treatment credit for FY17 is 21.32 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

5.1.3.3 Tree Planting IAC for FY 2016

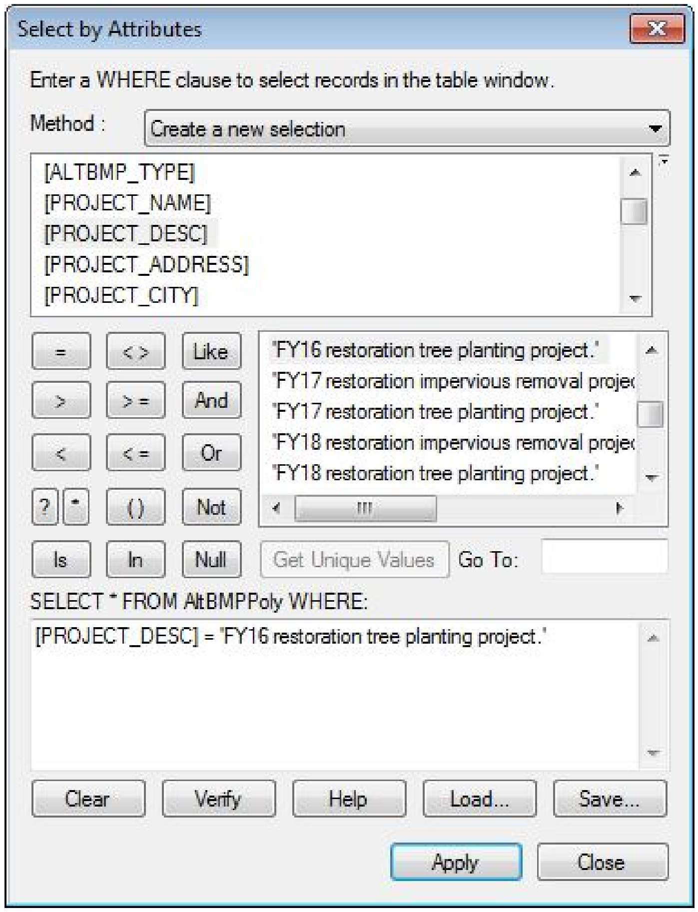
- Within the AltBMPPolygon attribute table, click the Select by Attributes button.



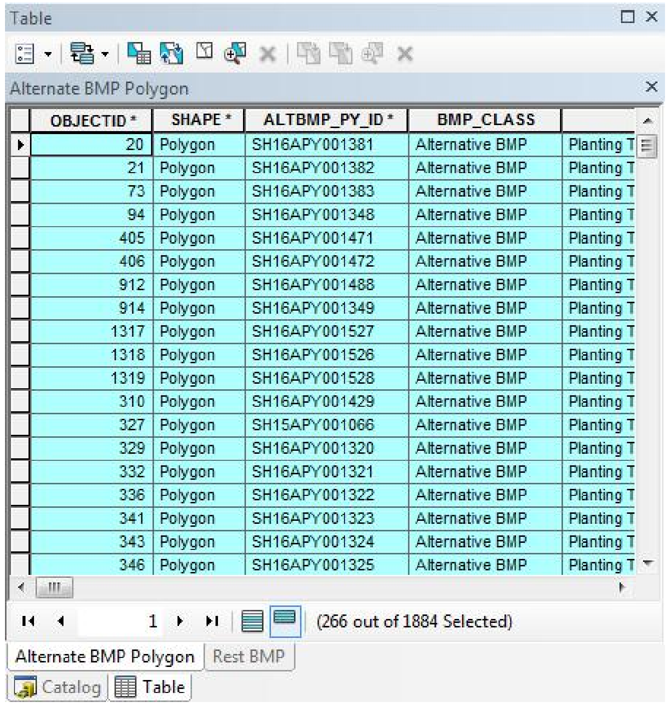
TP_REDUCTION	TN_REDUCTION	EQU_IMP_ACR	ACRES
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.47	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.14	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.69	<Null>
<Null>	<Null>	0.16	<Null>
<Null>	<Null>	0.21	<Null>
<Null>	<Null>	0.12	<Null>
<Null>	<Null>	0.11	<Null>
<Null>	<Null>	0.23	<Null>
<Null>	<Null>	0.15	<Null>
<Null>	<Null>	0.14	<Null>

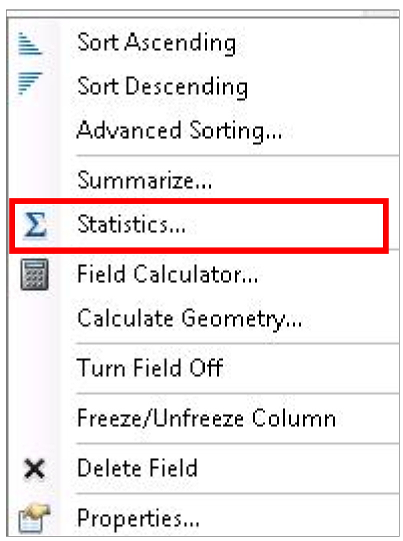
- Within the Select by Attributes dialog window, enter the following selection statement to identify tree planting for FY 16, and click “Apply”:

  [PROJECT_DESC] = 'FY16 restoration tree planting project.'

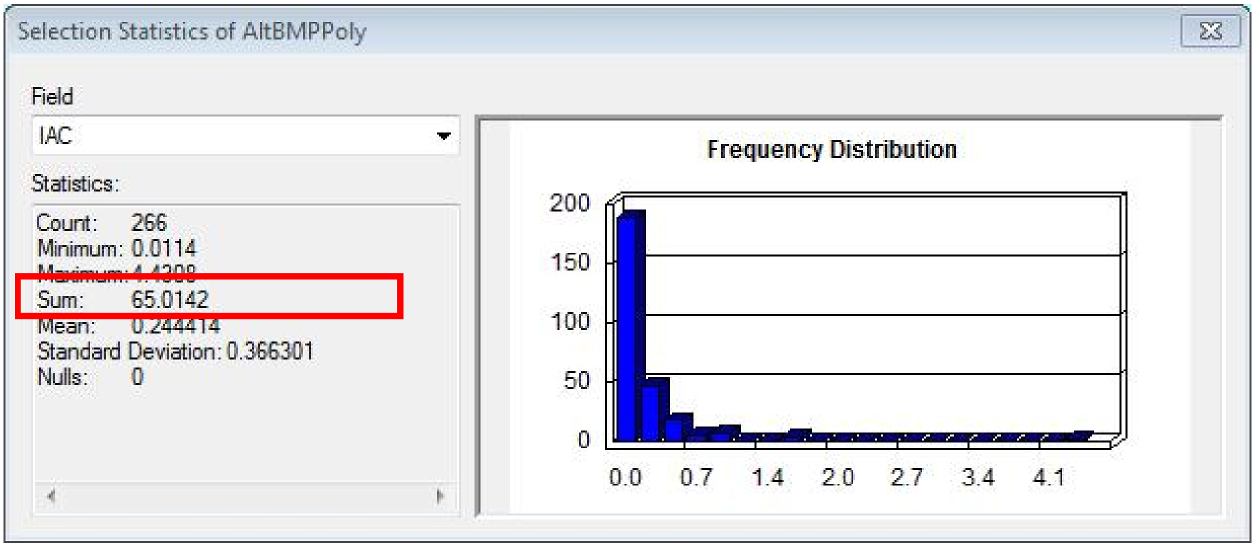


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





- View the “Sum” field to view the total restoration treatment credit claimed for Tree Planting FY 16.

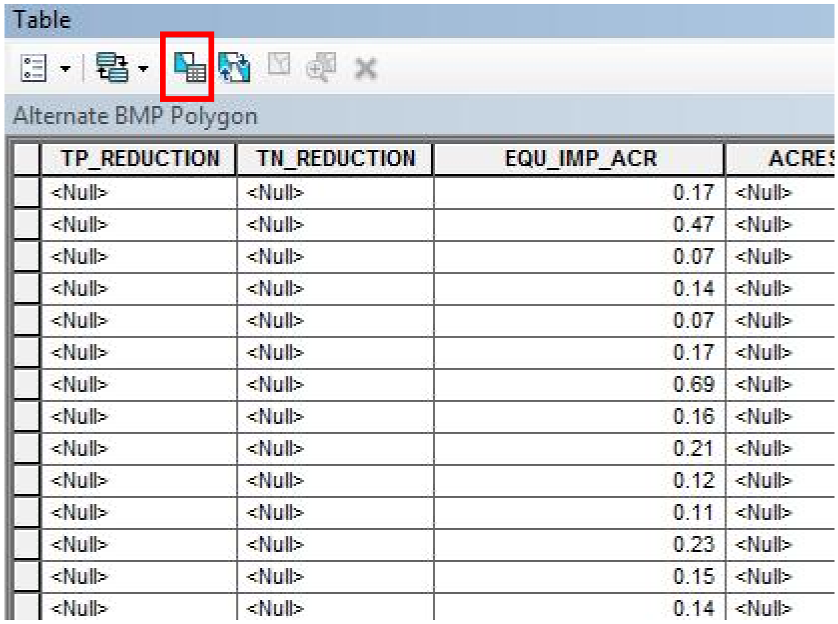


The total tree planting treatment credit for FY16 is 65.00 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

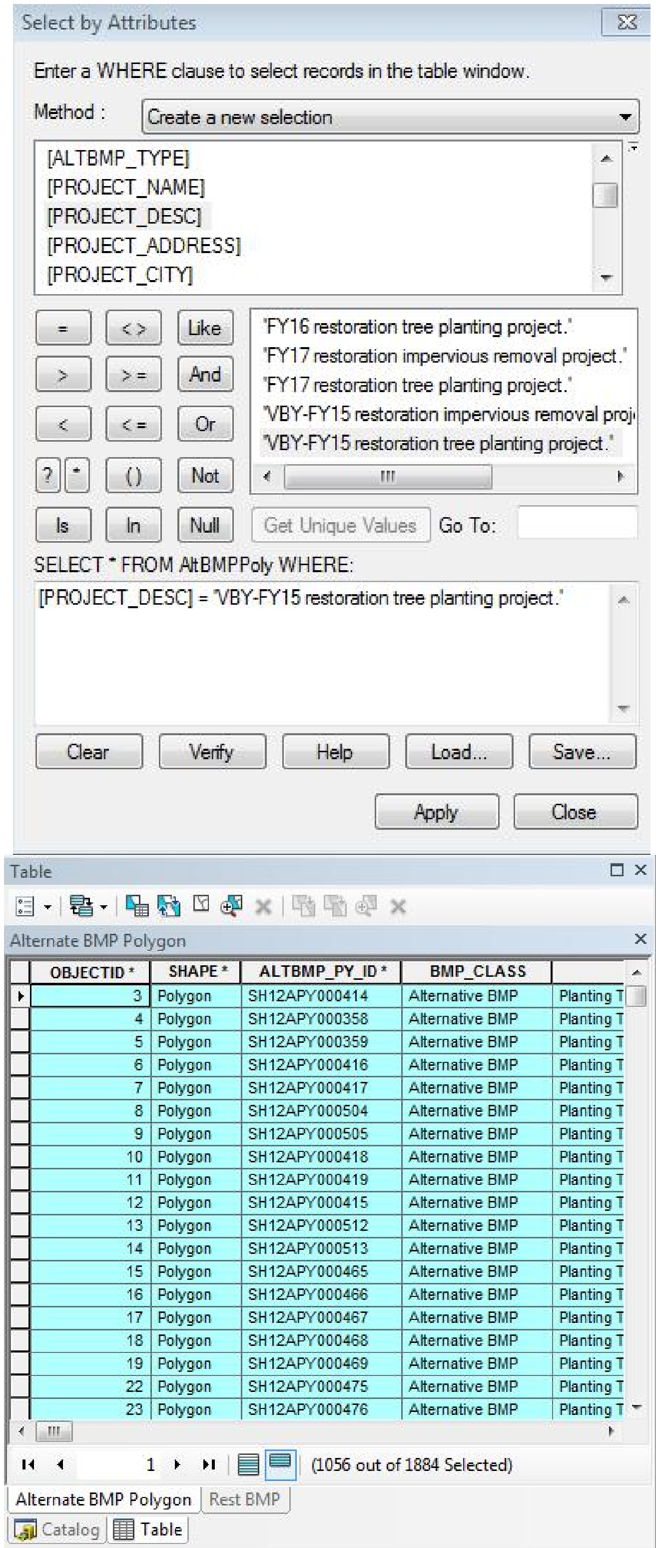
5.1.3.4 Tree Planting IAC for VBY-2015

- Within the AltBMPPolygon attribute table, click the Select by Attributes button.

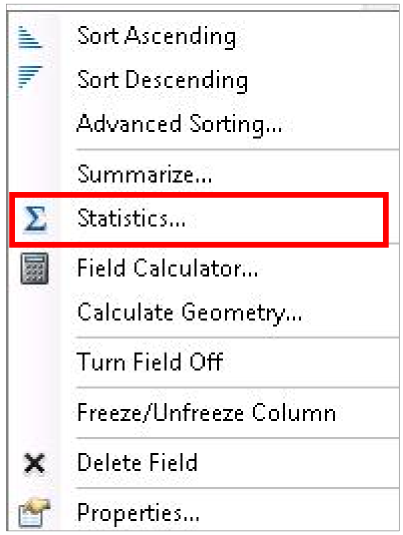


	TP_REDUCTION	TN_REDUCTION	EQU_IMP_ACR	ACRES
	<Null>	<Null>	0.17	<Null>
	<Null>	<Null>	0.47	<Null>
	<Null>	<Null>	0.07	<Null>
	<Null>	<Null>	0.14	<Null>
	<Null>	<Null>	0.07	<Null>
	<Null>	<Null>	0.17	<Null>
	<Null>	<Null>	0.69	<Null>
	<Null>	<Null>	0.16	<Null>
	<Null>	<Null>	0.21	<Null>
	<Null>	<Null>	0.12	<Null>
	<Null>	<Null>	0.11	<Null>
	<Null>	<Null>	0.23	<Null>
	<Null>	<Null>	0.15	<Null>
	<Null>	<Null>	0.14	<Null>

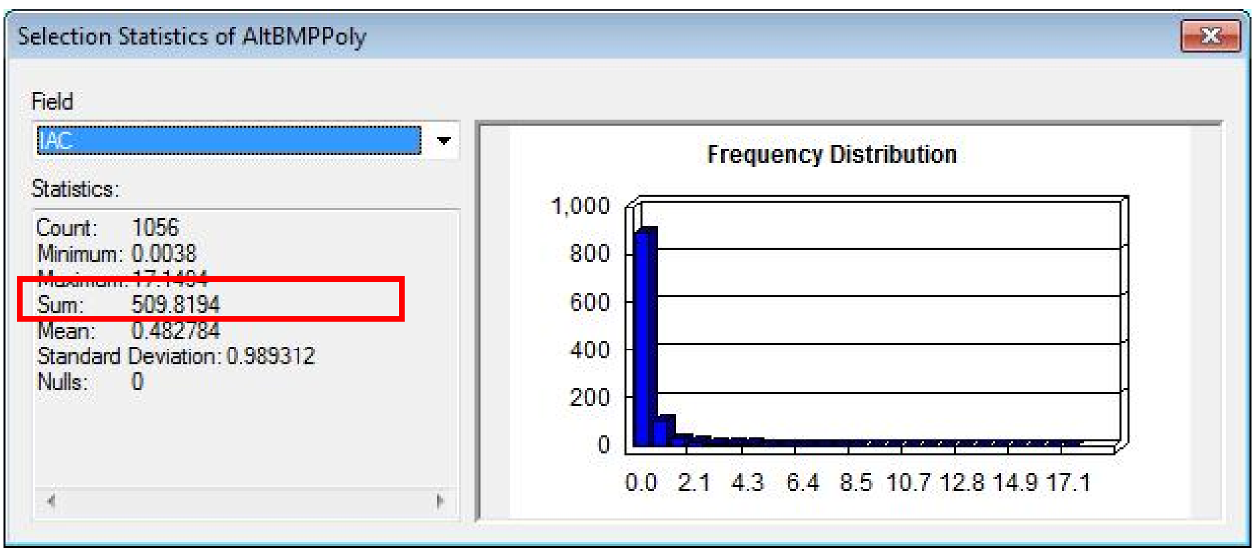
- Within the Select by Attributes dialog window, enter the following selection statement to identify tree planting for VBY-2015, and click “Apply”:
  [PROJECT_DESC] = 'VBY-FY15 restoration tree planting project.'



- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"



- View the “Sum” field to view the total restoration treatment credit claimed for tree planting VBY-2015.



Note: This calculation method generates a slightly different result due to rounding

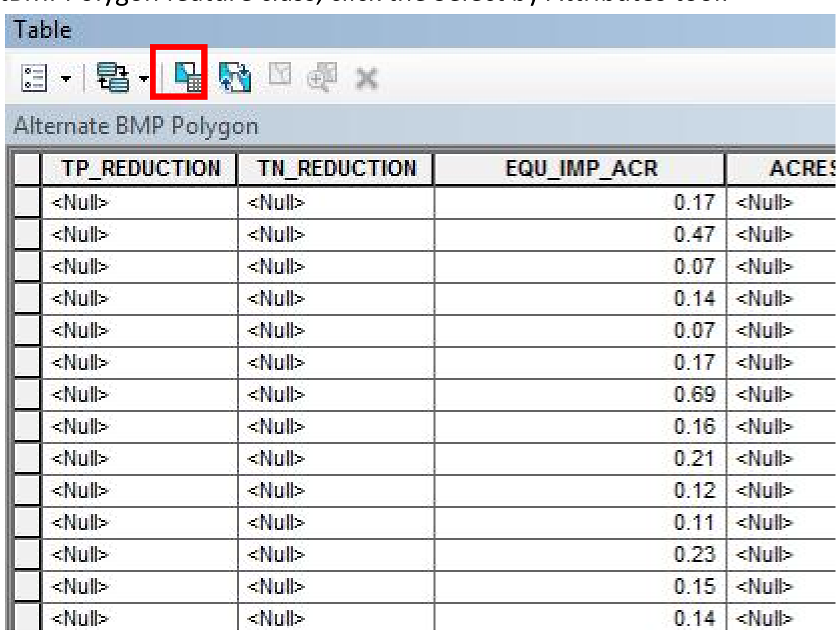
The total total tree planting treatment credit for VBY-2015 is 509.77 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

5.2 Total Tree Planting IAC Sum

Baseline trees are also included in the tree planting restoration data. To determine total restoration Tree Planting IAC without the baseline data, select Tree Planting, and sum the EQU_IMP_ACR:

- Within the AltBMPPolygon feature class, click the Select by Attributes tool.

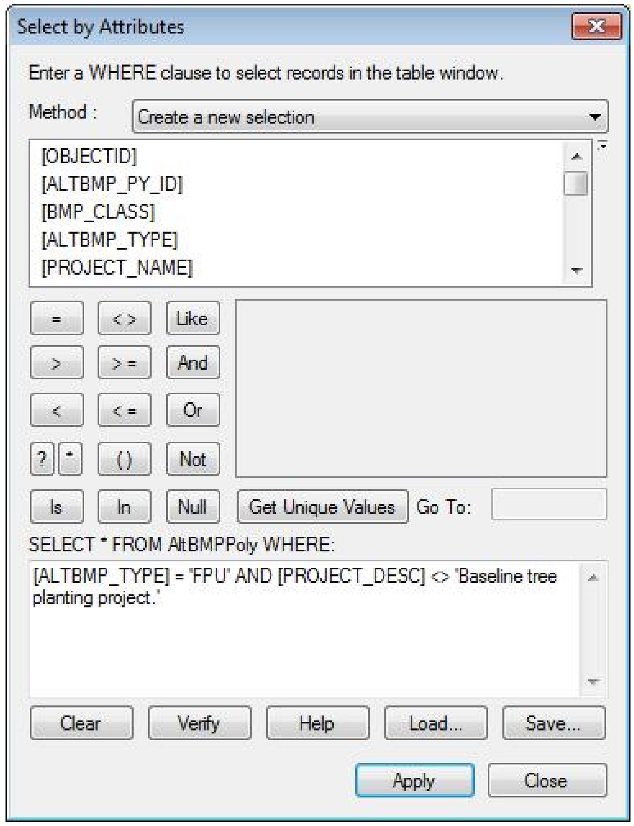


Table

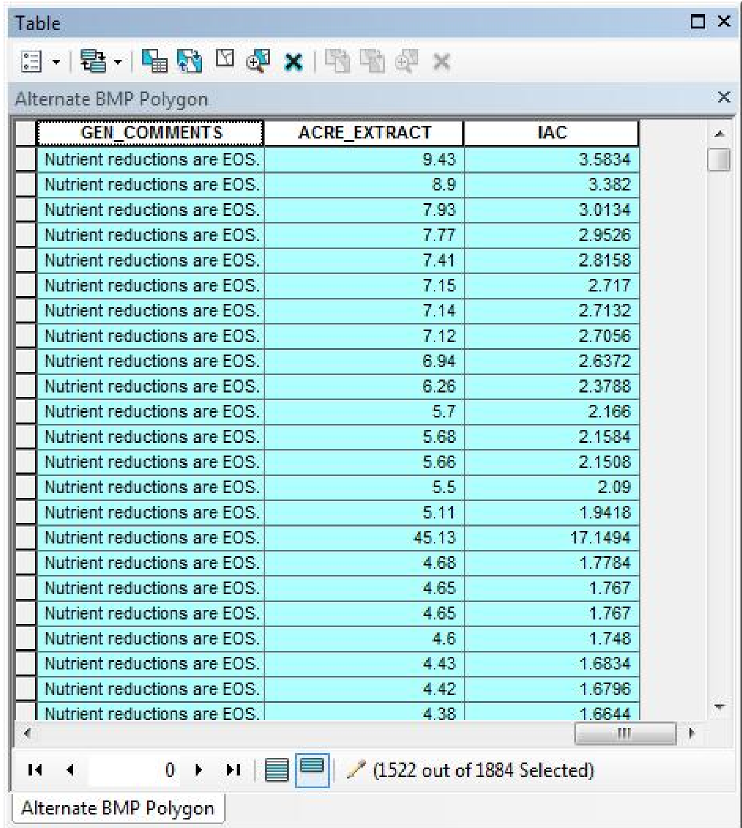
Alternate BMP Polygon

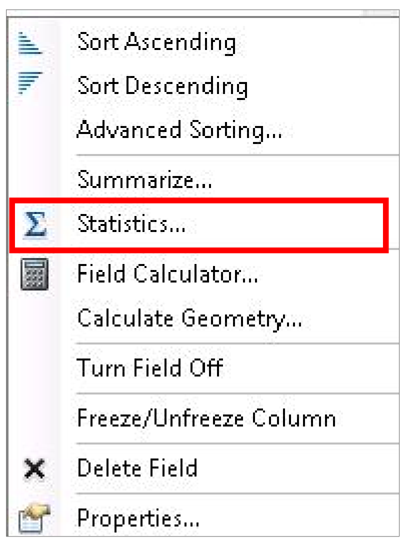
TP_REDUCTION	TN_REDUCTION	EQU_IMP_ACR	ACRES
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.47	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.14	<Null>
<Null>	<Null>	0.07	<Null>
<Null>	<Null>	0.17	<Null>
<Null>	<Null>	0.69	<Null>
<Null>	<Null>	0.16	<Null>
<Null>	<Null>	0.21	<Null>
<Null>	<Null>	0.12	<Null>
<Null>	<Null>	0.11	<Null>
<Null>	<Null>	0.23	<Null>
<Null>	<Null>	0.15	<Null>
<Null>	<Null>	0.14	<Null>

- In the statement box, enter the following selection statement and click “Apply”: [ALTBMP_TYPE] = 'FPU' AND [PROJECT_DESC] <> 'Baseline tree planting project.'

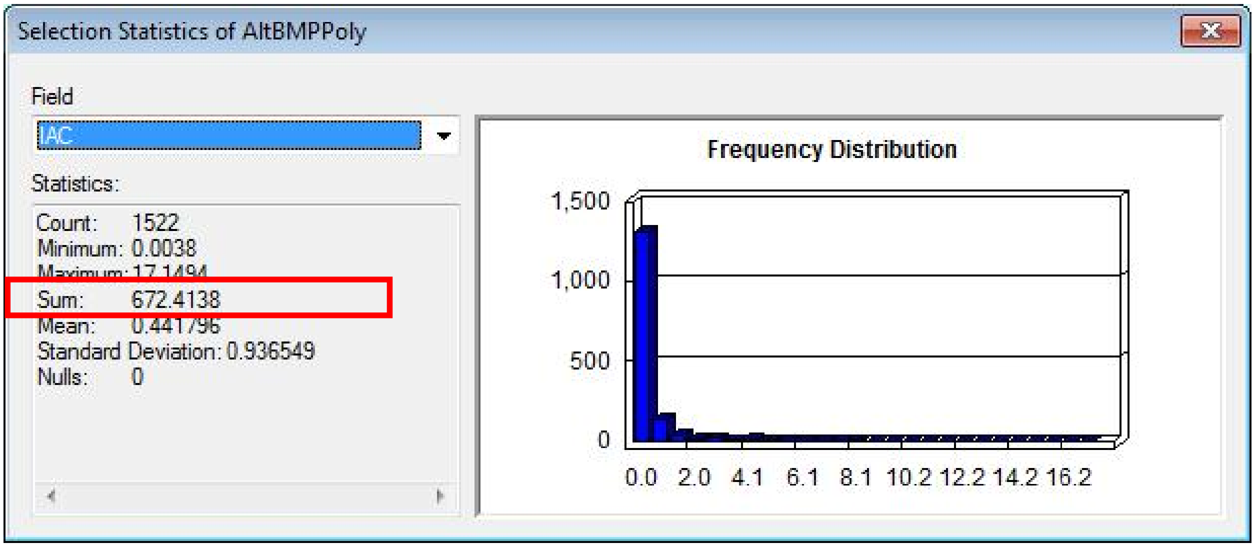


- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”





- View the “Sum” field to view the total restoration treatment credit claimed for Tree Planting



Note: This calculation method generates a slightly different result due to rounding

The total tree planting treatment credit 672.36 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

6.0 Impervious Area Removal

Calculating the impervious treatment credit for Impervious Area Removal requires two (2) primary inputs:

• Impervious Acres Eliminated, from within the MDE MS4 geodatabase (AltBMPPoly feature class' IMP_ACR_ELIM field).

• Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance (0.75 for Impervious Urban to Pervious)

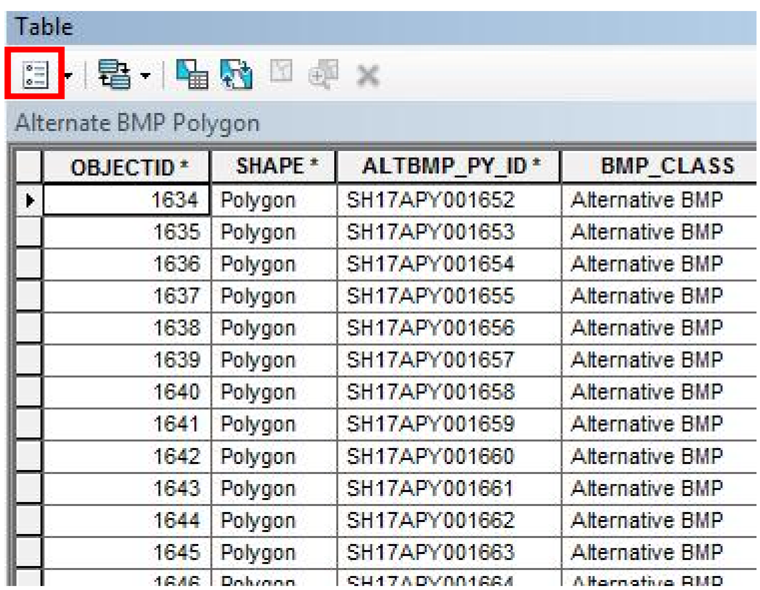
6.1 Impervious Area Removal IAC Calculation

The AltBMPLinePolygon feature class contains a field to explicitly capture IAC ("EQU_IMP_ACR"). To verify the IAC, this example will add a new, temporary field to the AltBMPPolygon feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

This process could also be done in Excel after exporting the AltBMPPolygon feature class (the calculation of IAC in Excel is not described within this document).

6.1.1 Add New IAC Field

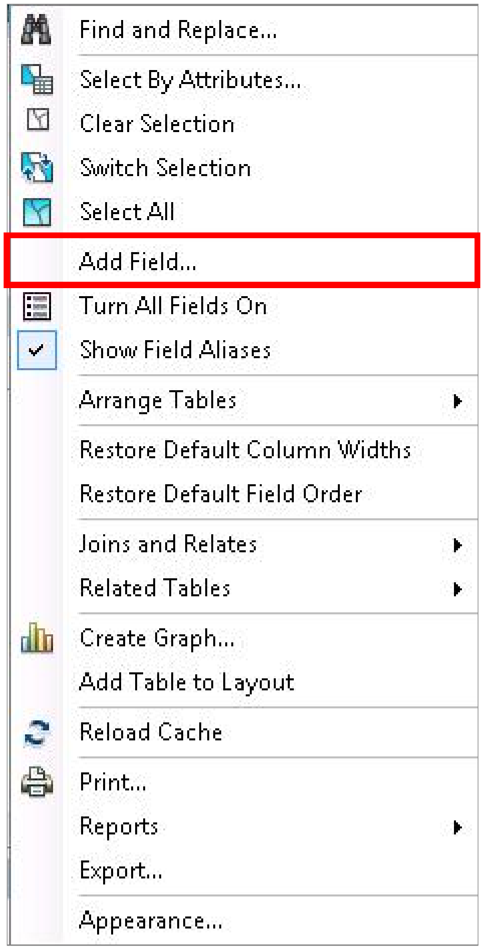
Within the AltBMPPolygon attribute table, click the Table Options button, and select "Add Field..."



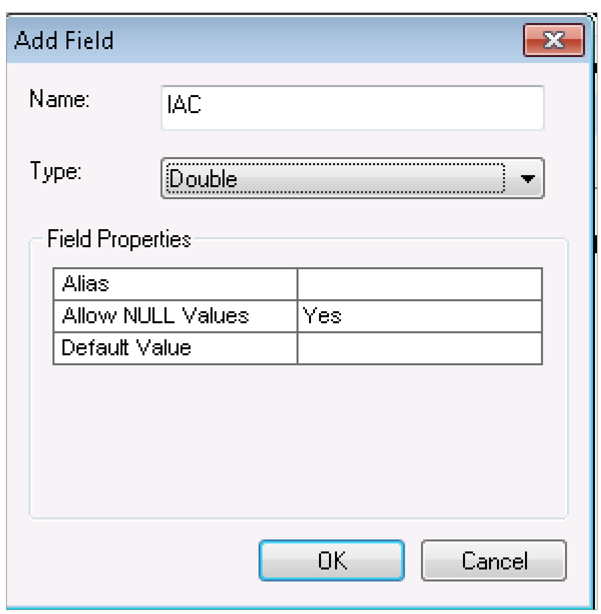
Table

Alternate BMP Polygon

OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS
1634	Polygon	SH17APY001652	Alternative BMP
1635	Polygon	SH17APY001653	Alternative BMP
1636	Polygon	SH17APY001654	Alternative BMP
1637	Polygon	SH17APY001655	Alternative BMP
1638	Polygon	SH17APY001656	Alternative BMP
1639	Polygon	SH17APY001657	Alternative BMP
1640	Polygon	SH17APY001658	Alternative BMP
1641	Polygon	SH17APY001659	Alternative BMP
1642	Polygon	SH17APY001660	Alternative BMP
1643	Polygon	SH17APY001661	Alternative BMP
1644	Polygon	SH17APY001662	Alternative BMP
1645	Polygon	SH17APY001663	Alternative BMP
1646	Polygon	SH17APY001664	Alternative BMP



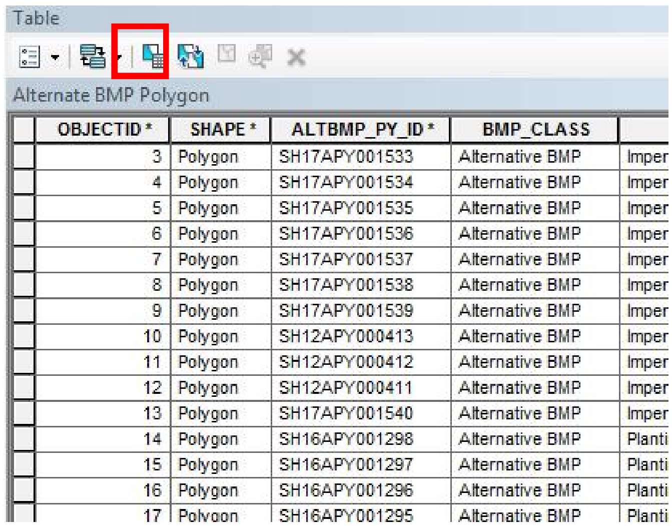
- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK".



6.1.2 Calculate IAC

Since tree planting and impervious area removal require different calculations to determine EQU_IMP_ACR, an attribute query is required. To determine restoration impervious area removal IAC, select impervious area removal, and sum the EQU_IMP_ACR:

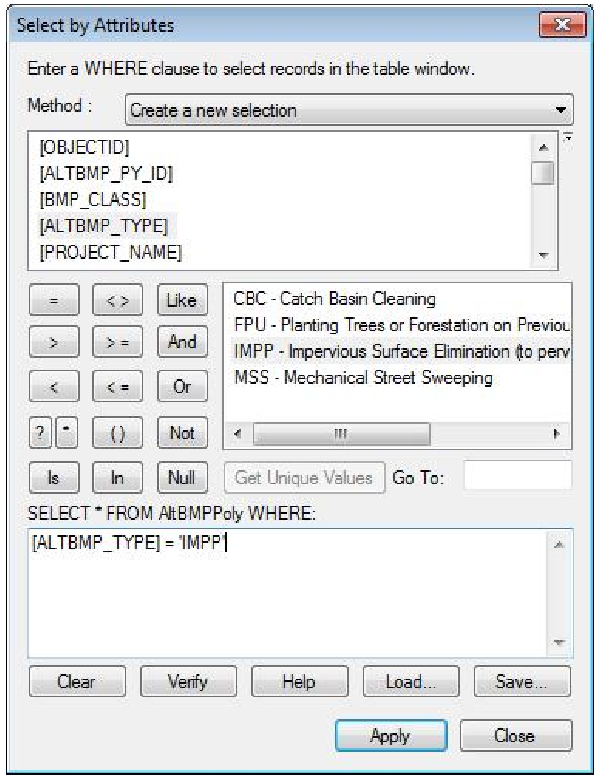
- Within the AltBMPPolygon feature class, click the Select by Attributes tool.



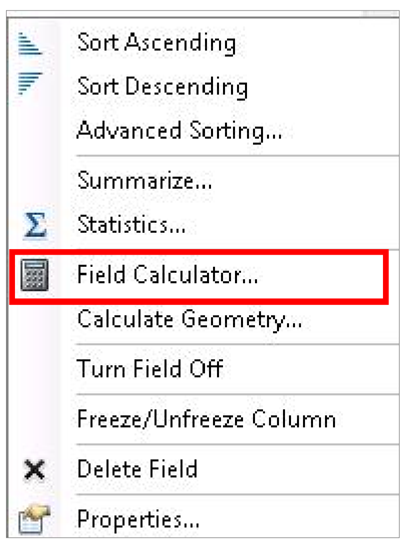
OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
3	Polygon	SH17APY001533	Alternative BMP	Imper
4	Polygon	SH17APY001534	Alternative BMP	Imper
5	Polygon	SH17APY001535	Alternative BMP	Imper
6	Polygon	SH17APY001536	Alternative BMP	Imper
7	Polygon	SH17APY001537	Alternative BMP	Imper
8	Polygon	SH17APY001538	Alternative BMP	Imper
9	Polygon	SH17APY001539	Alternative BMP	Imper
10	Polygon	SH12APY000413	Alternative BMP	Imper
11	Polygon	SH12APY000412	Alternative BMP	Imper
12	Polygon	SH12APY000411	Alternative BMP	Imper
13	Polygon	SH17APY001540	Alternative BMP	Imper
14	Polygon	SH16APY001298	Alternative BMP	Planti
15	Polygon	SH16APY001297	Alternative BMP	Planti
16	Polygon	SH16APY001296	Alternative BMP	Planti
17	Polygon	SH16APY001295	Alternative BMP	Planti

- In the statement box, enter the following selection statement and click “Apply”:

  [ALTBMP_TYPE] = 'IMPP'

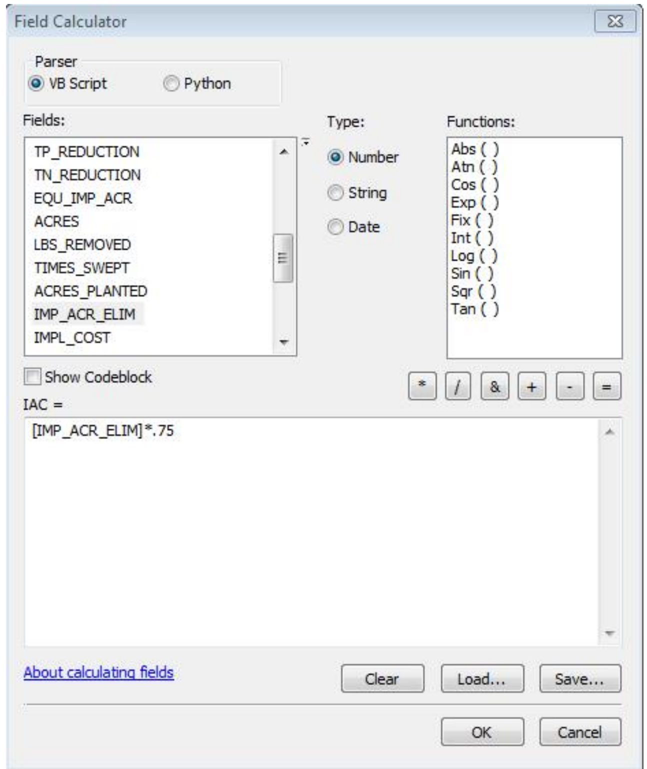


- Right click on the new IAC field, and select "Field Calculator..."



Within the Field Calculator dialog window, enter the following calculation and click "OK":

[IMP_ACR_ELIM]*.75

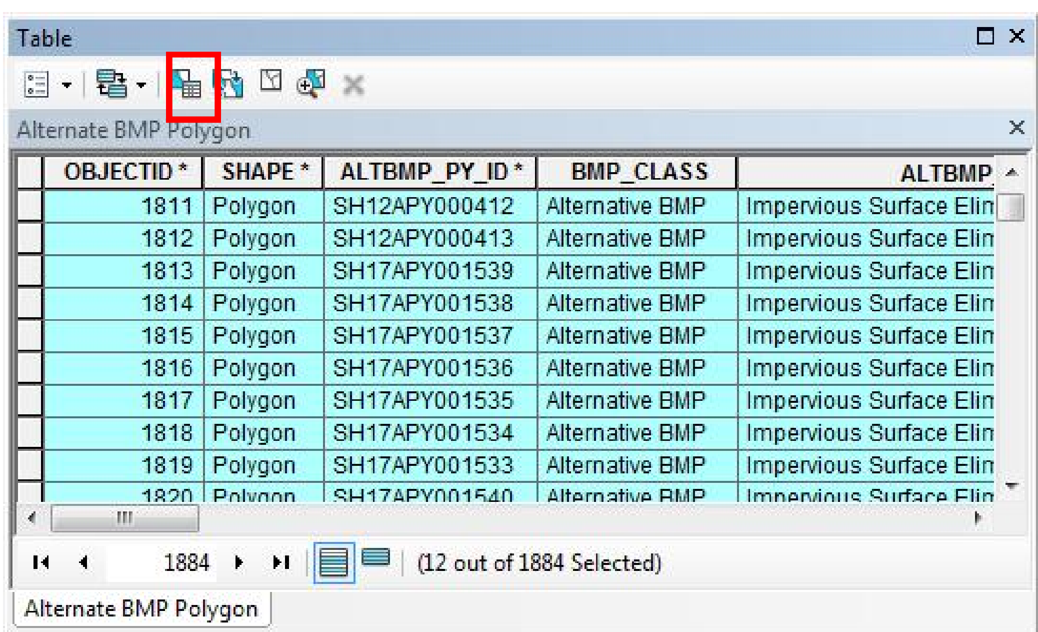


6.1.3 Impervious Area Removal IAC by Fiscal Year

The IAC values for Impervious Area Removal by fiscal year and strategy can be summed using the process below.

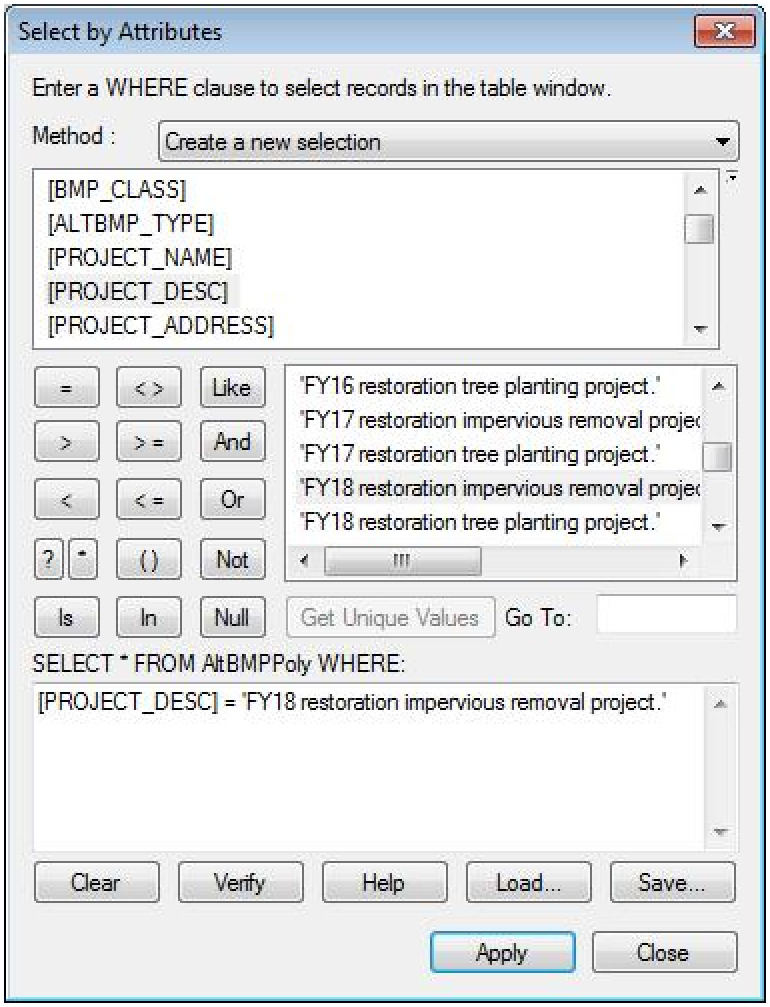
6.1.3.1 Impervious Area Removal IAC for FY 2018

Within the AltBMPPoly attribute table, click the Select by Attributes button.

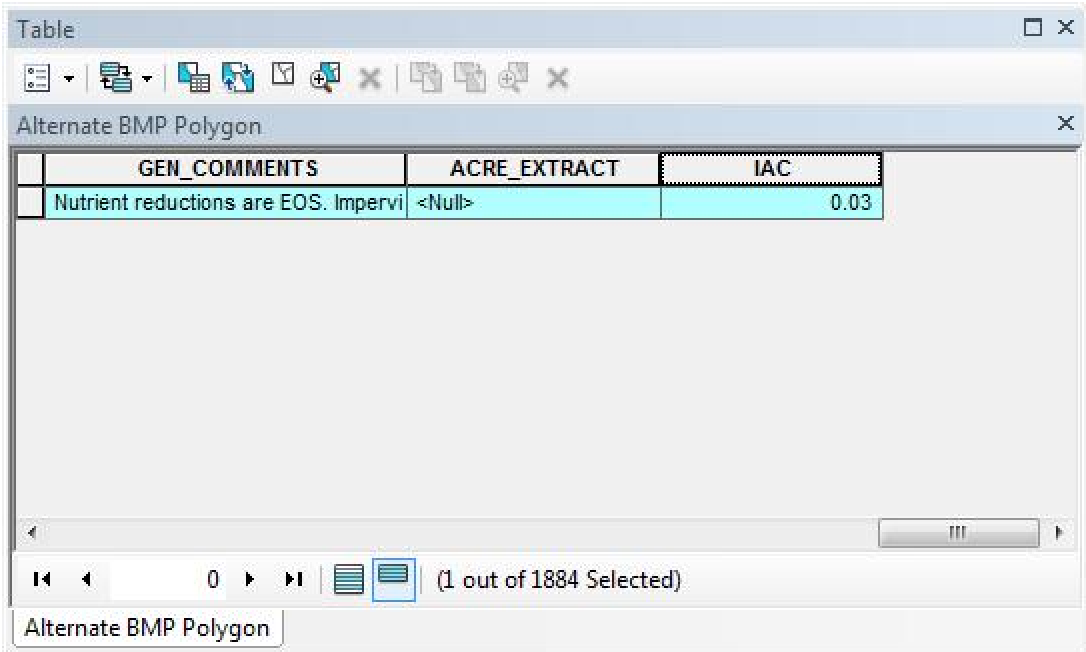


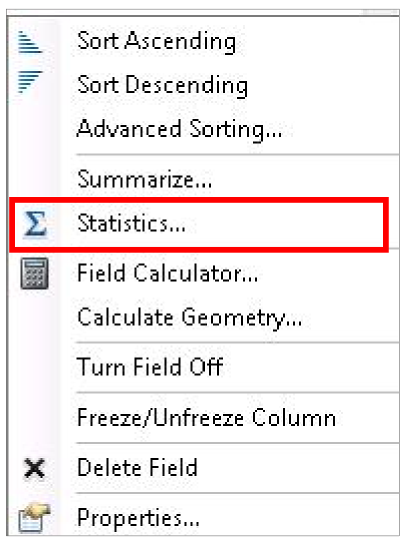
Within the Select by Attributes dialog window, enter the following selection statement to identify Impervious Area Removal for FY18, and click “Apply”:

[PROJECT_DESC] = 'FY18 restoration impervious removal project.'

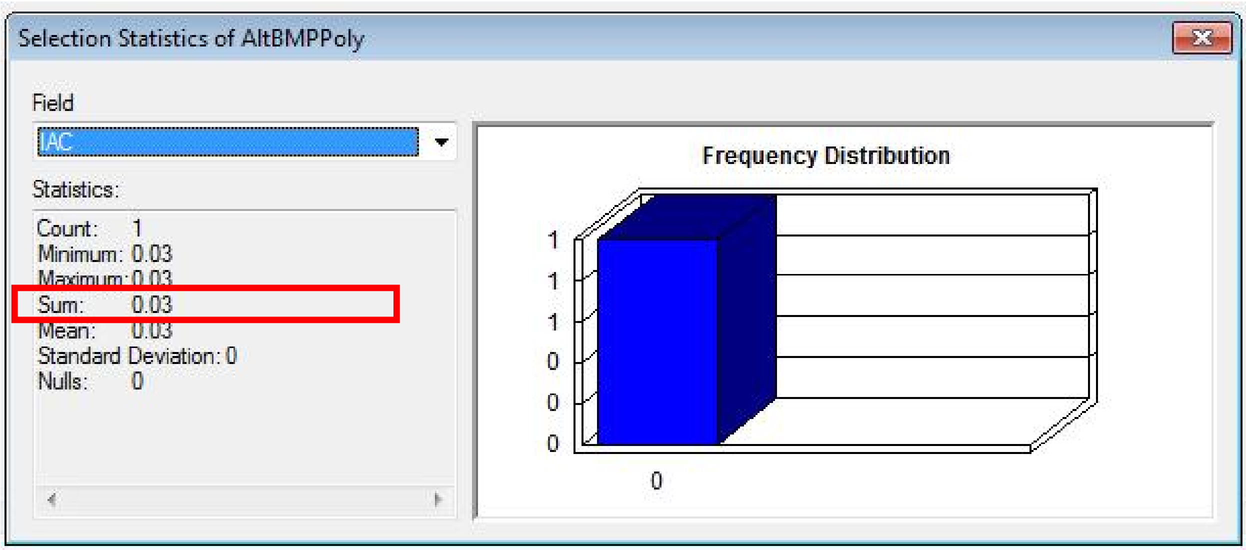


Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select “Statistics…”





View the “Sum” field to view the total restoration treatment credit claimed for Impervious Area Removal FY18.

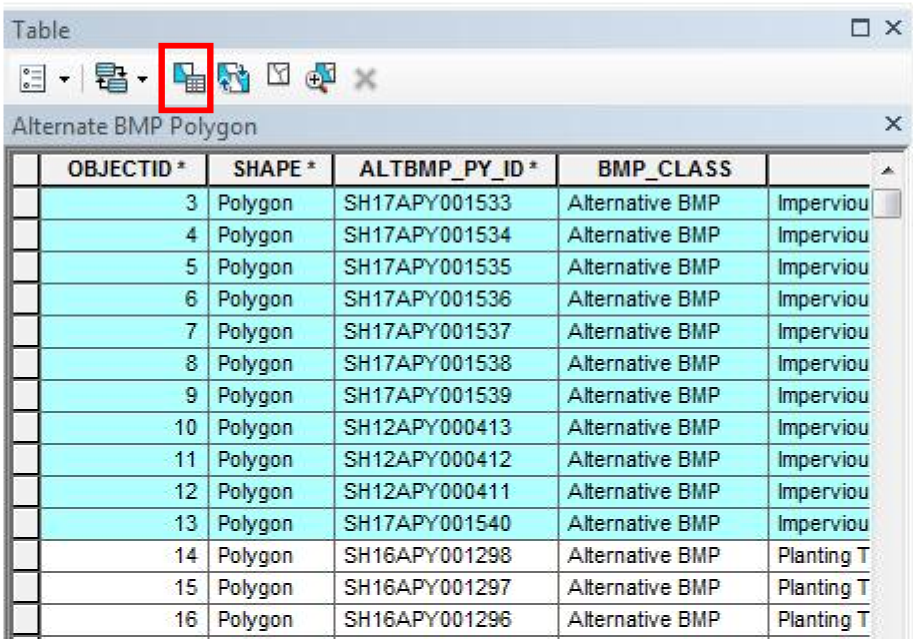


The total impervious area removal treatment credit for FY18 is 0.03 acres.

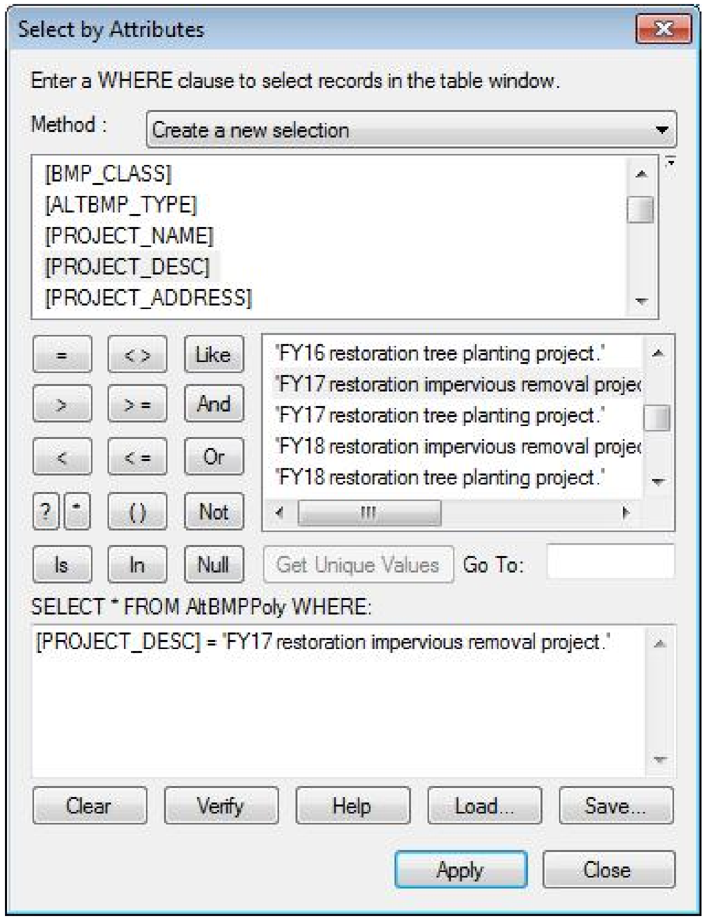
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

6.1.3.2 Impervious Area Removal IAC for FY 2017

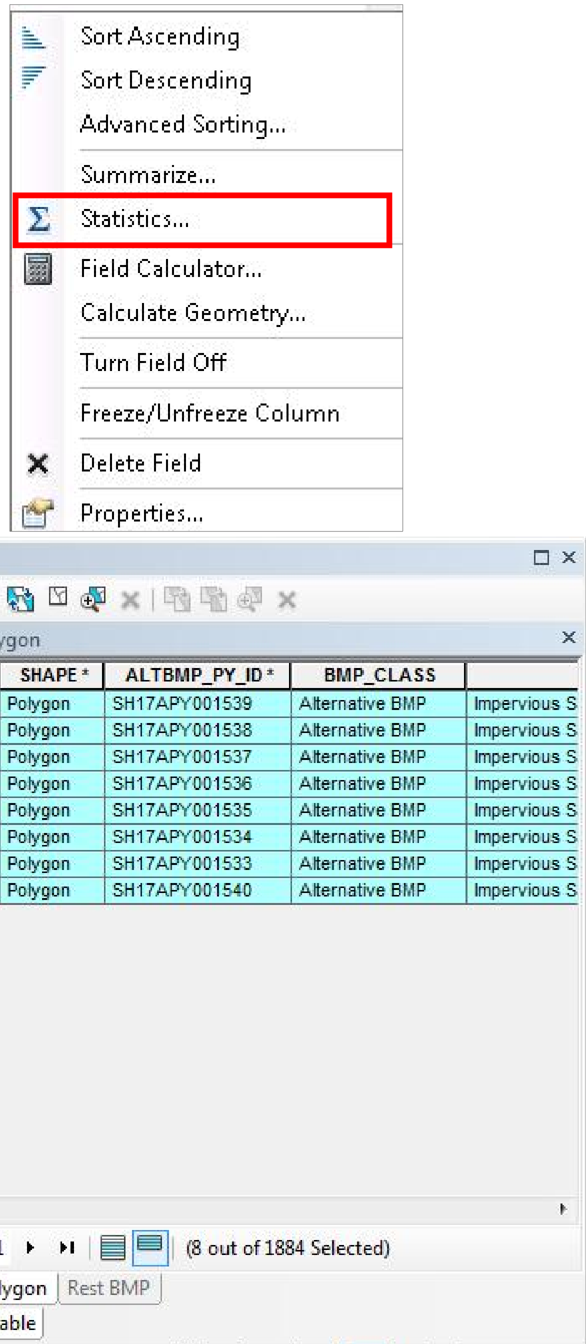
- Within the AltBMPPoly attribute table, click the Select by Attributes button.



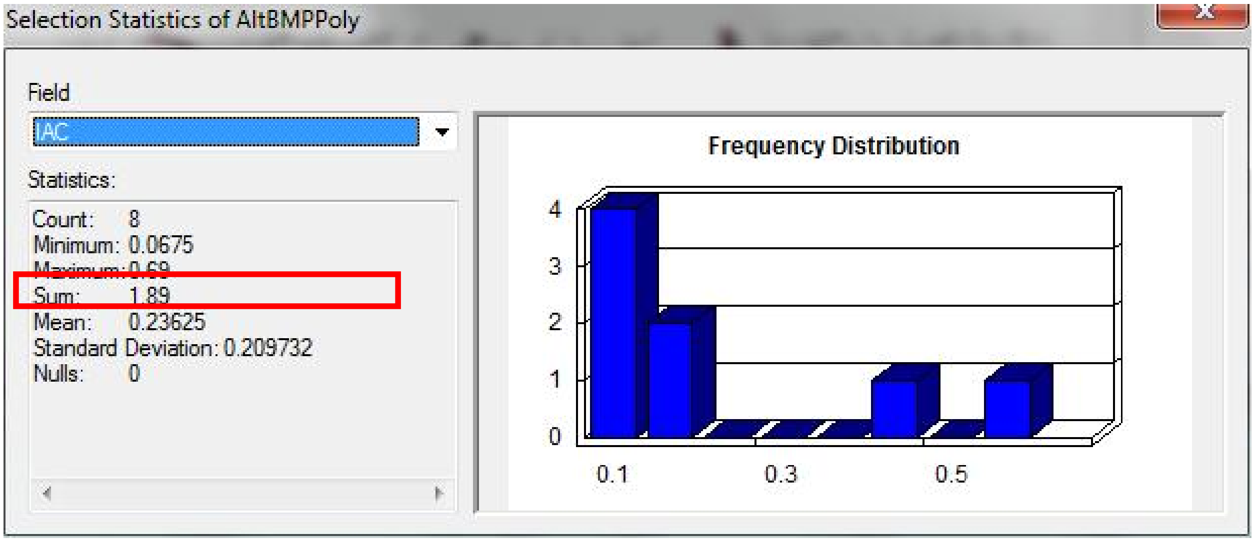
- Within the Select by Attributes dialog window, enter the following selection statement to identify Impervio*u*s Area Removal for FY 17, and click “Apply”:
  [PROJECT_DESC] = 'FY17 restoration impervious removal project.'



- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"



- View the "Sum" field to view the total restoration treatment credit claimed for Impervious Area Removal FY17.



Note: This calculation method generates a slightly different result due to rounding.

The total impervious area removal treatment credit for FY17 is 1.85 acres.

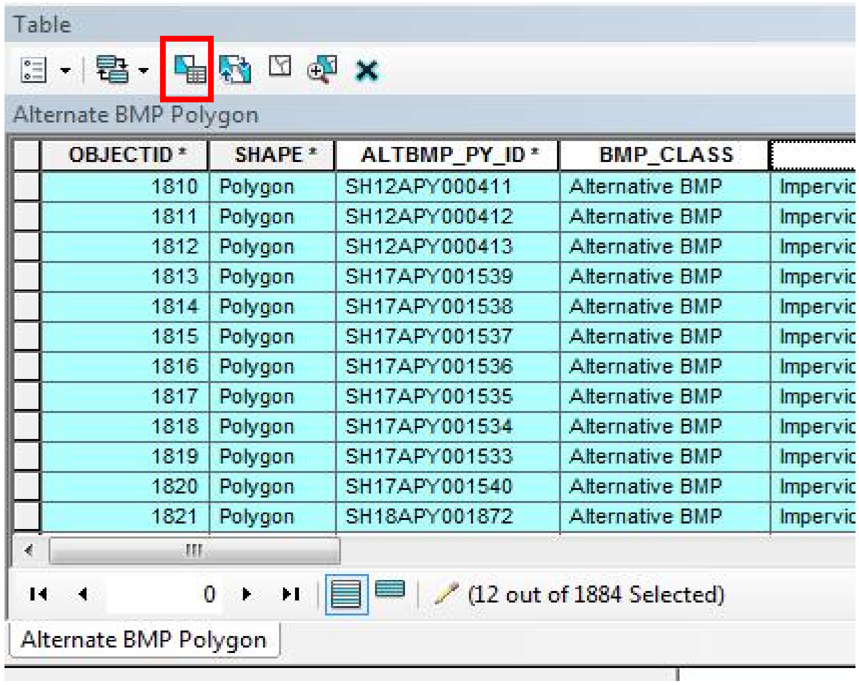
Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

6.1.3.2 Impervious Area Removal IAC for FY 2016

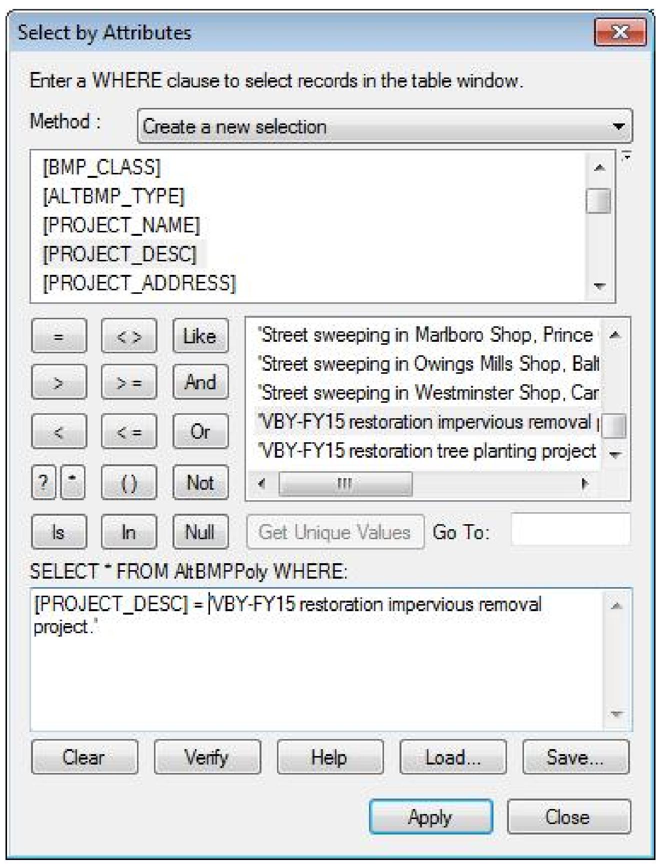
There are no impervious area removals for FY 16.

6.1.3.3 Impervious Area Removal IAC for VBY-2015

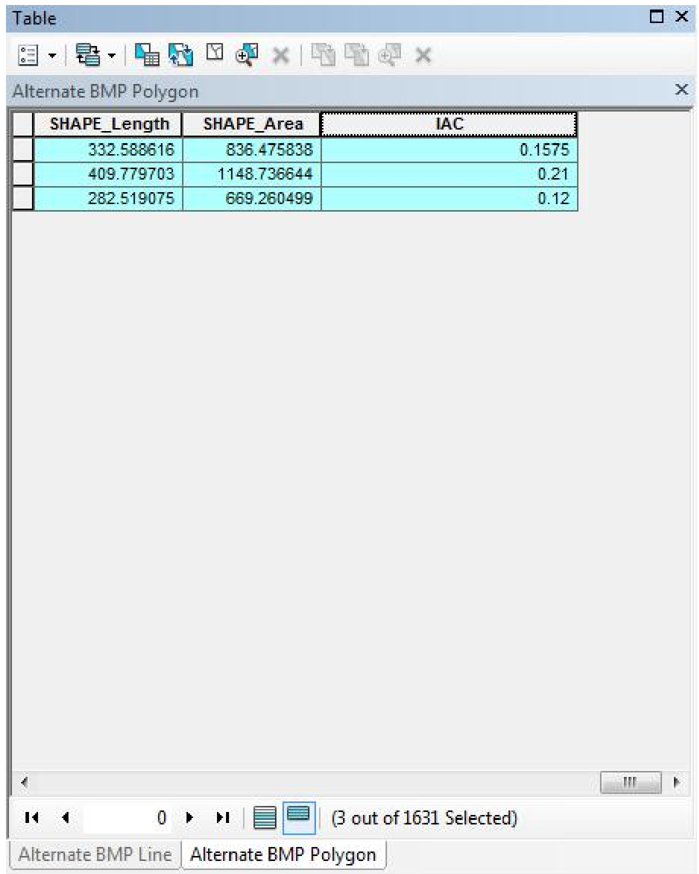
- Within the AltBMPPoly attribute table, click the Select by Attributes button.

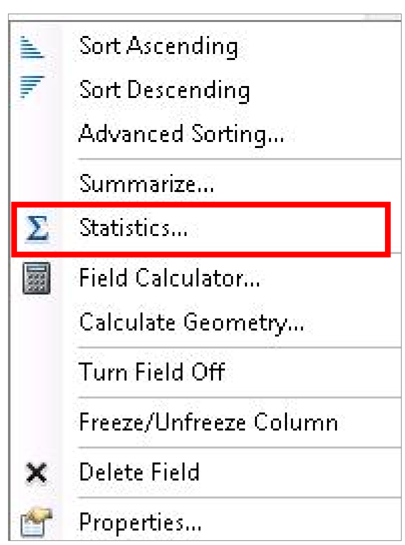


- Within the Select by Attributes dialog window, enter the following selection statement to identify Impervious Area Removal for VBY-2015, and click "Apply":
  [PROJECT_DESC] = 'VBY-FY15 restoration impervious removal project.'

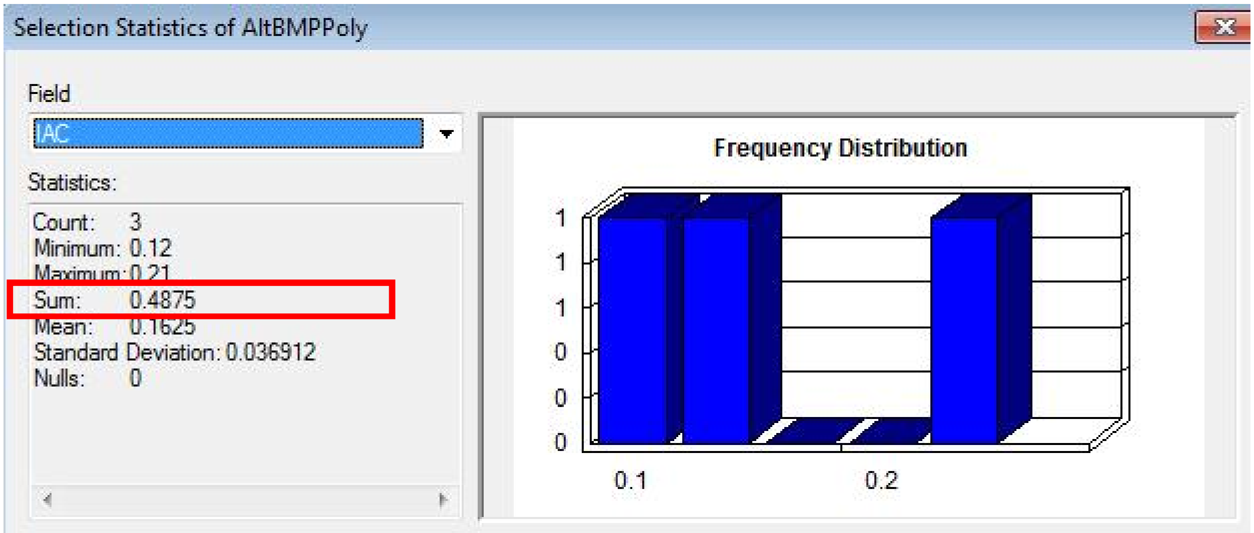


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR field, and select "Statistics…"





- View the "Sum" field to view the total restoration treatment credit claimed for Impervious Area Removal VBY-2015.



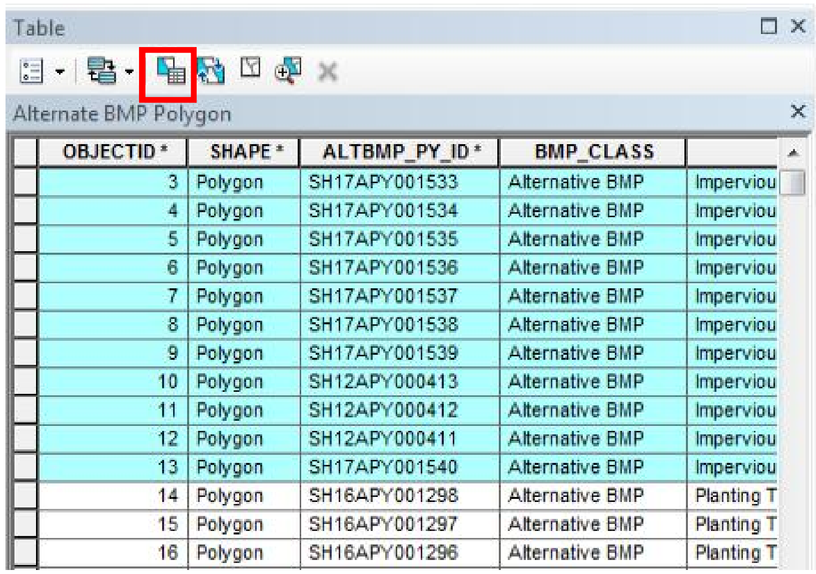
The total impervious area removal treatment credit for VBY-2015 is 0.49 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

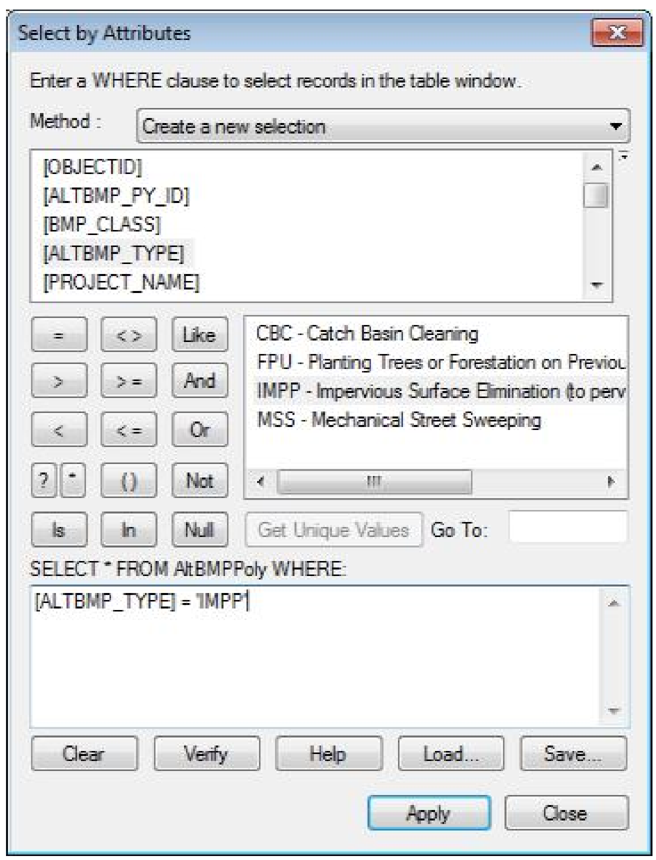
6.2 Total Impervious Area Removal IAC Sum

To determine restoration Impervious Area Removal IAC, select Impervious Area Removals, and sum the EQU_IMP_ACR:

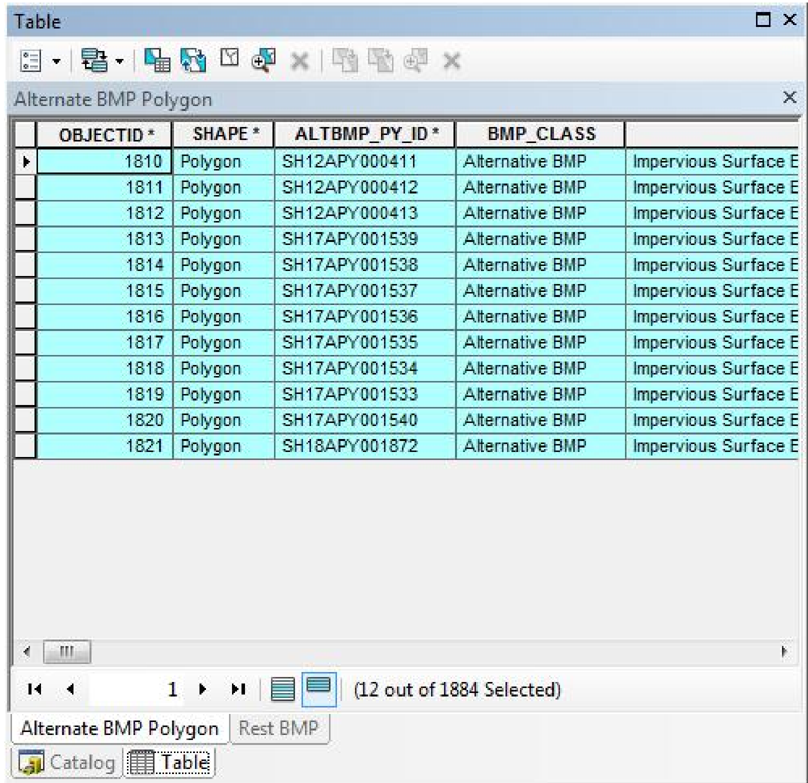
- Within the AltBMPoly feature class, click the Select by Attributes tool.

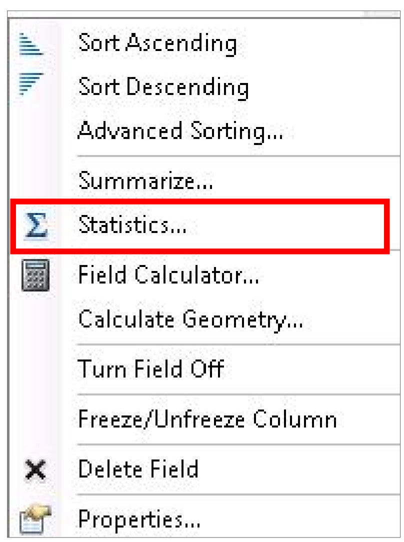


- In the statement box, enter the following selection statement and click "Apply": [ALTBMP_TYPE] = 'IMPP'

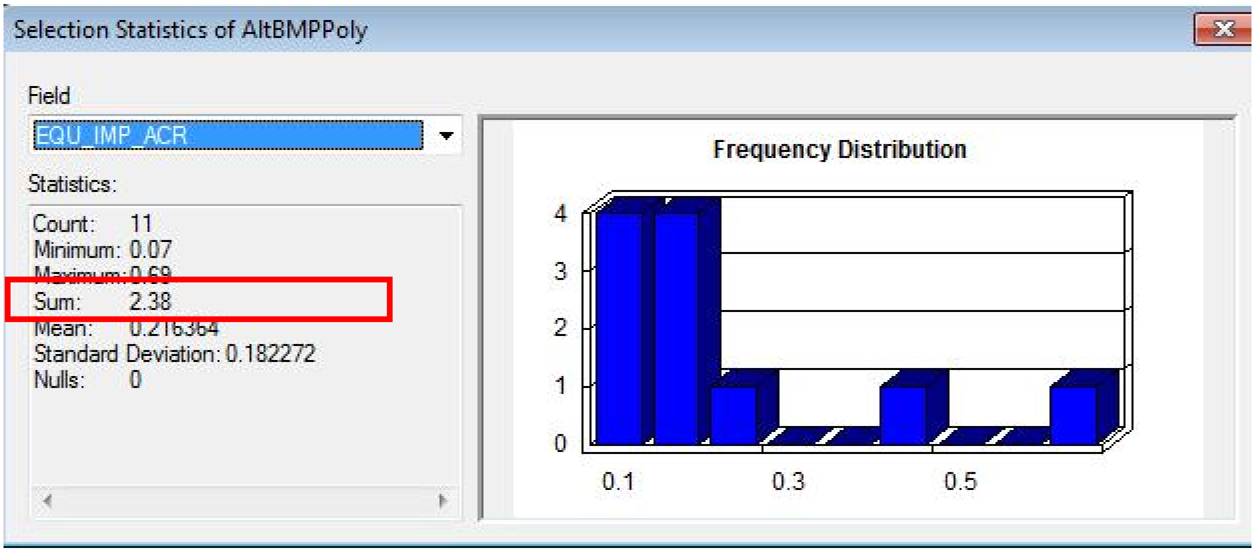


- Ensuring that the selection is retained, right click on the EQU_IMP_ACR, and select "Statistics…"





- View the "Sum" field to view the total restoration treatment credit claimed for Impervious Area Removal



Note: This calculation method generates a slightly different result due to rounding

The total impervious area removal treatment credit 2.37 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

7.0 Inlet Cleaning

Calculating the impervious treatment credit for Inlet Cleaning requires two (2) primary inputs:

- Pounds removed from within the MDE MS4 geodatabase (AltBMPPoly feature class' LBS_REMOVED field)
- Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance (0.4 for catch basin cleaning.

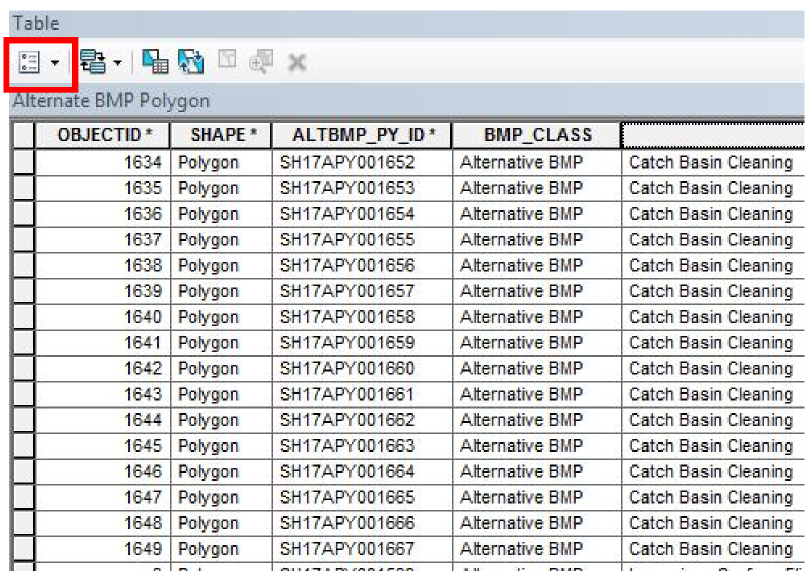
7.1 Inlet Cleaning IAC Calculation

The AltBMPPoly feature class contains a field to explicitly capture IAC ("EQU_IMP_ACR"). To verify the IAC, this example will add a new, temporary field to the AltBMPPoly feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

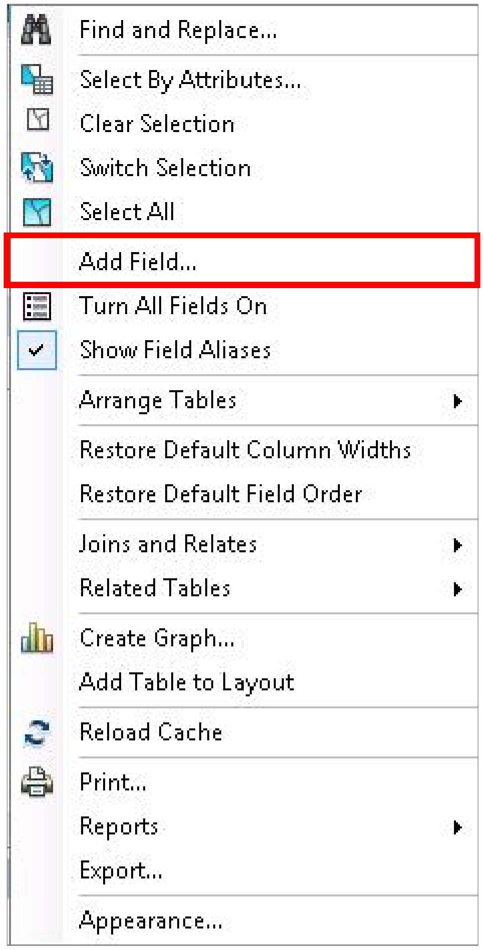
This process could also be done in Excel after exporting the AltBMPLine feature class (the calculation of IAC in Excel is not described within this document).

7.1.1 Add New IAC Field

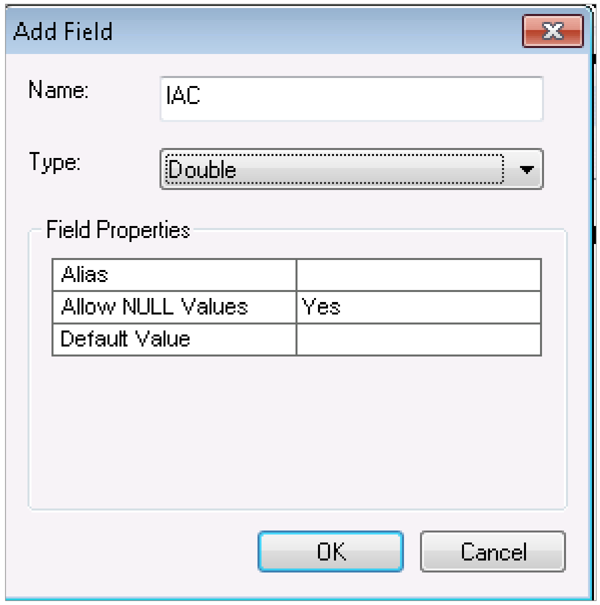
Within the AltBMPPoly attribute table, click the Table Options button, and select "Add Field…"



OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1634	Polygon	SH17APY001652	Alternative BMP	Catch Basin Cleaning
1635	Polygon	SH17APY001653	Alternative BMP	Catch Basin Cleaning
1636	Polygon	SH17APY001654	Alternative BMP	Catch Basin Cleaning
1637	Polygon	SH17APY001655	Alternative BMP	Catch Basin Cleaning
1638	Polygon	SH17APY001656	Alternative BMP	Catch Basin Cleaning
1639	Polygon	SH17APY001657	Alternative BMP	Catch Basin Cleaning
1640	Polygon	SH17APY001658	Alternative BMP	Catch Basin Cleaning
1641	Polygon	SH17APY001659	Alternative BMP	Catch Basin Cleaning
1642	Polygon	SH17APY001660	Alternative BMP	Catch Basin Cleaning
1643	Polygon	SH17APY001661	Alternative BMP	Catch Basin Cleaning
1644	Polygon	SH17APY001662	Alternative BMP	Catch Basin Cleaning
1645	Polygon	SH17APY001663	Alternative BMP	Catch Basin Cleaning
1646	Polygon	SH17APY001664	Alternative BMP	Catch Basin Cleaning
1647	Polygon	SH17APY001665	Alternative BMP	Catch Basin Cleaning
1648	Polygon	SH17APY001666	Alternative BMP	Catch Basin Cleaning
1649	Polygon	SH17APY001667	Alternative BMP	Catch Basin Cleaning



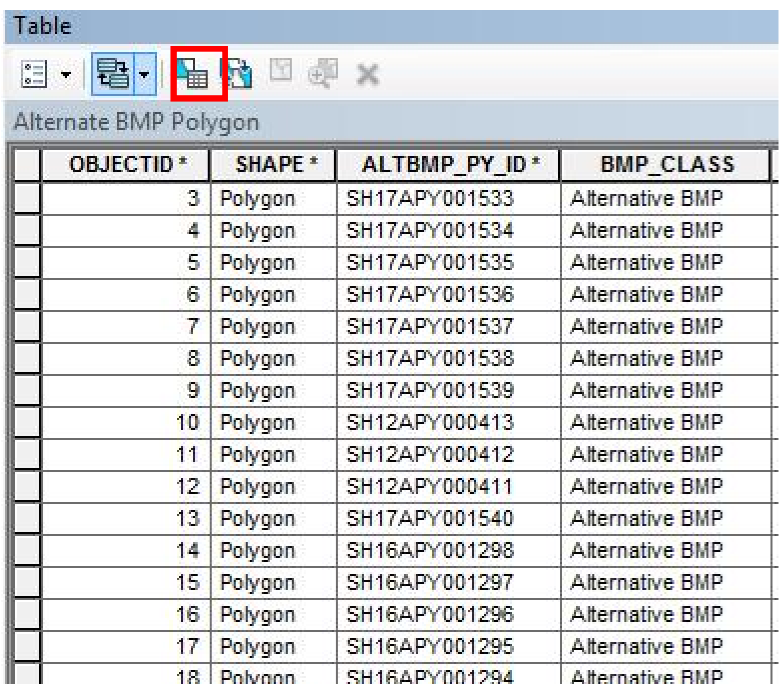
- Within the Add Field dialog window, enter the new field name – “IAC”. Set Type = Double. Accept the default Allow Nulls setting. Click “OK”. This field may already have been created in a previous step. It can be re-used to calculate the IAC for catch basin cleaning only.



7.1.2 Calculate IAC

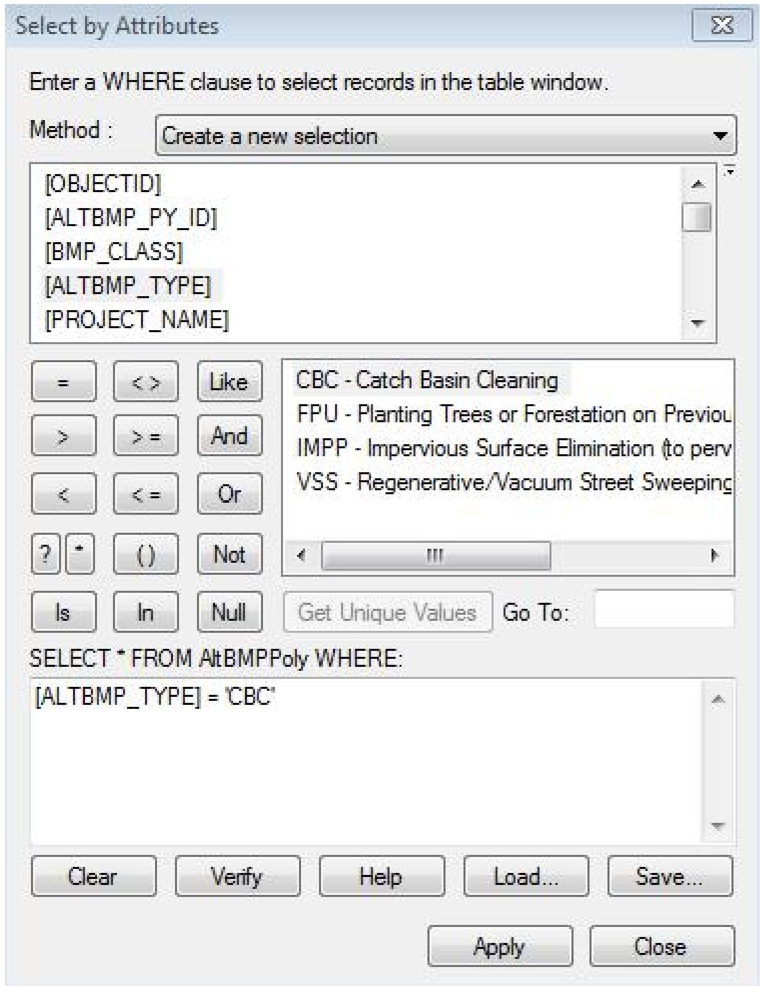
Because multiple strategies exist within the AltBMPPoly feature class, select the targeted strategy prior to obtain the sum of IAC.

- Within the AltBMPPoly attribute table, click the Select by Attributes button.

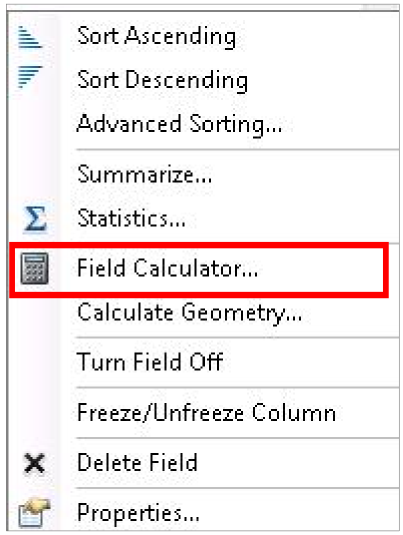


- Within the Select by Attributes dialog window, enter the following selection statement and click "Apply":

[ALTBMP_TYPE] = 'CBC'

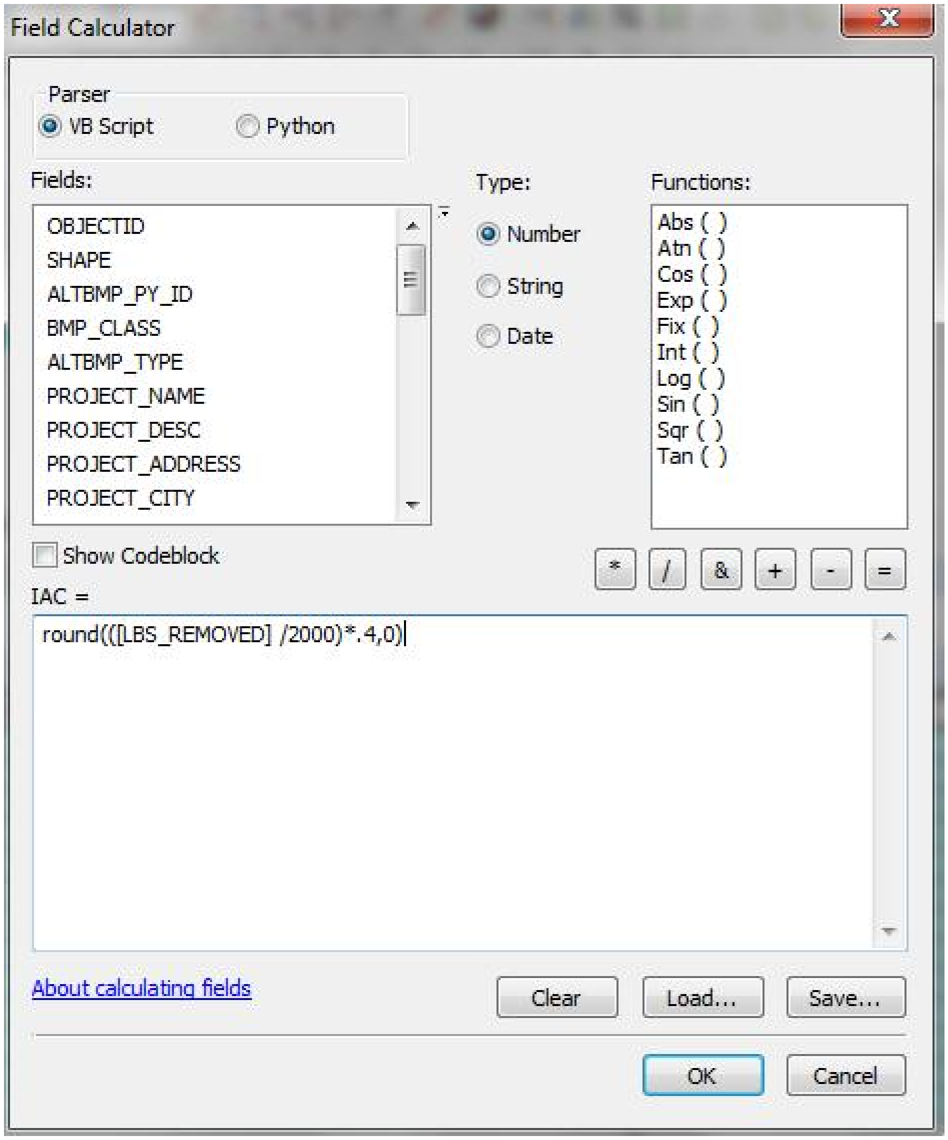


- Right click on the new IAC field, and select "Field Calculator…"



- Within the Field Calculator dialog window, enter the following calculation and click "OK":
  round([LBS_REMOVED]/2000)*.4,0)

  This formula represents the conversion from dry weight pounds to tons, then multiplied by the Impervious Acre Equivalent factor of 0.40. This strategy is also rounded slightly to achieve a value of 175 impervious equivalent acres. Refer to Section E in the Annual Report text for an expanded description of the inlet cleaning program and the capped credit achievement approach for FY17 and FY18.

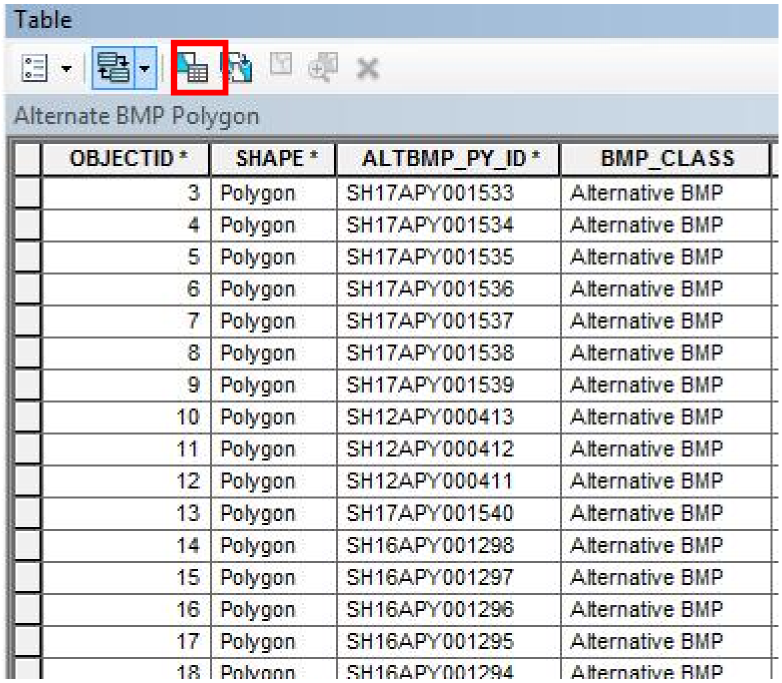


7.2 Inlet Cleaning by Fiscal Year

Inlet Cleaning is an ongoing annual operational activity in which SHA claimed 150 acres in FY17 and an additional supplemental 25 acres in FY18. MDOT SHA is responsible for achieving 175 acres per year using this strategy.

Because multiple strategies exist within the AltBMPPoly feature class, select the targeted strategy prior to obtain the sum of IAC.

- Within the AltBMPPoly attribute table, click the Select by Attributes button.



Table

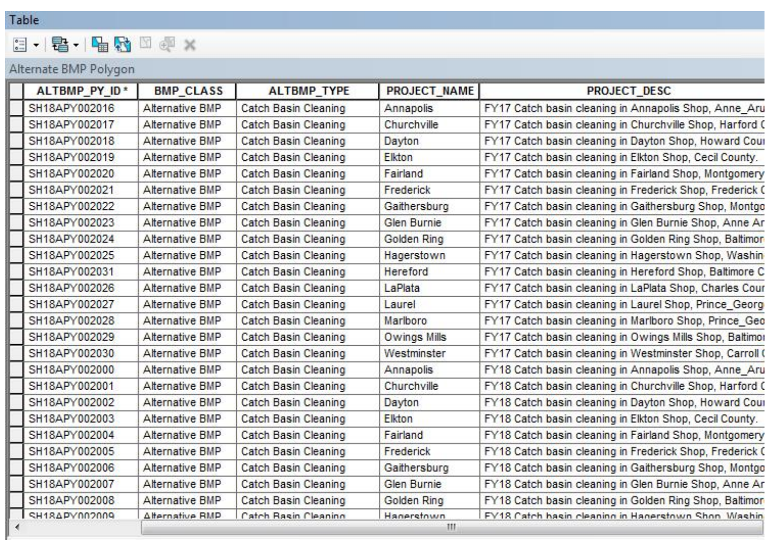
Alternate BMP Polygon

	OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS
	3	Polygon	SH17APY001533	Alternative BMP
	4	Polygon	SH17APY001534	Alternative BMP
	5	Polygon	SH17APY001535	Alternative BMP
	6	Polygon	SH17APY001536	Alternative BMP
	7	Polygon	SH17APY001537	Alternative BMP
	8	Polygon	SH17APY001538	Alternative BMP
	9	Polygon	SH17APY001539	Alternative BMP
	10	Polygon	SH12APY000413	Alternative BMP
	11	Polygon	SH12APY000412	Alternative BMP
	12	Polygon	SH12APY000411	Alternative BMP
	13	Polygon	SH17APY001540	Alternative BMP
	14	Polygon	SH16APY001298	Alternative BMP
	15	Polygon	SH16APY001297	Alternative BMP
	16	Polygon	SH16APY001296	Alternative BMP
	17	Polygon	SH16APY001295	Alternative BMP
	18	Polygon	SH16APY001294	Alternative BMP

- Within the Select by Attributes dialog window, enter the following selection statement and click "Apply":

  [ALTBMP_TYPE] = 'CBC'

- Both FY17 and FY18 inlet cleaning data is provided. The FY17 data and FY17 data is distinguished with leading year in the PROJECT_DESC field.



Table

Alternate BMP Polygon

	ALTBMP_PY_ID *	BMP_CLASS	ALTBMP_TYPE	PROJECT_NAME	PROJECT_DESC
	SH18APY002016	Alternative BMP	Catch Basin Cleaning	Annapolis	FY17 Catch basin cleaning in Annapolis Shop, Anne_Aru
	SH18APY002017	Alternative BMP	Catch Basin Cleaning	Churchville	FY17 Catch basin cleaning in Churchville Shop, Harford (
	SH18APY002018	Alternative BMP	Catch Basin Cleaning	Dayton	FY17 Catch basin cleaning in Dayton Shop, Howard Cou
	SH18APY002019	Alternative BMP	Catch Basin Cleaning	Elkton	FY17 Catch basin cleaning in Elkton Shop, Cecil County.
	SH18APY002020	Alternative BMP	Catch Basin Cleaning	Fairland	FY17 Catch basin cleaning in Fairland Shop, Montgomery
	SH18APY002021	Alternative BMP	Catch Basin Cleaning	Frederick	FY17 Catch basin cleaning in Frederick Shop, Frederick (
	SH18APY002022	Alternative BMP	Catch Basin Cleaning	Gaithersburg	FY17 Catch basin cleaning in Gaithersburg Shop, Montgo
	SH18APY002023	Alternative BMP	Catch Basin Cleaning	Glen Burnie	FY17 Catch basin cleaning in Glen Burnie Shop, Anne Ar
	SH18APY002024	Alternative BMP	Catch Basin Cleaning	Golden Ring	FY17 Catch basin cleaning in Golden Ring Shop, Baltimor
	SH18APY002025	Alternative BMP	Catch Basin Cleaning	Hagerstown	FY17 Catch basin cleaning in Hagerstown Shop, Washin
	SH18APY002031	Alternative BMP	Catch Basin Cleaning	Hereford	FY17 Catch basin cleaning in Hereford Shop, Baltimore C
	SH18APY002026	Alternative BMP	Catch Basin Cleaning	LaPlata	FY17 Catch basin cleaning in LaPlata Shop, Charles Cour
	SH18APY002027	Alternative BMP	Catch Basin Cleaning	Laurel	FY17 Catch basin cleaning in Laurel Shop, Prince_Georg
	SH18APY002028	Alternative BMP	Catch Basin Cleaning	Marlboro	FY17 Catch basin cleaning in Marlboro Shop, Prince_Geo
	SH18APY002029	Alternative BMP	Catch Basin Cleaning	Owings Mills	FY17 Catch basin cleaning in Owings Mills Shop, Baltimor
	SH18APY002030	Alternative BMP	Catch Basin Cleaning	Westminster	FY17 Catch basin cleaning in Westminster Shop, Carroll (
	SH18APY002000	Alternative BMP	Catch Basin Cleaning	Annapolis	FY18 Catch basin cleaning in Annapolis Shop, Anne_Aru
	SH18APY002001	Alternative BMP	Catch Basin Cleaning	Churchville	FY18 Catch basin cleaning in Churchville Shop, Harford (
	SH18APY002002	Alternative BMP	Catch Basin Cleaning	Dayton	FY18 Catch basin cleaning in Dayton Shop, Howard Cou
	SH18APY002003	Alternative BMP	Catch Basin Cleaning	Elkton	FY18 Catch basin cleaning in Elkton Shop, Cecil County.
	SH18APY002004	Alternative BMP	Catch Basin Cleaning	Fairland	FY18 Catch basin cleaning in Fairland Shop, Montgomery
	SH18APY002005	Alternative BMP	Catch Basin Cleaning	Frederick	FY18 Catch basin cleaning in Frederick Shop, Frederick (
	SH18APY002006	Alternative BMP	Catch Basin Cleaning	Gaithersburg	FY18 Catch basin cleaning in Gaithersburg Shop, Montgo
	SH18APY002007	Alternative BMP	Catch Basin Cleaning	Glen Burnie	FY18 Catch basin cleaning in Glen Burnie Shop, Anne Ar
	SH18APY002008	Alternative BMP	Catch Basin Cleaning	Golden Ring	FY18 Catch basin cleaning in Golden Ring Shop, Baltimor
	SH18APY002009	Alternative BMP	Catch Basin Cleaning	Hagerstown	FY18 Catch basin cleaning in Hagerstown Shop, Washin

7.2.1 Inlet Cleaning Fiscal Year 2018

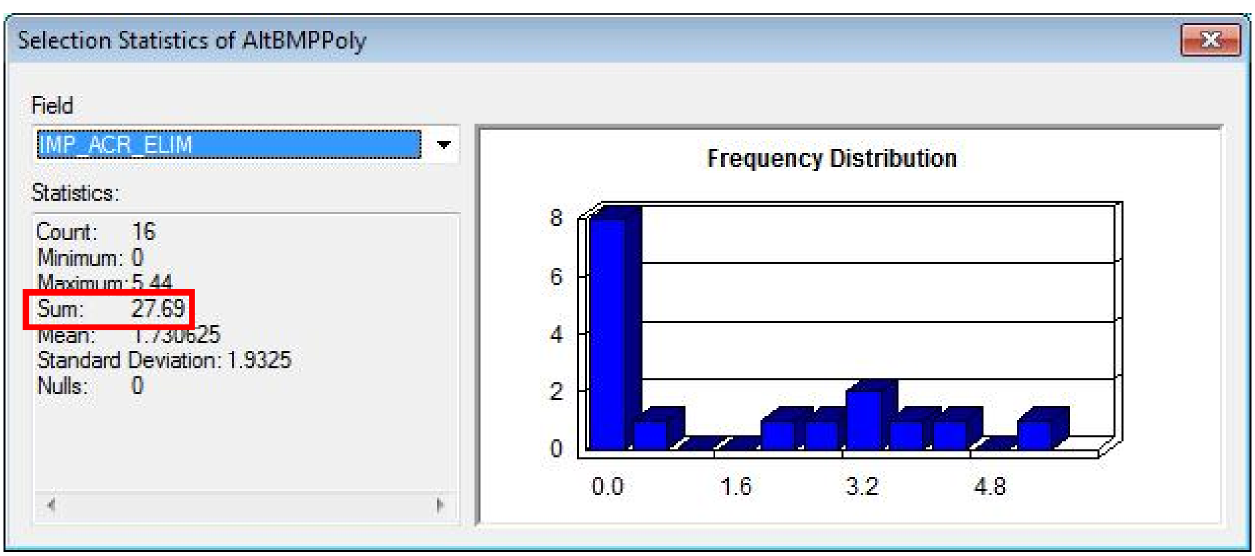
- With the subset of inlet cleaning records still selected, select all records containing leading “FY18” in the PROJECT_DESC field.

Table

Alternate BMP Polygon

ALTBMP_TYPE	PROJECT_NAME	PROJECT_DESC	
Catch Basin Cleaning	Annapolis	FY18 Catch basin cleaning in Annapolis Shop, Anne_Arun	<Null>
Catch Basin Cleaning	Churchville	FY18 Catch basin cleaning in Churchville Shop, Harford Co	<Null>
Catch Basin Cleaning	Dayton	FY18 Catch basin cleaning in Dayton Shop, Howard Count	<Null>
Catch Basin Cleaning	Elkton	FY18 Catch basin cleaning in Elkton Shop, Cecil County.	<Null>
Catch Basin Cleaning	Fairland	FY18 Catch basin cleaning in Fairland Shop, Montgomery C	<Null>
Catch Basin Cleaning	Frederick	FY18 Catch basin cleaning in Frederick Shop, Frederick Co	<Null>
Catch Basin Cleaning	Gaithersburg	FY18 Catch basin cleaning in Gaithersburg Shop, Montgom	<Null>
Catch Basin Cleaning	Glen Burnie	FY18 Catch basin cleaning in Glen Burnie Shop, Anne Aru	<Null>
Catch Basin Cleaning	Golden Ring	FY18 Catch basin cleaning in Golden Ring Shop, Baltimore	<Null>
Catch Basin Cleaning	Hagerstown	FY18 Catch basin cleaning in Hagerstown Shop, Washingt	<Null>
Catch Basin Cleaning	Hereford	FY18 Catch basin cleaning in Hereford Shop, Baltimore Co	<Null>
Catch Basin Cleaning	LaPlata	FY18 Catch basin cleaning in LaPlata Shop, Charles Count	<Null>
Catch Basin Cleaning	Laurel	FY18 Catch basin cleaning in Laurel Shop, Prince_George'	<Null>
Catch Basin Cleaning	Marlboro	FY18 Catch basin cleaning in Marlboro Shop, Prince_Georg	<Null>
Catch Basin Cleaning	Owings Mills	FY18 Catch basin cleaning in Owings Mills Shop, Baltimore	<Null>
Catch Basin Cleaning	Westminster	FY18 Catch basin cleaning in Westminster Shop, Carroll Co	<Null>

- Ensuring that the selection is retained, right click on the IAC field and select “Statistics…”
- View the “Sum” field to view the total inlet cleaning credit claimed for FY18.



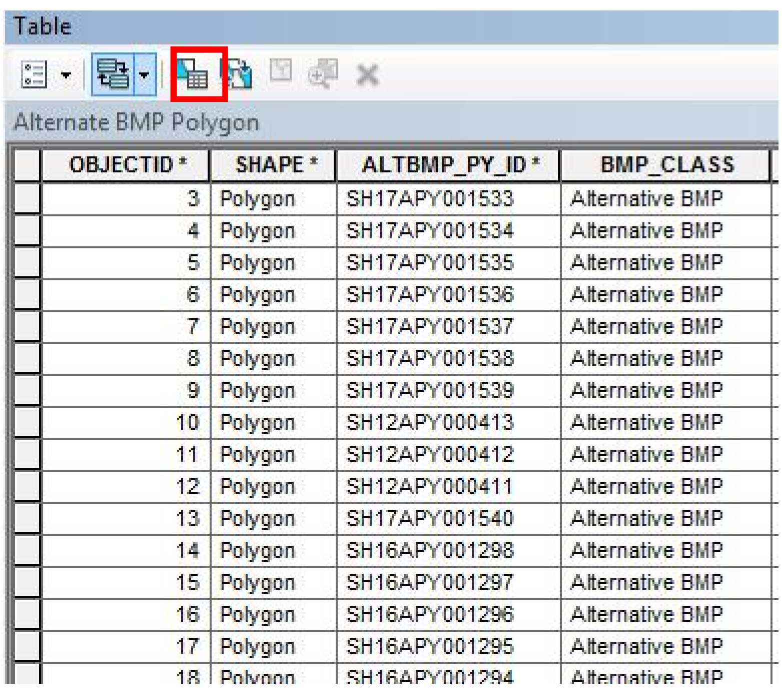
The total inlet cleaning credit for FY18 is 27.7 acres, covering the additional credit claimed in 2018 (25 acres).

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

Please note, the 2.77 extra acres for FY18 beyond the 25 acres claimed make up for the slight variance in the annual basis of 150 acres required to continue to claim the 150 acres from 2017.

7.2.2 Inlet Cleaning Fiscal Year 2017

- Within the AltBMPPoly attribute table, click the Select by Attributes button.



Table

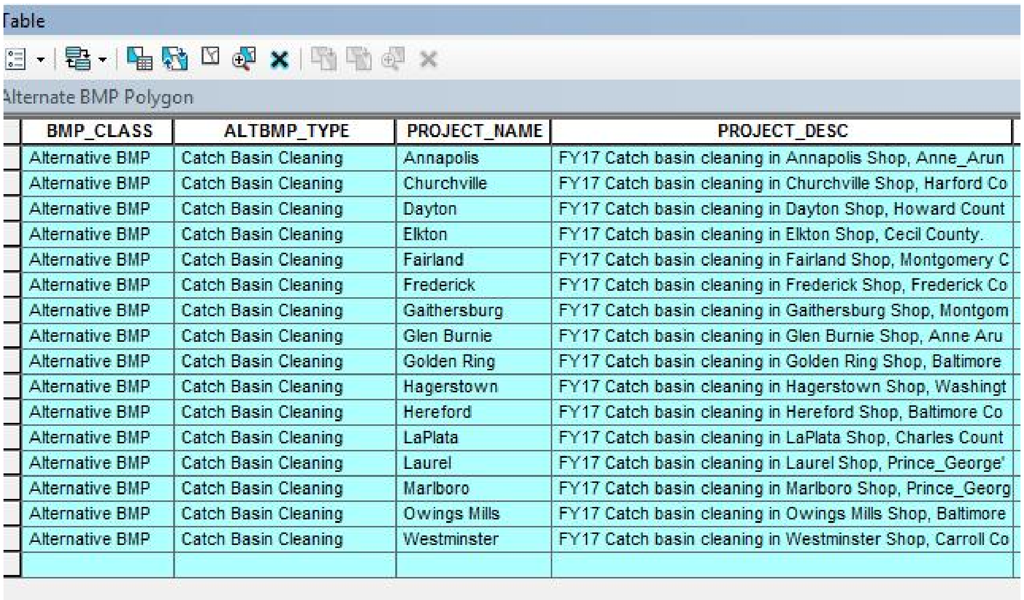
Alternate BMP Polygon

	OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS
	3	Polygon	SH17APY001533	Alternative BMP
	4	Polygon	SH17APY001534	Alternative BMP
	5	Polygon	SH17APY001535	Alternative BMP
	6	Polygon	SH17APY001536	Alternative BMP
	7	Polygon	SH17APY001537	Alternative BMP
	8	Polygon	SH17APY001538	Alternative BMP
	9	Polygon	SH17APY001539	Alternative BMP
	10	Polygon	SH12APY000413	Alternative BMP
	11	Polygon	SH12APY000412	Alternative BMP
	12	Polygon	SH12APY000411	Alternative BMP
	13	Polygon	SH17APY001540	Alternative BMP
	14	Polygon	SH16APY001298	Alternative BMP
	15	Polygon	SH16APY001297	Alternative BMP
	16	Polygon	SH16APY001296	Alternative BMP
	17	Polygon	SH16APY001295	Alternative BMP
	18	Polygon	SH16APY001294	Alternative BMP

- Within the Select by Attributes dialog window, enter the following selection statement and click "Apply":

[ALTBMP_TYPE] = 'CBC'

- With the subset of inlet cleaning records still selected, select all records containing leading "FY17" in the PROJECT_DESC field.

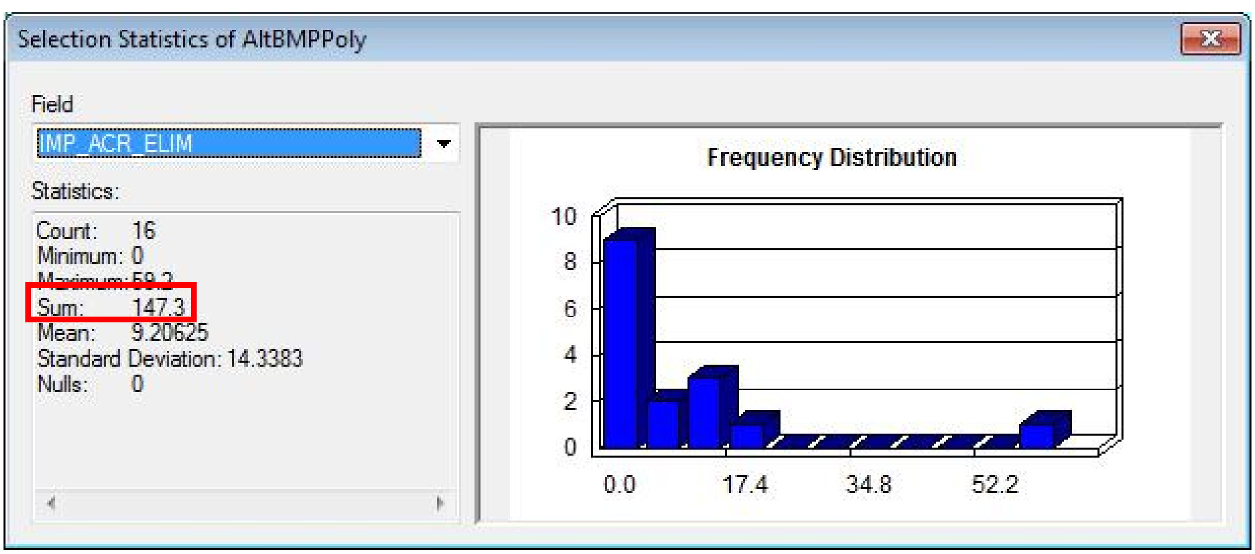


Table

Alternate BMP Polygon

BMP_CLASS	ALTBMP_TYPE	PROJECT_NAME	PROJECT_DESC
Alternative BMP	Catch Basin Cleaning	Annapolis	FY17 Catch basin cleaning in Annapolis Shop, Anne_Arun
Alternative BMP	Catch Basin Cleaning	Churchville	FY17 Catch basin cleaning in Churchville Shop, Harford Co
Alternative BMP	Catch Basin Cleaning	Dayton	FY17 Catch basin cleaning in Dayton Shop, Howard Count
Alternative BMP	Catch Basin Cleaning	Elkton	FY17 Catch basin cleaning in Elkton Shop, Cecil County.
Alternative BMP	Catch Basin Cleaning	Fairland	FY17 Catch basin cleaning in Fairland Shop, Montgomery C
Alternative BMP	Catch Basin Cleaning	Frederick	FY17 Catch basin cleaning in Frederick Shop, Frederick Co
Alternative BMP	Catch Basin Cleaning	Gaithersburg	FY17 Catch basin cleaning in Gaithersburg Shop, Montgom
Alternative BMP	Catch Basin Cleaning	Glen Burnie	FY17 Catch basin cleaning in Glen Burnie Shop, Anne Aru
Alternative BMP	Catch Basin Cleaning	Golden Ring	FY17 Catch basin cleaning in Golden Ring Shop, Baltimore
Alternative BMP	Catch Basin Cleaning	Hagerstown	FY17 Catch basin cleaning in Hagerstown Shop, Washingt
Alternative BMP	Catch Basin Cleaning	Hereford	FY17 Catch basin cleaning in Hereford Shop, Baltimore Co
Alternative BMP	Catch Basin Cleaning	LaPlata	FY17 Catch basin cleaning in LaPlata Shop, Charles Count
Alternative BMP	Catch Basin Cleaning	Laurel	FY17 Catch basin cleaning in Laurel Shop, Prince_George'
Alternative BMP	Catch Basin Cleaning	Marlboro	FY17 Catch basin cleaning in Marlboro Shop, Prince_Georg
Alternative BMP	Catch Basin Cleaning	Owings Mills	FY17 Catch basin cleaning in Owings Mills Shop, Baltimore
Alternative BMP	Catch Basin Cleaning	Westminster	FY17 Catch basin cleaning in Westminster Shop, Carroll Co

- Ensuring that the selection is retained, right click on the IAC field and select "Statistics…"
- View the "Sum" field to view the total inlet cleaning credit claimed for FY17.



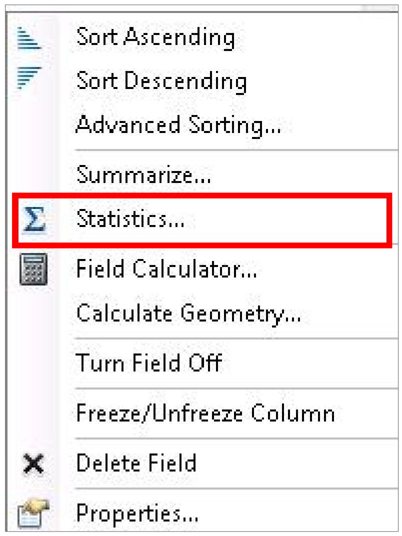
The total inlet cleaning credit for FY17 was 150 acres, and the operational activity is required to be achived each year. The FY18 completion of this operational basis of 150 acres is achieved by adding the 27.77 acres and the 147.3 acres for a total achievement of 175 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

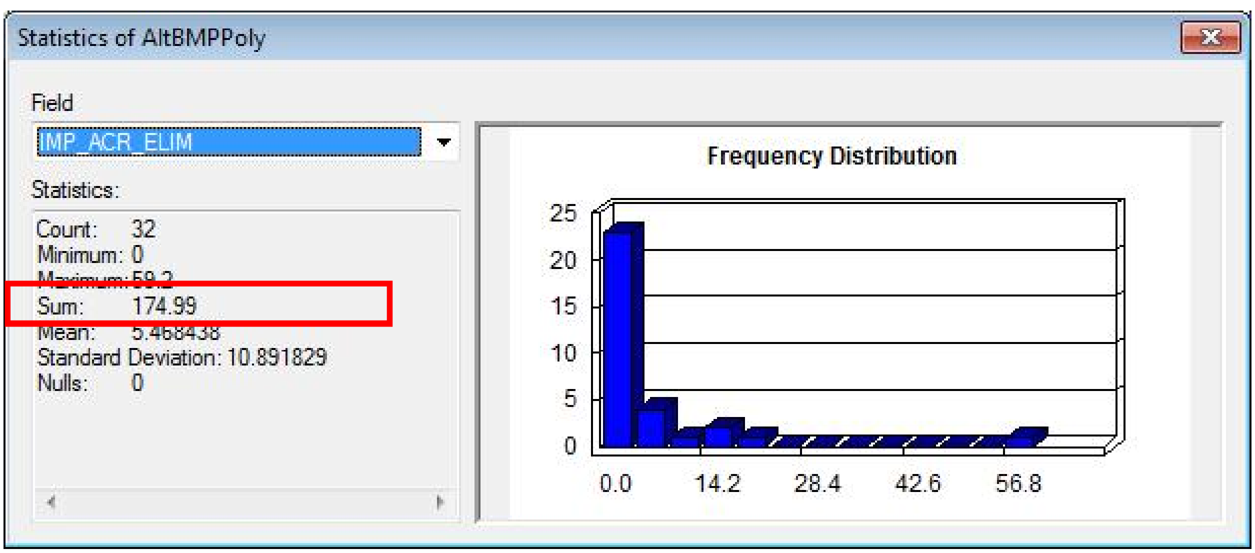
7.3 Total Inlet Cleaning IAC Sum

To determine restoration inlet cleaning IAC, select inlet cleaning, and sum the EQU_IMP_ACR:

- Ensuring that the selection is retained, right click on the EQV_IMP_ACR, and select "Statistics…"



- View the "Sum" field to view the total restoration treatment credit claimed for Inlet Cleaning.



The total inlet cleaning treatment credit 175 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

8.0 Street Sweeping

Calculating the impervious treatment credit for street sweeping requires two (2) primary inputs:

- Times swept from within the MDE MS4 geodatabase (AltBMPPoly feature class' TIMES_SWEPT field); this is representative of the timeframe in which the route was swept with the required biweekly frequency.
- Impervious Acre Equivalent factor, from Table 7 of MDE's August 2014 guidance: 0.07

8.1 Street Sweeping IAC Calculation

The AltBMPPoly feature class contains a field to explicitly capture IAC ("EQU_IMP_ACR"). To verify the IAC, this example will add a new, temporary field to the AltBMPPoly feature class. This new field will hold the results of the IAC calculation, so once calculated, will equal the existing MDE field "EQU_IMP_ACR". This field is added as a way to re-calculate the IAC, and ensure values align with the MDE field.

This process could also be done in Excel after exporting the AltBMPLine feature class (the calculation of IAC in Excel is not described within this document).

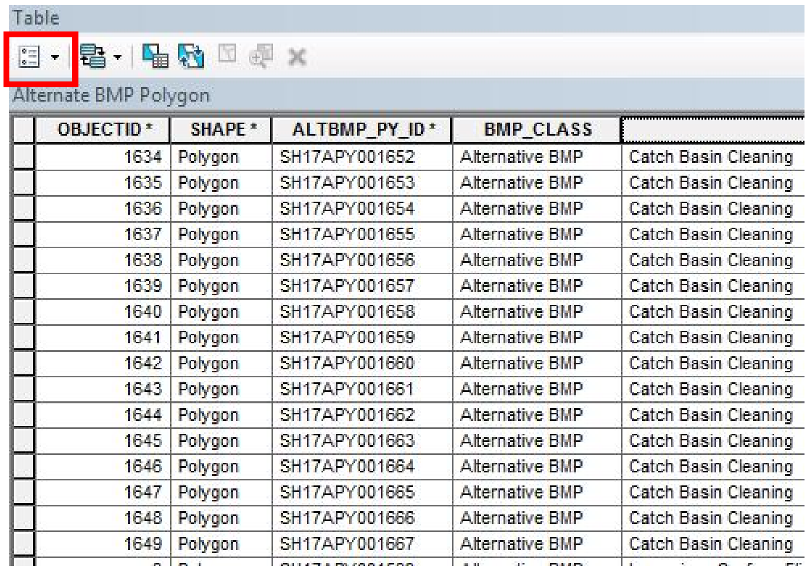
In FY18, MDOT SHA street sweeping contractors used Mechanical Street Sweepers instead of the Vacuum Street Sweepers used in FY 17. This changes the Impervious Acres Equivalent factor to 0.07

from 0.13. Although the factor has change each shop either hit or went above the target street sweeping miles therefore the credit acres remains the same at 33 acres for FY18.

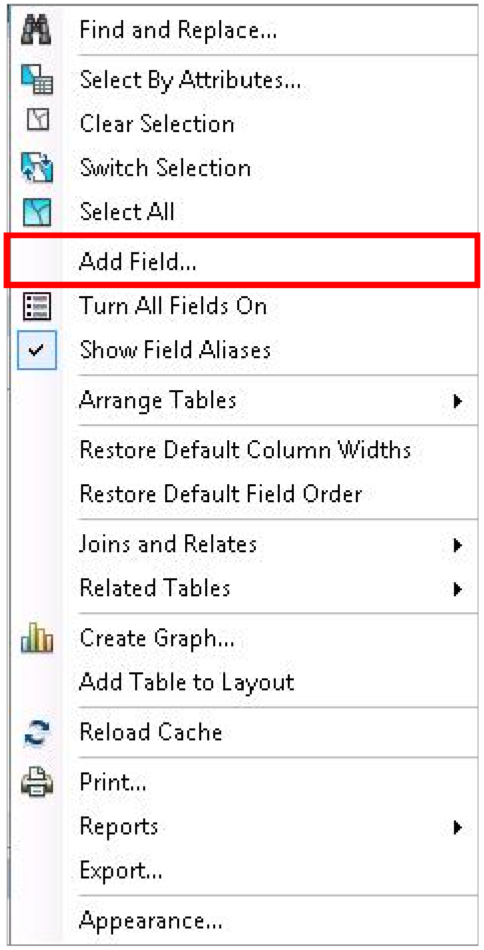
Street sweeping is an ongoing annual operational requirement

8.1.1 Add New IAC Field

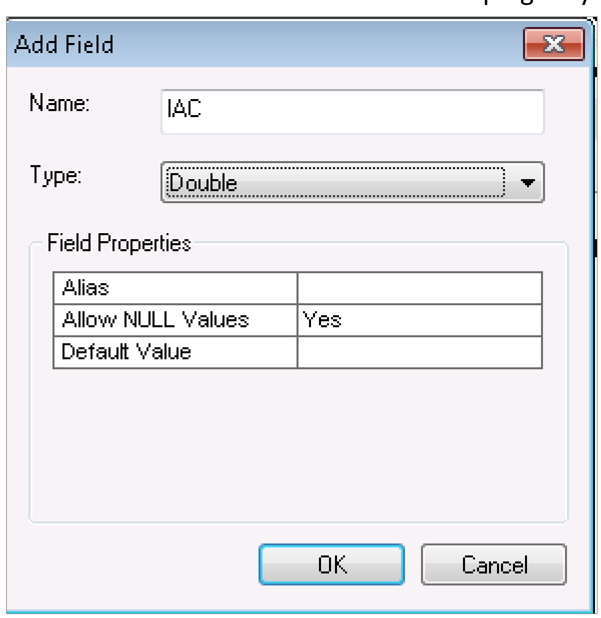
Within the AltBMPLine attribute table, click the Table Options button, and select “Add Field…”



OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS	
1634	Polygon	SH17APY001652	Alternative BMP	Catch Basin Cleaning
1635	Polygon	SH17APY001653	Alternative BMP	Catch Basin Cleaning
1636	Polygon	SH17APY001654	Alternative BMP	Catch Basin Cleaning
1637	Polygon	SH17APY001655	Alternative BMP	Catch Basin Cleaning
1638	Polygon	SH17APY001656	Alternative BMP	Catch Basin Cleaning
1639	Polygon	SH17APY001657	Alternative BMP	Catch Basin Cleaning
1640	Polygon	SH17APY001658	Alternative BMP	Catch Basin Cleaning
1641	Polygon	SH17APY001659	Alternative BMP	Catch Basin Cleaning
1642	Polygon	SH17APY001660	Alternative BMP	Catch Basin Cleaning
1643	Polygon	SH17APY001661	Alternative BMP	Catch Basin Cleaning
1644	Polygon	SH17APY001662	Alternative BMP	Catch Basin Cleaning
1645	Polygon	SH17APY001663	Alternative BMP	Catch Basin Cleaning
1646	Polygon	SH17APY001664	Alternative BMP	Catch Basin Cleaning
1647	Polygon	SH17APY001665	Alternative BMP	Catch Basin Cleaning
1648	Polygon	SH17APY001666	Alternative BMP	Catch Basin Cleaning
1649	Polygon	SH17APY001667	Alternative BMP	Catch Basin Cleaning



- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK". This field may already have been created in a previous step. It can be re-used to calculate the IAC street sweeping only.

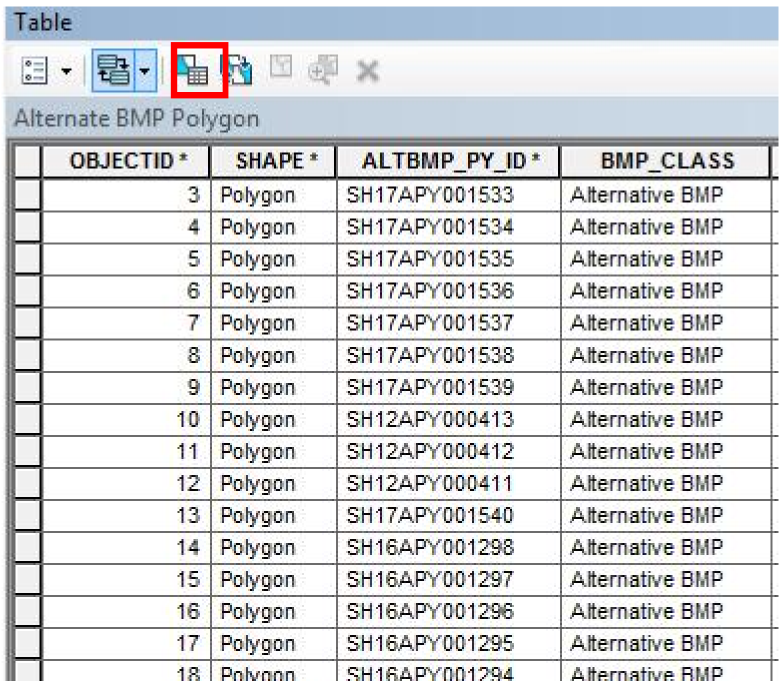


8.1.2 Calculate IAC

.

Because multiple strategies exist within the AltBMPPoly feature class, select the targeted strategy prior to obtain the sum of IAC.

7 Within the AltBMPPoly attribute table, click the Select by Attributes button.



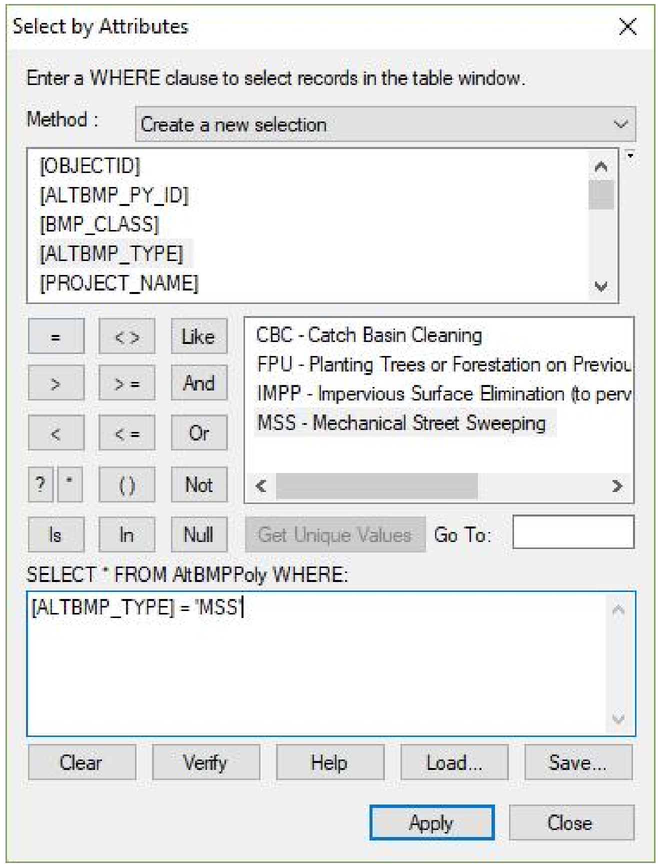
Table

Alternate BMP Polygon

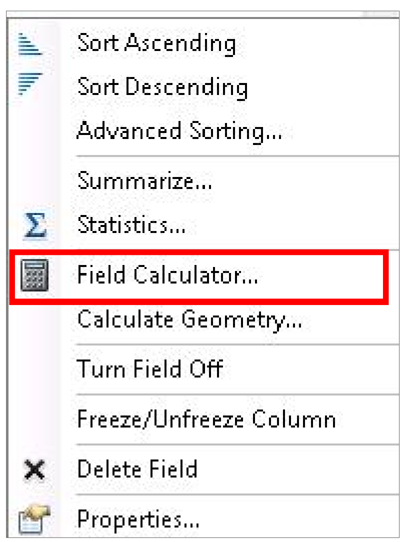
OBJECTID *	SHAPE *	ALTBMP_PY_ID *	BMP_CLASS
3	Polygon	SH17APY001533	Alternative BMP
4	Polygon	SH17APY001534	Alternative BMP
5	Polygon	SH17APY001535	Alternative BMP
6	Polygon	SH17APY001536	Alternative BMP
7	Polygon	SH17APY001537	Alternative BMP
8	Polygon	SH17APY001538	Alternative BMP
9	Polygon	SH17APY001539	Alternative BMP
10	Polygon	SH12APY000413	Alternative BMP
11	Polygon	SH12APY000412	Alternative BMP
12	Polygon	SH12APY000411	Alternative BMP
13	Polygon	SH17APY001540	Alternative BMP
14	Polygon	SH16APY001298	Alternative BMP
15	Polygon	SH16APY001297	Alternative BMP
16	Polygon	SH16APY001296	Alternative BMP
17	Polygon	SH16APY001295	Alternative BMP
18	Polygon	SH16APY001294	Alternative BMP

8 Within the Select by Attributes dialog window, enter the following selection statement and click "Apply":

[ALTBMP_TYPE] = 'MSS'



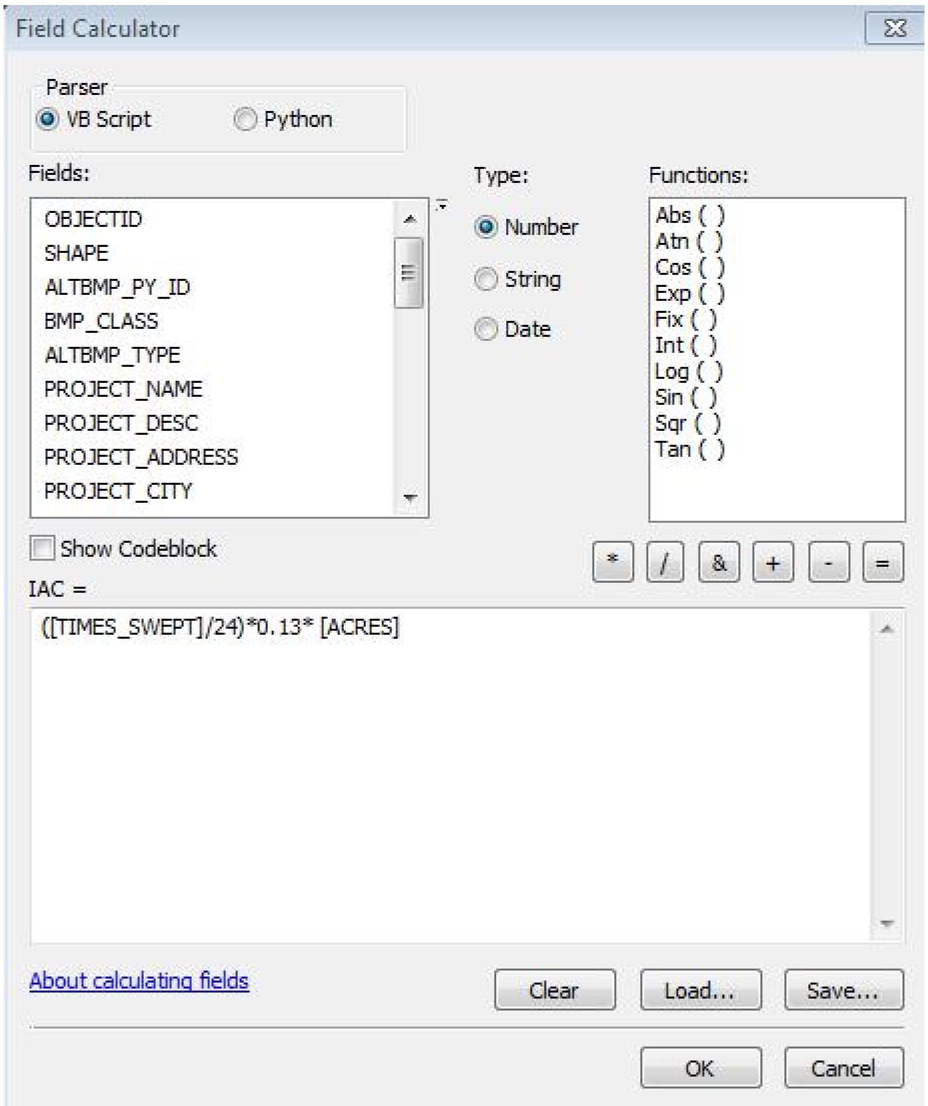
- Right click on the new IAC field, and select “Field Calculator…”



- Within the Field Calculator dialog window, enter the following calculation and click “OK”:

([TIMES_SWEPT]/24)*0.07* [ACRES]

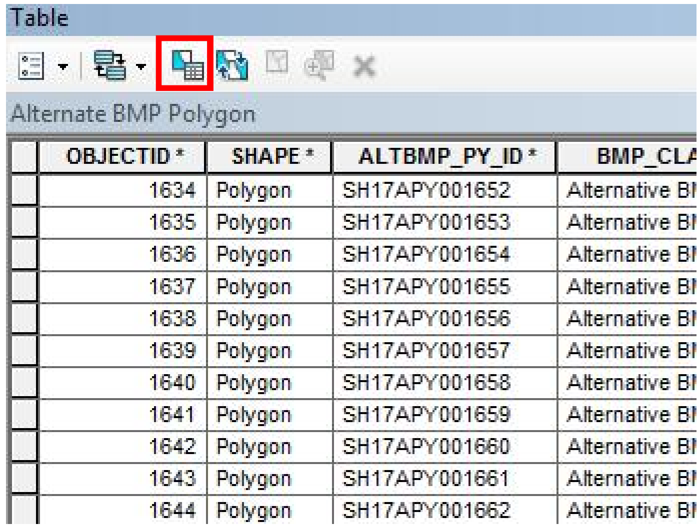
This formula represents includes the number of biweekly sweepings, the acres swept, and factors these by the Impervious Acre Equivalent factor of 0.07. This strategy is also rounded slightly to achieve a value of 33 impervious equivalent acres. Refer to Section E in the Annual Report text for an expanded description of the street sweeping program and the capped credit achievement approach for FY18.



8.2 Total Street Sweeping IAC Sum

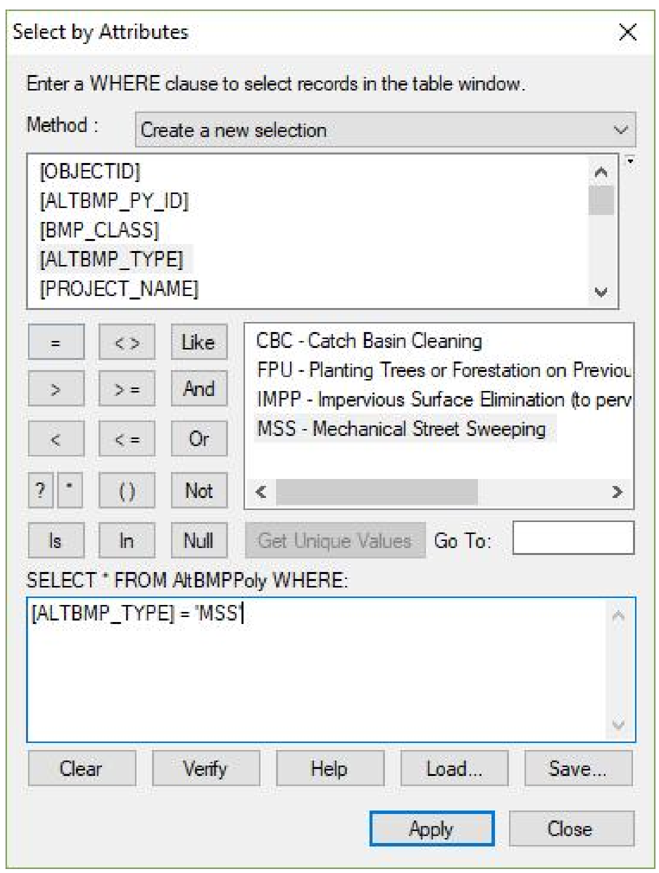
To determine street sweeping restoration IAC, select inlet cleaning, and sum the EQU_IMP_ACR:

Within the AltBMPPoly feature class, click the Select by Attributes tool.

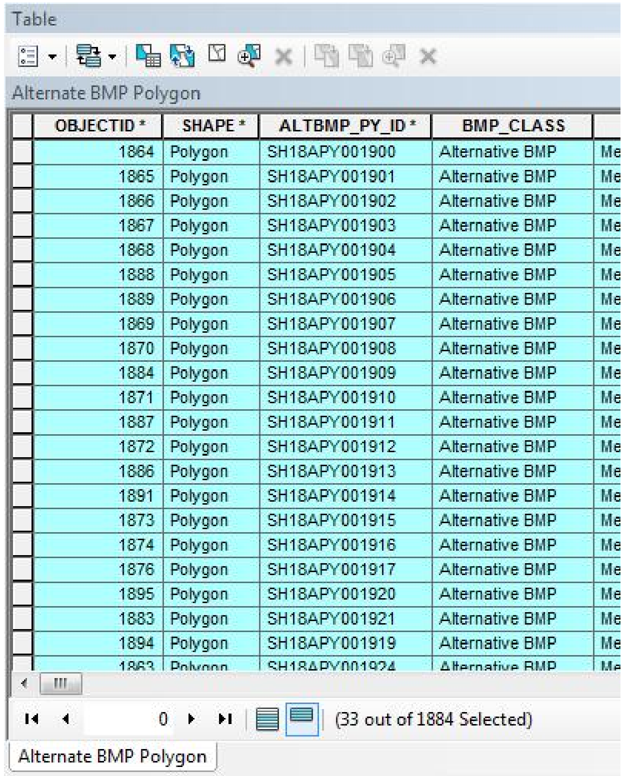


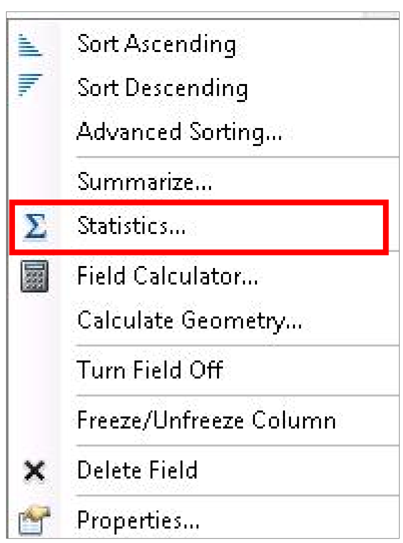
In the statement box, enter the following selection statement and click “Apply”:

[ALTBMP_TYPE] = '
MSS'

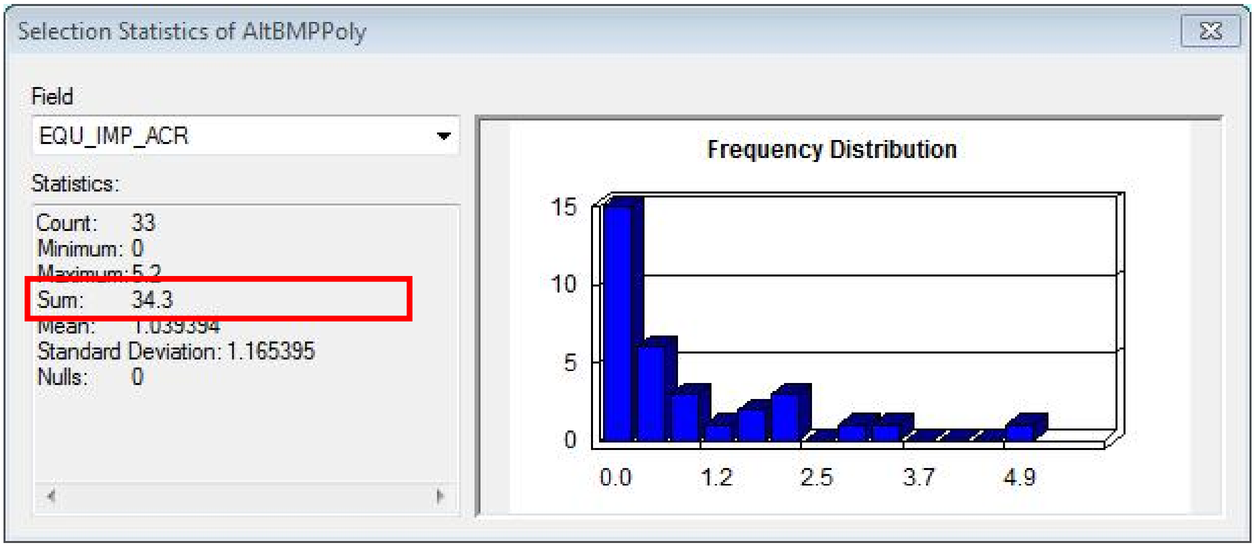


- Ensuring that the selection is retained, right click on the EQV_IMP_ACR, and select “Statistics…”





- View the “Sum” field to view the total restoration treatment credit claimed for street sweeping.



Note: This calculation method generates a slightly different result due to rounding.

The total street sweeping treatment credit 33 acres.

Street sweeping is an ongoing annual operational activity in which SHA achieved a 33 acre credit basis in FY18, complying with the FY17 33 acre basis.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

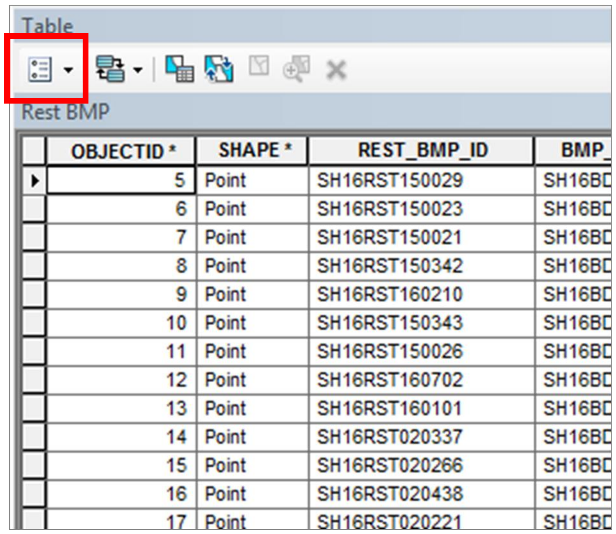
9.0 Redevelopment Credit

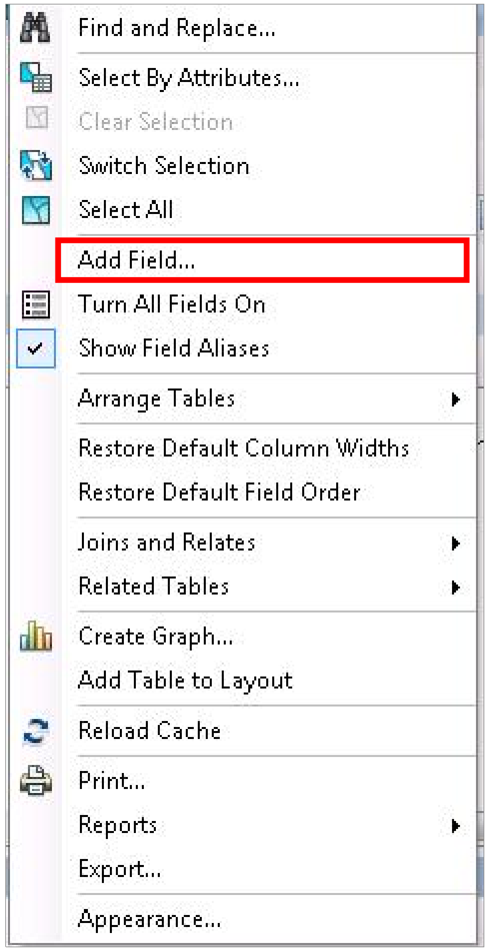
The values for redevelopment projects are contained within the GEN_COMMENTS field. To extract those values the functions below will need to be performed.

9.1 Redevelopment Credit IAC Calculation

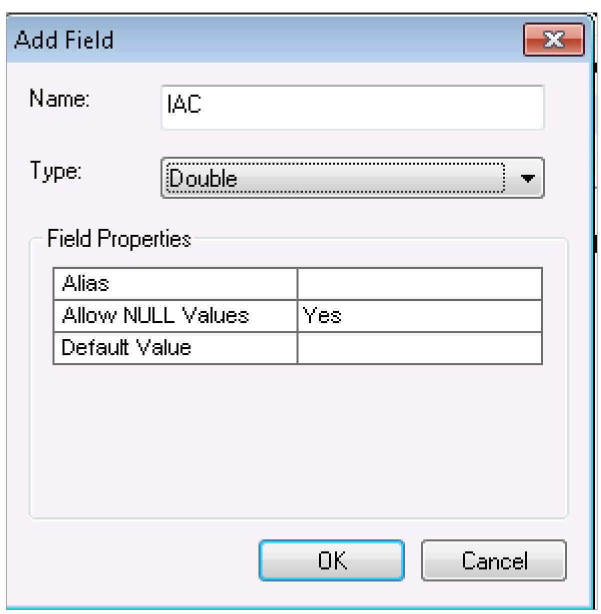
9.1.1 Add New IAC Field

- Within the RestBMP attribute table, click the Table Options button, and select “Add Field…”





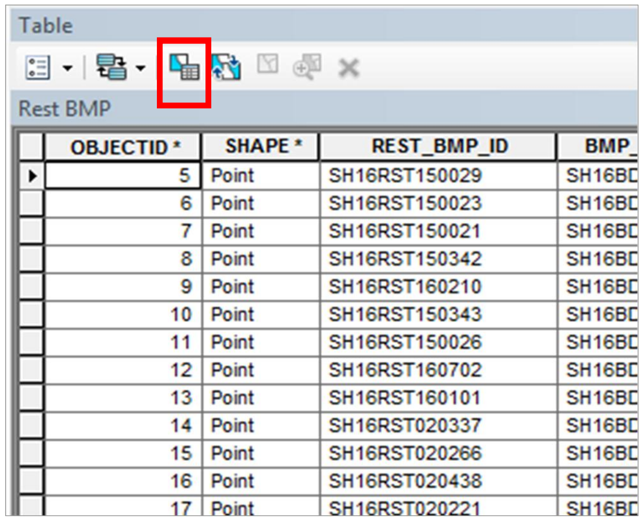
- Within the Add Field dialog window, enter the new field name – "IAC". Set Type = Double. Accept the default Allow Nulls setting. Click "OK".



9.1.2 Calculate IAC

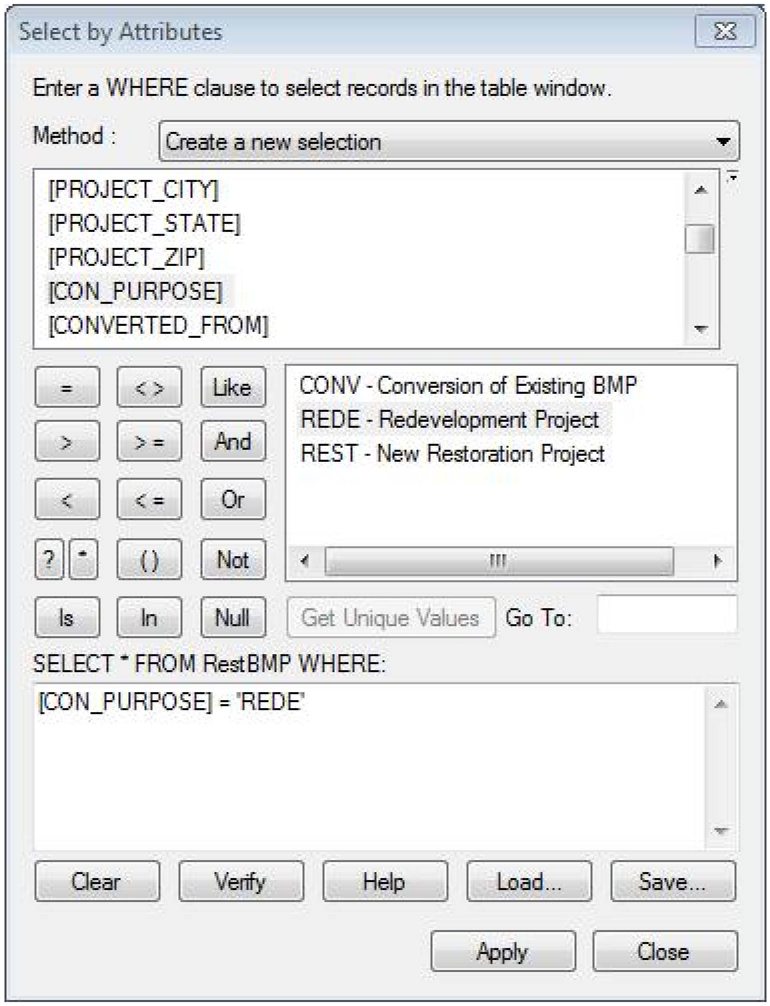
Because multiple strategies exist within the AltBMPPoly feature class, select the targeted strategy prior to obtain the sum of IAC.

- Within the RestBMP attribute table, click the Select by Attributes button.

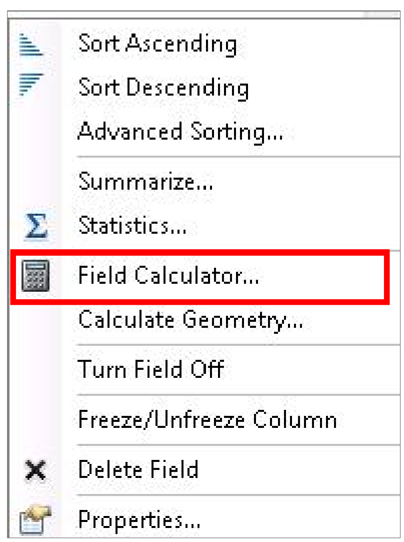


- Within the Select by Attributes dialog window, enter the following selection statement to identify BMPs for redevelopment BMPs, and click “Apply”:

  [CON_PURPOSE] = 'REDE'

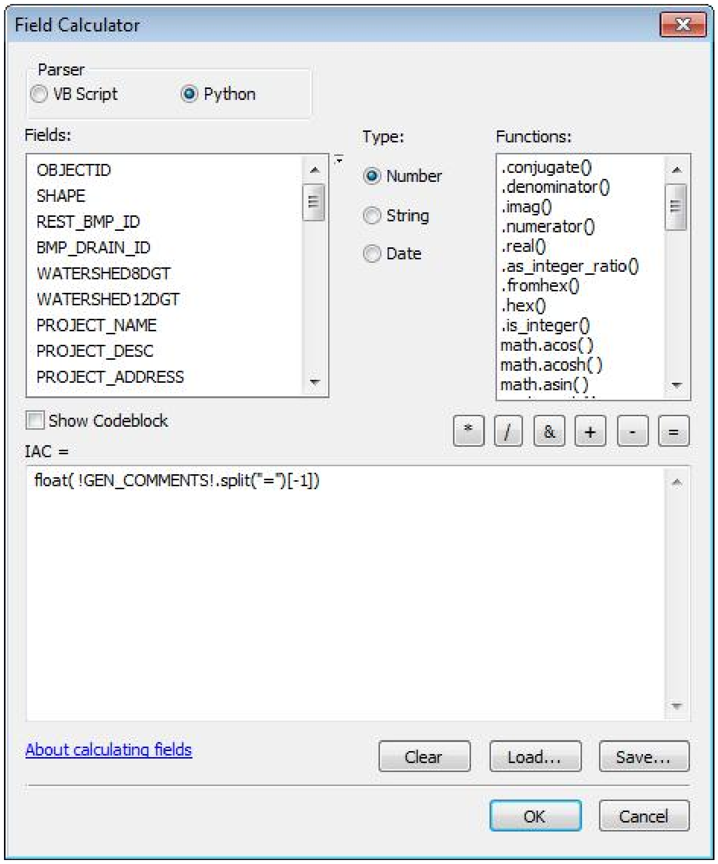

Select by Attributes
Enter a WHERE clause to select records in the table window.
Method :
Create a new selection
[PROJECT_CITY]
[PROJECT_STATE]
[PROJECT_ZIP]
[CON_PURPOSE]
[CONVERTED_FROM]
=
<>
Like
>
>=
And
<
<=
Or
?
*
()
Not
Is
In
Null
CONV - Conversion of Existing BMP
REDE - Redevelopment Project
REST - New Restoration Project
Get Unique Values
Go To:
SELECT * FROM RestBMP WHERE:
[CON_PURPOSE] = 'REDE'
Clear
Verify
Help
Load...
Save...
Apply
Close

Ensuring that the selection is retained, right click on the new IAC field, and select “Field Calculator…”



Within the Field Calculator dialog window, enter the following calculation and click “OK”:
float(!GEN_COMMENTS!.split("=")[-1])

This formula will extract the text acres from the GEN_COMMENTS field and convert it to a number in one step.

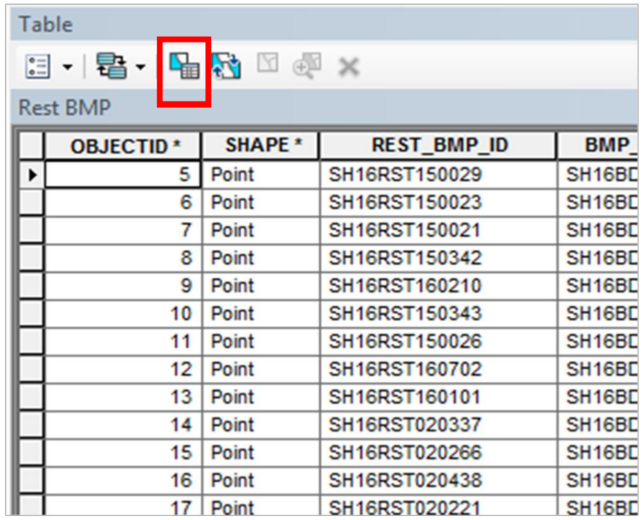


9.1.3 Redevelopment IAC by Fiscal Year

The IAC values for Redevelopment Credit by fiscal year and strategy can be summed using the process below.

9.1.4 Redevelopment IAC for FY 2018

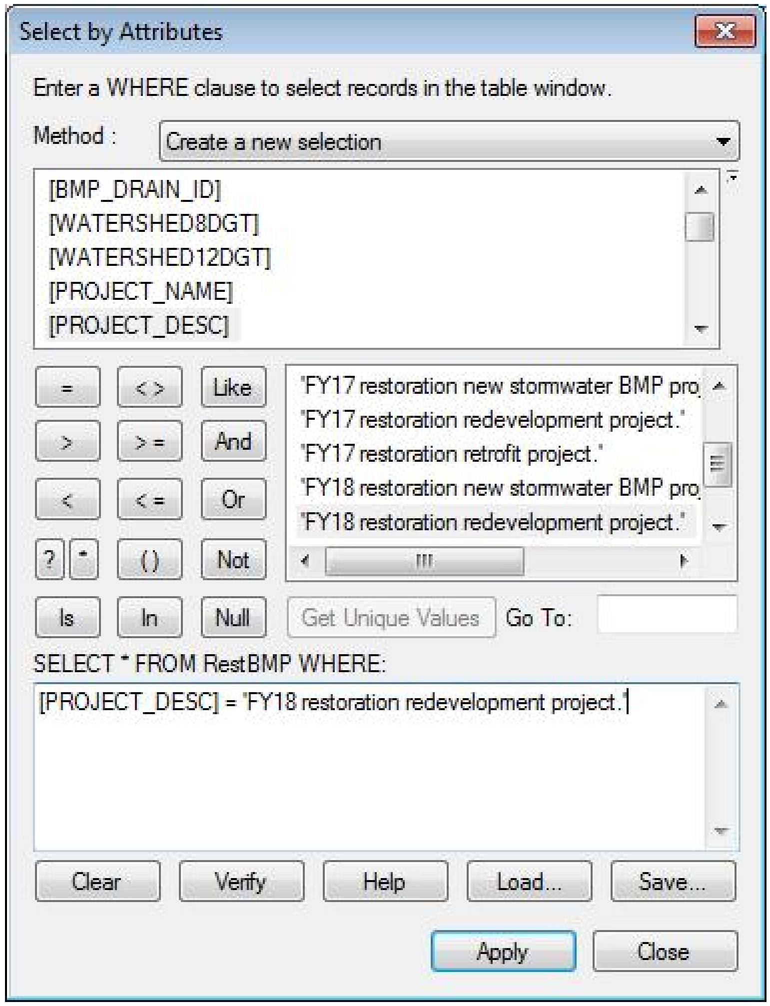
Within the RestBMP attribute table, click the Select by Attributes button.



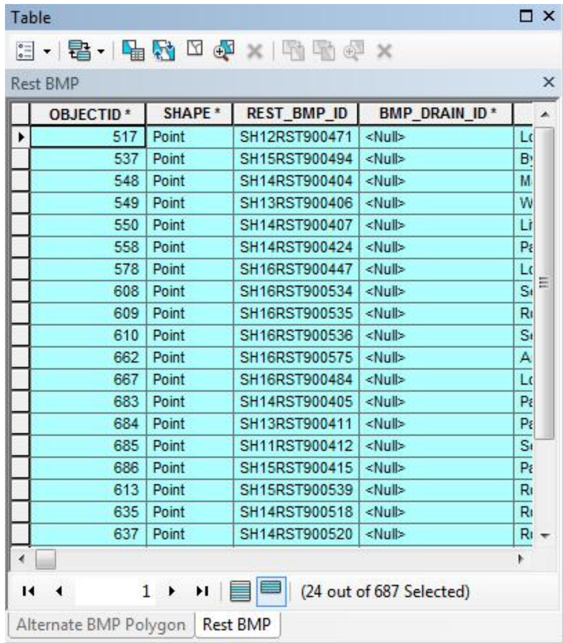
OBJECTID *	SHAPE *	REST_BMP_ID	BMP_
5	Point	SH16RST150029	SH16BD
6	Point	SH16RST150023	SH16BD
7	Point	SH16RST150021	SH16BD
8	Point	SH16RST150342	SH16BD
9	Point	SH16RST160210	SH16BD
10	Point	SH16RST150343	SH16BD
11	Point	SH16RST150026	SH16BD
12	Point	SH16RST160702	SH16BD
13	Point	SH16RST160101	SH16BD
14	Point	SH16RST020337	SH16BD
15	Point	SH16RST020266	SH16BD
16	Point	SH16RST020438	SH16BD
17	Point	SH16RST020221	SH16BD

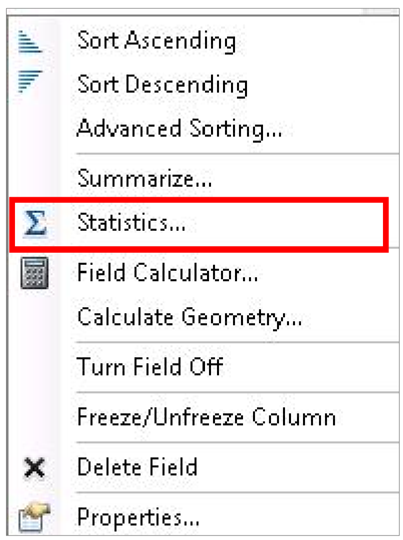
Within the Select by Attributes dialog window, enter the following selection statement to identify Redevelopment BMPs for FY18, and click “Apply”:

[PROJECT_DESC] = 'FY18 restoration redevelopment project.'

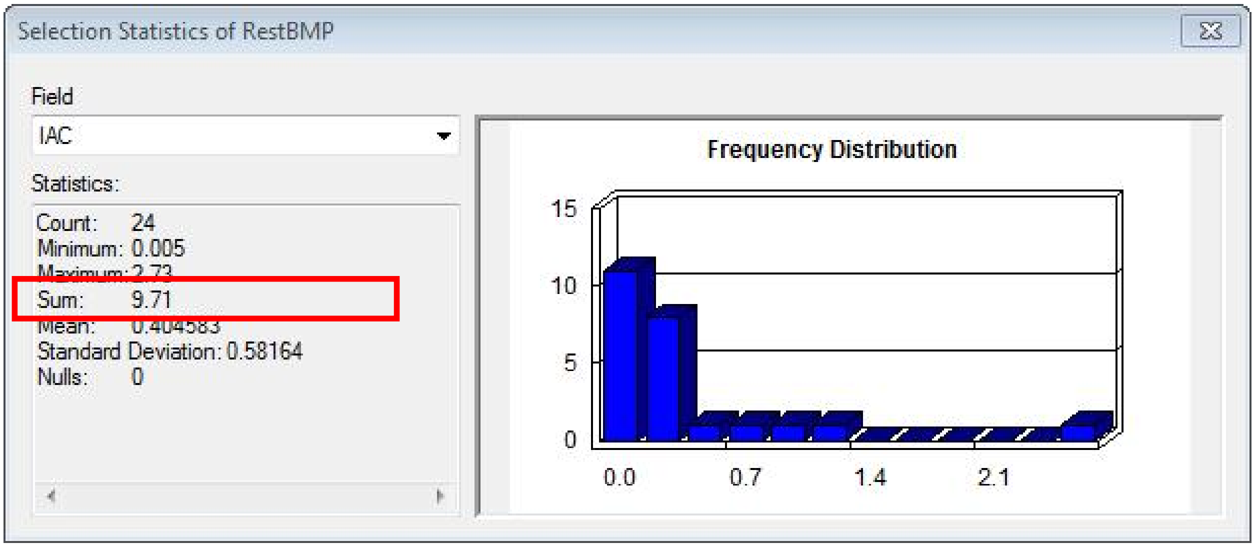


Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”





View the “Sum” field to view the total restoration treatment credit claimed for redevelopment FY18.

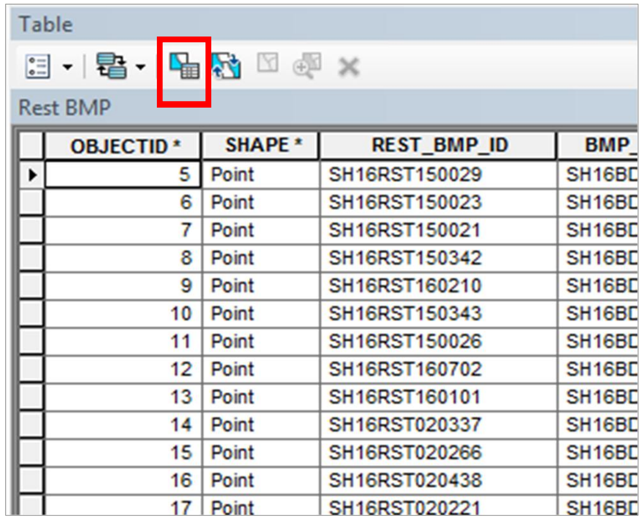


The total restoration redevelopment treatment credit for FY18 is 9.71 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

9.1.5 Redevelopment IAC for FY 2017

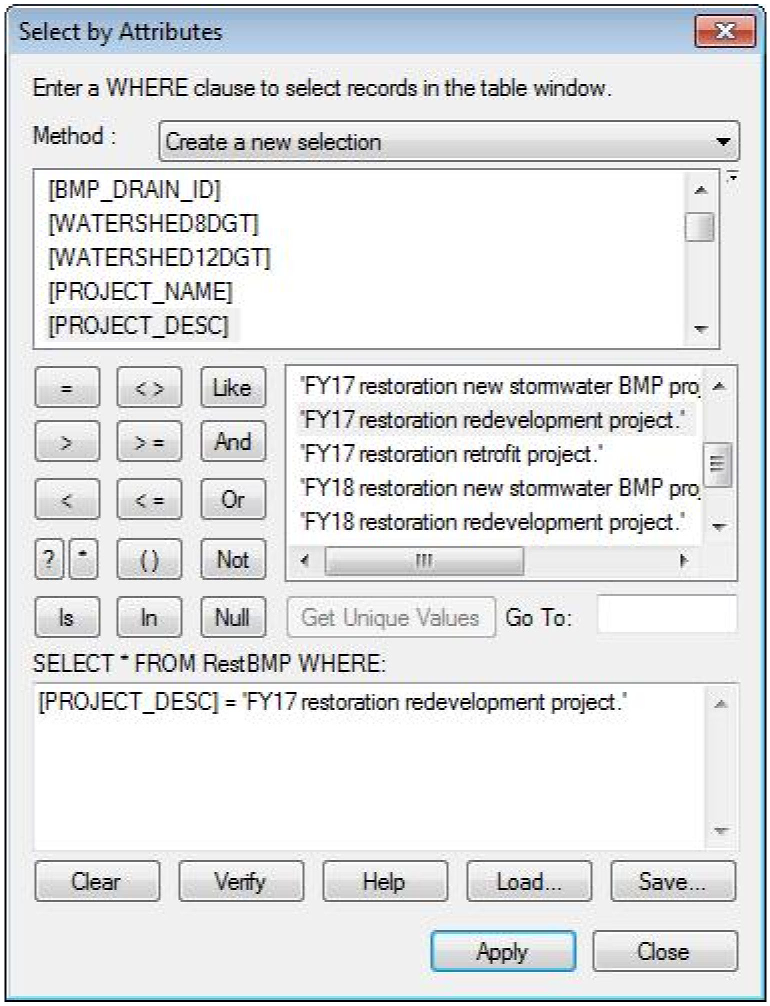
Within the RestBMP attribute table, click the Select by Attributes button.



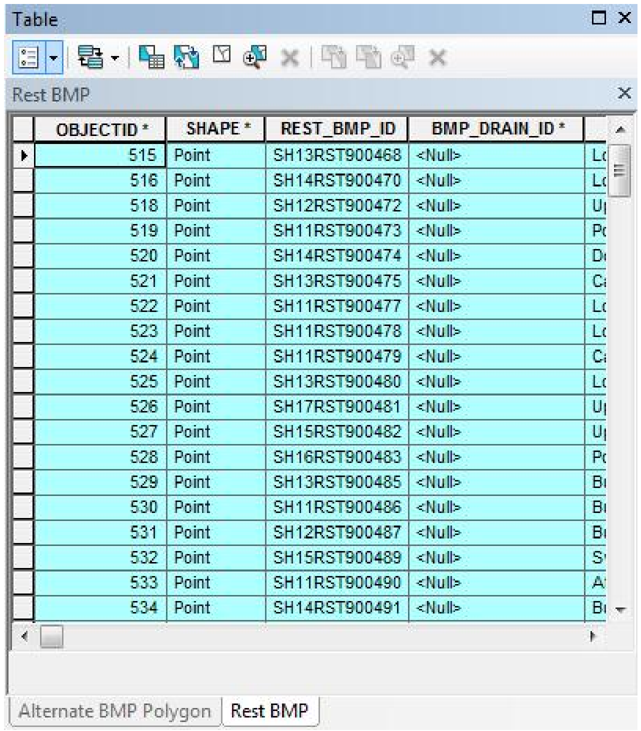
	OBJECTID *	SHAPE *	REST_BMP_ID	BMP_
▸	5	Point	SH16RST150029	SH16BD
	6	Point	SH16RST150023	SH16BD
	7	Point	SH16RST150021	SH16BD
	8	Point	SH16RST150342	SH16BD
	9	Point	SH16RST160210	SH16BD
	10	Point	SH16RST150343	SH16BD
	11	Point	SH16RST150026	SH16BD
	12	Point	SH16RST160702	SH16BD
	13	Point	SH16RST160101	SH16BD
	14	Point	SH16RST020337	SH16BD
	15	Point	SH16RST020266	SH16BD
	16	Point	SH16RST020438	SH16BD
	17	Point	SH16RST020221	SH16BD

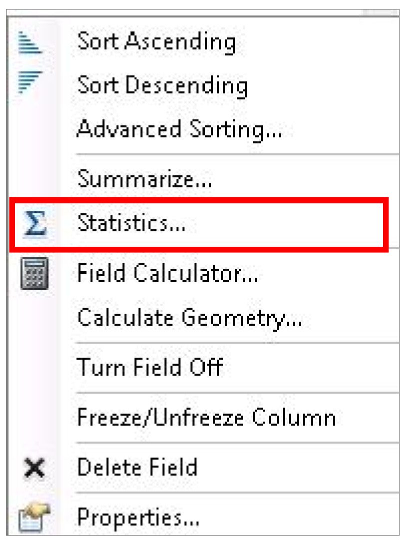
Within the Select by Attributes dialog window, enter the following selection statement to identify Redevelopment BMPs for FY17, and click “Apply”:

[PROJECT_DESC] = 'FY17 restoration redevelopment project.'

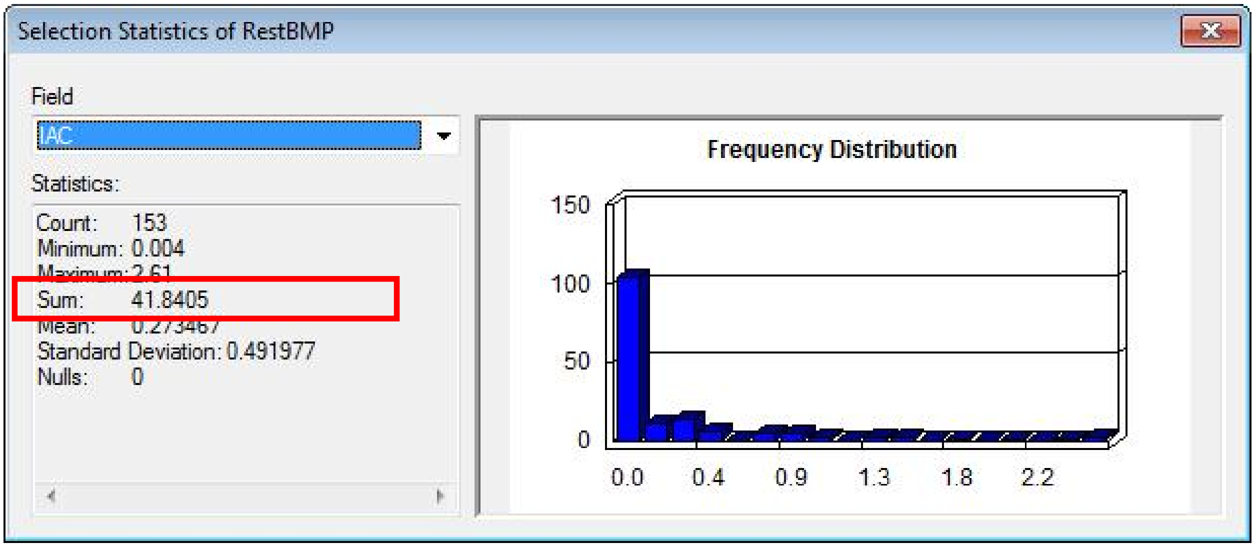


Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”





View the “Sum” field to view the total restoration treatment credit claimed for redevelopment FY17.



The total restoration redevelopment treatment credit for FY17 is 41.85 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

9.1.6 Redevelopment IAC for FY 2016

There are no restoration redevelopment projects for FY 16

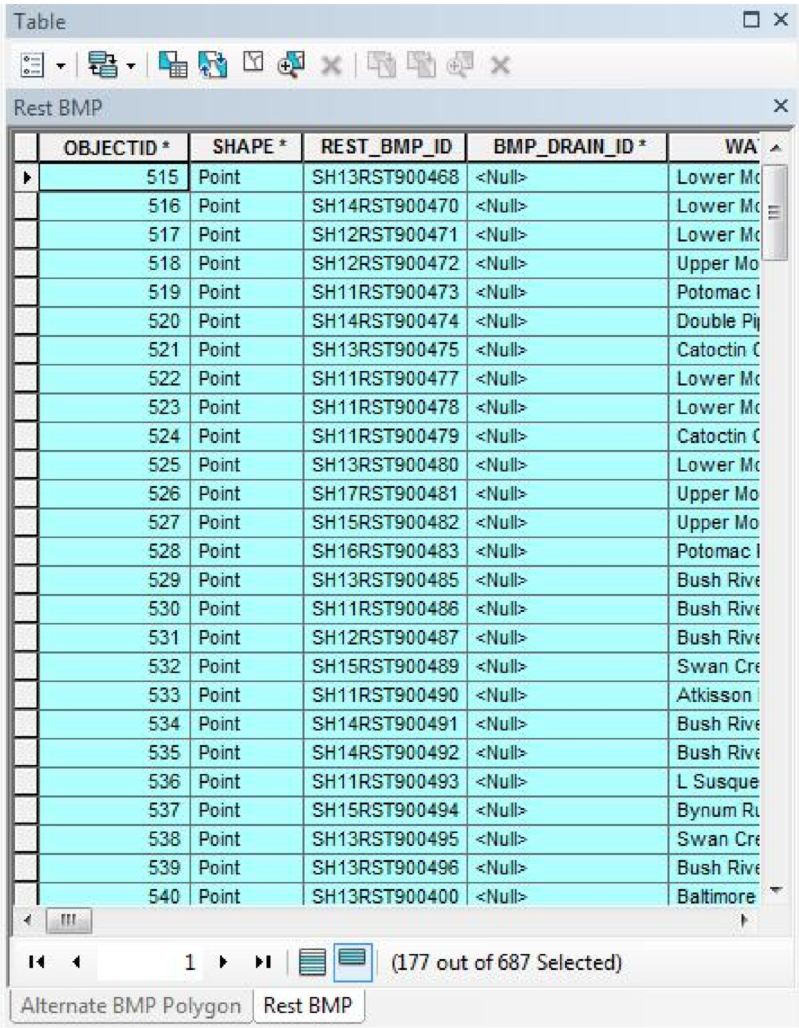
9.1.7 Redevelopment IAC for VBY-2015

There are no restoration redevelopment projects for VBY-2015

9.2 Calculating the Sum

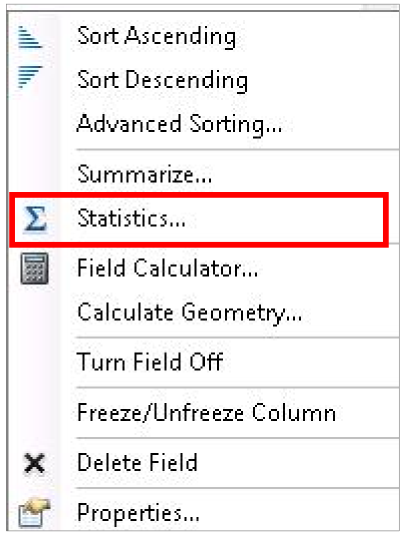
Because multiple strategies exist within the AltBMPLine feature class, select the targeted strategy prior to obtain the sum of IAC.

- Ensuring that the selection is retained, right click on the new IAC field, and select “Statistics…”

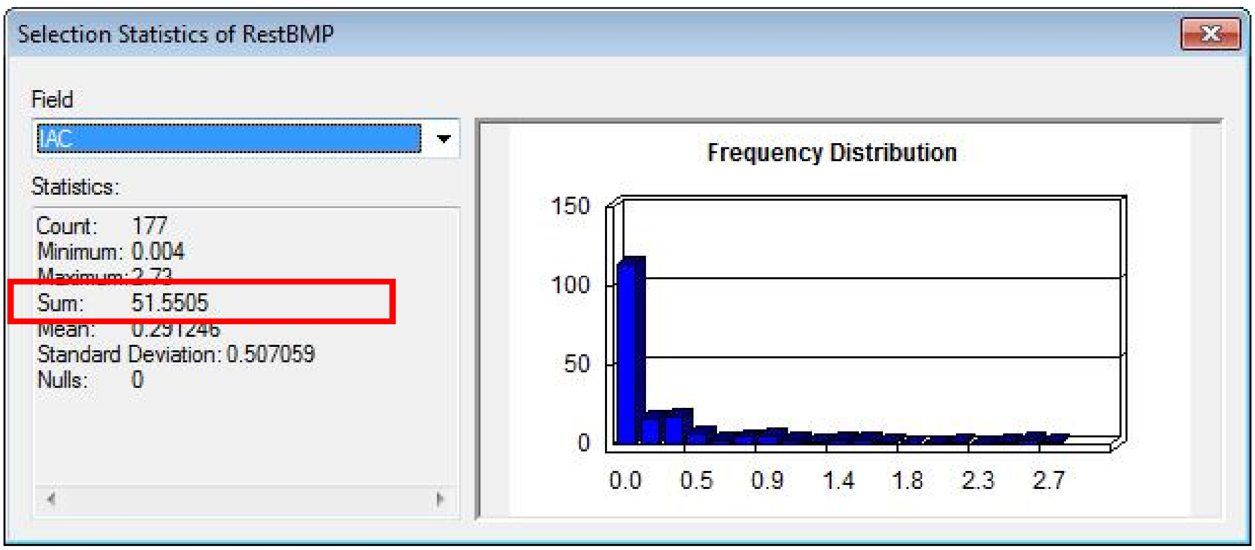


OBJECTID *	SHAPE *	REST_BMP_ID	BMP_DRAIN_ID *	WA
515	Point	SH13RST900468	<Null>	Lower Mc
516	Point	SH14RST900470	<Null>	Lower Mc
517	Point	SH12RST900471	<Null>	Lower Mc
518	Point	SH12RST900472	<Null>	Upper Mo
519	Point	SH11RST900473	<Null>	Potomac I
520	Point	SH14RST900474	<Null>	Double Pi
521	Point	SH13RST900475	<Null>	Catoctin C
522	Point	SH11RST900477	<Null>	Lower Mc
523	Point	SH11RST900478	<Null>	Lower Mc
524	Point	SH11RST900479	<Null>	Catoctin C
525	Point	SH13RST900480	<Null>	Lower Mc
526	Point	SH17RST900481	<Null>	Upper Mo
527	Point	SH15RST900482	<Null>	Upper Mo
528	Point	SH16RST900483	<Null>	Potomac I
529	Point	SH13RST900485	<Null>	Bush Rive
530	Point	SH11RST900486	<Null>	Bush Rive
531	Point	SH12RST900487	<Null>	Bush Rive
532	Point	SH15RST900489	<Null>	Swan Cre
533	Point	SH11RST900490	<Null>	Atkisson
534	Point	SH14RST900491	<Null>	Bush Rive
535	Point	SH14RST900492	<Null>	Bush Rive
536	Point	SH11RST900493	<Null>	L Susque
537	Point	SH15RST900494	<Null>	Bynum Ru
538	Point	SH13RST900495	<Null>	Swan Cre
539	Point	SH13RST900496	<Null>	Bush Rive
540	Point	SH13RST900400	<Null>	Baltimore

- Right click on the new IAC field, and select “Statistics…”



- View the “Sum” field to view the total redevelopment treatment credit claimed.



The total redevelopment treatment credit 51.56 acres.

Strategy	Oct 21, 2010 - 2015 (acres)	2016 (acres)	2017 (acres)	2018 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.85	0.03	2.37
New Stormwater	87.41	53.53	54.73	49.75	245.42
Grass Swales	0.00	9.07	11.60	0.00	20.67
Outfall Stabilization	0.00	7.50	10.89	9.40	27.79
Retrofit	0.00	94.43	4.78	66.03	165.24
Stream Restoration	436.59	138.77	66.61	2.38	644.35
Tree Planting	509.77	65.00	21.32	76.27	672.36
Redevelopment Credit	0.00	0.00	41.85	9.71	51.56
Inlet Cleaning	0.00	0.00	150.00	25	175.00
Street Sweeping	0.00	0.00	33.00	0	33.00
Totals	1,034	368	397	239	2,038

Appendix C

Non-Functioning Restoration BMP Accounting Protocol

Appendix C

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Non-Functioning Restoration BMP Accounting Protocol

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Non-Functioning Restoration BMP Accounting Protocol

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1 INTRODUCTION

This document describes the Maryland Department of Transportation State Highway Administration (MDOT SHA) procedure for handling best management practice (BMP) inspection, maintenance, and repair timeframes relative to Municipal Separate Storm Sewer System (MS4) permit requirements. The MDE (2014) guidance document for wasteload and impervious accounting for the MS4 permit stipulates 3-year inspection and maintenance be provided for all BMPs used for impervious baseline treatment, impervious restoration credit, and TMDL pollutant load reductions. Field inspections provide assessment of BMP function using grades that indicate whether the BMP has passed (A-C) or failed (D-E), but determination of how to proceed with addressing need for maintenance or repairs is not clear. Differing levels of maintenance or repair may result, and timelines associated will vary widely based on the type of failure. A second level of assessment is necessary to make the determination as to the exact type of repairs or maintenance needed, scheduling, work order development and assignments, contracting mechanisms, permitting, and priority. This protocol does not deal with this maintenance and repair assessment process.

The question this protocol answers concerns timelines related to BMPs that are determined to be non-functioning or failing, and managing through that process in a manner to retain the MS4 restoration or pollutant load credits associated with that facility. It is recognized that different timelines are necessary depending upon the type of failure. If MDOT SHA can demonstrate they are adhering to the necessary timeframe for the type of failure; the baseline treatment, restoration credit, or pollutant load reductions will be retained. This protocol focuses on timeframes in the inspection cycle when a facility is determined to be failed, leeway for performing maintenance or repair assessments, and timeframes for completing maintenance or repairs before the MS4 credit will be temporarily or permanently lost.

2 INSPECT AND MAINTAIN

The MDE MS4 Accounting Guidance (MDE, 2014) addresses urban BMP inspections and maintenance in several areas:

> <u>Reporting and Maintenance</u>: *NPDES stormwater permits require that a database be maintained of all stormwater BMPs implemented for new development, redevelopment, and restoration. The urban BMP database structure is outlined in Appendix B. Data for TMDL and impervious acre credits will be noted for each BMP. The database also contains information regarding inspection and maintenance. Regular maintenance shall occur for all BMPs once every 3 years and each jurisdiction shall implement appropriate actions to document that any deficiencies are rectified. Otherwise the credits will be removed until proper performance is verified. Therefore, proper reporting and ongoing BMP inspection and maintenance are essential for compliance with NPDES permit requirements.* (MDE, 2014, page 3 and 18)
>
> *BMPs where plans, design specifications and complete maintenance records are not available are not considered to provide acceptable water quality treatment. Impervious areas draining to these structures must count toward the baseline.* (MDE, 2014, page 7)

A comprehensive BMP inventory is required of all local stormwater programs and shall include updated information on inspection and maintenance activities. (MDE, 2104, page 7)

<u>BMP Maintenance and Verification</u>: All BMPs must be verified, inspected, and maintained according to State stormwater management regulations and CBP reporting and verification procedures. According to Code of Maryland Regulations (COMAR) for stormwater management, preventative maintenance of all ESD and structural stormwater management measures is required to ensure proper function. Regular inspections shall occur once every 3 years and each jurisdiction shall implement appropriate actions and document that any deficiencies are rectified. The BMP database (see Appendix B) will need to specify the last inspection date and whether the facilities have been properly maintained. A 'failed' designation assigned to any BMP indicates that the facility is not functioning as designed. This is described in the BMP Implementation and Restoration Credit section of this document. (MDE. 2014, pages 7-8)

In the 2014 memo to the CBP's Urban Stormwater Workgroup, "Final Recommended Guidance for Verification of Urban Stormwater BMPs," Schueler and Goulet emphasize the need for regular inspection and maintenance. This will ensure that BMPs perform as designed. In order for BMPs to qualify for pollutant removal rates and to take credit toward the Chesapeake Bay TMDL, the information in the BMP Implementation and Restoration Credit section of this document must be provided. (MDE, 2014, page 8)

Successful restoration requires that BMPs function properly to ensure that the expected water quality improvements are achieved. Therefore, BMP inspection and routine maintenance need to be conducted in order for MS4 jurisdictions to claim credit. Further, to receive proper credit toward the Chesapeake Bay TMDL, MDE will need to report BMP data using CBP approved rates, reporting procedures, and BMP verification requirements (Schueler and Goulet, 2014a). Otherwise, the credits will be removed until proper performance is verified. Therefore, BMP inspection, maintenance, and verification are essential for compliance with NPDES permit requirements. MDE will evaluate permit compliance based on the success of implementation and ongoing maintenance and whether these activities are performed to MEP. (MDE, 2014, page 25)

3 Procedure for Non-Functioning BMPs

MDOT SHA uses many practices to meet the MS4 impervious baseline, restoration, and TMDL load reduction requirements of the MS4 permit. Practices can include both operational activities such as inlet cleaning or street sweeping, and built practices included in MDE (2014) such as the ones listed below:

- SW Control Structures,
- SW Control Structure Retrofits,
- Urban Tree Planting (Reforestation on Pervious Urban),
- Stream Restoration,

- Outfall Stabilization,
- Pavement Removal (Impervious Urban to Pervious), and
- Shoreline Management.

All BMPs used for MS4 credit are subject to the 3-year inspection and maintenance requirement. MDOT SHA has undertaken a robust BMP inspection program using qualified stormwater professionals to inspect and document the BMP condition. Grades are used to determine the functional level provided by the BMP which indicates whether the BMP is providing water quality (WQ) treatment. A failing grade indicates that the BMP is not providing WQ treatment. **Table 1** identifies the field inspection grading system used.

Table 1: BMP Field Inspection Grade Definitions

Field Inspections			
Grade	Description	Translation*	Pass/Fail
NR	Not Rated	Functioning	Pass
A	No Issues	Functioning	Pass
B	Minor Condition	Functioning	Pass
C	Moderate Maintenance	Functioning	Pass
D	Major Maintenance	Not Functioning	Fail
E	Failing	Not Functioning	Fail
* 'Not Functioning' means not providing WQ treatment.			

Because there is a maintenance, repair, or remediation timeframe that needs to be factored in when handling BMPs with failed inspection grades, MS4 credit will not be removed from MS4 compliance accounting immediately after a failed grade is determined. BMPs may fail to varying degrees. Some may require major maintenance activities to bring it to acceptable functioning, some may require minor repairs or reconstruction, and some may require complete, structural overhaul. Because the timeframes associated with these degrees also vary, MDOT SHA uses different approaches to determine how the documented WQ treatment is handled. It may be kept in the dataset, or it may need to be temporarily or permanently removed from the dataset and MS4 credit accounting.

Table 2 documents the timeframes and inspection and maintenance assessment scenarios MDOT SHA will use for handling MS4 credit relative to non-functioning inspection grades and scheduled maintenance or repairs performed to return the facility back to acceptable function. There are five different scenarios identified and documented.

Table 2: Inspection Scenarios and Maintenance Assessment/Completion Timeframes

	Field Inspection Grade				
Inspection Scenario	Year 1	Year 3	Year 6	Scheduled Remediation Completion Date	Actual Remediation Completion Date
1	**PASS**– WQ treatment kept in reported data.	**FAIL –** Initial failed rating, WQ treatment kept in reported data. Office maintenance assessment performed before next inspection cycle.	**PASS** – Minor remediation or major maintenance needed and performed within 3-year timeframe. WQ treatment kept in reported data.		
2	**PASS**– WQ treatment kept in reported data.	**FAIL** -- Initial failed rating, WQ treatment kept in reported data. Office maintenance assessment performed before next inspection cycle.	**FAIL** -- Major remediation needed. Remediation schedule provided to MDE, WQ treatment kept in reported data.	**PASS** – WQ treatment kept in reported data.	
3	**PASS**– WQ treatment kept in reported data.	**FAIL** -- Initial failed rating, WQ treatment kept in reported data. Office maintenance assessment performed before next inspection cycle.	**FAIL** -- Major remediation needed. Remediation schedule provided to MDE, WQ treatment kept in reported data.	**FAIL** – WQ treatment temporarily removed from reported MS4 credit.	**PASS** – WQ treatment added back into reported data and reported MS4 credit.
4	**PASS**– WQ treatment kept in reported data.	**PASS**– Office maintenance assessment determines that the facility is not providing WQ functions and should be considered failed.	**FAIL –** Grade changed during office maintenance assessment. Maintenance or remediation schedule provided to MDE, WQ treatment kept in reported data.	**PASS** – WQ treatment kept in reported data.	

	Field Inspection Grade				
Inspection Scenario	Year 1	Year 3	Year 6	Scheduled Remediation Completion Date	Actual Remediation Completion Date
5	**PASS**– WQ treatment kept in reported data.	**FAIL --** Initial failed rating, WQ treatment kept in reported data. Office maintenance assessment performed before next inspection cycle.	**FAIL** – Due to various considerations, facility determined to be abandoned. WQ treatment permanently removed from reported MS4 credit.		

4 References

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Maryland Department of the Environment (MDE, 2015). *NPDES MS4 Phase I Permit for Maryland State Highway Administration*. MDE, Baltimore, MD, October 9, 2015. Retrieved from http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Documents/SHA%20Final%20Permit%20complete%2010_9_2015.pdf

Appendix D

Analysis of Impervious Restoration Credit Variance

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Appendix D

Analysis of Impervious Restoration Credit Variance

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Analysis of Impervious Restoration Credit Variance

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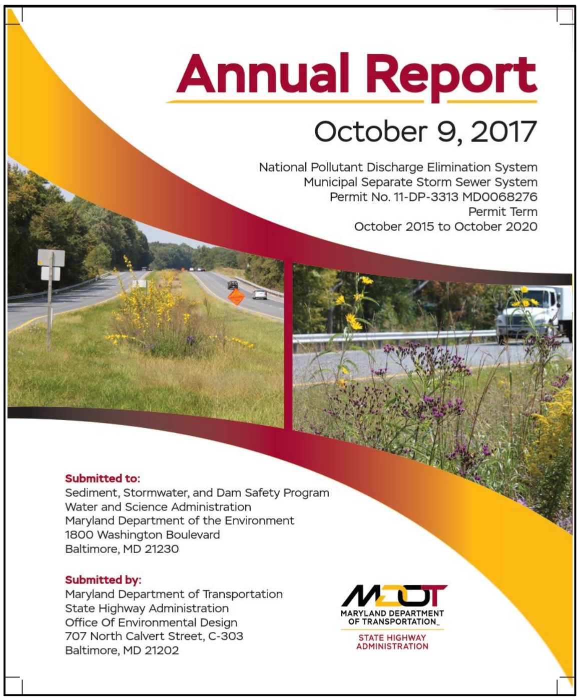

Annual Report

October 9, 2017

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System
Permit No. 11-DP-3313 MD0068276
Permit Term
October 2015 to October 2020

Submitted to:
Sediment, Stormwater, and Dam Safety Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Submitted by:
Maryland Department of Transportation
State Highway Administration
Office Of Environmental Design
707 North Calvert Street, C-303
Baltimore, MD 21202

MARYLAND DEPARTMENT OF TRANSPORTATION
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Annual Report

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1 INTRODUCTION

This document explains the Maryland Department of Transportation State Highway Administration (MDOT SHA) variances between impervious restoration credit claimed between the published versions of the 2017 and 2018 Annual Reports. In order to document variations in credit, MDOT SHA has summarized the credit changes between the two reporting years.

2 2017 IMPERVIOUS RESTORATION CREDIT BY BMP

On October 9, 2017, MDOT SHA published the 2017 Annual Report. Within this 2017 document, Table 1-27 summarized the impervious restoration credit accomplishment through FY17. This table is provided below for reference as Exhibit A. Over the last year, MDOT SHA has documented several reasons that credit has varied causing previously reported credit acreage values to change in the 2018 Annual Report.

Exhibit A: 2017 Annual Report Impervious Restoration Credit

Table 1-27: Impervious Restoration Credit by BMP Type for Timeframe between Baseline Year through FY17*

BMP Type	Baseline Year - 2015 (acres)	2016 (acres)	2017 (acres)	Total (acres)
Impervious Surface Elimination (to Pervious)	0.49	0.00	1.89	2.38
New Stormwater Control Structures	87.41	53.53	54.77	195.71
Grass Swales	0.00	9.07	11.60	20.67
Outfall Stabilization	0.00	2.00	16.25	18.25
Retrofit Existing Stormwater Control Structures	0.00	94.43	4.78	99.21
Stream Restoration	444.04	137.24	67.00	648.28
Tree Planting	598.27	66.65	22.09	687.01
Redevelopment Credit	0.00	0.00	81.00	81.00
Inlet Cleaning	0.00	0.00	150.00	150.00
Street Sweeping	0.00	0.00	33.00	33.00
Totals	**1,130**	**363**	**442**	**1,936**
20% Restoration Target				**4,709**
% Impervious Restoration				**8.2%**
% Progress Towards Restoration Goal				**41.1%**
**See Table 1-25 for variable baseline years by MS4 County.*				

The following sections include detailed discussion of the variance between the current 2018 impervious area restoration credit presented in this FY18 annual report (Section E.4.a - Table 1-27) and past annual reports.

3 Variance Summary – 2015 and Earlier Reporting Period

When comparing the reported numbers between the 2017 and 2018 Annual Reports for the reporting period of October 21, 2010 through 2015, the variances are detailed in **Table 3-1**.

Table 3-1

BMP Type	2017 Annual Report Oct 21, 2010 - 2015 (acres)	2018 Annual Report Oct 21, 2010 - 2015 (acres)	Variance	Description
Impervious Surface Elimination (to Pervious)	0.49	0.49	0.00	
New Stormwater Control Structures	87.41	87.41	0.00	
Grass Swales	0.00	0.00	0.00	
Outfall Stabilization	0.00	0.00	0.00	
Retrofit Existing Stormwater Control Structures	0.00	0.00	0.00	
Stream Restoration	444.04	436.59	-7.45	Two streams originally claimed as restoration were moved to baseline as they fell between 2005 - 2010. Details include: 2008 Milestone, moved to baseline. Stream STRU ID 030005UR: 275 LFR, 2.75 IAC 2007 Milestone, moved to baseline. Stream STRU ID 100004UR: 470 LFR, 4.70 IAC
Tree Planting	598.27	509.77	-88.50	Approx. 125 acres of Tree planting sites claimed as restoration were moved back into baseline as they fell between 2005 - 2010. In addition, 37 acres of replanting sites requiring maintenance and not originally claimed were added to our restoration total for a total variance of 88 acres.
Redevelopment Credit	0.00	0.00	0.00	
Inlet Cleaning	0.00	0.00	0.00	
Street Sweeping	0.00	0.00	0.00	
Totals	**1,130**	**1,034**	**-96**	

4 VARIANCE SUMMARY – 2016 REPORTING PERIOD

When comparing the reported numbers for between the 2017 and 2018 Annual Reports for the 2016 reporting period, the variances are detailed in **Table 4-1**.

Table 4-1

BMP Type	2017 Annual Report 2016 (acres)	2018 Annual Report 2016 (acres)	Variance	Description
Impervious Surface Elimination (to Pervious)	0.00	0.00	0.00	
New Stormwater Control Structures	53.53	53.53	0.00	
Grass Swales	9.07	9.07	0.00	
Outfall Stabilization	2.00	7.50	5.50	Original reported credit based on 200LF estimate (2AC), while 2018 has provided as-built credit results using alternative protocol.
Retrofit Existing Stormwater Control Structures	94.43	94.43	0.00	
Stream Restoration	137.24	138.77	1.53	Credit adjustments made based on as built information. Site 150009UR was updated from 30.03 to 32.92. Site 020003UR was updated from 23.00 to 24.14. Site 020004UR was updated from 2.50 to 0.00. The site was constructed, but credit is applied to the outfall portion of the project
Tree Planting	66.65	65.00	-1.65	Sites that were previously reported in 2017 were removed from reporting in 2018. These sites were deactivated due to being no longer maintained for credit.
Redevelopment Credit	0.00	0.00	0.00	
Inlet Cleaning	0.00	0.00	0.00	
Street Sweeping	0.00	0.00	0.00	
Totals	**363**	**368**	**5**	

5 Variance Summary – 2017 Reporting Period

When comparing the reported numbers for between the 2017 and 2018 Annual Reports for the 2017 reporting period, the variances are detailed in **Table 5-1**.

Table 5-1

BMP Type	2017 Annual Report 2017 (acres)	2018 Annual Report 2017 (acres)	Variance	Description
Impervious Surface Elimination (to Pervious)	1.89	1.85	-0.04	Site 030102UI was updated from .17 IAC to .13 IAC based on as-built information
New Stormwater Control Structures	54.77	54.73	-0.04	Credit adjustment due to as-built information, reduction of .04AC
Grass Swales	11.60	11.60	0.00	
Outfall Stabilization	16.25	10.89	-5.36	Credit for seven BMPs (160005UO, 160029UO, 160001UO, 160007UO, 160006UO, 160004UO) were adjusted to use the alternative protocol (net increase of .14AC), and two sites were removed and should not have been reported (160002UO and 160009UR for a decrease of 5.5AC)
Retrofit Existing Stormwater Control Structures	4.78	4.78	0.00	
Stream Restoration	67.00	66.61	-0.39	Two site credit adjustments based on as built information. Site 150003UR went from 32.0 to 33.06, site 150004UR went from 32 to 30.55 for a total decrease of .39AC
Tree Planting	22.09	21.32	-0.77	Two sites (160176UT, 020025UT) adjusted to decrease credit by 1.12AC, moved site to 2016 for proper reporting (020393UT) adjusted decrease of .16AC, and identified three missing sites that were to be reported in 2017 (020390UT, 060279UT, 060280UT) for an increase of .5AC
Redevelopment Credit	81.00	41.85	-39.15	Adjusted redevelopment project credit to remove credit prior to October 10, 2010 and push into baseline credit or adjusted into restoration for 2018.
Inlet Cleaning	150.00	150.00	0.00	
Street Sweeping	33.00	33.00	0.00	
Totals	**442**	**397**	**-46**	

Appendix E

Redevelopment Project Credit Accounting Methodology

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Redevelopment Project Credit Accounting Methodology

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Redevelopment Project Credit Accounting Methodology

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1 INTRODUCTION

This document explains the Maryland Department of Transportation State Highway Administration (MDOT SHA) methodology for determining the baseline treatment and restoration credit accounting for redevelopment projects used to meet the NPDES MS4 permit impervious restoration condition. MDOT SHA has conducted research of projects requiring a stormwater management (SWM) permit dating back to 2001, when MDE redevelopment guidelines were implemented. Per the MDE *Accounting for Stormwater Wasteload Allocation and Impervious Acres Treated* (August 2014), "Any project that meets or exceeds the regulatory requirements for redevelopment may be used to claim credit toward impervious acre treatment requirements and pollutant reductions." MDOT SHA has researched water quality summary sheets (WQSS), permit approval letters, permit databases, water quality bank reconciliation documents, as-builts, and SWM reports within the MDOT SHA files. Additionally, MDOT SHA, in cooperation with the MDE Sediment & Stormwater Plan Review Division, has researched documents within the MDE Plan Review files. The data recovered from these documents is compiled in a master accounting workbook and assessed for potential MS4 redevelopment project credit. *It is important to understand that the baseline treatment and restoration credits are project-based, not BMP specific.* This document outlines the accounting methodology for redevelopment project credit.

2 MDE AND MDOT SHA AGREEMENTS AND GUIDELINES FOR ACCOUNTING

On December 18, 2015 MDOT SHA WPD and PRD representatives met with representatives of MDE Programs Division and MDE Plan Review Division to discuss the methodology MDOT SHA developed for redevelopment project credit accounting. Following this meeting, MDOT SHA prepared and distributed to MDE a draft meeting summary memo outlining the items discussed and the resolutions agreed upon by all parties. On March 15, 2016, MDOT SHA prepared and delivered the final meeting summary memo, included in Appendix A of this document, to MDE. This memo stated that MDOT SHA's accounting methodology is acceptable to MDE and the full accounting of redevelopment projects could begin.

Key agreements made between MDE and MDOT SHA regarding the redevelopment project credit accounting include:

1. MDOT SHA projects may typically be defined as redevelopment projects.
2. Water quality bank and TMDL redevelopment project crediting are to be accounted for and maintained separately, however redevelopment project crediting for water quality bank *debits* is acceptable to MDE and not considered "double dipping". MDOT SHA will not include water quality bank *credits* in the redevelopment project credits.
3. MDOT SHA projects/POIs classified as "new development" can include reconstruction that may be credited toward MS4 redevelopment.
4. The net change in impervious (ΔAi) shows the new impervious portion, which is not credited toward MS4 redevelopment.
5. The cutoff for the baseline treatment/restoration crediting is October 21, 2010.

Accounting for redevelopment project credit consists of two main categories: baseline treatment and restoration credit. MDOT SHA, as agreed upon with MDE, has set the date of October 21, 2010 as the division between the baseline treatment and restoration credit. All redevelopment projects completed PRIOR to October 21, 2010 are attributed to baseline treatment. All redevelopment projects completed ON or AFTER October 21, 2010 are attributed to restoration credit. The October 21, 2010 and beyond was mutually agreed upon by MDE and MDOT SHA for restoration credit since this was the origination date of the previous permit term.

Redevelopment includes both existing impervious area reconstruction and existing impervious area removal. As requested by MDE, the accounting methodology breaks the redevelopment project credit accounting in to these two categories, which are described in detail below:

- *Reconstruction:* This is the existing impervious area within the project limit of disturbance (LOD) that will be removed and replaced in proposed conditions and may be found in typical WQSS as column E. Depending on the SWM regulations in effect at the time of the project, redevelopment was required to be treated at a rate of 20% or 50% of the reconstructed impervious area. In addition to compiling the project information from the WQSS researched, the appropriate percent rate used for the project at the time of approval is determined and recorded. This percent rate, when applied to the available reconstruction quantity, results in the amount of reconstruction redevelopment project credit.

- *Impervious Area Reduction:* This is the net decrease in impervious area within the project LOD. This value is not readily available on typical WQSS and therefore is developed from the WQSS data. The typical WQSS provides the pre-development impervious area and post-development impervious area. However, the values provided in these columns may or may not be areas within the LOD of the project. Often these values are for the overall point of investigation (POI) listed on the WQSS and therefore are not an accurate account of the net change in impervious area within the LOD, as drainage divides can shift from existing to proposed conditions. Additionally, the typical WQSS also provides the new development acres, reconstructed acres, and existing impervious acres removed. These values are typically within the LOD of the project and are more reliable. For this reason, and as agreed upon with MDE, the net change in impervious area for a project is computed using these more reliable values.

Due to the inconsistency and varying availability of documents and data for completed projects, there are some issues that have arisen when determining the redevelopment project credit. The following is a list of issues MDOT SHA has encountered in developing the accounting methodology and the resolution agreed upon with MDE in addressing these issues.

- *Projects without a MDE and/or MDOT SHA signed WQSS:* For some projects, the research resulted in only a MDE approval letter. Some of these approval letters state the means by which the project met or exceeded the water quality requirements, often with the specific amount of impervious area treatment noted. However, the breakdown of impervious quantities between new impervious, reconstructed impervious, and existing impervious area removed are not included. If no other documentation providing the breakdown of impervious quantities can be located at MDE and/or MDOT SHA for these projects, MDOT SHA contacts the design consultant who prepared the stormwater management design for the project and requests their records and aid in determining the portion of the project that is redevelopment. The information provided by the design consultant is assumed correct and recorded for credit, provided this information appears to be reasonable when compared to the MDE approval letter.

- *Projects with all impervious area listed as new development:* Some projects classified as new development list all project impervious area in the new development column of the WQSS, rather than breaking out the reconstructed impervious area. This was done often to force the WQSS in to requiring 100% treatment of all impervious area as required for a new development project. This combining of impervious area quantities prevents MDOT SHA from taking credit for the reconstructed impervious area. If no other documentation providing the breakdown of impervious quantities can be located at MDE and/or MDOT SHA for these projects, MDOT SHA contacts the design consultant who prepared the stormwater management design for the project and requests their records and aid in determining the portion of the project that is redevelopment. The information provided by the design consultant is assumed correct and recorded for credit, provided this information appears to be reasonable when compared to the WQSS and the MDE approval letter.

Detailed discussion of how each category of credit is computed is presented in the following sections.

3 Baseline Treatment Accounting

The baseline treatment project credit applies to all projects with approved SWM/ESC permits from MDE prior to October 21, 2010 that have been verified constructed and include redeveloped impervious area. As it is not possible to determine the exact construction date of each of these projects, it is considered conservative to apply the cutoff date to their SWM/ESC permit approval and credit these projects to baseline treatment.

Baseline treatment project credit only includes reconstructed impervious areas. This is due to the baseline imagery MDOT SHA uses to determine the baseline impervious area. With the cutoff date of October 21, 2010, it is assumed that any existing impervious area removed by the baseline treatment projects would not show in the baseline imagery. Therefore, it would not have been counted towards the baseline.

The baseline treatment accounting worksheet is included in Appendix B and the following column descriptions walk through the credit accounting.

- *ID:* This value provides MDOT SHA with a unique identification number for each project which aids in the transfer of data to GIS mapping and credit reporting.

- *Route Number, Description, County, SHA Contract Number, MDE Number, Watershed Number, Date WQSS Prepared by Consultant PE, HD PE/Consultant PE:* The data in these columns is pulled directly from the top section of the WQSS.

- *MDE Project Classification (New Development/Redevelopment):* This column allows for noting the classification of the project per MDE's 2010 SWM regulations. Projects in the baseline treatment credit accounting generally received approval prior to these regulations taking effect and therefore this column is typically left blank. This is for informational purposes only in the event that a project was listed as new development specifically and MDOT SHA had to use the design consultant to determine the breakdown of impervious areas for crediting the reconstruction. [See Section 2 bullet *Project with all impervious area listed as new development*]

- *Pre-development Impervious Area, Post-development Impervious Area, New Development, Re-constructed Impervious Area, Existing Impervious Area Removed:* The data in these columns is pulled directly from columns B through F of the WQSS.

- *Project Net Change in Impervious Area:* This column determines the net change in impervious area for the project. This is computed automatically by the spreadsheet using New Development – Existing Impervious Area Removed. The project net change in impervious area applies to determining the Impervious Area Reduction credit, which is NOT part of the baseline treatment. This column is included in the baseline treatment spreadsheet for informational purposes only and applies to Restoration credit accounting which is discussed in Section 4.

- *Water Quality Pavement Removal:* This column applies to projects that provided additional existing impervious area removal solely dedicated to meeting water quality requirements. This impervious area removal was valued at 100% regardless of the SWM regulations at the time and is listed separately in the typical WQSS in column L. The Water Quality Pavement Removal applies to determining Impervious Area Reduction credit, which is NOT part of the baseline treatment. This column is included in the baseline treatment spreadsheet for informational purposes only and applies to Restoration credit accounting which is discussed in Section 4.

- *Total Project Impervious Area Reduction:* This column determines the total reduction of impervious area for the overall project. This is computed automatically by the spreadsheet using Water Quality Pavement Removal – Project Net Change in Impervious Area. The total project impervious area reduction applies to determining Impervious Area Reduction credit, which is NOT part of the baseline treatment. This column is included in the baseline treatment spreadsheet for informational purposes only and applies to Restoration credit accounting which is discussed in Section 4.

- *Project Redevelopment Requirements:* This column states the percent at which the project was required to treat redevelopment. Prior to MDE's 2010 SWM requirements taking effect, the redevelopment percentage for projects was 20%. Following the implementation of the MDE 2010 SWM requirements, the redevelopment percent for projects was changed to 50%. This percentage is taken directly from the WQSS in column H. Column H includes the formula for determining a project's impervious area requiring treatment. Within this formula is the redevelopment rate of 0.2 (20%) or 0.5(50%) multiplied by the two redevelopment categories (reconstructed impervious area and existing impervious area removed).

- *Reconstruction Baseline Treatment Credit:* This column provides the total reconstructed impervious area credit for each project. This is automatically computed by the spreadsheet using Reconstructed Impervious Area * Project Redevelopment Requirements. This is the value MDOT SHA reports for the baseline treatment redevelopment credit.

- *Source of WQSS:* This column provides the source of the WQSS as researched by MDOT SHA. This can be MDOT SHA, MDE, or the design consultant.

- *Are There Both MDOT SHA and MDE Sources?:* This column notes if MDOT SHA has acquired both the MDE and the MDOT SHA WQSS for the project.

- *WQSS Approval Date:* This column states the date the project SWM/ESC approval was signed. It is important to note that the WQSS are often not dated when they are signed by MDE. In these cases, the MDE approval letter date is used in this column.

- *WQSS File Name:* This column provides the file name for the supporting documents researched and acquired by MDOT SHA to provide the data in the spreadsheet. These files include documents such as WQSS, MDE approval letter, modifications to the SWM/ESC permit & WQSS, any other supporting information.

- *SWMFAC Number from WQSS:* This column provides the SWMFAC numbers of all BMPs associated with the project. If the project did not include BMPs, it is noted and the method for which the water quality requirements were met for the project is noted (debit from water quality bank, impervious area removal). It needs to be understood that baseline treatment redevelopment credit is NOT determined based on SWM BMPs within a project. The SWM BMPs, debits, and impervious removal are noted to show how the project met its overall SWM requirements. This data is for informational purposes only. The credit is derived from the reconstructed impervious area within the project. MDOT SHA has listed the applicable SWMFAC numbers for SWM BMPs for each project as requested by MDE although these SWM BMPs do not result in the redevelopment credit claimed.

- *2017/2018 Notes:* This column allows MDOT SHA to internally tack important information related to the project. This includes noting which projects have not yet been field verified as constructed, support documents acquired, issues or anomalies in the WQSS acquired, and more.

- *Fiscal Year Credit Claimed by MDOT SHA:* This column states the FY MDOT SHA claims each project for redevelopment credit. This is mainly dependent on when the project was verified constructed. Construction verification is performed through GIS imagery and/or field visit as applicable.

4 Restoration Credit Accounting

The restoration project credit applies to all projects with approved SWM/ESC permits from MDE/MDOT SHA PRD on or after October 21, 2010 that have been verified constructed and include redeveloped impervious area. Restoration treatment project credit includes reconstructed impervious areas and impervious area reduction. This is due to the baseline imagery MDOT SHA uses to determine the baseline impervious area. With the cutoff date of October 21, 2010, any existing impervious area removed after the cutoff date would still show in the baseline imagery and impervious surfaces and, therefore, be included in the restoration requirements for MDOT SHA.

The restoration credit accounting worksheet is included in Appendix C and the following column descriptions walk through the credit accounting.

- *ID:* This value provides MDOT SHA with a unique identification number for each project which aids in the transfer of data to GIS mapping and credit reporting.

- *Route Number, Description, County, SHA Contract Number, MDE Number, Watershed Number, Date WQSS Prepared by Consultant PE, HD PE/Consultant PE:* The data in these columns is pulled directly from the top section of the WQSS.

- *MDE Project Classification (New Development/Redevelopment):* This column allows for noting the classification of the project per MDE's 2010 SWM regulations. The MDE WQSS did not provide a classification column for this information and very few MDOT SHA projects can be classified as New Development, therefore this column is typically left blank. This is for informational purposes only in the event that a project was listed as new development specifically and MDOT SHA had to use the design consultant to determine the breakdown of impervious areas for crediting the reconstruction. [See Section 2 bullet *Project with all impervious area listed as new development*]

- *Pre-development Impervious Area, Post-development Impervious Area, New Development, Re-constructed Impervious Area, Existing Impervious Area Removed:* The data in these columns is pulled directly from columns B through F of the WQSS.

- *Does WQSS IART include F [Existing Impervious Area Removed] in the Equation?:* This column results in a Yes/No response based on the WQSS column H equation for impervious area requiring treatment (IART). The WQSS IART equation requires the treatment of existing impervious area removed based on the project redevelopment requirement. Since this impervious area is removed by the project already, requiring treatment of it again, based on the project redevelopment requirement, is requiring double treatment of this area. The most recent versions of the MDE WQSS (2018 draft) and MDOT SHA PRD WQSS (2018 draft) have removed this issue. MDOT SHA, in this restoration accounting, has accounted for this double treatment and computed the correct credit for impervious area removal in the following series of columns.

- *<u>Project Net Change in Impervious Area:</u>* This column determines the net change in impervious area for the project. This is computed automatically by the spreadsheet using New Development – Existing Impervious Area Removed. The project net change in impervious area applies to determining the impervious area reduction credit. Any overall net increase in impervious area must be addressed by the impervious area removal before restoration credit can be taken.

- *<u>Water Quality Pavement Removal:</u>* This column applies to projects that provided additional existing impervious area removal solely dedicated to meeting water quality requirements. This impervious area removal was valued at 100% regardless of the SWM regulations at the time and is listed separately in the typical WQSS in column L. The Water Quality Pavement Removal applies to determining impervious area reduction credit.

- *<u>Total Project Impervious Area Reduction:</u>* This column determines the total reduction of impervious area for the overall project. This is computed automatically by the spreadsheet using Water Quality Pavement Removal – Project Net Change in Impervious Area. The total project impervious area reduction applies to determining impervious area reduction credit.

- *<u>Project Redevelopment Requirements:</u>* This column states the percent at which the project was required to treat redevelopment. Prior to MDE's 2010 SWM requirements taking effect, the redevelopment percentage for projects was 20%. Following the implementation of the MDE 2010 SWM requirements, the redevelopment percent for projects was changed to 50%. This percentage is taken directly from the WQSS in column H. Column H includes the formula for determining a project's impervious area requiring treatment. Within this formula is the redevelopment rate of 0.2 (20%) or 0.5(50%) multiplied by the two redevelopment categories (reconstructed impervious area and existing impervious area removed).

- *<u>Existing Impervious Area Removed Double Treated by Project:</u>* This column is automatically computed by the spreadsheet using the following if/then statement:
    - If the WQSS includes existing impervious area removed in the IART equation (column H), the resulting value is: Existing impervious area removed * Project redevelopment requirements.
    - If the WQSS does NOT include existing impervious area removed in the IART equation (column H), the resulting value is 0.

- *<u>Credit Applied to the MDOT SHA Water Quality Bank:</u>* This column is taken directly from the WQSS column M TOTAL field. This is the amount of credit to be banked by the project. MDOT SHA does NOT include water quality bank credits in redevelopment accounting in order to avoid double counting of credit. Only water quality bank debits are included in the redevelopment credit.

- *<u>Total Available Impervious Area Reduction Restoration Credit:</u>* This column is automatically computed by the spreadsheet using Total project impervious area reduction + Existing impervious area removed double treated by project – Credit applied to the

MDOT SHA water quality bank. This equation verifies that water quality bank credits are not included in the redevelopment credit.

- *Total Available Impervious Urban to Pervious:* This column is automatically computed by the spreadsheet using Total available impervious area reduction restoration credit – Existing impervious area removed by double counting. This equation separates the impervious area reduction that is direct pavement removal from the double treatment quantity following the removal of any water quality bank credits.
- *Total Available Existing Impervious Area Double Treated by Project:* This column is automatically computed by the spreadsheet using the if/then statement:
  - If the total available impervious urban to pervious is > 0, the resulting value is the existing impervious area removed double treated by the project.
  - If the total available impervious urban to pervious is not > 0, the resulting value is the total available impervious urban to pervious + the existing impervious area removed double treated by the project.

  This equation determines the available existing impervious area double treated by the project once the water quality bank credits are removed.
- *Reconstruction Restoration Credit:* This column provides the total reconstructed impervious area credit for each project. This is automatically computed by the spreadsheet using Reconstructed Impervious Area * Project Redevelopment Requirements. This is the value MDOT SHA reports for the Reconstruction Restoration portion of the redevelopment credit.
- *Impervious Area Reduction Restoration Credit:* This column provides the total impervious area reduction credit for each project. This is automatically computed by the spreadsheet using the following if/then statement:
  - If the total project impervious area reduction is > 0, the resulting value is the total available existing impervious area removed double treated by project + 0.75* the total available impervious urban to pervious.
  - If the total project impervious area reduction is not > 0, the resulting value is 0 and no credit is taken.

  This equation includes the double treated impervious area back in to the credit as long as the total project impervious area reduction is greater than 0. This accounts for the net change in impervious area of the project as well as for removing water quality bank credits. Additionally, per the MDE *Accounting for Stormwater Wasteload Allocation and Impervious Acres Treated* (August 2014), impervious urban to pervious BMPs are credited at 75%. This equation applies the 75% requirement before adding it to the total credit. This is the value MDOT SHA reports for the Impervious Area Reduction Restoration credit portion of the redevelopment credit.

- *Source of WQSS:* This column provides the source of the WQSS as researched by MDOT SHA. This can be MDOT SHA, MDE, or the design consultant.
- *Are There Both MDOT SHA and MDE Sources?:* This column notes if MDOT SHA has acquired both the MDE and the MDOT SHA WQSS for the project.
- *WQSS Approval Date:* This column states the date the project SWM/ESC approval was signed. It is important to note that the WQSS are often not dated when they are signed by MDE. In these cases, the MDE approval letter date is used in this column.
- *WQSS File Name:* This column provides the file name for the supporting documents researched and acquired by MDOT SHA to provide the data in the spreadsheet. These files include documents such as WQSS, MDE approval letter, modifications to the SWM/ESC permit & WQSS, any other supporting information.
- *SWMFAC Number from WQSS:* This column provides the SWMFAC numbers of all BMPs associated with the project. If the project did not include BMPs, it is noted and the method for which the water quality requirements were met for the project is noted (debit from water quality bank, impervious area removal). It needs to be understood that baseline treatment redevelopment credit is NOT determined based on SWM BMPs within a project. The SWM BMPs, debits, and impervious removal are noted to show how the project met its overall SWM requirements. This data is for informational purposes only. The credit is derived from the reconstructed impervious area within the project. MDOT SHA has listed the applicable SWMFAC numbers for SWM BMPs for each project as requested by MDE although these SWM BMPs do not result in the redevelopment credit claimed.
- *2017/2018 Notes:* This column allows MDOT SHA to internally track important information related to the project. This includes noting which projects have not yet been field verified as constructed, support documents acquired, issues or anomalies in the WQSS acquired, and more.
- *Fiscal Year Credit Claimed by MDOT SHA:* This column states the FY MDOT SHA claims each project for redevelopment credit. This is mainly dependent on when the project was verified constructed. Construction verification is performed through GIS imagery and/or field visit as applicable.

5 Redevelopment Project Credit Mapping and Reporting

Documentation of the baseline treatment or restoration credit for each project is available for MDE review upon request. This documentation includes WQSS, MDE or MDOT SHA PRD approval letters, modification approvals, and any other applicable information acquired through the research combined in to a single pdf for each project named by MDOT SHA contract number.

MDOT SHA has provided baseline and restoration redevelopment data in the 2018 MDE Geodatabase submittal. In order to comply with the established MDE geodatabase framework for reporting, the redevelopment project-based information was loaded into the database in the following feature classes and attributes:

- **BMPPOI –** mapped a point location to represent the general location of the project. This point location is the exact same x, y location mapped in RestBMP for consistency. This location is not a specific BMP due to reasons explained earlier in this document. The following comments were attributed to clarify and assist in the interpretation of the data:
  - GEN_COMMENTS – used to flag records as baseline or restoration redevelopment project accounting.
    - Example: "FY17 restoration redevelopment project accounting. BMP_POI point is mapped to represent the general project location."
- **RestBMP –** mapped a point location to represent the general location of the project. This point location is the exact same x, y location mapped in BMPPOI for consistency. This location is not a specific BMP due to reasons explained earlier in this document. The following comments were attributed to clarify and assist in the interpretation of the data:
  - PROJECT_DESC – used to flag records as baseline or restoration redevelopment project accounting.
    - Example: "FY17 restoration redevelopment project."
  - CON_PURPOSE – assigned value of "Redevelopment Project"
  - BMP_CLASS – assigned value of "Alternative BMP"
  - GEN_COMMENTS – used to provide details of the redevelopment project accounting and the origin of the specific records credit source. Provides the date of the WQSS approval, summarizes the reconstruction credit and IA reduction credit and provides a total project credit in acres.

MDOT SHA understands that MDE typically associates drainage areas and inspections to redevelopment BMPs, however in this circumstance, the data records provided represent redevelopment project accounting and not a specific BMP; and as such, there will not be a BMP drainage area or inspection provided in the geodatabase associated to the features. Redevelopment project accounting credit, since the results are project-based and are not specific to a BMP location, the mapping will not provide a BMP drainage area feature associated with the records. MDOT SHA has provided mapping of the general project location and accounted for the credit from the accounting.

Refer to Appendix B for the GIS methods to summarize the redevelopment project accounting credit using the MDE geodatabase.

APPENDIX A: MDOT SHA & MDE CORRESPONDENCE

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

State Highway Administration
Maryland Department of Transportation

Pete K. Rahn, *Secretary*
Gregory C. Johnson, P.E., *Administrator*

March 15, 2016

Mr. Raymond Bahr
Sediment, Stormwater, and Dam Safety Program
Water Management Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 440
Baltimore MD 21230

Dear Mr. Bahr:

Below is a summary of our meeting held at MDE on December 18, 2015 regarding SHA's MS4 Redevelopment Credit Accounting based on the outcome of the July 29, 2015 meeting with MDE. MDE and SHA agree to the following understanding.

Attendees:
- Raymond Bahr – MDE Programs
- Brian Cooper – MDE Programs
- Amanda Malcolm – MDE Plan Review
- Karen Coffman – SHA WPD
- Karuna Pujara – SHA PRD
- Ryan Doran – SHA WPD
- Kristin Langway – SHA WPD

1) MS4 Redevelopment Credit Accounting Worksheet Discussion

Accounting & Reporting

WPD's accounting approach is acceptable to MDE and WPD now has approval to move forward with full assessments as stated in the MS4 Redevelopment Credit Accounting protocol summary. It was agreed that the "project check" column will be removed from the final worksheet by SHA as it has no bearing on the computations and was only in place to support SHA's use of columns D & F over B & C.

MDE indicated they would prefer WPD remain below 10% (for 20% restoration component) in the credit claimed for MS4 redevelopment, as they believe a higher percentage would produce a negative perception. This preference is noted by SHA.

PRD will complete verification of construction of all documented WQ BMPs under their WQSS reconciliation and will provide the results to WPD for tracking and reporting. WPD will provide MDE with a point at the POI or center of each 6-digit watershed to display the baseline reduction values to address MDE's visual confirmation request. For current reporting, MDE accepted this approach.

WPD and MDE agreed that the protocol document and worksheets with MS4 redevelopment credit accounting will be added to the annual report appendix.

Database Requirements

Based on a quick in-meeting presentation by WPD of a typical SHA project and the fact that 42% of SHA right-of-way is impervious, MDE agreed that SHA projects may typically be defined as redevelopment projects. The current MS4 database 'Con Purpose' field from Attachment A of the MS4 permit requires a BMP be defined as new development, redevelopment, restoration, or retrofit; however, defining an SHA BMP as one of these options is not feasible. SHA BMPs can treat redevelopment or a combination of new development and redevelopment. MDE suggested a 'combination' coding defined as redevelopment if 50% or more of the BMP's drainage area is redeveloped area or new development if the drainage area is less than 50% redevelopment. WPD requested that all SHA BMPs be coded redevelopment, based on SHA typical projects, regardless of the amount of redevelopment within the project, as only the redevelopment portion is credited. MDE agreed, per this discussion and the SHA typical project presentation that all SHA BMPs will be coded redevelopment unless they are one of SHA's few true new development projects such as the ICC or MD 404. [*It should be noted that these projects were used as examples only, MD 404 is outside of TMDL counties and the ICC is owned and maintained by MdTA*].

MDE closed this discussion, with the agreement of WPD and PRD, stating four basic "rules":

1. WQSS and TMDL crediting are to be kept separate.
2. Projects/POIs classified as "new development" can include reconstruction that may be credited toward MS4 redevelopment
3. The net change in impervious (ΔAi) shows the new impervious portion, which is not credited.
4. The cutoff for baseline reduction/restoration is 10/21/2010.

2) MDE Draft WQSS Additions & Comments

MDE directed that the WQ Bank and TMDL credit should be kept separate and taking TMDL credit for redevelopment is not "double dipping". BMPs are required to be sized to treat the drainage area draining to them and therefore may treat more than the required impervious area for the project. WPD noted that MS4 redevelopment credit is only taken when projects are approved and therefore would not apply to WQ bank credits.
Projects that forced all impervious in to the "new development" column in the WQSS even though there may be reconstructed impervious area within the project are easy to pull out of SHAs research, as the majority of all SHA projects show redevelopment. WPD will put the new development-only projects to the side during research and ultimately determine how many projects are affected. If the list of projects is worth the detailed research effort, WPD

will perform this research as noted in the MS4 redevelopment accounting protocol summary. MDE agreed with this approach.

MDE added two columns to the Draft WQSS for restoration credit and stated that for Attachment A reporting, the BMP data MDE needs is type, Pe treated, drainage area, as-built data, and three-year inspection data. SHA Plan Review Division (PRD) put together a template of their own draft WQSS incorporating additional tracking needs by both PRD and WPD. WPD requested additional columns be added to the final WQSS to state the actual restoration credit for impervious area reduction and reconstructed restoration. PRD, WPD, and MDE will work together to develop an MS4/TMDL accounting summary sheet to be submitted to PRD with each SHA design project. This sheet will include all data necessary to document each BMP and all MS4/TMDL data needed for MDE reporting.

3) Upcoming items for future discussion

<u>SHA's 2015 Annual Report</u>
MDE provided a comment concerning SHA's 2015 MS4 Annual Report that SHA needs to either continue monitoring at Long Draught Branch and construct the project or select another monitoring site. WPD is in the process of selecting a new monitoring site (probably Little Catoctin Creek). WPD will be submitting both the watershed and stormwater management site for monitoring to MDE for review and approval in a couple months.

<u>Financial Assurance Plan</u>
MDE asked if SHA is required to produce a Financial Assurance Plan (FAP). It was determined by all that further discussion is needed to determine this requirement. If a FAP is required, the plan will be due to MDE on 7/1/2016. This plan requirement is included in Senate Bill 863 (5/12/2015) that rescinded the requirement for the stormwater fee and is a means to assure that the Bay restoration plans will be completed.

Subsequent email dated 12/28/2015 from MDE to WPD confirmed that SHA is not required to submit a FAP.

<u>Bank Reconciliation</u>
The goal is to have the WQ Bank reconciled and have a finalized WQSS on or before 2/5/16. MDE requested documentation from the previous WQ Bank reconciliation from 2003 to determine which projects were included. PRD will provide this information.

We believe that the above accurately reflects what transpired at this meeting. If you have any questions or require additional information, please contact Mr. Ryan Doran at 410-545-8635 or via email at RDoran@sha.state.md.us or me at 410-545-8407 or via email at KCoffman@sha.state.md.us.

Sincerely,

Karen M Coffman

Karen Coffman, Chief
Water Programs Division

cc: Mr. Brian Cooper, Sediment, Stormwater, and Dam Safety Program, MDE
Ms. Amanda Malcolm, Plan Review Division, MDE
Mr. Ryan Doran, Water Programs Division, SHA
Ms. Karuna Pujara, Plan Review Division, SHA
Ms. Kristin Langway, Water Programs Division, SHA
Mr. Rob Shreeve, Office of Environmental Design, SHA

APPENDIX B: BASELINE TREATMENT ACCOUNTING SPREADSHEET

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	Are/There Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
	Anne Arundel County																									
AA100001	MD 100	MD 100 EB to MD 2 NB Ramp	Anne Arundel	AA3475130	06-SF-0045	02-13-09	11/3/2005	KRP/GWN		0.39	41.00	0.02	0.15	0.00	0.02	0.00	0.00	0.20	0.03	SHA	No	11/29/2005	AA3475130.pdf			2017
AA100013	MD 2	MD 2 at Brick Church Road, Intersection Improvements	Anne Arundel	AA7285130/AA7285175	03-SF-0358	2/13/2011	2/3/2004	WTB		0.58	0.61	0.10	0.06	0.06	0.04	0.00	0.00	0.20	0.01	Consultant	No	12/21/2004	AA7285130.pdf			2017
AA100014	MD 424	MD 424 at MD 214, Intersection Improvements	Anne Arundel	AA7295187	03-SF-0036	2/13/2011	5/1/2005	WTB		0.37	0.51	0.15	0.00	0.00	0.15	0.00	0.00	0.20	0.00	Consultant	No	6/22/2005	AA7295187.pdf			2017
AA100016	MD 175	MD 175-Rockenbach Road to Disney Road, Drainage Improvement	Anne Arundel	AA3385174	04-SF-0223	02-13-11	12/23/2003	RAJA/JMH		0.96	0.94	0.00	0.19	0.02	-0.02	0.00	0.02	0.20	0.04	Consultant	No	3/3/2005	AA3385174.pdf			2017
AA100018	MD 648	MD 648 (Baltimore/Annapolis Rd) ADA Sidewalk Retrofit from Phyllis Rd to MD 177	Anne Arundel	AA2755133/AX3745133	08-SF-0098	02-13-09	10/9/2007	RHD/CSF		0.37	0.45	0.09	0.00	0.01	0.08	0.00	0.00	0.20	0.00	SHA	No	11/7/2007	AA2755133-AX3745133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
AA100019	MD 652	MD 652 and MD 176 - Pump Station, Force Main, and Sanitary Sewer	Anne Arundel	AA4465129	06-SF-0171	02-13-09	1/24/2006	CAL/SPA		0.00	0.06	0.06	0.00	0.00	0.06	0.00	0.00	0.20	0.00	SHA	No	6/30/2006	AA4465129.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
AA100020	I-97/MD 100	I-97/MD 100 SWM Facilities Functional Upgrades in Anne Arundel County	Anne Arundel	AA5355174	08-SF-0413	02-13-09 02-13-10	4/28/2009 6/15/2009	KP/GAI		10.25	10.12	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	7/29/2009	AA5355174.pdf	2220, 2210, 2206, 2205, 2098, 2099, 2477, 2185, 2198, 2201	Retrofit Project to benefit the WQ bank; MDE Approval letter included in WQSS file pdf	2017
AA100021	MD 2	MD 2 at Birdsville	Anne Arundel	AA4615130	09-SF-0311	02-13-11	2/19/2009	KJP/FOA		0.91	1.18	0.28	0.00	0.00	0.28	0.00	0.00	0.20	0.00	SHA	No	4/1/2009	AA4615130.pdf	None Provided - grass swale(s); Also Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2018
AA100022	MD 295	Ridge Road Bridges over MD 295	Anne Arundel	AA4795180	10-SF-0045	02-13-09	10/5/2009	KP/B. Benda		0.45	0.54	0.13	0.10	0.04	0.09	0.00	0.00	0.20	0.02	SHA	No	11/5/2009	AA4795180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
AA100023	I-695	Ramp From I-695 West To MD-295 North	Anne Arundel	AA3075176	04-SF-0054	02-13-09	9/30/2003	RAJA/MJI		2.78	2.84	0.13	1.44	0.08	0.05	0.00	0.00	0.20	0.29	SHA	No	7/31/2006	AA3075176.pdf	None Provided - grass swale(s) for treatment per docs	GIS team to determine if BMPs were constructed. MDE Approval letter included in WQSS file pdf	
AA100024	SHA Glen Burnie Maintenance Shop	Stormwater Retrofit and Drainage Improvements at Sawmill Creek	Anne Arundel	AA2735174	08-SF-0037	02-13-09	10/8/2009	DH/MFL		3.14	6.30	0.04	0.00	0.00	0.04	0.00	0.00	0.20	0.00	SHA	No	5/26/2010	AA2735174.pdf	20957	MDE Approval letter included in WQSS file pdf	2017
AA100025	MD 170	MD170 From MD 648 to 10th Avenue Streetscape	Anne Arundel	AA3585184	06-SF-0257	02-14-02 02-13-09	4/7/2006	SJR		0.00	0.00	0.24	1.24	0.72	-0.48	0.00	0.48	0.20	0.25	SHA	No	7/18/2006	AA3585184.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
AA100026	MD 295	MD 295 from I-695 to I-195	Anne Arundel	AA3515170 AA3515170R	06-SF-0086	02-13-09	10/31/2006	KRP/DLH		30.88	35.29	4.67	1.41	0.00	4.67	0.00	0.00	0.20	0.28	SHA	No	7/31/2007	AA3515170.pdf	2535; Also grass swale(s)	MDE Approval letter included in WQSS file pdf	2017
AA100027	MD 665	Harry S. Truman Park and Ride Improvements	Anne Arundel	AA2665181	10-SF-0199	02-13-10-03	3/1/2010	KP/RJM		8.98	9.44	0.57	0.00	0.00	0.57	0.00	0.00	0.20	0.00	MDE	No	4/9/2010	AA2665181.pdf	20584		2017
AA100028	MD 2	MD 2 (Solomons Island Road) at Friendship/Sansbury Road Roundabout	Anne Arundel	AA3645176	06-SF-0039	02-13-11	3/21/2007	CLM/GAI		0.00	0.00	0.23	0.33	0.17	0.06	0.00	0.00	0.20	0.07	SHA	No	3/28/2007	AA3645176.pdf	None Provided - 2 wet swales	MDE Approval letter included in WQSS file pdf	2017
AA100029	MD 176	Materials and Tec Consolidated Lab and Office of Construction Facility	Anne Arundel	AT6155129	05-SF-0179	02-13-09	11/4/2005	CAL/Jswann		5.37	14.03	9.45	2.43	0.69	8.76	0.00	0.00	0.20	0.49	SHA	No	1/16/2007	AT6155129.pdf	2614 2615	MDE Approval letter included in WQSS file pdf	2017
	Anne Arundel County Totals												**7.35**	**1.79**					**1.47**							
	Baltimore County																									
BA100001	I-696 / MD 702	Bridge Deck Resurfacing for 18 Structures	Baltimore	BA7935180	04-SF-0294	02-13-08	4/27/2004	JR/KBR		1.31	1.31	0.00	0.20	0.00	0.00	0.00	0.00	0.20	0.04	SHA	No	7/13/2004	BA7935180.pdf			2017
BA100005	MD 45	Beaverdam Run Structure to Thornton Mill Road	Baltimore	BA4925177	05-SF-0333	02-13-08	6/9/2005	KP/MAW		0.25	0.26	0.01	0.04	0.00	0.01	0.00	0.00	0.20	0.01	SHA	No	6/13/2005	BA4925177.pdf			2017
BA100019	MD 151	From Wise Ave. to Relocated Morse Lane	Baltimore	BA278A21	01-SF-0409	02-13-09	9/16/2002	NP		1.07	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	1/29/2003	BA278A21.pdf			2017
BA100020	I-695 Ramp G and North Charles Street	Roland Run Stabilization/Restoration	Baltimore	BA3815272	02-SF-0039	02-13-09	7/22/2003	D. Altland		0.00	0.00	0.00	0.00	4.12	-4.12	0.00	4.12	0.20	0.00	SHA	No	11/12/2003	BA3815272.pdf			2017
BA100021	I-83 NorthBound	Noise Abatement Wall From South of Seminary to Timonium Road	Baltimore	BA7495176	02-SF-0237	02-13-09	7/21/2004	CL/PFC		11.52	12.02	0.58	1.23	0.00	0.58	0.15	0.00	0.20	0.25	SHA	No	7/8/2002	BA7495176.pdf			2017
BA100022	MD 45 (York Road)	MD 45 at Pedonia Road	Baltimore	BA4035187	04-SF-0125	02-13-09	11/14/2003	F. Grabowski		0.00	0.00	0.04	0.16	0.01	0.03	0.00	0.00	0.20	0.03	SHA	No	6/29/2004	BA4035187.pdf			2017
BA100023	I-695 / US 40	I-695 at US 40 Beltway/Baltimore National Pike	Baltimore	BA3895172	04-SF-0147	02-13-09	9/2/2004	R. Doran		19.40	20.31	1.67	1.46	0.00	1.67	0.76	0.00	0.20	0.29	SHA	No	11/11/2004	BA3895172.pdf			2017
BA100024	MD 150	Intersection Improvements at Taylor Avenue	Baltimore	BA7605176	04-SF-0254	02-13-09	7/30/2004	FGS/SA		0.16	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.20	0.03	SHA	No	11/10/2004	BA7605167.pdf			2017
BA100025	MD 695	From Morse La. To Back River	Baltimore	BA7925180	04-SF-0295	02-13-09	5/7/2004	JR/GWF		0.00	0.00	0.12	2.45	0.00	0.12	0.00	0.00	0.20	0.49	SHA	No	7/6/2004	BA7925180.pdf			2017
BA100026	MD 695	MD Route 695 Over Chesaco Avenue	Baltimore	BA6935180	05-SF-0037	02-13-09	6/30/2004	BS/JDC		3.27	3.36	0.11	0.41	0.00	0.11	0.00	0.00	0.20	0.08	SHA	No	9/13/2004	BA6935180.pdf			2017
BA100027	I-70 Ramp B	Road Widening I-70 EB Ramp to NB I-695	Baltimore	BA4065176	04-SF-0159	02-13-09	4/29/2005	KP/DJW		1.57	2.06	0.49	0.23	0.03	0.46	0.00	0.00	0.20	0.05	SHA	No	3/28/2005	BA4065176.pdf			2017
BA100028	I-195	Rehabilitation of Decks for Four Bridges on I-195 from Francis Ave. to CSX Railroad	Baltimore	BA7915180R	05-SF-0200	02-13-09	1/12/2005	RSK		4.94	4.94	0.00	0.37	0.00	0.00	0.00	0.00	0.20	0.07	SHA	No	1/14/2005	BA7915180R.pdf			2017
BA100029	I-95 and I-195	Shoulder Treatment	Baltimore	BA4795176	05-SF-0285	02-13-09	2/25/2005	SP/JDC		11.14	11.22	0.08	0.27	0.00	0.08	0.00	0.00	0.20	0.05	SHA	No	7/25/2005	BA4795176.pdf			2017
BA100031	MD 26 (Liberty Road)	Brenbrook Drive to Baltimore City/ County Line	Baltimore	BA4845176	05-SF-0362	02-13-09	6/2/2005	RSK/TGT		0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.20	0.00	SHA	No	7/26/2005	BA4845176.pdf			2017
BA100064	MD 7 From Old Bay Line to 450 to the East	Sidewalk Project	Baltimore	AT5965179	05-SF-GA04	02-13-09	9/30/2004	KP/FG		0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.00	0.20	0.00	SHA	No	4/22/2005	AT5965179.pdf			2017
BA100065	MD 648	Ohio Ave. to Pennsylvania Ave.	Baltimore	AT5965179	05-SF-0070	02-13-09	9/9/2004	KP/FG		0.00	0.00	0.14	0.02	0.00	0.14	0.00	0.00	0.20	0.00	SHA	No	9/14/2004	AT5996179.pdf			2017
BA100067	MD 542	Baltimore County Line to Hillen Road	Baltimore	AT5996179	05-SF-0071	02-13-09	9/9/2004	KP/FG		0.00	0.00	0.08	0.05	0.00	0.08	0.00	0.00	0.20	0.01	SHA	No	9/14/2004	AT5996179.pdf			2017
BA100068	MD 25 (Falls Road)	From the Culvert over the Jones Falls to North of I-695	Baltimore	BA3725177	01-SF-0404	02-13-09	8/5/2002	NP		0	0	0.04	0.14	0.00	0.04	0.00	0.00	0.20	0.03	SHA	No	10/3/2002	BA3725177.pdf			2017
BA100070	MD 45	MD 45 (York Road) from Northern Pkway to Stevenson Lane	Baltimore	BA3125176	03-SF-0209	02-13-09	1/14/2003	Minami		9.69	10.03	0.37	0.54	0.09	0.28	0.00	0.00	0.20	0.11	SHA	No	3/13/2003	BA3125176.pdf			2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
BA100071	MD 41	MD 41 (Perring Parkway) from Baltimore City Line to Joppa Road	Baltimore	BA3055177	08-SF-0332	02-13-09	4/2/2008	RHD/JDC		0.20	0.24	0.06	0.00	0.03	0.03	0.00	0.00	0.20	0.00	SHA	No	5/2/2008	BA3055177.pdf	None - Debit from WQ bank		2017
BA100072	MD 45	MD 45 (York Road) from Cavan Drive to Ridgely Road	Baltimore	BA7065171	05-SF-0189	02-13-08 02-13-09	9/2/2008	KP/KW		17.36	18.75	1.48	2.34	0.09	1.39	0.00	0.00	0.20	0.47	SHA	No	2/4/2008	BA7065171.pdf	30031 & debit	MDE Approval letter & modification letters included in WQSS file pdf	2017
BA100073	MD 147	MD 147 (Harford Road) from The Baltimore City Line to Joppa Road	Baltimore	BA6835184	05-SF-0295	02-13-08 02-13-09	7/16/2007	CM/JDC		19.34	19.24	0.30	5.47	0.58	-0.28	0.00	0.28	0.20	1.09	SHA	No	8/27/2007	BA6835184.pdf	30037 & debit	MDE Approval letter included in WQSS file pdf	2017
BA100074	MD 7	MD 7 (Philadelphia Road) at Raphel Road Intersection Improvements	Baltimore	BA3925130	05-SF-0349	02-13-08	6/17/2005	KP/JW/CAL		1.20	1.47	0.27	0.17	0.00	0.27	0.00	0.00	0.20	0.03	SHA	No	3/28/2006	BA3925130.pdf	30033 & 30034 - dry swales	MDE Approval letter included in WQSS file pdf	2017
BA100075	MD 147	MD 147 (Harford Road) from Jomat Ave. to N. Cub Hill Road	Baltimore	BA4345177	06-SF-0074	02-13-08	4/13/2006	DJW		5.65	5.94	0.33	1.25	0.10	0.23	0.00	0.00	0.20	0.25	SHA	No	4/27/2006	BA4345177.pdf	30035	MDE Approval letter included in WQSS file pdf	2017
BA100076	NP	District 4 Office Building	Baltimore	BA5145129	06-SF-0124	02-13-08	12/17/2007	KRP/RHD		0.04	1.92	1.92	0.00	0.00	1.92	0.00	0.00	0.20	0.00	SHA	No	5/5/2008	BA5145129.pdf	30043 - wet pond	MDE Approval letter included in WQSS file pdf	2017
BA100077	MD 150	MD 150 (Eastern Avenue) from East of MD 587 (Wilson Point Rd.) to Graces Quarters	Baltimore	BA3965177	07-SF-0133	02-13-08	5/15/2006	KP/JD/OK		19.74	20.10	0.36	0.12	0.06	0.30	0.00	0.00	0.20	0.02	SHA	No	2/8/2007	BA3965177.pdf	None - Debit from WQ bank & non structural credits	MDE Approval letter included in WQSS file pdf	2017
BA100078	US 1	US 1 (Belair Road) From Cottington Road to E. Joppa Road/India Avenue	Baltimore	BA4855187 BA4855176	07-SF-0209	02-13-08	6/9/2008	JW/SCP		0.00	0.00	0.20	0.58	0.00	0.20	0.00	0.00	0.20	0.12	SHA	No	6/3/2008	BA4855187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100079	I-83	District 4 Radio Tower	Baltimore	NP	08-SF-0107	02-13-08	1/21/2008	JSR		0.06	0.36	0.30	0.00	0.00	0.30	0.00	0.00	0.20	0.00	SHA	No	3/13/2008	BA D4 Radio.pdf	None - Debit from WQ bank & non structural credits	MDE Approval letter included in WQSS file pdf	2017
BA100080	MD 700	MD 700 from Kelso Drive to MD 150	Baltimore	XX3945133	08-SF-0390	02-13-08	4/15/2008	KP/SP		0.47	0.56	0.13	0.00	0.04	0.09	0.00	0.00	0.20	0.00	SHA	No	7/2/2008	XX3945133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100081	MD 137	MD 137 (Mount Carmel Rd.) at I-83 NB Off Ramp	Baltimore	BA675855 AT9815176	08-SF-0392	02-13-08	5/5/2008	KP/FOA		1.42	1.39	0.21	0.05	0.24	-0.03	0.00	0.03	0.20	0.01	SHA	No	5/11/2009	BA675855-AT9815176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100082	US 1	Replacement of Bridge 3001 on US 1 over Little Gunpowder Falls	Baltimore	BA3285180	09-SF-0135	02-13-08	6/2/2009	KRP/DJW		2.23	2.56	0.72	1.47	0.39	0.33	0.00	0.00	0.20	0.29	SHA	No	7/28/2009	BA3285180.pdf	None - Debit from WQ bank & non structural credits	MDE Approval letter included in WQSS file pdf	2017
BA100083	I95/I695	I-95 at I-695 Southwest Ramp Widening - Interchange Improvements	Baltimore	BA4805176	09-SF-0201	02-13-08	6/11/2009	KP/RSK/FG		17.44	17.76	0.64	0.30	0.32	0.32	0.00	0.00	0.20	0.06	SHA	No	7/29/2009	BA4805176.pdf	None Provided - Grass Channel Credit - credit has not SWMFAC, variance also from SWM	MDE Approval letter included in WQSS file pdf	2017
BA100084	MD 700	MD 700 from US 40 To MD 150	Baltimore	BA5885168	09-SF-0213	02-13-08 02-13-09	3/9/2009	SP		0.98	0.24	0.00	0.24	0.57	-0.57	0.00	0.57	0.20	0.05	SHA	No	2/5/2010	BA5885168.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA100085	Freeland Road	Replacement of Bridge No. 3207 on Freeland Rd Over I-83	Baltimore	BA4155180	06-SF-0296	02-12-02	6/20/2006	DJW		1.73	2.00	0.09	0.71	0.00	0.09	0.00	0.00	0.20	0.14	SHA	No	9/7/2006	BA4155180.pdf	None - Debit from WQ bank & non structural credits	MDE Approval letter included in WQSS file pdf	2017
BA100086	MD 702	MD 702 Roundabout at Hyde Park Road	Baltimore	BA5095187	05-SF-0297	02-13-09	1/11/2006	SP/JDC		5.10	4.20	0.21	0.46	1.11	-0.90	0.00	0.90	0.20	0.09	SHA	No	3/21/2006	BA5095187.pdf	None - Credit to WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100087	US 40	US 40 from Old Frederick Road to Winters Lane	Baltimore	BA7715187	06-SF-0095	02-13-09	8/25/2006	KP/RD		6.91	7.55	0.72	0.44	0.00	0.72	0.00	0.00	0.20	0.09	SHA	No	6/6/2008	BA7715187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100088	MD 166	MD 166 from MD 144 to Bloomsbury Road - Street Improvements	Baltimore	BA4365177	06-SF-0116	02-13-09	2/22/2006	CAL/FG		0.00	0.00	0.02	0.13	0.00	0.02	0.00	0.00	0.20	0.03	SHA	No	2/24/2006	BA4365177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100089	I-695	I-695 Inner Loop at Greenspring Avenue, Ramp 3	Baltimore	BA5035130	06-SF-0138	02-13-09	11/22/2005	DJW		1.06	1.24	0.18	0.07	0.00	0.18	0.00	0.00	0.20	0.01	SHA	No	2/23/2006	BA5035130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100090	MD 45	MD 45 @ Timonium Rd - Resurfacing and Safety Improvements	Baltimore	BA4945187	06-SF-0216	02-13-09	3/1/2006	KRP		0.00	0.00	0.01	0.12	0.00	0.01	0.00	0.00	0.20	0.02	SHA	No	3/10/2006	BA4945187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100091	MD 940	MD 940 at Dolfield Road - Intersection Improvements	Baltimore	BA3915187	07-SF-0100	02-13-09	12/15/2006	CEI		3.06	3.58	0.50	0.26	0.00	0.50	0.00	0.00	0.20	0.05	SHA	No	11/8/2007	BA3915187.pdf	30039 - wet pond	MDE Approval letter included in WQSS file pdf	2017
BA100092	MD 157	MD 157 (Merritt Blvd.) from German Hill Rd. to Holabird/ Wise Ave. - ADA Sidewalk Retrofits	Baltimore	BA6835133	07-SF-0212	02-13-09	3/7/2007	RHD/ATW		0.58	0.63	0.05	0.36	0.00	0.05	0.00	0.00	0.20	0.07	SHA	No	3/29/2007	BA6835133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100093	MD 157	MD 157 (Merritt Blvd.) at German Hill Rd. - ADA Sidewalk Retrofits	Baltimore	BA6385433 AX1795133	07-SF-0263	02-13-09	4/20/2007	RHD/ATW		0.07	0.11	0.04	0.06	0.00	0.04	0.00	0.00	0.20	0.01	SHA	No	6/26/2007	BA6385433.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100094	MD 129	MD 129 (Park Heights Avenue) from Slade Avenue to Autumn Drive - ADA Sidewalk Retrofits	Baltimore	BA6385133 AX1795133	07-SF-0294	02-13-09	6/25/2007	RHD/ATW		0.44	0.46	0.09	0.30	0.07	0.02	0.00	0.00	0.20	0.06	SHA	No	7/19/2007	BA6385133-AX1795133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100095	MD 134	MD 134 from 500 Ft. South of Malvern Ave. to Boyce Ave. - Installation and/or Replacement of Sidewalks	Baltimore	XX5015179	07-SF-0295	02-13-09	6/27/2007	RD/FG		0.06	0.15	0.10	0.05	0.01	0.09	0.00	0.00	0.20	0.01	SHA	No	8/1/2007	XX5015179B.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100096	MD 588	MD 588, Golden Ring Rd. / Kenwood Ave - Resurfacing	Baltimore	BA5075177	07-SF-0299	02-13-09	6/1/2007	CEI/RSK		0.00	0.00	0.03	0.00	0.01	0.02	0.00	0.00	0.20	0.00	SHA	No	3/7/2008	BA5075177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100097	MD 157	MD 157 Northbound (Merritt Blvd.) from German Hill Rd. to Holabird/Wise Ave. - ADA Sidewalk Retrofits	Baltimore	BA6385333 AX1795133	08-SF-0018	02-13-09	7/5/2007	RHD/ATW		0.39	0.49	0.10	0.00	0.00	0.10	0.00	0.00	0.20	0.00	SHA	No	8/3/2007	BA6385333-AX1795133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100098	MD 26	MD 26 from Offutt Rd. to Anne Hathaway Rd. - Roadway Resurfacing and Sidewalk Ramp Reconstruction	Baltimore	BA4335177	08-SF-0027	02-13-09	4/20/2007	RK		3.72	3.73	0.00	0.02	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	2/15/2008	BA4335177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100099	MD 122	MD 122 from Rolling Road to Whitehead Rd. - ADA Sidewalk Retrofits	Baltimore	BA6385133 AX1795133	08-SF-0081	02-13-09	8/23/2007	RHD/DET		0.62	0.79	0.17	0.00	0.00	0.17	0.00	0.00	0.20	0.00	SHA	No	10/2/2007	BA6385133-AX1795133-1.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100100	MD 372	MD 372 from I-695 to Alan Drive - ADA Sidewalk Retrofits	Baltimore	BA638A75 AX1795133	08-SF-0167	02-13-09	12/14/2007	RHD/DET		0.13	0.17	0.04	0.00	0.00	0.04	0.00	0.00	0.20	0.00	SHA	No	1/16/2008	BA638A57-AX1795133.pdf	None - Debit from WQ bank	Contract # discrepancy - BA638A75 (MDE) or BA638A57 (WQSS); MDE Approval letter included in WQSS file pdf	2017
BA100101	MD 129	MD 129 (Park Heights Avenue) from Baltimore City Line to North of Autumn Drive	Baltimore	BA5875177	08-SF-0189	02-13-09	12/7/2007	DJW/RSK		0.04	0.04	0.01	0.01	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	3/12/2008	BA5875177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100102	McDonough Road	Bridge No. 03032, McDonough Road over Gwynns Falls	Baltimore	BA6055180	08-SF-0265	02-13-09	8/14/2008	RG/ATP		0.17	0.18	0.01	0.09	0.00	0.01	0.00	0.00	0.20	0.02	SHA	No	10/31/2008	BA6055180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100103	MD 150	MD 150 (Eastern Avenue) at Island Point Rd. - Fund 76 Safety and Spot Improvements	Baltimore	BA6645176	08-SF-0373	02-13-09	7/18/2008	RHD/WAF		2.13	2.21	0.08	0.19	0.14	-0.06	0.00	0.06	0.20	0.04	SHA	No	6/18/2009	BA6645176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100104	MD 144	MD 144 from Swim Club Entrance to South Rolling Rd. - Sidewalk and Drainage Improvements	Baltimore	XX5015179	08-SF-0375	02-13-09	5/29/2008	KP/FLG		1.56	1.60	0.07	0.21	0.03	0.04	0.00	0.00	0.20	0.04	SHA	No	7/21/2008	XX5015179C.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100105	I-195	I-195 From I-95 Interchange to US 1 - Noise Abatement	Baltimore	BA7175126	09-SF-0014	02-13-09	8/4/2008	KP/JMT		25.85	25.80	0.09	0.03	0.02	0.07	0.12	0.05	0.20	0.01	SHA	No	1/15/2009	BA7175126.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA100106	US 1	Deck Replacement for Bridge 0300500, US 1 over Sulphur Spring Road	Baltimore	BA5655180	09-SF-0129	02-13-09	12/8/2008	KP/DJW		0.28	0.28	0.00	0.05	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	12/8/2008	BA5655180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100107	MD 131	Replacement of Bridge No. 03358 on MD 131 over Tributary To Roland Run	Baltimore	BA6415180	09-SF-0261	02-13-09	12/23/2008	RHD/BD		0.12	0.12	0.00	0.04	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	8/14/2009	BA6415180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100108	I-695	Replacement of Bridge No. 03139, I-695 over MD 26	Baltimore	BA4625168	09-SF-0372	02-13-09	5/23/2011	BS/SAS		15.54	17.42	2.32	2.70	0.44	1.88	0.00	0.00	0.20	0.54	MDE	Yes	1/13/2010	BA4625168.pdf	030366 - 030368	MDE Approval letter included in WQSS file pdf	2017
BA100109	MD 129	MD 129 From Slade Avenue to Overbrook Road - Sidewalk Improvements	Baltimore	XX6305179	09-SF-0411	02-13-09	5/11/2009	KP/FLG		0.59	0.70	0.11	0.04	0.00	0.11	0.00	0.00	0.20	0.01	SHA	No	5/28/2009	XX6305179B.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100110	US 40	Replacement of Superstructure and Rehabilitation of Conc. Arch Bridge 3109, US 40 over Patapsco River	Baltimore	BA4875180 BA4675180	09-SF-0112	02-13-09	8/17/2008	JGS/JW		3.76	3.99	0.21	0.29	0.02	0.19	0.00	0.00	0.20	0.06	MDE	Yes	7/29/2010	BA4875180.pdf	None Provided - Grass Channel Credit	Temp. Pavement WQSS ignored; MDE Approval letter included in WQSS file pdf	2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
BA100111	MD 144	MD 144 From Baltimore/Howard County Line to E. of River Rd.	Baltimore	AT9815176	09-SF-0327	02-13-09	2/12/2009	KP/JMH		1.52	1.61	0.09	0.06	0.00	0.09	0.00	0.00	0.20	0.01	SHA	No	5/13/2009	AT9815176 (09-SF-0327).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100112	MD 943	MD 943 (Warren Road) from 200' East of I-83 to 300' West of Beaver Dam Rd. (Light Rail)	Baltimore	AT9815176	08-SF-0150	02-13-08	1/11/2008	RHD/FOA		1.49	1.54	0.04	0.04	0.02	0.02	0.00	0.00	0.20	0.01	SHA	No	5/15/2008	AT9815176 (08-SF-0150).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100113	Stevenson Road	Stevenson Road at MD 129A (Brooks Robinson Drive)	Baltimore	AT9815176 BA675B54	08-SF-0289	02-13-09	4/29/2008	KP/ATN		0.66	0.75	0.10	0.07	0.01	0.09	0.00	0.00	0.20	0.01	SHA	No	7/15/2008	AT9815176 (08-SF-0289).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100114	I-83	I-83 Crossover, North of Mt. Carmel Rd. and South of Middletown Rd.	Baltimore	AT9815176	10-SF-0088	2/13/2008	9/14/2009	RHD		0.04	0.04	0.04	0.02	0.04	0.00	0.00	0.00	0.20	0.00	SHA	No	10/6/2009	AT9815176 (10-SF-0088).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA100115	US 1	US 1 (Southwestern Boulevard) from North of Washington Blvd. to Tom Day Blvd.	Baltimore	AT9815176	09-SF-0391	02-13-09	5/5/2009	RHD/CKL		2.50	2.27	0.10	0.00	0.33	-0.23	0.00	0.23	0.20	0.00	SHA	No	5/15/2009	AT9815176 (09-SF-0391).pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA100116	I-695	Interstate Route 695 (Baltimore Beltway) at Charles Street (MD 139) - Interchange Reconstruction	Baltimore	BA9775A72	07-SF-0176	02-13-09	8/20/2010	BGB		34.30	36.72	4.01	3.23	1.46	2.55	0.10	0.00	0.20	0.65	SHA	No	9/16/2008	BA9775A72.pdf	030054 & 030056 & nonstructural credits	Credit in WQSS and on approval letter do not match - used approval letter credit as date is latest. MDE Approval letter included in WQSS file pdf	2017
	Baltimore County Totals												**29.77**	**10.38**					**5.95**							
	Carroll County																									
CL100001	MD 32	MD 32 Improvements at Liberty High School	Carroll	NP	04-SF-0014	02-13-09	8/26/2003	RV/LGT		1.23	1.12	0.01	0.05	0.12	-0.11	0.00	0.11	0.20	0.01	SHA	No	9/18/2003	MD32LibertyHigh.pdf	No SHA Contract Number Present.		2017
CL100002	MD 97	MD 97/MD 850H Roundabout	Carroll	CL8525176	04-SF-0126	02-13-09	2/6/2004	M. Pariaklan		5.63	5.34	0.09	0.07	0.20	-0.11	0.18	0.29	0.20	0.01	SHA	No	8/28/2004	CL8525176.pdf			2017
CL100016	MD 194	Replacement of Bridge No. 6035 over Big Pipe Creek	Carroll	CL7035180	04-SF-0152	02-14-03	11/20/2003	ATN		1.55	1.78	0.36	0.44	0.12	0.24	0.00	0.00	0.20	0.09	SHA	No	9/30/2004	CL7035180.pdf			2017
CL100017	MD 30 (Hampstead Bypass)	MD 30 (Hampstead Bypass) Road Relocation	Carroll	CL4165370	05-SF-0279 05-SF-0069	02-13-08 02-13-09	8/14/2008 1/29/2009	SB/BSN/DM		60.23	92.68	34.32	2.66	1.45	32.87	0.00	0.00	0.20	0.53	SHA	No	5/5/2009	CL4165370.pdf	060011 - 060023	Grass channel credit; MDE Approval letter included in WQSS file pdf	2017
CL100018	MD 32	MD 32 from South of MacBeth Way to MD 26 - Safety, Resurfacing, Widening & Drainage Improvements	Carroll	CL3115187	06-SF-0311	02-13-09	5/23/2007	GH/CJB		7.14	7.07	0.33	0.56	0.38	-0.05	0.00	0.05	0.20	0.11	SHA	No	11/16/2007	CL3115187.pdf	060004 - sandfilter	MDE Approval letter included in WQSS file pdf	2017
CL100019	MD 27	MD 27 from Ridge Avenue to 1300' North of Center Street	Carroll	CL3265176	08-SF-0007	02-13-09	12/18/2008	RHD/RSK		10.72	12.29	1.57	0.09	0.03	1.54	0.00	0.00	0.20	0.02	SHA	No	12/23/2009	CL3265176.pdf	60024	MDE Approval letter included in WQSS file pdf	2017
CL100020	MD 97	Salt Storage Facility at the SHA Westminister Shop	Carroll	CL3395129	08-SF-0132	02-13-09	10/1/2007	CAL/RGB		0.35	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.20	0.07	SHA	No	2/28/2008	CL3395129.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CL100021	MD 26	MD 26 at Klee Mill Road/MD 850 (Old Liberty Road) - Widening and Resurfacing	Carroll	CL3145130 CL3145168	08-SF-0352	02-13-09	12/17/2008	KP/JMA		8.35	8.46	0.32	0.55	0.00	0.32	0.21	0.00	0.20	0.11	SHA	No	6/8/2009	CL3145130.pdf	060350 - grass swale	MDE Approval letter included in WQSS file pdf	2017
CL100022	MD 97	Replacement of Deck for Bridge 06050 on MD 97 over Morgan Run	Carroll	CL3495180	09-SF-0282	02-13-09	12/12/2008	RHD/RB		1.35	1.35	0.00	0.25	0.00	0.00	0.00	0.00	0.20	0.05	SHA	No	2/11/2009	CL3495180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CL100023	MD 140	MD 140 at Gorsuch Road - Intersection Improvements	Carroll	CL4385187	09-SF-0285	02-13-09	6/15/2009	RHD/RSK		0.95	1.11	0.16	0.02	0.00	0.16	0.00	0.00	0.20	0.00	SHA	No	12/1/2009	CL4385187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CL100024	MD 27	MD 27 at MD 140 Interchange - Ramp Widening	Carroll	CL3225168	09-SF-0347	02-13-09	4/22/2009	RHD/GWF		1.63	1.84	0.21	0.14	0.11	0.10	0.00	0.00	0.20	0.03	SHA	No	6/11/2009	CL3225168.pdf	60161	MDE Approval letter included in WQSS file pdf	2017
CL100025	MD 140	MD 140 From MD 382 to Harney Road	Carroll	CL6955184	06-SF-0295	02-14-03	8/14/2006	Minami		0.00	0.00	0.25	8.64	0.08	0.17	2.62	2.45	0.20	1.73	SHA	No	1/17/2008	CL6955184.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
CL100026	MD 832	Replacement of Deck for Bridge 6025 on MD 832 (Taneytown Road) over Big Pipe Creek	Carroll	CL3245180	07-SF-0088	02-14-03	8/3/2006	SCP		0.00	0.00	0.01	0.07	0.00	0.01	0.00	0.00	0.20	0.01	SHA	No	1/16/2007	CL3245180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CL100027	MD 140	MD 140 @ Sandymount Road - Extension of Left Turn Lanes	Carroll	CL3445187	08-SF-0144	02-14-03	1/25/2010	KRP/MAJ		0.93	1.21	0.28	0.20	0.03	0.25	0.00	0.00	0.20	0.04	SHA	No	3/11/2010	CL3445187.pdf	060366-060369 - grass channel credit/swales	MDE Approval letter included in WQSS file pdf	2017
CL100028	MD 31	MD 31 - High Street Extended	Carroll	CL3005184	06-SF-0195	02-14-03	4/21/2006	P. Solliday		5.35	6.55	1.25	0.71	0.34	0.91	0.00	0.00	0.20	0.14	SHA	No	3/8/2006	CL3005184.pdf	6002	MDE Approval letter included in WQSS file pdf	2017
	Carroll County Totals												**14.80**	**2.86**					**2.96**							
	Cecil County																									
CE100006	US 301 @ MD 299	Truck Weigh and Inspection Pull off	Cecil	CE3165123	04-SF-0115	02-13-06	12/13/2004	Tony Brudis		9.25	15.41	6.41	0.17	0.00	6.41	0.00	0.00	0.20	0.03	SHA	No	12/13/2004	CE3165123.pdf			2017
CE100008	MD 213	MD 213 at Basil Avenue	Cecil	CE8035176	06-SF-0033	02-13-06	10/13/2005	KRP/SBP		0.31	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.20	0.06	SHA	No	12/7/2005	CE8035176.pdf			2017
CE100010	MD 7	Replacement of Bridge 7006 on MD 7 over Mill Creek	Cecil	CE7825180	05-SF-0282	02-13-06	2/9/2006	DJW		4.89	5.04	0.15	0.73	0.00	0.15	0.00	0.00	0.20	0.15	SHA	No	4/26/2006	CE7825180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE100011	MD 7D	MD 7D from MD 213 to End of State Maintenance	Cecil	CE3185177	06-SF-0105	02-13-06	11/12/2008	KP/GAI		4.38	4.16	0.10	0.92	0.25	-0.15	0.08	0.23	0.20	0.18	SHA	No	11/25/2008	CE3185177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE100012	MD 7D	MD 7D from Big Elk Creek to Creswell Ave.	Cecil	CE3405177	09-SF-0096	02-13-06	1/26/2009	JGK/KCI		1.52	1.52	0.00	0.54	0.00	0.00	0.00	0.00	0.20	0.11	SHA	No	8/14/2009	CE3405177.pdf	Grass channel credit - additional treatment NOT credited to WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE100013	MD 545	Prestressed Concrete Girder Bridge 7055 on MD 545 over Little Elk Creek	Cecil	CE3335180	09-SF-0460	02 -13-06	9/14/2010	RHD/DJW		0.30	0.36	0.06	0.21	0.00	0.06	0.00	0.00	0.20	0.04	SHA	No	10/14/2010	CE3335180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE100014	US 301	US 301 NB Weigh Station and Inspection Facility	Cecil	DelDOT 23-500-38	N/A	02-13-06	6/18/2007	RHD/SKH		0.18	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.20	0.04	SHA	No	6/25/2007	DelDOT 23-500-38.pdf	None - Debit from WQ bank		2017
CE100015	MD 222	MD 222 / Blythedale Road Ride Sharing Facility Expansion	Cecil	CE3415168	09-SF-0218	02-13-06	2/6/2009	DJW		0.98	1.19	0.21	0.00	0.00	0.21	0.00	0.00	0.20	0.00	SHA	No	3/26/2009	CE3415168.pdf	070788 - Bioretention	*GIS team verified in the field & will add to NPDES layer* MDE Approval letter included in WQSS file pdf	2017
CE100016	US 301	SB US 301 Truck Weigh and Inspection Station - Well, Septic, and Inspection Pit	Cecil	CE3465123	08-SF-0323	02-13-06	6/24/2008	Tony Brudis		0.05	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	2/11/2009	CE3465123.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
	Cecil County Totals												**3.11**	**0.25**					**0.62**							
	Charles County																									
CH100001	MD 5 Relocated	Expansion of Park and Ride	Charles	CH6445181	04-SF-0111	02-14-01	8/1/2004	TJW		3.61	5.87	2.12	0.07	0.05	2.07	0.00	0.00	0.20	0.01	SHA	No	9/10/2004	CH6445181.pdf			2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
CH100005	US 301	US 301 at Billingsley Road - Left Turn Bay Extension	Charles	CH3595130	10-SF-0264	02-14-01	4/16/2010	RD/DFD		8.04	8.22	0.18	0.30	0.00	0.18	0.00	0.00	0.20	0.06	SHA	No	4/21/2010	CH3595130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CH100006	US 301	US 301 North of MD 257 Median Crossover	Charles	CH6635176	04-SF-0063 04-SF-0065	02-14-01	11/26/2003	CAL/PU		0.81	0.89	0.08	0.04	0.00	0.08	0.00	0.00	0.20	0.01	SHA	No	1/23/2006	CH6635176.pdf	080002 - dry swale	MDE Approval letter included in WQSS file pdf	2017
	Charles County Totals												0.41	0.05					0.08							
	Frederick County																									
FR100021	US 15 From Rosemont Ave. to US 40	Widening, Accel. Lane Extension and Safety Improvements	Frederick	FR4395176	05-SF-0089	02-14-03	12/8/2004	CL/GWF		3.52	3.86	0.34	0.60	0.00	0.34	0.25	0.00	0.20	0.12	SHA	No	2/15/2005	FR4395176.pdf			2017
FR100022	I-70 (Phase 2B/2C)	Interstate Route 70 - E of MD 144 to W of MD 355	Frederick	FR4265172	01-SF-0431	02-14-03	11/1/2002	RAJA		50.05	83.11	68.02	1.00	36.24	31.78	0.00	0.00	0.20	0.20	SHA	No	7/8/2005	FR4265172.pdf			2017
FR100023	MD 874C	Replacement of Bridge No. 10043 Over Ben's Branch	Frederick	FR3965180	03-SF-0364	02-14-03	5/29/2003	ATN		0.30	0.33	0.03	0.05	0.00	0.03	0.00	0.00	0.20	0.01	SHA	No	10/26/2004	FR3965180.pdf			2017
FR100025	MD 17	Replacement of Bridge Nos. 10068, 10068, & 10071 over Middle Creek	Frederick	FR3375180	04-SF-0159	02-14-03	3/29/2004	RK/GWF		1.92	1.93	0.08	0.37	0.08	0.00	0.00	0.00	0.20	0.07	SHA	No	6/14/2004	FR3375180.pdf			2017
FR100028	MD 550	MD 550 at Owens	Frederick	FR4525175	05-SF-0142	02-14-03	1/20/2005	B. Nelson		0.66	0.65	0.19	0.10	0.00	0.19	0.19	0.00	0.20	0.02	SHA	No	5/26/2005	FR4525175.pdf			2017
FR100030	US 340	Expansion of Park and Ride Lot at US 340 and Lander Road	Frederick	FR5035181	06-SF-0151	02-14-03	5/3/2006	TRE/CSN		2.65	2.89	0.24	0.10	0.02	0.22	0.00	0.00	0.20	0.02	SHA	No	5/22/2006	FR5035181.pdf	100009 - Dry swale & Debit from WQ Bank	MDE Approval letter included in WQSS file pdf	2017
FR100031	MD 351	MD 351 Roundabout at Elmer Derr Road	Frederick	FR5125130	08-SF-0105	02-14-03	4/11/2008	RSK/DJW		1.25	2.21	0.96	0.98	0.00	0.96	0.00	0.00	0.20	0.20	MDE	Yes	1/21/2010	FR5125130.pdf	10134		2017
FR100032	I-70	I-70 Eastbound Ramp to MD 75 Ramp Widening	Frederick	FR5845187	10-SF-0044	02-14-03	9/21/2009	RHD/CSF		0.41	0.51	0.10	0.11	0.00	0.10	0.00	0.00	0.20	0.02	MDE	Yes	6/30/2010	FR5845187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100033	MD 464	MD 464 (Sauder Road) from Maple Avenue to Second Avenue	Frederick	FR6235179	10-SF-0112	02-14-03	10/9/2009	RHD/GLG		0.00	0.22	0.22	0.00	0.00	0.22	0.00	0.00	0.20	0.00	MDE	Yes	1/7/2010	FR6235179.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100034	MD 80	MD 80 @ Ijamsville Rd./Big Woods Road - Intersection Reconstruction	Frederick	FR4785176	06-SF-0201	02-14-03	10/3/2008	CEI		1.11	3.08	1.57	0.86	0.19	1.38	0.00	0.00	0.20	0.17	SHA	No	10/21/2008	FR4785176.pdf	Debit from WQ bank & 101694- grass channel	*GIS team field verified grass channel and added to NPDES layer. *MDE Approval letter included in WQSS file pdf	2017
FR100035	I-270	I-270 Southbound, Auxiliary Lane Extension: I-70 to MD 85	Frederick	FR4955187	07-SF-0041	02-14-03	9/1/2006	B. Scott		196.91	197.55	0.64	0.47	0.00	0.64	0.00	0.00	0.20	0.09	SHA	No	11/20/2006	FR4955187.pdf	100120 - Micropool ED pond	MDE Approval letter included in WQSS file pdf	2017
FR100036	I-270	I-270 Northbound from Bennett Creek to MD 80 - Safety and Resurfacing	Frederick	FR4535177	07-SF-0047	02-14-03	5/4/2006	KP/ETK		1.06	1.07	0.14	0.04	0.00	0.14	0.13	0.00	0.20	0.01	SHA	No	11/11/2008	FR4535177.pdf	None - Debit from WQ bank & IA Reduction	MDE Approval letter included in WQSS file pdf	2017
FR100037	MD 28	Replacement of Bridge 10016 on MD 28 Over Washington Run	Frederick	AX4695180 FR4455180	08-SF-0023	02-14-03	9/12/2007	KP/TB		1.99	2.14	0.20	1.26	0.05	0.15	0.00	0.00	0.20	0.25	SHA	No	7/1/2008	FR4455180.pdf	None - Debit from WQ bank & nonstructural credits	MDE Approval letter included in WQSS file pdf	2017
FR100038	I-70	I-70 South Mountain Welcome Center Wastewater Treatment Facility Upgrade	Frederick	FR5325327	08-SF-0074	02-14-03	10/9/2007	SP/HG		0.80	1.39	0.59	0.24	0.00	0.59	0.00	0.00	0.20	0.05	SHA	No	1/4/2008	FR5325327.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100039	MD 180	MD 180 over a Tributary to Potomac River - Small Structure & Retaining Walls	Frederick	FR3815180	08-SF-0151	02-14-03	11/24/2008	KP/GAI		28.39	28.44	0.05	0.08	0.00	0.05	0.00	0.00	0.20	0.02	SHA	No	1/26/2008	FR3815180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100040	I-270	Steel Girder Bridge 10080 on I-270 Over Dr. Perry Road	Frederick	FR3825280	08-SF-0190	02-14-03	3/17/2008	RD/RD		6.60	6.80	0.20	1.74	0.00	0.20	0.00	0.00	0.20	0.35	SHA	No	7/3/2008	FR3825280.pdf	100135 - dry swale	MDE Approval letter included in WQSS file pdf	2017
FR100041	US 15	US 15 SB - Resurfacing from North of Bridge 10182 to MD 26	Frederick	FR6215168 FR6215177	09-SF-0300	02-14-03	3/2/2009	RHD/CSN		55.00	55.00	0.00	0.12	0.00	0.00	0.00	0.00	0.20	0.02	SHA	No	3/5/2009	FR6215168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100042	I-270 Park and Ride	MD 80/I-270 Expansion of Existing Park and Ride Facility	Frederick	FR5675181	08-SF-0211	02-14-03	4/11/2008	B.Benda		15.01	15.91	0.90	0.36	0.00	0.90	0.00	0.00	0.20	0.07	SHA	No	7/23/2008	FR5675181.pdf	10010	MDE Approval letter included in WQSS file pdf	2017
FR100043	I-70	I-70 Westbound from Structure 1013800 to Structure 1012700 (Hollow Road) - Safety Improvements & Resurfacing	Frederick	FR4895177	08-SF-0219	02-14-03	10/6/2008	RD/LMM		3.60	3.88	0.28	0.00	0.00	0.28	0.00	0.00	0.20	0.00	SHA	No	1/15/2009	FR4895177.pdf	100143 & 100144	MDE Approval letter included in WQSS file pdf	2017
FR100044	US 340	US 340/ US 15 Ride Sharing Facility	Frederick	FR5955181	08-SF-0313	02-14-03	8/31/2009	KP/RSK		0.67	1.32	0.65	0.00	0.00	0.65	0.00	0.00	0.20	0.00	SHA	No	6/15/2010	FR5955181.pdf	100153	MDE Approval letter included in WQSS file pdf	2017
FR100045	MD 464	Replacement of Bridge 10091 on MD 464 over Catoctin Creek	Frederick	FR5395180	09-SF-0396	02-14-03	9/28/2009	RHD/CSF		0.45	0.54	0.09	0.11	0.00	0.09	0.00	0.00	0.20	0.02	SHA	No	1/12/2010	FR5395180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100046	US 15	US 15 (Catoctin Mountain Highway) at Hayward Road - Intersection Improvement	Frederick	FR6105176 FR6415176	10-SF-0131	02-14-03	7/8/2008	RHD/RSK		1.62	1.30	0.11	0.23	0.09	0.02	0.34	0.32	0.20	0.05	MDE	Yes	6/18/2010	FR6415176.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf; Per SHA WQ bank database, same project with two different contract numbers	2017
FR100047	MD 28	Replacement of Bridge 10014 on MD 28 over Tuscarora Creek	Frederick	FR3805180	05-SF-0249	02-14-03	6/16/2006	FGS/SBP		1.05	1.15	0.09	0.41	0.00	0.09	0.00	0.00	0.20	0.08	SHA	No	1/16/2007	FR3805180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR100048	I-70	I-70 Welcome Center Reconstruction	Frederick	FR5325127	07-SF-0118	02-14-03	11/28/2006	KRP/RMF		6.26	7.31	2.17	0.65	1.12	1.05	0.00	0.00	0.20	0.13	SHA	No	2/26/2009	FR5325127.pdf	100131 & 100132 - Wet ED ponds	SHA only has the LOI and conditional approval & WQSS	2017
	Frederick County Totals												9.88	37.79					1.98							
	Harford County																									
HA100001	MD 23	MD 23 at Park and Ride/Tucker Field	Harford	AT2555179	03-SF-0275	02-13-07	2/20/2003	F. Grabowski		0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.20	0.00	SHA	No	3/17/2003	AT2555179.pdf			2017
HA100002	MD 646	Replacement of Small Structures over MD 646 over Tributaries of Broad Creek	Harford	HA2335180	02-SF-0123	02-12-02	2/12/2002	NP		0.00	0.00	0.02	0.14	0.00	0.02	0.00	0.00	0.20	0.03	SHA	No	2/12/2002	HA2335180.pdf			2017
HA100008	MD 23	From Spenceola Parkway to South of Old Jarretsville Road	Harford	HA2165177	04-SF-0012	02-13-07	11/7/2003	FGS/SA		6.54	6.67	0.13	0.26	0.00	0.13	0.00	0.00	0.20	0.05	SHA	No	12/18/2003	HA2165177.pdf			2017
HA100020	MD 155	MD 155 from Lapidum Road to US 40	Harford	HA2625177	04-SF-0258	02-12-02	11/5/2004	JMA		7.78	7.78	0.00	0.47	0.00	0.00	0.00	0.00	0.20	0.09	SHA	No	12/16/2004	HA2625177.pdf			2017
HA100022	MD 155	MD 155 from McCommons Road to I-95 - Resurface and Rehabilitation	Harford	HA2955177	06-SF-0091	02-13-07	1/11/2006	RSK/CAL		17.30	17.30	0.00	0.18	0.00	0.00	0.00	0.00	0.20	0.04	SHA	No	5/10/2006	HA2955177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100023	MD 136	Replacement Bridge 12034 on MD 136 Over James Run	Harford	HA2025180	06-SF-0025	02-13-07	8/1/2005	SCP		0.15	0.20	0.05	0.11	0.00	0.05	0.00	0.00	0.20	0.02	SHA	No	2/15/2006	HA2025180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100024	MD 147/US 1	MD 147/US 1 (Bus) from North of MD 152 to South of Tollgate Road	Harford	HA2805177	05-SF-0253	02-13-07	3/20/2005	KP/MAW		1.00	0.86	0.00	0.10	0.00	0.00	0.14	0.14	0.20	0.02	SHA	No	4/13/2005	HA2805177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
HA100025	MD 924	MD 924 from MacPhail Road to Ring Factory Road	Harford	HA2255176	02-SF-0256	02-13-07	5/11/2005	CAL/ATN		4.47	4.76	0.49	0.08	0.00	0.49	0.21	0.00	0.20	0.02	SHA	No	1/20/2005	HA2255176.pdf	122001-wet extended detention pond	MDE Approval letter included in WQSS file pdf	2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
HA100026	MD 924	MD 924 (Main St.) from MD 22 (Fulford Ave) to Gordon St. - Design Build Water Main	Harford	HA1865184	05-SF-0243	02-13-07	10/24/2005	AW/KGH		3.99	3.98	0.02	2.48	0.12	-0.10	0.00	0.10	0.20	0.50	Consultant	No	3/30/2007	HA1865184.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf **Note, 1st WQSS is latest/final which matches MDE approval of Modification showing debit**	2017
HA100027	US 1	US 1 at Connelly Road and MD 147 - Road and Intersection Improvements	Harford	HA2525176	03-SF-0373	02-13-07	6/20/2007	KRP/JAF		9.68	10.17	0.49	0.60	0.00	0.49	0.25	0.00	0.20	0.12	SHA	No	10/26/2007	HA2525176.pdf	120204 - dry swale & 120205 - wet swale	MDE Approval letter included in WQSS file pdf	2017
HA100028	MD 24	Bushes Corner Salt Barn - Additional Paving	Harford	HA3105129R HA3105129 (HA310A21)	08-SF-0346	02-12-02	8/27/2010	KRP/DJW		1.07	1.25	0.21	0.92	0.00	0.21	0.00	0.00	0.20	0.18	SHA	No	8/31/2010	HA3105129R.pdf	120206	MDE Approval letter included in WQSS file pdf	2017
HA100029	MD 7A	MD 7A from Old Bay Line to Union Avenue	Harford	HA2985177	06-SF-0208	02-12-02	3/20/2006	CAL/RJM		6.11	6.13	0.02	0.20	0.00	0.02	0.00	0.00	0.20	0.04	SHA	No	3/24/2006	HA2985177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100030	MD 24	MD 24 Northbound from CSX Bridge 12070 to US 40 Connector Road	Harford	HA3015175	06-SF-0218	02-13-07	2/6/2006	JR/JDC		0.50	0.50	0.00	0.10	0.00	0.00	0.00	0.00	0.20	0.02	SHA	No	5/15/2006	HA3015175.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100031	MD 755	MD 755 from MD 24 to Willoughby Beach Drive	Harford	HA1315184	06-SF-0265	02-13-07	3/17/2006	SA/KCI		10.14	10.66	0.59	0.48	0.07	0.52	0.00	0.00	0.20	0.10	SHA	No	3/14/2008	HA1315184.pdf	120208 - sand filter	MDE Approval letter included in WQSS file pdf	2017
HA100032	MD 23	Replacement of Bridge 12064 on MD 23 over Morse Road	Harford	HA2835180	07-SF-0104	02-13-07	11/6/2006	CAL/TB		0.34	0.35	0.06	0.29	0.00	0.06	0.00	0.00	0.20	0.06	SHA	No	12/4/2006	HA2835180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100033	MD 924	MD 924 (Main St.) from 300 Feet South of Broadway to Maulsby Avenue; Sidewalk Construction	Harford	XX5015179	07-SF-0279	02-13-07	6/5/2007	RD/FG		0.14	0.16	0.03	0.13	0.01	0.02	0.00	0.00	0.20	0.03	SHA	No	6/22/2007	XX5015179.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100034	MD 924	MD 924 (Main St.) from St. Clair Drive to Woodsdale Road	Harford	HA2825176	08-SF-0139	02-13-07	1/31/2008	SP/WJ		13.74	14.80	0.82	0.43	0.02	0.80	0.00	0.00	0.20	0.09	SHA	No	5/19/2008	HA2825176.pdf	120207	MDE Approval letter included in WQSS file pdf	2017
HA100035	MD 159	Bridge 12039 on MD 159 Over Cranberry Run	Harford	HA2685180	08-SF-0171	02-13-07	12/5/2007	RHD/CSF		0.12	0.14	0.02	0.10	0.00	0.02	0.00	0.00	0.20	0.02	SHA	No	6/18/2008	HA2685180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100036	MD 462	MD 462 from MD 132 to Bridge over Carsins Run	Harford	HA3125168	11-SF-0086	02-13-07-06	10/18/2010	JMT/Doran		0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.20	0.00	SHA	No	10/18/2010	HA3125168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
HA100037	MD 543	MD 543 (Fountain Green Road) from Wheel Road to MD 22 (Churchville Road)	Harford	HA3285177	09-SF-0272	02-13-08	2/4/2009	KP/FG		10.20	10.18	0.00	0.00	0.00	0.00	0.02	0.02	0.20	0.00	SHA	No	2/20/2009	HA3285177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
HA100038	MD 763	MD 763 from East of Ohio Avenue to Juniata Street - Sidewalk Improvements	Harford	XX6305179	09-SF-0438	02-12-02	5/15/2009	KP/FLG		0.68	0.73	0.05	0.04	0.00	0.05	0.00	0.00	0.20	0.01	SHA	No	6/10/2009	XX6305179.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
	Harford County Totals												**7.11**	**0.23**					**1.42**							
	Howard County																									
HO100022	MD 99	MD 99 at Mt. Hebron Dr. and Maple Rock Dr. - Intersection Improvements	Howard	HO8285176	01-SF-0359	02-13-09	1/30/2003	RJM		1.33	1.89	0.63	0.00	0.00	0.63	0.00	0.00	0.20	0.00	SHA	No	2/6/2003	HO8285176.pdf	None Provided - Grass Channel Credit	MDE Approval letter included in WQSS file pdf.	2017
HO100023	MD 32	MD 32 at I-70 Park and Ride Expansion and Roadway Widening	Howard	HO3105181	05-SF-0141	02-13-11	1/4/2005	ATN		1.27	1.67	0.40	0.07	0.00	0.40	0.00	0.00	0.20	0.01	SHA	No	2/16/2005	HO3105181.pdf	130286-grass swale; 130263-sand filter; WQ bank debit	MDE Approval letter included in WQSS file pdf.	2017
HO100024	US 40	US 40 at Ridge Road - Lane Improvements	Howard	HO6875176	04-SF-0122	02-13-09	11/7/2003	FGS/JK		4.09	4.09	0.00	0.23	0.00	0.00	0.00	0.00	0.20	0.05	SHA	No	12/14/2004	HO6875176.pdf	WQ bank debit, no BMP	MDE Approval letter included in WQSS file pdf.	2017
HO100025	US 1	US 1 at CSX Railraod Structure to the Baltimore County Line - Resurfacing and Drainage Improvements	Howard	HO6915177	04-SF-0221	02-13-09	6/17/2004	CAL/GF		4.35	4.34	0.00	0.04	0.03	-0.03	0.00	0.03	0.20	0.01	SHA	No	10/19/2004	HO6915177.pdf	IA Reduction, no BMP	MDE Approval letter included in WQSS file pdf.	2017
HO100026	MD 108	MD 108 from Howard High School to Centre Park Drive - Lane Widening	Howard	HO3215176	06-SF-0156	02-13-09	12/X/2006	NP		0.91	1.03	0.12	0.11	0.00	0.12	0.00	0.00	0.20	0.02	SHA	No	1/19/2007	HO3215176.pdf	WQ bank debit, no BMP	MDE Approval letter included in WQSS file pdf.	2017
HO100027	US 40	US 40 at MD 144/Pebble Beach Drive - Widening for Double Left Turn Lane	Howard	HO3205176	06-SF-0300	02-13-09	11/30/2005	DW		0.92	1.14	0.18	0.14	0.00	0.18	0.00	0.00	0.20	0.03	SHA	No	9/7/2006	HO3205176.pdf	13402-sand filter	SWMFAC not currently in NPDES layer - GIS team will update. MDE Approval letter included in WQSS file pdf.	2017
HO100028	US 29	US 29 at Old Columbia Road	Howard	HO3735130	07-SF-0236	02-13-11	9/20/2007	RHD/JMA		3.90	3.77	0.07	0.06	0.20	-0.13	0.00	0.13	0.20	0.01	SHA	No	6/23/2008	HO3735130.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
HO100029	MD 175	MD 175 Westbound from Dobbin Road to US 29	Howard	HO3715177	08-SF-0108	02-13-11	1/30/2008	RHD/CSN		0.03	0.03	0.03	0.00	0.00	0.03	0.03	0.00	0.20	0.00	SHA	No	2/19/2008	HO3715177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100030	I-70	I-70 West Friendship Truck Weigh Station - Geometric Improvements	Howard	HO4285123	09-SF-0007	02-13-11	9/25/2008	Tony Brudis		0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.00	0.20	0.01	SHA	No	12/11/2008	HO4285123.pdf	130443-dry swale	MDE Approval letter included in WQSS file pdf.	2017
HO100031	MD 99	MD 99 from Dorchester Way West to Mckenzie Road - ADA Sidewalk Retrofits	Howard	AX3755133 HO414A53	08-SF-0086	02-13-09	10/5/2007	RHD/DJW		0.14	0.10	0.01	0.00	0.05	-0.04	0.00	0.04	0.20	0.00	SHA	No	11/7/2007	HO41453-AX3755133.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
HO100032	MD 108	MD 108 from Mellebrook Rd. to West of Phelps Luck Dr. - Sidewalk Reconstruction and ADA Ramp Retrofits	Howard	HO414A54 AX3755133	08-SF-0178	02-13-09	10/29/2007	DJW/CDG		0.25	0.27	0.04	0.00	0.02	0.02	0.00	0.00	0.20	0.00	SHA	No	1/18/2008	HO414A54-AX3755133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100033	US 1	US 1 from Loudon Ave. to Montgomery Road - ADA Sidewalk Retrofits	Howard	AX3755133 HO414A5A3735176 HO414A5A	08-SF-0209	02-13-09	1/23/2008	RHD/JJS		0.33	0.34	0.04	0.00	0.03	0.01	0.00	0.00	0.20	0.00	SHA	No	11/25/2008	AX3755133-HO414A5A3735176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100034	MD 103	MD 103 from MD 100 to MD 104 - ADA Sidewalk Retrofit	Howard	AX3755133 HO414A57	08-SF-0227	02-13-09	4/3/2008	RHD/JJS		0.46	0.47	0.07	0.00	0.06	0.01	0.00	0.00	0.20	0.00	SHA	No	8/21/2008	AX3755133-HO414A57.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100035	US 1	US 1 from 500' South of Freestate Dr. to 800' South of Mission Rd. - ADA Sidewalk Retrofit	Howard	HO414A56 AX3755133	08-SF-0291	02-13-11	4/15/2008	AR		0.17	0.20	0.04	0.00	0.01	0.03	0.00	0.00	0.20	0.00	SHA	No	5/8/2008	HO414A56-AX3755133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100036	US 40	US 40 from Pebble Beach Road to Dogwood Drive - ADA Sidewalk Retrofit	Howard	HO414A55 AX3755133	08-SF-0294	02-13-11	3/24/2008	RHD/JJS		0.16	0.20	0.04	0.00	0.00	0.04	0.00	0.00	0.20	0.00	SHA	No	4/11/2008	HO414A55-AX3755133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100037	US 29	Replacement of Deck for Bridge 1304802 on US 29 Southbound over I-70	Howard	HO4265180	09-SF-0067	02-13-09	8/22/2008	RHD/DJW		0.12	0.12	0.00	0.02	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	9/23/2008	HO4265180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100038	MD 32	MD 32 from 4000' West of I-95 to 2500' East of I-95 - Resurfacing and Safety Improvements	Howard	HO3305177	06-SF-0009	02-13-11	10/13/2005	TRE/CSN		19.20	19.20	0.00	0.54	0.00	0.00	0.00	0.00	0.20	0.11	SHA	No	1/25/2006	HO3305177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
HO100039	MD 32	MD 32 at I-70 Interchange - Extend Existing Turning Lanes	Howard	HO3495176 HO3495187	06-SF-0038	02-13-11	8/23/2005	JA/GWF		1.60	1.72	0.12	0.06	0.00	0.12	0.00	0.00	0.20	0.01	SHA	No	11/21/2006	HO3495187.pdf	130401-dry swale	MDE Approval letter included in WQSS file pdf. Using SHA contract number from MDE approval letter.	2017
HO100040	MD 216	MD 216 Relocated From East of US 29 to West of I-95	Howard	HO3065171 102-129 (2002)	01-SF-0093	02-13-11	12/12/2002	RKK		8.10	25.08	17.32	0.00	1.36	15.96	0.00	0.00	0.20	0.00	SHA	No	7/8/2004	HO3065171.pdf	Grass Swales: 13256, 13257, 13260-13262; Sand Filters: 13246, 13250-13251, 13255, 13258-13259; Dry Swales: 13247-13249, 13252-13254	MDE Approval letter included in WQSS file pdf.	2017
HO100041	MD 100	MD 100 at I-95 (NW Quad) and MD 100 at Meadowridge Road - SWM Facility	Howard	HO3145125 HO3145174	04-SF-0005 04-SF-0002	02-13-09	7/19/2004	RJM/RSK		8.68	7.80	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	10/20/2004	HO3145125 HO3145174.pdf	13217 & 13210 and debit from WQ bank.	SHA contract & MDE SF numbers do not match between MDE approval & WQSS; debit amount matches on both. No resolution obtained from WQ bank database. Since no MS4 credit anyway, research stopped	2017
	Howard County Totals												**1.33**	**1.76**					**0.27**							
	Montgomery County																									
MO100001	MD 650 (South View to Norwood)	Sidewalk Installation or Replacement	Montgomery	AT3035179	03-SF-0083	02-14-02	9/23/2002	Frank Grabowski		0.00	0.00	0.20	0.00	0.00	0.20	0.00	0.00	0.20	0.00	SHA	No	12/4/2002	AT3035179.pdf			2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F		L										
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
MO100002	MD MD 410 (East West Highway) Beach Drive to Meadowbrook Lane	Sidewalk	Montgomery	AT3035179	03-SF-0198	02-14-02	1/2/2003	F. Grabowski		0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.20	0.00	SHA	No	1/23/2003	AT3035179.pdf			2017
MO100003	MD 355	Side Walk Replacement	Montgomery	AT4305177	04-EX-0001	02-14-02	6/25/2003	F. Grabowski		0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	7/7/2003	AT4305177.pdf			2017
MO100008	I-495 at Old Georgetown Road (MD 187)	I-495 at Old Georgetown Road	Montgomery	MO8045180	01-SF-0148	02-14-02	12/16/2003	NP		20.17	21.15	2.81	2.81	2.81	0.00	0.00	0.00	0.20	0.56	SHA	No	12/16/2003	MO8045180.pdf			2017
MO100010	MD 547	Garret Park Street Scape	Montgomery	MO7835184	03-SF-0039	02-14-02	8/20/2002	KCI Technologies		0.00	0.00	0.98	0.00	0.00	0.98	0.00	0.00	0.20	0.00	SHA	No	2/26/2003	MO7835184.pdf			2017
MO100011	MD 97	From Belvedere Blvd. to Tilton Drive	Montgomery	MO6405187	03-SF-0135	02-14-02	11/4/2002	S. Phillips		0.86	0.92	0.07	0.01	0.01	0.06	0.00	0.00	0.20	0.00	SHA	No	2/2/2004	MO6405187.pdf			2017
MO100012	I-270	I-270 SB Ramp at Middlebrook Road	Montgomery	MO821A21	03-SF-0234	02-14-02	1/3/2003	Jason Alwine		0.76	0.76	0.00	0.22	0.00	0.00	0.00	0.00	0.20	0.04	SHA	No	5/12/2004	MO821A21.pdf			2017
MO100013	MD 115	MD 115 Improvements	Montgomery	MO9105171	04-SF-0016	02-14-02	12/23/2003	AW/JDC		1.52	2.64	1.22	1.43	0.12	1.10	0.00	0.00	0.20	0.29	SHA	No	3/9/2004	MO9105171.pdf			2017
MO100014	I-495 (Capital Beltway)	From MD 97 to I-270 Spur Safety and Resurfacing	Montgomery	MO6935177	04-SF-0058	02-14-02	9/9/2003	R. Sobbott		1.00	0.00	0.00	1.35	0.00	0.00	0.31	0.31	0.20	0.27	SHA	No	1/14/2004	MO6935177.pdf			2017
MO100015	MD 320	Resurfacing MD 320 From MD 193 to MD 650	Montgomery	MO3215177	04-SF-0073	02-14-02	9/19/2003	Trout/Sobbott		0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.20	0.00	SHA	No	3/11/2004	MO3215177.pdf			2017
MO100016	MD 28	Resurfacing Project	Montgomery	MO8905177	04-SF-0114	02-14-02	3/10/2004	G&O		1.65	2.30	0.07	0.58	0.00	0.07	0.00	0.00	0.20	0.12	SHA	No	8/4/2004	MO8905177.pdf			2017
MO100018	US 29	US 29 Safety and Resurfacing From MD 97 to I-95/I-495	Montgomery	MO685A21	04-SF-0145	02-14-02	12/5/2003	LGT/Jacobs		3.72	3.78	0.06	0.04	0.00	0.06	0.00	0.00	0.20	0.01	SHA	No	5/17/2004	MO685A21.pdf			2017
MO100021	MD 190, I-495	Rehabilitation of Bridges 15109 and 15110; Ramps A and N	Montgomery	MO8845180	05-SF-0097	02-14-03	8/6/2004	BS/JDC		3.68	3.85	0.17	0.33	0.00	0.17	0.00	0.00	0.20	0.07	SHA	No	11/12/2004	MO8845180.pdf			2017
MO100047	MD 182	MD 182 (Layhill Road) at Norwood Road	Montgomery	MO8215171	00-SF-0180	02-14-02	4/10/2000	NP		0.00	0.00	0.31	0.00	0.00	0.31	0.00	0.00	0.20	0.00	Consultant	No	4/28/2000	MO8215171.pdf			2017
MO100052	MD 586	MD 586 from Andrew Street to MD 193 - Safety and Resurfacing	Montgomery	MO2125177	10-SF-0334	02-14-02	4/26/2010	SH/KAP		0.11	0.12	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	MDE	Yes	5/10/2010	MO2125177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100053	MD 193	MD 193 from Arcola Ave. to US 29 - Safety and Resurfacing	Montgomery	MO0945177 MO2945168	09-SF-0169	02-14-02	4/30/2009	RJM		0.36	0.36	0.00	0.01	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	2/17/2010	MO2945177.pdf	No SWM required, no BMP	MDE Approval letter included in WQSS file pdf.	2017
MO100054	I-495	I - 495 Inner Loop Ramp M onto Southbound MD 355 - Ramp Widening and Intersection Improvements	Montgomery	MO3885187	06-SF-0266	02-14-02	5/9/2006	KP/JW		1.63	1.69	0.07	0.17	0.01	0.06	0.00	0.00	0.20	0.03	SHA	No	7/10/2006	MO3885187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100055	MD 190	Replacement of Structure 15073x0 on MD 190 over Rock Run	Montgomery	MO3545174	05-SF-0277	02-14-03	3/16/2006	CSP/JDC		0.93	1.11	0.26	0.14	0.08	0.18	0.00	0.00	0.20	0.03	SHA	No	4/19/2006	MO3545174.pdf	150614	MDE Approval letter included in WQSS file pdf.	2017
MO100056	MD 355	MD 355 at Randolph Road - Grade Separation of Existing Intersection	Montgomery	MO830B21	04-SF-0131	02-14-02	5/17/2007	WTB/BWS		27.02	28.31	3.77	3.36	3.51	0.26	0.09	0.00	0.20	0.67	SHA	No	6/11/2007	MO830B21.pdf	150740 - pond 150741, 150742 - sand filters IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
MO100057	MD 193	MD 193 (University Boulevard) from MD 320 to Lebanon St.	Montgomery	MO3375177	06-SF-0104	02-14-02	1/9/2006	CAL/MC		0.00	0.00	0.04	0.00	0.02	0.02	0.00	0.00	0.20	0.00	SHA	No	1/17/2006	MO3375177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100058	MD 187	MD 187 from I-495 to West Cedar Lane - Safety and Resurfacing	Montgomery	MO3325177	05-SF-0042	02-14-02	8/10/2004	LT/DJW		0.04	0.05	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	1/5/2005	MO3325177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100059	MD 193/MD 650	MD 193 from Lebanon St. to 14th Ave & MD 650 from Holton Ln. to Merrimac Dr.	Montgomery	MO3335184	05-SF-0197	02-14-02	6/21/2006	NP		0.00	0.00	0.08	1.06	0.12	-0.04	0.00	0.04	0.20	0.21	SHA	No	7/11/2008	MO3335184.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100060	MD 124	MD 124 from South of Airpark Road to Rosewood Manor Lane - Design/Build	Montgomery	MO6325171	05-SF-0250	02-14-02	5/5/2008	KP/MRS		19.21	28.81	9.60	14.93	0.09	9.51	0.13	0.00	0.20	2.99	SHA	No	7/3/2008	MO6325171.pdf	150723, 150725, 150727-150729	MDE Approval letter included in WQSS file pdf.	2017
MO100061	MD 28	MD 28 at Wintergate Drive - Roadway Widening	Montgomery	MO6285130	05-SF-0307	02-14-02	8/23/2005	KP/FG		0.00	0.00	0.09	0.14	0.00	0.09	0.00	0.00	0.20	0.03	SHA	No	12/20/2005	MO6285130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100062	MD 124	MD 124 (Mid-County Highway) at Goshen Road - Intersection Improvements	Montgomery	MO3705176	06-SF-0152	02-14-02	2/13/2006	MW/SCP		0.00	0.00	0.32	0.14	0.00	0.32	0.00	0.00	0.20	0.03	SHA	No	5/22/2006	MO3705176.pdf	150615 - sand filter	MDE Approval letter included in WQSS file pdf.	2017
MO100063	Grosvernor Lane	Bridge Deck Replacement on Grosvernor Lane over I-270	Montgomery	MO3775180R MO3775180	06-SF-0170	02-14-02	1/5/2006	KRP/RD		1.15	1.17	0.02	0.11	0.00	0.02	0.00	0.00	0.20	0.02	SHA	No	5/22/2008	MO3775180.pdf	None - Debit from WQ bank	Contract # changed in 2007. MDE Approval letter included in WQSS file pdf.	2017
MO100064	MD 198	MD 198 at MD 650 and Kruhm Road	Montgomery	MO3795176	06-SF-0192	02-14-02	10/31/2006	GWF/MRS		0.03	0.07	0.04	0.03	0.00	0.04	0.00	0.00	0.20	0.01	SHA	No	11/3/2006	MO3795176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100065	MD 193	MD 193 (University Boulevard) @ I-495 Interchange (New Double Right & Left Turn Lanes)	Montgomery	MO6235187	06-SF-0211	02-14-02	10/31/2006	MTR/FLG		6.59	6.52	0.34	0.05	0.45	-0.11	0.00	0.11	0.20	0.01	SHA	No	4/4/2007	MO6235187.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
MO100066	MD 355	Replacement of Deck for Bridge 1511900 on MD 355 NBR over I-495 WBR	Montgomery	MO3265180	07-SF-0115	02-14-02	11/17/2006	RSK/GWM		0.80	0.80	0.00	0.06	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	11/27/2006	MO3265180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100067	MD 107	MD 107 from Tom Fox Avenue to Hersperger Lane - ADA Sidewalk Retrofits	Montgomery	MO2855133	07-SF-0211	02-14-02	3/13/2007	RHD/DET		0.19	0.21	0.02	0.19	0.00	0.02	0.00	0.00	0.20	0.04	SHA	No	3/29/2007	MO2855133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100068	MD 410	MD 410 (East West Highway) from Chelton Road to Pearl St.	Montgomery	MO4045130	07-SF-0213	02-14-02	4/28/2007	KRP/DJW		1.61	1.57	0.10	0.18	0.14	-0.04	0.00	0.04	0.20	0.04	SHA	No	5/7/2007	MO4045130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100069	MD 650	MD 650 at Adelphi Road - Intersection Improvements	Montgomery	MO3915187	07-SF-0228	02-14-02	3/26/2007	KRP/MLK		0.00	0.00	0.27	0.22	0.03	0.24	0.00	0.00	0.20	0.04	SHA	No	3/4/2008	MO3915187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100070	MD 650	MD 650 from Shaw Avenue to Randolph Road	Montgomery	MO2835177	08-SF-0141	02-14-02	1/23/2008	KRP/GAI		0.00	0.00	0.01	0.00	0.02	-0.01	0.00	0.01	0.20	0.00	SHA	No	4/10/2008	MO2835177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
MO100071	MD 650	MD 650 From Milestone Drive to Venice Drive	Montgomery	MO2775177	08-SF-0142	02-14-02	6/11/2008	GAI/JMS		0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.00	0.20	0.00	SHA	No	11/19/2008	MO2775177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100072	MD 28	MD 28 at MD 586 (Viers Mill Road)/MD 911 (First Street) - Intersection Improvements	Montgomery	MO4215168	08-SF-0179	02-14-02	5/12/2009	KP/FG		9.86	10.13	0.27	0.17	0.00	0.27	0.00	0.00	0.20	0.03	SHA	No	7/7/2009	MO4215168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100073	I-495	Replacement of Deck for Bridge 15103 on I-495 SB Ramp over WB Clara Barton Parkway	Montgomery	MO5555180	08-SF-0821	02-14-02	2/12/2008	CSF		0.19	0.20	0.01	0.05	0.00	0.01	0.00	0.00	0.20	0.01	SHA	No	4/17/2008	MO5555180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100074	MD 108	MD 108 at Fieldcrest Road - Intersection Improvements	Montgomery	MO4185187	08-SF-0319	02-14-02	6/11/2008	KP/FOA		0.41	0.47	0.06	0.08	0.00	0.06	0.00	0.00	0.20	0.02	SHA	No	6/30/2008	MO4185187.pdf	150746 - dry swale	MDE Approval letter included in WQSS file pdf.	2017
MO100075	MD 97	MD 97 from MD 185 to Glenallan Road - ADA Pedestrian Improvements	Montgomery	MO5325133	09-SF-0034	02-14-02	7/14/2008	KP/KL		18.37	18.36	0.02	0.02	0.03	-0.01	0.00	0.01	0.20	0.00	SHA	No	9/4/2008	MO5325133.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
MO100076	MD 650	MD 650 (Damascus Road) at MD 97 (Georgia Avenue) - Intersection Improvements	Montgomery	MO5445176	09-SF-0086	02-13-11-08	8/17/2010	SBP/RD		0.60	0.63	0.03	0.37	0.00	0.03	0.00	0.00	0.20	0.07	SHA	No	9/10/2010	MO5445176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100077	MD 198	MD 198 (Sandy Spring Road) at Dino Drive	Montgomery	MO5875130	09-SF-0070	02-14-02	2/18/2009	KRP/DJW		2.34	2.50	0.16	0.03	0.00	0.16	0.00	0.00	0.20	0.01	SHA	No	5/13/2009	MO5875130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100078	MD 109	Replacement of Deck for Bridge 15099 on MD 109 over Little Bennett Creek	Montgomery	MO4225180	09-SF-0111	02-14-02	9/23/2008	KP/WW		0.33	0.33	0.00	0.15	0.00	0.00	0.00	0.00	0.20	0.03	SHA	No	12/4/2008	MO4225180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
MO100079	MD 198	MD 198 at Good Hope Road - Intersection Improvements	Montgomery	MO2885176	09-SF-0210	02-14-02	1/30/2009	KP/MS		1.44	1.55	0.11	0.35	0.00	0.11	0.00	0.00	0.20	0.07	SHA	No	3/17/2009	MO2885176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100080	MD 187	MD 187 (Old Georgetown Road) from 150' South of Center Drive to North Brook Lane - Safety and Resurfacing	Montgomery	MO4295177 MO4295168	09-SF-0284	02-14-02	12/22/2008	RHD/DJW		0.24	0.23	0.00	0.00	0.01	-0.01	0.00	0.01	0.20	0.00	SHA	No	3/4/2009	MO4295177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
MO100081	MD 97	MD 97 From Tidewater Court and Queen Elizabeth Drive	Montgomery	MO5315184	08-SF-0344	02-13-11	6/16/2008	CSF		1.69	1.81	0.14	0.12	0.03	0.11	0.00	0.00	0.20	0.02	SHA	No	9/11/2008	MO5315184.pdf	150747 - sand filter	MDE Approval letter included in WQSS file pdf.	2017
MO100082	MD 355	MD 355 at MD 118 - Left Turn Lane Extension	Montgomery	MO5635187	07-SF-0157	02-14-02	7/1/2008	NP		0.00	0.00	0.11	0.00	0.00	0.11	0.00	0.00	0.50	0.00	SHA	No	7/17/2009	MO5635187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100083	MD 28	MD 28 @ Barn Ridge Drive and Radwick Road - Intersection Improvements	Montgomery	MO4485187	09-SF-0439	02-14-02	6/1/2009	CB/ALA		254.52	254.42	0.09	0.01	0.00	0.09	0.00	0.00	0.20	0.00	SHA	No	10/14/2009	MO4485187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100084	MD 193	MD 193 (University Blvd.) at MD 320 (Piney Branch Road)	Montgomery	MO3945187	07-SF-0187	02-14-02	4/9/2007	WKW		0.90	0.92	0.04	0.11	0.02	0.02	0.00	0.00	0.20	0.02	SHA	No	8/15/2007	MO3945187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100085	MD 115	MD 115 (Muncaster Mill Road) From Sweetbirch Drive to MD 28	Montgomery	MO3425174	05-SF-0028	02-14-02	2/21/2005	AW/SNG		15.27	15.29	0.04	0.61	0.02	0.02	0.00	0.00	0.20	0.12	SHA	No	3/23/2005	MO3425174.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO100086	MD 109	Ramp from MD 109 WB to I-270 NB - Embankment Stabilization	Montgomery	AW730A21	06-SF-0309	02-14-05	7/14/2004	RSK/CV		0.13	0.13	0.00	0.02	0.00	0.00	0.00	0.00	0.20	0.00	MDE	No	12/21/2007	AW730A21_06-SF-0309.pdf	None - IART less than 0.01 so MDE accepted as 0.		2018
	Montgomery County Totals												**29.65**	**7.52**					**5.93**							
	Prince George's County																									
PG100001	MD 193 at BW Parkway	Sidewalk Installation or Replacement	Prince George's	AT3035179	03-SF-0079	02-14-02	8/28/2002	Frank Grabowski		0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	12/4/2002	AT3035179.pdf			2017
PG100002	MD 193 (Greenbelt Road)	Sidewalk Replacement from 62nd Ave. to Edmonston Rd.	Prince George's	AT3035179	03-SF-0080	02-14-02	8/21/2002	Frank Grabowski		0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.20	0.02	SHA	No	12/4/2002	AT3035179.pdf			2017
PG100003	MD 208	Sidewalk Installation/ Replacement Between Queen's Chapel Rd. and 38th St.	Prince George's	AT3035179	03-SF-0082	02-14-02	8/20/2002	Frank Grabowski		0.00	0.00	0.10	0.01	0.00	0.10	0.00	0.00	0.20	0.00	SHA	No	12/4/2002	AT3035179.pdf			2017
PG100004	MD 410 (East West Highway) Kenilworth Avenue to 61st Ave.	Sidewalk	Prince George's	AT3035179	03-SF-0177	02-14-02	11/21/2002	Frank Grabowski		0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.20	0.00	SHA	No	12/12/2002	AT3035179.pdf			2017
PG100005	MD MD 210 (Indian Head Highway)	Sidewalk	Prince George's	AT3035179	03-SF-0179	02-14-02	11/20/2002	F. Grabowski		0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.20	0.00	SHA	No	12/12/2002	AT3035179.pdf			2017
PG100006	MD 201 (Kenilworth Ave) at Sarvis Ave	Sidewalk	Prince George's	AT3035179	03-SF-0199	02-14-02	12/17/2002	F. Grabowski		0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	12/17/2002	AT3035179.pdf			2017
PG100007	MD 193	Cherrywood Lane to Cunningham Drive	Prince George's	AT5995179	04-SF-GA02	02-14-02	11/21/2005	KP/FG		0.00	0.00	0.09	0.00	0.00	0.09	0.00	0.00	0.20	0.00	SHA	No	12/12/2005	AT5995179.pdf			2017
PG100008	MD 208	36th Ave. to 38th Ave.	Prince George's	AT5995179	04-SF-GA02	02-14-02	2/9/2005	KP/FG		0.46	0.44	0.00	0.00	0.02	-0.02	0.00	0.02	0.20	0.00	SHA	No	1/19/2005	AT5995179.pdf			2017
PG100018	MD 6	At Surrats Road	Prince George's	PG3745176	03-SF-7301	02-14-02	5/25/2002	H. Mofoll		5.06	6.22	1.16	0.00	0.00	1.16	0.00	0.00	0.20	0.00	SHA	No	5/30/2002	PG3745176.pdf			2017
PG100019	MD 202	Landover Road @ Brightseat Road	Prince George's	PG3835176	03-SF-0106	02-14-02	10/8/2002	Frank Grabowski		0.00	0.00	0.40	0.04	0.00	0.40	0.00	0.00	0.20	0.01	SHA	No	3/6/2003	PG3835176.pdf			2017
PG100020	I-95	Noise Abatement - Interstate I-95 Hollywood Extension	Prince George's	PG3665126	03-SF-0360	02-04-02	8/20/2003	JAR		3.15	3.14	0.00	0.00	0.01	-0.01	0.00	0.01	0.20	0.00	SHA	No	8/20/2003	PG3665126.pdf			2017
PG100021	MD 193	From 23rd Avenue to Adelphi Road	Prince George's	PG4985177	04-SF-0110	02-14-02	10/1/2003	NP		0.00	0.00	0.20	0.22	0.03	0.17	0.00	0.00	0.20	0.04	SHA	No	10/1/2003	PG4985177.pdf			2017
PG100022	MD 210 (Indian Head Highway)	Roadway Improvements From Livingston RD. to DC Line	Prince George's	PG4885177	05-SF-0010	02-14-02	5/23/2005	GWF/SP		5.25	5.22	0.02	0.04	0.05	-0.03	0.00	0.03	0.20	0.01	SHA	No	6/9/2005	PG4885177.pdf			2017
PG100025	MD 201 From MD 410 to Paint Branch Parkway	Resurfacing and Rehabilitation	Prince George's	PG6615177	05-SF-0304	02-14-02	2/23/2005	GWF/ARH		10.90	10.91	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	6/20/2005	PG6615177.pdf			2017
PG100026	MD 650	MD 650 at Piney Branch (MD 320)	Prince George's	PG6085176	05-SF-0345	02-14-02	8/17/2005	KRP/SBP		0.00	0.00	0.12	0.04	0.00	0.12	0.00	0.00	0.20	0.01	SHA	No	9/16/2005	PG6085176.pdf			2017
PG100050	MD 450	Bridge No. 16017/MD 450 Over CSX Railroad (Pope's Creek Railroad Crossing)	Prince George's	PG4395180	03-SF-0229	02-13-11	3/10/2004	Paul Upton		1.90	1.97	0.16	0.98	0.09	0.07	0.00	0.00	0.20	0.20	Consultant	No	3/31/2005	PG4395180.pdf			2017
PG100053	MD 197	MD 197 from Murikirk Road to MD 198	Prince George's	PG4805177	04-SF-0302	02-13-11	7/26/2005; latest 8/10/2006	NP		0.00	0.00	1.65	0.95	0.10	1.55	0.00	0.00	0.20	0.19	SHA	No	9/3/2005	PG4805177.pdf			2017
PG100054	MD 4	Replacement of Superstructures and Rehabilitation of Substructures for Dual Bridges No. 16100 on MD 4 Over Western Branch	Prince George's	PG2585180	00-SF-0089	02-13-11	8/22/1999	CB		3.77	4.50	0.00	0.00	0.44	-0.44	0.00	0.44	0.20	0.00	SHA	No	11/18/1999	PG2585180.pdf			2017
PG100055	MD 95/MD 495	Salt Barn Facility at the SHA Metro Shop	Prince George's	PG5615129	06-SF-0013	02-13-11	8/2005; latest 3/9/2006	CAL/RGB		0.71	0.48	0.01	0.47	0.00	0.01	0.00	0.00	0.20	0.09	SHA	No	9/20/2005	PG5615129.pdf			2017
PG100057	I-70	I-70 @ Marriottsville Road - Lighting	Prince George's	PG3515224	15-PR-0089	02-13-11	12/18/2015	Nimish Desal		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	SHA	No	11/7/2006	PG3515224.pdf	None		2017
PG100058	MD 212	MD 212 from Tesst College to East of Odell Road - Sidewalk Construction	Prince George's	AT599A21 AT9575179	08-SF-0363	02-14-02	3/20/2008	KP/DJW		0.07	0.13	0.06	0.08	0.00	0.06	0.00	0.00	0.20	0.02	SHA	No	5/16/2008	AT599A21-AT9575179.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100059	MD 212	MD 212 from Roby Avenue to TESST College - Sidewalk Construction	Prince George's	AT599A21 AT9575179	08-SF-0364	02-14-02	3/20/2008	KP/DJW		0.04	0.12	0.08	0.02	0.00	0.08	0.00	0.00	0.20	0.00	SHA	No	5/16/2008	AT599A21-AT9575179B.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100060	MD 414	MD 414 Ramps at MD 5 - Sidewalk Retrofits	Prince George's	AT9575179	08-SF-0126	02-14-02	10/30/2007	RD/JDC		0.06	0.07	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	12/14/2007	AT9575179 (MD414).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
PG100061	MD 214	Rehabilitation of Bridge 0205400 on MD 214 over Patuxent River	Prince George's	AT1785180 BCS202-26D	06-SF-0119	02-13-10 02-13-11	4/13/2007	B. Benda		0.70	0.72	0.04	0.32	0.01	0.03	0.00	0.00	0.20	0.06	SHA	No	4/19/2007	AT1785180.pdf	None - Debit from WQ bank, both Watersheds	MDE Approval letter included in WQSS file pdf.	2017
PG100062	MD 564	MD 564 from Maple Ave. to 11th St. - Sidewalk Construction	Prince George's	AT9575179	08-SF-0013	02-13-11	6/19/2007	RHD/JAG		1.16	1.18	0.02	0.04	0.00	0.02	0.00	0.00	0.20	0.01	SHA	No	8/6/2007	AT9575179 (MD564).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
PG100063	Bald Eagle Road	Bald Eagle Road Relocation at MD 210	Prince George's	PG3975172	10-SF-0099	02-14-02	1/28/2010	LL/MRS		22.90	24.06	1.34	0.17	0.18	1.16	0.00	0.00	0.20	0.03	SHA	No	3/24/2010	PG3975172.pdf	160801 - wet pond		2017
PG100064	US 1	US 1 Northbound from Talbot Ave. to Howard County Line - Streetscape	Prince George's	PG1115384	06-SF-0207	02-13-11	4/7/2008	E. Funk		31.70	31.79	0.13	0.39	0.04	0.09	0.00	0.00	0.20	0.08	SHA	No	7/18/2006	PG1115384.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100065	MD 725	Replacement of Bridge 16009 on MD 725 over Federal Spring Branch	Prince George's	PG3245180	09-SF-0283	02-13-11	10/10/2008	KP/JGK		0.87	0.96	0.10	0.13	0.01	0.09	0.00	0.00	0.20	0.03	SHA	No	7/7/2009	PG3245180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100066	MD 201	Replacement of Bridge 16028 on MD 201 over AMTRAK and Beaver Dam Branch	Prince George's	PG3325180	05-SF-0025	02-14-02	10/19/2005	FGS/JPK		8.80	9.65	0.85	2.51	0.00	0.85	0.00	0.00	0.20	0.50	SHA	No	11/20/2007	PG3325180.pdf	160811 - wet pond	MDE Approval letter included in WQSS file pdf.	2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
PG100067	MD 4	MD 4 (Pennsylvania Avenue) from Parkland Drive to Walters Lane - Pedestrian Safety Improvements	Prince George's	PG6395176	05-SF-0188	02-14-02	9/14/2006	KRP		13.41	14.37	0.96	0.19	0.00	0.96	0.00	0.00	0.20	0.04	SHA	No	9/14/2006	PG6395176.pdf	160807 & 160808 - dry swales; Debit from WQ Bank.	MDE Approval letter included in WQSS file pdf.	2017
PG100068	I-495	I-495 at Arena Drive from MD 202 to MD 214 - Interim Improvement Project	Prince George's	PG6385172	06-SF-0035	02-14-02 02-13-11	7/30/2007 7/30/2008	RGH/DLH GH/DLH		84.90	91.76	14.98	8.18	1.87	13.11	8.45	0.00	0.20	1.64	SHA	No	10/24/2007	PG6385172.pdf	160820 - wet pond	MDE Approval letter included in WQSS file pdf.	2017
PG100069	US 1	US 1 at Rhode Island Avenue - Geometric Improvements	Prince George's	PG2555130 PG2555187	06-SF-0115	02-14-02	2/3/2006	CAL/FG		0.00	0.00	0.05	0.09	0.02	0.03	0.00	0.00	0.20	0.02	SHA	No	2/3/2006	PG2555187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100070	MD 201	MD 201 from MD 193 to I-495	Prince George's	PG6495176	06-SF-0128	02-14-02	10/25/2005	NP		1.62	1.80	0.18	0.23	0.00	0.18	0.00	0.00	0.20	0.05	SHA	No	3/14/2007	PG6495176.pdf	None - Debit from WQ bank per WQSS; Approval letter states no change in WQ bank (does not state if BMPs are provided). Assuming none.	MDE Approval letter included in WQSS file pdf. WQSS & MDE approval letter do not match in regards to WQ bank changes. WQSS shows debit to bank, approval letter states no change in bank. MDE & SHA both have same documents. Assuming reconstructed quantity on WQSS is correct. Design consultant could not provide clarification.	2017
PG100071	I-95/495	I-95/I-495 Outer Loop Ramp from MD 193 to Montgomery County Line - Safety and Resurfacing	Prince George's	PG6435177	06-SF-0145	02-14-02	2/2/2006	KRP/SAS		0.00	0.00	0.03	0.04	0.00	0.03	0.00	0.00	0.20	0.01	SHA	No	2/27/2006	PG6435177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100072	MD 210	MD 210 at Livingston/Palmer Rd. and Livingston/Swan Creek Rd	Prince George's	PG6065187	06-SF-0187	02-14-02	1/6/2006	B. Scott		4320.30	4320.40	0.10	0.02	0.00	0.10	0.00	0.00	0.20	0.00	SHA	No	2/21/2006	PG6065187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100073	MD 704	MD 704 from Greenleaf Road to Barlowe - Resurfacing, Drainage, and Safety Improvements	Prince George's	PG6605177	06-SF-0193	02-14-02	5/8/2006	NP		9.42	9.13	0.00	0.40	0.29	-0.29	0.00	0.29	0.20	0.08	SHA	No	7/17/2006	PG6605177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
PG100074	NP	Woodrow Wilson Bridge Project - Anacostia East (ANA-11) Wetland Mitigation	Prince George's	PG3515173	06-SF-0299	02-14-02	6/7/2006	KRP		0.00	0.00	1.10	0.00	0.00	1.10	0.00	0.00	0.20	0.00	SHA	No	11/7/2006	PG3515173.pdf	None - Non Rooftop Disconnection Credit for Hike/Bike Path on M NCPPC property through wetland [info from design consultant, EA].	MDE Approval letter included in WQSS file pdf.	2017
PG100075	MD 5	MD 5 (Branch Ave.) at 32nd Ave. and Bonita St.	Prince George's	PG6845176	07-SF-0073	02-14-02	1/18/2007	KRP/FOA		1.80	1.85	0.05	0.18	0.00	0.05	0.00	0.00	0.20	0.04	SHA	No	4/23/2007	PG6845176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100076	MD 214	MD 214 (Central Avenue) from Cindy Lane to DC Line - Safety and Resurfacing	Prince George's	PG5695177	07-SF-0242	02-14-02	1/31/2008	NP		14.33	14.34	0.01	0.01	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	3/12/2008	PG5695177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100077	MD 337	MD 337 Westbound from East of MD 5 to Suitland Rd. - ADA Sidewalk Retrofits	Prince George's	PG5865133 AX1785133	07-SF-0262	02-14-02	3/16/2007	RHD/JW		0.64	0.78	0.14	0.64	0.00	0.14	0.00	0.00	0.20	0.13	SHA	No	6/11/2007	PG5865133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100078	MD 337	MD 337 Eastbound from East of MD 5 to Auth Road - ADA Sidewalk Retrofits	Prince George's	PG5865233 AX1785133	08-SF-0026	02-14-02	7/17/2007	RHD/RJM		0.35	0.42	0.07	0.00	0.00	0.07	0.00	0.00	0.20	0.00	SHA	No	8/9/2007	PG5865233-AX1785133.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100079	US 1	US 1 (Rhode Island Avenue) from MD 410 (East West Highway) to Albion Road - Safety and Resurfacing	Prince George's	PG5685177 PG5685168 PG5685168R	08-SF-0047	02-14-02	10/7/2010	KRP/JMS		64.45	64.48	0.09	0.00	0.03	0.06	0.00	0.00	0.20	0.00	SHA	No	5/19/2008	PG5685177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100080	MD 212	MD 212 from 250' North of Sargent Road to MD 193 - Safety and Resurfacing	Prince George's	PG5715177 PG1405177	08-SF-0157	02-14-02	11/17/2010	KRP/SP		10.85	10.85	0.01	0.03	0.00	0.01	0.00	0.00	0.20	0.01	SHA	No	3/21/2008	PG5715177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100081	MD 212	MD 212 (Riggs Road) from the D.C. Line to Sargent Road	Prince George's	PG7095168	09-SF-0321	02-14-02	2/26/2009	NP		8.82	8.83	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	3/11/2009	PG7095168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100082	MD 410	MD 410 from MD 201 to West of 67th Place - Safety and Resurfacing	Prince George's	PG7415168	09-SF-0382	02-14-02	3/4/2009	RHD/CKL		0.58	0.58	0.02	0.00	0.02	0.00	0.00	0.00	0.20	0.00	SHA	No	6/3/2009	PG7415168.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
PG100083	Forestville Road	Rehabilitation of Bridge 16161 on Forestville Rd. over I-95/I-495	Prince George's	PG5725168	09-SF-0403	02-14-02	8/27/2009	RHD/SC		1.11	1.15	0.04	0.05	0.00	0.04	0.00	0.00	0.20	0.01	SHA	No	10/8/2009	PG5725168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100084	Berwyn Road	Replacement of Deck for Bridge 16072 on Berwyn Rd. over Indian Creek	Prince George's	PG7375180 PG7375168	10-SF-0055	02-14-02	9/3/2009	RHD/JDC		0.05	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	4/2/2010	PG7375180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100085	US 301	US 301 From CSX Railroad to Chrysler Drive	Prince George's	PG6625177	06-SF-0032	02-13-11	2/6/2006	GWF/SP		10.60	10.61	0.01	0.00	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	1/10/2006	PG6625177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100086	MD 202	MD 202 from Approx. 1493' West of Campus Way to Approx. 1429' East of Campus Way	Prince George's	PG202A21 PG6025176	06-SF-0158	02-13-11	12/28/2005	B. Nelson		10.38	11.16	0.78	0.00	0.00	0.78	0.00	0.00	0.20	0.00	SHA	No	3/31/2010	PG6025176-PG202A21.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf. Permit Expired.	2017
PG100087	MD 201	Deck Replacement for Dual Bridge on MD 201 at I-95/I-495	Prince George's	PG6715180	10-SF-0090	02-14-02	10/30/2009	KP/FOA		6.68	7.12	0.44	0.30	0.00	0.44	0.00	0.00	0.20	0.06	SHA	No	12/3/2009	PG6715180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100088	US 301	Deck Replacement for Bridge 16103 on US 301 SB over MD 214	Prince George's	PG6895180	09-SF-0142	02-13-11	10/14/2008	DJW		0.23	0.23	0.00	0.04	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	12/15/2008	PG6895180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100089	MD 410	MD 410 (East West Highway) at MD 500 (Queens Chapel Road)/Adelphi Road Intersection	Prince George's	PG6865168 PG6865187	08-SF-0092	02-14-02	8/17/2007	EMR		21.20	21.21	0.03	0.10	0.04	-0.01	0.00	0.01	0.20	0.02	SHA	No	6/16/2009	PG6865168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100090	MD 193	MD 193 at Hanover Parkway	Prince George's	PG6795176	07-SF-0134	02-14-02	2/5/2007	EMR		34.32	34.37	0.18	0.06	0.06	0.12	0.00	0.00	0.20	0.01	SHA	No	5/21/2007	PG6795176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG100091	MD 704	MD 704 From Barlowe Drive to Glenarden Parkway - Sidewalk Retrofits	Prince George's	AT9575179	08-SF-0391	02-14-02	6/10/2008	ATN		3.86	3.98	0.14	0.18	0.02	0.12	0.00	0.00	0.20	0.04	SHA	No	6/24/2008	AT9575179 (MD704).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
	Prince George's County Totals												**17.31**	**3.33**					**3.46**							
	Washington County																									
WA100002	I-70 / I-81 Interchange	I-70 / I-81 Interchange	Washington	WA1486130	04-SF-0127	02-14-05	3/12/2004	CL/DFD		0.75	0.75	0.00	0.07	0.00	0.00	0.00	0.00	0.20	0.01	SHA	No	10/4/2004	WA1735176.pdf			2017
WA100003	US Route 40	Rehabilitation of Bridge No. 21010 over Licking Creek	Washington	WA1585180	05-SF-0120	02-14-05	10/26/2004	WKW		0.92	0.93	0.01	0.02	0.00	0.01	0.00	0.00	0.20	0.00	SHA	No	11/15/2004	WA1585180.pdf			2017
WA100004	I-70/ MD 68	I-70 @ MD 68 - SWM Facility	Washington	WA1305280	05-SF-0317	02-14-05	7/30/2003	RAJA/NMP		3.45	3.56	0.11	0.00	0.00	0.11	0.00	0.00	0.20	0.00	SHA	No	11/23/2005	WA1305280.pdf			2017
WA100015	US 11	US 11 - From Mauguans Avenue to Showalter Road, Safety and Resurface	Washington	WA1415177	03-SF-0187	02-14-05	8/26/2004	RAJA/GAI		7.73	7.73	0.00	0.42	0.00	0.00	0.00	0.00	0.20	0.08	Consultant	No	11/17/2003	WA1415177.pdf			2017
WA100018	MD 65 and MD 68	MD 65 / MD 68 - Intersection Improvements	Washington	WA1425176	03-SF-0302	02-14-05	12/18/2003	FGS/RSK		3.77	4.11	0.34	0.71	0.00	0.34	0.00	0.00	0.20	0.14	SHA	No	1/25/2007	WA1425176.pdf	210002 - sand filter		2017
WA100019	MD 144	MD 144 Westbound at 0.07 Miles West of Center Sreet - Ridesharing Facility Expansion	Washington	WA4365181	06-SF-0245	02-14-05	5/3/2006	KRP/CSF		0.44	0.51	0.08	0.23	0.00	0.08	0.00	0.00	0.20	0.05	SHA	No	5/15/2006	WA4365181.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100020	US 40	US 40 at Edgewood Drive - Intersection Improvements	Washington	WA1995187 WA1995171	07-SF-0084	02-14-05	7/10/2007	BS/JDC		54.26	56.67	2.45	2.95	0.04	2.41	0.00	0.00	0.20	0.59	SHA	No	2/28/2008	WA1995187.pdf	210021 - 210023 - ponds	MDE Approval letter included in WQSS file pdf.	2017
WA100021	MD 68	MD 68 from 0.25 mi. West of Cedar Ridge Road to 0.01 mi. West of Bottom Road	Washington	WA3085177	07-SF-0167	02-14-05	3/27/2007	Karuna		0.36	0.38	0.02	0.00	0.00	0.02	0.00	0.00	0.20	0.00	SHA	No	4/19/2007	WA3085177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100022	I-70	Replacement of Bridges on I-70 over Black Rock Road - Westbound Detour	Washington	WA4375180	07-SF-0207	02-14-05	2/23/2007	GH/CWH		2.08	2.08	0.00	0.90	0.00	0.00	0.00	0.00	0.20	0.18	SHA	No	4/10/2008	WA4375180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100023	I-70	I-70 @ MD 68 Median Crossover	Washington	WA3225176	08-SF-0149	02-14-05	4/21/2008	KRP/JJW		2.49	2.78	0.29	0.17	0.00	0.29	0.00	0.00	0.20	0.03	SHA	No	5/20/2008	WA3225176.pdf	210004 - shallow marsh	MDE Approval letter included in WQSS file pdf.	2017
WA100024	I-81	I-81 at I-70 - Interchange Improvements	Washington	WA3235176	08-SF-0195	02-14-05	4/16/2008	SBP/SCP		0.00	0.00	0.20	1.17	0.00	0.20	0.00	0.00	0.20	0.23	SHA	No	7/8/2008	WA3235176.pdf	210025 - wet pond	MDE Approval letter included in WQSS file pdf.	2017

Redevelopment Project Credit Accounting - Baseline Treatment

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New Development/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Project Net Change in Impervious Area, D-F (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Reconstruction Baseline Treatment Credit (ACRES)	Source of WQSS (MDE, SHA, Consultant)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers from WQSS	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																	[WQ Pavement Removal - Net change in Imp Area]		[Reconstructed Impervious Area * Redevelopment %]							
WA100025	MD 34	MD 34 - Grove Farm Civil War Wayside Parking Area Improvements	Washington	WA4015188	09-SF-0053	02-14-05	7/31/2008	RHD/Doran		0.19	0.07	0.04	0.00	0.16	-0.12	0.00	0.12	0.20	0.00	SHA	No	10/6/2008	WA4015188.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
WA100026	I-70	I-70 Emergency Crossover at Exit 12	Washington	WA3505176	09-SF-0106	02-14-05	3/20/2009	KRP/MDW		2.63	3.16	0.53	0.30	0.00	0.53	0.00	0.00	0.20	0.06	SHA	No	6/22/2009	WA3505176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100027	MD 65	MD 65 at MD 63 - Geometric Improvements	Washington	WA3425168	09-SF-0212	02-14-05	4/3/2009	BS/SCP		2.21	2.33	0.12	0.41	0.00	0.12	0.00	0.00	0.20	0.08	SHA	No	6/22/2009	WA3425163.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100028	MD 67D	MD 67D at 200' West of CO994 (Weverton Trailhead Ridesharing Facility)	Washington	WA3305181	08-SF-0158	02-14-03	4/25/2008	KP/GAI		0.26	0.43	0.22	0.21	0.05	0.17	0.00	0.00	0.20	0.04	SHA	No	7/7/2008	WA3305181.pdf	210024	MDE Approval letter included in WQSS file pdf.	2017
WA100029	MD 65	MD 65 from MD 68 to I-70 - Safety and Resurfacing Improvements	Washington	WA1895177	06-SF-0204	02-14-05	2/28/2006	Steve Phillips		0.00	0.00	0.02	0.01	0.00	0.02	0.00	0.00	0.20	0.00	SHA	No	4/10/2006	WA1895177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA100030	US 11	US 11 at Englewood Road	Washington	WA1815174	06-SF-0030	02-14-05	8/2/2005	KP/GWM		0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.20	0.00	SHA	No	9/12/2006	WA1815174.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
	Washington County Totals												7.57	0.25					1.51							
	Area Wide																									
AW100001	MD 32 Corridor	BMP 13049 Retrofit	Howard, Montgomery	AT4375174	03-SF-0319	02-13-09	5/12/2003	F. Grabowski		1.39	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	SHA	No	6/10/2003	AT4375174.pdf			2017
	Area Wide Totals												0.00	0.00					0.00							
	TOTAL MS4 Redevelopment Baseline Reduction Credit (Acres)																		25.66							

APPENDIX C: RESTORATION CREDIT ACCOUNTING SPREADSHEET

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)
AA200001	MD 170	Bicycle Retrofit - (MD 648 to Andover Rd.)	Anne Arundel	AA151B21 AA1515188	13-SF-0214	02-13-09	10/4/2013	PS/JMA		4.96	3.90	0.03	0.04	1.04	Yes
AA200002	MD 710	MD 710 at V.E.I.P. Entrance	Anne Arundel	AA2085176	11-SF-0175	02-13-09	8/17/2011	KRP/DFD		1.72	1.87	0.15	0.32	0.00	Yes
AA200003	MD 168	Hammonds Ferry Road and MD 168 Over MD 295	Anne Arundel	AA4805180	10-SF-0392	02-13-09	10/22/2010	CSF	New	1.36	1.35	0.01	0.24	0.02	Yes
AA200004	MD 295	Replacement of Bridge No. 02014 and 02217 on W. Nursery Rd.	Anne Arundel	AA2595180	11-SF-0329	02-13-09	5/11/2012	KRP/CLW		0.62	0.65	0.03	0.62	0.00	Yes
AA200005	MD 2	MD 2 at Earleigh Heights/ Magothy Bridge Road	Anne Arundel	AA2785187	11-SF-0337	02-13-10	1/20/2014	EA/TMR		2.06	2.54	0.59	2.00	0.05	Yes
AA200006	MD 424	MD 424 @ US 50 Park and Ride Addition	Anne Arundel	AA4315181	12-SF-0374	02-13-10	3/19/2013	RHD/BCD	New	0.22	2.03	2.03	0.00	0.00	Yes
AA200007	MD 4	MD 4 at Lower Pindell Road	Anne Arundel	AA4385130	12-SF-0237	02-13-11	11/2/2012	KRP/TMR		1.61	1.65	0.19	0.00	0.00	Yes
AA200008	MD 2	MD 2 at MD 256 Intersection Improvements	Anne Arundel	AA4915130	12-SF-0002	02-13-11	7/28/2014	RHD/SS		1.01	1.36	0.44	0.77	0.05	Yes
AA200009	MD 2	MD 2 at MD 255 Intersection Improvements	Anne Arundel	AA4925130	12-SF-0156	02-13-10 02-13-11	4/8/2013	RHD/SS		3.25	3.64	0.74	0.67	0.35	Yes
AA200010	MD 4	Functional Enhancements of SWM Facilities along MD 4	Anne Arundel	AA5515174	09-SF-0258	02-13-11	7/23/2010	DH/RSK		7.27	8.49	0.00	0.00	0.00	Yes
AA200011	MD 175	BRAC - MD 175 at Reece Rd and Mapes Rd	Anne Arundel	AA5805680 AA5805670	09-SF-0227	02-13-10 02-13-11	2/5/2014	NP		24.59	29.75	5.16	1.25	2.26	Yes
AA200012	MD 450	Annapolis Maintenance Shop - Drainage and Stormwater Management Improvements	Anne Arundel	AA7665174	09-SF-0153	02-13-10	5/12/2011	ER/JDC		0.79	0.77	0.08	0.10	0.00	Yes
AA200013	MD 450	MD 450 from Housley Road to Generals Highway	Anne Arundel	AA8285177	12-SF-0193	02-13-10	7/18/2012	B. Benda		3.05	3.06	0.01	0.04	0.00	Yes
AA200014	MD 648	MD 648 from AA County Line to I-895	Anne Arundel	AX6445278	14-SF-0069	02-13-09	8/16/2013	RHD/RG		0.26	0.28	0.03	0.00	0.01	Yes
AA200016	MD 424	From 750 feet of MD 3 to Underwood Rd. Sidewalk ADA Improvements	Anne Arundel	AA1375133	12-SF-0150	02-13-11-05	12/17/2013	RHD/CVM		200.00	200.45	0.52	0.10	0.07	Yes
AA200017	MD 2	MD 2 at Harwood Drive - Dedicated Turn Lane	Anne Arundel	AA2705176 AA2705130	12-SF-0036	02-13-11-04	12/10/2012	NP		1.98	2.37	0.39	0.51	0.00	Yes
AA200018	MD 175	BRAC - MD 175 at Rockenbach Road and Disney Road	Anne Arundel	AA580A21 / AA5805370	09-SF-0219	02-13-11-05	5/12/2010	KP/FOA		13.23	17.74	4.51	0.95	0.00	Yes
AA200019	MD 4	MD 4 at MD 794 Waysons Corner Park and Ride Extension	Anne Arundel	AA8125181	12-SF-0328	02-13 11	5/10/2013	RHD/JP		0.08	0.74	0.74	0.00	0.00	Yes
AA200020	MD 450	MD 450 From MD 2 (Solomons Island Rd.) to MD 435 (Taylor Ave.) - ADA Compliance	Anne Arundel	AA8275178	11-SF-0292	02-13-10	4/25/2011	KRP/GAI		1.52	1.88	0.36	0.00	0.00	Yes
AA200021	US 50	Broad Creek Wetland and Stream Restoration	Anne Arundel	AA8955182	15-SF-0134	02-13-10	7/21/2016	RC/CAL		18.82	18.82	0.00	0.00	0.00	Yes
AA200022	MD 980B	MD 980B Full Depth Reclamation Project From Wrington Road to Talbott Road	Anne Arundel	AA1595177	15-PR-0052	02-13-11	4/5/2016	RT/NMP		10.11	10.11	0.00	0.00	0.00	Yes
AA200024	MD 174	MD 174 (Quarterfield Road) ADA Sidewalk Retrofits	Anne Arundel	AX6995378	14-SF-0266	02-13-09-03	1/29/2014	KRP/DZ		1.02	1.08	0.06	0.09	0.00	Yes
AA200025	MD 175	MD 175 West of Reece Road to East of Disney Road; Road Widen and Resurface.	Anne Arundel	AA4365471	15-PR-0023	3-10 and 02-1	6/24/2016	ERS		8.62	13.56	13.32	0.00	0.75	Yes
AA200026	MD 295 SB	MD 295 SB from Hanover Road to Winterson Road, Hammonds Ferry Road to Baltimore City Line	Anne Arundel	AA1965177	15-PR-0134	02-13-09	11/8/2016	JF/CSF		10.24	10.24	0.00	0.00	0.00	Yes
AA200027	MD 2	MD 2 at MD 423 Intersection Improvements	Anne Arundel	AA4935130/AA493A21	10-SF-0248	02-13-10-05	9/18/2015	Psolliday		0.83	0.97	0.16	0.16	0.00	Yes
AA200028	MD 2	MD 2 at Owensville Sudley Road - Intersection Shoulder Bypass Lane	Anne Arundel	AA2695130	11-SF-0342	2/13/2010	11/21/2014	RHD/DFD		2.35	2.76	0.41	0.64	0.00	Yes
	Anne Arundel County Totals												**8.50**	**4.60**	
BA200001	MD 150	MD 150 EB from Rolling Mill Rd. to 300 Ft. East of I-695 Outer Loop	Baltimore	AX6445278	13-SF-0163	02-13-09	2/25/2013	RHD/FW		0.14	0.26	0.14	0.00	0.02	Yes
BA200002	MD 648	MD 648 from I-895 to Baltimore City line	Baltimore	AX6445278	13-SF-0309	02-13-09	7/10/2013	RHD/RG		1.17	1.22	0.08	0.00	0.03	Yes
BA200003	MD 150 (Eastern Ave.)	MD 150 From E of Pembroke Blvd. to Southern Ave.	Baltimore	AX9985178	13-SF-0051	02-13-09	8/23/2012	KRP/RJH		0.24	0.25	0.01	0.00	0.00	Yes
BA200004	US 1 Alternate	US 1 Bike Lane Feasibility Study and ADA Improvement Study From US 1 Alt. to Baltimore City Line	Baltimore	BA0785288	14-SF-0218	02-13-09	5/15/2014	RLS		0.00	0.00	0.23	0.00	0.55	Yes

ID	Project Net Change in Impervious Area, (Acres) [New Development - Existing Impervious Area Removed]	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction [WQ Pavement Removal - Net change in Imp Area]	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres) [If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	Credit Applied to MDOT SHA Water Quality Bank (Acres) [Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	Total Available Impervious Area Reduction Restoration Credit (Acres) [Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	Total Available Impervious Urban to Pervious (Acres) [Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	Total Available Existing Impervious Area Double Treated by Project (Acres) After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	Reconstruction Restoration Credit (Acres) [Reconstructed Impervious Area * Redevelopment %]	Impervious Area Reduction Restoration Credit (Acres) [If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]
AA200001	-1.01	0.05	1.06	0.50	0.52	0.52	1.06	0.54	0.52	0.02	0.93
AA200002	0.15	0.00	0.00	0.50	0.00	0.21	0.00	0.00	0.00	0.16	0.00
AA200003	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.12	0.02
AA200004	0.03	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.31	0.00
AA200005	0.54	0.00	0.00	0.50	0.03	0.32	0.00	-0.03	0.00	1.00	0.00
AA200006	2.03	0.00	0.00	0.50	0.00	0.89	0.00	0.00	0.00	0.00	0.00
AA200007	0.19	0.00	0.00	0.50	0.00	0.07	0.00	0.00	0.00	0.00	0.00
AA200008	0.39	0.00	0.00	0.50	0.03	0.85	0.00	-0.03	0.00	0.39	0.00
AA200009	0.39	0.00	0.00	0.50	0.18	0.75	0.00	-0.18	0.00	0.34	0.00
AA200010	0.00	0.00	0.00	0.20	0.00	5.86	0.00	0.00	0.00	0.00	0.00
AA200011	2.90	0.00	0.00	0.50	1.13	0.29	0.84	-0.29	0.84	0.63	0.00
AA200012	0.08	0.10	0.02	0.20	0.00	0.77	0.00	0.00	0.00	0.02	0.00
AA200013	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00
AA200014	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00
AA200016	0.45	0.00	0.00	0.50	0.04	0.00	0.04	0.00	0.04	0.05	0.00
AA200017	0.39	0.00	0.00	0.50	0.00	0.29	0.00	0.00	0.00	0.26	0.00
AA200018	4.51	0.00	0.00	0.20	0.00	2.66	0.00	0.00	0.00	0.19	0.00
AA200019	0.74	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AA200020	0.36	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AA200021	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AA200022	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AA200024	0.06	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.05	0.00
AA200025	12.57	0.00	0.00	0.50	0.38	0.47	0.00	-0.38	0.00	0.00	0.00
AA200026	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AA200027	0.16	0.00	0.00	0.20	0.00	0.13	0.00	0.00	0.00	0.03	0.00
AA200028	0.41	0.00	0.00	0.50	0.00	0.36	0.00	0.00	0.00	0.32	0.00
Anne Arundel County Totals										**3.89**	**0.94**
BA200001	0.12	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00
BA200002	0.05	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00
BA200003	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BA200004	-0.32	0.00	0.32	0.50	0.28	0.06	0.54	0.26	0.28	0.00	0.47

ID	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
AA200001	MDE	Yes	10/4/2013	AA151B21.pdf	IA Reduction, no BMP		2017
AA200002	SHA	No	10/12/2011	AA2085176.pdf	021535 - Grass Swale		2017
AA200003	SHA	No	12/2/2010	AA48051808.pdf	WQ bank debit, no BMP		2017
AA200004	SHA	No	4/1/2013	AA2595180.pdf	21189 - Microbioretention		2017
AA200005	MDE	No	3/17/2014	AA2785187.pdf	021466 - 021473	GIS team verified construction completed. As-builts received.	2018
AA200006	MDE	No	4/26/2013	AA4315181.pdf	21431 - 21439	WQSS forced to new development only, could not determine redeveloped area	2017
AA200007	MDE	No	11/2/2012	AA4385130.pdf	21307	Approval date not on WQSS; not sure what exact date is	2017
AA200008	MDE	No	8/6/2014	AA4915130.pdf	021242, 021243, 021245, 021246	GIS team verified construction completed. Approval date not on WQSS; not sure what exact date is	2018
AA200009	MDE	No	6/27/2013	AA4925130.pdf	021272 - 021276	GIS team verified constuction completed.	2018
AA200010	SHA	No	3/14/2011	AA5515174.pdf	2437, 2311, 2301, 2299	MDE Approval letter included in WQSS file pdf; WQ bank mitigation project	2017
AA200011	MDE	No	6/6/2014	AA5805680.pdf	21480 - 21482 21490 - 21492	GIS team verified construction completed.	2018
AA200012	MDE	No	6/21/2012	AA7665174.pdf	20676		2017
AA200013	MDE	No	7/17/2012	AA8285177.pdf	WQ bank debit, no BMP		2017
AA200014	MDE	No	10/10/2013	AX6445278 (MD 648,14SF0069).pdf	WQ bank debit, no BMP		2017
AA200016	MDE	No	1/14/2014	AA1375133.pdf	Disconnection Credit [not shown in NPDES] & WQ bank debit		2017
AA200017	MDE	No	8/8/2013	AA2705176.pdf	021458 - 021462; 5 Structural BMPs	GIS team verified construction completed.	2018
AA200018	MDE	No	1/14/2011	AA5805370.pdf	20688 - 20689	GIS team verified construction completed.	2018
AA200019	SHA	No	6/6/2013	AA8125181.pdf	21440 - 21443 - 2 Micro-bioretentions, permeable pavers	MDE Approval letter included in WQSS file pdf	2017
AA200020	SHA	No	5/16/2011	AA82751788.pdf	WQ bank debit, no BMP		2017
AA200021	SHA	No	9/6/2016	AA8955182.pdf	020268 - TMDL Stream Restoration		2017
AA200022	SHA PRD	No	4/29/2016	AA1595177.pdf	No SWM required for this project, no BMP - paving project	**May not yet be constructed*** No redevelopment credit, so not sent to GIS team for verification	
AA200024	SHA	No	9/24/2014	AX6995378.pdf	WQ bank debit, no BMP	MDE Approval letter included in WQSS file pdf	2017
AA200025	SHA PRD	No	11/14/2016	AA4365471.pdf	21898 - 21924	**May not yet be constructed*** No redevelopment credit, so not sent to GIS team for verification	
AA200026	SHA PRD	No	12/13/2016	AA1965177.pdf	No SWM required for this project, no BMP - paving project	**May not yet be constructed*** No redevelopment credit, so not sent to GIS team for verification	
AA200027	MDE	No	10/7/2015	AA4935130-AA493A21.pdf	21212		2017
AA200028	MDE	Yes	3/24/2015	AA2695130.pdf	021541 - 021546 - bioswales & grasss swales	Per SWMFAC Comments - facilities constructed as of 2016	2018
Anne Arundel County Totals						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
BA200001	MDE	No	3/28/2013	AX6445278 (MD150).pdf	None - Debit from WQ bank		2017
BA200002	MDE	No	7/30/2014	AX6445278 (MD648 13SF0309).pdf	None - Debit from WQ bank		2017
BA200003	SHA	No	9/20/2012	AX9985178.pdf	None - Debit from WQ bank		2017
BA200004	MDE	No	9/12/2014	BA0785288.pdf	IA Reduction, no BMP		2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
BA200005	US 1 Alternate	US 1 Alt. from Baltimore County Line to I-695	Baltimore	BA1535277	15-SF-0088	02-13-09-06	2/6/2015	RD/SP		0.33	0.38	0.06	0.23	0.01	Yes	0.05	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.12	0.00	MDE	No	3/23/2015	BA1535277.pdf	None - Debit from WQ bank		2017
BA200006	MD 25	Replacement of Bridge No. 0301900 on MD 25 (Falls Road) over George's Run	Baltimore	BA8105180	15-SF-0115	02-13-08-06	1/27/2015	RHD/BB		0.23	0.32	0.09	0.16	0.00	Yes	0.09	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.08	0.00	MDE	No	3/20/2015	BA8105180.pdf	No numbers provided; WQ met by stream restoration/stabilization as stated on MDE approval letter	Credit should be located at bridge crossing of George's Run as a result of stream restoration/stabilization at this location	2017
BA200008	US 40	US 40 from 950 ft. East of the Bridge over the Patapsco River to Pine St.	Baltimore	BA0515177	14-SF-0232	02-13-09	3/6/2014	RHD/ATN		20.29	20.31	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	No	3/26/2014	BA0515177.pdf	None - Debit from WQ bank		2017
BA200009	MD 150	MD 150 from North Point Road to Diamond Point Road	Baltimore	BA0545177	14-SF-0077	02-13-09	10/10/2013	RHD/CSF		0.00	0.00	0.03	0.13	0.03	Yes	0.00	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.07	0.00	MDE	No	1/27/2014	BA0545177.pdf	None - Debit from WQ bank		2017
BA200010	MD 131	MD 131 (Seminary Ave.) from MD 25 (Falls Rd.) to MD 45 (York Rd.)	Baltimore	BA0575177	14-SF-0178	02-13-09	1/14/2014	RHD/CSF		0.00	0.00	0.05	0.00	0.02	Yes	0.03	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	No	5/8/2014	BA0575177.pdf	None - Debit from WQ bank		2017
BA200011	MD 587	MD 587 From MD 150 (Eastern Ave.) to Strawberry Point Road	Baltimore	BA0585177	14-SF-0190	02-13-08	2/18/2014	CAL/JMH		3.20	2.43	0.15	1.22	0.00	Yes	0.15	0.91	0.76	0.50	0.00	0.15	0.61	0.61	0.00	0.61	0.46	MDE	No	6/11/2014	BA0585177.pdf	IA Reduction, no BMP		2017
BA200012	US 40	US 40 (Pulaski Highway) from Todds Lane to MD 700 (Martin Blvd.)	Baltimore	BA0595177	14-SF-0007	02-13-09	3/14/2014	RHD/TKP		0.00	0.00	0.21	0.00	0.12	Yes	0.09	0.00	0.00	0.50	0.06	0.82	0.00	-0.06	0.00	0.00	0.00	MDE	No	4/29/2014	BA0595177.pdf	030705 & 030706		2017
BA200013	I-695	Replacement of Bridge 0313900 on I-695 over MD 26 (Liberty Road)	Baltimore	BA4625168	09-SF-0372	02-13-09-05	5/23/2011	BS/SAS		15.54	17.42	2.32	2.70	0.44	Yes	1.88	0.00	0.00	0.20	0.09	0.11	0.00	-0.09	0.00	0.54	0.00	MDE	No	6/17/2011	BA4625168.pdf	030366 - 030368	Verified SWMFAC numbers by reviewing as-builts & matching locations to GIS	2017
BA200014	I-695	SWM Mitigation at the SE Loop Ramp of I-695 and MD 147	Baltimore	BA0895174	11-SF-0060	02-13-08-01	4/20/2012	Koser/Solliday		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	2.43	0.00	0.00	0.00	0.00	0.00	SHA	No	9/13/2012	BA0895174.pdf	30389	This is a WQ mitigation project with one BMP to add credit to the WQ bank.	2017
BA200015	I-195	I-195 at MD 166 Ridesharing Lot Rehabilitation	Baltimore	BA0925181	13-SF-0235	02-13-09	2/22/2013	RHD		2.95	2.85	0.00	0.00	0.10	Yes	-0.10	0.00	0.10	0.50	0.05	0.05	0.10	0.05	0.05	0.00	0.09	SHA	No	4/23/2013	BA0925181.pdf	IA Reduction, no BMP	MDE Approval letter included in WQSS file pdf	2017
BA200016	MD 439	I-83 at MD 439 East of Interchange Park and Ride Lot Expansion	Baltimore	BA0935181	13-SF-0336	02-13-08	10/9/2014	WAR		0.91	0.99	0.41	0.00	0.00	Yes	0.41	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	10/29/2014	BA0935181.pdf	30671 & 30672; and Debit to WQ Bank	MDE Approval letter included in WQSS file pdf	2017
BA200017	MD 166	MD 166 at I-195 Ramps and Park and Ride	Baltimore	BA1365187	11-SF-0315	02-13-09	10/5/2011	RHD/CF		1.60	1.32	0.23	0.37	0.17	Yes	0.06	0.35	0.29	0.50	0.09	0.02	0.36	0.27	0.09	0.19	0.29	SHA	No	1/24/2012	BA1365187.pdf	None - Pavement Removal	MDE Approval letter included in WQSS file pdf	2017
BA200018	MD 45	Resurfacing and Rehabilitation of MD 45 from Ridgely Rd to 400' North of Timonium Rd	Baltimore	BA1615177	11-SF-0238	02-13-08-05	2/17/2011	Doran/Patel		0.00	0.00	0.03	0.00	0.00	Yes	0.03	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	5/18/2011	BA1615177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200019	I-695 and US 1	I-695 Bridge Nos. 0311305/0311405 and US 1 from Knecht Ave. to Linden Ave.	Baltimore	BA3665170	14-SF-0129	02-13-09	6/18/2014	RGH/AMT		20.50	21.51	2.18	5.45	1.39	Yes	0.79	0.19	0.00	0.50	0.70	0.00	0.70	0.00	0.70	2.73	0.00	MDE	No	9/5/2014	BA3665170.pdf	030710 through 030722	GIS team determined construction complete per field visit	2018
BA200020	MD 26	MD 26 From Powells Run Road to Offutt Road	Baltimore	BA4325177	09-SF-0457	02-13-09	3/18/2011	RD/CKL		6.80	6.81	0.03	0.04	0.02	Yes	0.01	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA	No	8/2/2012	BA4325177.pdf	None - Debit from WQ bank	This project was modified to include BA5395177/09-SF-0256 in 2011; therefore BA5395177 (ID 200026) was removed from the accounting spreadsheet; MDE Approval letters included in WQSS file pdf	2017
BA200021	I-83	Replacement of Bridge No. 03214 on Middletown Rd. over I-83	Baltimore	BA4215180	12-SF-0326	02-13-08	3/23/2012	RHD/DJW		5.74	6.10	0.96	0.12	0.63	Yes	0.33	0.00	0.00	0.50	0.32	0.09	0.23	-0.09	0.23	0.06	0.00	SHA	No	10/12/2012	BA4215180.pdf	30535, 30536, 30537, 30538, 30539, 30543, 30544	MDE Approval letter included in WQSS file pdf	2017
BA200022	I-695	I-695 from Perring Parkway to Harford Road	Baltimore	BA4585172	14-SF-0060/05-SF-0318	02-13-08 02-13-09	12/20/2013 12/23/2013	PS/GA		37.95	38.71	1.74	5.22	0.54	Yes	1.20	0.41	0.00	0.50	0.27	0.00	0.27	0.00	0.27	2.61	0.00	MDE	Yes	6/19/2014	BA4585172.pdf	30037, 30389, 30040	MDE Approval letter included in WQSS file pdf	2017
BA200023	I-695	Replacement of Bridge No. 0314000 on I-695 over Milford Mill Road	Baltimore	BA4625280	11-SF-0368	02-13-09	9/6/2013	RHD/ATN		5.95	8.11	2.24	4.82	0.08	Yes	2.16	0.02	0.00	0.50	0.04	0.00	0.04	0.00	0.04	2.41	0.00	MDE	No	9/27/2013	BA4625280.pdf	030644 through 030655		2017
BA200025	MD 129	MD 129 Deck Replacement for Bridge #03147 over I-695	Baltimore	BA5025180	13-SF-0325	02-13-09	1/23/2014	RHD/JK		10.74	10.92	0.18	0.23	0.00	Yes	0.18	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.12	0.00	SHA	No	3/19/2014	BA5025180.pdf	30278 through 30280	MDE Approval letter included in WQSS file pdf	2017
BA200027	I-695	Replacement of Bridge No. 0311905 over MD 372	Baltimore	BA6015180	11-SF-0169	02-13-09-06	4/6/2011	Weaver/Helms		0.00	0.00	1.85	2.21	0.10	Yes	1.75	0.00	0.00	0.50	0.05	0.00	0.05	0.00	0.05	1.10	0.00	SHA	No	7/21/2011	BA6015180.pdf	30394 through 30400	MDE Approval letter included in WQSS file pdf	2017
BA200028	MD 295	MD 295 Riverview/Baltimore Highlands Community Noise Barrier	Baltimore	BA9785226	15-SF-0086	2/13/2009	12/12/2014	RHD/MJS		25.97	25.90	0.08	0.00	0.06	Yes	0.02	0.08	0.06	0.50	0.03	0.03	0.06	0.03	0.03	0.00	0.05	MDE	No	3/20/2015	BA9785226.pdf	None - Pavement Removal	MDE Approval letter included in WQSS file pdf	2017
BA200029	MD 157	MD 157 from Peninsula Expressway to Wise Avenue	Baltimore	BA3325177	13-SF-0079	02-13-09	1/15/2013	RHD/RG		156.52	156.19	0.61	1.09	0.15	Yes	0.46	0.79	0.33	0.50	0.08	0.00	0.41	0.33	0.08	0.55	0.32	SHA	No	3/18/2013	BA3325177.pdf	None - Pavement Removal & Debit from WQ Bank	MDE Approval letter included in WQSS file pdf	2017
BA200030	MD 140	Replacement of Bridge on MD 140 over N. Branch Patapsco River	Baltimore	BA6075180	12-SF-0404	02-13-09	8/7/2013	RHD/RIG		0.00	0.11	0.06	0.30	0.00	Yes	0.06	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.15	0.00	MDE	Yes	8/26/2013	BA6075180.pdf	60380		2017
BA200031	MD 26	MD 26 (Liberty Road) from I-695 to the Baltimore City/County Line Resurfacing and Rehabilitation	Baltimore	BA5965177	12-SF-0028	02-13-09-05	8/2/2012	RHD		1.74	2.03	0.35	0.00	0.06	Yes	0.29	0.00	0.00	0.50	0.03	0.00	0.03	0.00	0.03	0.00	0.00	SHA	No	11/2/2012	BA5965177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200032	MD 26 (Liberty Road)	MD 26 (Liberty Rd.) at Wards Chapel Road	Baltimore	BA6125187	08-SF-0316	02-13-09	9/29/2011	KRP/FG		6.10	6.37	0.27	0.41	0.00	Yes	0.27	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.08	0.00	MDE	No	10/21/2011	BA6125187.pdf	Debit from WQ bank & 032316-grass swale	*GIS team field verified grass swale and added to NPDES layer*	2017
BA200033	MD 30	MD 30 @ MD 91	Baltimore	BA6165187	09-SF-0230	02-13-09	5/31/2011	RHD/SP		12.79	13.83	1.07	0.71	0.03	Yes	1.04	0.00	0.00	0.20	0.01	1.97	0.00	-0.01	0.00	0.14	0.00	SHA	No	8/31/2011	BA6165187.pdf	No numbers provided - WQ provided by wet pond & grass channels	MDE Approval letter included in WQSS file pdf	2017
BA200034	I-695	I-695 Southwest Outer Loop Phase 2A: Frederick Road (MD 144) Interchange Reconstruction	Baltimore	BA7275380	04-SF-0290	02-13-09	5/14/2014	DJW		39.19	39.72	1.00	1.69	0.47	Yes	0.53	0.00	0.00	0.20	0.09	0.00	0.09	0.00	0.09	0.34	0.00	MDE	No	8/18/2014	BA7275380.pdf	None - Debit from WQ bank	Latest WQ summary sheet is from Redline No. 6; MDE Approval letter in WQSS pdf is original, not for redline no. 6.	2017
BA200035	MD 145/146	MD 145 at MD 146 Intersection Improvements	Baltimore	BA7725187	06-SF-0120	02-13-08	3/20/2013	RHD/DW		4.15	4.85	0.78	0.67	0.00	Yes	0.78	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.13	0.00	SHA	No	4/22/2013	BA7725187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200036	MD 150	MD 150 over MD 700 - Rehabilitation of Bridge No. 03095	Baltimore	BA8555180	12-SF-0286	02-13-09	7/6/2012	KP/KL		3.40	3.51	0.12	0.43	0.00	Yes	0.12	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.22	0.00	SHA	No	9/26/2012	BA8555180.pdf	30505 & Debit from WQ Bank	MDE Approval letter included in WQSS file pdf	2017
BA200038	I-83	I-83 from I-695 Shawan Road to I-695 - Safety, Resurfacing & Rehabilitation	Baltimore	BA8735277	14-SF-0143	02-13-08	12/13/2013	RHD/DLH		64.69	64.72	0.03	0.00	0.07	Yes	-0.04	0.00	0.04	0.50	0.04	0.01	0.07	0.03	0.04	0.00	0.06	SHA	No	1/16/2014	BA8735277.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
BA200039	I-695	I-695 Resurfacing & Saftey Improvements from MD 122 to 2000' South of MD 26	Baltimore	BA0915177	13-SF-0189	02-13-09	12/27/2012	RHD/SP		0.02	0.00	0.00	0.00	0.02	Yes	-0.02	0.00	0.02	0.50	0.01	0.01	0.02	0.01	0.01	0.00	0.02	SHA	No	3/11/2013	BA0915177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA200040	US 40	US 40 Median Barrier & Rehabilitation Improvements from Baltimore City Line to Howard County Line	Baltimore	BA8775177	11-SF-0349	02-13-09	5/24/2011	KRP/FOA		0.38	0.39	0.04	0.00	0.03	Yes	0.01	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	SHA	No	9/12/2011	BA8775177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200041	I-695	Deck Replacement of Bridge No. 0328100 on MD 695 [I-695] Ramp C over Northeast Cr. **MDE approval letter states MD 695, not I-695 in error**	Baltimore	BA8965180	13-SF-0153	02-13-09	11/4/2014	RHD/IAI		0.86	0.43	0.00	0.86	0.00	Yes	0.00	0.43	0.43	0.50	0.00	0.00	0.43	0.43	0.00	0.43	0.32	SHA	No	2/11/2015	BA8965180.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA200042	MD 7	MD 7 at Hospital Drive	Baltimore	BA9445176	11-SF-0369	02-13-09	5/17/2012	RHD/JMH		3.85	4.00	0.15	0.86	0.01	Yes	0.14	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.43	0.00	SHA	No	6/3/2013	BA9445176.pdf	30529	MDE Approval letter included in WQSS file pdf	2017
BA200043	MD 139	MD 139 at Sheppard Pratt Hospital Entrance	Baltimore	BA9465176	11-SF-0200	02-13-09	7/28/2009	JAF		0.33	0.23	0.10	0.13	0.00	Yes	0.10	0.20	0.10	0.50	0.00	0.04	0.06	0.06	0.00	0.07	0.05	MDE	No	9/6/2011	BA9465176.pdf	None - IA Reduction		2017
BA200044	I-695	I-695 Outer Loop From MD 7 to Md 150	Baltimore	BA9705277	12-SF-0145	02-13-09	12/2/2011	RHD/NHL		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	6/11/2013	BA9705277.pdf	None	MDE Approval letter included in WQSS file pdf	2017
BA200045	US 40	US 40 at Middle River Road	Baltimore	BA4045176	07-SF-0106	02-13-08 02-13-09	6/6/2008	KP/DJW		11.36	11.75	0.43	2.41	0.00	Yes	0.43	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.48	0.00	SHA	No	2/24/2011	BA4045176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200046	MD 140	MD 140 from Stocksdale Ave. to Woodley Ave.	Baltimore	XY1485176 (MD 140)	14-SF-0304	02-13-09	6/30/2014	KRP/GRL		0.72	0.72	0.02	0.12	0.03	Yes	-0.01	0.00	0.01	0.50	0.02	0.00	0.03	0.01	0.02	0.06	0.02	MDE	No	8/5/2014	XY1485176 (MD140).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
BA200047	MD 7	MD 7 (Philadelphia Road) from Rossville Blvd. to Ridge Rd.	Baltimore	XY1485176 (MD 7)	14-SF-0320	02-13-09	3/19/2014	KRP/MB		1.84	1.91	0.07	0.15	0.01	Yes	0.06	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.08	0.00	MDE	No	8/27/2014	XY1485176 (MD7).pdf	None - Debit from WQ bank		2017
BA200048	MD 146	MD 146 (Dulaney Valley Rd.) from Towson Roundabout to I-695	Baltimore	BA9825177	12-SF-0294	02-13-09	2/29/2012	KRP/ATN		7.72	7.72	0.01	0.00	0.00	Yes	0.01	0.01	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	No	6/16/2012	BA9825177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
BA200049	MD 147	MD 147 at Glen Arm and Mount Vista Roads - Round-about Construction	Baltimore	BA4655187	09-SF-0200	02-13-08	1/15/2016	SP/MA		1.91	2.61	1.08	0.82	0.38	Yes	0.70	0.00	0.00	0.50	0.19	0.00	0.19	0.00	0.19	0.41	0.00	SHA	No	2/22/2016	BA4655187.pdf	31847	GIS team verified construction complete.	2018
BA200050	MD 140	MD 140 (Reisterstown Rd.) from N of Painters Mill Rd to S. of Garrison View Road (Widening)	Baltimore	BA7295270	09-SF-0187	02-13-09	9/9/2016	XY		4.76	5.19	0.62	1.25	0.19	Yes	0.43	0.00	0.00	0.50	0.10	0.00	0.10	0.00	0.10	0.63	0.00	MDE	No	2/2/2017	BA7295270.pdf	None - Debit from WQ bank	**Not Yet Constructed ** MDE Approval letter included in WQSS file pdf	
BA200051	I-83	I-83 Northbound Safety Improvement and Resurfacing from Shawan Road to MD 137 (Mount Carmel Road)	Baltimore	BA1285177	16-PR-0100	02-13-08	1/17/2017	SP/RB		0.00	0.00	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.01	0.01	0.00	0.01	0.00	0.01	SHA PRD	No	2/10/2017	BA1285177.pdf	None - IA Reduction	**May not yet be constructed*** PRD Approval letter included in WQSS file pdf	
BA200052	NP	Golden Ring Maintenance Facility Underground Storage Tank Replacement	Baltimore	BA6135249	15-PR-0115	02-13-09	10/28/2015	MP		5.64	5.64	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	4/25/2016	BA6135249.pdf	No SWM required, no BMP	**May not yet be constructed*** 3.3A Waiver - No SWM, No MS4 Credit	
BA200053	I-83 / I-795	I-83 North at I-695 and I-795 at MD 940 - Interchange Lighting	Baltimore	BA2435185	16-PR-0018	02-13-09	2/29/2016	RK/BJG		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	6/2/2016	BA2435185.pdf	No SWM required, no BMP	**May not yet be constructed*** 3.3A Waiver - No SWM, No MS4 Credit	
BA200054	MD 45	MD 45 from South of Corbett Road to Gifford Lane	Baltimore	BA6435130	12-SF-0281	02-13-08	4/23/2015	SP/CSC		0.00	0.00	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.03	0.00	-0.01	0.00	0.00	0.00	MDE	No	7/10/2015	BA6435130.pdf	030731 & 030732	GIS team verified construction complete.	2018
BA200055	MD 138	MD 138 (Monkton Road/Shepperd Road) from Gunpowder Falls Bridge to JM Pearce Road	Baltimore	BA9535277	15-SF-0141	02-13-08	6/1/2015	PS/JDC		0.00	0.00	0.02	0.03	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	SHA	No	7/22/2015	BA9535277.pdf	None - Debit from WQ bank		2017
BA200056	I-95/I-695	I-95/I-695 - Interchange Lighting	Baltimore	BA0155185	16-PR-0026	02-13-09	3/7/2016	RK/BJG		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	7/22/2016	BA0155185.pdf	No SWM required, no BMP	**May not yet be constructed*** No SWM required, No treatment provided	
	Baltimore County Totals												**34.83**	**5.78**											**14.82**	**2.15**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
CL200001	MD 91	MD 91 at Deer Park Road - Widening and Resurfacing	Carroll	CL3555176	10-SF-0205	02-13-09	11/10/2010	RHD/JSR		2.55	2.40	0.13	0.11	0.00	Yes	0.13	0.28	0.15	0.20	0.00	0.13	0.02	0.02	0.00	0.02	0.02	SHA	No	9/13/2011	CL3555176.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
CL200002	MD 97	MD 97 (Littlestown Pike) at Relocated Stone Road	Carroll	CL2365130	10-SF-0126	02-14-03	11/26/2012	FOA		0.40	1.86	1.86	0.00	0.16	Yes	1.70	0.00	0.00	0.50	0.08	0.59	0.00	-0.08	0.00	0.00	0.00	SHA	No	2/7/2013	CL2365130.pdf	060271, 060276, 060278, 060279, 060281, 060282	MDE Approval letter included in WQSS file pdf	2017
CL200003	MD 140	MD 140 (Baltimore Boulevard) at Kays Mill Road - Geometric Improvements	Carroll	CL4565130	14-SF-0345	2/13/2009	1/15/2015	RD/SP		0.12	0.17	0.05	0.12	0.00	Yes	0.05	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.06	0.00	MDE	Yes	2/2/2015	CL4565130.pdf	60382 - bioswale	MDE Approval letter included in WQSS file pdf	2017
CL200004	MD 26	MD 26 from 1050 Ft. West of Emerald Lane to Calvert Way - Widening	Carroll	CL2255187	11-SF-0302 16-PR-0149	02-13-09	11/5/2016	JF/CSF		21.13	23.11	2.56	0.15	0.00	Yes	2.56	0.00	0.00	0.50	0.00	0.26	0.00	0.00	0.00	0.08	0.00	SHA PRD	No	1/27/2017	CL2255187.pdf	060472-060474, 060400-060405	GIS team verified project NOT yet constructed. Anticipated completion in 2019	
CL200006	MD 140	MD 140 (Taneytown Pike) at Pleasant Valley Road - Widen for Left Turn Lanes	Carroll	CL2135176	11-SF-0309	02-14-03	6/24/2013	Brudis/Doran		1.62	2.68	2.68	0.00	0.00	Yes	2.68	0.00	0.00	0.50	0.00	0.38	0.00	0.00	0.00	0.00	0.00	SHA	No	10/28/2014	CL2135176.pdf	060314-060319	MDE Approval letter included in WQSS file pdf	2017
CL200007	MD 31	MD 31 at Tahoma Farms Road - Intersection Improvements	Carroll	CL2435130	15-PR-0066	02-14-03	1/22/2016	None		0.20	0.37	0.18	0.00	0.01	Yes	0.17	0.00	0.00	0.50	0.01	0.26	0.00	-0.01	0.00	0.00	0.00	SHA PRD	No	12/19/2016	CL2435130.pdf	060399 - bio swale	GIS team verified construction complete.	2018
CL200008	MD 140	MD 140 from WMC Drive to Meadow Branch/Royer Road	Carroll	CL4355187	13-SF-0331	02-14-03	6/4/2015	KL/SA		0.16	0.66	0.66	0.00	0.01	Yes	0.65	0.00	0.00	0.50	0.01	0.05	0.00	-0.01	0.00	0.00	0.00	MDE	Yes	4/5/2016	CL4355187.pdf	060395 - 060938 - 3 micro-bioretentions, 1 bioswale	GIS team verified construction complete.	2018
CL200009	MD 97	MD 97 at MD 32 Intersection Improvements	Carroll	CL3695130	13-SF-0168	2/13/2009	1/9/2015	DH/FOA		0.13	0.63	0.63	0.00	0.00	Yes	0.63	0.00	0.00	0.50	0.00	0.37	0.00	0.00	0.00	0.00	0.00	SHA	No	7/20/2015	CL3695130.pdf	060374-060378, 060385	SWMFAC shown constructed in NPDES layer	2018
CL200010	MD 27	MD 27 at Center Street Lane Widening & Resurfacing	Carroll	CL2425130	14-SF-0201	2/13/2009	5/24/2016	JF/CSF		44.43	44.55	0.14	0.00	0.00	Yes	0.14	0.00	0.00	0.50	0.00	0.06	0.00	0.00	0.00	0.00	0.00	SHA	No	1/17/2017	CL2425130.pdf	060548 - bioswale	**May not yet be constructed*** no MS4 credit	
	Carroll County Totals												**0.38**	**0.18**											**0.16**	**0.02**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
CE200001	N/A	Elkton Maintenance Shop Tank Replacement	Cecil	CE2845149	15-SF-0094	02-13-06	11/20/2014	RHD/SM		0.05	0.16	0.16	0.00	0.01	Yes	0.15	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	11/20/2014	CE2845149.pdf	None - Debit from WQ bank		2017
CE200002	MD 781	MD 781 at US 40	Cecil	CE456A21	11-SF-0323	02-13-06	10/27/2011	K. Leah, PE		0.07	0.08	0.09	0.02	0.03	Yes	0.06	0.00	0.00	0.20	0.01	0.00	0.01	0.00	0.01	0.00	0.00	SHA	No	10/28/2011	CE456A21.pdf	70041, 70042		2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

										B	C	D	E	F			L	
ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]
CE200003	MD 279	MD 279 from Belle Hill Rd. to the Delaware State Line - Safety and Resurfacing	Cecil	CE63785177	12-SF-0039	02-13-06	8/24/2011	RHD		0.00	0.01	0.01	0.00	0.00	Yes	0.01	0.00	0.00
CE200004	US 40	US 40 from Bridge over Big Elk Creek to Delaware State Line - Resurfacing and Safety Improvements	Cecil	CE3265177	12-SF-0210	02-13-06	6/18/2012	RD/GWS		0.14	0.30	0.15	0.00	0.00	Yes	0.15	0.00	0.00
CE200005	MD 282	MD 282 From West of Corporate Town Limit of Cecilton to MD 213 - Resurfacing and Safety Improvements	Cecil	CE3925177	13-SF-0223	02-13-06	8/2/2013	RHD/MWK		0.00	0.00	0.04	0.05	0.00	Yes	0.04	0.00	0.00
CE200006	MD 272	Replacement of Bridge 7036 on MD 272 over AMTRAK	Cecil	CE4465180	13-SF-0080	02-13-06	2/23/2013	RHD/JW		1.36	1.66	0.48	1.18	0.18	Yes	0.30	0.00	0.00
CE200007	MD 213	MD 213 at Frenchtown Road	Cecil	CE2925130 BCS 2009-12A	16-PR-0044	02-13-06	1/4/2017	JF/MRB		3.93	4.68	1.76	0.49	0.20	Yes	1.56	0.00	0.00
CE200008	MD 279	MD 279 from US 40 to Belle Hill Road - Resurfacing and Safety Improvements	Cecil	CE3955177	15-SF-0040	02-13-06	4/2/2015	PS/SA		0.18	0.25	0.07	0.00	0.07	Yes	0.00	0.00	0.00
CE200010	MD 272	MD 272 from Irishtown Road to Church Street - Sidewalk Retrofits	Cecil	CE2915379	14-SF-0317	02-13-06	8/14/2015	B. Benda		0.42	0.43	0.09	0.17	0.08	Yes	0.01	0.00	0.00
CE200011	MD 7	Replacement of Bridge 7006 on MD 7 over Mill Creek	Cecil	CE7825180	05-SF-0282	02-13-06	2/9/2006	DJW		4.89	5.04	0.15	0.73	0.00	Yes	0.15	0.00	0.00
CE200012	MD 7D	MD 7D from MD 213 to End of State Maintenance	Cecil	CE3185177	06-SF-0105	02-13-06	11/12/2008	KP/GAI		4.38	4.16	0.10	0.92	0.25	Yes	-0.15	0.08	0.23
CE200013	MD 7D	MD 7D from Big Elk Creek to Creswell Ave.	Cecil	CE3405177	09-SF-0096	02-13-06	1/26/2009	JGK/KCI		1.52	1.52	0.00	0.54	0.00	Yes	0.00	0.00	0.00
CE200014	MD 545	Prestressed Concrete Girder Bridge 7055 on MD 545 over Little Elk Creek	Cecil	CE3335180	09-SF-0460	02 -13-06	9/14/2010	RHD/DJW		0.30	0.36	0.06	0.21	0.00	Yes	0.06	0.00	0.00
CE200015	US 301	US 301 NB Weigh Station and Inspection Facility	Cecil	DelDOT 23-500-38	N/A	02-13-06	6/18/2007	RHD/SKH		0.18	0.18	0.00	0.18	0.00	Yes	0.00	0.00	0.00
CE200016	MD 222	MD 222 / Blythedale Road Ride Sharing Facility Expansion	Cecil	CE3415168	09-SF-0218	02-13-06	2/6/2009	DJW		0.98	1.19	0.21	0.00	0.00	Yes	0.21	0.00	0.00
CE200017	US 301	SB US 301 Truck Weigh and Inspection Station - Well, Septic, and Inspection Pit	Cecil	CE3465123	08-SF-0323	02-13-06	6/24/2008	Tony Brudis		0.05	0.05	0.00	0.05	0.00	Yes	0.00	0.00	0.00
CE200018	MD 222	MD 222 Bridge No. 0702700 Replacement over Rock Run	Cecil	CE3515180	15-SF-0120	02-12-02	6/24/2015	JAF/GWF		0.43	0.46	0.09	0.21	0.06	Yes	0.03	0.00	0.00
CE200019	MD 267	MD 267 from Market Street to West of Old Philadelphia Road - Retrofit Project	Cecil	CE2915279	15-PR-0004	02-13-06	12/14/2015	RLS		0.62	0.42	0.11	0.34	0.16	Yes	-0.05	0.00	0.05
CE200020	MD 273	MD 273 at Appleton Road Roundabout	Cecil	CE3875176	14-SF-0242	02-13-06	5/1/2015	EA/CVM		2.59	2.88	0.31	0.49	0.02	Yes	0.29	0.00	0.00
	Cecil County Totals												5.58	1.06				
CH200001	MD 210	Sidewalk along Westside of MD 210 from Ruth B. Swann Dr. to Wooster Dr.	Charles	CH2005179	14-SF-0116	02-14-01	10/21/2014	CAL/VM		8.13	8.32	0.39	0.00	0.00	Yes	0.39	0.00	0.00
CH200002	SHA La Plata Shop	Vactor Truck Dewatering Station	Charles	CH2045149	14-SF-0080	02-13-11	9/3/2013	RHD/JMS		0.06	0.05	0.00	0.06	0.01	Yes	-0.01	0.00	0.01
CH200003	MD 5	MD 5 - Intersection Improvements	Charles	CH3165184	13-SF-0111	02-14-01	1/14/2013	KL/JMH		0.25	0.32	0.07	0.25	0.00	Yes	0.07	0.00	0.00
CH200004	SHA La Plata Shop	Storage Tanks Removal and Replacement	Charles	CH3775149	14-SF-0312	02-14-01	8/4/2014	RHD/SKD		0.15	0.15	0.00	0.15	0.00	Yes	0.00	0.00	0.00
CH200005	MD 234	MD 234 - Emergency Bridge Replacement over Allens Fresh Run	Charles	CH2095180	12-SF-0398	02-14-01	7/30/2012	RHD/CSC		2.45	2.38	0.00	0.53	0.06	Yes	-0.06	0.00	0.06
CH200006	MD 234	Replacement of Bridge 8047 on MD 234 over Gilbert Swamp Run	Charles	CH2065180	14-SF-0311	02-14-01	2/17/2015	RD/CSC		0.27	0.30	0.04	0.27	0.01	Yes	0.03	0.00	0.00
	Charles County Totals												1.26	0.08				
FR200001	MD 464	MD 464 ADA Improvements at Ninth Street	Frederick	AX6445478	13-SF-0031	02-14-03-01	7/25/2012	KRP/PW		0.07	0.08	0.01	0.00	0.00	Yes	0.01	0.00	0.00
FR200002	US 40	US 40 (West Patrick Street) ADA Improvements	Frederick	AX6445478	13-SF-0028	02-14-03-02	7/13/2012	KRP/DZ		0.25	0.29	0.04	0.00	0.00	Yes	0.04	0.00	0.00
FR200003	MD 80	MD 80 Sidewalk Improvements from I-270 to 780' East of Carriage Hill Drive	Frederick	AX6445478	14-SF-0100	02-14-03	10/29/2013	RHD/PW		0.71	0.69	0.08	0.00	0.11	Yes	-0.03	0.00	0.03
FR200004	MD 17	MD 17 at Ventrie Court - Park and Ride Expansion	Frederick	FR6085181	12-SF-0134	02-14-03	11/26/2013	NP		3.87	4.66	1.41	0.05	0.52	Yes	0.89	0.00	0.00
FR200005	MD 17	MD 17 from Eagle Bay Drive to Cedar Street	Frederick	FR1415179	14-SF-0006	02-14-03	7/10/2013	RHD/JJK		0.26	0.50	0.24	0.00	0.01	Yes	0.23	0.00	0.00
FR200006	MD 75 at I-70	MD 75 at I-70 Park and Ride Expansion	Frederick	FR2255181	13-SF-0239	02-14-03	8/5/2014	CAL/RD		0.00	0.39	0.39	0.00	0.00	Yes	0.39	0.00	0.00

ID	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
CE200003	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	9/22/2011	CE3785177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200004	0.50	0.00	0.04	0.00	0.00	0.00	0.00	0.00	SHA	No	9/6/2012	CE3265177.pdf	070061, 070062	MDE Approval letter included in WQSS file pdf	2017
CE200005	0.50	0.00	0.00	0.00	0.00	0.00	0.03	0.00	SHA	No	11/13/2013	CE3825177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200006	0.50	0.09	0.82	0.00	-0.09	0.00	0.59	0.00	MDE	Yes	4/2/2014	CE4465180.pdf	70125, 70126	GIS team verified currently under construction.	
CE200007	0.50	0.10	0.39	0.00	-0.10	0.00	0.25	0.00	SHA PRD	No	2/13/2017	CE2925130.pdf	None provided - Grass swales, wet swales, and SGWs	GIS team verified currently under construction. Anticipated completion in 2019.	
CE200008	0.50	0.04	0.00	0.04	0.00	0.04	0.00	0.00	SHA	No	4/22/2015	CE3955177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200010	0.50	0.04	0.00	0.04	0.00	0.04	0.09	0.00	MDE	Yes	10/15/2015	CE2915379.pdf	070159-070161 - grass swales 070162 - bioswale	MDE Approval letter included in WQSS file pdf	2017
CE200011	0.20	0.00	0.00	0.00	0.00	0.00	0.15	0.00	SHA	No	4/26/2006	CE7825180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200012	0.20	0.05	0.00	0.28	0.23	0.05	0.18	0.22	SHA	No	11/25/2008	CE3185177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200013	0.20	0.00	0.00	0.00	0.00	0.00	0.11	0.00	SHA	No	8/14/2009	CE3405177.pdf	Grass channel credit - additional treatment NOT credited to WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200014	0.20	0.00	0.00	0.00	0.00	0.00	0.04	0.00	SHA	No	10/14/2010	CE3335180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200015	0.20	0.00	0.00	0.00	0.00	0.00	0.04	0.00	SHA	No	6/25/2007	DelDOT 23-500-38.pdf	None - Debit from WQ bank		2017
CE200016	0.20	0.00	0.74	0.00	0.00	0.00	0.00	0.00	SHA	No	3/26/2009	CE3415168.pdf	070788 - Bioretention	*GIS team verified in the field & will add to NPDES layer* MDE Approval letter included in WQSS file pdf	2017
CE200017	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA	No	2/11/2009	CE3465123.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CE200018	0.50	0.03	0.04	0.00	-0.03	0.00	0.11	0.00	SHA	No	10/8/2015	CE3515180.pdf	070164 - bioswale	SWMFAC shown constructed in NPDES layer	2018
CE200019	0.50	0.08	0.00	0.13	0.05	0.08	0.17	0.12	SHA PRD	No	6/1/2016	CE2915279.pdf	070167 - wet swale & debit to WQ bank	GIS team verified construction complete	2018
CE200020	0.50	0.01	0.00	0.01	0.00	0.01	0.25	0.00	SHA	No	6/23/2015	CE3875176.pdf	070142 - bioswale 070144 - microbioretention	SWMFAC shown constructed in NPDES layer	2018
Cecil County Totals							2.00	0.34						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
CH200001	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	11/6/2014	CH2005179.pdf	82321	GIS team verified construction complete.	2018
CH200002	0.50	0.01	0.00	0.02	0.01	0.01	0.03	0.01	MDE	Yes	10/31/2013	CH2045149.pdf	None - Debit from WQ bank		2017
CH200003	0.50	0.00	0.00	0.00	0.00	0.00	0.13	0.00	MDE	Yes	6/11/2013	CH3165184.pdf	None - Debit from WQ bank		2017
CH200004	0.50	0.00	0.00	0.00	0.00	0.00	0.08	0.00	MDE	Yes	9/12/2014	CH3775149.pdf	None - Debit from WQ bank		2017
CH200005	0.50	0.03	0.00	0.09	0.06	0.03	0.27	0.08	SHA	No	1/17/2013	CH2095180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
CH200006	0.50	0.01	0.00	0.01	0.00	0.01	0.14	0.00	SHA	No	2/17/2015	CH2065180.pdf	None - Debit from WQ bank		2017
Charles County Totals							0.63	0.09						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
FR200001	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/11/2012	AX6445478 (MD464).pdf	None - Debit from WQ bank		2017
FR200002	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/11/2012	AX6445478 (US40).pdf	None - Debit from WQ bank		2017
FR200003	0.50	0.06	0.00	0.09	0.03	0.06	0.00	0.08	MDE	Yes	12/19/2013	AX6445478 (MD80).pdf	None - Debit from WQ bank		2017
FR200004	0.50	0.26	0.13	0.13	-0.13	0.13	0.03	0.00	MDE	Yes	3/14/2014	FR6085181.pdf	100230 - 100232 - Microbioretentions	WQSS corrected by SHA/MDE in 2015 - all docs in WQSS file pdf	2017
FR200005	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	9/3/2013	FR1415179.pdf	None - Debit from WQ bank		2017
FR200006	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	9/19/2014	FR2255181.pdf	100647 & 100648	MDE Approval letter included in WQSS file pdf	2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
FR200007	MD 144FB	MD 144FB from West Royal Oak Drive to Bye Alley	Frederick	FR3275184	05-SF-0298	02-14-03	5/14/2014	KRP/JMH		0.00	0.00	0.56	0.79	0.35	Yes	0.21	0.00	0.00	0.50	0.18	0.00	0.18	0.00	0.18	0.40	0.00	MDE	Yes	7/16/2014	FR3275184.pdf	None - Debit from WQ bank		2017
FR200008	MD 550	Bridge 1009400 on MD 550 over Israel Creek	Frederick	FR4575180	12-SF-0005	02-14-03	11/7/2011	RHD/DJW		0.27	0.28	0.04	0.20	0.03	Yes	0.01	0.00	0.00	0.50	0.02	0.04	0.00	-0.02	0.00	0.10	0.00	MDE	Yes	3/29/2012	FR4575180.pdf	100239 & 100240	GIS team verified construction complete.	2018
FR200010	MD 140	Replacement of Bridge 10065 on MD 140 over Monocacy River	Frederick	FR5045180	11-SF-0243	02-14-03	8/14/2012	RHD		1.37	1.53	0.94	0.06	0.76	Yes	0.18	0.00	0.00	0.50	0.38	0.00	0.38	0.00	0.38	0.03	0.00	SHA	No	6/7/2012	FR5045180.pdf	100289-100291	MDE Approval letter included in WQSS file pdf	2017
FR200011	MD 76	Bridge 1019600 on MD 76 (Motters Station Rd.) over Motters Run	Frederick	FR5305180	10-SF-0268	02-14-03-03	7/5/2012	KRP/FOA		0.00	0.97	0.97	0.00	0.00	Yes	0.97	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	5/18/2012	FR5305180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR200012	US 15	US 15 (Catoctin Mountain Highway) - Monocacy Blvd Interchange	Frederick	FR5715170	10-SF-0402	02-14-03	7/11/2014	PH/WW		18.50	34.72	20.19	1.26	0.48	Yes	19.71	0.00	0.00	0.50	0.24	1.39	0.00	-0.24	0.00	0.63	0.00	MDE	Yes	1/8/2015	FR5715170.pdf	100527-100534, 100536-100540, 100542-100545, 100550-100599, 100662, 100663	GIS team verified construction NOT yet complete. Anticipated completion for this project is Fall 2018	
FR200013	US 15	US 15 @ Mountville Road - Intersection Improvements	Frederick	FR6015130	09-SF-0481	02-14-03	4/15/2011	KRP/GAI		3.78	3.82	0.27	0.10	0.00	Yes	0.27	0.23	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.02	0.00	MDE	Yes	12/6/2011	FR6015130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR200014	MD 75	Replacement of Bridge 1017200 on MD 75 over Haines Branch	Frederick	FR6475180	13-SF-0008	02-14-03	9/25/2014	RHD/GWF		0.27	0.35	0.09	0.06	0.00	Yes	0.09	0.00	0.00	0.50	0.00	0.23	0.00	0.00	0.00	0.03	0.00	MDE	Yes	11/6/2014	FR6475180.pdf	100520-100523		2017
FR200015	I-70	I-70 at Hollow Road	Frederick	NP - Maintenance Activity	13-SF-0333	02-14-03	5/13/2013	RHD		0.03	0.00	0.00	0.00	0.03	Yes	-0.03	0.00	0.03	0.50	0.02	0.02	0.03	0.01	0.02	0.00	0.02	MDE	Yes	6/6/2013	I70HollowRoad.pdf	None - IA Reduction		2017
FR200016	MD 351 and US 15	Traffic Signal Modification/ Reconstruction with APS/CPS in Districts 3,4,& 7	Frederick	XY15555185	14-SF-0247	02-14-03	3/25/2014	RHD/BJG		0.00	0.01	0.02	0.00	0.01	Yes	0.01	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	6/20/2014	XY1555185.pdf	None - Debit from WQ bank		2017
FR200017	I-270	Replacement of Decks for Dual Bridges on I-270 over Bennett Creek and MD 80	Frederick	FR3825180	09-SF-0249	02-14-03	9/28/2010	B. Benda		0.00	3.25	3.25	0.00	0.00	Yes	3.25	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	12/16/2010	FR3825180.pdf	None	SHA only has the temp paving WQSS (debit & credit back), not the WQSS for the overall project. - No credit for MS4 without overall project WQSS	
FR200018	US 15	NB US 15 Auxiliary Lane - Motter Ave. to MD 26	Frederick	FR5785187	11-SF-0332	02-14-03	11/25/2014	RD/SGC		1.50	1.82	0.32	0.41	0.00	Yes	0.32	0.00	0.00	0.50	0.00	0.47	0.00	0.00	0.00	0.21	0.00	MDE	Yes	3/13/2015	FR5785187.pdf	100669 - 100671 - swales		2017
FR200019	Motter Avenue	Replacement of Bridge 10098 on Motter Ave. Over US 15	Frederick	FR4185180	09-SF-0113	02-14-03-02	1/4/2011	RHD/AM		11.31	12.93	1.91	1.35	0.04	Yes	1.87	0.00	0.00	0.20	0.01	0.09	0.00	-0.01	0.00	0.27	0.00	SHA	No	10/27/2011	FR4185180.pdf	100164 & 100165 - filters	MDE Approval letter included in WQSS file pdf	2017
FR200020	I-70	I-70 EB from West of Ridge Road to West of I-270	Frederick	FR4125168	09-SF-0134	02-14-03	10/8/2008	RHD/JJK		28.25	28.47	0.22	0.04	0.00	Yes	0.22	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA	No	4/28/2011	FR4125168.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
FR200021	US 40	US 40 Alt. at Beechtree Drive and Willow Tree Drive	Frederick	FR5925130 / FR5925168	09-SF-0351	02-14-03	6/2/2009	RHD/RSK		1.99	2.04	0.05	0.04	0.00	Yes	0.05	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	MDE	Yes	1/10/2011	FR5925130-68.pdf	None - Debit from WQ bank		2017
FR200027	I-270	I-270 NB from MD 80 to North of I-70 - Resurfacing and Safety Improvements	Frederick	FR6335177	12-SF-0316	02-14-03	3/8/2012	RHD		0.21	0.00	0.00	0.00	0.21	Yes	-0.21	0.00	0.21	0.50	0.11	0.11	0.21	0.10	0.11	0.00	0.18	MDE	Yes	12/17/2013	FR6335177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
FR200028	US 15	US 15 Business at MD 140 Community Safety & Enhancement Project	Frederick	FR1715184	15-PR-0112	02-14-03	1/10/2017	Tyler Bazan		27.04	27.09	0.09	0.07	0.04	Yes	0.05	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.04	0.00	SHA PRD	No	1/11/2017	FR1715184.pdf	None - Debit from WQ bank		2017
FR200029	US 15	US 15 Southbound from PA State Line to Roddy Rd - Safety and Resurfacing Project	Frederick	FR1515177	15-SF-0078	02-14-03	9/18/2014	KRP/SAS		0.00	0.00	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.01	0.01	0.00	0.01	0.00	0.01	SHA	No	4/9/2015	FR1515177.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
FR200030	US 15	US 15 NB Bridge 1009701 over MD 26 - Widening	Frederick	FR1305180	15-PR-0055	02-14-03	4/13/2016	TK		0.53	1.02	1.02	0.00	0.00	Yes	1.02	0.00	0.00	0.50	0.00	0.04	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	5/17/2016	FR1305180.pdf	100716-100718 - 3 bioswales	GIS team verified construction complete.	2018
FR200031	US 340	US 340 EB from MD 17 to Lander Road - Resurfacing and Rehabilitation	Frederick	FR1985177	15-PR-0120	02-14-03	6/7/2016	GWF/JND		0.04	0.02	0.02	0.00	0.04	Yes	-0.02	0.00	0.02	0.50	0.02	0.00	0.04	0.02	0.02	0.00	0.04	SHA PRD	No	6/7/2016	FR1985177.pdf	None - IA Reduction	Construction complete in 2016 per SHA PM April Stitt astitt@sha.state.md.us	2017
FR200032	NP	Frederick Maintenance Facility Wash Bay in Frederick County	Frederick	FR2595149	16-PR-0001	02-14-03	6/27/2016	Meredith Wilson		0.60	0.56	0.02	0.54	0.06	Yes	-0.04	0.00	0.04	0.50	0.03	0.01	0.06	0.03	0.03	0.27	0.05	SHA PRD	No	8/23/2016	FR2595149.pdf	100725	GIS team verified NOT yet constructed	
FR200033	MD 140	Bridge Replacement 100620 on MD 140 (East Main Street) over Flat Run	Frederick	FR5365180	15-PR-0078	02-14-03	4/18/2016	Steve Phillips		0.61	0.71	0.39	0.32	0.10	Yes	0.29	0.00	0.00	0.50	0.05	0.01	0.04	-0.01	0.04	0.16	0.00	SHA PRD	No	9/2/2016	FR5365180.pdf	101226-101228 - 1 wet swale, 2 bioswales	GIS team to determine if BMPs have been constructed.	
FR200034	US 40	Bridge Deck Replacement 1014600 on US 40 EBR over US 40 Ramp F	Frederick	FR1145180	16-PR-0013	02-14-03	6/24/2016	JF/GS		0.10	0.03	0.03	0.00	0.07	Yes	-0.04	0.00	0.04	0.50	0.04	0.01	0.07	0.03	0.04	0.00	0.06	SHA PRD	No	9/8/2016	FR1145180.pdf	None - IA Reduction	Construction complete per SHA PM Prasoon Shresthat; pshresthat@sha.state.md.us	2018
	Frederick County Totals												**5.29**	**2.87**											**2.19**	**0.43**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
HA200001	MD 7	Replacement of Bridge 1200009 on MD 7 (Philadelphia Road) over James Run	Harford	HA2425180	11-SF-0138	02-13-07	3/22/2013	RHD/MWA		0.78	0.90	0.14	0.39	0.02	Yes	0.12	0.00	0.00	0.50	0.01	0.08	0.00	-0.01	0.00	0.20	0.00	SHA	No	12/9/2013	HA2425180.pdf	122006 & 122007 - bioswales	MDE Approval letter included in WQSS file pdf	2017
HA200002	US 40	BRAC Intersection at APG - US 40 at MD 7 and MD 159 Intersection Improvements (Phase 1)	Harford	HA3485270	09-SF-0188	02-13-07	2/21/2011	LL/DZ		7.39	7.99	0.60	0.63	0.00	Yes	0.60	0.00	0.00	0.20	0.00	0.46	0.00	0.00	0.00	0.13	0.00	SHA	No	11/1/2011	HA3485270.pdf	120158 - filter & grass swale	MDE Approval letter included in WQSS file pdf	2017
HA200003	US 40 and MD 715	US 40 (South Philadelphia Boulevard) and MD 715 (Short Lane) - Design Build - Phase 2	Harford	HA270A21	10-SF-0168	02-13-07 02-13-07-01	4/18/2011	KP/PFC		0.00	0.00	6.27	1.05	2.42	Yes	3.85	0.00	0.00	0.20	0.48	2.80	0.00	-0.48	0.00	0.21	0.00	MDE	Yes	2/16/2012	HA270A21.pdf	120288, 120289, 120291 & debit		2017
HA200004	MD 22	MD 22 at Beard's Hill Road - Intersection Improvements	Harford	HA3482470	09-SF-0244	02-13-07	7/5/2012	RK/CSC		3.88	6.54	3.04	3.55	0.38	Yes	2.66	0.00	0.00	0.50	0.19	0.00	0.19	0.00	0.19	1.78	0.00	MDE	Yes	7/23/2015	HA3482470.pdf	122018, 122020-122023	*GIS team verified facilities in field & updated NPDES layer* MDE Approval letter included in WQSS file pdf. **WQSS in file is NOT correct - used MDE approval letter.	2017
HA200005	MD 22	MD 22 at MD 462 - Intersection Improvements (BRAC)	Harford	HA3482370 HA3485170	09-SF-0193	02-13-07	6/10/2014	TB/CSC		4.39	4.87	2.10	2.72	1.61	Yes	0.49	0.00	0.00	0.50	0.81	1.30	0.00	-0.81	0.00	1.36	0.00	SHA	No	1/22/2015	HA3482370.pdf	122024 & 122025	Using SHA contract number on MDE approval letter; WQSS shows different SHA contract number. In WQ bank database the WQSS contract number is used. There is an error somewhere, but this is one project and has not been double counted.	2017
HA200006	MD 924	MD 924 (Emmorton Road) from East MacPhail Road to US 1/MD22	Harford	HA3875177	11-SF-0289	02-13-07	5/26/2011	KRP/DJW		0.01	0.12	0.11	0.03	0.00	Yes	0.11	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	SHA	No	5/31/2011	HA3875177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
HA200007	US 40	US 40 from Long Bar Harbor to Spesutia Road	Harford	HA4995177	14-SF-0184	02-13-07	12/16/2013	RHD/WRW		19.21	19.18	0.03	0.00	0.06	Yes	-0.03	0.00	0.03	0.50	0.03	0.00	0.06	0.03	0.03	0.00	0.05	MDE	Yes	3/20/2014	HA4995177.pdf	None - IA Reduction		2017
HA200008	MD 755	MD 755 Phase II Streetscape Improvements	Harford	HA2145184	12-SF-0356	02-13-07	12/19/2013	None		6.67	6.89	0.30	0.60	0.00	Yes	0.30	0.08	0.00	0.50	0.00	0.06	0.00	0.00	0.00	0.30	0.00	MDE	Yes	3/17/2014	HA2145184.pdf	122011 & 122012 & IA reduction		2017
HA200009	MD155	MD 155 (Level Road) From Bayview Drive to Graceview Drive	Harford	HA2925176	09-SF-0229	02-12-02	3/13/2009	KRP/DJW		2.50	2.72	0.25	0.13	0.07	Yes	0.18	0.00	0.00	0.20	0.01	0.00	0.01	0.00	0.01	0.03	0.00	SHA	No	5/19/2011	HA2925176.pdf	None - Debit from WQ bank	Using MDE number from MDE approval letter - WQSS MDE number assumed incorrect. MDE Approval letter included in WQSS file pdf	2017
HA200010	MD 7	Culvert Replacement on MD 7 over Tributary to Bynum Run	Harford	HA2585180	13-SF-0057	02-13-07	1/8/2015	AJD/DZ		0.28	0.29	0.01	0.04	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	MDE	Yes	3/31/2015	HA2585180.pdf	120201 - Rain garden	GIS team verified construction completed. MDE Approval letter included in WQSS file pdf.	2018
HA200011	MD 22	MD 22 at Old Post Road - Intersection Improvements (BRAC)	Harford	HA3485570	09-SF-0245	02-13-07	3/5/2013	AW/CSC		10.00	12.09	2.32	1.87	0.22	Yes	2.10	0.00	0.00	0.20	0.04	3.33	0.00	-0.04	0.00	0.37	0.00	MDE	Yes	8/8/2013	HA3485570.pdf	120153		2017
HA200012	MD 543	I-95 Southbound Off-Ramp at MD 543 (SHA); I-95 Northbound Ramp at MD 543 (MDE)	Harford	HA3515176	13-SF-0024	02-13-07	5/1/2013	RHD/JSC		2.00	2.47	0.47	0.35	0.01	Yes	0.46	0.00	0.00	0.50	0.01	0.05	0.00	-0.01	0.00	0.18	0.00	SHA	No	5/10/2013	HA3515176.pdf	120400 & 122008	MDE Approval letter included in WQSS file pdf	2017
HA200013	MD 623	MD 623 (Castleton Road) from Franklin Road to Glen Cove Road	Harford	HA4335174	16-PR-0024	02-12-02	1/11/2016	Junaid Kahn		3.92	3.94	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.49	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	2/6/2017	HA4335174.pdf	122239 & 122240	GIS team verified construction complete.	2018
HA200014	US 40	US 40 Westbound Parking/Service Road between MD 132 and Robinson Avenue	Harford	HA1075176	12-SF-0272	02-13-07	11/12/2012	RHD/SP		0.59	0.05	0.03	0.02	0.00	Yes	0.03	0.57	0.54	0.50	0.00	0.53	0.01	0.01	0.00	0.01	0.01	SHA	No	2/11/2013	HA1075176.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf	2017
HA200016	US 40	BRAC Intersection at APG - US 40 at MD 7 and MD 159 Intersection Improvements (Phase 2)	Harford	HA3485770 HA3485170	12-SF-0306	02-13-07	9/9/2015	None		4.68	5.80	1.74	4.68	0.62	Yes	1.12	0.00	0.00	0.50	0.31	0.00	0.31	0.00	0.31	2.34	0.00	MDE	No	8/5/2016	HA3485770.pdf	122216 - 122219 - 1 Wet Pond, 2 Bio-Swales & 1 Grass Swale	GIS team verified currently under construction. MDE Approval letter included in WQSS file pdf. Using SHA contract number on MDE approval letter; WQSS shows different SHA contract number. In WQ bank database the WQSS contract number is used. There is an error somewhere, but this is one project and has not been double counted.	
HA200017	MD 924	MD 924 FROM Holly Wreath to St. Clair Drive	Harford	HA4265177	15-PR-0015	2/13/2007	5/20/2015	RHD/NRD		0.00	0.00	0.15	0.10	0.00	Yes	0.15	0.00	0.00	0.50	0.00	0.04	0.00	0.00	0.00	0.05	0.00	SHA	No	5/20/2015	HA4265177	122058-Microbioretention	SWMFAC shown constructed in NPDES layer	2018
	Harford County Totals												**16.16**	**5.41**											**6.98**	**0.06**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
HO200001	N/A	Jessup Salt Barn Facility	Howard	HO2195129	13-SF-0023	02-13-09	9/20/2013	PH/AO		0.29	1.29	1.29	0.00	0.00	Yes	1.29	0.00	0.00	0.50	0.00	0.01	0.00	0.00	0.00	0.00	0.00	MDE	Yes	11/5/2013	HO2195129.pdf	132052-132057	MDE Approval letter included in WQSS file pdf	2017
HO200005	I-95	I-95 Southbound Rest Area - Truck Parking Expansion	Howard	HO2935181	12-SF-0392	02-13-11-06	8/30/2012	Eduardo Alvarez		10.04	11.62	2.12	1.52	0.51	Yes	1.61	0.00	0.00	0.50	0.26	1.52	0.00	-0.26	0.00	0.76	0.00	SHA	No	3/8/2013	HO2935181.pdf	130584-130593, 130714-130715	MDE Approval letter included in WQSS file pdf	2017
HO200006	MD 175	MD 175 @ Snowden River Parkway - Park and Ride Expansion	Howard	HO2945181	13-SF-0258	02-13-11	1/22/2014	KPJ		0.13	0.93	0.93	0.00	0.00	Yes	0.93	0.00	0.00	0.50	0.00	0.07	0.00	0.00	0.00	0.00	0.00	SHA	No	3/12/2014	HO2945181.pdf	132102 - 132104; 1 bioswale, 2 MBs	Beware, there is a WQSS floating around with this SHA contract number listed as MO county (MO2945181), but the same project - MO county project in this spreadsheet has been deleted to avoid double counting - MDE Approval letter included in WQSS file pdf	2017
HO200008	MD 32	MD 32 - Linden Church Road Interchange	Howard	HO3915170	09-SF-0216	02-13-11	10/11/2012	CLW/RGH		3.09	4.70	4.70	0.00	0.00	Yes	4.70	0.04	0.00	0.50	0.00	0.39	0.00	0.00	0.00	0.00	0.00	MDE	Yes	1/18/2013	HO3915170.pdf	130674-130689; 130694-130699; 13700-130712		2017
HO200009	US 29	US 29 and MD 175 Interchange	Howard	HO1505185	15-PR-0058	02-13-11	10/19/2015	SP/JF		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	2/1/2016	HO1505185.pdf	None	**May not yet be constructed*** No PRD approval letter found - this may be a 3.3.A waiver and no MS4 credit, based on WQSS	
HO200010	MD 32	MD 32 Northbound from Bridge 13114 over Middle Patuxent River to North of MD 108	Howard	HO1535177	16-PR-0062	02-13-11	8/23/2016	RT/SP		0.38	0.38	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	2/13/2017	HO1535177.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
HO200011	MD 32	MD 32 Southbound from North of MD 108 to Structure 13114 over Middle Patuxent River	Howard	HO1535277	16-PR-0006	02-13-11	2/2/2016	RT/SP		0.25	0.25	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	3/2/2016	HO1535277.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
HO200012	MD 32	MD 32 Wilcox Driveway Access Management Project	Howard	HO7565270	08-SF-0322	02-13-11	1/7/2015	JB/MW		0.04	0.18	0.14	0.01	0.00	Yes	0.14	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA	No	1/8/2016	HO7565270.pdf	None provided - Structural facility listed in WQSS, not sure what it is - Better not to include this right now	GIS team to determine if BMP has been constructed. **May not yet be constructed, no PRD approval letter located; Project location is also unknown.	
HO200013	I-70	I-70 Eastbound from Marriottsville Road to Baltimore County Line - Safety and Resurfacing	Howard	HO1775177	15-PR-0128	02-13-09 02-13-11	4/5/2016	JF/GWF		30.50	30.59	0.09	0.00	0.00	Yes	0.09	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	4/22/2016	HO1775177.pdf	WQ bank debit, no BMP	**May not yet be constructed***No MS4 credit	
HO200014	MD 32	MD 32 from South of Day Road to North of West Friendship Road	Howard	HO4725176	12-SF-0152	02-13-09	8/6/2013	GF		1.76	3.10	2.38	0.64	0.05	Yes	2.33	0.00	0.00	0.50	0.03	1.05	0.00	-0.03	0.00	0.32	0.00	MDE	Yes	5/1/2014	HO4725176.pdf	20 bioswales: 132060-132075; 132077-132079	MDE Approval letter included in WQSS file pdf.	2017
HO200015	US 40	US 40 at Rogers Avenue - Intersection Improvements	Howard	HO3785187	10-SF-0225	02-13-09	1/16/2015	GH/CSC		1.01	1.67	0.81	0.86	0.15	Yes	0.66	0.00	0.00	0.50	0.08	0.00	0.08	0.00	0.08	0.43	0.00	SHA	No	NP	HO3785187.pdf	Underground structural facility, GIS team added as 133157	SHA project, facility turned over to private owner & HO Co for maintenance/monitoring	2017
HO200016	US 29	US 29 NB Widening Phase 1A and 1B from S. of Seneca Drive to S. of MD 175	Howard	HO3175170 HO3175270	09-SF-0114	02-13-11	2/26/2015	GH/ALM		94.67	99.38	8.64	0.00	1.02	Yes	7.62	0.00	0.00	0.50	0.51	4.53	0.00	-0.51	0.00	0.00	0.00	SHA	No	3/7/2014	HO3175170.pdf	Grass swales: 130645-130648, 132080-132089, 132105-132108; MB: 130660-130664, 132090-132099, 132100; Wet Pond: 132101; Retrofit: 130166, 130169, 130171	MDE Approval letter included in WQSS file pdf. HO3175270.pdf is phase 1A temp WQSS, however the Phase 1B WQSS includes all Phase 1A work, so only that one is used.	2017
	Howard County Totals												**3.03**	**1.73**											**1.52**	**0.00**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
MO200001	MD 212	MD 212 (Riggs Road) at Powder Mill Road	Montgomery	AX6445178	11-SF-0330	02-14-02	4/25/2011	RK		0.02	0.04	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	9/14/2011	AX6445178 (MD212).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
MO200002	MD 115	MD 115 - MO-A ICC Redland Middle School Shared Use Path	Montgomery	AX3775360	09-SF-0164	02-14-02-06	12/20/2010	KP/RJM		1.12	1.27	0.19	0.05	0.04	Yes	0.15	0.00	0.00	0.20	0.01	0.00	0.01	0.00	0.01	0.01	0.00	SHA	No	1/21/2011	AX3775360.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200003	MD 191	MD 191 (Bradley Blvd.) at Strathmore Street - Intersection Crash Prevention	Montgomery	MO1345130	14-SF-0004	02-14-02	12/4/2013	RHD/RG		1.15	1.17	0.03	0.01	0.01	Yes	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.01	0.00	SHA	No	2/4/2014	MO1345130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
MO200004	MD 355	MD 355 at Jones Bridge Road - Main Contract	Montgomery	MO5935470	09-SF-0198	02-14-02	4/12/2011	CEI		10.21	10.31	0.28	0.77	0.18	Yes	0.10	0.00	0.00	0.20	0.04	0.00	0.04	0.00	0.04	0.15	0.00	MDE	Yes	9/7/2011	MO5935470.pdf	None - Debit from WQ bank		2017
MO200005	MD 28	MD 28 from Hurley Avenue to South Adams Street	Montgomery	MO1115177	12-SF-0132	02-14-02	12/13/2011	RHD/SBP		0.34	0.34	0.02	0.00	0.02	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	3/15/2012	MO1115177.pdf	None - Debit from WQ bank		2017
MO200006	MD 185	MD 185 (Connecticut Ave) from Warner Street to MD 97 (Georgia Ave.)	Montgomery	MO1135177	11-SF-0345	02-14-02-06	3/2/2012	RHD/JMH		0.00	0.00	0.05	0.02	0.06	Yes	-0.01	0.00	0.01	0.50	0.03	0.00	0.04	0.01	0.03	0.01	0.04	MDE	Yes	3/12/2012	MO1135177.pdf	None - Debit from WQ bank		2017
MO200007	MD 185	MD 185 (Connecticut Ave) from DC Line to North of MD 410	Montgomery	MO1155177	12-SF-0154	02-14-02	11/13/2012	KRP/GAI		11.78	12.19	0.41	0.00	0.00	Yes	0.41	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	11/14/2012	MO1155177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
MO200008	MD 355	MD 355 (Rockville Pike) from Nicholson Lane to 0.1 Miles North of MD 187	Montgomery	MO1165177	12-SF-0220	02-14-02	1/11/2012	KRP/KAP		0.03	0.02	0.02	0.00	0.03	Yes	-0.01	0.00	0.01	0.50	0.02	0.00	0.03	0.01	0.02	0.00	0.02	MDE	Yes	2/24/2012	MO1165177.pdf	None - Debit from WQ bank		2017
MO200009	MD 355	MD 355 (Wisconsin Avenue) from Bradley Lane to Montgomery Avenue - Safety and Resurfacing	Montgomery	MO1175177	12-SF-0047	02-14-02	2/26/2013	RHD/SP		0.35	0.34	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.01	SHA	No	3/28/2013	MO1175177.pdf	None - IA Reduction		2017
MO200010	MD 355	MD 355 from King Farm Blvd. to Mannakee Street	Montgomery	MO1185177	12-SF-0131	02-14-02-02 02-14-02-06	12/21/2011	RHD/SBP		1.01	1.01	0.04	0.00	0.03	Yes	0.01	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	MDE	Yes	2/13/2012	MO1185177.pdf	None - Debit from WQ bank		2017
MO200012	MD 28 & MD 355	MD 28 from Monroe Street to MD 911 & MD 355 from MD 28 to MD 911	Montgomery	MO1315477	12-SF-0368	02-14-02	10/18/2013	KRP/RG		0.00	0.00	0.02	0.00	0.02	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	2/11/2014	MO1315477.pdf	None - Debit from WQ bank		2017
MO200013	MD 28	MD 28 (Norbeck Road) from Maple Avenue to Rock Creek Bridge 15092	Montgomery	MO1315277	13-SF-0092	02-14-02	2/15/2013	RHD/NF		0.19	0.20	0.05	0.00	0.04	Yes	0.01	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	SHA	No	3/11/2013	MO1315277.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200014	MD 185	MD 185 (Connecticut Avenue) from Ramp 6 Off I-495 to Dupont Avenue	Montgomery	MO1315677	12-SF-0303	02-14-02	8/9/2013	RHD/JMH		0.00	0.00	0.02	0.02	0.01	Yes	0.01	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.01	0.00	MDE	Yes	4/4/2014	MO1315677.pdf	None - Debit from WQ bank		2017
MO200016	N/A	Gaithersburg Salt Barn Facility	Montgomery	MO1405229	14-SF-0236	02-14-02	9/5/2014	RD/NZF		6.22	5.85	0.01	2.85	0.37	Yes	-0.36	0.00	0.36	0.50	0.19	0.80	0.00	-0.19	0.00	1.43	0.00	MDE	Yes	10/17/2014	MO1405229.pdf	Bioretention facility on salt barn property - no SWMFAC # in NPDES layer	GIS team to determine if BMPs have been constructed.	
MO200017	MD 355	MD 355 (Wisconsin Avenue) from Grafton Street to MD 191 (Bradley Lane) - Sidewalk Retrofits	Montgomery	MO1495179	13-SF-0328	02-14-02	9/24/2013	RHD/CLW		0.03	0.63	0.63	0.00	0.00	Yes	0.63	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	12/18/2013	MO1495179.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200018	MD 410	MD 410 from MD 355 (Wisconsin Ave.) to MD 185 (Connecticut Ave.)	Montgomery	MO1595177	14-SF-0021	02-14-02	10/31/2014	RHD/CSF		0.50	0.50	0.03	0.00	0.01	Yes	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	11/10/2014	MO1595177.pdf	None - Debit from WQ bank		2017
MO200019	MD 97	MD 97 (Georgia Ave.) from Old Baltimore Rd to Queen Mary Dr	Montgomery	MO1595377	14-SF-0045	02-14-02	11/15/2013	RHD/JMH		0.00	0.00	0.02	0.00	0.02	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	2/4/2014	MO1595377.pdf	None - Debit from WQ bank		2017
MO200020	MD 124	MD 124 from MD 28 to Orchard Ridge Drive	Montgomery	MO1595877	14-SF-0068	02-14-02	8/15/2013	RHD/SBP		0.00	0.00	0.01	0.00	0.04	Yes	-0.03	0.00	0.03	0.50	0.02	0.01	0.04	0.02	0.02	0.00	0.04	MDE	Yes	2/2/2014	MO1595877.pdf	None - IA Reduction		2017
MO200021	MD 124	MD 124 (Woodfield Road) from MD 115 to 350' South of Lindbergh Drive	Montgomery	MO1615177	14-SF-0124	02-14-02	12/11/2013	RHD/RH		0.15	0.14	0.00	0.00	0.02	Yes	-0.02	0.00	0.02	0.50	0.01	0.01	0.02	0.01	0.01	0.00	0.02	MDE	Yes	2/11/2014	MO1615177.pdf	None - IA Reduction		2017
MO200022	MD 185	MD 185 from Saul Rd. to Washington St. - Sidewalk Improvement	Montgomery	MO2235176	10-SF-0344	02-14-02-06	3/7/2011	KP/MA		10.88	11.13	0.24	0.03	0.00	Yes	0.24	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	MDE	Yes	3/16/2012	MO2235176.pdf	None - Debit from WQ bank		2017
MO200023	MD 119	MD 119 at Kentlands Boulevard/ Orchard Ridge Drive	Montgomery	MO2595130	13-SF-0343	02-14-03	5/31/2013	RHD/JDC		0.09	0.13	0.06	0.00	0.02	Yes	0.04	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	12/19/2013	MO2595130.pdf	None - Debit from WQ bank		2017
MO200025	MD 27	MD 27 at Sweepstakes Road - Intersection Improvements	Montgomery	MO2955187	09-SF-0052	02-14-02	5/10/2012	AW		0.86	1.03	0.19	0.06	0.00	Yes	0.19	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	MDE	Yes	5/24/2012	MO2955187.pdf	None - Debit from WQ bank		2017
MO200027	MD 650	Deck Replacement for Bridge on MD 650 over Sligo Creek	Montgomery	MO4235180	12-SF-0133	02-14-02	12/22/2011	RHD/JSC		0.05	0.05	0.00	0.05	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.03	0.00	MDE	Yes	9/19/2012	MO4235180.pdf	None - Debit from WQ bank		2017
MO200028	MD 124	MD 124 (Midcounty Hwy) at Saybrooke Oaks Blvd./Woodfield Road	Montgomery	MO4325176	14-SF-0114	02-14-02	9/16/2014	RHD/ND		4.60	4.78	0.23	0.13	0.05	Yes	0.18	0.00	0.00	0.50	0.03	0.00	0.03	0.00	0.03	0.07	0.00	MDE	Yes	10/28/2014	MO4325176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200029	MD 107	MD 107 @ Partnership Road - Intersection Improvements	Montgomery	MO5305130	08-SF-0362	02-14-02-08	1/11/2011	KRP/JMS		0.72	0.84	0.12	0.16	0.00	Yes	0.12	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.03	0.00	SHA	No	4/5/2011	MO5305130.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200030	MD 182	MD 182 at Norwood Road - Intersection Improvements	Montgomery	MO5625176	09-SF-0191	02-14-02	7/2/2013	HHD/PE		1.40	2.22	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	8/16/2013	MO5625176.pdf	151458 - Grass channel credit	Per as-builts, streetview/aerial grass swale exist on either side of MD 182 and were used for SWM. GIS team verified swale in field visit.	2018
MO200031	MD 108	MD 108 at Bowie Mill Road - Intersection Improvements	Montgomery	MO5985187	12-SF-0011	02-14-02	9/27/2011	APM		0.00	0.00	0.09	0.04	0.00	Yes	0.09	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	SHA	No	9/28/2011	MO5985187.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200032	MD 355	MD 355 @ Cedar Lane - Intersection Improvements	Montgomery	MO5935270	09-SF-0199	02-14-02	4/22/2013	CEI		10.69	12.00	1.84	2.02	0.47	Yes	1.37	0.00	0.00	0.20	0.09	0.56	0.00	-0.09	0.00	0.40	0.00	MDE	Yes	12/5/2013	MO5935270.pdf	150148 - infiltration other	Do not have as-builts - not sure exactly what type of infiltration facility this is as in NPDES layer it is listed as infiltration other.	2017
MO200033	MD 187	MD 187 @ Oakmont - Intersection Improvement	Montgomery	MO5935370	09-SF-0197	02-14-02	3/28/2014	EAA/WJ		8.77	8.97	0.36	0.77	0.16	Yes	0.20	0.00	0.00	0.50	0.08	0.00	0.08	0.00	0.08	0.39	0.00	MDE	Yes	6/6/2014	MO5935370.pdf	150784 - grass swale	GIS team verified construction completed.	2018
MO200035	MD 320	MD 320 (Piney Branch Road) - Sligo Creek Trail Realignment	Montgomery	MO5935670	14-SF-0305	02-14-02	7/21/2014	KCS		0.06	0.08	0.08	0.00	0.02	Yes	0.06	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	8/25/2014	MO5935670.pdf	None - Debit from WQ bank		2017
MO200037	MD 586	MD 586 (Veirs Mill Road) at Ferrara Avenue	Montgomery	MO8355176	14-SF-0029	02-14-02	1/13/2014	RHD/JMH		0.03	0.04	0.04	0.07	0.03	Yes	0.01	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.04	0.00	MDE	Yes	4/3/2014	MO8355176.pdf	None - Debit from WQ bank		2017
MO200038	MD 97	MD 97 at Randolph Rd.	Montgomery	MO8545171	04-SF-0267	02-14-02	9/10/2013	AW/TKP		89.64	89.90	2.24	6.35	1.95	Yes	0.29	0.00	0.00	0.20	0.39	0.00	0.39	0.00	0.39	1.27	0.00	MDE	Yes	8/18/2014	MO8545171.pdf	150523 - bioretention	GIS team verified construction completed. MDE Approval letter included in WQSS file pdf.	2018
MO200039	MD 182	MD 182 from MD 97 to Longmead Road	Montgomery	MO9745277	14-SF-0038	02-14-02	10/15/2013	RHD/JMA		0.56	0.60	0.07	0.00	0.03	Yes	0.04	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	MDE	Yes	2/11/2014	MO9745277.pdf	None - Debit from WQ bank		2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
MO200040	I-270	I-270 Ramps from Montrose Road to MD 189	Montgomery	XX2275377 (I270)	12-SF-0142	02-14-02	1/25/2012	RHD/HP		0.15	0.14	0.01	0.00	0.02	Yes	-0.01	0.00	0.01	0.50	0.01	0.01	0.01	0.00	0.01	0.00	0.01	MDE	Yes	3/12/2012	XX2275377(I270).pdf	None - IA Reduction		2017
MO200041	MD 115	MD 115 (Muncaster Mill Road) from Shady Grove Road to MD 124 (Woodfield Road)	Montgomery	XX2275377 (MD 115)	14-SF-0086	02-14-02	9/25/2013	RHD/RH		0.12	0.12	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.01	MDE	Yes	10/10/2013	XX2275377 (MD115).pdf	None - IA Reduction		2017
MO200042	MD 185	MD 185 from Thornapple Street to 110' South of Club Drive	Montgomery	XX2275377 (MD 185)	13-SF-0236	02-14-02	3/25/2013	RHD/CSF		0.20	0.19	0.01	0.00	0.02	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.02	MDE	Yes	5/29/2013	XX2275377 (MD185).pdf	None - IA Reduction		2017
MO200043	MD 117	MD 117 (Clopper Road) from MD 118 to MD 119	Montgomery	XX2275377 (MD 117)	14-SF-0085	02-14-02	8/23/2013	RHD/RH		0.15	0.16	0.01	0.00	0.01	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	10/10/2013	XX2275377 (MD117).pdf	None - Debit from WQ bank		2017
MO200044	I-270	I-270 (Dwight Eisenhower Highway) from Middlebrook Road to MD 109 - Sidewalk Retrofits	Montgomery	XX2275377 (I270Sidewalks)	14-SF-0033	02-14-02	8/15/2013	RHD/RH		0.16	0.12	0.00	0.00	0.04	Yes	-0.04	0.00	0.04	0.50	0.02	0.02	0.04	0.02	0.02	0.00	0.04	MDE	Yes	9/19/2013	XX2275377(I270Sidewalks).pdf	None - IA Reduction		2017
MO200045	MD 109	MD 109 (Elgin Road) from 150' North of Haller Rd. to MD 107 (Fisher Ave.)	Montgomery	XX2275377 (MD 109)	13-SF-0044	02-14-02	8/8/2012	RHD/RH		0.13	0.15	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	11/8/2012	XX2275377 (MD109).pdf	None - Debit from WQ bank		2017
MO200046	MD 193	MD 193 (University Boulevard) from 14th Avenue to 23rd Avenue	Montgomery	XX2275377 (MD 193UB)	14-SF-0117	02-14-02	10/1/2013	RHD/RH		0.22	0.21	0.01	0.00	0.02	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.02	MDE	Yes	12/19/2013	XX2275377(MD193UB).pdf	None - IA Reduction		2017
MO200047	MD 390	MD 390 (16th Street) from Washington DC Line to MD 97 (Georgia Ave.)	Montgomery	XX2275377 (MD 390)	14-SF-0118	02-14-02	10/1/2013	RHD/RH		0.13	0.14	0.02	0.00	0.01	Yes	0.01	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	12/19/2013	XX2275377 (MD390).pdf	None - Debit from WQ bank		2017
MO200048	MD 182	MD 182 (Layhill Road) from Park Vista Drive to Chester Mill Road	Montgomery	MO1595277	15-SF-0042	02-14-02	8/11/2014	RHD/JMH		0.00	0.00	0.00	0.00	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.01	0.01	0.00	0.01	0.00	0.01	MDE	Yes	2/12/2015	MO1595277.pdf	None - IA Reduction		2017
MO200049	MD 355	MD 355 from Golf Lane to Nicholson Lane - Safety and Resurfacing	Montgomery	MO1595577	14-SF-0067	02-14-02	12/15/2014	RHD/DJW		0.12	0.11	0.00	0.09	0.01	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.05	0.01	MDE	Yes	1/16/2015	MO1595577.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200050	MD 190	MD 190 (River Road) at Willard Ave./Greenway Drive - Intersection Improvements	Montgomery	MO2075176	12-SF-0354	02-14-02	5/19/2014	K. Leah		0.35	0.37	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	8/25/2014	MO2075176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200051	I-495	Deck Rehabilitation for Bridge 1513700 on I-495 over Northwest Branch	Montgomery	MO2415180	11-SF-0055	02-14-02	6/28/2011	RHD		0.42	0.42	0.01	2.02	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	1.01	0.00	MDE	Yes	6/24/11 1/7/11	MO2415180.pdf	None - Debit from WQ bank	2 - WQSS sheets added to create final totals. Staging area added 6/28/11 to 10/05/10 #'s. MDE Approval letters included in WQSS file pdf.	2017
MO200052	NP	Kensington Maintenance Shop	Montgomery	MO2145186	11-SF-0225	02-14-02	2/15/2011	RHD/DGW		0.00	0.00	0.01	0.07	0.01	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.04	0.00	SHA	No	3/29/2011	MO2145186.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200053	MD 118	MD 118 (Germantown Road) at Wisteria Drive and Middlebrook Road - Intersection Improvements	Montgomery	MO5215130	10-SF-0322	02-14-02 02-14-02-08	4/26/2010	KRP/RKK		13.19	13.30	0.13	0.21	0.02	Yes	0.11	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.04	0.00	MDE	Yes	4/6/2011	MO5215130.pdf	None - Debit from WQ bank		2017
MO200054	MD 355	MD 355 (Wisconsin Ave.) from Maryland/Washington D.C. Line to MD 191 (Bradley Lane) - Safety and Resurfacing	Montgomery	MO5335177 MO5335168	09-SF-0275	02-14-02	3/3/2009	KRP/GAI		11.06	11.07	0.02	0.04	0.01	Yes	0.01	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA	No	11/23/2010	MO5335177.pdf	None - Debit from WQ bank	Using SHA contract number on MDE approval letter; MDE Approval letter included in WQSS file pdf.	2017
MO200055	MD 193	Superstructure Replacement with Substructure Rehabilitation for Bridge 1513600 on MD 193 over I-495	Montgomery	MO5825180	12-SF-0093	02-14-02-05	10/10/2012	RHD/JDC		1.98	1.92	0.04	1.43	0.09	Yes	-0.05	0.00	0.05	0.50	0.05	0.00	0.10	0.05	0.05	0.72	0.08	MDE	Yes	1/18/2013	MO5825180.pdf	150518 - micro-bioretention & Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
MO200056	MD 185	MD 185 and Jones Bridge Road - BRAC Intersection Improvements	Montgomery	MO5935570 MO593A21	09-SF-0196	02-14-02	12/15/2008	Erica Rigby		33.54	34.14	0.91	0.30	0.32	Yes	0.59	0.00	0.00	0.20	0.06	0.05	0.01	-0.05	0.01	0.06	0.00	MDE	Yes	12/8/2011	MO5935570.pdf	150345/150423 - sandfilters	MDE Approval letter included in WQSS file pdf.	2017
MO200059	MD 355	MD 355 (Rockville Pike) from Hubbard Drive to Templeton Place - Safety and Resurfacing	Montgomery	MO0805177	15-PR-0077	02-14-02	6/16/2015	JAF/MRT		0.00	0.00	0.03	0.00	0.03	Yes	0.00	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	SHA PRD	No	2/2/2016	MO0805177.pdf	None - Debit from WQ bank	**This may not yet be constructed** No MS4 credit	
MO200060	I-270	I-270 at Watkins Mill Road/MD 124 Great Seneca Crossing	Montgomery	MO3515170R	13-SF-0071	02-14-02	2/1/2017	JK/JMA		2.35	12.50	11.77	0.73	0.35	Yes	11.42	0.00	0.00	0.50	0.18	0.00	0.18	0.00	0.18	0.37	0.00	MDE	Yes	2/15/2017	MO3515170.pdf	SWMFACS and Debit from WQ bank	This was re-advertised in 2017 and is currently in construction to be completed in about 2 years. Cannot claim credit until construction is complete.	
MO200061	MD 355	MD 355 from King Farm Blvd. to Central Ave.	Montgomery	MO1315377	13-SF-0059	02-14-02-02 02-14-02-06	11/30/2012	RHD/SBP		18.25	16.89	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	2/19/2013	MO1315377.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
MO200062	MD 117	MD 117 (Clopper Road) from Longdraft Road to I-270 - Safety & Resurfacing	Montgomery	MO7735177	15-PR-0070	02-14-02	1/22/2016	KP/DJW		0.00	0.00	0.04	0.01	0.01	Yes	0.03	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.01	0.00	SHA PRD	No	3/8/2016	MO7735177.pdf	None - Debit from WQ bank	Construction complete per SHA PM Dorey Uong duong@sha.state.md.us	2018
MO200063	Seminary Road	Deck Replacement for Bridge 15129 on Seminary Road over I-495	Montgomery	MO5805180	15-PR-0063	02-14-02	2/7/2017	IKN		1.38	1.38	0.00	0.60	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.30	0.00	SHA PRD	No	3/10/2017	MO5805180.pdf	None - Debit from WQ bank	Currently under construction - assumed completion 12/2018; SHA PM Dipa Patel dpatel2@sha.state.md.us	
MO200064	I-495	I-495 Inner Loop - from I-270 Spur to Seminary Road - Resurfacing and Safety Improvements	Montgomery	MO1885177	15-PR-0049	02-14-02	2/3/2016	RD/SP		0.09	0.05	0.01	0.04	0.05	Yes	-0.04	0.00	0.04	0.50	0.03	0.00	0.07	0.04	0.03	0.02	0.06	SHA PRD	No	3/17/2016	MO1885177.pdf	None - Debit from WQ bank	Verified construction completed via field visit. SHA PM is Angela Strevig astrevig@sha.state.md.us	2018
MO200065	MD 28	MD 28 713 W. Montgomery Avenue (MD 28) Drainage Issue between Nelson St. & Mannakee Street	Montgomery	AW730A21	15-PR-0038	02-14-02	8/14/2015	JB		1.20	1.20	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	3/22/2016	AW730A21.pdf	None - 3.3.A Waiver, no SWM req'd	**This may not yet be constructed*** 3.3.A Waiver; No MS4 credit	
MO200066	MD 124	MD 124 (Quince Orchard Road) from Orchard Ridge Road to MD 355 (Frederick Road) - Safety & Resurfacing	Montgomery	MO9475177	15-PR-0125	02-14-02	11/19/2015	Ryan Thomas		0.31	0.30	0.01	0.00	0.02	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.02	SHA PRD	No	4/15/2016	MO9475177.pdf	None - IA Reduction	Verified construction completed; SHA PM is Erica Rigby; erigby@sha.state.md.us	2018
MO200067	NP	Gradall Equipment Training at Fairland Road and Old Columbia Pike	Montgomery	AX969A13	16-PR-0020	02-14-02	4/8/2016	JF/SBP		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	4/18/2016	AX969A13.pdf	None - 3.3.A Waiver	**This may not yet be constructed*** 3.3.A Waiver; No MS4 credit	
MO200068	MD 190	MD 190 (River Road) at MD 188 (Wilson Road) - Landscape Installation and Establishment	Montgomery	MO0645124SBR	16-PR-0007	02-14-02	2/2/2016	Matt Allisch		0.11	0.11	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	4/20/2016	MO0645124.pdf	None - 3.3.A Waiver	**This may not yet be constructed*** 3.3.A Waiver; No MS4 credit	
MO200069	MD 185, MD 187, MD 355	Reconstruction of Existing Traffic Signals with APS/CPS and ADA Ramp Upgrades at 13 Intersections on MD 185, MD 187, and MD 355	Montgomery	MO8695285	15-PR-0123	02-14-02	3/3/2016	RJM		12.38	12.40	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	5/19/2016	MO8695285.pdf	None - Debit from WQ bank	**This may not yet be constructed** No MS4 credit	
MO200070	MD 193	MD 193 from I-495 to MD 320 - Safety and Resurfacing	Montgomery	MO1595777	14-SF-0031	02-14-02	3/30/2016	RT/JF		0.00	0.02	0.01	0.00	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	6/6/2016	MO1595777.pdf	None - Debit from WQ bank	**This may not yet be constructed*** No MS4 credit. MDE Approval letter included in WQSS file pdf.	
MO200071	MD 195	Deck Replacement and Misc. Repairs of Concrete Arch Bridge 15033 on MD 195 (Carroll Ave) over Sligo Creek Parkway	Montgomery	MO2405180	14-SF-0126	02-14-02	4/3/2015	RD/ALM		89.41	89.47	0.06	0.29	0.00	Yes	0.06	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.15	0.00	SHA	No	7/7/2015	MO2405180.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	B Pre-Development Impervious Area (Acres)	C Post-Development Impervious Area (Acres)	D New Development (Acres)	E Re-constructed Impervious Area (Acres)	F Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	L Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]
MO200072	MD 190	MD 190 (River Rd) from MD 614 to DC Line - Safety and Resurfacing	Montgomery	MO0815177	15-PR-0091	02-14-02	5/26/2016	JAF/CWH		18.58	18.52	0.00	0.04	0.07	Yes	-0.07	0.00	0.07
MO200073	MD 187	MD 187 (Old Georgetown Road) from Lincoln Drive to Charles Street - Bethesda Trolley Trail	Montgomery	MO1505188	14-SF-0043	02-14-02	9/1/2015	GMG/DAS		0.38	0.65	0.46	0.03	0.00	Yes	0.46	0.00	0.00
MO200111	MD 185	MD 185 (Connecticut Avenue) from Knowles Avenue to Dupont Avenue	Montgomery	XX1645176	15-PR-0064 Site 2	02-14-02	10/12/2016	NH		4.28	4.20	0.00	0.06	0.07	Yes	-0.07	0.00	0.07
MO200112	MD 191	MD 191 (Bradley Blvd.) from Burdette Road to Arlington Road	Montgomery	XX2275377 (MD 191)	14-SF-0250	02-14-02	3/27/2014	RHD/REH		0.13	0.16	0.04	0.00	0.01	Yes	0.03	0.00	0.00
	Montgomery County Totals												**19.36**	**4.85**				
PG200001	US 1	US 1 from 300' South of Braygreen Rd. to Laurel Lakes Ct.	Prince George's	AX6445178 (US1)	11-SF-0253	02-13-11	3/16/2011	KRP/JRG		0.05	0.11	0.07	0.00	0.01	Yes	0.06	0.00	0.00
PG200002	MD 212	MD 212 (Riggs Road) at Powder Mill Road	Prince George's	AX6445178	11-SF-0330	02-14-02-05	4/25/2011	RK		0.02	0.04	0.02	0.00	0.00	Yes	0.02	0.00	0.00
PG200003	MD 430	MD 430 (Greenbelt Road) from Baltimore Ave. to University Blvd.	Prince George's	AX6445178 (MD430)	13-SF-0040	02-14-02-05	7/30/2012	RHD/MPA		0.19	0.26	0.07	0.00	0.00	Yes	0.07	0.00	0.00
PG200004	MD 5	MD 5 at Brandywine Road & MD 373 - Capacity Improvements	Prince George's	PG1755270	08-SF-0388	02-14-02	2/8/2011	RHD/DBR		9.73	11.21	1.60	2.49	0.37	Yes	1.23	0.00	0.00
PG200005	MD 198	MD 198 (Sandy Spring Road) from Montgomery County Line to I-95	Prince George's	PG0765577	14-SF-0090	02-13-11 02-14-02	1/14/2014	RHD/TKP		0.00	0.00	0.01	0.00	0.00	Yes	0.01	0.54	0.53
PG200006	US 50	US 50 at MD 410 - Noise Abatement Wall	Prince George's	PG0785126	13-SF-0265	02-14-02	12/20/2013	PS/MS		2.42	2.43	0.01	0.00	0.00	Yes	0.01	0.00	0.00
PG200007	I-95	I-95 at Contee Road Interchange - Total Project	Prince George's	PG4195172	10-SF-0302	02-14-02 02-13-11	5/30/2013 11/14/2012 8/26/2014	PH/DFD		14.48	30.36	21.36	0.00	3.75	Yes	17.61	0.00	0.00
PG200010	MD 5	MD 5 Metro Access Road Phase 2	Prince George's	PG4945172	08-SF-0111	02-14-02	12/16/2013	RGH		86.33	89.64	5.57	5.13	2.17	Yes	3.40	0.00	0.00
PG200011	MD 450	MD 450 from I-95/ I-495 Ramp to 85th Avenue	Prince George's	PG5415176	12-SF-0219	02-14-02	1/24/2012	Puajra/Desai		0.28	0.27	0.00	0.12	0.01	Yes	-0.01	0.00	0.01
PG200012	US 1	US 1 at Ammendale Road	Prince George's	PG5435174	13-SF-0078	02-14-02	6/6/2014	Leah/Snyder		3.08	2.87	0.27	2.46	0.48	Yes	-0.21	0.00	0.21
PG200013	MD 500	MD 500 - Neighborhood Conservation Project	Prince George's	PG5465184	12-SF-0101	02-14-02	2/3/2014	PS/RG		4.02	2.65	0.21	0.86	1.58	Yes	-1.37	0.00	1.37
PG200014	MD 193	MD 193 (Greenbelt Road) at Cipriano Road	Prince George's	PG5645176	14-SF-0035	02-13-11	12/2/2013	RHD/MTS		0.10	0.14	0.06	0.09	0.01	Yes	0.05	0.00	0.00
PG200015	US 1	US 1 (Baltimore Ave.) at MD 410 (East-West Highway)	Prince George's	PG5935176	12-SF-0337	02-14-02	8/24/2012	KRP/JDC		0.26	0.29	0.01	0.27	0.00	Yes	0.01	0.00	0.00
PG200016	MD 4	MD 4 at Suitland Parkway - Interchange Improvements	Prince George's	PG6185170	08-SF-0042	02-13-11	7/30/2014	RGH/DCB		30.41	46.40	24.88	1.98	8.89	Yes	15.99	0.00	0.00
PG200018	MD 197	MD 197 (Laurel Bowie Road) at Powder Mill Road	Prince George's	PG6325187	06-SF-0291	02-14-02	10/26/2011	KRP/FG		1.81	1.97	0.16	0.29	0.00	Yes	0.16	0.00	0.00
PG200019	MD 704	MD 704 (Martin Luther King Jr. Highway) from Washington DC Line to Hill Road - Safety and Resurfacing	Prince George's	PG6995176	08-SF-0173	02-14-02	12/4/2012	RD/JMH/apm		0.00	0.00	0.29	0.47	0.19	Yes	0.10	0.00	0.00
PG200020	I-95/I-495	I-95/ I-495 Park and Ride Relocation	Prince George's	PG7515181	12-SF-0085	02-14-02	6/25/2012	DAS (LR)		1.14	2.18	2.18	0.00	0.00	Yes	2.18	0.25	0.00
PG200021	MD 201	MD 201 from Kenilworth Towers to Riverdale Road - Sidewalk Improvements	Prince George's	PG7785184	10-SF-0271	02-14-02	8/6/2014	RD/JW		24.74	24.96	0.60	3.14	0.38	Yes	0.22	0.00	0.00
PG200022	MD 5	MD 5 Intersection Improvements	Prince George's	PG7825184	13-SF-0113	02-14-02	3/14/2014	MA/LMM		2.10	2.59	1.13	1.31	0.64	Yes	0.49	0.00	0.00
PG200023	MD 223	MD 223 (Floral Park Rd.) from Livingston Rd. to 0.09 Miles E. of Livingston Rd.	Prince George's	PG7865177	13-SF-0054	02-14-02	10/22/2012	RHD/RG		0.98	0.85	0.02	0.00	0.15	Yes	-0.13	0.00	0.13
PG200024	MD 197	MD 197 (Collington Road) from Evergreen Parkway to US 301 (Crain Highway)	Prince George's	PG7865277	13-SF-0191	02-13-11	3/1/2013	Doran/Green		0.04	0.05	0.01	0.00	0.00	Yes	0.01	0.00	0.00
PG200025	MD 212	MD 212 From Pleasant Acres Drive to I-95 - Safety and Resurfacing	Prince George's	PG7865477	13-SF-0138	02-14-02	10/26/2012	RHD/JMA		0.10	0.13	0.03	0.00	0.00	Yes	0.03	0.00	0.00
PG200026	US 301	US 301 from MD 5 to Westwood Drive	Prince George's	PG7865577	12-SF-0288	02-13-11	4/25/2013	RHD/GAI		0.00	0.00	0.01	0.07	0.00	Yes	0.01	0.00	0.00
PG200027	MD 202	MD 202 from Homestead Drive to PG Community College Entrance	Prince George's	PG8965177	12-SF-0136	02-13-11	12/20/2011	RHD/JJK		0.00	0.00	0.06	0.06	0.01	Yes	0.05	0.00	0.00

ID	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
MO200072	0.50	0.04	0.02	0.09	0.05	0.04	0.02	0.07	SHA PRD	No	7/25/2016	MO0815177.pdf	None - IA Reduction		2017
MO200073	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	SHA	No	10/8/2015	MO1505188.pdf	Permeable Concrete Shared-Use Trail (Bethesda Trolley Trail) & Debit from WQ bank	Completed construction; final inspection expected by 6/2018 per SHA PM Luis Gonzalez lgonzalez@sha.state.md.us; MDE Approval letter included in WQSS file pdf.	2018
MO200111	0.50	0.04	0.01	0.10	0.06	0.04	0.03	0.08	SHA PRD	No	11/23/2016	XX1645176 (MD185).pdf	None - IA Reduction	Currently under construction to be completed Summer 2019 per SHA PM Dorey Uong duong@sha.state.md.us	
MO200112	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	5/20/2014	XX2275377 (MD191).pdf	None - Debit from WQ bank		2017
Montgomery County Totals							**6.68**	**0.54**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
PG200001	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	9/14/2011	AX6445178 (US1).pdf	None - Debit from WQ bank		2017
PG200002	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	9/14/2011	AX6445178.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200003	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/11/2012	AX6445178 (MD430).pdf	None - Debit from WQ bank		2017
PG200004	0.20	0.07	0.00	0.07	0.00	0.07	0.50	0.00	SHA	No	2/22/2011	PG1755270.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200005	0.50	0.00	0.53	0.00	0.00	0.00	0.00	0.00	MDE	Yes	5/27/2014	PG0765577.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
PG200006	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	1/9/2014	PG0785126.pdf	None - Debit from WQ bank		2017
PG200007	0.50	1.88	0.35	1.53	-0.35	1.53	0.00	0.00	MDE	Yes	8/28/2014	PG4195177.pdf	160520-160525, 160527-160533, 160537, 160861-160875,160877-160879	MDE Approval letter included in WQSS file pdf. Multiple WQSS, used latest dated 2014 (multiple watersheds)	2017
PG200010	0.50	1.09	0.21	0.88	-0.21	0.88	2.57	0.00	MDE	Yes	2/4/2014	PG4945172.pdf	160900		2017
PG200011	0.50	0.01	0.00	0.02	0.01	0.01	0.06	0.01	MDE	Yes	4/5/2012	PG5415176.pdf	None - Debit from WQ bank		2017
PG200012	0.50	0.24	0.14	0.31	0.07	0.24	1.23	0.29	MDE	Yes	8/28/2014	PG5435174.pdf	161087 - SGW	Streetview shows this facility has been constructed although NPDES layer shows it as proposed.	2017
PG200013	0.50	0.79	0.15	2.01	1.22	0.79	0.43	1.71	MDE	Yes	3/21/2014	PG5465184.pdf	None - IA Reduction		2017
PG200014	0.50	0.01	0.00	0.01	0.00	0.01	0.05	0.00	MDE	Yes	3/26/2014	PG5645176.pdf	None - Debit from WQ bank		2017
PG200015	0.50	0.00	0.00	0.00	0.00	0.00	0.14	0.00	MDE	Yes	9/20/2012	PG5935176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf	2017
PG200016	0.50	4.45	1.03	3.42	-1.03	3.42	0.99	0.00	SHA	No	7/30/2014	PG6185170.pdf	160260 & 160261		2017
PG200018	0.20	0.00	0.00	0.00	0.00	0.00	0.06	0.00	SHA	No	9/3/2013	PG6325187.pdf	None Provided - grass channel credit	MDE Approval letter included in WQSS file pdf. Sent grass channel credit info/location to GIS team to determine if it should be added to the NPDES layer.	2017
PG200019	0.20	0.04	0.00	0.04	0.00	0.04	0.09	0.00	SHA	No	12/4/2012	PG6995176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200020	0.50	0.00	0.01	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/17/2012	PG7515181.pdf	160342-160350, 160352 - MBs		2017
PG200021	0.50	0.19	0.00	0.19	0.00	0.19	1.57	0.00	SHA	No	10/17/2014	PG7785184.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200022	0.50	0.32	0.00	0.32	0.00	0.32	0.66	0.00	MDE	Yes	4/28/2014	PG7825184.pdf	160901 - 160905	Construction stopped and project to re-advertise in 2018. SWMFACs not yet constructed. Cannot claim credit in 2017/2018, will need to check on status of these sites next year.	
PG200023	0.50	0.08	0.06	0.15	0.07	0.08	0.00	0.13	MDE	Yes	3/18/2013	PG7865177.pdf	None - IA Reduction		2017
PG200024	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	3/5/2013	PG7865277.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200025	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	2/21/2013	PG7865477.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200026	0.50	0.00	0.82	0.00	0.00	0.00	0.04	0.00	MDE	Yes	2/19/2014	PG7865577.pdf	160899 - Bioretention	GIS team found evidence of this being constructed already in imagery. Assume constructed.	2017
PG200027	0.50	0.01	0.00	0.01	0.00	0.01	0.03	0.00	MDE	Yes	2/9/2012	PG8965177.pdf	None - Debit from WQ bank		2017

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F		[New Development - Existing Impervious Area Removed]	L	[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
PG200028	MD 214	MD 214 (Central Avenue) from MD 193 to West of Devonwood Drive	Prince George's	PG8985177	11-SF-0355	02-13-11	1/30/2012	KRP/JMH		0.00	0.00	0.02	0.00	0.00	Yes	0.02	0.02	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	2/17/2012	PG8985177.pdf	None - IA Reduction		2017
PG200029	MD 450	MD 450 from Seabrooke Road to MD 193/ Holemhurst Estates	Prince George's	PG9005171	14-SF-0015 (Prev. 95-SF-0082)	02-13-11	4/22/2014	KRP		0.00	0.00	2.79	0.00	0.00	Yes	2.79	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	5/6/2014	PG9005177.pdf	160306 - wet pond		2017
PG200030	MD 410	MD 410 (East West Highway) from MD 650 to MD 212	Prince George's	PG9045177	12-SF-0135	02-14-02	10/7/2011	RHD/NHL		0.40	0.42	0.03	0.07	0.00	Yes	0.03	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.04	0.00	MDE	Yes	4/12/2012	PG9045177.pdf	None - Debit from WQ bank		2017
PG200031	US 1	US 1 from Delaware Street to Howard Avenue	Prince George's	PG9385177	11-SF-0194	02-14-02-05	2/15/2011	RHD/JC		0.32	0.34	0.04	0.00	0.02	Yes	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	3/30/2011	PG9385177.pdf	None - Debit from WQ bank		2017
PG200032	MD 414	MD 414 from I-95 to MD 5	Prince George's	PG9795377	13-SF-0366	02-14-02	4/9/2013	RHD/SBP		0.00	0.00	0.01	0.00	0.62	Yes	-0.61	0.00	0.61	0.50	0.31	0.30	0.62	0.31	0.31	0.00	0.54	MDE	Yes	12/12/2013	PG9795377.pdf	None - IA Reduction		2017
PG200033	MD 5	MD 5 (Branch Avenue) from MD 223 to I-95 (Capital Beltway)	Prince George's	PG9795577	14-SF-0024	02-14-02	1/17/2014	RHD/NF		0.00	0.01	0.01	0.00	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	2/11/2014	PG9795577.pdf	None - Debit from WQ bank		2017
PG200034	MD 201	MD 201 (Kenilworth Avenue) from Good Luck Road to I-95 (Capital Beltway)	Prince George's	PG9795677	13-SF-0136	02-14-02	1/11/2013	RHD/NF		0.08	0.12	0.04	0.01	0.00	Yes	0.04	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.01	0.00	MDE	Yes	2/6/2013	PG9795677.pdf	None - Debit from WQ bank		2017
PG200035	US 50	US 50 From Western Corp. Limits of Cheverly to VMS sign #315	Prince George's	PG9795477	13-SF-0133	02-14-02	12/15/2012	RHD/SP		0.03	0.02	0.01	0.00	0.02	Yes	-0.01	0.00	0.01	0.50	0.01	0.00	0.02	0.01	0.01	0.00	0.02	SHA	No	9/20/2013	PG9795477.pdf	None - IA Reduction	MDE Approval letter included in WQSS file pdf.	2017
PG200036	US 1	US 1 from 50' South of Contee Road to 50' South of Lindendale Road	Prince George's	XX2275377 (US 1)	13-SF-0251	02-14-02	2/17/2013	RHD/CSF		0.12	0.12	0.01	0.00	0.01	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	5/29/2013	XX2275377 (US1).pdf	None - Debit from WQ bank		2017
PG200037	MD 214	MD 214 from Hampton Park Drive Spur to 500' South of Ramp 6	Prince George's	XX2275377 (MD 214)	13-SF-0250	02-14-02	2/15/2013	RHD/CSF		0.18	0.21	0.03	0.00	0.00	Yes	0.03	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	5/29/2013	XX2275377 (MD214).pdf	None - Debit from WQ bank		2017
PG200038	MD 193	MD 193 from MD 202 to MD 214	Prince George's	XX2275377 (MD 193)	12-SF-0416	02-13-11-03	5/9/2013	RHD/RG		0.24	0.24	0.02	0.00	0.02	Yes	0.00	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	5/17/2013	XX2275377 (MD193).pdf	None - Debit from WQ bank		2017
PG200040	MD 564	MD 564 from Maple Avenue to 11th - Sidewalk Retrofit	Prince George's	XX2275377 (MD 564)	12-SF-0141	02-13-11	2/15/2013	RHD/DJW		0.19	0.22	0.03	0.00	0.01	Yes	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	3/14/2013	XX2275377 (MD 564).pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200041	MD 193	MD 193 from Campus Drive to US 1	Prince George's	PG0765177	14-SF-0255	02-14-02	1/5/2015	RHD/CSF		0.12	0.13	0.01	0.00	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	1/5/2015	PG0765177.pdf	None - Debit from WQ bank		2017
PG200042	US 1	US 1 Alt. (Bladensburg Road) from DC Line to Anacostia River Bridge	Prince George's	PG0765277	14-SF-0284	02-14-02	3/31/2014	RHD/RH		0.67	0.67	0.03	0.00	0.02	Yes	0.01	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	2/2/2015	PG0765277.pdf	None - Debit from WQ bank		2017
PG200043	MD 202	MD 202 from Brightseat Road to MD 704	Prince George's	PG0765477	14-SF-0204	02-14-02	11/15/2014	RHD/SBP		0.00	0.00	0.02	0.00	0.01	Yes	0.01	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	3/24/2015	PG0765477.pdf	None - Debit from WQ bank		2017
PG200044	MD 4	Bridge Replacement for Bridges 1618101 and 1618102 on MD 4 over MD 223	Prince George's	PG6645180	12-SF-0329	02-13-11	2/18/2013	BSN		27.81	28.04	0.30	2.90	0.08	Yes	0.22	0.00	0.00	0.50	0.04	0.64	0.00	-0.04	0.00	1.45	0.00	MDE	Yes	3/8/2013	PG6645180.pdf	160555-160560, 160563-160564, 160568	MDE Approval letter included in WQSS file pdf.	2017
PG200045	MD 458	MD 458 From MD 5 (Branch Ave.) to Walker Mill Road	Prince George's	PG7865777	12-SF-0336	02-14-02	3/12/2012	RHD/NHL		0.01	0.03	0.03	0.00	0.01	Yes	0.02	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	SHA	No	10/11/2013	PG7865777.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200047	MD 337	MD 337 (Allentown Road) from South of I-95/I-495 NB Off Ramp to North of Suitland Road/Westover Drive	Prince George's	PG7805270	12-SF-0335	02-14-02	12/12/2014	CAL/WW		22.89	23.54	0.79	1.55	0.14	Yes	0.65	0.00	0.00	0.50	0.07	0.00	0.07	0.00	0.07	0.78	0.00	MDE	Yes	3/17/2015	PG7805270.pdf	161150-161155	GIS team verified construction completed. MDE Approval letter included in WQSS file pdf.	2018
PG200048	MD 5	MD 5 from South of Moores Road to South of Surratts Road - Safety and Resurfacing	Prince George's	PG0395177	15-PR-0096	02-14-02	5/31/2016	SP/SR		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	1/10/2017	PG0395177.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
PG200049	MD 5	MD 5 at Brandywine Road and MD 373	Prince George's	PG1755170	11-SF-0189	02-14-02	2/26/2016	MRB/JK		7.45	16.70	14.15	2.56	3.30	Yes	10.85	0.00	0.00	0.50	1.65	3.73	0.00	-1.65	0.00	1.28	0.00	SHA	No	NP	PG1755170.pdf	161199 - 161221; 161223 - 161241; 161255	GIS team verified currently under construction.	
PG200050	MD 704	MD 704 From Hill Road to Greenleaf Road - Safety and Resurfacing	Prince George's	PG9585377	14-SF-0070	02-14-02-05	10/23/2014	RHD/RJG		0.45	0.44	0.04	0.00	0.05	Yes	-0.01	0.00	0.01	0.50	0.03	0.00	0.04	0.01	0.03	0.00	0.03	SHA	No	2/6/2015	PG9585377.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200051	NP	Prince George's County outfall stabilization and/or conveyance improvements at 11 sites	Prince George's	PG0705174	16-PR-0009	02-14-02 02-14-01 02-13-11	02/08/16 6/10/2016 01/25/17	JB/LGT		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	Yes	2/24/2017	PG0705174.pdf	None	**May not yet be constructed*** 3.3.A waiver, no MS4 credit	
PG200052	MD 5	MD 5 (Branch Avenue) from Surratts Road to MD 223 - Safety & Resurfacing	Prince George's	PG0415177	15-PR-0090	02-14-01	3/3/2016	CKL		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	3/16/2016	PG0415177.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
PG200053	MD 4	MD 4 at Suitland Parkway - Stream Restoration at Marbury Drive	Prince George's	PG6185270	15-SF-0077	02-13-11	11/17/2014	RGH/JMH		0.00	0.02	0.02	0.00	0.00	Yes	0.02	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	3/31/2015	PG6185270.PDF	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200054	US 301	US 301 (Crain Highway) from 481' South of Excalibur Road to 1800' North of MD 3 Structure 16236	Prince George's	PG9585477	14-SF-0044	02-13-11	1/9/2015	RHD/JMH		0.00	0.00	0.05	0.03	0.00	Yes	0.05	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.02	0.00	SHA	No	4/9/2015	PG9585477.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200055	US 1	US 1 (Baltimore Avenue) from Albion Road to Structure 16004 over Paint Branch - Resurfacing and Rehabilitation	Prince George's	PG9365177	11-SF-0208	02-14-02-05	4/13/2011	Liang/Doran		0.00	0.03	0.03	0.00	0.00	Yes	0.03	0.01	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA	No	4/11/2011	PG9365177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
PG200057	MD 210	MD 210 NB (Indian Head Hwy) Phase 2 from Farmington Road to Old Fort Rd/Washington Lane	Prince George's	PG5105177	15-PR-0022	02-14-02	4/12/2016	CAL/JMH		0.00	0.00	0.01	0.01	0.00	Yes	0.01	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.01	0.00	SHA PRD	No	4/14/2016	PG5105177.pdf	None - Debit from WQ bank	Per field visit - not yet constructed; SHA PM is Angela Strevig astrevig@sha.state.md.us	
PG200058	MD 202	MD 202 from US 50 to MD 450 and MD 202/US 50 Interchange Ramps - Safety and Resurfacing	Prince George's	PG0515177	15-PR-0111	02-14-02	10/7/2015	PS/SP		15.70	15.70	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	5/26/2016	PG0515177.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
PG200059	MD 202	MD 202 (Largo Road) at Town Farm Road - Roadway Improvements	Prince George's	PG0275776 XX1645176	15-PR-0064 Site 1	02-13-11	8/13/2015	DH/MTS		0.05	0.02	0.01	0.01	0.04	Yes	-0.03	0.00	0.03	0.50	0.02	0.01	0.04	0.02	0.02	0.01	0.04	SHA PRD	No	6/7/2016	XX1645176 (MD202).pdf	None - IA Reduction	Currently under construction; Erica Rigby is SHA PM; erigby@sha.state.md.us	
PG200060	MD 214 and MD 202	MD 214 and MD 202 - Traffic Signal and ADA Upgrades	Prince George's	PG3195285	15-PR-0093	02-14-02 02-13-11	5/26/2016	MW/JAB		0.64	0.66	0.04	0.62	0.01	Yes	0.03	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.31	0.00	SHA PRD	No	2/13/2017	PG3195285.pdf	None - Debit from WQ bank	Currently under construction; Richard Pascual is SHA PM rpascual@sha.state.md.us	
PG200061	I-95/I-495	Replacement of Dual Bridges 16162 on I-95/495 over Suitland Road	Prince George's	PG6985180	15-PR-0121	02-14-02	7/22/2016	GSA		0.00	0.00	1.08	6.80	0.00	Yes	1.08	0.00	0.00	0.50	0.00	0.76	0.00	0.00	0.00	3.40	0.00	SHA PRD	No	7/26/2016	PG6985180.pdf	161291 - 161299	Project started construction the summer of 2017; Cannot take credit until construction is complete.	

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
										B	C	D	E	F			L																
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
PG200064	MD 214	MD 214 (Central Ave) at I-95/I-495 (Capital Beltway) and MD 202 (Largo Rd.) - Signing	Prince George's	PG1155285	16-PR-0022	02-13-11	10/21/2016	Jason Ferner		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	11/14/2016	PG1155285.pdf	None	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
PG200065	MD 381	Bridge Replacement 1630500 on MD 381 over Timothy Branch	Prince George's	PG046A21 PG0465180	16-PR-0027	02-14-01	11/18/2016	XY		88.49	88.57	0.08	0.29	0.00	Yes	0.08	0.00	0.00	0.50	0.00	0.02	0.00	0.00	0.00	0.15	0.00	SHA PRD	No	11/18/2016	PG046A21.pdf	161826 & 161827 - grass swales	GIS team verified still proposed - not yet constructed. Cannot claim credit yet.	
PG2000103	MD 214	MD 214 at Addison Road Metro Station - Intersection Improvements (PRD 15-PR-0064-Site 3)	Prince George's	XX1645176	15-PR-0064-03 (Site 3)	2/14/2002	4/7/2017	AGB		1.07	1.02	0.01	0.03	0.06	Yes	-0.05	0.00	0.05	0.50	0.03	0.01	0.07	0.04	0.03	0.02	0.06	SHA PRD	No	4/11/2017	XX1645176 (MD214).pdf	None - IA Reduction	Per District 3, this has NOT yet started construction. Cannot claim credit yet.	
PG200099	MD 410	MD 410 from MD 212 to MD 500 - Safety and Resurfacing	Prince George's	PG7525177	10-SF-0319	02-14-02-05	7/2/2010	NP		16.22	16.22	0.02	0.13	0.02	Yes	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.03	0.00	SHA	No	2/10/2011	PG7525177.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
	Prince George's County Totals												**33.75**	**23.08**											**15.86**	**2.83**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
WA200001	I-70	Hagerstown Maintenance Facility - Storage Tank Removal and Replacement	Washington	WA2405149	14-SF-0302	02-14-05	6/9/2014	RHD/AS		5.29	5.33	0.04	0.06	0.00	Yes	0.04	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.03	0.00	MDE	Yes	10/17/2014	WA2405149.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA200003	I-70	Bridges 2110603 and 2110604 on I-70 over Conococheague Creek	Washington	WA3255180	11-SF-0133	02-14-05	2/9/2012	APM		7.88	8.98	1.38	0.59	0.28	Yes	1.10	0.00	0.00	0.50	0.14	0.94	0.00	-0.14	0.00	0.30	0.00	MDE	Yes	4/30/2012	WA3255180.pdf	210178 - 210190		2017
WA200004	MD 63	Replacement of Deck For Bridge 21057 on MD 63 over CSX Railroad	Washington	WA3275180	11-SF-0049	02-14-05-01	2/7/2011	KRP/RKG		0.00	0.00	0.00	0.08	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.04	0.00	SHA	No	3/7/2011	WA32751808.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA200005	US 40 Alt.	US 40 Alt. at Poffenberger Road	Washington	WA3515130	11-SF-0171	02-14-05	3/13/2012	RHD/GWF		1.48	2.40	0.62	0.85	0.39	Yes	0.23	0.00	0.00	0.50	0.20	0.07	0.13	-0.07	0.13	0.43	0.00	MDE	Yes	4/5/2012	WA3515130.pdf	210263, 210268 - 210271 & Nonrooftop Disconnection Credit	*Per imagery this project is finished. Sent to GIS team to update NPDES layer to show BMPs as constructed & not proposed.	2017
WA200006	MD 66	MD 66 from Benevola Church Road to Pony Trail Road - Geometric Improvements	Washington	WA352B21 WA3525176	12-SF-0170	02-14-05	9/17/2013	GG/JMH		0.02	0.09	0.09	0.00	0.00	Yes	0.09	0.00	0.00	0.50	0.00	0.11	0.00	0.00	0.00	0.00	0.00	MDE	Yes	6/5/2014	WA352B21.pdf	210521 - wet swale	MDE Approval letter included in WQSS file pdf.	2017
WA200007	MD 144	Roundabout at the MD 144 (Washington Street) and MD 910C (Western Parkway) Intersection	Washington	WA3785176	14-SF-0260	02-14-05	10/9/2014	RHD/WJ		1.80	1.68	0.06	0.34	0.19	Yes	-0.13	0.00	0.13	0.50	0.10	0.01	0.22	0.12	0.10	0.17	0.19	MDE	Yes	11/19/2014	WA3785176.pdf	210626 - bioretention		2017
WA200008	US 40 Alt.	US 40 Alt. (Frederick Street) from North of Wilson Blvd. to South of Kenly Ave.	Washington	WA3925179	13-SF-0339	02-14-05	11/25/2013	RHD/JJK		0.16	0.39	0.23	0.00	0.02	Yes	0.21	0.00	0.00	0.50	0.01	0.00	0.01	0.00	0.01	0.00	0.00	MDE	Yes	12/23/2013	WA3925179.pdf	None - Debit from WQ bank		2017
WA200009	US 40	US 40 at MD 63	Washington	WA3475187	10-SF-0049	02-14-05	9/21/2011	KP/RJM		10.03	10.35	0.32	0.37	0.01	Yes	0.31	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.07	0.00	SHA	No	8/13/2012	WA3475187.pdf	210258 - grass swale	*Appears constructed based on imagery & streetview - sent to GIS team to update NPDES layer.**MDE Approval letter included in WQSS file pdf.	2017
WA200010	I-81	I-81 at I-70 - Interchange Improvements Phase 2	Washington	WA4025176	10-SF-0092	02-14-05	1/15/2010	SP/SCP		0.00	0.00	0.46	0.93	0.00	Yes	0.46	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.19	0.00	SHA	No	4/14/2011	WA4025176.pdf	None - Debit from WQ bank	MDE Approval letter included in WQSS file pdf.	2017
WA200011	MD 68	MD 68 - New Park & Ride	Washington	WA4055181	13-SF-0015	02-14-05-04	5/5/2012	JSR		0.00	1.38	1.38	0.00	0.00	Yes	1.38	0.00	0.00	0.50	0.00	0.01	0.00	0.00	0.00	0.00	0.00	MDE	Yes	6/17/2013	WA4055181.pdf	210511 - 210513 - bioswales		2017
WA200013	I-70	Replacement of Bridge 21108 on I-70 over MD 63	Washington	WA4165180	11-SF-0347	02-14-05	9/19/2012	RHD/BGB		2.42	2.55	0.39	1.81	0.27	Yes	0.12	0.00	0.00	0.50	0.14	0.02	0.12	-0.02	0.12	0.91	0.00	SHA	No	10/2/2012	WA4165180.pdf	210253 - 210256 - bioswales		2017
WA200014	US 40	Rehabilitation of Bridge 21136 on US 40 over I-70	Washington	WA4205180	14-SF-0203	02-14-05	2/5/2014	RHD/RG		0.15	0.15	0.00	0.15	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.08	0.00	MDE	Yes	5/21/2014	WA4205180.pdf	None - Debit from WQ bank		2017
WA200015	I-81	I-81 at 0.65 Miles North of Halfway Blvd. - Acceleration and Deceleration Lanes for Existing Emergency Cross Over	Washington	WA4245176	12-SF-0056	02-14-05-04	10/28/2011	Snyder/Doran		0.00	0.00	0.43	0.10	0.00	Yes	0.43	0.00	0.00	0.50	0.00	0.53	0.00	0.00	0.00	0.05	0.00	SHA	No	9/10/2012	WA4245176.pdf	210274 - 210281 - grass swales & bioswales	MDE Approval letter included in WQSS file pdf.	2017
WA200016	MD 494	MD 494 (Fairview Rd.) at Fairview Church Road	Washington	WA4255176	12-SF-0293	02-14-05	8/20/2013	RHD/JAT		0.81	1.29	0.67	0.11	0.21	Yes	0.46	0.00	0.00	0.50	0.11	0.00	0.11	0.00	0.11	0.06	0.00	MDE	Yes	9/5/2013	WA4255176.pdf	210519 grass swale & 210520 - sand filter	GIS team verified these were constructed	2017
WA200017	I-81	I-81 Northbound from I-70 to Halfway Blvd. - Auxiliary Lane Improvement	Washington	WA2785187	15-PR-0030	02-14-05	4/15/2016	JF/CSF		179.07	179.62	1.33	0.07	0.00	Yes	1.33	0.00	0.00	0.50	0.00	0.21	0.00	0.00	0.00	0.04	0.00	SHA PRD	No	4/28/2016	WA2785187.pdf	210930 - 210935 - grass swlaes & bioswales	GIS team verified these were constructed. Asbuilts certified 3/8/2017	2017
WA200018	US 40	US 40 from Nottingham Road to Cannon Avenue - ADA Compliance Upgrades	Washington	WA4445177	16-PR-0017	02-14-05	4/27/2016	NP		0.04	0.04	0.02	0.01	0.03	Yes	-0.01	0.00	0.01	0.50	0.02	0.00	0.03	0.01	0.02	0.01	0.02	SHA PRD	No	6/22/2016	WA4445177.pdf	None - Debit from WQ bank	Verified construction completed SHA PM Barry Ritchie; minor items to be addressed by 6/2018	2018
WA200019	I-81	I-81 Escort Vehicle Area	Washington	AX513B21	15-PR-0016	02-14-05	1/12/2014	PS/JC		0.63	0.69	0.04	0.08	0.00	Yes	0.04	0.00	0.00	0.50	0.00	0.19	0.00	0.00	0.00	0.04	0.00	SHA	No	8/21/2015	WA2815123.pdf	210784 - bioswale	GIS team verified this was constructed	2017
WA200020	I-70	Hagerstown Maintenance Facility Wash Bay	Washington	WA4455149	16-PR-0053	02-14-05	9/8/2016	NP		0.03	0.54	0.54	0.00	0.00	Yes	0.54	0.00	0.00	0.50	0.00	0.05	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/31/2016	WA4455149.pdf	210942 & 210943 - microbioretentions	**May not yet be constructed***No credit, so did not send to GIS team to field verify.	
	Washington County Totals												**5.55**	**1.40**											**2.39**	**0.21**						Need to subtract out reconstruction & IA reduction for projects that have not yet been constructed	
AW200001	US 1	US 1 from Ducketts Lane to Loudon Avenue	Baltimore, Anne Arundel	AX6445478 (US1)	13-SF-0032	02-13-09	7/18/2012	RHD/JK		0.04	0.14	0.10	0.00	0.00	Yes	0.10	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	10/11/2012	AX6445478 (US1).pdf	None - Debit from WQ bank		2017
AW200002	MD 228	MD 228 from Sharperville Rd. to MD 210	Prince George's, Charles	AW760-501-571	92-SF-0007	02-14-01	12/6/2011	NP		0.00	0.00	15.73	0.00	0.00	Yes	15.73	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MDE	Yes	1/3/2012	AW-760-501-571.pdf	80025 - 80028, 80095, 16454, 16456, 80031, 80030	Determined SWMFAC from matching as-built plans to NPDES layer	2017
AW200003	MD 650/MD 189/MD190/MD 198/MD 117/MD 115. & MD 201	Traffic Signal Modification/ Reconstruction with APS/CPS in Districts 3,4,& 7	Baltimore, Carroll, Frederick, Howard, Montgomery, Prince George's	XY15555185	14-SF-0247	02-14-02 02-14-03 02-13-11	3/25/2014	RHD/BJG		0.00	0.08	0.11	0.00	0.03	Yes	0.08	0.00	0.00	0.50	0.02	0.00	0.02	0.00	0.02	0.00	0.00	SHA	No	6/20/2014	XY1555185.pdf	None - Debit from WQ bank.	MDE Approval letter included in WQSS file pdf	2017
AW200011	District 5	Installation of Trees at Various Locations in District 5	Anne Arundel	AW0475182	16-PR-0090	02-13-09 02-13-10 02-13-11	9/21/2016	JF/SM		0.00	0.00	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	No	10/27/2016	AW0475182.pdf	No SWM required, no BMP	**May not yet be constructed***	
AW200012	NP	Landscape Sustainability Improvements at Various Locations	Baltimore	AX0265124R	15-PR-0081	02-13-08 02-13-09	6/21/2016 4/18/2016	RSK		3.54	3.54	0.00	0.00	0.00	Yes	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHA PRD	Yes	11/4/2016	AX0265124R.pdf	No SWM required, no BMP	**May not yet be constructed*** 3.3.A Waiver, no MS4 credit	
	Area Wide Totals												**0.00**	**0.03**											**0.00**	**0.00**							

Redevelopment Project Credit Accounting - Restoration Credit

Baseline Cutoff Date of 10/21/2010 for ALL Counties

										B	C	D	E	F			L																
ID	Route Number	Description	County	SHA Contract Number	MDE/PRD Number	Watershed Number	Date WQSS Prepared by Consultant PE	HD PE/Consultant PE	MDE Project Classification (New/Redevelopment)	Pre-Development Impervious Area (Acres)	Post-Development Impervious Area (Acres)	New Development (Acres)	Re-constructed Impervious Area (Acres)	Existing Impervious Area Removed (Acres)	Does WQSS IART include F [Ex. IA Removed] in the Equation? (Yes/No)	Project Net Change in Impervious Area, (Acres)	Water Quality Pavement Removal (Acres)	Total Project Impervious Area Reduction	Project Redevelopment Requirements (.20 or .50)	Existing Impervious Area Removed Double Treated by Project (Acres)	Credit Applied to MDOT SHA Water Quality Bank (Acres)	Total Available Impervious Area Reduction Restoration Credit (Acres)	Total Available Impervious Urban to Pervious (Acres)	Total Available Existing Impervious Area Double Treated by Project (Acres)	Reconstruction Restoration Credit (Acres)	Impervious Area Reduction Restoration Credit (Acres)	Source of WQSS (MDE or SHA)	AreThere Both SHA and MDE WQSS Sources? (Y/N)	WQSS Approval Date	WQSS File Name	SWM FAC Numbers	2017/2018 Notes	MDOT SHA Fiscal Year that Credit is Claimed
																[New Development - Existing Impervious Area Removed]		[WQ Pavement Removal - Net change in Imp Area]		[If WQSS includes Ex. IA Removed in IART equation: Ex. IA Removed * Project Redevelopment Requirements. If it is NOT included in IART equation, then credit not taken]	[Unadjusted WQ CREDITS only; Debits listed as 0 in this column]	[Total Project IA Reduction + Ex. IA Removed Double Treated by Project - Credit Applied to SHA WQ bank]	[Total Available IA Reduction Credit - Ex. IA Removed Double Treated by Project]	After WQ bank credits are applied, remaining amount of Total Ex. IA Removed Double Treated by Project available for credit	[Reconstructed Impervious Area * Redevelopment %]	[If Total Project IA Reduction is > 0: Total Available Ex. IA Removed Double Treated by Project + 0.75*Total Available Urban to Pervious. If Total Project IA Reduction not >0, no credit taken]							
	TOTAL MS4 Redevelopment Restoration Credit (Acres)																								57.10	7.60							

Appendix F

Appendix F

MDOT SHA IDDE Investigation Processes

Appendix F

MDOT SHA IDDE Investigation Processes

MARYLAND DEPARTMENT OF TRANSPORTATION™

STATE HIGHWAY ADMINISTRATION

MES Illicit Discharge Detection and Elimination (IDDE) Procedure for SHA OED Requests

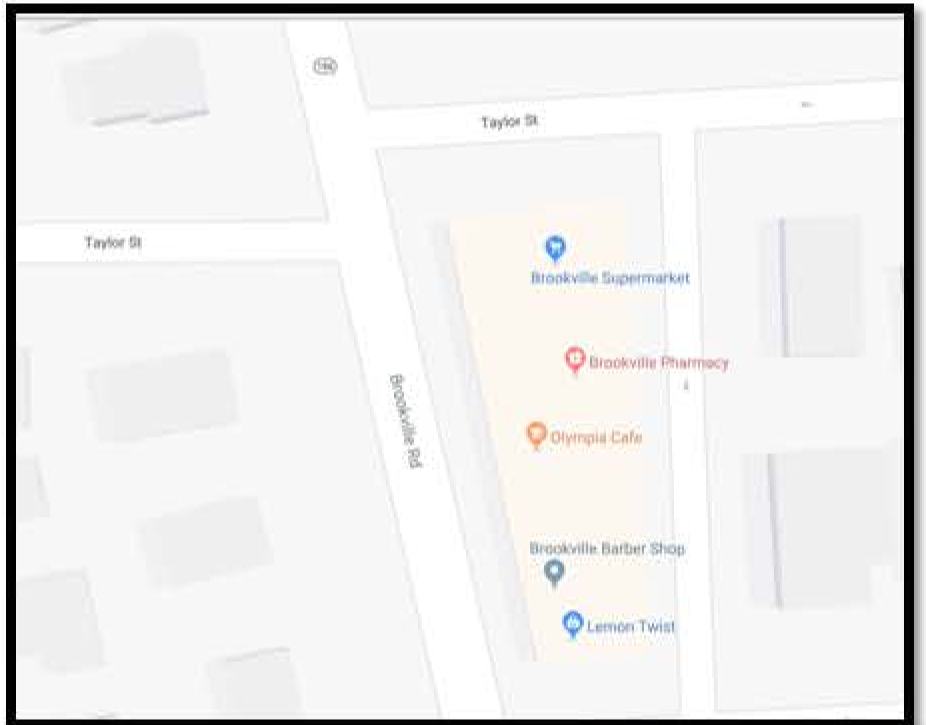
1. SHA provides a request to MES via email or phone call to investigate a stormwater structure where a suspected illicit discharge is occurring. The request typically details the location of the suspected illicit discharge and any observations made by SHA or its contractors. If a map of the location is available, it is provided to MES. An example SHA IDDE location map is included in Appendix A .
2. MES gathers additional information from SHA regarding the request, such as the need for follow-up field screening samples, need for bottle samples for laboratory analysis, and any other details that may be applicable to the specific request.
3. MES utilizes either ArcGIS or SHA's eGIS tool to create a field map(s) that includes the SHA-owned stormwater structure where the suspected illicit discharge originates, as well as upstream and downstream SHA-owned stormwater structures with flow directionality in the general area, as well as SHA's right-of-way (ROW). An example MES field map is included in Appendix B.
    a. To access SHA's eGIS tool, MES staff must travel to SHA OED's office in Hanover.
4. MES coordinates staff, supplies, and equipment to conduct an investigation and collect a sample(s) at the site of the suspected illicit discharge.
    a. Reagents required for all applicable testing parameters are routinely checked to ensure that they have not expired. If expired, MES coordinates to procure replacement reagents before conducting additional field screenings.
5. MES checks recorded rainfall for the site of the suspected illicit discharge to ensure that a period of 48 hours of dry weather has occurred prior to mobilizing for the investigation and potential sampling activities.
6. MES utilizes a checklist to ensure that all necessary supplies and equipment are ready prior to mobilizing to the site of a suspected illicit discharge. MES's pre-work checklist is included in Appendix C.
7. MES mobilizes to the site of the suspected illicit discharge.
8. MES conducts a visual investigation, taking photos and taking field notes of observations at the site of the suspected illicit discharge and upstream from this location. MES will continue its investigation upstream until it is able to affirm a potential source of the suspected illicit discharge. In some cases, MES may also continue its investigation downstream from the site of the suspected illicit discharge. MES also notes any other observations that may be contributing to the suspected illicit discharge at this site (e.g., a hose that is visibly leading to an upstream structure that is located on private property), and may generate a rough diagram of more complex systems. An example rough diagram is included in Appendix D.
    a. MES limits its investigations to SHA's ROW and never enters private property.
9. If flow is observed at the location of the suspected illicit discharge, unless otherwise directed by SHA, MES collects a sample for field screening analysis. Field screening results are recorded on SHA's NPDES Program Inspection Form. An example of a completed inspection form is included in Appendix E.
    a. MES utilizes a Hach DR/890 colorimeter to conduct field screening analysis for chlorine, copper, and pH.
    b. MES utilizes a Hach PL-1 Phenols Test Kit to test for phenols.

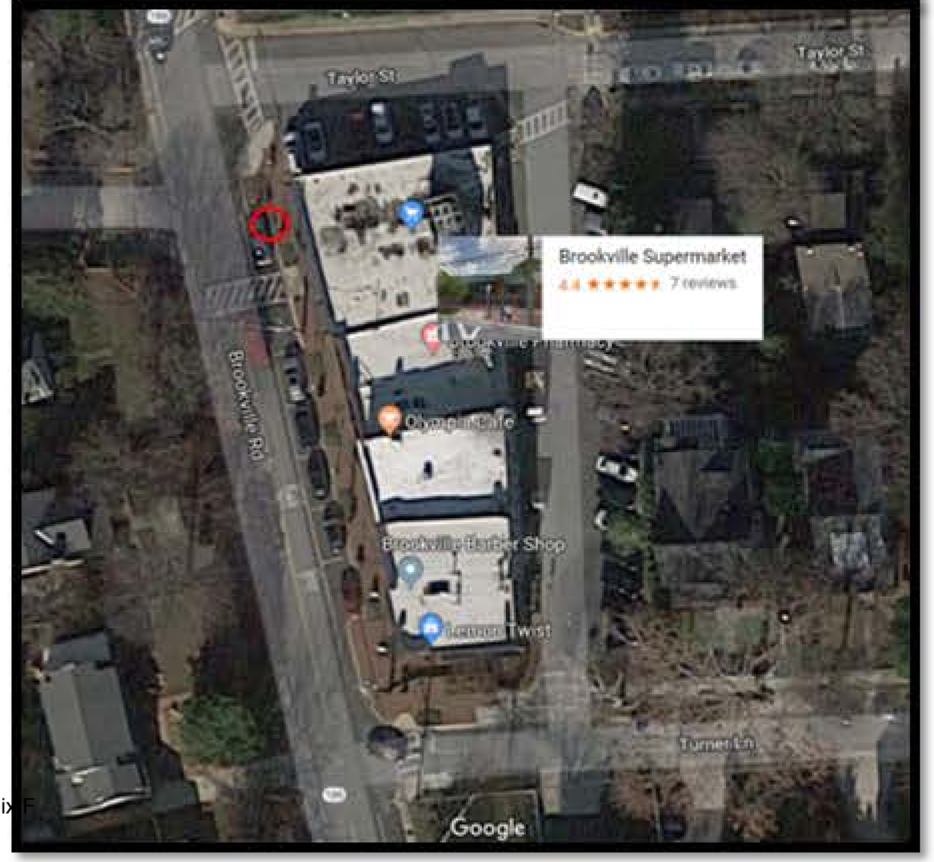
c. MES utilizes a CHEMetrics R-9423 Instrumental Detergents Test Kit to test for detergents.
d. Per SHA's request, MES no longer tests for ammonia during field screenings.

10. If the field screening results for any of the aforementioned parameters is found to be outside of SHA's acceptable range, as outlined in Chapter 5 – Illicit Discharge Detection and Elimination (IDDE) Procedures of SHA's NPDES Program Guidelines, MES conducts a follow-up field screening within 4-24 hours to confirm its initial field screening results.
11. In some instances, SHA has requested that MES collect a laboratory sample, in lieu of conducting a follow-up field screening.
    a. In such instances, utilizing appropriate laboratory-provided sample containers, MES collects a sample for all parameters that were found to be outside of SHA's acceptable range during the field screening. On occasion, per SHA's request, MES will collect and send a sample(s) to the laboratory for analysis if the results of the field screening are close to being outside of SHA's acceptable range, in order to verify the validity of the field screening results.
        i. Samples are kept on ice during transport from the site to MES's office and custody is properly relinquished to the laboratory for analysis. An example chain of custody (COC) is included in Appendix F.
    b. Samples are sent to an MES-contracted laboratory for analysis (currently ALS Environmental). An example laboratory report is included in Appendix G.
12. MES develops and delivers a report of its findings from the illicit discharge investigation and sampling(s) to SHA.
    a. This report includes a narrative describing the findings of MES's investigation, results from applicable field screening(s) and laboratory analyses, site maps, flow directionality diagrams, commentary regarding potential source(s) of dry weather flow, suggestion(s) of next steps, and site photos. An example IDDE deliverable report is included in Appendix H.

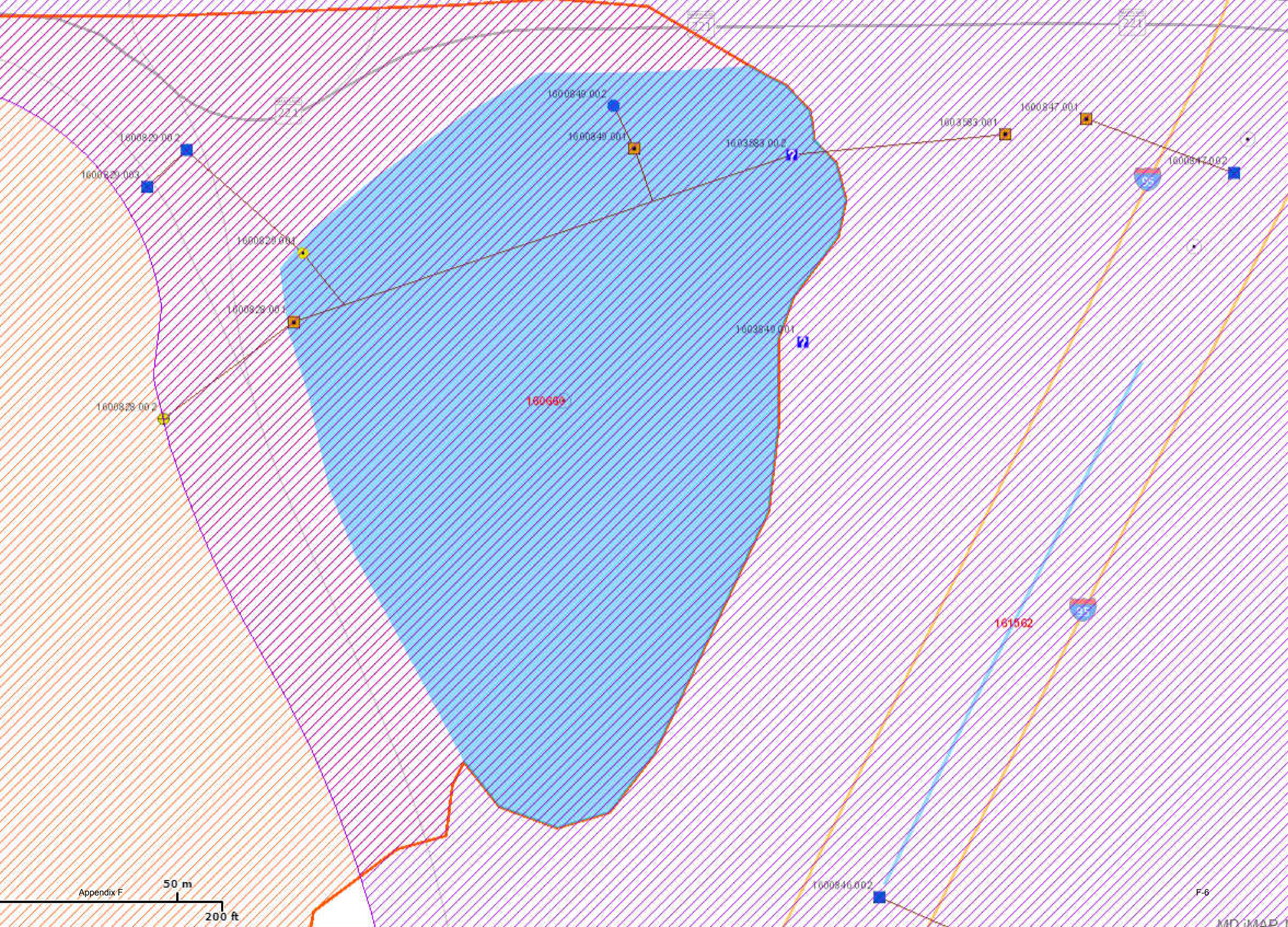
Appendix A
Example SHA IDDE Location Map

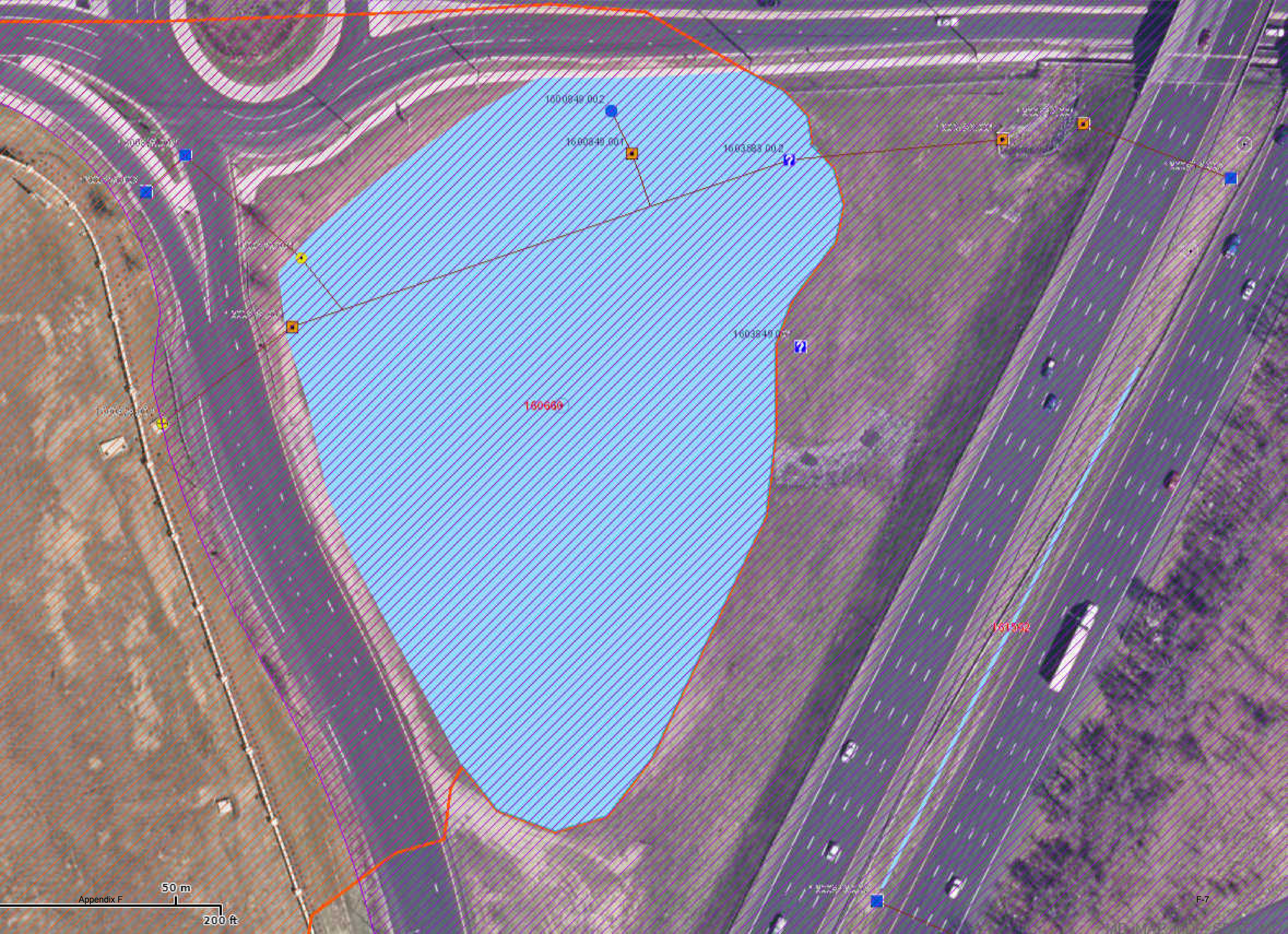
Brookville Supermarket
7027 Brookville Rd, Chevy Chase, MD 20815





Appendix B
Example MES Field Map


1600849.002
1600849.001
1603583.002
1603583.001
1600847.001
1600847.002
1600829.002
1600829.003
1600829.004
1600828.001
1600828.002
1603849.001
160669
161562
95
1600846.002
50 m
200 ft


160669
161052
50 m
200 ft
Appendix F
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Appendix C
MES Pre-work Checklist

IDDE Sampling Pre-Work Checklist

PPE

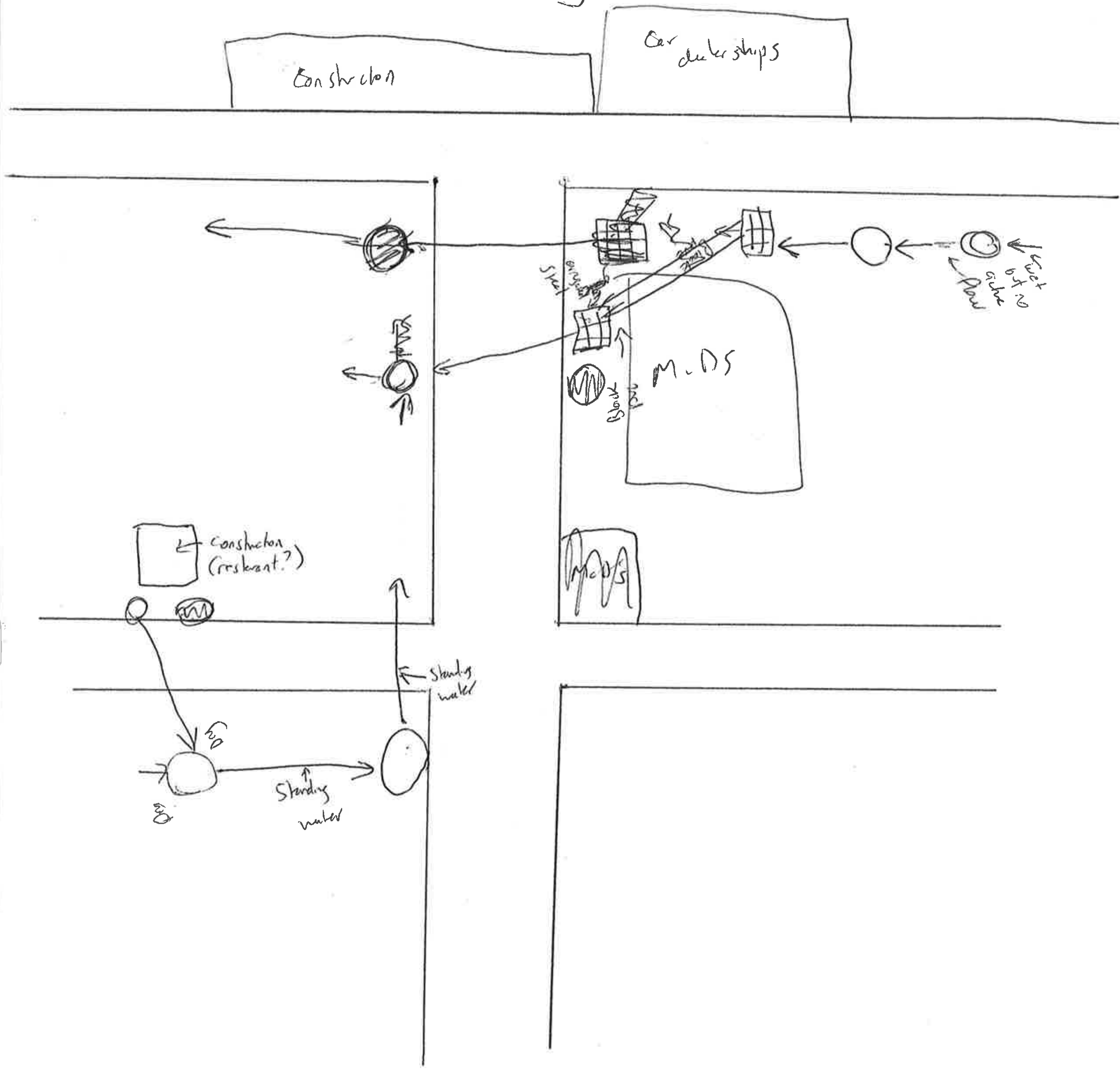
- ☐ Safety vest
- ☐ Safety glasses
- ☐ Steel-toed boots
- ☐ Nitrile gloves
- ☐ Work gloves
- ☐ Hard hat (accessing culverts)
- ☐ PID meter (accessing culverts)

Equipment/Materials

- ☐ Maps/Directions/Site Paperwork
- ☐ Cooler w/ ice (for lab samples)
- ☐ Flashlight
- ☐ Kim wipes
- ☐ Two (2) qty. copies of data sheet per sample site (1 for initial, 1 for follow-up)
- ☐ Phone/camera
- ☐ 2-3 qty. DI water (in 1L clear sample bottles)
- ☐ Multiple empty/new 1L sample bottles
- ☐ 1L amber, glass sample bottle (probably in black test kit case; disposal of waste from detergents and ammonia tests; **contents of bottle must be disposed of as hazwaste**)
- ☐ YSI multi-parameter meter (must be capable of water temperature)
- ☐ Sharpie (bottle labeling)
- ☐ Ruler/yard stick (for flow depth)
- ☐ Extra AA batteries (4-8 qty.)
- ☐ J-hook
- ☐ Hand wipes
- ☐ Traffic cones
- ☐ Cooler/Ice

Appendix D
Example Rough Flow Directionality Diagram

PG. Co. Ritchie Marlboro Rd.
Flow directionality



Appendix E
Example Completed SHA IDDE Inspection Form

INSPECTION TABLE

Field	Domain/Input to Database	Description
INSPECT_ID	Auto-Populated	Unique Inspection ID
STRUCTURE_ID	Auto-Populated 1600828.001	Unique structure ID
INSPECTR	Magpuitz / Morrow	Inspector name (fist initial last name, i.e., jdoe)
DATE_SCRN	11/2/17	Date of initial visual screening and/or sampling (yyyymmdd)
LAST_RAIN	10/29/17	Date of last rainfall exceeding 0.1 inch
SCRTIME	11:45	Time of visual screening or sampling (hh:min)
FLOWOBSERV	☑ TRUE ☐ FALSE	Documents whether dry weather flow is observed
ALGAEGROW	☐ TRUE ☑ FALSE	Documents whether algae is present
ODOR_TYPE	☐ G -- Gas ☒ N – None ☐ O - Other ☐ OL – Oil ☐ RS – Rancid-Sour ☐ S – Sulfur ☐ SE – Sewage	Documents if odor is present and describes the odor
ODOR_DESC	N/A	Additional comments of odor. Note type if 'other' is designated in type
DEPOS_TYPE	☒ N – None ☐ O - Other ☐ OL – Oily ☐ S – Sediment	Documents if deposits are present and describes the deposit
DEPOS_DESC	N/A	Additional deposit comments. Note type if 'other' is designated in type
VEGET_TYPE	☐ EG – Excessive Growth ☐ IG – Inhibited Growth ☒ N – Normal ☐ O – Other	Documents vegetation condition
VEGET_DESC	N/A	Additional vegetation comments.
COND_TYPE	☒ N – Normal ☐ CC – Cracking Concrete ☐ SP – Concrete Spalling ☐ MC – Metal Corrosion ☐ PP – Peeling Paint ☐ OD – Outfall Damage ☐ S – Submerged ☐ O – Other	Documents condition of outfall structure
COND_DESC	N/A	Additional comments on structure condition

FLOW_CHAR TABLE

Field	Domain/Input to Database	Description
INSPECTION_ID	Auto-Populated	Unique Inspection ID
COLOR_TYPE	☐ B– Brown ☒ C –Clear ☐ G – Gray ☐ GR – Green ☐ O – Other ☐ R – Red ☐ Y – Yellow	Documents sample color
COLOR_DESC	N/A	Additional color comments
CLAR_TYPE	☒ C– Clear ☐ O – Opaque ☐ IN – Inlet ☐ PC – Pipe Connection	Documents sample clarity
CLAR_DESC	N/A	Additional clarity comments
FLOAT_TYPE	☒ N– None ☐ O – Other ☐ OS– Oil Sheen ☐ S – Sewerage ☐ T – Trash	Documents any floatable in the sample or at outfall
FLOAT_DESC	~~N/A~~ minor bubbles	Additional floatable comments
WATERTEMP	20.5°C	Temperature of water sampled (F)
AIRTEMP	69°F	Temperature of air (F)
PH	7.33	pH of sample
PHENOL	~~[illegible]~~ Could not determine	Phenol concentration (mg/L)
CHLORINE	0.37	Chlorine concentration (mg/L)
DETERGENTS	Exceeded range of meter	Detergents concentration (mg/L)
COPPER	0.03	Copper concentration (mg/L)
AMMONIA	N/A	Ammonia concentration (mg/L)
COM_FLOW	Heavy dry weather flow	Additional comments for flow characteristics overall

Appendix F
Example Chain of Custody

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Maryland Environmental Service • 259 Najoles Rd. • Millersville, MD 21108 • (410) 729-8200 • FAX (410) 729-8340 L5919346

COC # ______ Laboratory ______ **QC Labs** ______

Sampler T. Rielke, T. Magowitz

Client Name/Phone/FAX Maryland Environmental Service, Attn: Cheryl Griffin

Project Name/# SHA IDDE

Client Address 259 Najoles Rd., Millersville, MD 21108 410-254-8356

Cost center: 3911-3244

Invoice Address same

Sample Turnaround Time Routine

Station No./ Sample ID	Station Location	Grab or Composite	Container Description/ Preservation Status	Matrix	# of Containers	Date	Time	Analyses Required/Comments
1	SHA-IDDE Jones Toyota	Grab	500mL plastic unpreserved	WW	1	11/18/15	10:05	Surfactants (MBAS), pH

Transferred by:	Received by:	Date	Time
Transferred by: [signature]	Received by: MES Fridge	11/18/15	11:25
Transferred by: MES Fridge	Received by: [signature]	11/18/15	1406
Transferred by: [signature]	Received by: [signature]	11/18/15	16:30

Cooler Receipt Information **(LAB USE ONLY)**

Sufficient ice? - Yes/No Temp.= 3.2 °C

Sample containers properly pres'd? - Yes/No If No, explain

Initials: Date:

Appendix F

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Appendix G
Example Laboratory Report

eurofins | QC

Analytical Report

Serialized: 11/20/2017 02:49pm DE36

Order Number:	L6968590
Project Name:	SHA IDDE
Receive Date:	11-03-2017
Client Code:	MES_B
Project Location:	SHA IDDE

CHERYL GRIFFIN
MARYLAND ENVIRONMENTAL SERVICE B
259 NAJOLES ROAD
RE: SHA IDDE
MILLERSVILLE,MD 21108

PROJECT ID:

AL0141 SHA IDDE

LABORATORY REPORT NUMBER:

L6968590

Authorized by: Ronald T. Fazio, President

Eurofins QC, Inc.

Analytical Report

Printed 11/20/17 14:49 DE36

Order Number:	L6968590
Project Name:	SHA IDDE
Receive Date:	11-03-2017
Client Code:	MES_B
Project Location:	SHA IDDE

CHERYL GRIFFIN
MARYLAND ENVIRONMENTAL SERVICE B
259 NAJOLES ROAD
RE: SHA IDDE
MILLERSVILLE, MD 21108

Account No: AL0141, MARYLAND ENVIRONMENTAL SERVICE B **P.O. No:** **Inv. No:** MES_AL0141 PI
Project No: AL0141 SHA IDDE, SHA IDDE **PWSID No:**

Sample ID	Sample Description	Samp. Date/Time/Temp	Sampled by
L6968590-1	SHA ID# 1600828.001	11/02/17 01:12pm NA C	Customer

Received Date/Time/Temp 11/03/17 02:10pm 5.0 C **Iced (Y/N):** Y

Parameter	Result	Qual	Units	Method	DF	RL	Test Date, Time, Analyst
GENERAL CHEMISTRY							
Surfactants, MBAS (Delaware)	7.08		mg/l	SM 5540C	20	1.00	11/04/17 12:45PM EGL

--SUBCONTRACTED RESULT REFERENCES--

See attached reports for the following Subcontract Laboratories:

Eurofins - Lancaster Laboratories, Environmental (ELLE)
PHENOL

Sample Comments | Result Qualifiers:

L6968590-1 :
MBAS is reported as LAS, molecular weight; 340.

PIN: 15216 Serial Number: 6392701

DEFINITIONS

Eurofins QC, Inc. (EQC) ***The following terms or abbreviations are used in this report:***

MPN	Most probable number
CFU	Colony forming unit
POS	Positive / Present
NEG	Negative / Absent
PRES	Presumptive
MF	Membrane Filtration
TNTC	Too numerous to count
DRY	The result was reported on a dry weight basis.
TON	Threshold Odor Number
DF	Dilution Factor (For Microbiology, DF = volume of sample tested)
QUAL	Qualifier (Q)
NTU	Nephelometric turbidity units
RL	Laboratory reporting limit or Limit of Quantitation (LOQ)
MCL	EPA recommended “Maximum Contaminant Level”
MDL	Method Detection Limit
ND	Analyte concentration not detected greater than the RL / MDL
ND	For the odor test: No Odor Observed

ppm (mg/l)	Parts per million: equivalent to 1 milligram per kilogram (mg/Kg) for solids or one milligram per liter (mg/L) for aqueous samples.
ppb (ug/L)	Parts per billion: equivalent to 1 microgram per kilogram (ug/Kg) for solids or one microgram per liter (ug/L) for aqueous samples.
<	Less than: In conjunction with a numerical value, indicates a concentration less than RL / MDL.
>	Greater than: In conjunction with a numerical value, indicates a concentration greater than RL / MDL.

Data Qualifiers

J	Estimated value $\geq$ MDL but < RL.
T	Temperature receipt exceedance, refer to Sample Comments/ Results Qualifiers section.
E	Microbiology: estimated CFU count
Q	Qualifier: defined in Sample Comment section on report

Warranties, Terms, and Conditions

- Unless otherwise indicated in the Parameter Field, analyses for environmental microbiology, odor, and pharmaceutical microbiology are performed at the EQCI Horsham facility (702 Electronic Dr. Horsham, PA 19044).
- Analyses for Field Parameters is performed by EQC Field staff and when the chain of custody identifies the field staff with the code: ”ERF”, that field staff performs tests under State certification # NJ 02015
- The test results meet all TNI or other applicable regulatory agency requirements, including holding times and preservation, unless otherwise indicated.
- The report shall not be reproduced, except in full, without the written consent of the laboratory.
- All samples are collected as “grab” samples unless otherwise identified.
- The reported results relate only to the sample as tested. EQCI is not responsible for sample integrity unless sampling has been performed by a member of our staff.
- EQCI is not responsible for sampling and/or testing omissions. Note that regulatory authorities may assess substantial fines for testing omissions. Please track your sample collection schedules and results on a regular basis (e.g. weekly, monthly, or quarterly) to ensure compliance. EQCI’s internet program “LIVE ACCESS” will provide you with real-time access to collection dates and testing results. Please contact Customer Service for further information.
- The following personnel or their deputies have approved the results of the tests performed by EQCI: Nicki Smith (Environmental Chemistry), Amanda Berd (Pharmaceutical), Sue Abbott (EQCI Delaware), and Bhavita Shah (EQCI Horsham, Microbiology).

EQC Accreditations

Horsham, PA — NELAP IDs:
PA: 46-05499
NJ: PA093

New Castle, DE	State IDs:	DE 00011; MD 138
Wind Gap, PA	State IDs:	PA 48-01334; NJ PA001
East Rutherford, NJ	State ID:	NJ 02015
Vineland, NJ	State ID:	NJ 06005

L6A68590

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Maryland Environmental Service • 259 Najoles Rd. • Millersville, MD 21108 • (410) 729-8200 • FAX (410) 729-8340

COC# [redacted] Laboratory QC Labs	Sampler Magowitz/Morrow
Client Name/Phone/FAX Maryland Environmental Service, Attn: Cheryl Griffin	Project Name/# SHA IDDE
Client Address 259 Najoles Rd., Millersville, MD 21108 410-254-8356	Cost center: 3911-3244
Invoice Address same	Sample Turnaround Time Routine

Station No./ Sample ID	Station Location	Grab or Composite	Container Description/ Preservation Status	Matrix	# of Containers	Date	Time	Analyses Required/Comments
SHA 001	SHA ID# 1600828.001	Grab	500mL plastic unpreserved	WW	1	11/2/2017	1312	Surfactants (MBAS),
SHA 002	SHA ID# 1600828.001	Grab	250mL glass amber H2SO4	WW	1	11/2/2017	1312	Total Phenols

Transferred by	Received by	Date	Time	Cooler Receipt Information (LAB USE ONLY)
Transferred by: Jeah J Morrow	Received by: MES Fridge	Date 11/2/17	Time 1536	Sufficient Ice? - Yes/No Temp.= ________
Transferred by: MES Fridge	Received by: [signature] 5.0°c	Date 11/3/17	Time 1440	Sample containers properly pres'd? - Yes/No If No, explain
Transferred by: [signature]	Received by:	Date	Time	Initials: Date:

eurofins
Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

ANALYSIS REPORT

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Eurofins QC Labs - DE 272 Quigley Blvd New Castle DE 19720

Report Date: November 10, 2017 08:42

Project: L6968590

Account #: 21166
Group Number: 1871191
PO Number: L6968590
State of Sample Origin: MD

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To Eurofins QC Laboratories Attn: Nicki Smith

Respectfully Submitted,

Wendy A. Kozma

Wendy A. Kozma
Principal Specialist Group Leader

SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
L6968590-1 Composite Wastewater	11/02/2017 13:12	9299927

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Project Name: L6968590
ELLE Group #: 1871191

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

For dual column analyses, the surrogate (for multi-surrogate tests, at least one surrogate) must be within the acceptance limits on at least one of the two columns.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

EPA 420.4, Wet Chemistry

Batch #: 17313125102A (Sample number(s): 9299927 UNSPK: P300184)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: Phenols (water)

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Lancaster Laboratories Environmental

Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: **L6968590-1 Composite Wastewater**
SHA ID# 1600828.001

Project Name: **L6968590**

Submittal Date/Time: 11/03/2017 18:00
Collection Date/Time: 11/02/2017 13:12

Eurofins QC Labs - DE
ELLE Sample #: WW 9299927
ELLE Group #: 1871191
Matrix: Wastewater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
Wet Chemistry	**EPA 420.4**		**mg/l**	**mg/l**	
14002	Phenols (water)	n.a.	N.D. Q4	0.020	1

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14002	Phenols (water)	EPA 420.4	1	17313125102A	11/10/2017 02:46	Joseph E McKenzie	1

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Quality Control Summary

Client Name: Eurofins QC Labs - DE Group Number: 1871191
Reported: 11/10/2017 08:42

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result mg/l	LOQ mg/l
Batch number: 17313125102A	Sample number(s): 9299927	
Phenols (water)	N.D.	0.020

LCS/LCSD

Analysis Name	LCS Spike Added mg/l	LCS Conc mg/l	LCSD Spike Added mg/l	LCSD Conc mg/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 17313125102A	Sample number(s): 9299927								
Phenols (water)	0.250	0.254			102		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 17313125102A	Sample number(s): 9299927 UNSPK: P300184									
Phenols (water)	N.D.	0.200	0.233	0.200	0.232	117*	116*	90-110	0	6

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

1871191

L1A68590

CHAIN OF CUSTODY / SAMPLE INFORMATION FORM

Maryland Environmental Service • 259 Najoles Rd. • Millersville, MD 21108 • (410) 729-8200 • FAX (410) 729-8340

COC #________ Laboratory **QC Labs**	Sampler Magowitz/Morrow
Client Name/Phone/FAX Maryland Environmental Service, Attn: Cheryl Griffin	Project Name/# SHA IDDE
Client Address 259 Najoles Rd., Millersville, MD 21108 410-254-8356	Cost center: 3911-3244
Invoice Address same	Sample Turnaround Time Routine

Station No./ Sample ID	Station Location	Grab or Composite	Container Description/ Preservation Status	Matrix	# of Containers	Date	Time	Analyses Required/Comments
SHA 001	SHA ID# 1600828.001	Grab	500mL plastic unpreserved	WW	1	11/2/2017	1312	Surfactants (MBAS),
SHA 002	SHA ID# 1600828.001	Grab	250mL glass amber H2SO4	WW	1	11/2/2017	1312	Total Phenols

Transferred by	Received by	Date	Time	
Transferred by: Leah J. Morrow	Received by: MES Fridge	Date 11/2/17	Time 1536	Cooler Receipt Information **(LAB USE ONLY)** Sufficient ice? - Yes/No Temp.= ________
Transferred by: MES Fridge	Received by: [illegible] 5.0°C	Date 11/3/17	Time 1410	Sample containers properly pres'd? - Yes/No If No, explain
Transferred by: [illegible]	Received by: [illegible]	Date 11/3/17	Time 1820	Initials: Date:

eurofins | Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 199973

Group Number(s): 1871191

Client: EQCL

Delivery and Receipt Information

Delivery Method:	EQCL Drop Off	Arrival Timestamp:	11/03/2017 18:26
Number of Packages:	1	Number of Projects:	7

Arrival Condition Summary

Shipping Container Sealed:	Yes
Custody Seal Present:	Yes
Custody Seal Intact:	Yes
Samples Chilled:	Yes
Paperwork Enclosed:	Yes
Samples Intact:	Yes
Missing Samples:	No
Extra Samples:	No
Discrepancy in Container Qty on COC:	No

Sample IDs on COC match Containers:	Yes
Sample Date/Times match COC:	Yes
VOA Vial Headspace ≥ 6mm:	N/A
Total Trip Blank Qty:	0
Air Quality Samples Present:	No

Unpacked by Karen Diem (3060) at 18:47 on 11/03/2017

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.0	DT	Wet	Y	Loose/Bag	N

2425 New Holland Pike
Lancaster, PA 17605-2425

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level
C	degrees Celsius
cfu	colony forming units
CP Units	cobalt-chloroplatinate units
F	degrees Fahrenheit
g	gram(s)
IU	International Units
kg	kilogram(s)
L	liter(s)
lb.	pound(s)
m3	cubic meter(s)
meq	milliequivalents
mg	milligram(s)
mL	milliliter(s)
MPN	Most Probable Number
N.D.	non-detect
ng	nanogram(s)
NTU	nephelometric turbidity units
pg/L	picogram/liter
RL	Reporting Limit
TNTC	Too Numerous To Count
µg	microgram(s)
µL	microliter(s)
umhos/cm	micromhos/cm

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report
B	Detection in the Blank
Q0	LCS/LCSD Low
Q1	LCS/LCSD High
Q4	MS/MSD Out of Range
Q7	LCS/LCSD RPD
Q8	DUP RPD
Q9	MS/MSD RPD

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Appendix H
Example IDDE Deliverable Report

SHA Illicit Discharge Detection and Elimination (IDDE) Inspection and Sampling Report
Prince George's County – Eastover Car Wash, 5409 Indian Head Hwy – (Structure # N/A)

Report Date: April 23, 2015

Per SHA's request and under MES Contract # 10-07-36, Task Order # 23, MES performed an investigation of a possible illicit connection at 5409 Indian Head Highway in Oxon Hill, MD on March 25, 2015 at 9:30AM. Upon arrival to the site, MES noticed a clogged stormwater inlet on Indian Head Highway in front of Eastover Car Wash. MES further investigated another stormwater inlet near Talbert Drive on Indian Head Highway and observed both to be full of sediment and debris, to the point that one was inundated with standing water.

During the investigation, MES spoke with the owner of Eastover Car Wash. He stated that during large storm events the precipitation does not flow into the inlets along Indian Head Highway because of the sedimentation. This causes the street to flood with water, which subsequently flows into the car wash and carries washwater back onto the street. This stormwater and washwater mix then flows northwest along Indian Head Highway and then west-southwest onto Talbert Drive, as shown by maps 3A-3F. These diagrams simply show the flow of stormwater on the street and do not necessarily represent the true flow directionality of the stormwater system, as it is not currently functioning as intended.

While no rain was observed at the time of MES' investigation, there is concern for a potential illicit discharge during major rain events because of the washwater that is reportedly transported from the car wash into the street, which eventually discharges into Oxon Creek, a tributary of the Potomac River. MES observed that the two SHA-owned stormwater inlets on Indian Head Highway, described above, could be contributing to the alleged flooding problem. Photos of the sedimentation in these inlets can be seen in Figures 1-4.

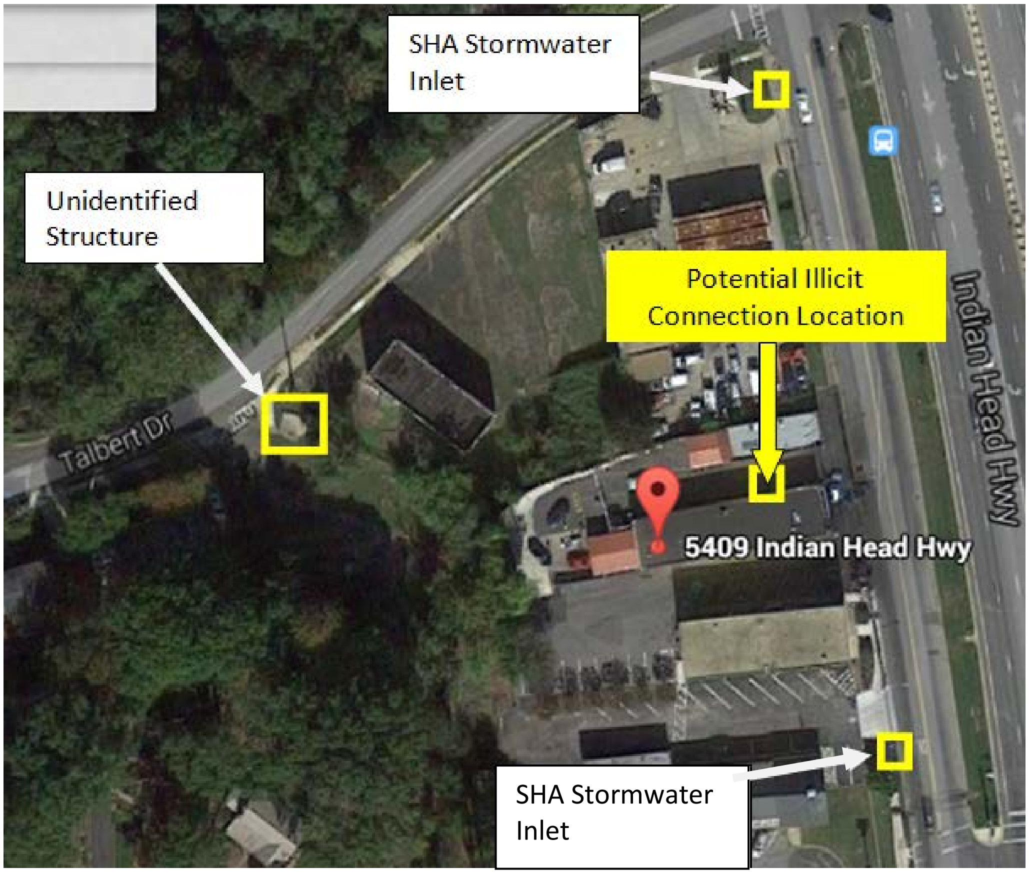
Behind the car wash, accessible via Talbert Drive, is an unidentified structure that is not on SHA's right of way (ROW). During MES' investigation, it was noted that this structure's manhole reads "SEWER" and looks very different than the SHA stormwater manholes in the area. Because of the "SEWER" denotation, MES did not open the manhole for further inspection. There is a hose that discharges into the structure, seen in Figure 5. MES investigated this hose further and determined its source to be the Eastover Car Wash. MES could not definitively confirm what was being discharged from the hose. The screenshot in Map 1 shows the location of the unidentified structure in relation to the car wash. Figures 6-9 illustrate the path of the hose that is connected to the car wash which is discharging into the unknown structure. The

hose is connected to the car wash (Figure 9), then goes out the back of the property, down a hill (Figures 7 and 8), and finally discharges into to the unidentified structure (Figure 6).
According to SHA statewide GIS data, as well as eGIS, there are two known SHA-owned stormwater structures located in the area shown in Map 1. Additionally, MES confirmed that the structure located behind the car wash is not an SHA-owned stormwater structure, and therefore, no further action is required by SHA with regards to the discharge hose.

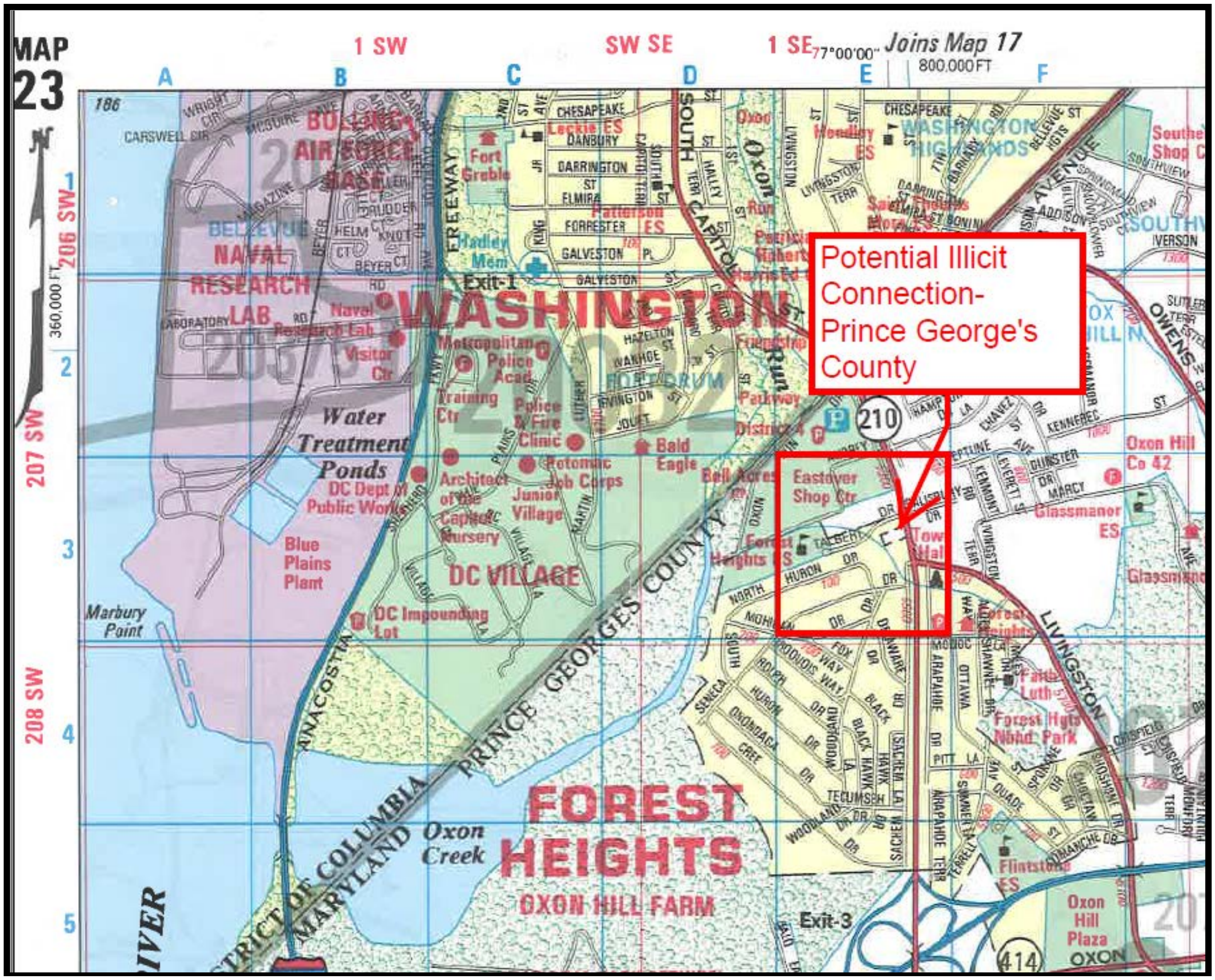
While no illicit connection was recorded or observed, MES recommends that SHA inspect and subsequently conduct maintenance activities on the stormwater structures along Indian Head Highway to avoid a potential illicit discharge in the event of any future major storm events. MES also recommends conducting more frequent routine maintenance activities in this area to ensure this issue does not persist in the future.

Maps and Figures

Map 1: Google Satellite view of potential illicit connection location



Map 2: ADC Map of illicit connection location

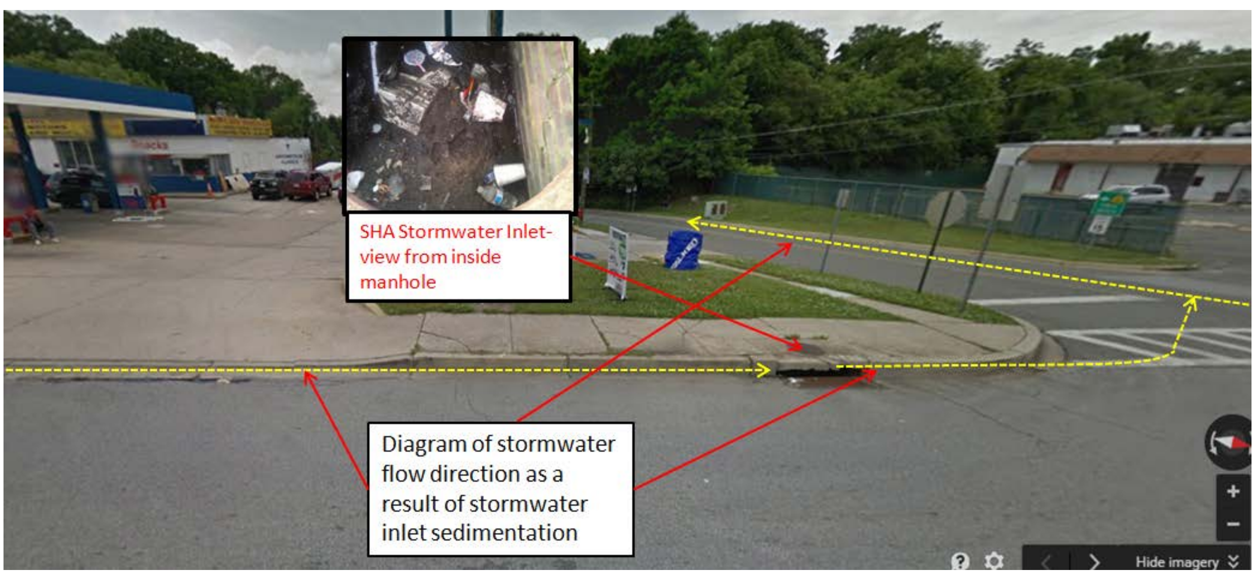


Map 3A: Map with stormwater flow direction

Map 3B: Map with stormwater flow direction (east of Map 3A above)

Map 3C: Map with stormwater flow direction (east of Map 3B above)

Map 3D: Map with stormwater flow direction (east of Map 3C above, intersection of Indian Head Highway and Talbert Drive)



Map 3E: Map with stormwater flow direction

Map 3F: Map with stormwater flow direction

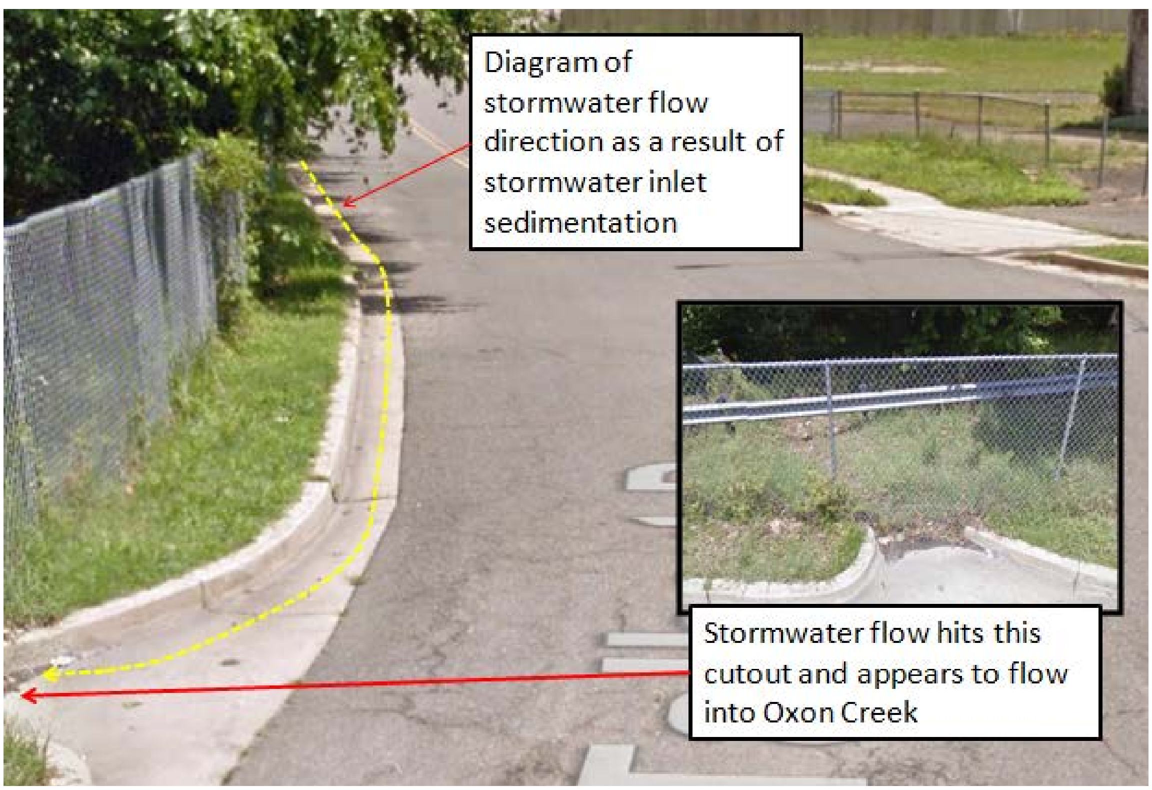


Figure 1: Stormwater inlet in front of gas station on Indian Head Highway (outside view)

Figure 2: Stormwater inlet in front of gas station on Indian Head Highway (inside view)

Figure 3: Stormwater inlet in front of the church on Indian Head Highway (outside view)

Figure 4: Stormwater inlet in front of the church on Indian Head Highway (inside manhole)

Figure 5: Unidentified structure behind Eastover Car Wash property on Talbert Drive

Figure 6: Hose from Eastover Car Wash discharging into unidentified structure on Talbert Drive (between addresses 108 and 112 Talbert Drive)

Figure 7: Hose connected to Eastover Car Wash

Figure 8: Hose connected to Eastover Car Wash

Figure 9: Hose connected to Eastover Car Wash

Appendix G

Appendix G

Optional Worksheets for MS4 Stormwater WLA Implementation Planning

Appendix G

Optional Worksheets for
MS4 Stormwater WLA Implementation Planning

MARYLAND DEPARTMENT
OF TRANSPORTATION™

STATE HIGHWAY
ADMINISTRATION

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Antietam Creek
County Name	Washington
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	717
Pervious Acres in Implementation Baseline Year	1,244

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	21.4%
Required reduction % for TSS	
Available on TMDL Data Center WLA Search	

					Scenario Name: Baseline Year	**Progress Fiscal Year** 2018				**Target Year** 2030				
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		7.0		9.6						7.0
				Pervious Acre Treated		15.7								15.7
		Grass Swales	Cumulative	Impervious Acres Treated	16.7					13.3		22.3		30.0
				Pervious Acre Treated	35.0					19.9				54.9
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated						12.4		19.4		12.4
				Pervious Acre Treated						36.5				36.5
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	2.0									2.0
				Pervious Acre Treated	2.4									2.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	8.7		12.3						8.7
				Pervious Acre Treated	n/a	20.1								20.1
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	1.8					3.0		2.5		4.8
				Pervious Acre Treated	0.9					4.2				5.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		58.9		1.7						58.9
		Inlet Cleaning	Annual **	Dry tons removed						27.8		39.0		27.8
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious	6.7	94.6		17.5						94.6
		Urban Stream Restoration	Cumulative	Linear feet restored						2,033.6		138.3		2,033.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						400.0		27.2		400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**41**	**0**	**TOTAL**	**0**	**249**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,295	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	1,254	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	1,005	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	21.4%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	1,018	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Antietam Creek
County Name	Washington
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	711
Pervious Acres in Implementation Baseline Year	1,253

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	58.1%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2000: BMPs installed before 2000	Progress Fiscal Year 2018: BMPs installed from 2000 to 2018	Progress Reductions (achieved between 2000 and 2018): TN lbs/year	TP lbs/year	TSS lbs/year	Target Year 2045: BMPs planned for installation from 2018 to 2045	Future Reductions (planned from 2018 to 2045): TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		7.0			14,169.9					7.0
				Pervious Acre Treated		15.7								15.7
		Grass Swales	Cumulative	Impervious Acres Treated	16.3					13.3			20,670.3	29.6
				Pervious Acre Treated	34.3					19.9				54.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated						12.4			29,107.7	12.4
				Pervious Acre Treated						36.5				36.5
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	8.7			18,129.1					8.7
				Pervious Acre Treated	n/a	20.1								20.1
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	1.8					3.0			3,951.0	4.8
				Pervious Acre Treated	0.9					4.2				5.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		58.9			8,927.3					58.9
		Inlet Cleaning	Annual **	Dry tons removed						27.8			11,686.5	27.8
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		101.3			22,126.9					101.3
		Urban Stream Restoration	Cumulative	Linear feet restored						2,034			91,512.0	2,033.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						400			18,000.0	400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**63,353**	**TOTAL**	**0**	**0**	**174,928**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,734,045

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,670,692

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	1,495,764

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL | **Legend** | Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	58.1%

From top of worksheet

Target Load

TN	TP	TSS
0	0	726,565

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Bynum Run
County Name	Harford
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	157
Pervious Acres in Implementation Baseline Year	232

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	19.3%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2030**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	3.4					0.2			2,088.3	3.6
				Pervious Acre Treated	4.3					0.2				4.5
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	1.5									1.5
				Pervious Acre Treated	6.6									6.6
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	5.6									5.6
				Pervious Acre Treated	37									37.0
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	6.5			1,910.2					6.5
				Pervious Acre Treated	n/a	5.0								5.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	17.8									17.8
				Pervious Acre Treated	47.5									47.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		30.2			12,700.8					30.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		23.0			1,450.0	2.9			182.9	25.9
		Urban Stream Restoration	Cumulative	Linear feet restored						246.0			11,070.0	246.0
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						307.5			13,837.5	307.5
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**16,061**	**TOTAL**	**0**	**0**	**27,179**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		125,987

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	109,926

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	82,747

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL | **Legend** | Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	19.3%

From top of worksheet

Target Load

TN	TP	TSS
0	0	101,672

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Cabin John Creek
County Name	Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	409
Pervious Acres in Implementation Baseline Year	398

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	22.9%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year** 2005	**Progress Fiscal Year 2018** Progress Reductions				**Target Year 2045** Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2045			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2045	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	5.7					11.5			3,164.7	17.2
				Pervious Acre Treated	6.1					18.2				24.3
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	5.6									5.6
				Pervious Acre Treated	8.9									8.9
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	1.2									1.2
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	5.1			9,261.1					5.1
				Pervious Acre Treated	n/a	9.0								9.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	18.6									18.6
				Pervious Acre Treated	150.8									150.8
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		31.5			3,411.4					31.5
		Inlet Cleaning	Annual **	Dry tons removed		9.8			4,101.3	31.9			13,406.4	41.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		3.6			737.6	0.5			110.8	4.1
		Urban Stream Restoration	Cumulative	Linear feet restored						166.4			7,485.9	166.4
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet		9.4			846.0	1,205.9			55,482.4	1,215.3
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	0	0	18,357	**TOTAL**	0	0	79,650	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,012,693

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	994,336

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	914,685

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	22.9%

From top of worksheet

Target Load

TN	TP	TSS
0	0	780,786

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Catoctin Creek
County Name	Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	401
Pervious Acres in Implementation Baseline Year	844

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	9.0%
Required reduction % for TSS	

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2009: BMPs installed before 2009	Progress Fiscal Year 2018: BMPs installed from 2009 to 2018	Progress Reductions (achieved between 2009 and 2018): TN lbs/year	TP lbs/year	TSS lbs/year	Target Year 2025: BMPs planned for installation from 2018 to 2025	Future Reductions (planned from 2018 to 2025): TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	11.7					1.3		44.4		13.0
				Pervious Acre Treated	43.2					2.0				45.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	0.1									0.1
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		0.1		0.2		13.6		19.0		13.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.2		0.1						0.2
		Urban Tree Planting	Cumulative	Acre planted on pervious	16.0	18.7		9.4		102.5		51.6		121.2
		Urban Stream Restoration	Cumulative	Linear feet restored	719.0					8,930.2		607.3		9,649.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						400.0		27.2		400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**10**	**0**	**TOTAL**	**0**	**749**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,704	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	1,694	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	945	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	9.0%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	1,551	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Catoctin Creek
County Name	Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	397
Pervious Acres in Implementation Baseline Year	850

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	49.1%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2035**	
					2000	Progress Reductions				Future Reductions				
							Reductions achieved between 2000 and 2018				Planned reductions from 2018 to 2035			
		BMP Name	**Type**	**Unit**	BMPs installed before 2000	BMPs installed from 2000 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2035	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	11.7					1.3			21,467.2	13.0
				Pervious Acre Treated	43.2					2.0				45.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		0.1			44.1	13.5			5,688.9	13.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.2			43.5					0.2
		Urban Tree Planting	Cumulative	Acre planted on pervious		34.7			7,464.3	102.5			22,437.0	137.2
		Urban Stream Restoration	Cumulative	Linear feet restored		463.0			20,835.0	8,930.2			401,859.0	9,393.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet		256.0			11,520.0	400.0			18,000.0	656.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**39,907**	**TOTAL**	**0**	**0**	**469,452**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,210,465

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,170,558

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	701,106

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	49.1%

From top of worksheet

Target Load

TN	TP	TSS
0	0	616,127

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Conococheague Creek
County Name	Washington
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	438
Pervious Acres in Implementation Baseline Year	925

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	45.3%
Available on TMDL Data Center WLA Search	

					Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2045**	
						2000	Progress Reductions				Future Reductions				
								Reductions achieved between 2000 and 2018				Planned reductions from 2018 to 2045			
		BMP Name	**Type**	**Unit**		BMPs installed before 2000	BMPs installed from 2000 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2045	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Rain Gardens	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Bioswales	Cumulative	Impervious Acres Treated			6.3			12185.3					6.3
				Pervious Acre Treated			9.4								9.4
		Grass Swales	Cumulative	Impervious Acres Treated		23.4					0.3			7,504.8	23.7
				Pervious Acre Treated		55.7					0.4				56.1
		Permeable Pavement	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated		1.0									1.0
				Pervious Acre Treated		2.3									2.3
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated		n/a	2.8			8,001.5					2.8
				Pervious Acre Treated		n/a	9.9								9.9
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated			n/a				n/a				
				Pervious Acre Treated			n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated			n/a				n/a				
				Pervious Acre Treated			n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated		5.3	1.3			2,850.7	0.8			2,137.3	7.4
				Pervious Acre Treated		14	2.2				2.3				18.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept			11.6			1,867.0					11.6
		Inlet Cleaning	Annual **	Dry tons removed							8.6			3,616.2	8.6
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious											-
		Urban Tree Planting	Cumulative	Acre planted on pervious			57.6			13,163.10					57.6
		Urban Stream Restoration	Cumulative	Linear feet restored							694.0			31,248.0	694.0
		Outfall Enhancement	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Outfall Stabilization	Cumulative	Linear feet							400.0			18,000.0	400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious		n/a									-
				REDUCTIONS:			**TOTAL**	0	0	38,068	**TOTAL**	0	0	62,506	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,152,566

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,114,498

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	1,051,992

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	45.3%

From top of worksheet

Target Load

TN	TP	TSS
0	0	630,454

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Double Pipe Creek
County Name	Carroll / Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	408
Pervious Acres in Implementation Baseline Year	654

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	66.0%
Required reduction % for TSS	

Available on TMDL Data Center WLA Search

					Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2030**	
						2009	Progress Reductions				Future Reductions				
								Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**		BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Rain Gardens	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Bioswales	Cumulative	Impervious Acres Treated		0.4									0.4
				Pervious Acre Treated		1.9									1.9
		Grass Swales	Cumulative	Impervious Acres Treated		6.5					15.6		120.6		22.1
				Pervious Acre Treated		16.4					31.6				48.0
		Permeable Pavement	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated		0.2									0.2
				Pervious Acre Treated		1.4									1.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated		1.0									1.0
				Pervious Acre Treated		4.8									4.8
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated		n/a									-
				Pervious Acre Treated		n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated			n/a				n/a				
				Pervious Acre Treated			n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated			n/a				n/a				
				Pervious Acre Treated			n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept			10.1		1.2						10.1
		Inlet Cleaning	Annual **	Dry tons removed			0.2		0.3						0.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious			0.1		0.0						0.1
		Urban Tree Planting	Cumulative	Acre planted on pervious			40.0		18.3		84.7		38.1		124.7
		Urban Stream Restoration	Cumulative	Linear feet restored							18,844.0		1,281.4		18,844.0
		Outfall Enhancement	Cumulative	Impervious Acres Treated											-
				Pervious Acre Treated											-
		Outfall Stabilization	Cumulative	Linear feet							800.0		54.4		800.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious		n/a									-
				REDUCTIONS:			**TOTAL**	0	20	0	**TOTAL**	0	1,495	0	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,575	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	1,555	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	61	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	66.0%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	536	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Double Pipe Creek
County Name	Carroll / Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	407
Pervious Acres in Implementation Baseline Year	655

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	46.8%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2030**	
					2000	Progress Reductions				Future Reductions				
							Reductions achieved between 2000 and 2018				Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**	BMPs installed before 2000	BMPs installed from 2000 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	5.7					15.6			51,217.5	21.3
				Pervious Acre Treated	12.3					31.6				43.9
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	0.2									0.2
				Pervious Acre Treated	1.4									1.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		10.1			3,057.5					10.1
		Inlet Cleaning	Annual **	Dry tons removed		0.2			88.2					0.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.1			20.7					0.1
		Urban Tree Planting	Cumulative	Acre planted on pervious		40.0			6,970.6	84.7			14,512.5	124.7
		Urban Stream Restoration	Cumulative	Linear feet restored						18,844.2			847,989.0	18,844.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						800.0			36,000.0	800.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**10,137**	**TOTAL**	**0**	**0**	**949,719**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Baseline Load

TN	TP	TSS
		972,329

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	962,192

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	12,473

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	46.8%

From top of worksheet

Target Load

TN	TP	TSS
0	0	517,279

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Gwynns Falls
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	565
Pervious Acres in Implementation Baseline Year	853

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	36.4%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2050**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2050	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	14.6					3.9			15,812.3	18.5
				Pervious Acre Treated	43.3					5.8				49.1
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	0.5									0.5
				Pervious Acre Treated	0.1									0.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	0.6									0.6
				Pervious Acre Treated	3.0									3.0
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	1.8									1.8
				Pervious Acre Treated	2.6									2.6
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		23.0			9,657.9	36.8			15,435.0	59.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		59.4			9,512.4	3.0			482.3	62.4
		Urban Stream Restoration	Cumulative	Linear feet restored						912.8			41,076.0	912.8
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						401.8			18,082.2	401.8
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**19,170**	**TOTAL**	**0**	**0**	**90,888**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,368,169

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,348,999

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	1,258,111

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	36.4%

From top of worksheet

Target Load

TN	TP	TSS
0	0	870,155

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Jones Falls
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	435
Pervious Acres in Implementation Baseline Year	397

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	21.7%

Available on TMDL Data Center WLA Search

					Scenario Name: Baseline Year	Progress Fiscal Year 2018				Target Year 2025				
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2025			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2025	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	10.5					6.8			4,950.1	17.3
				Pervious Acre Treated	11.4					9.9				21.3
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	3.8									3.8
				Pervious Acre Treated	24.5									24.5
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	7.7									7.7
				Pervious Acre Treated	4.4									4.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	25.4									25.4
				Pervious Acre Treated	18.6									18.6
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		11.9			4,983.3					11.9
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		18.2			1,402.9	2.6			194.0	20.8
		Urban Stream Restoration	Cumulative	Linear feet restored						1,982.4			89,208.0	1,982.4
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet		1,264.0			56,880.0	401.6			18,070.5	1,665.6
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**63,266**	**TOTAL**	**0**	**0**	**112,423**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		436,719

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	373,453

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	261,030

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	21.7%

From top of worksheet

Target Load

TN	TP	TSS
0	0	341,951

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Liberty Reservoir
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	622
Pervious Acres in Implementation Baseline Year	1,284

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for TN	
Required reduction % for TP	45.0%
Required reduction % for TSS	
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2035**	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2035			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2035	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	3.6									3.6
		Grass Swales	Cumulative	Impervious Acres Treated	33.9					10.2		52.8		44.1
				Pervious Acre Treated	59.4					14.4				73.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	3.4									3.4
				Pervious Acre Treated	9.5									9.5
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	22.8		37.1						22.8
				Pervious Acre Treated	n/a	105.3								105.3
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	31.1									31.1
				Pervious Acre Treated	99.5									99.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		51.2		3.0						51.2
		Inlet Cleaning	Annual **	Dry tons removed		2.3		3.2						2.3
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		109.6		25.7		26.9		6.2		136.5
		Urban Stream Restoration	Cumulative	Linear feet restored						4,359.6		309.1		4,359.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						6,438.0		453.9		6,438.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**69**	**0**	**TOTAL**	**0**	**822**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,251	

This represents the load from the watershed at the baseline year of the implementation plan

TMDL Reductions

TN	TP	TSS
0.0%	45.0%	0.0%

From top of worksheet

Current Load

TN	TP	TSS
0	1,182	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	360	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

Target Load

TN	TP	TSS
0	688	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Liberty Reservoir
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	622
Pervious Acres in Implementation Baseline Year	1,284

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	45.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	Baseline Year	Progress Fiscal Year			2018	Target Year			2035	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2035			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2035	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	3.6									3.6
		Grass Swales	Cumulative	Impervious Acres Treated	33.9					10.2			0.0	44.1
				Pervious Acre Treated	59.4					14.4				73.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	3.4									3.4
				Pervious Acre Treated	9.5									9.5
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	31.1	22.8			39,994.9					53.9
				Pervious Acre Treated	99.5	105.3								204.8
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		51.2			11,698.1					51.2
		Inlet Cleaning	Annual **	Dry tons removed		2.3			970.2					2.3
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.2			31.5					0.2
		Urban Tree Planting	Cumulative	Acre planted on pervious		109.6			14,196.8	26.9			3,481.7	136.5
		Urban Stream Restoration	Cumulative	Linear feet restored						4,145.6			186,552.0	4,145.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						6,652.0			318,377.0	6,652.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**66,892**	**TOTAL**	**0**	**0**	**508,411**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		1,126,330

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,059,438

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	551,028

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	45.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	619,482

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Little Patuxent River
County Name	Anne Arundel / Howard
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	969
Pervious Acres in Implementation Baseline Year	1,745

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	36.1%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2025**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2025			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2025	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	2.1	15.0			28,737.8					17.1
				Pervious Acre Treated	3.6	27.1								30.7
		Grass Swales	Cumulative	Impervious Acres Treated	97.2					15.5			25,177.1	112.7
				Pervious Acre Treated	174.4					23.0				197.4
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	54.1	0.5			1,061.6					54.6
				Pervious Acre Treated	191.2	0.6								191.8
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	12.3									12.3
				Pervious Acre Treated	18.3									18.3
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					16.1			15,792.1	16.1
				Pervious Acre Treated	n/a					23.0				23.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	93.0									93.0
				Pervious Acre Treated	440.5									440.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		55.8			15,187.0					55.8
		Inlet Cleaning	Annual **	Dry tons removed		3.0			1,278.9					3.0
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.2			11.4	0.1			6.8	0.3
		Urban Tree Planting	Cumulative	Acre planted on pervious		93.9			13,245.4	13.0			1,103.5	106.9
		Urban Stream Restoration	Cumulative	Linear feet restored		6890.0			310,050.0	3,033.2			136,495.9	9,923.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						7,491.0			337,095.0	7,491.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**369,572**	**TOTAL**	**0**	**0**	**515,670**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
TN	TP	TSS
		1,454,208
This represents the load from the watershed at the baseline year of the implementation plan		

Current Load		
TN	TP	TSS
0	0	1,084,636
This represents the load from the watershed at the time the implementation plan was developed		

Load under full implementation		
TN	TP	TSS
0	0	568,965
This represents the load from the watershed in the year that the plan is fully implemented		
meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions		
TN	TP	TSS
0.0%	0.0%	36.1%
From top of worksheet		

Target Load		
TN	TP	TSS
0	0	929,239
This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage		

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Lower Gunpowder Falls
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	127
Pervious Acres in Implementation Baseline Year	95

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	67.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year** 2009	**Progress Fiscal Year 2018** — Progress Reductions	Reductions achieved between 2009 and 2018			**Target Year 2030** — Future Reductions	Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.4									0.4
				Pervious Acre Treated	1.3									1.3
		Grass Swales	Cumulative	Impervious Acres Treated	1.2					3.4			12,148.1	4.6
				Pervious Acre Treated	1.7					4.0				5.7
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated						7.1			11,842.6	7.1
				Pervious Acre Treated						7.8				7.8
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	6.0									6.0
				Pervious Acre Treated	17.9									17.9
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	1.5									1.5
				Pervious Acre Treated	7.0									7.0
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		3.5			1,455.3					3.5
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		48.5			7,358.0	3.4			520.1	51.9
		Urban Stream Restoration	Cumulative	Linear feet restored						9,808.2			441,369.0	9,808.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabiliazation	Cumulative	Linear feet						402.1			18,094.0	402.1
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	0	0	8,813	**TOTAL**	0	0	483,974	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		254,358

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	245,545

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	-238,429

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL | **Legend** | Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	67.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	83,938

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning	
Version: Short Aug-15	
Maryland Department of the Environment-Science Services Administration	

Watershed Name	Lower Monocacy River
County Name	Carroll / Frederick / Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	1,336
Pervious Acres in Implementation Baseline Year	2,189

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for TN	
Required reduction % for TP	25.0%
Required reduction % for TSS	
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year** 2009	**Progress Fiscal Year 2018** — Progress Reductions		Reductions achieved between 2009 and 2018		**Target Year 2040** — Future Reductions	Planned reductions from 2018 to 2040			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2040	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	2.9	8.7		21.0						11.6
				Pervious Acre Treated	3.8	9.0								12.8
		Grass Swales	Cumulative	Impervious Acres Treated	64.4					45.6		103.2		110.0
				Pervious Acre Treated	120.1					71.4				191.5
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	6.3	5.3		15.7						11.6
				Pervious Acre Treated	30.2	8.7								38.9
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	10.0									10.0
				Pervious Acre Treated	28.1									28.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	1.0									1.0
				Pervious Acre Treated	3.8									3.8
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	2.6		6.5		10.9		30.0		13.5
				Pervious Acre Treated	n/a	12.1				37.6				49.7
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	112.9									112.9
				Pervious Acre Treated	911.4									911.4
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		49.7		5.4						49.7
		Inlet Cleaning	Annual **	Dry tons removed		1.7		2.4		4.3		6.0		6.0
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		1.6		0.7						1.6
		Urban Tree Planting	Cumulative	Acre planted on pervious	6.9	123.9		54.6		65.7		29.1		189.6
		Urban Stream Restoration	Cumulative	Linear feet restored						21,319.5		1,449.7		21,319.5
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						7,772.3		528.5		7,772.3
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**106**	**0**	**TOTAL**	**0**	**2,147**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	4,474	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	4,368	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	2,221	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	25.0%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	3,356	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning	
Version: Short Aug-15	
Maryland Department of the Environment-Science Services Administration	

Watershed Name	Lower Monocacy River
County Name	Frederick / Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	1,309
Pervious Acres in Implementation Baseline Year	2,217

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	60.8%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2045**	
					2000	Progress Reductions				Future Reductions				
							Reductions achieved between 2000 and 2018				Planned reductions from 2018 to 2045			
		BMP Name	**Type**	**Unit**	BMPs installed before 2000	BMPs installed from 2000 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2045	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.5	8.7			13,301.6					9.2
				Pervious Acre Treated	0.4	9.0								9.4
		Grass Swales	Cumulative	Impervious Acres Treated	61.7					45.6			32,756.0	107.3
				Pervious Acre Treated	114.8					71.4				186.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	6.3	5.3			6,709.1					11.6
				Pervious Acre Treated	30.2	8.7								38.9
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	9.1									9.1
				Pervious Acre Treated	25.2									25.2
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	2.6			3,881.3	10.9			15,679.8	13.5
				Pervious Acre Treated	n/a	12.1				37.6				49.7
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	60.9									60.9
				Pervious Acre Treated	542.5									542.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		49.3			10,879.9					49.3
		Inlet Cleaning	Annual **	Dry tons removed		1.6			661.5	54.0			22,667.4	55.5
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		1.6			296.8					1.6
		Urban Tree Planting	Cumulative	Acre planted on pervious		128.4			15,410.2	53.6			6,988.0	182.0
		Urban Stream Restoration	Cumulative	Linear feet restored						11,949.5			537,726.1	11,949.5
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						3,732.3			167955.7	3,732.3
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**51,140**	**TOTAL**	**0**	**0**	**783,773**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
TN	TP	TSS
		1,648,092
This represents the load from the watershed at the baseline year of the implementation plan		

Current Load		
TN	TP	TSS
0	0	1,596,952
This represents the load from the watershed at the time the implementation plan was developed		

Load under full implementation		
TN	TP	TSS
0	0	813,179
This represents the load from the watershed in the year that the plan is fully implemented		
meets TMDL	Legend	Does not meet TMDL

TMDL Reductions		
TN	TP	TSS
0.0%	0.0%	60.8%
From top of worksheet		

Target Load		
TN	TP	TSS
0	0	646,052
This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage		

Notes
- Modeling was completed at the Lower Monocacy River subsegmentshed for the TSS local TMDL.
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Patapsco River Lower North Branch
County Name	Anne Arundel / Baltimore / Howard
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	1,415
Pervious Acres in Implementation Baseline Year	2,020

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	18.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2030**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2030			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2030	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.3	7.2			11,004.1					7.5
				Pervious Acre Treated	0.3	10.8								11.1
		Grass Swales	Cumulative	Impervious Acres Treated	52.0	1.4			1,771.4	46.6			38,258.3	100.0
				Pervious Acre Treated	95.5	2.9				55.1				153.5
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	4.1	1.9			4,011.9					6.0
				Pervious Acre Treated	8.9	3.7								12.6
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	48.5									48.5
				Pervious Acre Treated	164.1									164.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					12.3			5,459.2	12.3
				Pervious Acre Treated	n/a					18.9				18.9
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	88.4	0.3			605.0					88.7
				Pervious Acre Treated	219.3	0.4								219.7
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		34.0			11,798.0					34.0
		Inlet Cleaning	Annual **	Dry tons removed		23.6			9,922.5					23.6
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.04			9.4	0.2			41.6	0.2
		Urban Tree Planting	Cumulative	Acre planted on pervious		92.9			14,801.9	33.2			4,254.2	126.1
		Urban Stream Restoration	Cumulative	Linear feet restored		538.0			335.0	16,662.5			749,811.5	17,200.5
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						6,604.3			309,795.7	6,604.3
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**54,259**	**TOTAL**	**0**	**0**	**1,107,621**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		2,631,967

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	2,577,708

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	1,470,087

This represents the load from the watershed in the year that the plan is fully implemented

Legend: meets TMDL | **Legend** | Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	18.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	2,158,213

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Patuxent River Upper
County Name	Anne Arundel / Howard / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	636
Pervious Acres in Implementation Baseline Year	927

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	11.4%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2025**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2025			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2025	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	2.3	3.4			1,330.3					5.7
				Pervious Acre Treated	12.5	3.3								15.8
		Grass Swales	Cumulative	Impervious Acres Treated	38.7					20.0			9,275.3	58.7
				Pervious Acre Treated	79.3					33.6				112.9
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	0.5									0.5
				Pervious Acre Treated	0.3									0.3
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	15.4									15.4
				Pervious Acre Treated	37.1									37.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated		0.2			127.1					0.2
				Pervious Acre Treated		1.0								1.0
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	54.4	4.7			2,871.3					59.1
				Pervious Acre Treated	253.3	25.3								278.6
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		27.3			1,503.5					27.3
		Inlet Cleaning	Annual **	Dry tons removed		4.6			1,940.4					4.6
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious						0.1			5.7	0.1
		Urban Tree Planting	Cumulative	Acre planted on pervious		8.9			521.0	7.2			338.5	16.1
		Urban Stream Restoration	Cumulative	Linear feet restored						3,986.3			119,794.9	3,986.3
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						5,088.4			228,881.0	5,088.4
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**8,294**	**TOTAL**	**0**	**0**	**358,295**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		343,714

This represents the load from the watershed at the baseline year of the implementation plan

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	11.4%

From top of worksheet

Current Load

TN	TP	TSS
0	0	335,420

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	-22,875

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

Target Load

TN	TP	TSS
0	0	304,531

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Potomac River MO County
County Name	Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	596
Pervious Acres in Implementation Baseline Year	524

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	36.2%

Available on TMDL Data Center WLA Search

					Scenario Name: Baseline Year	**Progress Fiscal Year** 2018				**Target Year** 2045				
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2045			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2045	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		1.5			1,847.7					1.5
				Pervious Acre Treated		1.9								1.9
		Grass Swales	Cumulative	Impervious Acres Treated	12.3					4.9			9,945.2	17.2
				Pervious Acre Treated	14.8					7.4				22.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	15.2									15.2
				Pervious Acre Treated	37.0									37.0
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated	48.7	n/a				n/a				
				Pervious Acre Treated	496.9	n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		34.9			2,656.0					34.9
		Inlet Cleaning	Annual **	Dry tons removed		18.2			7,629.3	59.1			24,828.3	77.3
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		52.7			6,838.6	2.6			344.8	55.3
		Urban Stream Restoration	Cumulative	Linear feet restored	201.0					1,855.2			83,483.0	2,056.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						400.0			18,000.0	400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	0	0	18,972	**TOTAL**	0	0	136,601	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		885,933

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	866,961

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	730,360

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	36.2%

From top of worksheet

Target Load

TN	TP	TSS
0	0	565,225

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE	**Optional Worksheet for MS4 Stormwater WLA Implementation Planning**		**Watershed Name**	Rock Creek
	Version: Short Aug-15		**County Name**	Montgomery
	Maryland Department of the Environment-Science Services Administration		**Date**	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	730
Pervious Acres in Implementation Baseline Year	441

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	32.0%
Required reduction % for TSS	
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2023**	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2023			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2023	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.9									0.9
				Pervious Acre Treated	2.2									2.2
		Grass Swales	Cumulative	Impervious Acres Treated	11.6					12.2		6.8		23.8
				Pervious Acre Treated	18.4					20.2				38.6
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	16.4									16.4
				Pervious Acre Treated	32.7									32.7
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	9.6									9.6
				Pervious Acre Treated	11.6									11.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	8.6		9.6						8.6
				Pervious Acre Treated	n/a	20.8								20.8
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	6.6									6.6
				Pervious Acre Treated	31.2									31.2
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		29.5		0.5						29.5
		Inlet Cleaning	Annual **	Dry tons removed		29.7		41.6						29.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		8.0		1.4		1.3		0.2		9.3
		Urban Stream Restoration	Cumulative	Linear feet restored		10,857.0		738.3		398.0		27.1		11,255.0
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet		2,907.0		197.7		600.0		54.4		3,507.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**989**	**0**	**TOTAL**	**0**	**89**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,106	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	117	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	28	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	32.0%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	752	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Rock Creek
County Name	Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	703
Pervious Acres in Implementation Baseline Year	472

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	37.9%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Scenario Name: Baseline Year 2005 — BMPs installed before 2005	Progress Fiscal Year 2018 — Progress Reductions — BMPs installed from 2005 to 2018	Reductions achieved between 2005 and 2018 — TN lbs/year	TP lbs/year	TSS lbs/year	Target Year 2030 — Future Reductions — BMPs planned for installation from 2018 to 2030	Planned reductions from 2018 to 2030 — TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.5									0.5
				Pervious Acre Treated	0.5									0.5
		Grass Swales	Cumulative	Impervious Acres Treated	11.6					12.2			10,533.2	23.8
				Pervious Acre Treated	18.4					20.2				38.6
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	16.4									16.4
				Pervious Acre Treated	32.7									32.7
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	0.3									0.3
				Pervious Acre Treated	0.1									0.1
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	8.6			19,912.9					8.6
				Pervious Acre Treated	n/a	20.8								20.8
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	6.6									6.6
				Pervious Acre Treated	31.2									31.2
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		29.5			3,166.6					29.5
		Inlet Cleaning	Annual **	Dry tons Removed		29.7			12,480.0					29.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		8.0			1,653.7	1.3			269.6	9.3
		Urban Stream Restoration	Cumulative	Linear feet restored		13,764.0			619,380.0	398.0			17,912.0	14,162.0
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						600.0			36,000.0	600.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**656,593**	**TOTAL**	**0**	**0**	**64,715**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Baseline Load

TN	TP	TSS
		1,757,766

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	1,101,173

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	1,036,458

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	37.9%

From top of worksheet

Target Load

TN	TP	TSS
0	0	1,091,573

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- BMP data through 6/30/2018 as of 7/26/2018. Street sweeping and inlet cleaning data provided by OOM through 6/30/2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Seneca Creek
County Name	Montgomery
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND		
	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	733
Pervious Acres in Implementation Baseline Year	743

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	44.9%
Available on TMDL Data Center WLA Search	

		BMP Name	Type	Unit	Scenario Name: Baseline Year 2005 — BMPs installed before 2005	Progress Fiscal Year 2018 (Progress Reductions) — BMPs installed from 2005 to 2018	Reductions achieved between 2005 and 2018 — TN lbs/year	TP lbs/year	TSS lbs/year	Target Year 2045 (Future Reductions) — BMPs planned for installation from 2018 to 2045	Planned reductions from 2018 to 2045 — TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.2	1.7			2,839.8					1.9
				Pervious Acre Treated	0.6	2.1								2.7
		Grass Swales	Cumulative	Impervious Acres Treated	36.3					4.9			12,821.8	41.2
				Pervious Acre Treated	41.9					13.4				55.3
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	2.6									2.6
				Pervious Acre Treated	2.1									2.1
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	6.0									6.0
				Pervious Acre Treated	7.1									7.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	10.5									10.5
				Pervious Acre Treated	17.7									17.7
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					9.4			19,684.5	9.4
				Pervious Acre Treated	n/a					23.0				23.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	59.6									59.6
				Pervious Acre Treated	500.3									500.3
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		20.6			2,001.4					20.6
		Inlet Cleaning	Annual **	Dry tons removed		15.2			6,394.5	58.1			24,387.3	73.3
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		29.2			4,492.5	2.8			448.6	32.0
		Urban Stream Restoration	Cumulative	Linear feet restored		3,991.0			179,595.0	3,469.9			156,147.0	7,460.9
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						400.0			18,000.0	400.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**195,323**	**TOTAL**	**0**	**0**	**231,489**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
TN	TP	TSS
		1,328,366

This represents the load from the watershed at the baseline year of the implementation plan

Current Load		
TN	TP	TSS
0	0	1,133,043

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation		
TN	TP	TSS
0	0	901,554

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions		
TN	TP	TSS
0.0%	0.0%	44.9%
From top of worksheet		

Target Load		
TN	TP	TSS
0	0	731,930

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	South River
County Name	Anne Arundel
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	438
Pervious Acres in Implementation Baseline Year	853

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	28.0%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2025**	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2025			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2025	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.6	2.1			608.9					2.7
				Pervious Acre Treated	1.1	1.2								2.3
		Grass Swales	Cumulative	Impervious Acres Treated	4.4	10.5			3,600.4	17.7			8,172.6	32.6
				Pervious Acre Treated	7.7	13.4				26.4				47.5
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	41.8									41.8
				Pervious Acre Treated	100.1									100.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated	3.1									3.1
				Pervious Acre Treated	14.3									14.3
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	32.0			9,680.1	9.5			3,580.5	41.5
				Pervious Acre Treated	n/a	29.4				24.2				53.6
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	58.4									58.4
				Pervious Acre Treated	192.9									192.9
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		48.8			2,461.5					48.8
		Inlet Cleaning	Annual **	Dry tons removed		2.9			1,234.8					2.9
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious						0.1			9.1	0.1
		Urban Tree Planting	Cumulative	Acre planted on pervious	0.6	7.0			328.0	10.4			522.3	17.4
		Urban Stream Restoration	Cumulative	Linear feet restored		2,300.0			34,500.0	1,981.9			29,728.9	4,281.9
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						21,456.0			965,520.0	21,456.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**52,414**	**TOTAL**	**0**	**0**	**1,007,533**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		229,305

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	176,891

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	-830,642

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	28.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	165,100

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Swan Creek
County Name	Harford
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	142
Pervious Acres in Implementation Baseline Year	110

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	13.0%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2009: BMPs installed before 2009	Progress Fiscal Year 2018 – Progress Reductions: BMPs installed from 2009 to 2018	Reductions achieved between 2009 and 2018: TN lbs/year	TP lbs/year	TSS lbs/year	Target Year 2025 – Future Reductions: BMPs planned for installation from 2018 to 2025	Planned reductions from 2018 to 2025: TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	7.0					2.0			913.3	9.0
				Pervious Acre Treated	22.9					2.6				25.5
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		11.9			4,983.3					11.9
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious		1.3			43.2	8.7			288.9	10.0
		Urban Stream Restoration	Cumulative	Linear feet restored						295.2			13,284.0	295.2
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						369.0			16,605.0	369.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	0	0	5,027	**TOTAL**	0	0	31,091	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		59,038

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	54,012

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	22,920

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	13.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	51,363

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Upper Monocacy River
County Name	Carroll / Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	546
Pervious Acres in Implementation Baseline Year	624

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	3.0%
Required reduction % for TSS	
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2025**	
					2009	Progress Reductions				Future Reductions				
							Reductions achieved between 2009 and 2018				Planned reductions from 2018 to 2025			
		BMP Name	**Type**	**Unit**	BMPs installed before 2009	BMPs installed from 2009 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2025	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		16.9		46.4						16.9
				Pervious Acre Treated		30.7								30.7
		Grass Swales	Cumulative	Impervious Acres Treated	67.1					28.9		99.2		96.0
				Pervious Acre Treated	114.4					43.4				157.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	2.6	5.5		16.2						8.1
				Pervious Acre Treated	2.2	12.7								14.9
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	0.3									0.3
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					3.6		10.6		3.6
				Pervious Acre Treated	n/a					12.0				12.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	0.9									0.9
				Pervious Acre Treated	5.9									5.9
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		0.2		0.3		18.6		26.0		18.8
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious	0.2	43.3		20.0		52.9		24.2		96.2
		Urban Stream Restoration	Cumulative	Linear feet restored						4,633.6		315.1		4,633.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						800.0		54.4		800.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**83**	**0**	**TOTAL**	**0**	**530**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
	1,808	

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	1,725	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	1,196	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	3.0%	0.0%

From top of worksheet

Target Load

TN	TP	TSS
0	1,754	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Upper Monocacy River
County Name	Carroll / Frederick
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2000
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2000
Impervious Acres in Implementation Baseline Year	547
Pervious Acres in Implementation Baseline Year	623

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for TN	
Required reduction % for TP	
Required reduction % for TSS	49.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2035**	
					2000	Progress Reductions				Future Reductions				
							Reductions achieved between 2000 and 2018				Planned reductions from 2018 to 2035			
		BMP Name	**Type**	**Unit**	BMPs installed before 2000	BMPs installed from 2000 to 2018	TN lbs/year	TP lbs/year	TSS lbs/year	BMPs planned for installation from 2018 to 2035	TN lbs/year	TP lbs/year	TSS lbs/year	BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		16.9			30,907.8					16.9
				Pervious Acre Treated		30.7								30.7
		Grass Swales	Cumulative	Impervious Acres Treated	66.7					28.9			31,133.3	95.6
				Pervious Acre Treated	112.6					43.4				156.0
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated		5.5			10,839.2					5.5
				Pervious Acre Treated		12.7								12.7
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	0.1									0.1
				Pervious Acre Treated	0.3									0.3
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST) - Bioretention	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					3.6			8,222.1	3.6
				Pervious Acre Treated	n/a					12.0				12.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed		0.2			88.2	18.6			7,805.7	18.8
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.7			104.9					0.7
		Urban Tree Planting	Cumulative	Acre planted on pervious		43.5			5,093.8	52.9			7,373.6	96.4
		Urban Stream Restoration	Cumulative	Linear feet restored						4,633.6			208,512.0	4,633.6
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet						800.0			36,000.0	800.0
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**0**	**0**	**47,034**	**TOTAL**	**0**	**0**	**299,047**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

TN	TP	TSS
		842,512

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

TN	TP	TSS
0	0	795,478

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

TN	TP	TSS
0	0	496,431

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL | **Legend** | Does not meet TMDL

TMDL Reductions

TN	TP	TSS
0.0%	0.0%	49.0%

From top of worksheet

Target Load

TN	TP	TSS
0	0	429,681

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2000 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Anacostia River Tidal
County Name	Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	422
Pervious Acres in Implementation Baseline Year	414

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	99.9%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2005: BMPs installed before 2005	Progress Fiscal Year 2018 (Progress Reductions): BMPs installed from 2005 to 2018	Reductions achieved between 2005 and 2018: PCBs g/yr			Target Year 2050 (Future Reductions): BMPs planned for installation from 2018 to 2050	Planned reductions from 2018 to 2050: PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	12.7									12.7
				Pervious Acre Treated	12.0									12.0
		Bioswales	Cumulative	Impervious Acres Treated		0.7								0.7
				Pervious Acre Treated		0.8								0.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	0									-
				Pervious Acre Treated	0.3									0.3
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	3.3									3.3
				Pervious Acre Treated	5.7									5.7
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	0.3									0.3
				Pervious Acre Treated	0.2									0.2
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	9.7								9.7
				Pervious Acre Treated	n/a	16.3								16.3
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	21.9									21.9
				Pervious Acre Treated	109.1									109.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		33.8								33.8
		Inlet Cleaning	Annual **	Dry tons removed		5.4				34.7				40.1
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.3**	**0**	**0**	**TOTAL**	**0.7**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
16.1		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
15.8	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
15.1	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

PCBs		
99.9%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Back River Oligohaline Tidal
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2001
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2001
Impervious Acres in Implementation Baseline Year	518
Pervious Acres in Implementation Baseline Year	661

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	53.0%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2001: BMPs installed before 2001	Progress Fiscal Year 2018 (Progress Reductions): BMPs installed from 2001 to 2018	Reductions achieved between 2001 and 2018: PCBs g/yr			Target Year 2045 (Future Reductions): BMPs planned for installation from 2018 to 2045	Planned reductions from 2018 to 2045: PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	27.4					6.2				33.6
				Pervious Acre Treated	50.5					9.4				59.9
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	7.0									7.0
				Pervious Acre Treated	14.8									14.8
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	6.4								6.4
				Pervious Acre Treated	n/a	5.9								5.9
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	0.6	1.3								1.9
				Pervious Acre Treated	17.2	2.7								19.9
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		31.1								31.1
		Inlet Cleaning	Annual **	Dry tons removed		17.5								17.5
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.3**	**0**	**0**	**TOTAL**	**0.1**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
19.3		

This represents the load from the watershed at the baseline year of the implementation plan

TMDL Reductions

PCBs		
53.0%	0.0%	0.0%

From top of worksheet

Current Load

PCBs		
19.0	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
18.9	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

Target Load

PCBs		
9	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2001 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Baltimore Harbor Embayment
County Name	Anne Arundel / Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND		
	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2004
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2004
Impervious Acres in Implementation Baseline Year	98
Pervious Acres in Implementation Baseline Year	42

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for PCBs	91.0%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2038**	
					2004	Progress Reductions				Future Reductions				
							Reductions achieved between 2004 and 2018				Planned reductions from 2018 to 2038			
		BMP Name	**Type**	**Unit**	BMPs installed before 2004	BMPs installed from 2004 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2038	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	3.4									3
				Pervious Acre Treated	2.6									3
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		4.4								4.4
		Inlet Cleaning	Annual **	Dry tons removed		1.2				70.0				71
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.0**	**0**	**0**	**TOTAL**	**1.3**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
PCBs		
6.2		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load		
PCBs		
6.2	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation		
PCBs		
4.9	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions		
PCBs		
91.0%	0.0%	0.0%

From top of worksheet

Target Load		
PCBs		
1	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2004 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Bear Creek
County Name	Anne Arundel / Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2004
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2004
Impervious Acres in Implementation Baseline Year	97
Pervious Acres in Implementation Baseline Year	69

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	92.0%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2004: BMPs installed before 2004	Progress Fiscal Year 2018 (Progress Reductions): BMPs installed from 2004 to 2018	Reductions achieved between 2004 and 2018: PCBs g/yr			Target Year 2038 (Future Reductions): BMPs planned for installation from 2018 to 2038	Planned reductions from 2018 to 2038: PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	4.5									5
				Pervious Acre Treated	5.5									6
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		11.0								11.0
		Inlet Cleaning	Annual **	Dry tons removed		4.6				26.8				31
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.1**	**0**	**0**	**TOTAL**	**0.5**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
6.3		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
6.2	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
5.7	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

PCBs		
92.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
1	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2004 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Bird River
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2010
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2010
Impervious Acres in Implementation Baseline Year	199
Pervious Acres in Implementation Baseline Year	254

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	70.0%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Scenario Name: Baseline Year 2010 — BMPs installed before 2010	Progress Fiscal Year 2018 — Progress Reductions — BMPs installed from 2010 to 2018	Reductions achieved between 2010 and 2018 — PCBs g/yr			Target Year 2050 — Future Reductions — BMPs planned for installation from 2018 to 2050	Planned reductions from 2018 to 2050 — PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	4.3					2.4				6.7
				Pervious Acre Treated	8.7					3.4				12.1
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	2.5									2.5
				Pervious Acre Treated	4.1									4.1
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	10.1									10.1
				Pervious Acre Treated	70.0									70.0
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	1.0									1.0
				Pervious Acre Treated	0.6									0.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	4.1								4.1
				Pervious Acre Treated	n/a	7.0								7.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	25.2									25.2
				Pervious Acre Treated	83.1									83.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed		9.5				25.7				35.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		TOTAL	0.0	0	0	TOTAL	0.1	0	0	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
1.3		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
1.3	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
1.2	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

PCBs		
70.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2010 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Bush River Oligohaline
County Name	Harford
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2010
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2010
Impervious Acres in Implementation Baseline Year	796
Pervious Acres in Implementation Baseline Year	1,046

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	62.0%
Available on TMDL Data Center WLA Search	

				Scenario Name:	Baseline Year	Progress Fiscal Year			2018	Target Year			2050	
					2010	Progress Reductions				Future Reductions				
							Reductions achieved between 2010 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	Type	Unit	BMPs installed before 2010	BMPs installed from 2010 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2050	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	14.2	0.5				2.9				17.6
				Pervious Acre Treated	28.8	0.5				4.0				33.3
		Bioswales	Cumulative	Impervious Acres Treated	1.6	7.5				1.1				10.2
				Pervious Acre Treated	1.8	14.4				2.0				18.2
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	2.2	2.2				1.2				5.6
				Pervious Acre Treated	8.1	4.3				4.6				17.0
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	29.7									29.7
				Pervious Acre Treated	217.0									217.0
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	2.0									2.0
				Pervious Acre Treated	5.6									5.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	9.9								9.9
				Pervious Acre Treated	n/a	17.8								17.8
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	45.7									45.7
				Pervious Acre Treated	207.2									207.2
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed		100.2				7.0				107.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.3**	**0**	**0**	**TOTAL**	**0.1**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
11.1		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
10.7	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
10.6	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

PCBs		
62.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
4	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2010 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Curtis Creek/Bay
County Name	Anne Arundel / Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2004
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2004
Impervious Acres in Implementation Baseline Year	740
Pervious Acres in Implementation Baseline Year	963

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	94.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2038**	
					2004	Progress Reductions				Future Reductions				
							Reductions achieved between 2004 and 2018				Planned reductions from 2018 to 2038			
		BMP Name	**Type**	**Unit**	BMPs installed before 2004	BMPs installed from 2004 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2038	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated						12.3				12
				Pervious Acre Treated						25.8				26
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	16.5	11.9								28.4
				Pervious Acre Treated	33.0	8.6								41.6
		Bioswales	Cumulative	Impervious Acres Treated						0.9				0.9
				Pervious Acre Treated						3.6				3.6
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated		0.4				1.4				1.8
				Pervious Acre Treated		0.6				1.9				2.5
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	110.2									110.2
				Pervious Acre Treated	604.7									604.7
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	32.6				22.5				55.1
				Pervious Acre Treated	n/a	71.4				26.6				98.0
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	65.9	1.4				0.3				67.6
				Pervious Acre Treated	469.5	0.9				0.4				470.8
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed		5.3				1.3				7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.9**	**0**	**0**	**TOTAL**	**0.5**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
31.3		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
30.4	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
29.9	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

PCBs		
94.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
2	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2004 land use is unavailable; so baseline loads will be modeled using 2005 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Lake Roland
County Name	Baltimore
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2010
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2010
Impervious Acres in Implementation Baseline Year	403
Pervious Acres in Implementation Baseline Year	351

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	29.0%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Scenario Name: Baseline Year 2010: BMPs installed before 2010	Progress Fiscal Year 2018 (Progress Reductions): BMPs installed from 2010 to 2018	Reductions achieved between 2010 and 2018: PCBs g/yr			Target Year 2025 (Future Reductions): BMPs planned for installation from 2018 to 2025	Planned reductions from 2018 to 2025: PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated	10.5					6.8				17.3
				Pervious Acre Treated	11.4					9.9				21.3
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	4.2									4.2
				Pervious Acre Treated	27.6									27.6
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	7.7									7.7
				Pervious Acre Treated	4.4									4.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	3.2									3.2
				Pervious Acre Treated	7.7									7.7
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	17.9									17.9
				Pervious Acre Treated	13.1									13.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed		10.6				14.6				25.2
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.1**	**0**	**0**	**TOTAL**	**0.2**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
16.1		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
16.0	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
15.8	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

PCBs		
29.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
11	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2010 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	NE Branch Anacostia River
County Name	Montgomery / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	833
Pervious Acres in Implementation Baseline Year	977

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	99.0%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2045**	
					2005	Progress Reductions				Future Reductions				
							Reductions achieved between 2005 and 2018				Planned reductions from 2018 to 2045			
		BMP Name	**Type**	**Unit**	BMPs installed before 2005	BMPs installed from 2005 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2045	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	59.7					7.9				67.6
				Pervious Acre Treated	112.8					16.5				129.3
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated		1.4								1.4
				Pervious Acre Treated		1.1								1.1
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	11.1									11.1
				Pervious Acre Treated	24.1									24.1
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	4.4									4.4
				Pervious Acre Treated	20.5									20.5
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	2.6				7.1				9.7
				Pervious Acre Treated	n/a	3.0				13.2				16.2
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	27.9									27.9
				Pervious Acre Treated	122.6									122.6
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		32.6								32.6
		Inlet Cleaning	Annual **	Dry tons removed		12.4				9.1				21.5
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	0.1	0	0	**TOTAL**	0.3	0	0	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
7.9		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
7.8	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
7.5	0	0

This represents the load from the watershed in the year that the plan is fully implemented

Legend: meets TMDL | Does not meet TMDL

TMDL Reductions

PCBs		
99.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	NW Branch Anacostia River
County Name	Montgomery / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	616
Pervious Acres in Implementation Baseline Year	331

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	98.0%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**		**2018**	**Target Year**			**2045**	
					2005	Progress Reductions			Future Reductions				
							Reductions achieved between 2005 and 2018			Planned reductions from 2018 to 2045			
		BMP Name	Type	Unit	BMPs installed before 2005	BMPs installed from 2005 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2045	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	3.9									3.9
				Pervious Acre Treated	6.3									6.3
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	0.2									0.2
				Pervious Acre Treated	0.1									0.1
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	4.6									4.6
				Pervious Acre Treated	8.4									8.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	3.9									3.9
				Pervious Acre Treated	26.5									26.5
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	9.2								9.2
				Pervious Acre Treated	n/a	25.8								25.8
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	25.8									25.8
				Pervious Acre Treated	134.8									134.8
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		17.6								17.6
		Inlet Cleaning	Annual **	Dry tons removed		22.7				53.0				75.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	0.1	0	0	**TOTAL**	0.2	0	0	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
7.7		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
7.6	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
7.4	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

PCBs		
98.0%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Patuxent River Tidal Fresh
County Name	Anne Arundel / Howard / Montgomery / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2010
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2010
Impervious Acres in Implementation Baseline Year	3,693
Pervious Acres in Implementation Baseline Year	5,876

REDUCTIONS REQUIRED UNDER THE TMDL

Required reduction % for PCBs	99.9%

Available on TMDL Data Center WLA Search

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**			**2018**	**Target Year**			**2050**	
					2010	Progress Reductions				Future Reductions				
							Reductions achieved between 2010 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	**Type**	**Unit**	BMPs installed before 2010	BMPs installed from 2010 to 2018	PCBs g/yr			BMPs planned for installation from 2018 to 2050	PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	266.5					65.9				332.4
				Pervious Acre Treated	512.1					104.3				616.4
		Bioswales	Cumulative	Impervious Acres Treated	11.8	36.3								48.1
				Pervious Acre Treated	23.0	54.7								77.7
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	10.6	3.2								13.8
				Pervious Acre Treated	15.7	3.2								18.9
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	135.6									135.6
				Pervious Acre Treated	837.4									837.4
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated		0.2								0.2
				Pervious Acre Treated		1.0								1.0
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	26.4									26.4
				Pervious Acre Treated	41.6									41.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	3.1				33.7				36.8
				Pervious Acre Treated	n/a	11.5				70.2				81.7
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	326.7	7.4								334.1
				Pervious Acre Treated	1,463.2	39.9								1,503.1
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		177.8								177.8
		Inlet Cleaning	Annual **	Dry tons removed		20.7				42.9				63.6
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious		0.2				0.3				0.5
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	**0.1**	**0**	**0**	**TOTAL**	**0.1**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

PCBs		
5.1		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

PCBs		
5.0	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

PCBs		
4.9	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

PCBs		
99.9%	0.0%	0.0%

From top of worksheet

Target Load

PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Accurate MDOT SHA data for 2010 land use is unavailable; so baseline loads will be modeled using 2011 land use. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Reduction requirements are only within PAXTF subwatershed.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Potomac River Upper Tidal
County Name	Charles / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
TN	see notes below	
TP		
TSS		

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2005
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2005
Impervious Acres in Implementation Baseline Year	636
Pervious Acres in Implementation Baseline Year	927

REDUCTIONS REQUIRED UNDER THE TMDL	
Required reduction % for PCBs	92.1%
Available on TMDL Data Center WLA Search	

		BMP Name	Type	Unit	Baseline Year 2005: BMPs installed before 2005	Progress Fiscal Year 2018 – Progress Reductions: BMPs installed from 2005 to 2018	Reductions achieved between 2005 and 2018: PCBs g/yr			Target Year 2050 – Future Reductions: BMPs planned for installation from 2018 to 2050	Planned reductions from 2018 to 2050: PCBs g/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass swales	Cumulative	Impervious Acres Treated	24.9					5.6				30.5
				Pervious Acre Treated	31.0					9.3				40.3
		Bioswales	Cumulative	Impervious Acres Treated	0.6									0.6
				Pervious Acre Treated	0.8									0.8
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	1.2									1.2
				Pervious Acre Treated	1.3									1.3
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	71.2									71.2
				Pervious Acre Treated	119.2									119.2
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept		30.1								30.1
		Inlet Cleaning	Annual **	Dry tons removed		5.3				32.4				37.7
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
	Non-Listed or non-traditional practices ***	Advanced IDDE Program	Annual **	Annual Load Removed										-
		Non-specified RR New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Non-specified ST New SWM	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
				REDUCTIONS:		**TOTAL**	0.0	0	0	**TOTAL**	0.0	0	0	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
PCBs		
1.2		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load		
PCBs		
1.2	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation		
PCBs		
1.2	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions		
PCBs		
92.1%	0.0%	0.0%

From top of worksheet

Target Load		
PCBs		
0	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology. BMPS with PCB reductions are first modeled as TSS EOS lbs/yr load reductions. TSS load reductions are then converted to PCB g/yr and reduced by 50% for a conservative approach.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates have been calculated at the most detailed level feasible: the land-river segments from the Chespeake Bay model / MAST P5.3.2. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet because impervious/pervious rates vary by land-river segment.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- PCB load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Baltimore Harbor - Furnace Creek
County Name	Anne Arundel
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND		
	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
	see notes below	

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2006
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2006
Impervious Acres in Implementation Baseline Year	378
Pervious Acres in Implementation Baseline Year	459

REDUCTIONS REQUIRED UNDER THE TMDL	
Required Reduction BN MPN/yr	77.8%
Available on TMDL Data Center WLA Search	

				Scenario Name:	Baseline Year	Progress Fiscal Year			2018	Target Year			2050	
					2006	Progress Reductions				Future Reductions				
							Reductions achieved between 2006 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	**Type**	**Unit**	BMPs installed before 2006	BMPs installed from 2006 to 2018	Bacteria billion counts/day			BMPs planned for installation from 2018 to 2050	Bacteria billion counts/day			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated						0.9				0.9
				Pervious Acre Treated						3.6				3.6
		Grass Swales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated						0.8				0.8
				Pervious Acre Treated						1.6				1.6
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	48.1									48.1
				Pervious Acre Treated	282.6									282.6
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	6.1									6.1
				Pervious Acre Treated	3.6									3.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	14.3								14.3
				Pervious Acre Treated	n/a	32.1								32.1
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	13.6	0.6								14.2
				Pervious Acre Treated	99.0	0.5								99.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed										-
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										-
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**1,114**	**0**	**0**	**TOTAL**	**186**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
billion counts/day		
34,094		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load		
billion counts/day		
32,980	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation		
billion counts/day		
32,794	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions		
billion counts/day		
77.8%	0.0%	0.0%
From top of worksheet		

Target Load		
billion counts/day		
7,569	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates are calculated by land use category in the WMT as MPN/100 ml. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet.
- Accurate MDOT SHA data for 2006 land use is unavailable; so baseline loads will be modeled using 2010 MDP land use and MDOT SHA 2011 ROW. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Bacteria load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Baltimore Harbor - Marley Creek
County Name	Anne Arundel
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND		
	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
	see notes below	

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2006
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2006
Impervious Acres in Implementation Baseline Year	287
Pervious Acres in Implementation Baseline Year	356

REDUCTIONS REQUIRED UNDER THE TMDL	
Required Reduction BN MPN/yr	75.8%
Available on TMDL Data Center WLA Search	

				Scenario Name:	**Baseline Year**	**Progress Fiscal Year**		**2018**		**Target Year**		**2050**		
					2006	Progress Reductions				Future Reductions				
							Reductions achieved between 2006 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	**Type**	**Unit**	BMPs installed before 2006	BMPs installed from 2006 to 2018	Bacteria billion counts/day			BMPs planned for installation from 2018 to 2050	Bacteria billion counts/day			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Grass Swales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated						0.6				0.6
				Pervious Acre Treated						0.3				0.3
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	51.3					12.3				63.6
				Pervious Acre Treated	256.7					25.8				282.5
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	18.2				7.9				26.1
				Pervious Acre Treated	n/a	39.4				5.7				45.1
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	30.9					0.3				31.2
				Pervious Acre Treated	223.1					0.4				223.5
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed										-
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										-
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**1,464**	**0**	**0**	**TOTAL**	**1,586**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
billion counts/day		
20,684		

This represents the load from the watershed at the baseline year of the implementation plan

TMDL Reductions		
billion counts/day		
75.8%	0.0%	0.0%

From top of worksheet

Current Load		
billion counts/day		
19,220	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation		
billion counts/day		
17,634	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

Target Load		
billion counts/day		
5,006	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates are calculated by land use category in the WMT as MPN/100 ml. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet.
- Accurate MDOT SHA data for 2006 land use is unavailable; so baseline loads will be modeled using 2010 MDP land use and MDOT SHA 2011 ROW. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Bacteria load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Loch Raven Reservoir
County Name	Baltimore / Carrol / Howard
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
	see notes below	

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2004
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2004
Impervious Acres in Implementation Baseline Year	751
Pervious Acres in Implementation Baseline Year	856

REDUCTIONS REQUIRED UNDER THE TMDL

Required Reduction BN MPN/yr	87.6%

Available on TMDL Data Center WLA Search

				Scenario Name:	Baseline Year	Progress Fiscal Year	2018			Target Year			2050	
					2004	Progress Reductions				Future Reductions				
							Reductions achieved between 2004 and 2018				Planned reductions from 2018 to 2050			
		BMP Name	**Type**	**Unit**	BMPs installed before 2004	BMPs installed from 2004 to 2018	Bacteria BN MPN/yr			BMPs planned for installation from 2018 to 2050	Bacteria BN MPN/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.2	10.1								10.3
				Pervious Acre Treated	0.6	27.6								28.2
		Grass Swales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	0.0					0.4				0.4
				Pervious Acre Treated	1.0					0.8				1.8
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	4.7									4.7
				Pervious Acre Treated	30.7									30.7
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	0.4									0.4
				Pervious Acre Treated	0.6									0.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a	2.0								2.0
				Pervious Acre Treated	n/a	2.8								2.8
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	2.7									2.7
				Pervious Acre Treated	21.3									21.3
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed										-
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										-
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**1,762**	**0**	**0**	**TOTAL**	**56**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

BN MPN/yr		
113,344		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

BN MPN/yr		
111,582	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

BN MPN/yr		
111,526	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	Legend	Does not meet TMDL

TMDL Reductions

BN MPN/yr		
87.6%	0.0%	0.0%

From top of worksheet

Target Load

BN MPN/yr		
14,055	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates are calculated by land use category in the WMT as MPN/100 ml. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet.
- Accurate MDOT SHA data for 2004 land use is unavailable; so baseline loads will be modeled using 2010 MDP land use and MDOT SHA 2011 ROW. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Bacteria load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

MDE

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Patapsco River LN Branch
County Name	Anne Arundel / Baltimore / Carrol / Howard
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND

	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
	see notes below	

BASELINE YEAR DETAILS

TMDL Baseline Year Available on TMDL Data Center WLA Search	2003
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2003
Impervious Acres in Implementation Baseline Year	1,668
Pervious Acres in Implementation Baseline Year	2,286

REDUCTIONS REQUIRED UNDER THE TMDL

Required Reduction BN MPN/yr	14.8%

Available on TMDL Data Center WLA Search

		BMP Name	Type	Unit	Baseline Year 2003: BMPs installed before 2003	Progress Fiscal Year 2018 (Progress Reductions): BMPs installed from 2003 to 2018	Reductions achieved between 2003 and 2018: Bacteria BN MPN/yr			Target Year 2046 (Future Reductions): BMPs planned for installation from 2018 to 2046	Planned reductions from 2018 to 2046: Bacteria BN MPN/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated		7.2								7.2
				Pervious Acre Treated		10.8								10.8
		Grass Swales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	4.1	1.9								6.0
				Pervious Acre Treated	8.9	3.7								12.6
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	47.6									47.6
				Pervious Acre Treated	160.7									160.7
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated	3.5									3.5
				Pervious Acre Treated	5.6									5.6
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a					12.3				12.3
				Pervious Acre Treated	n/a					18.9				18.9
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	81.2	0.3								81.5
				Pervious Acre Treated	204.0	0.4								204.4
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										-
		Inlet Cleaning	Annual **	Dry tons removed										-
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										-
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**843**	**0**	**0**	**TOTAL**	**986**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load

BN MPN/yr		
231,593		

This represents the load from the watershed at the baseline year of the implementation plan

Current Load

BN MPN/yr		
230,750	0	0

This represents the load from the watershed at the time the implementation plan was developed

Load under full implementation

BN MPN/yr		
229,764	0	0

This represents the load from the watershed in the year that the plan is fully implemented

meets TMDL	**Legend**	Does not meet TMDL

TMDL Reductions

BN MPN/yr		
14.8%	0.0%	0.0%

From top of worksheet

Target Load

BN MPN/yr		
197,318	0	0

This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction %

Notes

- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates are calculated by land use category in the WMT as MPN/100 ml. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet.
- Accurate MDOT SHA data for 2003 land use is unavailable; so baseline loads will be modeled using 2010 MDP land use and MDOT SHA 2011 ROW. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Bacteria load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Optional Worksheet for MS4 Stormwater WLA Implementation Planning
Version: Short Aug-15
Maryland Department of the Environment-Science Services Administration

Watershed Name	Patuxent River Upper
County Name	Anne Arundel / Prince George's
Date	10/9/2018

LOADING RATES FOR UNTREATED LAND		
	Impervious Rate lbs/acre/yr	Pervious Rate lbs/acre/yr
	see notes below	

BASELINE YEAR DETAILS	
TMDL Baseline Year Available on TMDL Data Center WLA Search	2009
Implementation Plan Baseline Year If different from TMDL Baseline year, provide explanation in write-up	2009
Impervious Acres in Implementation Baseline Year	257
Pervious Acres in Implementation Baseline Year	366

REDUCTIONS REQUIRED UNDER THE TMDL	
Required Reduction BN MPN/yr	45.3%
Available on TMDL Data Center WLA Search	

		BMP Name	Type	Unit	Scenario Name: Baseline Year 2009 — BMPs installed before 2009	Progress Fiscal Year 2018 — Progress Reductions — BMPs installed from 2009 to 2018	Reductions achieved between 2009 and 2018 — Bacteria BN MPN/yr			Target Year 2048 — Future Reductions — BMPs planned for installation from 2018 to 2048	Planned reductions from 2018 to 2048 — Bacteria BN MPN/yr			BMP Total
Runoff Reduction Practices	Runoff Reduction (RR) Practices	**Non-Specified RR Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Rain Gardens	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Bioswales	Cumulative	Impervious Acres Treated	0.5	0.9								1.4
				Pervious Acre Treated	0.4	0.5								0.9
		Grass Swales	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Permeable Pavement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (RR)	Cumulative	Impervious Acres Treated	1.5									1.5
				Pervious Acre Treated	1.1									1.1
		Urban Infiltration Practices	Cumulative	Impervious Acres Treated	15.0									15.0
				Pervious Acre Treated	35.2									35.2
	Stormwater Treatment (ST) Practices	**Non-Specified ST Retrofits**	**Cumulative**	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Urban Filtering Practices (ST)	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Convert Dry Pond to Wet Pond	Cumulative	Impervious Acres Treated	n/a									-
				Pervious Acre Treated	n/a									-
		Dry Detention Ponds and Hydrodynamic Structures	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Dry Extended Detention Ponds	Cumulative	Impervious Acres Treated		n/a				n/a				
				Pervious Acre Treated		n/a				n/a				
		Wet Ponds and Wetlands	Cumulative	Impervious Acres Treated	35.8									35.8
				Pervious Acre Treated	100.8									100.8
Alternative Practices	MDE Approved Alternative BMP Classifications	Street Sweeping	Annual **	Acres swept										0.0
		Inlet Cleaning	Annual **	Dry tons removed										
		Impervious Urban Surface Elimination	Cumulative	Impervious acre converted to pervious										-
		Urban Tree Planting	Cumulative	Acre planted on pervious										-
		Urban Stream Restoration	Cumulative	Linear feet restored										-
		Outfall Enhancement	Cumulative	Impervious Acres Treated										-
				Pervious Acre Treated										-
		Outfall Stabilization	Cumulative	Linear feet										-
		Urban Forest Buffers	Cumulative	Acre planted on pervious	n/a									-
				REDUCTIONS:		**TOTAL**	**45**	**0**	**0**	**TOTAL**	**0**	**0**	**0**	

* The acres and reductions in these scenarios should reflect restoration BMPs only. They should not include BMPs on new development that occurred following the implementation plan baseline year.

** Annual practice. Implementation should only include additional efforts beyond the previous scenario. So if 10 miles were swept in the baseline year, and 25 miles were swept in 2009, the 2009 scenario would show 15 miles along with the incremental additional load reduction from that increased effort. The mileage swept in the Target Year will equal the sum of the mileages from the Baseline, 2009, Current and Target Year scenarios. Any decrease in effort will require a negative mileage to be entered.

*** Provide a justification in the write-up for load reductions claimed from this practice

**** Note on redevelopment: load reductions from redevelopment projects should be represented by the specific types of treatment instituted at the redevelopment project in the upland treatment BMPs section. This also assumes no prior treatment at the redevlopment site.

Treated Baseline Load		
BN MPN/yr		
26,200		
This represents the load from the watershed at the baseline year of the implementation plan		

Current Load		
BN MPN/yr		
26,155	0	0
This represents the load from the watershed at the time the implementation plan was developed		

Load under full implementation		
BN MPN/yr		
26,155	0	0
This represents the load from the watershed in the year that the plan is fully implemented		
meets TMDL	Legend	Does not meet TMDL

TMDL Reductions		
BN MPN/yr		
45.3%	0.0%	0.0%
From top of worksheet		

Target Load		
BN MPN/yr		
14,331	0	0
This represents the load that must be achieved when the plan is fully implemeted. It is equal to the baseline reduction times the inverse of the required reduction percentage		

Notes
- Refer to *MDOT SHA Restoration Modeling Protocol* for a detailed description of modeling methodology.
- For local TMDL watersheds with multiple pollutant listings, treatment and load reductions are presented in separate summary sheets due to varying TMDL baseline years.
- Loading rates are calculated by land use category in the WMT as MPN/100 ml. Therefore, Loading Rates for Untreated Land are not provided in this summary sheet.
- Accurate MDOT SHA data for 2009 land use is unavailable; so baseline loads will be modeled using 2010 MDP land use and MDOT SHA 2011 ROW. This is likely to overstate the amount of land area and imperviousness compared to the TMDL analysis, which will lead to a higher restoration requirement; in other words, a conservative approach. Baseline load reductions are calculated from BMPs constructed prior to TMDL baseline year.
- Instead of presenting reductions between baseline year and permit issuance year, MDOT SHA is presenting FY2018 progress reductions which are defined as reductions achieved between baseline year and FY2018.
- Bacteria load reductions were calculated as the sum of reductions from the suite of restoration BMPs in the watershed. The modeling approach for this pollutant does not provide reductions by BMP type.

Appendix H

Appendix H

Comprehensive List of Restoration Practices by Contract

Appendix H

Comprehensive List of Restoration Practices by Contract

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

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Comprehensive List of Restoration Practices By FMIS Contract						
Table H-1: FMIS # AA1665182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000035	Outfall Stabilization	Severn River	02131002	159509.01	431999.29	7.50
SH16ALN000002	Stream Restoration	Severn River	02131002	159493.48	431938.55	0.00
					Complete BMP Acreage Total	**7.50**
					BMP Count	**2**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-2: FMIS # AA7955282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST021556	Submerged Gravel Wetlands	Baltimore Harbor	2130903	170966.30	434819.08	0.35
SH18RST021562	Grass Swale	Baltimore Harbor	2130903	169572.03	433859.78	0.26
SH18RST021563	Grass Swale	Baltimore Harbor	2130903	169506.53	434086.89	0.13
SH18RST021566	Bioretention	Baltimore Harbor	2130903	171073.71	433993.71	0.57
SH18RST021569	Bio-Swale	Baltimore Harbor	2130903	170993.96	433645.09	0.86
SH18RST021935	Bio-Swale	Baltimore Harbor	2130903	169563.85	433959.88	0.27
				Complete BMP Acreage Total		**2.44**
					BMP Count	**6**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-3: FMIS # AA8955182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16ALN000031	Stream Restoration	South River	2131003	145891.51	438563.02	24.14
					Complete BMP Acreage Total	**24.14**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-4: FMIS # AT0415182						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH16APY001381	Planting Trees or Forestation	Anacostia River	2140205	152842.50	400622.80	0.33
SH16APY001382	Planting Trees or Forestation	Anacostia River	2140205	152943.45	400754.76	0.70
SH16APY001384	Planting Trees or Forestation	Cabin John Creek	2140207	147222.35	386388.87	0.11
SH16APY001385	Planting Trees or Forestation	Seneca Creek	2140208	169838.88	377299.88	0.07
SH16APY001386	Planting Trees or Forestation	Seneca Creek	2140208	168356.65	377884.69	0.10
SH16APY001387	Planting Trees or Forestation	Seneca Creek	2140208	173617.02	375520.05	0.05
SH16APY001388	Planting Trees or Forestation	Seneca Creek	2140208	169213.14	377656.34	0.22
SH16APY001389	Planting Trees or Forestation	Seneca Creek	2140208	161846.25	367920.50	0.20
SH16APY001390	Planting Trees or Forestation	Seneca Creek	2140208	164196.29	381388.90	0.06
SH16APY001391	Planting Trees or Forestation	Potomac River MO Cnty	2140202	159057.23	384100.33	0.11
SH16APY001392	Planting Trees or Forestation	Seneca Creek	2140208	163463.94	381570.36	0.24
SH16APY001393	Planting Trees or Forestation	Seneca Creek	2140208	173882.75	375443.82	0.10
SH16APY001394	Planting Trees or Forestation	Seneca Creek	2140208	168407.79	377738.03	0.24
SH16APY001395	Planting Trees or Forestation	Rocky Gorge Dam	2131107	166367.00	394793.83	0.03
SH16APY001396	Planting Trees or Forestation	Rocky Gorge Dam	2131107	166446.40	394809.07	0.07
SH16APY001397	Planting Trees or Forestation	Cabin John Creek	2140207	148075.50	384694.08	0.07
SH16APY001398	Planting Trees or Forestation	Cabin John Creek	2140207	148012.97	384811.18	0.04
SH16APY001399	Planting Trees or Forestation	Seneca Creek	2140208	170081.65	377106.83	0.16
SH16APY001400	Planting Trees or Forestation	Seneca Creek	2140208	170005.46	377124.79	1.02
SH16APY001401	Planting Trees or Forestation	Seneca Creek	2140208	170207.70	377165.94	0.13
SH16APY001402	Planting Trees or Forestation	Seneca Creek	2140208	170295.77	377066.05	0.04
SH16APY001403	Planting Trees or Forestation	Seneca Creek	2140208	170645.38	376751.94	0.18
SH16APY001404	Planting Trees or Forestation	Potomac River MO Cnty	2140202	151665.88	379644.62	0.05
SH16APY001405	Planting Trees or Forestation	Potomac River MO Cnty	2140202	151724.14	379550.71	0.01
SH16APY001406	Planting Trees or Forestation	Potomac River MO Cnty	2140202	151745.81	379516.04	0.01
SH16APY001407	Planting Trees or Forestation	Seneca Creek	2140208	166498.53	375666.94	0.04
SH16APY001408	Planting Trees or Forestation	Seneca Creek	2140208	169681.19	378989.43	0.44
SH16APY001409	Planting Trees or Forestation	Potomac River MO Cnty	2140202	161819.56	384560.69	1.10
SH16APY001410	Planting Trees or Forestation	Cabin John Creek	2140207	147181.70	386417.62	0.13
SH16APY001411	Planting Trees or Forestation	Seneca Creek	2140208	169796.63	377325.04	0.07
SH16APY001412	Planting Trees or Forestation	Seneca Creek	2140208	169991.87	377054.96	0.15
SH16APY001413	Planting Trees or Forestation	Seneca Creek	2140208	170009.85	377025.49	0.15
SH16APY001414	Planting Trees or Forestation	Seneca Creek	2140208	170048.91	377018.16	0.03
SH16APY001415	Planting Trees or Forestation	Potomac River MO Cnty	2140202	151592.49	379766.47	0.03
SH16APY001416	Planting Trees or Forestation	Seneca Creek	2140208	164158.22	381386.75	0.04
SH16APY001417	Planting Trees or Forestation	Seneca Creek	2140208	161390.37	378270.75	0.51
SH16APY001418	Planting Trees or Forestation	Anacostia River	2140205	149559.10	396247.44	0.11
SH16APY001419	Planting Trees or Forestation	Seneca Creek	2140208	169914.56	377003.79	0.18
SH16APY001420	Planting Trees or Forestation	Seneca Creek	2140208	161377.32	378239.53	0.06
SH16APY001421	Planting Trees or Forestation	Anacostia River	2140205	156547.05	403829.81	0.31
SH16APY001422	Planting Trees or Forestation	Anacostia River	2140205	149599.54	396298.36	0.03
SH16APY001423	Planting Trees or Forestation	Anacostia River	2140205	161327.36	402324.11	4.43
SH16APY001424	Planting Trees or Forestation	Rocky Gorge Dam	2131107	161751.20	406421.26	0.07
SH16APY001425	Planting Trees or Forestation	Rocky Gorge Dam	2131107	161827.75	406465.07	0.10
SH16APY001426	Planting Trees or Forestation	Rocky Gorge Dam	2131107	160531.27	406112.11	0.32
SH16APY001427	Planting Trees or Forestation	Anacostia River	2140205	160116.34	406086.38	0.16
SH16APY001428	Planting Trees or Forestation	Anacostia River	2140205	160230.88	406143.19	0.13
SH16APY001429	Planting Trees or Forestation	Anacostia River	2140205	147194.95	409748.70	0.10
SH16APY001430	Planting Trees or Forestation	Western Branch	2131103	136031.50	413089.81	0.29
SH16APY001431	Planting Trees or Forestation	Mattawoman Creek	2140111	107760.53	395429.85	0.04
SH16APY001432	Planting Trees or Forestation	Anacostia River	2140205	141916.24	411508.35	0.47
SH16APY001433	Planting Trees or Forestation	Patuxent River upper	2131104	158880.07	413194.34	0.30
SH16APY001434	Planting Trees or Forestation	Potomac River U tidal	2140201	126125.49	400283.80	0.07
SH16APY001435	Planting Trees or Forestation	Potomac River U tidal	2140201	125886.16	400055.94	0.06
SH16APY001436	Planting Trees or Forestation	Potomac River U tidal	2140201	128850.45	410459.16	0.51
SH16APY001437	Planting Trees or Forestation	Potomac River M tidal	2140102	107594.61	395197.48	0.04
SH16APY001438	Planting Trees or Forestation	Piscataway Creek	2140203	111857.52	399421.63	0.19
SH16APY001439	Planting Trees or Forestation	Western Branch	2131103	127165.95	422575.24	0.03
SH16APY001440	Planting Trees or Forestation	Mattawoman Creek	2140111	110038.62	399197.01	0.11
SH16APY001441	Planting Trees or Forestation	Patuxent River upper	2131104	159195.23	409682.74	0.24
SH16APY001442	Planting Trees or Forestation	Anacostia River	2140205	139920.14	410998.43	0.06
SH16APY001443	Planting Trees or Forestation	Potomac River U tidal	2140201	126103.74	400141.03	0.13
SH16APY001444	Planting Trees or Forestation	Mattawoman Creek	2140111	107897.83	395562.29	0.03
SH16APY001445	Planting Trees or Forestation	Potomac River U tidal	2140201	130299.36	411441.08	0.04
SH16APY001446	Planting Trees or Forestation	Mattawoman Creek	2140111	107709.15	395359.89	0.02
SH16APY001447	Planting Trees or Forestation	Potomac River U tidal	2140201	130236.13	411310.20	0.40
SH16APY001448	Planting Trees or Forestation	Mattawoman Creek	2140111	110447.60	398611.22	0.06
SH16APY001449	Planting Trees or Forestation	Anacostia River	2140205	139644.52	410846.20	0.08
SH16APY001450	Planting Trees or Forestation	Anacostia River	2140205	139914.39	410760.95	0.12
SH16APY001451	Planting Trees or Forestation	Potomac River U tidal	2140201	125975.58	400172.34	0.30
SH16APY001452	Planting Trees or Forestation	Anacostia River	2140205	143712.43	411589.53	0.17
SH16APY001453	Planting Trees or Forestation	Anacostia River	2140205	139961.13	410925.56	0.12
SH16APY001454	Planting Trees or Forestation	Potomac River U tidal	2140201	125938.04	400032.74	0.10
SH16APY001455	Planting Trees or Forestation	Potomac River U tidal	2140201	129662.45	405072.42	0.08

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-4: FMIS # AT0415182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16APY001456	Planting Trees or Forestation	Anacostia River	2140205	148687.87	409230.74	0.06
SH16APY001457	Planting Trees or Forestation	Western Branch	2131103	134071.97	418766.58	0.17
SH16APY001458	Planting Trees or Forestation	Western Branch	2131103	135507.90	424314.68	0.16
SH16APY001459	Planting Trees or Forestation	Anacostia River	2140205	148992.49	409347.64	0.06
SH16APY001460	Planting Trees or Forestation	Western Branch	2131103	132936.70	413286.81	0.12
SH16APY001461	Planting Trees or Forestation	Anacostia River	2140205	148723.63	409216.38	0.25
SH16APY001462	Planting Trees or Forestation	Western Branch	2131103	127337.92	422523.29	0.13
SH16APY001463	Planting Trees or Forestation	Western Branch	2131103	130369.49	411726.81	0.36
SH16APY001464	Planting Trees or Forestation	Potomac River U tidal	2140201	125983.11	400029.23	0.09
SH16APY001465	Planting Trees or Forestation	Potomac River U tidal	2140201	125960.62	400034.17	0.03
SH16APY001466	Planting Trees or Forestation	Potomac River U tidal	2140201	125943.49	400199.11	0.17
SH16APY001467	Planting Trees or Forestation	Western Branch	2131103	127291.66	421750.86	0.07
SH16APY001468	Planting Trees or Forestation	Western Branch	2131103	127314.94	421811.01	0.08
SH16APY001469	Planting Trees or Forestation	Western Branch	2131103	127130.95	422602.54	0.04
SH16APY001470	Planting Trees or Forestation	Potomac River M tidal	2140102	107655.68	395284.57	0.04
					Complete BMP Acreage Total	**18.92**
					BMP Count	**89**

Comprehensive List of Restoration Practices By FMIS Contract
Table H-5: FMIS # AT0425182

Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH15APY001237	Planting Trees or Forestation	Antietam Creek	2140502	210830.44	345477.33	0.25
SH15APY001238	Planting Trees or Forestation	Antietam Creek	2140502	211544.70	344544.72	0.37
SH15APY001239	Planting Trees or Forestation	Antietam Creek	2140502	211075.03	345143.50	0.11
SH15APY001240	Planting Trees or Forestation	Antietam Creek	2140502	209399.80	347298.62	0.07
SH15APY001241	Planting Trees or Forestation	Antietam Creek	2140502	211203.18	344987.37	0.14
SH15APY001242	Planting Trees or Forestation	Antietam Creek	2140502	211723.50	344404.70	0.09
SH15APY001243	Planting Trees or Forestation	Antietam Creek	2140502	208812.80	347576.77	0.37
SH15APY001244	Planting Trees or Forestation	Antietam Creek	2140502	209432.04	347198.76	0.16
SH15APY001245	Planting Trees or Forestation	Antietam Creek	2140502	210429.95	346035.54	0.16
SH15APY001246	Planting Trees or Forestation	Antietam Creek	2140502	212226.96	343831.94	0.15
SH15APY001247	Planting Trees or Forestation	Antietam Creek	2140502	212499.76	343521.56	0.03
SH15APY001248	Planting Trees or Forestation	Antietam Creek	2140502	212940.75	343018.86	0.12
SH15APY001249	Planting Trees or Forestation	Antietam Creek	2140502	213076.24	342865.00	0.11
SH15APY001250	Planting Trees or Forestation	Antietam Creek	2140502	213200.09	342724.29	0.08
SH15APY001251	Planting Trees or Forestation	Antietam Creek	2140502	209435.96	347257.24	0.02
SH15APY001252	Planting Trees or Forestation	Antietam Creek	2140502	211110.42	345092.09	0.23
SH15APY001253	Planting Trees or Forestation	Antietam Creek	2140502	214192.72	343717.97	0.13
SH15APY001254	Planting Trees or Forestation	Conococheague Creek	2140504	215554.35	333794.57	0.69
SH15APY001255	Planting Trees or Forestation	Antietam Creek	2140502	213291.59	345047.38	0.02
SH15APY001256	Planting Trees or Forestation	Antietam Creek	2140502	213315.74	345063.24	0.02
SH16APY001471	Planting Trees or Forestation	Antietam Creek	2140502	214925.65	342203.99	0.12
SH16APY001472	Planting Trees or Forestation	Antietam Creek	2140502	214959.77	341514.06	0.05
SH16APY001473	Planting Trees or Forestation	Antietam Creek	2140502	199366.72	342995.37	0.33
SH16APY001474	Planting Trees or Forestation	Antietam Creek	2140502	197843.16	342718.74	0.34
SH16APY001475	Planting Trees or Forestation	Antietam Creek	2140502	197672.01	342715.90	0.04
SH16APY001476	Planting Trees or Forestation	Antietam Creek	2140502	197478.10	342736.44	0.23
SH16APY001477	Planting Trees or Forestation	Antietam Creek	2140502	197136.57	342830.61	0.05
SH16APY001478	Planting Trees or Forestation	Antietam Creek	2140502	195600.41	343070.74	1.77
SH16APY001479	Planting Trees or Forestation	Antietam Creek	2140502	195185.54	342921.63	0.32
SH16APY001480	Planting Trees or Forestation	Potomac River FR Cnty	2140301	192674.90	343445.65	0.54
SH16APY001481	Planting Trees or Forestation	Antietam Creek	2140502	194360.52	342900.73	0.86
SH16APY001482	Planting Trees or Forestation	Potomac River FR Cnty	2140301	194069.79	342989.78	0.59
SH16APY001483	Planting Trees or Forestation	Potomac River FR Cnty	2140301	192113.66	343674.61	0.08
SH16APY001484	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191849.28	343638.69	0.34
SH16APY001485	Planting Trees or Forestation	Antietam Creek	2140502	202901.13	344263.93	0.05
SH16APY001486	Planting Trees or Forestation	Antietam Creek	2140502	202854.22	344294.69	0.50
SH16APY001487	Planting Trees or Forestation	Antietam Creek	2140502	202549.69	344202.29	1.03
SH16APY001488	Planting Trees or Forestation	Antietam Creek	2140502	201552.49	343845.91	0.08
SH16APY001489	Planting Trees or Forestation	Antietam Creek	2140502	201272.63	343761.13	0.08
SH16APY001490	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191560.23	343538.73	0.10
SH16APY001491	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191493.05	343512.60	0.17
SH16APY001492	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191403.04	343476.27	0.22
SH16APY001493	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191097.45	343366.32	0.21
SH16APY001494	Planting Trees or Forestation	Potomac River FR Cnty	2140301	189112.87	342240.91	0.26
SH16APY001495	Planting Trees or Forestation	Potomac River FR Cnty	2140301	188970.22	342189.92	0.04
SH16APY001496	Planting Trees or Forestation	Potomac River FR Cnty	2140301	188934.55	342176.42	0.06
SH16APY001497	Planting Trees or Forestation	Potomac River FR Cnty	2140301	188664.42	342062.70	0.13
SH16APY001498	Planting Trees or Forestation	Potomac River FR Cnty	2140301	187535.21	341488.31	0.30
SH16APY001499	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186332.62	341185.93	0.15
SH16APY001500	Planting Trees or Forestation	Potomac River FR Cnty	2140301	185850.16	341058.04	0.11
SH16APY001501	Planting Trees or Forestation	Potomac River FR Cnty	2140301	185138.71	339791.07	0.24
SH16APY001502	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186694.87	341259.91	0.06
SH16APY001503	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186582.29	341232.59	0.33
SH16APY001504	Planting Trees or Forestation	Potomac River FR Cnty	2140301	187745.22	341523.57	0.16
SH16APY001505	Planting Trees or Forestation	Antietam Creek	2140502	197188.94	342813.74	0.07
SH16APY001506	Planting Trees or Forestation	Antietam Creek	2140502	197097.02	342901.17	0.84
SH16APY001507	Planting Trees or Forestation	Antietam Creek	2140502	198088.07	342726.37	0.23
SH16APY001508	Planting Trees or Forestation	Antietam Creek	2140502	199528.05	343160.70	0.99
SH16APY001509	Planting Trees or Forestation	Antietam Creek	2140502	201451.72	343815.87	0.04
SH16APY001510	Planting Trees or Forestation	Antietam Creek	2140502	199215.95	342982.75	0.13
SH16APY001511	Planting Trees or Forestation	Antietam Creek	2140502	201358.48	343786.51	0.05
SH16APY001512	Planting Trees or Forestation	Antietam Creek	2140502	194605.35	342827.40	0.22
SH16APY001513	Planting Trees or Forestation	Potomac River FR Cnty	2140301	185885.41	341076.43	0.04
SH16APY001514	Planting Trees or Forestation	Marsh Run	2140503	215471.28	336130.07	0.28
SH16APY001515	Planting Trees or Forestation	Marsh Run	2140503	215494.37	335962.04	0.25
SH16APY001516	Planting Trees or Forestation	Antietam Creek	2140502	213143.23	345082.50	0.19
SH16APY001517	Planting Trees or Forestation	Antietam Creek	2140502	212202.12	343793.26	0.63
SH16APY001518	Planting Trees or Forestation	Antietam Creek	2140502	214249.74	343759.38	0.13
SH16APY001519	Planting Trees or Forestation	Antietam Creek	2140502	212910.83	345480.25	0.18
SH16APY001520	Planting Trees or Forestation	Antietam Creek	2140502	214381.60	343597.75	0.11
SH16APY001521	Planting Trees or Forestation	Antietam Creek	2140502	214431.38	343536.54	0.12
SH16APY001522	Planting Trees or Forestation	Antietam Creek	2140502	213317.67	345014.45	0.17
SH16APY001523	Planting Trees or Forestation	Antietam Creek	2140502	214868.67	342252.98	0.14
SH16APY001524	Planting Trees or Forestation	Conococheague Creek	2140504	213681.26	342127.51	0.05
SH16APY001525	Planting Trees or Forestation	Antietam Creek	2140502	196864.49	342981.66	0.13
SH16APY001526	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191209.97	343400.10	0.08
SH16APY001527	Planting Trees or Forestation	Potomac River FR Cnty	2140301	191290.38	343444.83	0.17
SH16APY001528	Planting Trees or Forestation	Potomac River FR Cnty	2140301	189019.43	342207.18	0.13

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-5: FMIS # AT0425182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16APY001529	Planting Trees or Forestation	Antietam Creek	2140502	199280.29	343022.67	0.08
SH16APY001530	Planting Trees or Forestation	Conococheague Creek	2140504	220717.90	335705.19	0.56
SH16APY001531	Planting Trees or Forestation	Potomac River FR Cnty	2140301	192210.68	343672.46	0.09
SH16APY001532	Planting Trees or Forestation	Antietam Creek	2140502	213407.28	344845.46	0.14
					Complete BMP Acreage Total	**19.50**
					BMP Count	**82**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-6: FMIS # AT0445182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST021571	Grass Swale	Baltimore Harbor	2130903	169617.20	431745.51	0.30
SH16RST021575	Grass Swale	Baltimore Harbor	2130903	168421.04	431739.57	0.25
SH16RST021576	Grass Swale	Baltimore Harbor	2130903	165757.49	430672.37	0.97
SH16RST021577	Grass Swale	Baltimore Harbor	2130903	165499.54	430632.39	0.40
SH16RST021579	Grass Swale	Baltimore Harbor	2130903	163399.09	430765.39	1.14
SH16RST021580	Grass Swale	Baltimore Harbor	2130903	163191.05	430787.97	0.56
SH16RST021583	Grass Swale	Baltimore Harbor	2130903	161490.07	431286.72	0.76
SH16RST021584	Grass Swale	Baltimore Harbor	2130903	161300.63	431357.03	0.55
SH16RST021585	Grass Swale	Baltimore Harbor	2130903	161098.56	431439.00	1.06
SH16RST021586	Grass Swale	Baltimore Harbor	2130903	160573.14	431676.27	0.35
SH16RST021587	Grass Swale	Baltimore Harbor	2130903	160459.64	431727.11	0.42
SH16RST021588	Grass Swale	Severn River	2131002	155848.66	431399.00	0.53
SH16RST021591	Grass Swale	Severn River	2131002	155200.08	431095.53	0.60
SH16RST021592	Grass Swale	Severn River	2131002	154236.04	431991.02	0.40
SH16RST021593	Grass Swale	Severn River	2131002	154103.77	432089.95	0.23
SH16RST021617	Grass Swale	Severn River	2131002	155985.29	431579.77	0.55
SH17RST021594	Grass Swale	Severn River	2131002	153813.29	432308.23	0.29
SH17RST021595	Grass Swale	South River	2131003	152591.33	433420.69	0.25
SH17RST021596	Grass Swale	South River	2131003	152084.61	433550.56	0.53
SH17RST021597	Grass Swale	South River	2131003	151799.46	433546.26	0.76
SH17RST021598	Grass Swale	South River	2131003	151620.22	433514.54	0.51
SH17RST021599	Grass Swale	South River	2131003	151394.78	433441.33	0.66
SH17RST021600	Grass Swale	South River	2131003	151192.26	433358.87	0.34
SH17RST021601	Grass Swale	South River	2131003	150992.47	433296.17	0.80
SH17RST021602	Grass Swale	South River	2131003	150769.45	433299.31	0.22
SH17RST021603	Grass Swale	South River	2131003	150577.49	433336.85	0.71
SH17RST021604	Grass Swale	South River	2131003	150348.41	433383.66	0.42
SH17RST021605	Grass Swale	South River	2131003	149745.86	433507.27	0.48
SH17RST021606	Grass Swale	South River	2131003	149213.27	433635.59	0.64
SH17RST021607	Grass Swale	South River	2131003	149055.14	433743.91	0.52
SH17RST021608	Grass Swale	South River	2131003	148836.62	434143.98	0.47
SH17RST021610	Grass Swale	South River	2131003	148618.00	434601.51	0.39
SH17RST021611	Grass Swale	South River	2131003	148475.16	434749.70	0.79
SH17RST021612	Grass Swale	South River	2131003	148326.82	434876.18	0.28
SH17RST021614	Grass Swale	South River	2131003	147954.13	435241.47	0.83
SH17RST021615	Grass Swale	South River	2131003	147853.75	435442.04	0.41
SH17RST021616	Grass Swale	Baltimore Harbor	2130903	160792.95	431577.67	1.30
					Complete BMP Acreage Total	**20.67**
					BMP Count	**37**

Comprehensive List of Restoration Practices By FMIS Contract
Table H-7: FMIS # AT0685282

Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH14APY001630	Planting Trees or Forestation	Bird River	2130803	190452.12	441923.74	0.38
SH15APY000922	Planting Trees or Forestation	Deer Creek	2120202	226640.80	430546.18	1.02
SH15APY000923	Planting Trees or Forestation	Gwynns Falls	2130905	193833.92	418320.72	0.56
SH15APY000924	Planting Trees or Forestation	Gwynns Falls	2130905	193668.82	417762.48	0.18
SH15APY000925	Planting Trees or Forestation	Back River	2130901	180288.55	443065.00	0.22
SH15APY000926	Planting Trees or Forestation	Gwynns Falls	2130905	193016.37	417450.86	0.20
SH15APY000927	Planting Trees or Forestation	Gwynns Falls	2130905	182110.12	421757.02	0.08
SH15APY000928	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	192793.21	439282.71	0.15
SH15APY000929	Planting Trees or Forestation	Gwynns Falls	2130905	190581.64	421003.72	0.11
SH15APY000930	Planting Trees or Forestation	Jones Falls	2130904	193403.19	429020.79	0.34
SH15APY000931	Planting Trees or Forestation	Bird River	2130803	188803.99	449373.25	0.15
SH15APY000932	Planting Trees or Forestation	Back River	2130901	176252.56	446884.29	0.08
SH15APY000933	Planting Trees or Forestation	Back River	2130901	177606.66	446548.13	1.19
SH15APY000934	Planting Trees or Forestation	Bird River	2130803	190475.91	443475.21	0.27
SH15APY000935	Planting Trees or Forestation	Patapsco River L N Br	2130906	172747.00	425814.54	0.12
SH15APY000936	Planting Trees or Forestation	Back River	2130901	184764.58	444417.44	0.22
SH15APY000937	Planting Trees or Forestation	Back River	2130901	183938.97	446220.36	0.15
SH15APY000938	Planting Trees or Forestation	Patapsco River L N Br	2130906	182169.87	418406.39	0.14
SH15APY000939	Planting Trees or Forestation	Gwynns Falls	2130905	182084.40	421318.06	0.14
SH15APY000940	Planting Trees or Forestation	Gwynns Falls	2130905	190921.11	420902.92	0.50
SH15APY000941	Planting Trees or Forestation	Patapsco River L N Br	2130906	182051.89	419697.42	0.02
SH15APY000942	Planting Trees or Forestation	Gwynns Falls	2130905	192415.57	420284.22	0.09
SH15APY000943	Planting Trees or Forestation	Back River	2130901	188133.46	442721.03	0.67
SH15APY000944	Planting Trees or Forestation	Gwynns Falls	2130905	190197.49	421173.58	0.02
SH15APY000945	Planting Trees or Forestation	Bird River	2130803	190516.82	441457.64	0.26
SH15APY000946	Planting Trees or Forestation	Jones Falls	2130904	193292.75	428631.01	0.06
SH15APY000947	Planting Trees or Forestation	Jones Falls	2130904	193055.09	428092.13	0.54
SH15APY000948	Planting Trees or Forestation	Back River	2130901	180863.09	442718.49	0.24
SH15APY000949	Planting Trees or Forestation	Back River	2130901	182994.83	447026.43	0.09
SH15APY000950	Planting Trees or Forestation	Back River	2130901	183216.63	446932.45	0.07
SH15APY000951	Planting Trees or Forestation	Back River	2130901	183345.65	446954.82	0.13
SH15APY000952	Planting Trees or Forestation	Back River	2130901	175069.12	446912.30	0.82
SH15APY000953	Planting Trees or Forestation	Bird River	2130803	189561.42	448955.49	0.10
SH15APY000954	Planting Trees or Forestation	Bird River	2130803	190296.00	445944.64	0.06
SH15APY000955	Planting Trees or Forestation	Back River	2130901	185675.90	443688.72	0.08
SH15APY000956	Planting Trees or Forestation	Gwynns Falls	2130905	182199.49	421952.12	0.26
SH15APY000957	Planting Trees or Forestation	Back River	2130901	189184.38	441764.96	0.78
SH15APY000958	Planting Trees or Forestation	Jones Falls	2130904	191505.69	424863.66	0.13
SH15APY000959	Planting Trees or Forestation	Bird River	2130803	188582.98	449543.00	0.32
SH15APY000960	Planting Trees or Forestation	Gwynns Falls	2130905	191501.32	420459.19	0.12
SH15APY000962	Planting Trees or Forestation	Gwynns Falls	2130905	194087.35	417566.61	0.09
SH15APY000963	Planting Trees or Forestation	Bird River	2130803	190309.75	445847.75	0.07
SH15APY000964	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	193739.37	436356.45	0.10
SH15APY000965	Planting Trees or Forestation	Gwynns Falls	2130905	191507.46	420372.76	0.15
SH15APY000966	Planting Trees or Forestation	Deer Creek	2120202	227323.03	430023.98	0.02
SH15APY000968	Planting Trees or Forestation	Back River	2130901	180992.89	442750.85	0.15
SH15APY000969	Planting Trees or Forestation	Back River	2130901	183092.73	446984.23	0.19
SH15APY000970	Planting Trees or Forestation	Back River	2130901	183012.59	447102.19	0.16
SH15APY000971	Planting Trees or Forestation	Back River	2130901	184845.46	444360.85	0.07
SH15APY000972	Planting Trees or Forestation	Baltimore Harbor	2130903	178849.50	445359.78	0.09
SH15APY000973	Planting Trees or Forestation	Gwynns Falls	2130905	191240.59	420624.60	0.31
SH15APY000974	Planting Trees or Forestation	Back River	2130901	177912.10	446391.10	0.13
SH15APY000975	Planting Trees or Forestation	Back River	2130901	185641.20	443703.07	0.06
SH15APY000976	Planting Trees or Forestation	Back River	2130901	186173.92	445959.58	0.06
SH15APY000977	Planting Trees or Forestation	Jones Falls	2130904	191556.41	424892.15	0.15
SH15APY000978	Planting Trees or Forestation	Gwynns Falls	2130905	197092.69	415286.85	0.78
SH15APY000979	Planting Trees or Forestation	Patapsco River L N Br	2130906	175469.26	427149.04	0.09
SH15APY000980	Planting Trees or Forestation	Gwynns Falls	2130905	182080.47	422165.16	0.06
SH15APY000981	Planting Trees or Forestation	Back River	2130901	179534.31	444375.63	0.13
SH15APY000982	Planting Trees or Forestation	Gwynns Falls	2130905	182070.88	422322.77	0.59
SH15APY000983	Planting Trees or Forestation	Back River	2130901	185101.82	444034.67	0.10
SH15APY000984	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	192862.15	437052.61	0.24
SH15APY000985	Planting Trees or Forestation	Deer Creek	2120202	227921.39	429650.94	0.08
SH15APY000986	Planting Trees or Forestation	Gwynns Falls	2130905	190386.15	421228.37	0.12
SH15APY000987	Planting Trees or Forestation	Back River	2130901	185541.88	443833.96	0.69
SH15APY000988	Planting Trees or Forestation	Gwynns Falls	2130905	191139.24	420721.39	0.28
SH15APY000990	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	193678.24	436358.31	0.04
SH15APY000991	Planting Trees or Forestation	Jones Falls	2130904	191418.64	423921.65	0.06
SH15APY000992	Planting Trees or Forestation	Loch Raven Reservoir	2130805	213937.84	428069.88	0.27
SH15APY000993	Planting Trees or Forestation	Loch Raven Reservoir	2130805	218073.50	428538.93	0.23
SH15APY000994	Planting Trees or Forestation	Loch Raven Reservoir	2130805	193568.46	436075.89	0.85
SH15APY000995	Planting Trees or Forestation	Loch Raven Reservoir	2130805	213813.45	428019.66	0.10
SH15APY000996	Planting Trees or Forestation	Loch Raven Reservoir	2130805	193986.26	434551.55	0.11
SH15APY000997	Planting Trees or Forestation	Loch Raven Reservoir	2130805	217124.34	428551.27	0.19
SH15APY000998	Planting Trees or Forestation	Loch Raven Reservoir	2130805	208732.70	428691.20	0.13
SH15APY001000	Planting Trees or Forestation	Loch Raven Reservoir	2130805	224969.20	430666.39	0.42
SH15APY001002	Planting Trees or Forestation	Loch Raven Reservoir	2130805	217652.95	428342.24	0.15
SH15APY001003	Planting Trees or Forestation	Liberty Reservoir	2130907	200341.86	413986.43	0.12

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-7: FMIS # AT0685282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15APY001004	Planting Trees or Forestation	Loch Raven Reservoir	2130805	201986.56	425170.10	0.09
SH15APY001005	Planting Trees or Forestation	Loch Raven Reservoir	2130805	223864.95	430513.11	0.16
SH15APY001006	Planting Trees or Forestation	Loch Raven Reservoir	2130805	225357.97	430772.51	0.19
SH15APY001007	Planting Trees or Forestation	Loch Raven Reservoir	2130805	221068.70	429728.38	0.09
SH15APY001008	Planting Trees or Forestation	Patapsco River L N Br	2130906	175636.56	427375.93	0.25
SH15APY001009	Planting Trees or Forestation	Gwynns Falls	2130905	182267.99	422182.85	0.10
SH15APY001010	Planting Trees or Forestation	Gwynns Falls	2130905	182167.78	422229.66	0.67
SH15APY001011	Planting Trees or Forestation	Patapsco River L N Br	2130906	182059.60	419754.45	0.08
SH15APY001012	Planting Trees or Forestation	Deer Creek	2120202	227249.50	430060.91	0.19
SH15APY001013	Planting Trees or Forestation	Gwynns Falls	2130905	192336.14	420310.52	0.14
SH15APY001014	Planting Trees or Forestation	Gwynns Falls	2130905	192258.91	420332.16	0.03
SH15APY001015	Planting Trees or Forestation	Gwynns Falls	2130905	190262.62	421164.16	0.16
SH15APY001016	Planting Trees or Forestation	Gwynns Falls	2130905	193949.65	418326.83	0.08
SH16APY001313	Planting Trees or Forestation	Patapsco River L N Br	2130906	175904.06	427671.62	0.21
SH16APY001314	Planting Trees or Forestation	Gwynns Falls	2130905	181963.45	422259.94	0.20
SH16APY001315	Planting Trees or Forestation	Patapsco River L N Br	2130906	172117.48	426003.08	0.12
SH16APY001316	Planting Trees or Forestation	Patapsco River L N Br	2130906	175649.44	427230.22	0.25
SH16APY001317	Planting Trees or Forestation	Gwynns Falls	2130905	190325.68	421249.13	0.09
SH16APY001318	Planting Trees or Forestation	Gwynns Falls	2130905	181736.35	421973.73	0.37
SH16APY001319	Planting Trees or Forestation	Patapsco River L N Br	2130906	175895.77	427460.34	0.30
SH16APY001320	Planting Trees or Forestation	Patapsco River L N Br	2130906	176310.63	427966.16	0.29
SH16APY001321	Planting Trees or Forestation	Patapsco River L N Br	2130906	176172.59	427672.65	0.14
SH16APY001322	Planting Trees or Forestation	Gwynns Falls	2130905	190341.63	421148.72	0.09
SH16APY001323	Planting Trees or Forestation	Patapsco River L N Br	2130906	175871.85	427405.77	0.30
SH16APY001324	Planting Trees or Forestation	Patapsco River L N Br	2130906	175726.48	427655.54	0.27
SH16APY001325	Planting Trees or Forestation	Gwynns Falls	2130905	182056.04	421675.42	0.78
SH16APY001326	Planting Trees or Forestation	Gwynns Falls	2130905	181756.93	422235.60	0.05
SH16APY001327	Planting Trees or Forestation	Patapsco River L N Br	2130906	175808.09	427628.44	0.11
SH16APY001328	Planting Trees or Forestation	Liberty Reservoir	2130907	200892.06	414617.32	0.20
SH16APY001329	Planting Trees or Forestation	Loch Raven Reservoir	2130805	201806.27	425158.57	0.11
SH16APY001330	Planting Trees or Forestation	Loch Raven Reservoir	2130805	202225.41	425169.01	0.10
SH16APY001331	Planting Trees or Forestation	Loch Raven Reservoir	2130805	199976.41	429132.12	0.30
SH16APY001332	Planting Trees or Forestation	Gwynns Falls	2130905	181864.92	422209.61	0.50
SH16APY001333	Planting Trees or Forestation	Gwynns Falls	2130905	181876.86	422321.46	0.51
SH16APY001334	Planting Trees or Forestation	Bird River	2130803	190739.85	443283.19	0.17
SH16APY001335	Planting Trees or Forestation	Bird River	2130803	188924.02	449489.95	0.68
SH16APY001336	Planting Trees or Forestation	Gwynns Falls	2130905	186730.04	421844.00	1.01
SH16APY001337	Planting Trees or Forestation	Jones Falls	2130904	193931.73	429017.75	0.13
SH16APY001338	Planting Trees or Forestation	Jones Falls	2130904	193841.50	428975.04	0.09
SH16APY001339	Planting Trees or Forestation	Jones Falls	2130904	193996.98	428899.81	0.16
SH16APY001340	Planting Trees or Forestation	Back River	2130901	180079.70	443142.54	0.09
SH16APY001341	Planting Trees or Forestation	Back River	2130901	189246.38	442019.39	0.08
SH16APY001342	Planting Trees or Forestation	Bird River	2130803	190674.79	443219.73	0.04
SH16APY001343	Planting Trees or Forestation	Bird River	2130803	191180.24	443717.08	0.14
SH16APY001344	Planting Trees or Forestation	Liberty Reservoir	2130907	200228.36	414034.74	0.25
SH16APY001347	Planting Trees or Forestation	Patapsco River L N Br	2130906	175855.61	427605.39	0.04
SH16APY001597	Planting Trees or Forestation	Back River	2130901	192041.62	438768.55	0.36
SH16APY001602	Planting Trees or Forestation	Deer Creek	2120202	226863.76	430368.93	0.30
SH16APY001603	Planting Trees or Forestation	Deer Creek	2120202	227751.04	429857.02	0.22
SH16APY001604	Planting Trees or Forestation	Patapsco River L N Br	2130906	175757.98	427825.19	0.20
SH16APY001612	Planting Trees or Forestation	Loch Raven Reservoir	2130805	218269.03	428216.28	0.35
					Complete BMP Acreage Total	**30.52**
					BMP Count	**129**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-8: FMIS # AT0685382						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH14APY000815	Planting Trees or Forestation	Deer Creek	2120202	212314.28	468158.46	0.54
SH14APY000816	Planting Trees or Forestation	Swan Creek	2130706	212407.34	468382.65	0.29
SH14APY000817	Planting Trees or Forestation	Lower Susquehanna River	2120201	212028.76	471827.99	0.79
SH14APY000818	Planting Trees or Forestation	Broad Creek	2120205	224509.70	460201.60	0.12
SH14APY000819	Planting Trees or Forestation	Broad Creek	2120205	224926.26	459734.56	0.42
SH14APY000820	Planting Trees or Forestation	Broad Creek	2120205	225006.69	459608.77	0.11
SH14APY000822	Planting Trees or Forestation	Lower Susquehanna River	2120201	212059.95	473632.95	0.28
SH14APY000823	Planting Trees or Forestation	Lower Susquehanna River	2120201	211903.42	471529.53	0.30
SH14APY000824	Planting Trees or Forestation	Broad Creek	2120205	225549.32	458309.87	0.10
SH14APY000825	Planting Trees or Forestation	Broad Creek	2120205	226448.15	456692.30	0.05
SH14APY000826	Planting Trees or Forestation	Lower Susquehanna River	2120201	212200.29	472474.00	0.36
SH14APY000827	Planting Trees or Forestation	Broad Creek	2120205	228195.80	456316.92	0.09
SH14APY000828	Planting Trees or Forestation	Lower Susquehanna River	2120201	211894.11	471287.00	0.38
SH14APY000829	Planting Trees or Forestation	Broad Creek	2120205	225092.61	459424.80	0.03
SH14APY000830	Planting Trees or Forestation	Broad Creek	2120205	225299.45	458938.99	0.10
SH14APY000831	Planting Trees or Forestation	Broad Creek	2120205	225289.10	458923.89	0.22
SH14APY000832	Planting Trees or Forestation	Broad Creek	2120205	225219.31	453773.74	0.57
SH14APY000833	Planting Trees or Forestation	Broad Creek	2120205	227420.98	455941.31	0.11
SH14APY000834	Planting Trees or Forestation	Broad Creek	2120205	224373.62	460420.65	0.05
SH14APY000835	Planting Trees or Forestation	Broad Creek	2120205	223747.24	452571.36	0.07
SH14APY000836	Planting Trees or Forestation	Lower Susquehanna River	2120201	211951.11	471711.50	0.11
SH14APY000837	Planting Trees or Forestation	Broad Creek	2120205	225566.75	458318.48	0.01
SH14APY000840	Planting Trees or Forestation	Broad Creek	2120205	224447.57	453602.70	0.31
SH14APY000842	Planting Trees or Forestation	Broad Creek	2120205	224542.34	460144.42	0.02
SH14APY000843	Planting Trees or Forestation	Broad Creek	2120205	225358.00	458753.56	0.06
SH14APY000844	Planting Trees or Forestation	Broad Creek	2120205	225967.55	457519.16	0.09
SH14APY000846	Planting Trees or Forestation	Broad Creek	2120205	223700.53	452470.47	0.25
SH14APY000847	Planting Trees or Forestation	Broad Creek	2120205	227265.76	455787.30	0.18
SH14APY000848	Planting Trees or Forestation	Lower Susquehanna River	2120201	211946.67	471523.16	0.85
SH14APY000849	Planting Trees or Forestation	Broad Creek	2120205	225079.22	459416.49	0.07
SH14APY000850	Planting Trees or Forestation	Lower Susquehanna River	2120201	212200.52	473199.44	0.28
SH14APY000851	Planting Trees or Forestation	Broad Creek	2120205	223881.94	453116.84	1.61
SH14APY000852	Planting Trees or Forestation	Broad Creek	2120205	225396.08	458680.43	0.05
SH14APY000855	Planting Trees or Forestation	Broad Creek	2120205	224165.97	453520.60	0.61
SH14APY000856	Planting Trees or Forestation	Broad Creek	2120205	225927.34	454086.30	0.05
SH15APY001181	Planting Trees or Forestation	Bynum Run	2130704	211060.38	453631.99	0.09
SH15APY001182	Planting Trees or Forestation	Bynum Run	2130704	209840.89	454617.17	0.24
SH15APY001183	Planting Trees or Forestation	Bynum Run	2130704	210963.59	455446.92	1.32
SH15APY001184	Planting Trees or Forestation	Bush River	2130701	200764.63	465735.75	0.12
SH15APY001185	Planting Trees or Forestation	Bynum Run	2130704	211360.62	455802.86	1.13
SH15APY001186	Planting Trees or Forestation	Little Gunpowder Falls	2130804	206880.33	448201.33	0.15
SH15APY001187	Planting Trees or Forestation	Little Gunpowder Falls	2130804	205939.28	450132.77	0.17
SH15APY001188	Planting Trees or Forestation	Atkisson Reservoir	2130703	205788.24	450423.80	0.13
SH15APY001189	Planting Trees or Forestation	Atkisson Reservoir	2130703	204450.22	451331.55	0.25
SH15APY001190	Planting Trees or Forestation	Bynum Run	2130704	211636.81	455919.00	0.20
SH15APY001191	Planting Trees or Forestation	Lower Winters Run	2130702	196741.69	456562.07	0.33
SH15APY001192	Planting Trees or Forestation	Bush River	2130701	201224.87	465201.14	1.01
SH15APY001193	Planting Trees or Forestation	Swan Creek	2130706	205445.45	472288.06	0.20
SH15APY001194	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207139.33	447732.33	0.35
SH15APY001195	Planting Trees or Forestation	Atkisson Reservoir	2130703	208693.12	444964.15	0.48
SH15APY001196	Planting Trees or Forestation	Atkisson Reservoir	2130703	210794.23	453786.43	0.06
SH15APY001197	Planting Trees or Forestation	Bynum Run	2130704	210965.26	453687.49	0.05
SH15APY001198	Planting Trees or Forestation	Little Gunpowder Falls	2130804	206495.49	448997.21	0.57
SH15APY001199	Planting Trees or Forestation	Lower Winters Run	2130702	197602.92	460339.16	0.23
SH15APY001200	Planting Trees or Forestation	Bush River	2130701	202044.20	465176.79	0.10
SH15APY001201	Planting Trees or Forestation	Atkisson Reservoir	2130703	205844.85	450309.28	0.36
SH15APY001202	Planting Trees or Forestation	Atkisson Reservoir	2130703	210602.02	453891.70	0.04
SH15APY001203	Planting Trees or Forestation	Bynum Run	2130704	212196.59	456534.19	0.15
SH15APY001204	Planting Trees or Forestation	Little Gunpowder Falls	2130804	206989.52	448003.93	0.22
SH15APY001205	Planting Trees or Forestation	Little Gunpowder Falls	2130804	209074.42	444524.26	0.15
SH15APY001206	Planting Trees or Forestation	Bynum Run	2130704	211210.27	453520.07	0.18
SH15APY001208	Planting Trees or Forestation	Deer Creek	2120202	212425.83	456818.64	0.63
SH15APY001209	Planting Trees or Forestation	Bynum Run	2130704	211537.56	455193.18	0.21
SH15APY001210	Planting Trees or Forestation	Atkisson Reservoir	2130703	204566.92	456820.63	0.11
SH15APY001211	Planting Trees or Forestation	Bush River	2130701	202453.36	464206.51	0.12
SH15APY001212	Planting Trees or Forestation	Little Gunpowder Falls	2130804	208932.51	444694.58	0.02
SH15APY001213	Planting Trees or Forestation	Little Gunpowder Falls	2130804	206945.83	448092.10	0.02
SH15APY001214	Planting Trees or Forestation	Atkisson Reservoir	2130703	210726.07	453825.72	0.05
SH15APY001215	Planting Trees or Forestation	Atkisson Reservoir	2130703	206648.86	448678.52	0.12
SH15APY001216	Planting Trees or Forestation	Little Gunpowder Falls	2130804	208122.14	445997.61	0.09
SH15APY001217	Planting Trees or Forestation	Little Gunpowder Falls	2130804	208434.35	445355.55	0.31
SH15APY001218	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207495.11	447107.34	0.05
SH15APY001219	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207313.08	447431.31	0.05
SH15APY001220	Planting Trees or Forestation	Atkisson Reservoir	2130703	206720.77	448533.97	0.12
SH15APY001221	Planting Trees or Forestation	Atkisson Reservoir	2130703	209384.20	444152.76	0.05
SH15APY001222	Planting Trees or Forestation	Atkisson Reservoir	2130703	208783.60	444854.90	0.13
SH15APY001223	Planting Trees or Forestation	Atkisson Reservoir	2130703	210531.34	443120.71	0.13
SH15APY001224	Planting Trees or Forestation	Bynum Run	2130704	211396.01	453354.07	0.16

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-8: FMIS # AT0685382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15APY001226	Planting Trees or Forestation	Bush River	2130701	201972.00	465121.37	0.17
SH15APY001227	Planting Trees or Forestation	Bush River	2130701	201803.20	464992.07	0.53
SH15APY001228	Planting Trees or Forestation	Bush River	2130701	201748.02	464834.62	0.04
SH15APY001229	Planting Trees or Forestation	Atkisson Reservoir	2130703	204498.54	456873.53	0.15
SH16APY001354	Planting Trees or Forestation	Atkisson Reservoir	2130703	212528.80	447517.39	0.40
SH16APY001355	Planting Trees or Forestation	Bynum Run	2130704	211911.68	453981.05	0.39
SH16APY001356	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207910.04	446358.44	0.03
SH16APY001357	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207965.76	446276.69	0.10
SH16APY001359	Planting Trees or Forestation	Bynum Run	2130704	212504.27	452717.08	0.06
SH16APY001360	Planting Trees or Forestation	Bynum Run	2130704	212685.04	452673.46	0.04
SH16APY001361	Planting Trees or Forestation	Atkisson Reservoir	2130703	212016.81	449339.86	0.28
SH16APY001362	Planting Trees or Forestation	Broad Creek	2120205	224196.43	453506.63	0.46
SH16APY001363	Planting Trees or Forestation	Bynum Run	2130704	212611.19	452692.20	0.04
SH16APY001364	Planting Trees or Forestation	Bynum Run	2130704	212560.31	452705.77	0.06
SH16APY001365	Planting Trees or Forestation	Bynum Run	2130704	212226.91	452733.46	0.19
SH16APY001366	Planting Trees or Forestation	Bynum Run	2130704	212110.57	453155.32	0.55
SH16APY001367	Planting Trees or Forestation	Broad Creek	2120205	223839.77	453202.80	0.43
SH16APY001368	Planting Trees or Forestation	Atkisson Reservoir	2130703	211993.26	449632.24	1.78
SH16APY001369	Planting Trees or Forestation	Little Gunpowder Falls	2130804	207899.48	446352.22	0.30
SH16APY001370	Planting Trees or Forestation	Atkisson Reservoir	2130703	211992.49	449469.51	0.51
SH16APY001371	Planting Trees or Forestation	Little Gunpowder Falls	2130804	208006.78	446199.61	0.46
SH16APY001372	Planting Trees or Forestation	Atkisson Reservoir	2130703	211977.83	450691.13	0.85
SH16APY001373	Planting Trees or Forestation	Atkisson Reservoir	2130703	213370.41	445370.05	1.75
SH16APY001374	Planting Trees or Forestation	Atkisson Reservoir	2130703	212030.48	449205.69	0.21
					Complete BMP Acreage Total	**29.96**
					BMP Count	**102**

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Table H-9: FMIS # AT0685482						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16APY001348	Planting Trees or Forestation	Patuxent River lower	2131101	96410.98	419243.08	0.49
SH16APY001264	Planting Trees or Forestation	Patuxent River middle	2131102	122749.91	434853.30	0.16
SH16APY001265	Planting Trees or Forestation	Patuxent River middle	2131102	124426.35	435460.53	0.15
SH16APY001284	Planting Trees or Forestation	Patuxent River middle	2131102	123816.75	433242.24	0.52
SH16APY001275	Planting Trees or Forestation	Patuxent River middle	2131102	126070.70	434856.47	0.05
SH16APY001269	Planting Trees or Forestation	Patuxent River middle	2131102	124162.19	431505.06	0.95
SH16APY001270	Planting Trees or Forestation	Patuxent River middle	2131102	124517.99	430806.19	0.33
SH16APY001266	Planting Trees or Forestation	West River	2131004	135444.74	437395.31	0.12
SH16APY001257	Planting Trees or Forestation	Patuxent River lower	2131101	118692.57	435247.97	0.14
SH16APY001278	Planting Trees or Forestation	Patuxent River lower	2131101	118228.83	435048.27	0.38
SH16APY001287	Planting Trees or Forestation	Patuxent River middle	2131102	123701.55	432868.61	0.51
SH16APY001271	Planting Trees or Forestation	Patuxent River middle	2131102	123718.01	432693.42	0.20
SH16APY001258	Planting Trees or Forestation	South River	2131003	142976.84	430992.11	0.15
SH16APY001272	Planting Trees or Forestation	West River	2131004	135937.70	437470.68	0.24
SH16APY001273	Planting Trees or Forestation	South River	2131003	137710.78	438607.09	0.16
SH16APY001279	Planting Trees or Forestation	South River	2131003	143536.81	430091.68	0.14
SH16APY001280	Planting Trees or Forestation	Patuxent River middle	2131102	123769.73	432478.52	0.08
SH16APY001259	Planting Trees or Forestation	Patuxent River middle	2131102	126901.24	425864.11	0.12
SH16APY001274	Planting Trees or Forestation	Patuxent River middle	2131102	128123.54	434153.01	0.09
SH16APY001267	Planting Trees or Forestation	West Chesapeake Bay	2131005	127335.07	434407.12	0.62
SH16APY001285	Planting Trees or Forestation	West Chesapeake Bay	2131005	127585.47	434326.15	0.27
SH16APY001286	Planting Trees or Forestation	Patuxent River middle	2131102	127121.33	434478.45	0.09
SH16APY001260	Planting Trees or Forestation	Patuxent River middle	2131102	123774.82	432440.80	0.09
SH16APY001276	Planting Trees or Forestation	West Chesapeake Bay	2131005	124449.23	435528.73	0.16
SH16APY001261	Planting Trees or Forestation	West River	2131004	136033.39	437523.02	0.06
SH16APY001283	Planting Trees or Forestation	Patuxent River middle	2131102	125552.05	434847.66	0.46
SH16APY001268	Planting Trees or Forestation	Patuxent River middle	2131102	128052.10	434194.74	0.09
SH16APY001281	Planting Trees or Forestation	Patuxent River middle	2131102	127990.43	434219.32	0.05
SH16APY001262	Planting Trees or Forestation	South River	2131003	137611.83	438556.59	0.23
SH16APY001277	Planting Trees or Forestation	Patuxent River middle	2131102	123748.22	432566.45	0.31
SH16APY001282	Planting Trees or Forestation	Patuxent River middle	2131102	124249.21	435055.57	0.21
SH16APY001349	Planting Trees or Forestation	Mattawoman Creek	2140111	109698.52	410976.96	0.16
SH16APY001289	Planting Trees or Forestation	Patuxent River middle	2131102	125361.64	434849.32	0.19
SH16APY001288	Planting Trees or Forestation	West Chesapeake Bay	2131005	128600.55	433565.15	0.41
SH16APY001576	Planting Trees or Forestation	Patuxent River lower	2131101	97347.06	418272.35	0.10
SH16APY001350	Planting Trees or Forestation	Patuxent River lower	2131101	95721.88	419467.16	0.29
SH16APY001351	Planting Trees or Forestation	Patuxent River lower	2131101	97329.80	418203.34	0.19
SH16APY001303	Planting Trees or Forestation	Severn River	2131002	146356.82	439394.60	0.13
SH16APY001302	Planting Trees or Forestation	Severn River	2131002	149429.79	444224.70	0.06
SH16APY001301	Planting Trees or Forestation	Severn River	2131002	150534.17	445353.99	0.16
SH16APY001300	Planting Trees or Forestation	Severn River	2131002	151222.17	447625.99	0.12
SH16APY001299	Planting Trees or Forestation	Severn River	2131002	150653.99	445704.64	0.22
SH16APY001298	Planting Trees or Forestation	Severn River	2131002	149759.80	443845.90	0.23
SH16APY001297	Planting Trees or Forestation	Severn River	2131002	149601.77	443819.70	0.15
SH16APY001296	Planting Trees or Forestation	Severn River	2131002	149769.72	444082.10	0.14
SH16APY001295	Planting Trees or Forestation	Severn River	2131002	149615.39	444133.95	0.42
SH16APY001294	Planting Trees or Forestation	Severn River	2131002	149795.80	443913.93	0.18
SH16APY001293	Planting Trees or Forestation	Severn River	2131002	149552.19	443857.05	0.08
SH16APY001291	Planting Trees or Forestation	Patuxent River lower	2131101	117780.58	434748.37	0.17
SH16APY001290	Planting Trees or Forestation	Patuxent River middle	2131102	128474.74	433739.15	0.04
SH16APY001306	Planting Trees or Forestation	South River	2131003	145007.65	439847.41	0.15
SH16APY001308	Planting Trees or Forestation	West Chesapeake Bay	2131005	128560.02	433666.34	0.30
SH16APY001309	Planting Trees or Forestation	Patuxent River middle	2131102	128326.29	433988.52	0.16
SH16APY001305	Planting Trees or Forestation	South River	2131003	145130.08	439753.57	0.11
SH16APY001312	Planting Trees or Forestation	Patuxent River middle	2131102	128217.67	434070.03	0.12
SH16APY001311	Planting Trees or Forestation	Patuxent River middle	2131102	128255.88	434038.93	0.03
SH16APY001310	Planting Trees or Forestation	Patuxent River middle	2131102	128277.29	434022.15	0.06
SH16APY001352	Planting Trees or Forestation	Mattawoman Creek	2140111	109836.59	410945.64	0.19
SH16APY001353	Planting Trees or Forestation	Zekiah Swamp	2140108	105536.70	410907.02	0.35
SH16APY001582	Planting Trees or Forestation	Patapsco River L N Br	2130906	172460.08	429384.41	0.46
SH16APY001583	Planting Trees or Forestation	Baltimore Harbor	2130903	170938.51	430885.03	0.14
SH16APY001584	Planting Trees or Forestation	Baltimore Harbor	2130903	170510.68	433275.61	0.04
SH16APY001263	Planting Trees or Forestation	Patuxent River middle	2131102	124314.57	431286.95	0.45
SH16APY001563	Planting Trees or Forestation	West Chesapeake Bay	2131005	120527.08	435297.10	0.09
SH16APY001564	Planting Trees or Forestation	Patuxent River middle	2131102	120875.12	435221.04	0.27
SH16APY001566	Planting Trees or Forestation	Patuxent River middle	2131102	123750.39	433074.90	0.12
SH16APY001552	Planting Trees or Forestation	Patuxent River middle	2131102	123829.12	431943.22	0.12
SH16APY001553	Planting Trees or Forestation	Patuxent River middle	2131102	123840.20	431903.21	0.05
SH16APY001571	Planting Trees or Forestation	Zekiah Swamp	2140108	105839.72	410879.44	0.19
SH16APY001573	Planting Trees or Forestation	Patuxent River lower	2131101	97185.43	418367.85	0.35
SH16APY001575	Planting Trees or Forestation	South River	2131003	137874.28	438684.42	0.02
SH16APY001577	Planting Trees or Forestation	Severn River	2131002	159114.70	426518.67	0.33
SH16APY001569	Planting Trees or Forestation	Severn River	2131002	158260.85	427015.25	0.36
SH16APY001570	Planting Trees or Forestation	Severn River	2131002	155157.90	430916.20	0.46

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-9: FMIS # AT0685482						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16APY001572	Planting Trees or Forestation	Severn River	2131002	151078.59	447386.19	0.21
SH16APY001541	Planting Trees or Forestation	Severn River	2131002	150973.32	447423.22	0.34
SH16APY001542	Planting Trees or Forestation	Patuxent River middle	2131102	126857.89	425905.32	0.24
SH16APY001292	Planting Trees or Forestation	Patuxent River middle	2131102	124367.94	431167.47	0.19
SH16APY001543	Planting Trees or Forestation	Severn River	2131002	156841.52	428128.26	0.59
SH16APY001544	Planting Trees or Forestation	Severn River	2131002	156906.26	427992.67	0.57
SH16APY001545	Planting Trees or Forestation	Patuxent River middle	2131102	124077.35	433787.54	0.07
SH16APY001546	Planting Trees or Forestation	South River	2131003	145911.00	438977.87	0.30
SH16APY003000	Planting Trees or Forestation	Baltimore Harbor	2130903	162943.48	435221.00	0.33
SH16APY001578	Planting Trees or Forestation	Gilbert Swamp	2140107	89554.76	416010.52	0.20
SH16APY001579	Planting Trees or Forestation	Gilbert Swamp	2140107	89695.42	414793.75	0.32
SH16APY001567	Planting Trees or Forestation	South River	2131003	137833.51	438662.68	0.03
SH16APY001568	Planting Trees or Forestation	Nanjemoy Creek	2140110	91277.79	379800.75	0.28
					Complete BMP Acreage Total	**19.65**
					BMP Count	**87**

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Table H-10: FMIS # AT0685582						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15APY001055	Planting Trees or Forestation	Back Creek	2130604	206726.42	501747.58	0.14
SH15APY001056	Planting Trees or Forestation	Back Creek	2130604	206734.55	501685.98	0.17
SH15APY001057	Planting Trees or Forestation	Octoraro Creek	2120203	228531.03	483112.68	0.47
SH15APY001058	Planting Trees or Forestation	Octoraro Creek	2120203	227725.25	481857.22	0.31
SH15APY001059	Planting Trees or Forestation	Octoraro Creek	2120203	218587.09	479092.30	0.07
SH15APY001060	Planting Trees or Forestation	Little Elk Creek	2130605	221852.10	498242.42	0.43
SH15APY001061	Planting Trees or Forestation	Little Elk Creek	2130605	221638.98	498306.27	0.18
SH15APY001062	Planting Trees or Forestation	Little Elk Creek	2130605	226538.82	495754.05	0.04
SH15APY001063	Planting Trees or Forestation	Little Elk Creek	2130605	221568.57	498345.89	0.12
SH15APY001064	Planting Trees or Forestation	Northeast River	2130608	218083.34	490024.49	0.03
SH15APY001065	Planting Trees or Forestation	Northeast River	2130608	218058.23	490033.27	0.05
SH15APY001066	Planting Trees or Forestation	Octoraro Creek	2120203	227801.41	482072.58	0.07
SH15APY001067	Planting Trees or Forestation	Octoraro Creek	2120203	227760.58	482091.77	0.13
SH15APY001068	Planting Trees or Forestation	Little Elk Creek	2130605	221119.42	498654.41	0.05
SH15APY001069	Planting Trees or Forestation	Northeast River	2130608	222862.01	489396.60	0.17
SH15APY001070	Planting Trees or Forestation	Northeast River	2130608	222930.57	489357.85	0.04
SH15APY001071	Planting Trees or Forestation	Octoraro Creek	2120203	227108.34	479907.23	0.24
SH15APY001072	Planting Trees or Forestation	Octoraro Creek	2120203	227641.88	481771.42	0.54
SH15APY001073	Planting Trees or Forestation	Octoraro Creek	2120203	223442.31	479494.56	0.10
SH15APY001074	Planting Trees or Forestation	Octoraro Creek	2120203	225579.56	477847.19	0.38
SH15APY001075	Planting Trees or Forestation	Little Elk Creek	2130605	225988.09	494356.59	0.34
SH15APY001076	Planting Trees or Forestation	Little Elk Creek	2130605	221485.38	498410.62	0.24
SH15APY001077	Planting Trees or Forestation	Little Elk Creek	2130605	220973.59	498704.29	0.13
SH15APY001078	Planting Trees or Forestation	Little Elk Creek	2130605	216615.46	498821.34	0.13
SH15APY001079	Planting Trees or Forestation	Octoraro Creek	2120203	222906.97	479468.21	0.16
SH15APY001080	Planting Trees or Forestation	Little Elk Creek	2130605	222082.69	498232.05	0.01
SH15APY001081	Planting Trees or Forestation	Northeast River	2130608	217953.97	490057.55	0.21
SH15APY001082	Planting Trees or Forestation	Octoraro Creek	2120203	218692.03	479202.28	0.04
SH15APY001083	Planting Trees or Forestation	Octoraro Creek	2120203	218431.94	478936.38	0.09
SH15APY001084	Planting Trees or Forestation	Octoraro Creek	2120203	227129.02	480246.58	0.30
SH15APY001085	Planting Trees or Forestation	Octoraro Creek	2120203	225687.35	477971.38	0.07
SH15APY001086	Planting Trees or Forestation	Octoraro Creek	2120203	228454.64	483044.24	0.34
SH15APY001087	Planting Trees or Forestation	Northeast River	2130608	220083.35	495083.28	0.31
SH15APY001088	Planting Trees or Forestation	Northeast River	2130608	219241.43	489994.65	2.47
					Complete BMP Acreage Total	**8.57**
					BMP Count	**34**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-11: FMIS # AT0865182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST150021	Wet Pond - Wetland	Rock Creek	2140206	160507.76	393500.69	3.61
SH16RST150023	Wet Pond - Wetland	Anacostia River	2140205	161792.04	393727.25	7.46
SH16RST150026	Wet Pond - Wetland	Cabin John Creek	2140207	154321.19	386751.45	2.47
SH16RST150029	Wet Pond - Wetland	Cabin John Creek	2140207	154172.08	386587.08	1.11
SH16RST150342	Wet Pond - Wetland	Rock Creek	2140206	160128.28	393188.53	2.77
SH16RST150343	Wet Pond - Wetland	Rock Creek	2140206	160328.59	393480.09	2.49
SH16RST160101	Wet Pond - Wetland	Anacostia River	2140205	132813.54	408582.64	5.68
SH16RST160170	Sand Filter	Patuxent River upper	2131104	158886.89	413133.26	0.13
SH16RST160171	Sand Filter	Patuxent River upper	2131104	158942.58	413179.94	0.07
SH16RST160189	Sand Filter	Piscataway Creek	2140203	121223.53	410451.60	0.50
SH16RST160190	Sand Filter	Piscataway Creek	2140203	119758.58	410493.58	0.21
SH16RST160210	Wet Pond - Wetland	Western Branch	2131103	142074.86	413805.95	1.90
SH16RST160702	Wet Pond - Wetland	Anacostia River	2140205	147483.15	408515.21	2.36
SH18RST160737	Wet Pond - Wetland	Piscataway Creek	2140203	122199.49	410123.85	25.30
					Complete BMP Acreage Total	**56.06**
					BMP Count	**14**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-12: FMIS # AT0875182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST020090	Wet Pond - Wetland	Severn River	2131002	155529.16	430566.81	0.76
SH16RST020163	Wet Pond - Wetland	South River	2131003	149355.98	433629.39	1.52
SH16RST020221	Wet Pond - Wetland	Severn River	2131002	153637.30	432492.82	0.73
SH16RST020252	Wet Pond - Wetland	South River	2131003	146510.08	438730.38	3.41
SH16RST020262	Wet Pond - Wetland	South River	2131003	146277.05	439107.18	6.18
SH16RST020266	Wet Pond - Wetland	South River	2131003	146243.11	438968.32	1.14
SH16RST020269	Wet Pond - Wetland	South River	2131003	146311.34	438355.84	19.52
SH16RST020337	Extended Detention - Wetland	Patuxent River middle	2131102	126163.71	427008.74	1.54
SH16RST020438	Wet Pond - Wetland	Severn River	2131002	154974.35	431285.78	10.17
SH16RST020547	Wet Pond - Wetland	Baltimore Harbor	2130903	162247.60	430927.95	18.70
SH18RST020525	Infiltration Basin	South River	2131003	145235.28	439310.86	1.10
					Complete BMP Acreage Total	**64.77**
					BMP Count	**11**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-13: FMIS # AT0875282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST020232	Wet Pond - Wetland	Baltimore Harbor	2130903	166889.23	430950.77	6.03
					Complete BMP Acreage Total	**6.03**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-14: FMIS # AT0885182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST100299	Bio-Swale	Upper Monocacy River	2140303	200206.76	365434.87	0.72
SH16RST100300	Bio-Swale	Upper Monocacy River	2140303	200543.32	365535.83	0.73
SH16RST100301	Bio-Swale	Upper Monocacy River	2140303	200793.40	365655.99	0.87
SH16RST100302	Micro-Bioretention	Upper Monocacy River	2140303	200988.73	365750.17	0.33
SH16RST100303	Micro-Bioretention	Upper Monocacy River	2140303	201009.51	365757.46	0.49
SH16RST100304	Bio-Swale	Upper Monocacy River	2140303	201176.71	365812.34	0.80
SH16RST100305	Micro-Bioretention	Upper Monocacy River	2140303	201659.54	365858.88	1.71
SH16RST100306	Bio-Swale	Upper Monocacy River	2140303	202272.79	365772.85	0.92
SH16RST100309	Bio-Swale	Upper Monocacy River	2140303	203105.06	365745.77	0.32
SH16RST100310	Bio-Swale	Upper Monocacy River	2140303	203719.34	365631.06	1.54
SH16RST100311	Bio-Swale	Upper Monocacy River	2140303	204140.12	365407.05	0.40
SH16RST100312	Bio-Swale	Upper Monocacy River	2140303	204428.46	365220.57	0.44
SH16RST100313	Bio-Swale	Upper Monocacy River	2140303	204591.86	365111.42	0.40
SH16RST100314	Bio-Swale	Upper Monocacy River	2140303	204760.24	365001.66	0.42
SH16RST100315	Bio-Swale	Upper Monocacy River	2140303	204930.84	364890.60	0.33
SH16RST100316	Bio-Swale	Upper Monocacy River	2140303	205089.04	364787.11	0.45
SH16RST100319	Bio-Swale	Lower Monocacy River	2140302	192800.98	367365.83	0.24
SH16RST100320	Bio-Swale	Lower Monocacy River	2140302	192635.00	367756.54	0.32
SH16RST100321	Bio-Swale	Lower Monocacy River	2140302	192534.48	367991.41	0.27
SH16RST100322	Bio-Swale	Lower Monocacy River	2140302	192158.44	368728.81	0.31
SH16RST100323	Bio-Swale	Lower Monocacy River	2140302	192122.92	369225.82	0.62
SH16RST100324	Bio-Swale	Lower Monocacy River	2140302	192126.25	369458.11	0.33
SH16RST100325	Bio-Swale	Lower Monocacy River	2140302	192128.38	369623.76	0.36
SH16RST100326	Bio-Swale	Lower Monocacy River	2140302	192129.66	369734.24	0.68
SH16RST100327	Bio-Swale	Lower Monocacy River	2140302	192114.67	369951.18	0.41
SH16RST100328	Bio-Swale	Lower Monocacy River	2140302	192090.87	370129.39	0.59
SH16RST100329	Bio-Swale	Lower Monocacy River	2140302	192053.42	370383.61	0.58
SH16RST100330	Bio-Swale	Lower Monocacy River	2140302	192009.34	370656.26	0.68
SH16RST100331	Bio-Swale	Lower Monocacy River	2140302	191941.07	370916.99	0.65
SH16RST100332	Bio-Swale	Lower Monocacy River	2140302	191863.47	371166.22	0.53
SH16RST100333	Bio-Swale	Lower Monocacy River	2140302	191797.61	371369.28	0.71
SH16RST100334	Bio-Swale	Lower Monocacy River	2140302	191731.04	371583.78	0.46
SH16RST100335	Bio-Swale	Lower Monocacy River	2140302	191658.07	371808.73	0.81
SH15RST130544	Bio-Swale	Little Patuxent River	2131105	166058.41	414372.10	0.31
SH15RST130546	Bio-Swale	Little Patuxent River	2131105	164436.07	415332.70	0.49
SH15RST130549	Bio-Swale	Little Patuxent River	2131105	163739.21	415817.36	0.95
SH15RST130551	Bio-Swale	Little Patuxent River	2131105	163577.72	416022.22	0.38
SH15RST130552	Bio-Swale	Little Patuxent River	2131105	162955.29	416847.12	0.20
SH15RST130555	Bio-Swale	Middle Patuxent River	2131106	168280.54	410582.88	0.64
SH15RST130557	Bio-Swale	Middle Patuxent River	2131106	170929.03	405252.66	0.29
SH15RST130559	Bio-Swale	Middle Patuxent River	2131106	170802.94	405443.37	1.11
SH15RST130561	Bio-Swale	Middle Patuxent River	2131106	169577.03	407049.58	0.54
SH15RST130562	Bio-Swale	Middle Patuxent River	2131106	169540.01	407156.21	0.05
SH15RST130563	Bio-Swale	Middle Patuxent River	2131106	169533.07	407176.15	0.12
SH15RST130564	Bio-Swale	Middle Patuxent River	2131106	169201.33	407949.92	0.70
SH15RST130566	Bio-Swale	Middle Patuxent River	2131106	168800.72	408490.03	0.19
SH15RST130568	Bio-Swale	Little Patuxent River	2131105	167127.02	413088.88	0.12
SH15RST130569	Bio-Swale	Little Patuxent River	2131105	167167.63	413131.81	0.37
SH15RST130570	Bio-Swale	Little Patuxent River	2131105	166686.68	413769.28	0.30
SH15RST130571	Bio-Swale	Little Patuxent River	2131105	167717.85	411903.93	0.39
SH15RST130572	Bio-Swale	Little Patuxent River	2131105	167356.96	412589.27	0.44
SH15RST130573	Bio-Swale	Little Patuxent River	2131105	167300.11	412709.56	0.20
SH15RST130574	Bio-Swale	Little Patuxent River	2131105	167257.06	412802.04	0.20
SH15RST130575	Bio-Swale	Little Patuxent River	2131105	167194.37	412940.30	0.20
SH15RST130576	Bio-Swale	Little Patuxent River	2131105	167401.76	412619.98	0.36
SH15RST130577	Bio-Swale	Little Patuxent River	2131105	167534.16	412331.54	0.31
SH16RST130619	Bio-Swale	Little Patuxent River	2131105	174653.91	415973.60	0.57
SH16RST130620	Bio-Swale	Little Patuxent River	2131105	173822.69	416132.87	0.31
SH16RST130621	Bio-Swale	Patapsco River L N Br	2130906	172649.02	417090.61	0.47
SH16RST130622	Bio-Swale	Patapsco River L N Br	2130906	172624.90	417183.46	0.29
SH16RST130623	Bio-Swale	Patapsco River L N Br	2130906	172541.40	417473.10	0.39
SH16RST130624	Bio-Swale	Patapsco River L N Br	2130906	171226.26	417921.02	0.30
SH16RST130625	Bio-Swale	Patapsco River L N Br	2130906	171105.17	418896.81	0.16
SH16RST130627	Bio-Swale	Patapsco River L N Br	2130906	170286.93	419819.05	0.49
SH16RST130628	Bio-Swale	Patapsco River L N Br	2130906	170120.36	419969.29	0.31
SH16RST130629	Bio-Swale	Patapsco River L N Br	2130906	169716.09	420338.72	0.47
SH16RST130630	Bio-Swale	Patapsco River L N Br	2130906	169488.10	420545.38	0.49
SH16RST130631	Bio-Swale	Patapsco River L N Br	2130906	168362.08	421893.95	0.11
SH16RST130632	Bio-Swale	Patapsco River L N Br	2130906	168284.53	422009.43	0.29
					Complete BMP Acreage Total	**32.93**
					BMP Count	**69**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-15: FMIS # AT0895182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST080780	Bio-Swale	Port Tobacco River	2140109	90626.90	401018.91	0.96
SH16RST021223	Micro-Bioretention	Severn River	2131002	151951.44	442565.41	0.58
SH16RST021225	Micro-Bioretention	Severn River	2131002	151842.98	442635.18	0.56
SH16RST021232	Bio-Swale	Magothy River	2131001	152368.51	442296.81	0.28
SH16RST021237	Micro-Bioretention	Severn River	2131002	151655.89	442755.63	0.29
SH16RST021238	Bio-Swale	Severn River	2131002	151492.57	442860.99	0.67
SH16RST021239	Bio-Swale	Severn River	2131002	151179.48	443062.63	0.46
SH16RST021240	Micro-Bioretention	Severn River	2131002	150944.66	443213.16	0.46
SH16RST021241	Bio-Swale	Severn River	2131002	150506.45	443494.55	0.65
SH16RST021244	Bio-Swale	Severn River	2131002	150219.44	443679.98	0.33
SH16RST080750	Bio-Swale	Potomac River L tidal	2140101	85092.62	402219.12	0.83
SH16RST080756	Bio-Swale	Zekiah Swamp	2140108	86048.08	401514.01	0.67
SH16RST080758	Bio-Swale	Zekiah Swamp	2140108	86385.84	401264.63	0.43
SH16RST080760	Bio-Swale	Zekiah Swamp	2140108	86689.14	401055.08	1.14
SH16RST080764	Bio-Swale	Potomac River L tidal	2140101	84679.97	402521.97	0.48
SH16RST080767	Bio-Swale	Port Tobacco River	2140109	88653.78	400832.48	0.26
SH16RST080772	Bio-Swale	Port Tobacco River	2140109	89210.79	400886.39	0.50
SH16RST080777	Bio-Swale	Port Tobacco River	2140109	89988.54	400961.02	0.82
SH16RST080785	Bio-Swale	Port Tobacco River	2140109	91280.50	401082.23	0.37
SH16RST080786	Bio-Swale	Port Tobacco River	2140109	91426.59	401095.18	0.32
SH16RST080788	Bio-Swale	Port Tobacco River	2140109	91784.39	401130.09	0.37
SH16RST080796	Bio-Swale	Port Tobacco River	2140109	93816.90	401482.79	0.25
SH16RST080797	Bio-Swale	Port Tobacco River	2140109	93982.79	401516.93	0.44
SH16RST021222	Bio-Swale	Magothy River	2131001	154321.36	440996.88	0.79
					Complete BMP Acreage Total	**12.91**
					BMP Count	**24**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-16: FMIS # AT4285282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17APY001539	Impervious Surface Elimination	Lower Monocacy River	2140302	192187.83	368667.34	0.69
SH17APY001538	Impervious Surface Elimination	S Branch Patapsco	2130908	197771.27	394907.80	0.13
SH17APY001537	Impervious Surface Elimination	Double Pipe Creek	2140304	221259.12	409167.77	0.06
SH17APY001536	Impervious Surface Elimination	Upper Monocacy River	2140303	222609.85	386271.20	0.14
SH17APY001535	Impervious Surface Elimination	Lower Monocacy River	2140302	192986.16	362360.19	0.07
SH17APY001534	Impervious Surface Elimination	Lower Monocacy River	2140302	194031.21	362626.21	0.47
SH17APY001533	Impervious Surface Elimination	Little Patuxent River	2131105	167125.75	418273.00	0.17
SH17APY001540	Impervious Surface Elimination	Catoctin Creek	2140305	193908.41	349928.54	0.11
					Complete BMP Acreage Total	**1.84**
					BMP Count	**8**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-17: FMIS # AT5025182						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH12APY000377	Planting Trees or Forestation	Gwynns Falls	2130905	189738.21	421512.25	0.20
SH12APY000378	Planting Trees or Forestation	Gwynns Falls	2130905	191043.02	420587.98	2.95
SH12APY000379	Planting Trees or Forestation	Gwynns Falls	2130905	190716.34	420913.85	1.29
SH12APY000380	Planting Trees or Forestation	Deer Creek	2120202	227917.26	429596.38	0.43
SH12APY000381	Planting Trees or Forestation	Loch Raven Reservoir	2130805	226299.14	430322.22	0.35
SH12APY000382	Planting Trees or Forestation	Loch Raven Reservoir	2130805	202825.56	428690.11	0.22
SH12APY000383	Planting Trees or Forestation	Jones Falls	2130904	196715.81	431438.74	0.11
SH12APY000384	Planting Trees or Forestation	Loch Raven Reservoir	2130805	209005.39	428581.27	0.55
SH12APY000385	Planting Trees or Forestation	Loch Raven Reservoir	2130805	215127.54	429303.11	0.24
SH12APY000386	Planting Trees or Forestation	Loch Raven Reservoir	2130805	216353.56	428932.89	0.12
SH12APY000387	Planting Trees or Forestation	Loch Raven Reservoir	2130805	217669.73	428414.01	0.62
SH12APY000388	Planting Trees or Forestation	Loch Raven Reservoir	2130805	220512.55	429100.80	0.17
SH12APY000389	Planting Trees or Forestation	Loch Raven Reservoir	2130805	221734.26	430109.44	0.13
SH12APY000390	Planting Trees or Forestation	Loch Raven Reservoir	2130805	222563.25	430377.69	0.47
SH12APY000391	Planting Trees or Forestation	Loch Raven Reservoir	2130805	222753.76	430441.40	0.10
SH12APY000392	Planting Trees or Forestation	Loch Raven Reservoir	2130805	223069.90	430525.42	0.10
SH12APY000393	Planting Trees or Forestation	Loch Raven Reservoir	2130805	223810.00	430441.81	0.32
SH12APY000394	Planting Trees or Forestation	Deer Creek	2120202	226922.79	430252.09	0.49
SH12APY000395	Planting Trees or Forestation	Loch Raven Reservoir	2130805	226249.92	430541.02	0.93
SH12APY000396	Planting Trees or Forestation	Deer Creek	2120202	227930.95	429809.39	0.19
SH12APY000397	Planting Trees or Forestation	Loch Raven Reservoir	2130805	206536.19	429173.12	0.31
SH12APY000399	Planting Trees or Forestation	Gwynns Falls	2130905	189702.79	421850.94	0.38
SH12APY000401	Planting Trees or Forestation	Jones Falls	2130904	192005.35	426657.76	0.14
SH12APY000402	Planting Trees or Forestation	Gwynns Falls	2130905	190668.81	422807.55	0.28
SH12APY000403	Planting Trees or Forestation	Gwynns Falls	2130905	190608.81	422860.33	0.28
SH12APY000404	Planting Trees or Forestation	Loch Raven Reservoir	2130805	198600.86	430273.63	0.15
SH12APY000405	Planting Trees or Forestation	Loch Raven Reservoir	2130805	200658.88	429561.64	0.10
SH12APY000406	Planting Trees or Forestation	Loch Raven Reservoir	2130805	200722.54	429537.39	0.04
SH12APY000407	Planting Trees or Forestation	Loch Raven Reservoir	2130805	199749.76	429215.12	0.34
SH12APY000408	Planting Trees or Forestation	Loch Raven Reservoir	2130805	200300.17	429169.19	0.05
SH12APY000409	Planting Trees or Forestation	Loch Raven Reservoir	2130805	200180.58	429128.13	0.03
SH13APY000532	Planting Trees or Forestation	Gwynns Falls	2130905	196209.54	415835.44	0.24
SH13APY000533	Planting Trees or Forestation	Gwynns Falls	2130905	189828.49	421486.36	0.33
SH13APY000534	Planting Trees or Forestation	Gwynns Falls	2130905	190046.13	421401.51	1.41
SH13APY000535	Planting Trees or Forestation	Gwynns Falls	2130905	191212.96	420619.99	0.59
SH13APY000536	Planting Trees or Forestation	Gwynns Falls	2130905	192938.75	419968.26	0.26
SH13APY000538	Planting Trees or Forestation	Gwynns Falls	2130905	193519.65	418592.96	0.13
SH13APY000539	Planting Trees or Forestation	Gwynns Falls	2130905	193759.59	418149.25	0.50
SH13APY000540	Planting Trees or Forestation	Gwynns Falls	2130905	193981.80	417819.58	0.18
SH13APY000541	Planting Trees or Forestation	Gwynns Falls	2130905	196893.18	415400.89	0.19
SH13APY000542	Planting Trees or Forestation	Gwynns Falls	2130905	196929.96	415354.54	0.09
SH13APY000543	Planting Trees or Forestation	Gwynns Falls	2130905	197943.72	414700.50	0.27
SH13APY000544	Planting Trees or Forestation	Gwynns Falls	2130905	193590.69	417957.14	0.64
SH13APY000545	Planting Trees or Forestation	Loch Raven Reservoir	2130805	203231.80	428539.09	0.29
SH13APY000546	Planting Trees or Forestation	Back River	2130901	183761.83	444286.18	0.24
SH13APY000547	Planting Trees or Forestation	Back River	2130901	180892.34	442753.00	0.30
SH13APY000548	Planting Trees or Forestation	Back River	2130901	180804.53	442865.56	0.12
SH13APY000549	Planting Trees or Forestation	Back River	2130901	180320.41	442934.48	0.15
SH13APY000550	Planting Trees or Forestation	Back River	2130901	180230.42	442915.35	0.27
SH13APY000551	Planting Trees or Forestation	Back River	2130901	179913.83	443411.01	0.28
SH13APY000552	Planting Trees or Forestation	Back River	2130901	180009.93	443427.23	0.18
SH13APY000553	Planting Trees or Forestation	Back River	2130901	179840.69	443670.94	0.80
SH13APY000554	Planting Trees or Forestation	Back River	2130901	179536.88	444086.02	0.16
SH13APY000555	Planting Trees or Forestation	Baltimore Harbor	2130903	178821.12	445480.10	0.11
SH13APY000556	Planting Trees or Forestation	Back River	2130901	179095.80	445420.70	0.22
SH13APY000557	Planting Trees or Forestation	Back River	2130901	178852.53	445579.33	0.63
SH13APY000558	Planting Trees or Forestation	Baltimore Harbor	2130903	178215.13	446122.06	0.11
SH13APY000559	Planting Trees or Forestation	Back River	2130901	177617.34	446445.58	0.11
SH13APY000560	Planting Trees or Forestation	Back River	2130901	177837.06	446441.90	0.22
SH13APY000561	Planting Trees or Forestation	Back River	2130901	176483.68	446843.90	0.11
SH13APY000562	Planting Trees or Forestation	Back River	2130901	176366.65	446744.38	0.17
SH13APY000563	Planting Trees or Forestation	Back River	2130901	175530.46	447055.18	0.27
SH13APY000564	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	192587.53	437459.90	0.19
SH13APY000565	Planting Trees or Forestation	Back River	2130901	192135.55	438791.08	0.72
SH13APY000566	Planting Trees or Forestation	Loch Raven Reservoir	2130805	193879.48	434489.05	0.28
SH13APY000567	Planting Trees or Forestation	Back River	2130901	192220.34	438728.20	0.42
SH13APY000568	Planting Trees or Forestation	Jones Falls	2130904	194667.49	430854.07	0.64
SH13APY000569	Planting Trees or Forestation	Gwynns Falls	2130905	182884.62	422059.21	0.25
SH13APY000570	Planting Trees or Forestation	Back River	2130901	192069.90	439052.11	0.11
SH13APY000571	Planting Trees or Forestation	Back River	2130901	192146.75	438973.25	0.24
SH13APY000572	Planting Trees or Forestation	Gwynns Falls	2130905	182687.16	421913.65	0.41
SH13APY000573	Planting Trees or Forestation	Loch Raven Reservoir	2130805	194072.62	433293.92	0.19
SH13APY000575	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	193645.49	436222.87	0.24
SH13APY000576	Planting Trees or Forestation	Back River	2130901	183543.42	446714.43	0.11
SH13APY000577	Planting Trees or Forestation	Back River	2130901	183594.90	446796.49	0.14
SH13APY000578	Planting Trees or Forestation	Back River	2130901	183370.65	446779.49	0.73
SH13APY000579	Planting Trees or Forestation	Back River	2130901	181229.51	442831.21	0.30
SH13APY000580	Planting Trees or Forestation	Back River	2130901	180690.22	441484.36	0.36

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-17: FMIS # AT5025182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13APY000581	Planting Trees or Forestation	Back River	2130901	180685.23	441800.96	0.26
SH13APY000582	Planting Trees or Forestation	Back River	2130901	180639.32	441624.23	0.19
SH13APY000583	Planting Trees or Forestation	Back River	2130901	180755.50	441655.45	0.31
SH13APY000584	Planting Trees or Forestation	Back River	2130901	184952.39	444150.40	0.11
SH13APY000585	Planting Trees or Forestation	Back River	2130901	185172.35	444091.51	0.16
SH13APY000586	Planting Trees or Forestation	Back River	2130901	185106.13	444158.37	0.31
SH13APY000587	Planting Trees or Forestation	Back River	2130901	178989.79	445563.68	0.12
SH13APY000588	Planting Trees or Forestation	Back River	2130901	179005.31	445378.93	0.29
SH13APY000589	Planting Trees or Forestation	Back River	2130901	178666.23	449508.98	0.83
SH13APY000590	Planting Trees or Forestation	Gwynns Falls	2130905	182146.65	421897.24	1.55
SH13APY000591	Planting Trees or Forestation	Back River	2130901	178871.98	445522.20	0.23
SH13APY000592	Planting Trees or Forestation	Back River	2130901	179017.07	445395.66	0.06
SH13APY000593	Planting Trees or Forestation	Back River	2130901	177859.23	446416.95	0.01
SH13APY000635	Planting Trees or Forestation	Lower Winters Run	2130702	195167.44	459431.23	0.25
SH13APY000636	Planting Trees or Forestation	Gunpowder River	2130801	194958.22	459435.42	0.07
SH13APY000637	Planting Trees or Forestation	Atkisson Reservoir	2130703	206169.90	454066.60	0.34
SH13APY000638	Planting Trees or Forestation	Atkisson Reservoir	2130703	207954.72	454286.30	0.40
SH13APY000639	Planting Trees or Forestation	Bynum Run	2130704	209468.61	454320.79	0.41
SH13APY000640	Planting Trees or Forestation	Bynum Run	2130704	209723.00	454382.47	0.26
SH13APY000641	Planting Trees or Forestation	Bynum Run	2130704	209795.54	454432.74	0.18
SH13APY000642	Planting Trees or Forestation	Bynum Run	2130704	209904.81	454449.64	0.52
SH13APY000643	Planting Trees or Forestation	Bynum Run	2130704	210014.19	454546.57	1.28
SH13APY000644	Planting Trees or Forestation	Bynum Run	2130704	209952.15	454407.44	0.29
SH13APY000645	Planting Trees or Forestation	Conowingo Dam	2120204	220449.35	468578.02	0.23
SH13APY000646	Planting Trees or Forestation	Little Gunpowder Falls	2130804	203624.30	451627.76	0.25
SH13APY000647	Planting Trees or Forestation	Atkisson Reservoir	2130703	208120.08	454212.64	0.39
SH13APY000648	Planting Trees or Forestation	Lower Winters Run	2130702	195047.60	459414.77	0.04
SH13APY001581	Planting Trees or Forestation	Lower Winters Run	2130702	195304.08	459410.31	0.40
SH12APY003000	Planting Trees or Forestation	Back River	2130901	178888.10	445652.86	0.13
SH12APY003001	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	192833.63	436942.90	0.24
SH12APY003002	Planting Trees or Forestation	Back River	2130901	175191.06	446908.15	1.07
SH13APY003000	Planting Trees or Forestation	Gwynns Falls	2130905	191272.34	420650.67	0.72
SH12APY003003	Planting Trees or Forestation	Back River	2130901	175096.25	446786.37	0.03
					Complete BMP Acreage Total	**38.91**
					BMP Count	**111**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-18: FMIS # AT5025282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13APY000595	Planting Trees or Forestation	Double Pipe Creek	2140304	211801.74	398716.56	0.30
SH13APY000596	Planting Trees or Forestation	Double Pipe Creek	2140304	210097.18	397193.60	0.23
SH13APY000597	Planting Trees or Forestation	Double Pipe Creek	2140304	209833.42	396499.61	0.27
SH13APY000598	Planting Trees or Forestation	Double Pipe Creek	2140304	208482.88	391820.20	0.26
SH13APY000599	Planting Trees or Forestation	Double Pipe Creek	2140304	214575.46	395950.34	0.72
SH13APY000600	Planting Trees or Forestation	Double Pipe Creek	2140304	215067.52	395151.77	0.90
SH13APY000601	Planting Trees or Forestation	S Branch Patapsco	2130908	190150.25	387650.95	0.06
SH13APY000602	Planting Trees or Forestation	S Branch Patapsco	2130908	189194.05	387383.30	0.20
SH13APY000603	Planting Trees or Forestation	S Branch Patapsco	2130908	188563.50	386660.77	0.09
SH13APY000604	Planting Trees or Forestation	S Branch Patapsco	2130908	188386.60	402923.27	0.16
SH13APY000605	Planting Trees or Forestation	Double Pipe Creek	2140304	212963.81	399243.66	0.38
SH13APY000606	Planting Trees or Forestation	Double Pipe Creek	2140304	212174.50	399041.92	0.17
SH13APY000607	Planting Trees or Forestation	Double Pipe Creek	2140304	211906.79	398829.53	0.05
SH13APY000608	Planting Trees or Forestation	Double Pipe Creek	2140304	211206.47	398318.34	0.14
SH13APY000609	Planting Trees or Forestation	Double Pipe Creek	2140304	211637.01	398587.79	0.18
SH13APY000610	Planting Trees or Forestation	Double Pipe Creek	2140304	211424.81	398462.21	0.14
SH13APY000611	Planting Trees or Forestation	Double Pipe Creek	2140304	209932.55	396773.70	0.01
SH13APY000612	Planting Trees or Forestation	Double Pipe Creek	2140304	209530.83	396072.62	0.09
SH13APY000613	Planting Trees or Forestation	Double Pipe Creek	2140304	209737.92	396329.68	0.11
SH13APY000614	Planting Trees or Forestation	Double Pipe Creek	2140304	209618.21	396173.40	0.08
SH13APY000622	Planting Trees or Forestation	Lower Monocacy River	2140302	192354.50	364104.56	0.75
SH13APY000623	Planting Trees or Forestation	Lower Monocacy River	2140302	192861.31	367086.32	2.17
SH13APY000624	Planting Trees or Forestation	Lower Monocacy River	2140302	193047.61	369654.13	0.25
SH13APY000625	Planting Trees or Forestation	Lower Monocacy River	2140302	206691.02	373162.07	0.28
SH13APY000626	Planting Trees or Forestation	Lower Monocacy River	2140302	208064.33	373012.14	0.22
SH13APY000627	Planting Trees or Forestation	Lower Monocacy River	2140302	197161.50	365203.63	0.17
SH13APY000628	Planting Trees or Forestation	Lower Monocacy River	2140302	197430.18	365373.98	0.43
SH13APY000629	Planting Trees or Forestation	Lower Monocacy River	2140302	197244.88	365295.65	0.25
SH13APY000630	Planting Trees or Forestation	Upper Monocacy River	2140303	215349.79	363392.78	0.20
SH13APY000631	Planting Trees or Forestation	Upper Monocacy River	2140303	218700.74	364886.36	0.33
SH13APY000632	Planting Trees or Forestation	Upper Monocacy River	2140303	225950.15	373393.49	0.03
SH13APY000633	Planting Trees or Forestation	Upper Monocacy River	2140303	226053.04	373211.47	0.21
SH13APY000634	Planting Trees or Forestation	Upper Monocacy River	2140303	218639.57	364781.50	0.11
SH13APY000649	Planting Trees or Forestation	Patapsco River L N Br	2130906	171156.50	418484.83	0.39
SH13APY000650	Planting Trees or Forestation	Patapsco River L N Br	2130906	171144.78	418684.49	0.11
SH13APY000651	Planting Trees or Forestation	Patapsco River L N Br	2130906	171154.72	418817.34	0.09
SH13APY000652	Planting Trees or Forestation	Patapsco River L N Br	2130906	168897.56	421215.98	0.22
SH13APY000653	Planting Trees or Forestation	Patapsco River L N Br	2130906	169065.80	421038.69	0.24
SH13APY000654	Planting Trees or Forestation	Little Patuxent River	2131105	169371.19	416131.71	0.25
SH13APY000655	Planting Trees or Forestation	Little Patuxent River	2131105	169253.96	416158.29	0.59
SH13APY000656	Planting Trees or Forestation	Little Patuxent River	2131105	169171.42	416313.19	0.14
SH13APY000657	Planting Trees or Forestation	Middle Patuxent River	2131106	178443.16	401084.77	0.49
SH13APY000658	Planting Trees or Forestation	Middle Patuxent River	2131106	178397.34	401161.49	0.21
SH13APY000659	Planting Trees or Forestation	Little Patuxent River	2131105	163476.88	416363.26	0.71
SH13APY000660	Planting Trees or Forestation	Little Patuxent River	2131105	163383.15	416096.74	0.79
SH13APY000661	Planting Trees or Forestation	Little Patuxent River	2131105	163270.22	416252.59	0.61
SH13APY000662	Planting Trees or Forestation	Little Patuxent River	2131105	174599.81	413917.41	0.49
SH13APY000663	Planting Trees or Forestation	Little Patuxent River	2131105	173250.24	413458.41	0.05
SH13APY000664	Planting Trees or Forestation	Little Patuxent River	2131105	173354.08	413495.69	0.15
SH13APY000665	Planting Trees or Forestation	Little Patuxent River	2131105	173150.04	413450.37	0.08
SH13APY000666	Planting Trees or Forestation	Little Patuxent River	2131105	169178.42	411411.05	0.07
SH13APY000667	Planting Trees or Forestation	Middle Patuxent River	2131106	167966.34	410680.84	0.23
SH13APY000668	Planting Trees or Forestation	Middle Patuxent River	2131106	168184.29	410624.98	0.26
SH13APY000669	Planting Trees or Forestation	Little Patuxent River	2131105	168317.94	410954.19	0.07
SH13APY000670	Planting Trees or Forestation	Little Patuxent River	2131105	168014.24	410897.81	0.24
SH13APY000671	Planting Trees or Forestation	Little Patuxent River	2131105	181810.90	407448.52	0.24
SH13APY000672	Planting Trees or Forestation	Little Patuxent River	2131105	181857.03	407239.60	0.34
SH13APY000673	Planting Trees or Forestation	Middle Patuxent River	2131106	182210.91	403999.49	0.79
SH13APY000674	Planting Trees or Forestation	Middle Patuxent River	2131106	182382.63	403807.10	0.30
SH13APY000675	Planting Trees or Forestation	Patapsco River L N Br	2130906	180975.09	414872.60	0.08
SH13APY000676	Planting Trees or Forestation	Little Patuxent River	2131105	163448.65	410948.43	0.06
SH13APY000677	Planting Trees or Forestation	Little Patuxent River	2131105	163898.11	410172.67	0.20
SH13APY000678	Planting Trees or Forestation	Little Patuxent River	2131105	164075.53	409382.99	0.06
SH13APY000679	Planting Trees or Forestation	Little Patuxent River	2131105	164072.58	409527.93	0.05
SH13APY000680	Planting Trees or Forestation	Little Patuxent River	2131105	164051.59	409587.90	0.01
SH13APY000681	Planting Trees or Forestation	Patapsco River L N Br	2130906	169003.15	423947.95	0.77
SH13APY000682	Planting Trees or Forestation	Middle Patuxent River	2131106	178908.68	401463.02	0.61
SH13APY000683	Planting Trees or Forestation	Middle Patuxent River	2131106	179352.72	402117.05	0.87
SH13APY000684	Planting Trees or Forestation	Patapsco River L N Br	2130906	169032.98	423869.62	0.61
SH14APY000766	Planting Trees or Forestation	Double Pipe Creek	2140304	211305.08	385772.35	0.16
SH14APY000767	Planting Trees or Forestation	Double Pipe Creek	2140304	209848.03	389066.66	0.42
SH14APY000768	Planting Trees or Forestation	Double Pipe Creek	2140304	208678.93	392917.87	0.17
SH14APY000769	Planting Trees or Forestation	Double Pipe Creek	2140304	208884.77	394368.92	0.66
SH14APY000770	Planting Trees or Forestation	S Branch Patapsco	2130908	190649.54	387758.32	0.40
SH14APY000771	Planting Trees or Forestation	Double Pipe Creek	2140304	210494.04	397703.26	0.86
SH14APY000772	Planting Trees or Forestation	Double Pipe Creek	2140304	210945.31	398098.85	0.45
SH14APY000773	Planting Trees or Forestation	Double Pipe Creek	2140304	211972.23	398887.10	0.06
SH14APY000774	Planting Trees or Forestation	S Branch Patapsco	2130908	190883.15	387834.74	0.17

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-18: FMIS # AT5025282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH14APY000775	Planting Trees or Forestation	S Branch Patapsco	2130908	188168.33	387145.45	0.19
SH14APY000776	Planting Trees or Forestation	Upper Monocacy River	2140303	222114.05	385855.90	0.74
SH14APY000777	Planting Trees or Forestation	Upper Monocacy River	2140303	222670.37	386283.64	0.62
SH14APY000778	Planting Trees or Forestation	Upper Monocacy River	2140303	226847.50	389187.43	0.12
SH14APY000779	Planting Trees or Forestation	Double Pipe Creek	2140304	199780.42	393311.22	0.27
SH14APY000780	Planting Trees or Forestation	Upper Monocacy River	2140303	224764.81	387581.79	0.30
SH14APY000781	Planting Trees or Forestation	Upper Monocacy River	2140303	227721.14	389368.64	0.33
SH14APY000782	Planting Trees or Forestation	S Branch Patapsco	2130908	198405.65	393491.39	0.18
SH14APY000783	Planting Trees or Forestation	S Branch Patapsco	2130908	191652.77	387849.81	0.35
SH14APY000784	Planting Trees or Forestation	Lower Monocacy River	2140302	199379.76	390170.00	0.17
SH14APY000785	Planting Trees or Forestation	S Branch Patapsco	2130908	197889.97	394627.03	0.16
SH14APY000786	Planting Trees or Forestation	Double Pipe Creek	2140304	217975.70	390786.86	0.14
SH14APY000787	Planting Trees or Forestation	Upper Monocacy River	2140303	224619.68	387501.61	0.17
SH14APY000788	Planting Trees or Forestation	S Branch Patapsco	2130908	190899.86	387782.67	0.39
SH14APY000789	Planting Trees or Forestation	S Branch Patapsco	2130908	191105.86	387796.09	0.47
SH14APY000790	Planting Trees or Forestation	Upper Monocacy River	2140303	221841.24	385631.31	0.19
SH14APY000791	Planting Trees or Forestation	Double Pipe Creek	2140304	210752.76	397912.79	0.39
SH14APY000792	Planting Trees or Forestation	Lower Monocacy River	2140302	194169.69	362461.87	0.39
SH14APY000793	Planting Trees or Forestation	Catoctin Creek	2140305	199817.94	355976.22	0.23
SH14APY000794	Planting Trees or Forestation	Catoctin Creek	2140305	196542.31	352941.92	0.21
SH14APY000795	Planting Trees or Forestation	Catoctin Creek	2140305	196337.65	352683.52	0.20
SH14APY000796	Planting Trees or Forestation	Catoctin Creek	2140305	193759.52	349252.92	0.14
SH14APY000797	Planting Trees or Forestation	Lower Monocacy River	2140302	190655.38	375184.06	0.04
SH14APY000799	Planting Trees or Forestation	Lower Monocacy River	2140302	189132.03	382287.50	0.12
SH14APY000800	Planting Trees or Forestation	Lower Monocacy River	2140302	188882.05	382716.06	0.12
SH14APY000801	Planting Trees or Forestation	Lower Monocacy River	2140302	188778.00	356777.35	0.59
SH14APY000802	Planting Trees or Forestation	Lower Monocacy River	2140302	189281.53	357398.89	0.28
SH14APY000803	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186182.65	345190.35	0.02
SH14APY000804	Planting Trees or Forestation	Lower Monocacy River	2140302	190911.17	360577.21	0.13
SH14APY000805	Planting Trees or Forestation	Lower Monocacy River	2140302	201576.12	381353.05	0.31
SH14APY000806	Planting Trees or Forestation	Lower Monocacy River	2140302	201666.34	380152.39	0.08
SH14APY000807	Planting Trees or Forestation	Lower Monocacy River	2140302	206825.09	373215.34	0.76
SH14APY000808	Planting Trees or Forestation	Lower Monocacy River	2140302	187923.18	385267.73	0.36
SH14APY000809	Planting Trees or Forestation	Lower Monocacy River	2140302	201641.51	380235.29	0.09
SH14APY000810	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186273.77	345303.23	0.06
SH14APY000811	Planting Trees or Forestation	Catoctin Creek	2140305	199708.23	356033.36	0.15
SH14APY000812	Planting Trees or Forestation	Catoctin Creek	2140305	196668.32	353016.33	0.62
SH14APY000814	Planting Trees or Forestation	Lower Monocacy River	2140302	207106.20	373248.61	0.16
SH14APY000857	Planting Trees or Forestation	Middle Patuxent River	2131106	168504.77	409058.50	0.21
SH14APY000858	Planting Trees or Forestation	Middle Patuxent River	2131106	165646.37	409468.53	0.26
SH14APY000859	Planting Trees or Forestation	Middle Patuxent River	2131106	168410.86	410183.26	0.07
SH14APY000860	Planting Trees or Forestation	Middle Patuxent River	2131106	168522.19	408820.54	0.31
SH14APY000861	Planting Trees or Forestation	Patapsco River L N Br	2130906	171794.17	417684.87	0.20
SH14APY000862	Planting Trees or Forestation	Little Patuxent River	2131105	163472.68	416031.13	0.43
SH14APY000863	Planting Trees or Forestation	Middle Patuxent River	2131106	168607.55	408639.71	0.48
SH14APY000864	Planting Trees or Forestation	Little Patuxent River	2131105	168117.22	410684.94	0.68
SH14APY000865	Planting Trees or Forestation	Middle Patuxent River	2131106	169061.83	408021.90	0.57
SH14APY000909	Planting Trees or Forestation	Patapsco River L N Br	2130906	171630.64	417485.28	0.54
SH14APY000910	Planting Trees or Forestation	Patapsco River L N Br	2130906	171461.90	417387.21	0.71
SH14APY000911	Planting Trees or Forestation	Little Patuxent River	2131105	168055.96	410710.69	0.14
SH14APY000912	Planting Trees or Forestation	Little Patuxent River	2131105	168158.57	410739.30	0.21
SH14APY000914	Planting Trees or Forestation	Patapsco River L N Br	2130906	171482.82	417527.71	0.56
SH14APY000915	Planting Trees or Forestation	Little Patuxent River	2131105	163290.18	416098.22	0.12
SH14APY000916	Planting Trees or Forestation	Middle Patuxent River	2131106	168423.07	408852.47	0.10
SH14APY000917	Planting Trees or Forestation	Middle Patuxent River	2131106	168906.20	408290.48	0.13
SH14APY000918	Planting Trees or Forestation	Middle Patuxent River	2131106	168418.83	410042.58	0.09
SH14APY001556	Planting Trees or Forestation	Liberty Reservoir	2130907	216255.50	411724.43	3.81
SH14APY001557	Planting Trees or Forestation	Liberty Reservoir	2130907	216602.80	411691.23	2.71
SH14APY001558	Planting Trees or Forestation	Liberty Reservoir	2130907	217538.53	411273.54	0.76
SH14APY001559	Planting Trees or Forestation	Liberty Reservoir	2130907	217885.50	411383.85	3.58
SH14APY001560	Planting Trees or Forestation	Liberty Reservoir	2130907	218308.84	411403.56	0.91
SH14APY001561	Planting Trees or Forestation	Liberty Reservoir	2130907	216245.72	411246.97	12.23
SH14APY001562	Planting Trees or Forestation	Liberty Reservoir	2130907	217120.97	411308.52	10.32
SH12APY003004	Planting Trees or Forestation	Lower Monocacy River	2140302	192945.85	367162.37	0.23
SH14APY003000	Planting Trees or Forestation	Middle Patuxent River	2131106	182895.69	402612.75	0.21
					Complete BMP Acreage Total	**75.57**
					BMP Count	**143**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-19: FMIS # AT5025382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13APY000615	Planting Trees or Forestation	Patuxent River lower	2131101	96054.11	419360.02	0.32
SH13APY000616	Planting Trees or Forestation	Patuxent River lower	2131101	96081.24	419469.59	0.15
SH13APY000617	Planting Trees or Forestation	Patuxent River lower	2131101	95917.65	419503.16	0.14
SH13APY000618	Planting Trees or Forestation	Patuxent River lower	2131101	96214.77	419430.56	0.08
SH13APY000619	Planting Trees or Forestation	Patuxent River lower	2131101	97082.17	418604.00	0.15
SH13APY000620	Planting Trees or Forestation	Patuxent River lower	2131101	96461.89	419269.79	0.51
SH13APY000621	Planting Trees or Forestation	Patuxent River lower	2131101	96657.28	418966.66	0.17
SH13APY000685	Planting Trees or Forestation	Lower Monocacy River	2140302	179004.17	372091.22	0.47
SH13APY000686	Planting Trees or Forestation	Anacostia River	2140205	149852.19	398694.82	0.21
SH13APY000688	Planting Trees or Forestation	Anacostia River	2140205	149733.16	398481.05	0.07
SH13APY000689	Planting Trees or Forestation	Anacostia River	2140205	149849.49	398505.28	0.18
SH13APY000690	Planting Trees or Forestation	Anacostia River	2140205	149666.84	399507.00	0.09
SH13APY000692	Planting Trees or Forestation	Seneca Creek	2140208	171308.76	384230.31	0.36
SH13APY000693	Planting Trees or Forestation	Seneca Creek	2140208	171508.00	384355.05	0.34
SH13APY000694	Planting Trees or Forestation	Seneca Creek	2140208	171634.20	384464.04	0.13
SH13APY000695	Planting Trees or Forestation	Seneca Creek	2140208	171593.56	384255.50	0.31
SH13APY000696	Planting Trees or Forestation	Seneca Creek	2140208	171338.32	384066.91	0.17
SH13APY000515	Planting Trees or Forestation	Severn River	2131002	159187.04	426369.74	0.37
SH13APY000516	Planting Trees or Forestation	Patapsco River L N Br	2130906	166974.91	423412.34	1.07
SH13APY000517	Planting Trees or Forestation	Baltimore Harbor	2130903	164769.63	427509.05	0.19
SH13APY000518	Planting Trees or Forestation	Baltimore Harbor	2130903	165300.25	430514.05	0.82
SH13APY000519	Planting Trees or Forestation	Baltimore Harbor	2130903	165132.42	430536.19	1.68
SH13APY000520	Planting Trees or Forestation	Baltimore Harbor	2130903	165098.73	430730.48	0.65
SH13APY000521	Planting Trees or Forestation	Baltimore Harbor	2130903	164870.67	430771.49	1.03
SH13APY000522	Planting Trees or Forestation	Baltimore Harbor	2130903	164731.53	430738.72	0.90
SH13APY000523	Planting Trees or Forestation	Severn River	2131002	158258.05	432242.19	1.47
SH13APY000524	Planting Trees or Forestation	Severn River	2131002	158670.71	432321.78	0.37
SH13APY000525	Planting Trees or Forestation	Baltimore Harbor	2130903	166876.83	431039.48	0.59
SH13APY000526	Planting Trees or Forestation	Baltimore Harbor	2130903	167851.44	431507.00	0.08
SH13APY000527	Planting Trees or Forestation	Baltimore Harbor	2130903	167762.40	431446.51	0.32
SH13APY000528	Planting Trees or Forestation	Baltimore Harbor	2130903	165091.17	428941.69	0.39
SH13APY000529	Planting Trees or Forestation	Baltimore Harbor	2130903	165135.26	429129.15	3.01
SH13APY000530	Planting Trees or Forestation	Patapsco River L N Br	2130906	164759.78	426456.71	1.23
SH13APY000697	Planting Trees or Forestation	Western Branch	2131103	139028.36	412890.99	0.51
SH13APY000698	Planting Trees or Forestation	Western Branch	2131103	136211.07	413151.01	0.58
SH13APY000699	Planting Trees or Forestation	Western Branch	2131103	136278.18	413243.07	0.21
SH13APY000700	Planting Trees or Forestation	Potomac River U tidal	2140201	128134.93	406820.95	0.21
SH13APY000701	Planting Trees or Forestation	Potomac River U tidal	2140201	128089.43	406860.70	0.33
SH13APY000702	Planting Trees or Forestation	Potomac River U tidal	2140201	128173.99	406952.67	0.46
SH13APY000703	Planting Trees or Forestation	Potomac River U tidal	2140201	128147.95	407004.22	0.37
SH13APY000704	Planting Trees or Forestation	Piscataway Creek	2140203	117818.01	402342.30	1.54
SH13APY000705	Planting Trees or Forestation	Piscataway Creek	2140203	118549.05	402707.14	0.15
SH13APY000706	Planting Trees or Forestation	Potomac River U tidal	2140201	125834.32	400189.65	0.70
SH13APY000707	Planting Trees or Forestation	Anacostia River	2140205	139084.99	412859.78	0.09
SH12APY003005	Planting Trees or Forestation	Potomac River U tidal	2140201	125885.17	400145.82	0.17
SH13APY000687	Planting Trees or Forestation	Anacostia River	2140205	149698.52	398622.36	0.14
SH13APY000691	Planting Trees or Forestation	Anacostia River	2140205	149787.91	399440.29	0.13
					Complete BMP Acreage Total	**23.61**
					BMP Count	**47**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-20: FMIS # AT5025482						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13APY000708	Planting Trees or Forestation	Conococheague Creek	2140504	220571.54	326901.58	1.04
SH13APY000709	Planting Trees or Forestation	Conococheague Creek	2140504	220438.40	327360.66	0.55
SH13APY000710	Planting Trees or Forestation	Conococheague Creek	2140504	219978.75	328276.08	0.49
SH13APY000711	Planting Trees or Forestation	Conococheague Creek	2140504	216681.28	332501.51	0.58
SH13APY000712	Planting Trees or Forestation	Conococheague Creek	2140504	216762.57	332663.35	0.70
SH13APY000713	Planting Trees or Forestation	Conococheague Creek	2140504	216841.65	332749.57	0.35
SH13APY000715	Planting Trees or Forestation	Antietam Creek	2140502	214958.51	341402.73	0.65
SH13APY000716	Planting Trees or Forestation	Antietam Creek	2140502	214765.75	341501.29	0.79
SH13APY000717	Planting Trees or Forestation	Antietam Creek	2140502	208618.66	347772.65	0.52
SH13APY000718	Planting Trees or Forestation	Conococheague Creek	2140504	220682.21	324999.22	1.30
SH13APY000719	Planting Trees or Forestation	Conococheague Creek	2140504	220599.05	325742.81	0.84
SH13APY000720	Planting Trees or Forestation	Little Conococheague	2140505	220686.75	324017.39	0.43
SH13APY000721	Planting Trees or Forestation	Conococheague Creek	2140504	220680.08	324336.49	0.18
SH13APY000722	Planting Trees or Forestation	Little Conococheague	2140505	220883.14	321383.47	0.88
SH13APY000723	Planting Trees or Forestation	Little Conococheague	2140505	220701.50	323817.58	0.44
SH13APY000724	Planting Trees or Forestation	Little Conococheague	2140505	220582.28	320893.16	0.27
SH13APY000725	Planting Trees or Forestation	Potomac River WA Cnty	2140501	220249.29	319685.34	0.54
SH13APY000726	Planting Trees or Forestation	Potomac River WA Cnty	2140501	219795.85	318844.07	1.37
SH13APY000727	Planting Trees or Forestation	Little Conococheague	2140505	220618.78	320652.23	1.78
SH13APY000728	Planting Trees or Forestation	Potomac River WA Cnty	2140501	219123.15	317959.95	0.33
SH13APY000729	Planting Trees or Forestation	Potomac River WA Cnty	2140501	224795.59	304965.50	0.95
SH13APY000730	Planting Trees or Forestation	Potomac River WA Cnty	2140501	227181.41	298574.83	0.19
SH13APY000731	Planting Trees or Forestation	Potomac River WA Cnty	2140501	227156.57	298485.57	0.31
SH13APY000732	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227082.50	298346.07	0.54
SH13APY000733	Planting Trees or Forestation	Potomac River WA Cnty	2140501	225442.71	302566.43	0.44
SH13APY000734	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227696.09	298202.75	0.70
SH13APY000735	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227888.21	297894.82	0.73
SH13APY000736	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227327.03	298404.41	0.37
SH13APY000737	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227215.10	298368.44	0.33
SH13APY000738	Planting Trees or Forestation	Little Tonoloway Creek	2140509	228155.25	298137.32	0.85
SH13APY000739	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227995.76	298021.75	0.48
SH13APY000740	Planting Trees or Forestation	Little Tonoloway Creek	2140509	228049.05	290224.24	0.91
SH13APY000741	Planting Trees or Forestation	Little Tonoloway Creek	2140509	226205.20	292991.29	0.27
SH13APY000742	Planting Trees or Forestation	Little Tonoloway Creek	2140509	226197.67	293125.69	0.25
SH13APY000743	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227900.57	294517.36	0.25
SH13APY000744	Planting Trees or Forestation	Little Tonoloway Creek	2140509	227917.53	294634.58	0.12
SH13APY000745	Planting Trees or Forestation	Conococheague Creek	2140504	220864.68	335789.14	0.56
SH13APY000746	Planting Trees or Forestation	Conococheague Creek	2140504	226074.54	336479.42	0.37
SH13APY000747	Planting Trees or Forestation	Conococheague Creek	2140504	225923.70	336564.49	1.15
SH13APY000748	Planting Trees or Forestation	Conococheague Creek	2140504	225995.09	336673.84	0.45
SH13APY000749	Planting Trees or Forestation	Antietam Creek	2140502	215354.75	337439.59	0.80
SH13APY000750	Planting Trees or Forestation	Antietam Creek	2140502	215634.08	337460.59	0.91
SH13APY000751	Planting Trees or Forestation	Little Conococheague	2140505	220748.46	322467.79	0.93
SH13APY000752	Planting Trees or Forestation	Marsh Run	2140503	215638.40	334821.24	0.53
SH13APY000753	Planting Trees or Forestation	Conococheague Creek	2140504	220842.65	335955.64	0.19
SH13APY000754	Planting Trees or Forestation	Antietam Creek	2140502	215371.07	337311.90	0.56
SH13APY000755	Planting Trees or Forestation	Conococheague Creek	2140504	221220.49	331423.63	0.63
SH13APY000756	Planting Trees or Forestation	Potomac River WA Cnty	2140501	227144.11	298523.93	0.16
SH13APY000757	Planting Trees or Forestation	Conococheague Creek	2140504	220672.69	324299.23	0.09
SH13APY000758	Planting Trees or Forestation	Little Conococheague	2140505	220323.27	319853.53	0.07
SH13APY000759	Planting Trees or Forestation	Conococheague Creek	2140504	215636.22	333734.16	0.37
SH13APY000714	Planting Trees or Forestation	Marsh Run	2140503	215537.91	335059.01	0.53
SH13APY000760	Planting Trees or Forestation	Marsh Run	2140503	215498.74	335102.71	0.28
SH13APY000761	Planting Trees or Forestation	Potomac River WA Cnty	2140501	219082.59	317864.95	0.28
SH13APY000763	Planting Trees or Forestation	Marsh Run	2140503	215627.94	334018.23	0.39
SH13APY000762	Planting Trees or Forestation	Antietam Creek	2140502	214940.67	341568.09	0.40
					Complete BMP Acreage Total	**31.37**
					BMP Count	**56**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-21: FMIS # AT7995382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15RST021282	Bio-Swale	South River	2131003	144035.62	431432.35	0.67
SH15RST021283	Bio-Swale	South River	2131003	143800.62	430319.36	0.31
SH15RST021295	Bio-Swale	South River	2131003	143927.62	430950.88	0.33
SH15RST021298	Bio-Swale	Patuxent River upper	2131104	143168.35	427703.23	0.32
SH15RST021299	Bio-Swale	Patuxent River upper	2131104	143219.13	428153.30	0.41
SH15RST021302	Bio-Swale	South River	2131003	145267.18	433113.96	0.35
SH14RST080516	Bio-Swale	Wicomico River	2140106	81599.90	404121.02	0.28
SH14RST080517	Bioretention	Wicomico River	2140106	81627.78	404121.22	0.44
SH14RST080518	Bioretention	Zekiah Swamp	2140108	82783.79	403869.60	0.19
SH14RST080519	Bio-Swale	Zekiah Swamp	2140108	82814.00	403854.66	0.80
SH13RST080520	Bio-Swale	Zekiah Swamp	2140108	83427.72	403444.68	0.26
SH13RST080521	Bio-Swale	Zekiah Swamp	2140108	83536.72	403365.17	0.45
SH13RST080522	Bio-Swale	Zekiah Swamp	2140108	84190.80	402883.73	0.31
SH13RST080523	Bio-Swale	Zekiah Swamp	2140108	84321.53	402786.15	0.21
SH13RST080524	Bio-Swale	Zekiah Swamp	2140108	84347.39	402766.66	0.23
SH13RST080525	Bio-Swale	Zekiah Swamp	2140108	84458.25	402687.07	0.43
SH14RST082122	Bio-Swale	Patuxent River lower	2131101	93477.34	419641.81	0.45
SH14RST082123	Bio-Swale	Patuxent River lower	2131101	93554.81	419643.08	0.27
SH14RST082124	Bio-Swale	Patuxent River lower	2131101	93663.90	419644.78	0.17
SH14RST082125	Bio-Swale	Patuxent River lower	2131101	93835.60	419647.98	0.26
SH14RST082126	Bio-Swale	Patuxent River lower	2131101	93943.54	419649.48	0.26
SH14RST082127	Bio-Swale	Patuxent River lower	2131101	94096.86	419651.30	0.44
SH14RST082128	Bio-Swale	Patuxent River lower	2131101	94214.15	419652.50	0.75
SH14RST082133	Bio-Swale	Zekiah Swamp	2140108	98143.97	415819.46	0.65
SH14RST082134	Bio-Swale	Zekiah Swamp	2140108	98151.79	415703.28	0.62
SH14RST082135	Bio-Swale	Zekiah Swamp	2140108	98183.96	415303.22	0.43
SH13RST082136	Bio-Swale	Zekiah Swamp	2140108	98445.53	414223.58	0.52
SH13RST082138	Bio-Swale	Zekiah Swamp	2140108	99919.44	412104.98	0.25
SH13RST082139	Bio-Swale	Zekiah Swamp	2140108	100226.58	412083.09	0.43
SH13RST082140	Bio-Swale	Zekiah Swamp	2140108	103676.55	411143.98	0.16
SH13RST082141	Bio-Swale	Zekiah Swamp	2140108	103784.39	411107.38	0.98
SH15RST021449	Bio-Swale	Little Patuxent River	02131105	147545.67	425848.76	1.00
SH15RST021450	Bio-Swale	Little Patuxent River	02131105	147765.71	425893.44	0.37
SH15RST021451	Bio-Swale	Little Patuxent River	02131105	147882.71	425916.81	0.23
SH14RST021338	Bio-Swale	Patuxent River middle	2131102	122255.33	429745.51	0.29
SH14RST021341	Bio-Swale	Patuxent River middle	2131102	124601.82	429001.45	0.64
SH14RST021343	Bio-Swale	Patuxent River middle	2131102	124736.65	428930.95	0.42
SH14RST021348	Bio-Swale	Patuxent River middle	2131102	125767.03	427614.49	0.49
SH14RST021349	Bio-Swale	Patuxent River middle	2131102	125801.64	427563.54	0.06
SH14RST021351	Bio-Swale	Patuxent River middle	2131102	125825.18	427531.64	0.05
SH14RST021354	Bio-Swale	Patuxent River middle	2131102	125851.05	427494.22	0.31
SH14RST021359	Bio-Swale	Patuxent River middle	2131102	125931.60	427378.91	0.18
SH14RST021364	Bio-Swale	Patuxent River middle	2131102	126013.75	427265.55	0.35
SH14RST021369	Bio-Swale	Patuxent River middle	2131102	126378.42	426788.56	0.32
SH14RST021370	Bio-Swale	Patuxent River middle	2131102	126761.80	426249.77	0.34
SH14RST021371	Bio-Swale	Patuxent River middle	2131102	126926.70	425889.86	0.50
SH14RST021374	Bio-Swale	Patuxent River middle	2131102	127034.54	425465.89	0.68
					Complete BMP Acreage Total	**18.86**
					BMP Count	**47**

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Table H-22: FMIS # AW0435382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH11APY003000	Planting Trees or Forestation	Little Gunpowder Falls	2130804	194027.45	453392.14	4.58
SH11APY003010	Planting Trees or Forestation	Lower Susquehanna River	2120201	214111.92	474130.79	1.10
SH11APY003011	Planting Trees or Forestation	Lower Susquehanna River	2120201	214067.53	473943.57	3.36
SH11APY003012	Planting Trees or Forestation	Lower Susquehanna River	2120201	214400.45	473891.20	2.24
SH11APY003013	Planting Trees or Forestation	Lower Susquehanna River	2120201	214258.58	473826.48	1.29
SH11APY003014	Planting Trees or Forestation	Deer Creek	2120202	217092.45	461948.62	5.20
					Complete BMP Acreage Total	**17.77**
					BMP Count	**6**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-23: FMIS # AW0445182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18APY001815	Planting Trees or Forestation	Upper Monocacy River	2140303	223189.68	369754.09	0.80
SH18APY001816	Planting Trees or Forestation	Upper Monocacy River	2140303	223418.22	369924.71	0.23
SH18APY001817	Planting Trees or Forestation	Upper Monocacy River	2140303	223974.30	370218.89	0.05
SH18APY001818	Planting Trees or Forestation	Upper Monocacy River	2140303	223817.92	370336.33	0.20
SH18APY001819	Planting Trees or Forestation	Upper Monocacy River	2140303	223991.65	370400.17	0.17
SH18APY001838	Planting Trees or Forestation	Upper Monocacy River	2140303	224273.69	370555.47	0.47
SH18APY001839	Planting Trees or Forestation	Upper Monocacy River	2140303	224306.13	370699.96	0.63
SH18APY001840	Planting Trees or Forestation	Upper Monocacy River	2140303	223992.65	369788.95	0.05
SH18APY001841	Planting Trees or Forestation	Upper Monocacy River	2140303	224014.99	370269.51	0.09
SH18APY001860	Planting Trees or Forestation	Upper Monocacy River	2140303	223626.76	370738.59	0.14
					Complete BMP Acreage Total	**2.83**
					BMP Count	**10**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-24: FMIS # AW0445282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18APY001808	Planting Trees or Forestation	Double Pipe Creek	2140304	214160.56	396568.08	0.37
SH18APY001809	Planting Trees or Forestation	Liberty Reservoir	2130907	208942.89	401279.92	0.15
SH18APY001810	Planting Trees or Forestation	Double Pipe Creek	2140304	215911.36	393417.38	0.35
SH18APY001811	Planting Trees or Forestation	Double Pipe Creek	2140304	215970.54	393317.94	0.15
SH18APY001812	Planting Trees or Forestation	Liberty Reservoir	2130907	198910.69	399898.59	0.45
SH18APY001813	Planting Trees or Forestation	Double Pipe Creek	2140304	218216.86	390189.83	0.82
SH18APY001814	Planting Trees or Forestation	Double Pipe Creek	2140304	218499.53	389717.83	3.38
SH18APY001861	Planting Trees or Forestation	Liberty Reservoir	2130907	199013.15	399863.29	0.32
SH11APY003019	Planting Trees or Forestation	Liberty Reservoir	2130907	201218.09	400562.09	4.30
SH11APY003020	Planting Trees or Forestation	Liberty Reservoir	2130907	201380.35	400683.05	0.91
SH11APY003021	Planting Trees or Forestation	Liberty Reservoir	2130907	201406.96	400611.99	1.18
SH11APY003022	Planting Trees or Forestation	Liberty Reservoir	2130907	201468.09	400551.99	1.66
					Complete BMP Acreage Total	**14.04**
					BMP Count	**12**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-25: FMIS # AW0465182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17APY001639	Planting Trees or Forestation	Patuxent River upper	2131104	136647.13	424837.36	0.07
SH17APY001640	Planting Trees or Forestation	Anacostia River	2140205	148452.06	409184.41	0.16
SH17APY001641	Planting Trees or Forestation	Potomac River U tidal	2140201	127964.43	409190.48	0.12
SH17APY001642	Planting Trees or Forestation	Anacostia River	2140205	148541.30	409243.38	0.16
SH17APY001643	Planting Trees or Forestation	Anacostia River	2140205	146878.36	409949.92	0.27
SH17APY001644	Planting Trees or Forestation	Potomac River U tidal	2140201	129530.26	405101.51	0.07
SH17APY001645	Planting Trees or Forestation	Western Branch	2131103	133558.21	413779.34	0.31
SH17APY001646	Planting Trees or Forestation	Western Branch	2131103	141255.83	412621.85	1.28
SH17APY001647	Planting Trees or Forestation	Anacostia River	2140205	132799.89	408854.87	0.08
SH17APY001648	Planting Trees or Forestation	Western Branch	2131103	141308.91	412551.52	0.04
SH17APY001649	Planting Trees or Forestation	Potomac River U tidal	2140201	126919.20	402917.37	0.19
SH17APY001650	Planting Trees or Forestation	Anacostia River	2140205	146793.19	408102.50	0.28
SH17APY001651	Planting Trees or Forestation	Western Branch	2131103	142229.59	413540.58	0.26
					Complete BMP Acreage Total	**3.29**
					BMP Count	**13**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-26: FMIS # AW0475182						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH18APY001681	Planting Trees or Forestation	Baltimore Harbor	2130903	164512.11	427010.12	0.17
SH18APY001682	Planting Trees or Forestation	Patapsco River L N Br	2130906	164651.91	426996.11	0.08
SH18APY001683	Planting Trees or Forestation	Patapsco River L N Br	2130906	165420.25	422103.48	0.35
SH18APY001684	Planting Trees or Forestation	Patapsco River L N Br	2130906	165792.36	422280.85	0.60
SH18APY001685	Planting Trees or Forestation	Patapsco River L N Br	2130906	165455.20	422004.35	0.15
SH18APY001686	Planting Trees or Forestation	Patapsco River L N Br	2130906	164635.18	426910.51	0.15
SH18APY001687	Planting Trees or Forestation	Patapsco River L N Br	2130906	166669.14	423716.83	0.26
SH18APY001688	Planting Trees or Forestation	Patapsco River L N Br	2130906	165253.09	422040.79	0.31
SH18APY001689	Planting Trees or Forestation	Patapsco River L N Br	2130906	165359.31	421863.11	0.27
SH18APY001690	Planting Trees or Forestation	Patapsco River L N Br	2130906	165141.82	421884.67	0.20
SH18APY001691	Planting Trees or Forestation	Patapsco River L N Br	2130906	170301.49	426578.59	0.20
SH18APY001692	Planting Trees or Forestation	Patapsco River L N Br	2130906	164657.51	425305.36	0.08
SH18APY001693	Planting Trees or Forestation	Patapsco River L N Br	2130906	167522.03	423701.09	0.26
SH18APY001694	Planting Trees or Forestation	Patapsco River L N Br	2130906	171279.61	426382.73	0.04
SH18APY001695	Planting Trees or Forestation	Patapsco River L N Br	2130906	165102.76	426564.33	0.11
SH18APY001696	Planting Trees or Forestation	Severn River	2131002	156288.75	431847.14	0.63
SH18APY001697	Planting Trees or Forestation	Severn River	2131002	155803.65	431445.07	0.32
SH18APY001698	Planting Trees or Forestation	Severn River	2131002	155129.09	431062.54	0.39
SH18APY001699	Planting Trees or Forestation	Severn River	2131002	155767.31	431246.65	0.10
SH18APY001700	Planting Trees or Forestation	Little Patuxent River	2131105	161453.05	417572.82	0.09
SH18APY001701	Planting Trees or Forestation	Little Patuxent River	2131105	158648.07	417471.72	0.08
SH18APY001702	Planting Trees or Forestation	Little Patuxent River	2131105	161437.71	418743.48	0.10
SH18APY001703	Planting Trees or Forestation	Severn River	2131002	159298.81	426402.80	0.45
SH18APY001704	Planting Trees or Forestation	Severn River	2131002	155769.31	431358.32	0.22
SH18APY001705	Planting Trees or Forestation	Severn River	2131002	146499.96	440326.97	0.13
SH18APY001706	Planting Trees or Forestation	Severn River	2131002	146425.56	440250.70	0.05
SH18APY001707	Planting Trees or Forestation	Severn River	2131002	150896.83	449501.00	0.15
SH18APY001708	Planting Trees or Forestation	Magothy River	2131001	160766.33	436462.79	0.11
SH18APY001709	Planting Trees or Forestation	West River	2131004	133219.72	437890.36	0.26
SH18APY001710	Planting Trees or Forestation	Patuxent River middle	2131102	126882.68	426102.85	0.07
SH18APY001711	Planting Trees or Forestation	South River	2131003	145040.30	439596.49	0.10
SH18APY001712	Planting Trees or Forestation	South River	2131003	146326.47	436302.92	0.26
SH18APY001713	Planting Trees or Forestation	South River	2131003	146343.79	439338.15	0.06
SH18APY001714	Planting Trees or Forestation	South River	2131003	144898.95	439718.02	0.26
SH18APY001715	Planting Trees or Forestation	Patuxent River middle	2131102	123251.49	429340.70	0.08
SH18APY001716	Planting Trees or Forestation	Patuxent River middle	2131102	123829.47	429182.99	0.10
SH18APY001717	Planting Trees or Forestation	South River	2131003	145418.55	439251.56	0.06
SH18APY001718	Planting Trees or Forestation	Severn River	2131002	146525.04	440391.03	0.17
SH18APY001719	Planting Trees or Forestation	Severn River	2131002	146844.67	440460.71	0.25
SH18APY001720	Planting Trees or Forestation	West Chesapeake Bay	2131005	124845.94	436500.64	0.26
SH18APY001721	Planting Trees or Forestation	South River	2131003	144935.91	439578.98	0.10
SH18APY001722	Planting Trees or Forestation	Baltimore Harbor	2130903	169221.27	431677.52	0.12
SH18APY001723	Planting Trees or Forestation	Baltimore Harbor	2130903	169562.66	434144.09	0.23
SH18APY001724	Planting Trees or Forestation	Baltimore Harbor	2130903	170686.41	431971.73	0.80
SH18APY001725	Planting Trees or Forestation	Baltimore Harbor	2130903	171028.13	432696.30	0.41
SH18APY001726	Planting Trees or Forestation	Baltimore Harbor	2130903	171026.27	433480.41	0.05
SH18APY001727	Planting Trees or Forestation	Baltimore Harbor	2130903	170500.67	431856.57	0.11
SH18APY001728	Planting Trees or Forestation	Baltimore Harbor	2130903	162393.85	430915.17	0.30
SH18APY001729	Planting Trees or Forestation	Baltimore Harbor	2130903	163915.34	430679.63	0.05
SH18APY001730	Planting Trees or Forestation	Baltimore Harbor	2130903	163973.28	430765.83	0.20
SH18APY001731	Planting Trees or Forestation	Baltimore Harbor	2130903	164596.89	427209.49	0.29
SH18APY001732	Planting Trees or Forestation	Baltimore Harbor	2130903	164221.95	430658.76	0.37
SH18APY001733	Planting Trees or Forestation	Baltimore Harbor	2130903	165618.77	434167.98	0.15
SH18APY001734	Planting Trees or Forestation	Baltimore Harbor	2130903	166615.34	431030.68	0.15
SH18APY001735	Planting Trees or Forestation	Baltimore Harbor	2130903	165403.62	429004.09	0.38
SH18APY001736	Planting Trees or Forestation	Baltimore Harbor	2130903	164899.94	430496.83	0.70
SH18APY001737	Planting Trees or Forestation	Baltimore Harbor	2130903	165046.41	430345.66	0.18
SH18APY001738	Planting Trees or Forestation	Baltimore Harbor	2130903	163784.06	440970.87	0.22
SH18APY001739	Planting Trees or Forestation	Baltimore Harbor	2130903	165056.83	427925.63	0.05
SH18APY001740	Planting Trees or Forestation	Baltimore Harbor	2130903	164944.31	430827.30	0.30
SH18APY001741	Planting Trees or Forestation	Baltimore Harbor	2130903	164951.41	430912.95	0.26
SH18APY001742	Planting Trees or Forestation	Baltimore Harbor	2130903	165322.82	430411.96	0.15
SH18APY001743	Planting Trees or Forestation	Baltimore Harbor	2130903	164485.96	430737.46	0.27
SH18APY001744	Planting Trees or Forestation	Baltimore Harbor	2130903	165233.74	428206.96	0.66
SH18APY001745	Planting Trees or Forestation	Baltimore Harbor	2130903	168044.19	431594.42	0.13
SH18APY001746	Planting Trees or Forestation	South River	2131003	145633.13	439150.27	0.10
SH18APY001747	Planting Trees or Forestation	Patuxent River middle	2131102	122142.94	429720.39	0.07
SH18APY001748	Planting Trees or Forestation	Baltimore Harbor	2130903	161960.00	430776.53	0.14
SH18APY001749	Planting Trees or Forestation	Baltimore Harbor	2130903	162053.61	430703.60	0.05
SH18APY001750	Planting Trees or Forestation	Patapsco River L N Br	2130906	171070.44	426350.90	0.06
SH18APY001751	Planting Trees or Forestation	Patapsco River L N Br	2130906	163554.55	427208.35	0.09
SH18APY001752	Planting Trees or Forestation	Baltimore Harbor	2130903	163080.34	435490.25	0.15
SH18APY001753	Planting Trees or Forestation	Patapsco River L N Br	2130906	162923.20	427004.74	0.05
SH18APY001754	Planting Trees or Forestation	Severn River	2131002	158364.70	432120.56	0.32

Comprehensive List of Restoration Practices By FMIS Contract

Table H-26: FMIS # AW0475182

Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH18APY001755	Planting Trees or Forestation	Severn River	2131002	158538.03	432082.20	0.10
SH18APY001756	Planting Trees or Forestation	Severn River	2131002	159723.00	432055.06	0.20
SH18APY001757	Planting Trees or Forestation	Severn River	2131002	159857.79	432011.28	0.07
SH18APY001758	Planting Trees or Forestation	Baltimore Harbor	2130903	171143.21	433256.74	0.18
SH18APY001759	Planting Trees or Forestation	Severn River	2131002	155536.32	430883.29	0.04
SH18APY001760	Planting Trees or Forestation	Severn River	2131002	159032.63	426722.01	0.34
SH18APY001761	Planting Trees or Forestation	Severn River	2131002	159231.27	426534.01	0.46
SH18APY001762	Planting Trees or Forestation	Patapsco River L N Br	2130906	170153.01	426056.45	0.14
SH18APY001763	Planting Trees or Forestation	Patapsco River L N Br	2130906	164730.84	425421.59	0.09
SH18APY001764	Planting Trees or Forestation	Patapsco River L N Br	2130906	164807.91	425285.64	0.26
SH18APY001765	Planting Trees or Forestation	South River	2131003	145978.90	438854.90	0.11
SH18APY001766	Planting Trees or Forestation	South River	2131003	146120.62	438881.24	0.19
SH18APY001767	Planting Trees or Forestation	Little Patuxent River	2131105	150215.19	426271.74	0.19
SH18APY001768	Planting Trees or Forestation	Severn River	2131002	156952.38	427759.13	0.26
SH18APY001769	Planting Trees or Forestation	Baltimore Harbor	2130903	167612.68	431498.25	0.05
SH18APY001835	Planting Trees or Forestation	Baltimore Harbor	2130903	170933.90	432587.53	1.64
SH18APY001867	Planting Trees or Forestation	Mattawoman Creek	2140111	106781.33	402140.24	2.52
SH18APY001868	Planting Trees or Forestation	Mattawoman Creek	2140111	107015.21	402341.57	0.34
					Complete BMP Acreage Total	**22.82**
					BMP Count	**92**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-27: FMIS # AT0825282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH14APY000866	Planting Trees or Forestation	Middle Patuxent River	2131106	170376.93	405966.88	0.12
SH14APY000867	Planting Trees or Forestation	Little Patuxent River	2131105	172891.53	413470.02	0.10
SH14APY000868	Planting Trees or Forestation	Patapsco River L N Br	2130906	178978.00	415515.66	0.40
SH14APY000869	Planting Trees or Forestation	Little Patuxent River	2131105	175325.65	415762.28	0.23
SH14APY000870	Planting Trees or Forestation	Little Patuxent River	2131105	175301.32	415696.62	0.19
SH14APY000871	Planting Trees or Forestation	Little Patuxent River	2131105	175456.96	415842.74	0.23
SH14APY000872	Planting Trees or Forestation	Patapsco River L N Br	2130906	171401.40	417767.03	0.17
SH14APY000873	Planting Trees or Forestation	Patuxent River upper	2131104	162077.71	411789.16	0.22
SH14APY000874	Planting Trees or Forestation	Patapsco River L N Br	2130906	171223.53	418045.93	0.25
SH14APY000875	Planting Trees or Forestation	Little Patuxent River	2131105	174882.72	415997.37	0.10
SH14APY000876	Planting Trees or Forestation	Patapsco River L N Br	2130906	169767.32	420166.06	0.75
SH14APY000878	Planting Trees or Forestation	Patapsco River L N Br	2130906	171520.39	417671.05	0.09
SH14APY000879	Planting Trees or Forestation	Patapsco River L N Br	2130906	178678.25	415364.00	0.28
SH14APY000880	Planting Trees or Forestation	Middle Patuxent River	2131106	170960.30	405126.82	0.31
SH14APY000881	Planting Trees or Forestation	Middle Patuxent River	2131106	169493.50	407185.15	0.09
SH14APY000882	Planting Trees or Forestation	Little Patuxent River	2131105	164921.69	415108.50	0.14
SH14APY000883	Planting Trees or Forestation	Little Patuxent River	2131105	162311.45	417390.37	0.14
SH14APY000884	Planting Trees or Forestation	Little Patuxent River	2131105	162619.39	417328.88	0.13
SH14APY000885	Planting Trees or Forestation	Little Patuxent River	2131105	163376.81	416421.50	0.57
SH14APY000886	Planting Trees or Forestation	Little Patuxent River	2131105	166806.88	413713.74	0.37
SH14APY000887	Planting Trees or Forestation	Middle Patuxent River	2131106	169920.38	406463.53	0.15
SH14APY000888	Planting Trees or Forestation	Middle Patuxent River	2131106	170785.71	405532.95	0.34
SH14APY000889	Planting Trees or Forestation	Patapsco River L N Br	2130906	178999.52	415750.18	0.23
SH14APY000890	Planting Trees or Forestation	Little Patuxent River	2131105	175510.48	415662.09	1.16
SH14APY000891	Planting Trees or Forestation	Little Patuxent River	2131105	175580.15	415771.32	0.73
SH14APY000893	Planting Trees or Forestation	Little Patuxent River	2131105	164223.57	408941.91	1.94
SH14APY000894	Planting Trees or Forestation	Little Patuxent River	2131105	162235.98	417815.64	0.40
SH14APY000895	Planting Trees or Forestation	Patapsco River L N Br	2130906	169917.11	419995.78	0.40
SH14APY001554	Planting Trees or Forestation	Middle Patuxent River	2131106	168215.53	410580.54	0.28
SH14APY000899	Planting Trees or Forestation	Patuxent River upper	2131104	162050.81	412190.06	0.07
SH14APY000900	Planting Trees or Forestation	Patapsco River L N Br	2130906	171178.02	418657.93	0.19
SH14APY000901	Planting Trees or Forestation	Patapsco River L N Br	2130906	169621.29	420491.49	0.15
SH14APY000902	Planting Trees or Forestation	Patapsco River L N Br	2130906	170848.09	419276.40	0.24
SH14APY000903	Planting Trees or Forestation	Middle Patuxent River	2131106	178498.43	401261.63	0.45
SH14APY000904	Planting Trees or Forestation	Middle Patuxent River	2131106	170142.45	406122.59	0.07
SH14APY000905	Planting Trees or Forestation	Little Patuxent River	2131105	165413.52	414699.82	0.15
SH14APY000906	Planting Trees or Forestation	Little Patuxent River	2131105	162137.18	417787.71	0.61
SH14APY000907	Planting Trees or Forestation	Little Patuxent River	2131105	162951.33	416929.67	0.31
SH14APY000908	Planting Trees or Forestation	Middle Patuxent River	2131106	169818.13	406597.58	0.15
SH14APY000897	Planting Trees or Forestation	Little Patuxent River	2131105	169829.32	415787.79	0.50
SH14APY001555	Planting Trees or Forestation	Little Patuxent River	2131105	169494.98	416168.09	0.89
SH14APY000892	Planting Trees or Forestation	Little Patuxent River	2131105	168344.77	417741.44	0.70
SH14APY000913	Planting Trees or Forestation	Little Patuxent River	2131105	170019.25	415785.33	0.15
SH14APY001594	Planting Trees or Forestation	Little Patuxent River	2131105	168799.99	411116.48	0.14
SH14APY001596	Planting Trees or Forestation	Little Patuxent River	2131105	172857.32	413299.23	0.08
SH14APY001598	Planting Trees or Forestation	Little Patuxent River	2131105	172803.75	413294.89	0.34
SH14APY001599	Planting Trees or Forestation	Little Patuxent River	2131105	162516.80	417286.43	0.85
SH14APY001600	Planting Trees or Forestation	Little Patuxent River	2131105	162687.56	417071.47	0.71
SH14APY001601	Planting Trees or Forestation	Little Patuxent River	2131105	165534.51	414795.94	0.40
SH14APY000898	Planting Trees or Forestation	Middle Patuxent River	2131106	168002.21	410674.32	0.15
SH14APY000877	Planting Trees or Forestation	Little Patuxent River	2131105	169644.65	416013.70	0.16
SH14APY001605	Planting Trees or Forestation	Patuxent River upper	2131104	162067.00	412050.04	1.02
SH14APY001635	Planting Trees or Forestation	Little Patuxent River	2131105	163109.23	416752.77	0.14
SH14APY001636	Planting Trees or Forestation	Little Patuxent River	2131105	175804.25	415188.09	0.53
SH15APY001017	Planting Trees or Forestation	Double Pipe Creek	2140304	211508.75	385466.13	0.08
SH15APY001018	Planting Trees or Forestation	Double Pipe Creek	2140304	211276.95	385856.70	0.18
SH15APY001019	Planting Trees or Forestation	Double Pipe Creek	2140304	211341.77	385801.60	0.05
SH15APY001020	Planting Trees or Forestation	Double Pipe Creek	2140304	211273.90	386498.01	0.82
SH15APY001022	Planting Trees or Forestation	Upper Monocacy River	2140303	223253.58	386688.55	0.15
SH15APY001023	Planting Trees or Forestation	Upper Monocacy River	2140303	223467.88	386833.83	0.18
SH15APY001024	Planting Trees or Forestation	Upper Monocacy River	2140303	224888.61	387641.04	0.13
SH15APY001025	Planting Trees or Forestation	Upper Monocacy River	2140303	226089.47	389048.66	0.14
SH15APY001026	Planting Trees or Forestation	S Branch Patapsco	2130908	187822.84	385529.05	0.45
SH15APY001027	Planting Trees or Forestation	S Branch Patapsco	2130908	188036.52	385819.36	0.46
SH15APY001028	Planting Trees or Forestation	S Branch Patapsco	2130908	188656.33	386973.16	0.14
SH15APY001029	Planting Trees or Forestation	S Branch Patapsco	2130908	191432.70	387821.92	0.08
SH15APY001030	Planting Trees or Forestation	S Branch Patapsco	2130908	197421.52	395635.31	0.18
SH15APY001031	Planting Trees or Forestation	S Branch Patapsco	2130908	198456.12	393346.42	0.11
SH15APY001032	Planting Trees or Forestation	Double Pipe Creek	2140304	208596.19	392525.75	0.54
SH15APY001033	Planting Trees or Forestation	Double Pipe Creek	2140304	211385.38	385618.22	0.05
SH15APY001034	Planting Trees or Forestation	Double Pipe Creek	2140304	211318.79	386064.56	0.11
SH15APY001035	Planting Trees or Forestation	Upper Monocacy River	2140303	223155.90	386630.36	0.15
SH15APY001036	Planting Trees or Forestation	S Branch Patapsco	2130908	188987.59	387334.51	0.13
SH15APY001037	Planting Trees or Forestation	S Branch Patapsco	2130908	189898.52	387572.31	0.38

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-27: FMIS # AT0825282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15APY001038	Planting Trees or Forestation	S Branch Patapsco	2130908	191025.84	387842.19	0.23
SH15APY001039	Planting Trees or Forestation	Lower Monocacy River	2140302	199049.20	391968.87	0.28
SH15APY001040	Planting Trees or Forestation	S Branch Patapsco	2130908	198342.16	393673.40	0.13
SH15APY001041	Planting Trees or Forestation	Double Pipe Creek	2140304	208737.57	393056.81	0.30
SH15APY001042	Planting Trees or Forestation	Double Pipe Creek	2140304	208483.91	391763.97	0.08
SH15APY001089	Planting Trees or Forestation	Catoctin Creek	2140305	187817.04	352409.14	0.26
SH15APY001090	Planting Trees or Forestation	Catoctin Creek	2140305	187953.26	353899.18	0.31
SH15APY001091	Planting Trees or Forestation	Lower Monocacy River	2140302	194120.56	362588.37	0.41
SH15APY001092	Planting Trees or Forestation	Lower Monocacy River	2140302	194279.06	362489.75	0.13
SH15APY001093	Planting Trees or Forestation	Lower Monocacy River	2140302	197681.35	365354.36	0.27
SH15APY001094	Planting Trees or Forestation	Catoctin Creek	2140305	201249.58	355058.86	0.03
SH15APY001095	Planting Trees or Forestation	Lower Monocacy River	2140302	194327.29	358931.60	0.15
SH15APY001096	Planting Trees or Forestation	Lower Monocacy River	2140302	184053.24	369188.59	0.26
SH15APY001097	Planting Trees or Forestation	Lower Monocacy River	2140302	192831.57	360812.05	0.06
SH15APY001098	Planting Trees or Forestation	Catoctin Creek	2140305	202412.73	352001.50	0.22
SH15APY001099	Planting Trees or Forestation	Catoctin Creek	2140305	203872.02	350489.44	0.33
SH15APY001100	Planting Trees or Forestation	Lower Monocacy River	2140302	193030.48	359901.70	0.49
SH15APY001101	Planting Trees or Forestation	Catoctin Creek	2140305	187980.57	353356.51	0.18
SH15APY001102	Planting Trees or Forestation	Catoctin Creek	2140305	188304.83	354600.74	0.33
SH15APY001103	Planting Trees or Forestation	Lower Monocacy River	2140302	194000.04	362536.72	0.13
SH15APY001104	Planting Trees or Forestation	Lower Monocacy River	2140302	194363.69	362539.02	0.07
SH15APY001105	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186718.43	356401.69	0.53
SH15APY001106	Planting Trees or Forestation	Catoctin Creek	2140305	201389.83	354983.17	0.08
SH15APY001107	Planting Trees or Forestation	Lower Monocacy River	2140302	183892.91	369252.13	0.20
SH15APY001108	Planting Trees or Forestation	Catoctin Creek	2140305	188020.14	354198.22	0.11
SH15APY001109	Planting Trees or Forestation	Upper Monocacy River	2140303	216211.15	363888.81	0.14
SH15APY001110	Planting Trees or Forestation	Upper Monocacy River	2140303	224442.26	371467.25	0.22
SH15APY001111	Planting Trees or Forestation	Upper Monocacy River	2140303	225719.11	372986.90	0.03
SH15APY001135	Planting Trees or Forestation	Upper Monocacy River	2140303	210766.92	362905.44	0.35
SH15APY001136	Planting Trees or Forestation	Upper Monocacy River	2140303	201901.82	370484.96	0.15
SH14APY001565	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186842.02	346031.60	0.09
SH15APY001139	Planting Trees or Forestation	Potomac River FR Cnty	2140301	182408.59	355581.00	0.33
SH15APY001140	Planting Trees or Forestation	Lower Monocacy River	2140302	186830.29	366312.84	0.27
SH15APY001141	Planting Trees or Forestation	Lower Monocacy River	2140302	191596.35	372143.04	0.41
SH15APY001142	Planting Trees or Forestation	Potomac River FR Cnty	2140301	187119.09	346692.67	0.05
SH15APY001143	Planting Trees or Forestation	Catoctin Creek	2140305	187999.12	354127.76	0.08
SH15APY001144	Planting Trees or Forestation	Upper Monocacy River	2140303	217251.13	364072.62	0.09
SH15APY001145	Planting Trees or Forestation	Upper Monocacy River	2140303	216357.71	363978.60	0.08
SH15APY001146	Planting Trees or Forestation	Lower Monocacy River	2140302	207617.39	373154.72	0.16
SH15APY001147	Planting Trees or Forestation	Lower Monocacy River	2140302	194138.61	362671.59	0.05
SH15APY001148	Planting Trees or Forestation	Lower Monocacy River	2140302	190912.41	374103.69	0.32
SH15APY001149	Planting Trees or Forestation	Lower Monocacy River	2140302	192827.52	361290.44	0.42
SH15APY001150	Planting Trees or Forestation	Catoctin Creek	2140305	200435.14	354591.71	0.52
SH15APY001151	Planting Trees or Forestation	Upper Monocacy River	2140303	226993.75	373313.19	0.16
SH15APY001152	Planting Trees or Forestation	Upper Monocacy River	2140303	216029.31	363810.31	0.31
SH15APY001153	Planting Trees or Forestation	Upper Monocacy River	2140303	225960.60	373077.14	0.05
SH15APY001154	Planting Trees or Forestation	Upper Monocacy River	2140303	225996.76	373171.22	0.88
SH15APY001113	Planting Trees or Forestation	Lower Monocacy River	2140302	191244.71	373070.19	0.11
SH15APY001114	Planting Trees or Forestation	Lower Monocacy River	2140302	192720.99	365359.78	0.12
SH15APY001115	Planting Trees or Forestation	Catoctin Creek	2140305	200255.63	354910.11	0.54
SH15APY001116	Planting Trees or Forestation	Catoctin Creek	2140305	203896.55	350347.43	0.15
SH15APY001117	Planting Trees or Forestation	Upper Monocacy River	2140303	227757.85	373631.52	0.06
SH15APY001118	Planting Trees or Forestation	Upper Monocacy River	2140303	227701.64	373548.60	0.16
SH15APY001119	Planting Trees or Forestation	Upper Monocacy River	2140303	226472.51	373121.78	0.12
SH15APY001120	Planting Trees or Forestation	Upper Monocacy River	2140303	221375.98	367811.91	0.27
SH15APY001121	Planting Trees or Forestation	Upper Monocacy River	2140303	218651.38	364921.48	0.41
SH15APY001122	Planting Trees or Forestation	Upper Monocacy River	2140303	218873.89	365228.58	0.11
SH15APY001123	Planting Trees or Forestation	Lower Monocacy River	2140302	194379.31	362640.22	0.17
SH15APY001124	Planting Trees or Forestation	Lower Monocacy River	2140302	195714.02	363986.21	0.33
SH15APY001125	Planting Trees or Forestation	Upper Monocacy River	2140303	204053.81	365500.95	0.06
SH15APY001126	Planting Trees or Forestation	Upper Monocacy River	2140303	209913.51	362974.67	0.09
SH15APY001127	Planting Trees or Forestation	Upper Monocacy River	2140303	199833.51	368722.62	0.23
SH15APY001128	Planting Trees or Forestation	Upper Monocacy River	2140303	200795.76	369236.17	0.42
SH15APY001129	Planting Trees or Forestation	Catoctin Creek	2140305	187729.59	349746.75	0.05
SH15APY001130	Planting Trees or Forestation	Catoctin Creek	2140305	187580.09	348298.74	0.08
SH15APY001131	Planting Trees or Forestation	Catoctin Creek	2140305	187752.07	351677.57	0.14
SH15APY001132	Planting Trees or Forestation	Lower Monocacy River	2140302	189493.48	358009.89	0.29
SH15APY001133	Planting Trees or Forestation	Lower Monocacy River	2140302	195774.96	364072.27	0.22
SH15APY001134	Planting Trees or Forestation	Upper Monocacy River	2140303	203130.70	365781.92	0.13
SH15APY001044	Planting Trees or Forestation	S Branch Patapsco	2130908	189646.11	403016.53	0.04
SH15APY001155	Planting Trees or Forestation	Upper Monocacy River	2140303	220230.91	366729.26	0.34
SH15APY001161	Planting Trees or Forestation	Lower Monocacy River	2140302	190596.45	359943.46	0.12
SH15APY001160	Planting Trees or Forestation	Lower Monocacy River	2140302	190752.84	360192.44	0.36
SH15APY001159	Planting Trees or Forestation	Lower Monocacy River	2140302	188985.89	356901.36	0.22

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-27: FMIS # AT0825282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15APY001158	Planting Trees or Forestation	Catoctin Creek	2140305	188103.93	354182.56	0.06
SH15APY001157	Planting Trees or Forestation	Lower Monocacy River	2140302	190906.12	360439.54	0.40
SH15APY001166	Planting Trees or Forestation	Lower Monocacy River	2140302	190645.47	360022.70	0.12
SH15APY001156	Planting Trees or Forestation	Catoctin Creek	2140305	188074.00	354099.46	0.24
SH15APY001021	Planting Trees or Forestation	Double Pipe Creek	2140304	210948.31	387016.47	0.31
SH15APY001043	Planting Trees or Forestation	S Branch Patapsco	2130908	190132.64	402692.10	0.12
SH15APY001054	Planting Trees or Forestation	Upper Monocacy River	2140303	224321.35	387331.35	0.64
SH15APY001053	Planting Trees or Forestation	Upper Monocacy River	2140303	225311.48	388007.21	0.66
SH15APY001052	Planting Trees or Forestation	Upper Monocacy River	2140303	225070.04	387762.51	0.19
SH15APY001051	Planting Trees or Forestation	Upper Monocacy River	2140303	227266.11	389247.32	0.25
SH15APY001050	Planting Trees or Forestation	Upper Monocacy River	2140303	225929.09	388931.58	0.02
SH15APY001049	Planting Trees or Forestation	Upper Monocacy River	2140303	223876.31	387075.98	0.46
SH15APY001048	Planting Trees or Forestation	Upper Monocacy River	2140303	223554.27	386887.40	0.07
SH15APY001046	Planting Trees or Forestation	Upper Monocacy River	2140303	225528.11	388308.76	0.28
SH15APY001045	Planting Trees or Forestation	Upper Monocacy River	2140303	225445.24	388177.15	0.05
SH15APY001162	Planting Trees or Forestation	Lower Monocacy River	2140302	192326.24	362085.31	0.62
SH15APY001163	Planting Trees or Forestation	Lower Monocacy River	2140302	192636.96	361850.34	0.50
SH15APY001165	Planting Trees or Forestation	Lower Monocacy River	2140302	192362.42	361916.34	0.61
SH15APY001167	Planting Trees or Forestation	Lower Monocacy River	2140302	192148.26	362231.56	1.49
SH15APY001112	Planting Trees or Forestation	Lower Monocacy River	2140302	184206.97	368587.96	0.15
SH15APY001168	Planting Trees or Forestation	Lower Monocacy River	2140302	184689.59	367959.53	0.33
SH15APY001169	Planting Trees or Forestation	Lower Monocacy River	2140302	184369.31	368283.12	0.21
SH15APY001547	Planting Trees or Forestation	Lower Monocacy River	2140302	192197.73	361950.06	0.47
SH15APY001138	Planting Trees or Forestation	Lower Monocacy River	2140302	190329.53	377649.53	0.22
SH15APY001171	Planting Trees or Forestation	Upper Monocacy River	2140303	210300.79	362969.68	0.04
SH15APY003000	Planting Trees or Forestation	Upper Monocacy River	2140303	225841.91	388836.03	0.16
SH15APY001172	Planting Trees or Forestation	Lower Monocacy River	2140302	192943.58	360126.92	0.28
SH15APY001173	Planting Trees or Forestation	Lower Monocacy River	2140302	192879.44	360465.73	0.28
SH15APY001174	Planting Trees or Forestation	Upper Monocacy River	2140303	227461.42	373447.42	0.12
SH15APY001175	Planting Trees or Forestation	Upper Monocacy River	2140303	227241.95	373346.78	0.11
SH15APY001176	Planting Trees or Forestation	Catoctin Creek	2140305	187626.67	349990.27	0.06
SH15APY001177	Planting Trees or Forestation	Catoctin Creek	2140305	201325.93	354987.21	0.16
SH15APY001178	Planting Trees or Forestation	Catoctin Creek	2140305	199889.49	355191.74	0.42
SH15APY001179	Planting Trees or Forestation	Catoctin Creek	2140305	199741.55	355352.38	0.11
SH15APY001180	Planting Trees or Forestation	Catoctin Creek	2140305	200169.81	354888.85	0.53
SH14APY001608	Planting Trees or Forestation	Catoctin Creek	2140305	201434.09	354896.89	0.32
SH14APY001609	Planting Trees or Forestation	Catoctin Creek	2140305	188213.36	354433.02	0.02
SH14APY001610	Planting Trees or Forestation	Potomac River FR Cnty	2140301	187050.96	346433.94	0.03
SH14APY001611	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186949.24	346203.59	0.03
SH15APY001137	Planting Trees or Forestation	Potomac River FR Cnty	2140301	186665.12	345799.39	0.02
SH14APY001614	Planting Trees or Forestation	Upper Monocacy River	2140303	203981.05	365550.89	0.04
SH14APY001615	Planting Trees or Forestation	Upper Monocacy River	2140303	204239.21	365384.61	0.24
SH14APY001616	Planting Trees or Forestation	Lower Monocacy River	2140302	184128.65	368850.17	0.07
SH14APY001621	Planting Trees or Forestation	Upper Monocacy River	2140303	201715.12	370333.87	0.59
SH14APY001622	Planting Trees or Forestation	Catoctin Creek	2140305	200017.16	355171.20	0.86
					Complete BMP Acreage Total	**53.20**
					BMP Count	**193**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-28: FMIS # AX0335182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18ALN000047	Stream Restoration	Patapsco River L N Br	2130906	173446.15	423202.32	2.38
					Complete BMP Acreage Total	**2.38**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-29: FMIS # AX0805124						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH14APY003001	Planting Trees or Forestation	Anacostia River	2140205	153741.99	406480.61	0.08
SH14APY003002	Planting Trees or Forestation	Anacostia River	2140205	153758.87	406314.73	0.18
					Complete BMP Acreage Total	**0.26**
					BMP Count	**2**

Comprehensive List of Restoration Practices By FMIS Contract

Table H-30: FMIS # AX2645182

Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH14RST030567	Bio-Swale	Loch Raven Reservoir	2130805	226214.21	430694.22	0.97
SH14RST030568	Bio-Swale	Loch Raven Reservoir	2130805	225892.52	430805.64	1.30
SH14RST030569	Bio-Swale	Loch Raven Reservoir	2130805	225573.27	430790.35	0.25
SH13RST030570	Bio-Swale	Loch Raven Reservoir	2130805	225538.47	430780.96	0.12
SH13RST030571	Bio-Swale	Loch Raven Reservoir	2130805	225350.28	430731.03	0.23
SH13RST030572	Bio-Swale	Loch Raven Reservoir	2130805	224681.02	430549.92	0.25
SH13RST030573	Bio-Swale	Loch Raven Reservoir	2130805	224548.31	430517.05	0.07
SH13RST030574	Bio-Swale	Loch Raven Reservoir	2130805	224501.56	430506.45	0.39
SH13RST030575	Bio-Swale	Loch Raven Reservoir	2130805	224211.38	430463.57	1.04
SH13RST030576	Bio-Swale	Loch Raven Reservoir	2130805	223730.41	430483.50	0.23
SH13RST030577	Bio-Swale	Loch Raven Reservoir	2130805	223525.31	430497.28	0.77
SH13RST030578	Bio-Swale	Loch Raven Reservoir	2130805	223195.56	430500.15	1.08
SH13RST030580	Bio-Swale	Loch Raven Reservoir	2130805	222504.44	430322.42	0.16
SH13RST030581	Bio-Swale	Loch Raven Reservoir	2130805	222214.19	430227.60	0.20
SH13RST030582	Bio-Swale	Loch Raven Reservoir	2130805	221910.75	430129.14	0.19
SH13RST030583	Bio-Swale	Loch Raven Reservoir	2130805	221576.82	430020.70	0.22
SH13RST030584	Bio-Swale	Loch Raven Reservoir	2130805	221350.87	429947.27	0.21
SH13RST030585	Bio-Swale	Loch Raven Reservoir	2130805	221124.45	429854.48	1.24
SH13RST030587	Bio-Swale	Loch Raven Reservoir	2130805	222777.37	430413.60	0.70
SH13RST070046	Bio-Swale	Lower Susquehanna River	2120201	211893.55	480295.47	0.44
SH13RST070051	Bio-Swale	Lower Susquehanna River	2120201	211978.26	480432.58	0.44
SH13RST070052	Bio-Swale	Lower Susquehanna River	2120201	212093.88	480629.15	0.45
SH13RST070053	Bioretention	Lower Susquehanna River	2120201	212245.72	480906.69	1.23
SH13RST070071	Bio-Swale	Lower Susquehanna River	2120201	212340.69	481127.38	0.21
SH13RST070072	Bio-Swale	Lower Susquehanna River	2120201	212416.18	481330.73	1.45
SH13RST070073	Bio-Swale	Furnace Bay	2130609	212626.83	482097.77	0.53
SH13RST070074	Bio-Swale	Furnace Bay	2130609	212672.98	482273.60	0.51
SH13RST070075	Bio-Swale	Furnace Bay	2130609	212717.42	482450.68	0.64
SH13RST070076	Bio-Swale	Furnace Bay	2130609	212765.51	482625.19	0.56
SH13RST070077	Bio-Swale	Furnace Bay	2130609	212876.15	483047.56	1.15
SH13RST070081	Bioretention	Furnace Bay	2130609	212933.59	483263.15	0.55
SH13RST070082	Bio-Swale	Furnace Bay	2130609	212976.08	483423.79	0.82
SH13RST070083	Bio-Swale	Furnace Bay	2130609	213056.30	483727.66	0.37
SH13RST070084	Bio-Swale	Furnace Bay	2130609	213106.90	483915.19	0.74
SH13RST070085	Bio-Swale	Furnace Bay	2130609	213225.53	484363.81	0.92
SH13RST070086	Bio-Swale	Furnace Bay	2130609	213376.86	484875.50	0.69
SH13RST070087	Bio-Swale	Furnace Bay	2130609	213432.35	485011.52	0.27
SH13RST070088	Bioretention	Furnace Bay	2130609	213487.40	485133.76	0.67
SH12RST120310	Bio-Swale	Lower Winters Run	2130702	201433.00	458560.49	0.55
SH12RST120311	Bio-Swale	Atkisson Reservoir	2130703	202840.89	457925.31	0.28
SH12RST120312	Bio-Swale	Atkisson Reservoir	2130703	202916.41	457893.27	0.15
SH12RST120313	Bio-Swale	Atkisson Reservoir	2130703	203041.47	457832.11	0.37
SH12RST120314	Bio-Swale	Atkisson Reservoir	2130703	203298.50	457707.55	0.24
SH12RST120315	Bio-Swale	Atkisson Reservoir	2130703	203772.38	457454.22	0.47
SH12RST120317	Bio-Swale	Atkisson Reservoir	2130703	203866.56	457392.36	0.28
SH12RST120318	Bio-Swale	Atkisson Reservoir	2130703	204183.55	457117.17	0.11
SH12RST120319	Micro-Bioretention	Atkisson Reservoir	2130703	204374.02	456943.95	0.15
SH12RST120320	Micro-Bioretention	Atkisson Reservoir	2130703	204396.12	456924.06	0.94
SH12RST120321	Bio-Swale	Atkisson Reservoir	2130703	205083.09	456598.28	0.29
SH12RST120323	Bio-Swale	Atkisson Reservoir	2130703	206873.42	455220.11	0.14
SH12RST120324	Bio-Swale	Atkisson Reservoir	2130703	207292.54	454748.82	0.21
SH12RST120328	Bio-Swale	Atkisson Reservoir	2130703	205939.62	456348.44	0.41
SH13RST120333	Bio-Swale	Lower Winters Run	2130702	201323.68	458590.40	0.31
SH13RST120335	Bio-Swale	Lower Winters Run	2130702	201909.27	458370.75	0.30
SH13RST120337	Bio-Swale	Lower Winters Run	2130702	202263.61	458201.68	0.24
SH13RST120341	Bio-Swale	Atkisson Reservoir	2130703	204760.77	456679.18	0.85
SH13RST120343	Bio-Swale	Atkisson Reservoir	2130703	205285.84	456547.86	0.23
SH13RST120345	Bio-Swale	Atkisson Reservoir	2130703	206188.96	456114.19	0.73
SH13RST120347	Bio-Swale	Atkisson Reservoir	2130703	206309.52	455943.64	0.62
SH13RST120349	Bio-Swale	Atkisson Reservoir	2130703	207070.10	454996.18	0.35
					Complete BMP Acreage Total	**30.48**
					BMP Count	**60**

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Table H-31: FMIS # AX2645282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13RST150444	Bio-Swale	Seneca Creek	2140208	163698.25	376625.14	0.16
SH13RST150445	Bio-Swale	Seneca Creek	2140208	163351.29	377015.54	0.14
SH13RST150446	Bio-Swale	Seneca Creek	2140208	163368.38	376963.36	0.23
SH13RST150447	Bio-Swale	Seneca Creek	2140208	162646.04	379136.06	0.20
SH13RST150448	Bio-Swale	Seneca Creek	2140208	162602.66	379181.23	0.17
SH13RST150449	Bio-Swale	Potomac River MO Cnty	2140202	161903.11	379810.63	0.23
SH13RST150450	Bio-Swale	Potomac River MO Cnty	2140202	161666.04	380112.07	0.22
SH13RST150451	Bio-Swale	Potomac River MO Cnty	2140202	161227.52	380656.01	0.29
SH13RST150452	Bio-Swale	Potomac River MO Cnty	2140202	160055.83	381691.03	0.16
SH13RST150456	Bio-Swale	Seneca Creek	2140208	163305.99	377729.32	0.21
SH13RST150457	Bio-Swale	Seneca Creek	2140208	162751.02	378981.42	0.58
SH13RST150459	Bio-Swale	Potomac River MO Cnty	2140202	161976.14	379742.80	0.40
SH13RST150460	Bio-Swale	Potomac River MO Cnty	2140202	161618.92	380198.04	0.22
SH15RST160319	Bio-Swale	Western Branch	2131103	138735.97	413043.61	0.74
SH15RST160827	Bio-Swale	Anacostia River	2140205	141967.89	411909.99	0.71
SH15RST160830	Micro-Bioretention	Anacostia River	2140205	143688.99	411674.13	0.73
SH15RST160831	Micro-Bioretention	Anacostia River	2140205	143736.86	411600.62	0.63
					Complete BMP Acreage Total	**6.02**
					BMP Count	**17**

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Table H-32: FMIS # AX2645382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16RST080500	Bioretention	Potomac River L tidal	2140101	77731.85	403032.12	0.46
SH12RST080501	Bio-Swale	Potomac River L tidal	2140101	77797.42	403127.66	0.25
SH12RST080502	Bio-Swale	Potomac River L tidal	2140101	77881.55	403228.15	0.28
SH12RST080503	Bio-Swale	Potomac River L tidal	2140101	78016.19	403360.71	0.31
SH12RST080504	Bio-Swale	Wicomico River	2140106	78143.66	403459.97	0.44
SH12RST080505	Bio-Swale	Wicomico River	2140106	78314.87	403559.08	0.33
SH12RST080506	Bioretention	Wicomico River	2140106	78496.15	403637.13	0.62
SH14RST080507	Bio-Swale	Wicomico River	2140106	79522.68	403820.53	0.48
SH14RST080508	Bio-Swale	Wicomico River	2140106	79817.08	403865.76	0.50
SH14RST080512	Bio-Swale	Wicomico River	2140106	80556.53	403977.70	0.36
SH14RST080513	Bio-Swale	Wicomico River	2140106	80733.08	404005.84	0.44
SH14RST080515	Bio-Swale	Wicomico River	2140106	81433.75	404109.40	0.29
SH16RST080510	Bio-Swale	Wicomico River	2140106	80100.65	403908.93	0.35
				Complete BMP Acreage Total		**5.11**
				BMP Count		**13**

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Table H-33: FMIS # AX2645482						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13RST130520	Bio-Swale	Little Patuxent River	2131105	181474.37	407730.20	0.27
SH13RST130521	Bio-Swale	Little Patuxent River	2131105	181293.82	407932.93	0.42
SH13RST130522	Bio-Swale	Little Patuxent River	2131105	181047.34	408211.24	0.73
SH13RST130524	Bio-Swale	Little Patuxent River	2131105	180727.51	408640.04	0.48
SH13RST130525	Bio-Swale	Little Patuxent River	2131105	180642.51	408781.31	0.41
SH13RST130526	Bio-Swale	Little Patuxent River	2131105	180511.31	408996.92	0.35
SH13RST130527	Bio-Swale	Little Patuxent River	2131105	180408.84	409166.00	0.51
SH13RST130528	Bio-Swale	Little Patuxent River	2131105	180294.02	409354.25	0.54
SH13RST130529	Bio-Swale	Little Patuxent River	2131105	180258.98	409413.00	0.45
SH13RST130530	Bio-Swale	Little Patuxent River	2131105	179885.12	410034.63	0.42
SH13RST130532	Micro-Bioretention	Little Patuxent River	2131105	179796.16	410173.78	0.46
SH12RST130533	Bio-Swale	Little Patuxent River	2131105	179755.34	410241.30	0.54
SH13RST130534	Bio-Swale	Little Patuxent River	2131105	179574.70	410535.11	0.94
SH12RST130536	Bio-Swale	Little Patuxent River	2131105	179470.39	410687.90	0.37
SH13RST130539	Bio-Swale	Little Patuxent River	2131105	180760.51	408588.74	0.42
SH14RST210199	Bio-Swale	Conococheague Creek	2140504	220795.84	335444.71	0.29
SH14RST210201	Bio-Swale	Conococheague Creek	2140504	220798.55	335139.91	0.43
SH14RST210202	Bio-Swale	Conococheague Creek	2140504	220796.41	335088.75	0.19
SH14RST210203	Bio-Swale	Conococheague Creek	2140504	220797.63	334842.39	0.69
SH14RST210204	Bio-Swale	Conococheague Creek	2140504	220802.96	334991.47	0.17
SH14RST210205	Bio-Swale	Conococheague Creek	2140504	220789.53	334981.76	0.09
SH14RST210208	Bio-Swale	Antietam Creek	2140502	220599.55	336612.63	0.04
SH14RST210209	Bio-Swale	Antietam Creek	2140502	220624.82	336567.11	0.30
SH14RST210216	Bio-Swale	Conococheague Creek	2140504	220769.23	336282.72	0.28
SH16RST130531	Bio-Swale	Little Patuxent River	2131105	180175.30	409550.06	0.27
SH16RST210193	Bio-Swale	Conococheague Creek	2140504	220794.76	335875.16	0.17
SH16RST210194	Bio-Swale	Conococheague Creek	2140504	220794.46	335950.74	0.30
SH16RST210195	Bio-Swale	Conococheague Creek	2140504	220794.95	335856.15	0.07
SH16RST210196	Bio-Swale	Conococheague Creek	2140504	220794.83	335823.63	0.17
SH16RST210197	Bio-Swale	Conococheague Creek	2140504	220795.58	335320.73	0.32
SH16RST210198	Bio-Swale	Conococheague Creek	2140504	220795.67	335289.23	0.13
SH16RST210206	Bio-Swale	Conococheague Creek	2140504	220721.33	333577.16	0.19
SH16RST210207	Bio-Swale	Conococheague Creek	2140504	220710.34	333551.18	0.19
SH16RST210210	Bio-Swale	Antietam Creek	2140502	220644.66	336627.96	0.07
SH16RST210211	Bio-Swale	Antietam Creek	2140502	220670.18	336574.38	0.19
SH16RST100461	Bio-Swale	Upper Monocacy River	2140303	205217.68	364704.16	0.19
SH16RST100462	Micro-Bioretention	Upper Monocacy River	2140303	205705.10	364385.59	0.44
SH16RST100463	Bio-Swale	Upper Monocacy River	2140303	205947.50	364226.94	0.09
SH16RST100464	Bio-Swale	Upper Monocacy River	2140303	206436.65	363907.25	0.60
SH16RST100465	Bio-Swale	Upper Monocacy River	2140303	206582.21	363814.54	0.39
SH16RST100466	Bio-Swale	Upper Monocacy River	2140303	206957.81	363653.77	0.56
SH16RST100467	Bio-Swale	Upper Monocacy River	2140303	207162.47	363606.27	0.75
SH16RST100468	Bio-Swale	Upper Monocacy River	2140303	207707.89	363522.97	0.33
SH16RST100469	Bio-Swale	Upper Monocacy River	2140303	207999.21	363477.44	1.20
SH16RST100470	Bio-Swale	Upper Monocacy River	2140303	208846.96	363283.17	0.77
SH16RST100471	Micro-Bioretention	Upper Monocacy River	2140303	208981.10	363234.59	0.48
SH16RST100472	Micro-Bioretention	Upper Monocacy River	2140303	209348.67	363101.05	0.18
SH16RST100473	Micro-Bioretention	Upper Monocacy River	2140303	209615.13	363034.12	0.94
SH16RST100474	Bio-Swale	Upper Monocacy River	2140303	209864.42	363008.48	0.67
SH16RST100475	Bio-Swale	Upper Monocacy River	2140303	210171.28	363001.52	0.71
SH16RST100476	Bio-Swale	Upper Monocacy River	2140303	210586.06	362971.93	0.80
SH16RST100477	Micro-Bioretention	Upper Monocacy River	2140303	210851.01	362926.60	0.96
SH16RST100479	Bio-Swale	Upper Monocacy River	2140303	211082.66	362884.93	0.26
SH16RST100480	Bio-Swale	Upper Monocacy River	2140303	211245.18	362854.70	0.74
SH16RST100481	Bio-Swale	Upper Monocacy River	2140303	211565.96	362798.05	0.48
					Complete BMP Acreage Total	**23.40**
					BMP Count	**55**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-34: FMIS # AX3765360						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH12ALN000013	Stream Restoration	Anacostia River	2140205	159559.47	397321.50	60.11
					Complete BMP Acreage Total	**60.11**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-35: FMIS # AX3765560						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH14ALN000010	Stream Restoration	Rock Creek	2140206	162449.00	391909.38	29.07
SH16ALN000011	Stream Restoration	Rock Creek	2140206	160195.12	391644.34	62.92
					Complete BMP Acreage Total	**91.99**
					BMP Count	**2**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-36: FMIS # AX3765D60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000008	Stream Restoration	Anacostia River	2140205	148865.47	405647.43	64.50
					Complete BMP Acreage Total	**64.50**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-37: FMIS # AX3765E60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13ALN000003	Stream Restoration	Anacostia River	2140205	159559.85	402146.09	20.26
SH13ALN000005	Stream Restoration	Anacostia River	2140205	160042.82	401413.54	5.46
SH13ALN000007	Stream Restoration	Anacostia River	2140205	158520.42	401822.08	27.89
					Complete BMP Acreage Total	**53.61**
					BMP Count	**3**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-38: FMIS # AX3765F60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000004	Stream Restoration	Anacostia River	2140205	158745.99	400685.31	7.12
SH15ALN000006	Stream Restoration	Anacostia River	2140205	158471.35	400379.90	20.14
					Complete BMP Acreage Total	**27.26**
					BMP Count	**2**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-39: FMIS # AX3765K60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000009	Stream Restoration	Anacostia River	2140205	151553.44	408448.77	12.09
					Complete BMP Acreage Total	**12.09**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-40: FMIS # AX3765L60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16ALN000012	Stream Restoration	Anacostia River	2140205	157814.56	398261.67	51.71
					Complete BMP Acreage Total	**51.71**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-41: FMIS # AX3765N60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13ALN000032	Stream Restoration	Seneca Creek	2140208	170966.32	383824.12	39.91
					Complete BMP Acreage Total	**39.91**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-42: FMIS # AX3765U60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13ALN000014	Stream Restoration	Rock Creek	2140206	163439.62	386982.29	48.54
					Complete BMP Acreage Total	**48.54**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-43: FMIS # AX3785R60						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17ALN000046	Stream Restoration	Anacostia River	2140205	154518.98	401632.13	33.06
SH17ALN000045	Stream Restoration	Anacostia River	2140205	155213.31	401010.05	30.55
				Complete BMP Acreage Total		**63.61**
				BMP Count		**2**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-44: FMIS # AX7665182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17RST120055	Ext Det Structure - Wet	Deer Creek	2120202	210389.84	464481.73	1.44
SH17RST120094	Wet Pond - Wetland	Lower Winters Run	2130702	196802.07	456546.22	2.91
SH17RST030737	Grass Swale	Loch Raven Reservoir	2130805	200330.36	429190.56	0.44
SH17RST030181	Wet Pond - Wetland	Bird River	2130803	189787.86	448217.96	2.03
SH17RST030186	Submerged Gravel Wetlands	Bird River	2130803	190008.66	448423.09	0.93
SH17RST030230	Wet Pond - Wetland	Back River	2130901	185031.25	444228.81	2.89
SH17RST030267	Submerged Gravel Wetlands	Loch Raven Reservoir	2130805	193908.13	434579.05	2.08
SH17RST030744	Submerged Gravel Wetlands	Back River	2130901	185115.81	444184.74	1.30
SH18RST120103	Submerged Gravel Wetlands	Bynum Run	2130704	208360.73	457544.83	1.40
SH18RST120104	Submerged Gravel Wetlands	Bynum Run	2130704	208480.04	457742.18	1.00
SH18RST120136	Wet Pond - Wetland	Deer Creek	2120202	210045.21	465575.40	2.36
SH18RST122047	Grass Swale	Lower Winters Run	2130702	198446.10	459731.49	0.30
					Complete BMP Acreage Total	**19.08**
					BMP Count	**12**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-45: FMIS # AX7665582						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST210001	Submerged Gravel Wetlands	Conococheague Creek	2140504	220473.79	331330.69	3.68
SH18RST210015	Bioretention	Marsh Run	2140503	216020.27	335708.08	0.98
SH18RST210017	Submerged Gravel Wetlands	Antietam Creek	2140502	222826.28	340058.25	8.87
SH18RST210200	Submerged Gravel Wetlands	Little Tonoloway Creek	2140509	226240.49	293338.11	2.92
SH18RST210213	Submerged Gravel Wetlands	Conococheague Creek	2140504	217893.25	333541.11	0.27
					Complete BMP Acreage Total	**16.72**
					BMP Count	**5**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-46: FMIS # AX7665C82						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST100037	Wet Pond - Wetland	Lower Monocacy River	2140302	206029.91	372864.27	2.59
					Complete BMP Acreage Total	**2.59**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-47: FMIS # AX9295182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH14RST160390	Bio-Swale	Western Branch	2131103	137238.72	421739.59	0.46
SH14RST160391	Bio-Swale	Western Branch	2131103	137279.79	421977.57	0.50
SH14RST160394	Bio-Swale	Western Branch	2131103	137232.19	422379.55	0.65
SH14RST160396	Bio-Swale	Western Branch	2131103	137104.54	422635.62	0.48
SH14RST160397	Bio-Swale	Western Branch	2131103	137044.39	422844.01	0.58
SH14RST160398	Bio-Swale	Western Branch	2131103	137028.79	422977.42	0.27
SH14RST160399	Bio-Swale	Western Branch	2131103	137019.81	423058.74	0.60
SH14RST160400	Bio-Swale	Western Branch	2131103	136989.61	423327.34	0.91
SH14RST160410	Bio-Swale	Western Branch	2131103	136964.80	423548.88	0.46
SH14RST160411	Bio-Swale	Western Branch	2131103	136940.73	423730.78	0.73
SH14RST160412	Bio-Swale	Patuxent River upper	2131104	136869.30	424063.35	0.73
SH14RST160415	Bio-Swale	Patuxent River upper	2131104	136811.42	424297.42	0.38
SH14RST160416	Bio-Swale	Patuxent River upper	2131104	136724.08	424649.83	0.63
SH14RST160418	Bio-Swale	Patuxent River upper	2131104	136697.73	424755.73	0.75
SH15RST160886	Bio-Swale	Western Branch	2131103	136222.67	414858.53	0.99
SH16RST161120	Bio-Swale	Western Branch	2131103	127811.41	413931.71	1.63
SH16RST161121	Bio-Swale	Western Branch	2131103	127745.79	414149.29	0.51
					Complete BMP Acreage Total	**11.26**
					BMP Count	**17**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-48: FMIS # BA2015582						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST031889	Bio-Swale	Patapsco River L N Br	2130906	173688.35	425585.61	0.45
SH18RST031890	Bio-Swale	Patapsco River L N Br	2130906	173519.14	425698.07	0.30
SH18RST031891	Bio-Swale	Patapsco River L N Br	2130906	173321.26	425757.11	0.66
SH18RST031892	Bio-Swale	Patapsco River L N Br	2130906	173168.50	425761.83	0.37
SH18RST031893	Grass Swale	Patapsco River L N Br	2130906	173580.10	425636.41	0.22
SH18RST031899	Bioretention	Patapsco River L N Br	2130906	172824.63	425791.14	0.72
SH18RST031901	Sand Filter	Patapsco River L N Br	2130906	175324.60	424238.73	0.36
SH18RST031902	Grass Swale	Patapsco River L N Br	2130906	175168.44	424603.16	0.48
					Complete BMP Acreage Total	**3.56**
					BMP Count	**8**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-49: FMIS # BA2015582						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST031876	Bioretention	Patapsco River L N Br	2130906	174315.05	430278.58	2.47
SH18RST031877	Bioretention	Patapsco River L N Br	2130906	174468.19	425352.29	1.24
SH18RST031878	Bioretention	Patapsco River L N Br	2130906	174397.29	425257.06	0.58
SH18APY001872	Impervious Surface Elimination	Patapsco River L N Br	2130906	175716.09	427825.55	0.03
					Complete BMP Acreage Total	**4.32**
					BMP Count	**4**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-50: FMIS # CE2705182						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH18APY001679	Planting Trees or Forestation	Octoraro Creek	2120203	225899.23	478145.58	0.22
SH18APY001680	Planting Trees or Forestation	Octoraro Creek	2120203	227653.32	481560.69	0.47
SH18APY001821	Planting Trees or Forestation	Octoraro Creek	2120203	223799.38	479461.46	0.44
SH18APY001822	Planting Trees or Forestation	Octoraro Creek	2120203	226289.23	478538.73	0.52
SH18APY001823	Planting Trees or Forestation	Octoraro Creek	2120203	227223.15	480587.51	0.64
SH18APY001824	Planting Trees or Forestation	Northeast River	2130608	222750.50	489456.00	0.14
SH18APY001825	Planting Trees or Forestation	Northeast River	2130608	225511.21	487797.98	0.14
SH18APY001826	Planting Trees or Forestation	Northeast River	2130608	224215.15	488468.74	0.24
SH18APY001827	Planting Trees or Forestation	Northeast River	2130608	226027.19	487590.63	0.39
SH18APY001828	Planting Trees or Forestation	Northeast River	2130608	223744.17	488829.49	0.89
SH18APY001829	Planting Trees or Forestation	Lower Susquehanna River	2120201	216499.56	479727.84	0.16
SH18APY001830	Planting Trees or Forestation	Octoraro Creek	2120203	223648.30	479485.30	0.12
SH18APY001831	Planting Trees or Forestation	Northeast River	2130608	222206.12	489633.39	0.45
SH18APY001832	Planting Trees or Forestation	Octoraro Creek	2120203	227104.89	478949.57	0.84
SH18APY001844	Planting Trees or Forestation	Octoraro Creek	2120203	222371.73	479346.13	0.14
SH18APY001845	Planting Trees or Forestation	Octoraro Creek	2120203	222703.66	479445.85	0.34
SH18APY001846	Planting Trees or Forestation	Octoraro Creek	2120203	223571.17	479491.17	0.14
SH18APY001847	Planting Trees or Forestation	Lower Susquehanna River	2120201	218270.38	478773.20	0.58
SH18APY001848	Planting Trees or Forestation	Octoraro Creek	2120203	218778.52	479291.27	0.18
SH18APY001849	Planting Trees or Forestation	Octoraro Creek	2120203	227739.88	482100.62	0.44
SH18APY001850	Planting Trees or Forestation	Octoraro Creek	2120203	225754.54	478089.84	0.51
SH18APY001851	Planting Trees or Forestation	Octoraro Creek	2120203	226286.85	478650.64	0.37
SH18APY001852	Planting Trees or Forestation	Northeast River	2130608	224953.94	488136.60	0.20
SH18APY001853	Planting Trees or Forestation	Northeast River	2130608	223297.16	489122.80	1.81
SH18APY001854	Planting Trees or Forestation	Little Elk Creek	2130605	222785.35	498179.83	0.13
SH18APY001855	Planting Trees or Forestation	Lower Susquehanna River	2120201	217979.96	478483.31	0.11
SH18APY001856	Planting Trees or Forestation	Northeast River	2130608	217724.60	490077.70	0.46
SH18APY001857	Planting Trees or Forestation	Northeast River	2130608	221913.79	489722.67	0.29
SH18APY001858	Planting Trees or Forestation	Northeast River	2130608	221795.31	489754.42	0.27
SH18APY001859	Planting Trees or Forestation	Octoraro Creek	2120203	227127.21	480336.21	0.15
					Complete BMP Acreage Total	**11.78**
					BMP Count	**30**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-51: FMIS # CE2725282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST070484	Bioretention	Northeast River	2130608	224549.80	488241.10	0.36
SH18RST070485	Bioretention	Northeast River	2130608	224608.09	488215.82	0.84
SH18RST070487	Bio-Swale	Northeast River	2130608	222677.83	489445.31	0.31
SH18RST070489	Bioretention	Northeast River	2130608	219502.78	489444.19	0.79
SH18RST070490	Bio-Swale	Little Elk Creek	2130605	216711.43	498926.15	0.39
SH18RST070491	Bio-Swale	Little Elk Creek	2130605	216767.09	498953.59	0.32
SH18RST070492	Submerged Gravel Wetlands	Little Elk Creek	2130605	221354.32	498522.18	1.00
SH18RST070493	Grass Swale	Northeast River	2130608	223070.11	489221.09	0.12
SH18RST070494	Grass Swale	Northeast River	2130608	224329.79	488382.52	0.19
SH18RST070495	Bio-Swale	Northeast River	2130608	223398.49	489006.90	0.67
					Complete BMP Acreage Total	**4.99**
					BMP Count	**10**

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Table H-52: FMIS # CH2985182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST082828	Bioretention	Mattawoman Creek	2140111	99002.84	383696.58	0.59
SH18RST082829	Wet Pond - Wetland	Mattawoman Creek	2140111	98897.90	383855.55	5.08
SH18RST082831	Micro-Bioretention	Mattawoman Creek	2140111	98305.52	383839.61	0.13
SH18RST082832	Bioretention	Mattawoman Creek	2140111	98246.30	383642.40	0.25
SH18RST082833	Micro-Bioretention	Mattawoman Creek	2140111	98035.42	383850.12	0.25
					Complete BMP Acreage Total	**6.30**
					BMP Count	**5**

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Table H-53: FMIS # DNR - Million Tree

Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH11APY003002	Planting Trees or Forestation	Liberty Reservoir	2130907	201572.62	400936.00	1.45
SH11APY003001	Planting Trees or Forestation	Liberty Reservoir	2130907	199462.92	399784.47	4.42
SH11APY000299	Planting Trees or Forestation	Patapsco River L N Br	2130906	172605.88	422227.57	2.82
SH11APY000260	Planting Trees or Forestation	Lower Susquehanna River	2120201	214716.11	474110.66	2.81
SH11APY000248	Planting Trees or Forestation	Lower Susquehanna River	2120201	214768.58	474368.11	1.23
SH11APY000249	Planting Trees or Forestation	Lower Susquehanna River	2120201	214691.28	474353.39	1.19
SH11APY000250	Planting Trees or Forestation	Lower Susquehanna River	2120201	214758.43	474573.15	1.16
SH11APY000251	Planting Trees or Forestation	Lower Susquehanna River	2120201	214401.89	474134.89	1.81
SH11APY000252	Planting Trees or Forestation	Lower Susquehanna River	2120201	214220.61	473984.00	3.65
SH11APY000253	Planting Trees or Forestation	Lower Susquehanna River	2120201	214928.58	473306.29	2.80
SH11APY000254	Planting Trees or Forestation	Lower Susquehanna River	2120201	214806.95	473224.56	2.84
SH11APY000255	Planting Trees or Forestation	Lower Susquehanna River	2120201	214820.93	473449.24	1.91
SH11APY000256	Planting Trees or Forestation	Lower Susquehanna River	2120201	214701.41	473520.95	5.74
SH11APY000257	Planting Trees or Forestation	Lower Susquehanna River	2120201	214680.07	473189.64	2.88
SH11APY000258	Planting Trees or Forestation	Little Gunpowder Falls	2130804	194117.84	454474.84	1.13
SH11APY000259	Planting Trees or Forestation	Little Gunpowder Falls	2130804	193984.91	454490.44	1.01
SH12APY000414	Planting Trees or Forestation	Big Elk Creek	2130606	228105.26	499403.01	1.13
SH12APY000358	Planting Trees or Forestation	Lower Gunpowder Falls	2130802	194780.23	449453.10	17.15
SH12APY000359	Planting Trees or Forestation	Gunpowder River	2130801	188222.81	455121.35	7.64
SH12APY000416	Planting Trees or Forestation	Potomac River M tidal	2140102	87967.77	376896.14	1.34
SH12APY000417	Planting Trees or Forestation	Mattawoman Creek	2140111	101023.13	386530.41	8.78
SH12APY000504	Planting Trees or Forestation	Patuxent River middle	2131102	119203.16	425497.69	0.49
SH12APY000505	Planting Trees or Forestation	Patuxent River lower	2131101	107526.84	426532.97	1.41
SH12APY000418	Planting Trees or Forestation	Potomac River M tidal	2140102	105901.93	389922.94	2.16
SH12APY000419	Planting Trees or Forestation	Mattawoman Creek	2140111	100085.72	392563.00	0.35
SH12APY000415	Planting Trees or Forestation	Big Elk Creek	2130606	227154.76	498505.75	1.32
SH12APY000512	Planting Trees or Forestation	Little Conococheague	2140505	225433.22	318219.86	1.62
SH12APY000513	Planting Trees or Forestation	Sideling Hill Creek	2140510	222317.60	284794.46	1.18
SH12APY000429	Planting Trees or Forestation	Port Tobacco River	2140109	86274.64	395795.14	1.67
SH12APY000430	Planting Trees or Forestation	Port Tobacco River	2140109	86638.72	396192.37	0.32
SH12APY000428	Planting Trees or Forestation	Port Tobacco River	2140109	86848.72	395674.09	0.04
SH12APY000357	Planting Trees or Forestation	Severn River	2131002	155935.35	434341.69	0.63
SH12APY000431	Planting Trees or Forestation	Potomac River M tidal	2140102	105680.12	389578.05	2.71
SH12APY000432	Planting Trees or Forestation	Mattawoman Creek	2140111	99440.44	392742.41	0.25
SH11APY003004	Planting Trees or Forestation	Mattawoman Creek	2140111	99277.64	392737.57	0.38
SH12APY000433	Planting Trees or Forestation	Mattawoman Creek	2140111	99372.77	392839.41	0.15
SH12APY000434	Planting Trees or Forestation	Mattawoman Creek	2140111	99271.23	392772.98	0.05
SH12APY000435	Planting Trees or Forestation	Mattawoman Creek	2140111	98797.42	392774.30	0.46
SH12APY000436	Planting Trees or Forestation	Mattawoman Creek	2140111	98084.62	392777.45	0.32
SH12APY000437	Planting Trees or Forestation	Mattawoman Creek	2140111	97989.76	392697.75	0.08
SH12APY000438	Planting Trees or Forestation	Mattawoman Creek	2140111	97967.64	392730.80	0.02
SH12APY000506	Planting Trees or Forestation	Patuxent River lower	2131101	107282.65	426731.24	0.73
SH12APY000507	Planting Trees or Forestation	Patuxent River lower	2131101	106768.02	426524.06	1.08
SH12APY000508	Planting Trees or Forestation	Patuxent River lower	2131101	106980.17	426106.13	0.50
SH11APY003017	Planting Trees or Forestation	Patuxent River lower	2131101	107057.87	426054.08	0.43
SH17APY003001	Planting Trees or Forestation	Little Conococheague	2140505	225343.49	318523.44	1.84
SH12APY000514	Planting Trees or Forestation	Little Conococheague	2140505	225473.94	318595.96	0.58
SH12APY000426	Planting Trees or Forestation	Potomac River L tidal	2140101	85515.37	395219.58	1.66
SH12APY000439	Planting Trees or Forestation	Potomac River L tidal	2140101	85259.70	394032.14	2.72
SH12APY000440	Planting Trees or Forestation	Potomac River L tidal	2140101	85870.37	395593.56	0.95
SH12APY000441	Planting Trees or Forestation	Potomac River L tidal	2140101	84757.44	393672.35	0.81
SH12APY000442	Planting Trees or Forestation	Potomac River L tidal	2140101	84696.94	394240.06	0.84
SH12APY000443	Planting Trees or Forestation	Potomac River L tidal	2140101	85140.84	394677.24	1.03
SH12APY000444	Planting Trees or Forestation	Potomac River L tidal	2140101	84805.55	393950.00	0.48
SH12APY000445	Planting Trees or Forestation	Potomac River L tidal	2140101	86145.61	396007.76	0.64
SH12APY000446	Planting Trees or Forestation	Potomac River L tidal	2140101	85082.88	394275.27	0.39
SH12APY000447	Planting Trees or Forestation	Potomac River L tidal	2140101	84410.77	393974.29	0.32
SH12APY000448	Planting Trees or Forestation	Potomac River L tidal	2140101	84715.15	393793.31	0.37
SH11APY003005	Planting Trees or Forestation	Potomac River L tidal	2140101	84963.10	394373.80	0.27
SH12APY000449	Planting Trees or Forestation	Potomac River L tidal	2140101	85095.38	393899.33	0.24
SH11APY003006	Planting Trees or Forestation	Potomac River L tidal	2140101	84950.38	393525.31	0.19
SH12APY000450	Planting Trees or Forestation	Potomac River L tidal	2140101	85185.60	394269.42	0.10
SH12APY000451	Planting Trees or Forestation	Potomac River L tidal	2140101	85281.65	394151.15	0.19
SH12APY000452	Planting Trees or Forestation	Potomac River L tidal	2140101	85749.45	395472.48	0.13
SH12APY000453	Planting Trees or Forestation	Potomac River L tidal	2140101	84591.54	393617.08	0.04
SH12APY000454	Planting Trees or Forestation	Potomac River L tidal	2140101	85648.48	395358.85	0.09
SH11APY003007	Planting Trees or Forestation	Potomac River L tidal	2140101	85464.64	393785.62	0.08
SH11APY003008	Planting Trees or Forestation	Potomac River L tidal	2140101	85389.65	393963.24	0.04
SH12APY000427	Planting Trees or Forestation	Nanjemoy Creek	2140110	86707.09	393283.68	1.23
SH12APY000455	Planting Trees or Forestation	Nanjemoy Creek	2140110	86293.40	392832.09	1.01
SH12APY000456	Planting Trees or Forestation	Nanjemoy Creek	2140110	86362.34	393040.60	0.56
SH11APY003009	Planting Trees or Forestation	Nanjemoy Creek	2140110	86509.09	393184.85	0.30
SH12APY000457	Planting Trees or Forestation	Nanjemoy Creek	2140110	86472.38	392758.22	0.21
SH12APY000458	Planting Trees or Forestation	Nanjemoy Creek	2140110	86506.77	392981.83	0.12
SH11APY003003	Planting Trees or Forestation	Port Tobacco River	2140109	87169.69	394307.61	1.66
SH12APY000462	Planting Trees or Forestation	Mattawoman Creek	2140111	98616.01	392786.57	0.24
SH12APY000486	Planting Trees or Forestation	Potomac River MO Cnty	2140202	157163.31	367884.50	0.81
SH12APY000487	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156960.88	367789.76	2.15
SH12APY000488	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156758.30	367628.62	1.16
SH12APY000489	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156935.52	367297.90	0.39
SH12APY000490	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156378.83	366992.96	2.09
SH12APY000491	Planting Trees or Forestation	Potomac River MO Cnty	2140202	155888.32	366276.43	1.28
SH12APY000492	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156078.27	366252.27	1.68
SH12APY000493	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156317.27	366382.51	2.38
SH11APY003015	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156516.61	365833.52	1.06

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-53: FMIS # DNR - Million Tree						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH12APY000494	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156607.43	365954.59	1.77
SH12APY000495	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156717.13	366324.28	1.35
SH12APY000496	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156467.25	365292.26	0.33
SH12APY000497	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156409.28	365220.95	0.22
SH12APY000501	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156488.79	363859.41	0.73
SH12APY000502	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156430.86	363796.46	0.57
SH12APY000503	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156122.88	366380.46	0.37
SH11APY003016	Planting Trees or Forestation	Potomac River MO Cnty	2140202	156062.12	366904.35	3.12
SH12APY000509	Planting Trees or Forestation	Patuxent River middle	2131102	119233.37	425246.61	0.27
SH12APY000510	Planting Trees or Forestation	Patuxent River middle	2131102	118333.20	424968.36	1.00
SH12APY000511	Planting Trees or Forestation	Patuxent River middle	2131102	117950.53	424616.37	2.64
SH12APY000463	Planting Trees or Forestation	Deer Creek	2120202	217380.81	462598.97	2.81
SH12APY000464	Planting Trees or Forestation	Deer Creek	2120202	217607.41	462339.76	4.94
SH13APY001580	Planting Trees or Forestation	Severn River	2131002	155832.60	434638.06	0.32
SH18APY001783	Planting Trees or Forestation	Potomac River L tidal	2140101	84337.00	393729.20	0.30
					Complete BMP Acreage Total	**146.31**
					BMP Count	**100**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-54: FMIS # FR6635382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST101299	Bioretention	Lower Monocacy River	2140302	190620.48	377584.69	0.53
SH18RST101302	Bioretention	Lower Monocacy River	2140302	190304.54	377591.12	0.43
SH18RST101303	Bio-Swale	Lower Monocacy River	2140302	190211.47	377571.79	0.36
SH18RST101306	Bioretention	Lower Monocacy River	2140302	186691.36	366411.21	1.35
SH18RST101307	Bioretention	Lower Monocacy River	2140302	195534.30	357955.66	0.90
SH18RST101309	Bioretention	Lower Monocacy River	2140302	186731.92	366403.65	0.68
SH18RST101312	Bioretention	Lower Monocacy River	2140302	195712.46	357824.20	1.25
SH18RST101313	Bioretention	Lower Monocacy River	2140302	190406.67	377309.80	0.75
SH18RST101701	Grass Swale	Lower Monocacy River	2140302	190378.52	377841.65	0.06
					Complete BMP Acreage Total	**6.31**
					BMP Count	**9**

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Table H-55: FMIS # HA1925282						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST122227	Bioretention	Bush River	2130701	200968.67	465603.23	0.52
SH18RST122228	Bioretention	Bush River	2130701	200797.73	465719.58	1.03
SH18RST122232	Submerged Gravel Wetlands	Gunpowder River	2130801	194506.76	459709.12	2.46
					Complete BMP Acreage Total	**4.01**
					BMP Count	**3**

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Table H-56: FMIS # HA4075182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000015	Stream Restoration	Atkisson Reservoir	2130703	204740.72	456761.66	21.00
					Complete BMP Acreage Total	**21.00**
					BMP Count	**1**

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Table H-57: FMIS # HA4095182SBR						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH13ALN000017	Stream Restoration	Deer Creek	2120202	221430.99	441003.14	11.60
					Complete BMP Acreage Total	**11.60**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-58: FMIS # HO1695182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16ALN000044	Stream Restoration	Patapsco River L N Br	2130906	171819.50	425505.56	3.00
					Complete BMP Acreage Total	**3.00**
					BMP Count	**1**

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Table H-59: FMIS # HO2065182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH15ALN000016	Stream Restoration	Little Patuxent River	2131105	177825.43	412849.52	45.00
					Complete BMP Acreage Total	**45.00**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-60: FMIS # HO3255124						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH12ALN000018	Stream Restoration	Little Patuxent River	2131105	164274.84	418585.79	19.73
					Complete BMP Acreage Total	**19.73**
					BMP Count	**1**

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Table H-61: FMIS # HO4085174						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH12ALN000029	Stream Restoration	Little Patuxent River	2131105	174235.63	416127.26	4.17
					Complete BMP Acreage Total	**4.17**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-62: FMIS # MO1605174						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18ALN000048	Outfall Stabilization	Cabin John Creek	2140207	153942.03	386610.65	9.40
					Complete BMP Acreage Total	**9.40**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-63: FMIS # PG0585182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST161269	Bioretention	Western Branch	2131103	123802.51	416342.00	0.99
SH18RST161270	Bioretention	Western Branch	2131103	124029.17	416504.44	1.32
SH18RST161271	Bioretention	Western Branch	2131103	123851.12	416987.60	1.05
					Complete BMP Acreage Total	**3.36**
					BMP Count	**3**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-64: FMIS # PG0735182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17ALN000043	Outfall Stabilization	Potomac River U tidal	2140201	120063.30	400694.64	0.68
SH17ALN000039	Outfall Stabilization	Piscataway Creek	2140203	111718.18	399211.40	1.93
SH17ALN000036	Outfall Stabilization	Piscataway Creek	2140203	112612.86	399955.14	3.55
SH17ALN000038	Outfall Stabilization	Piscataway Creek	2140203	115358.50	400979.82	1.40
SH17ALN000037	Outfall Stabilization	Piscataway Creek	2140203	115659.99	400855.96	2.14
SH17ALN000041	Outfall Stabilization	Potomac River U tidal	2140201	119836.63	400705.06	1.19
					Complete BMP Acreage Total	**10.89**
					BMP Count	**6**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-65: FMIS # PG1085182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17RST161088	Wet Pond - Wetland	Patuxent River upper	2131104	136781.75	424123.71	5.46
SH17RST161089	Wet Pond - Wetland	Western Branch	2131103	127470.59	422687.46	4.45
					Complete BMP Acreage Total	**9.91**
					BMP Count	**2**

Comprehensive List of Restoration Practices By FMIS Contract

Table H-66: FMIS # Various Trees

Unique BMP #		BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH11APY000231	AX6325324	Planting Trees or Forestation	Loch Raven Reservoir	02130805	200700.40	########	0.21
SH11APY000232	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192320.37	########	2.22
SH11APY000233	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192486.21	########	1.92
SH11APY000234	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192631.87	########	0.62
SH11APY000235	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192436.49	########	0.23
SH11APY000236	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192410.85	########	0.60
SH11APY000237	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192093.04	########	2.11
SH11APY000238	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192164.46	########	0.44
SH11APY000239	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192192.70	########	1.16
SH11APY000240	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192293.47	########	0.22
SH11APY000241	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192218.35	########	0.52
SH11APY000242	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192307.07	########	0.42
SH11APY000243	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192299.69	########	0.12
SH11APY000244	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192368.15	########	0.13
SH11APY000245	FR6255168	Planting Trees or Forestation	Lower Monocacy River	02140302	192422.20	########	0.43
SH11APY000261	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	167675.63	########	1.66
SH11APY000262	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	167160.12	########	0.11
SH11APY000263	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	168391.36	########	0.27
SH11APY000264	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	184554.87	########	0.07
SH11APY000265	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	183078.46	########	0.09
SH11APY000266	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	182783.62	########	0.26
SH11APY000267	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	181966.16	########	0.14
SH11APY000268	AX6325324	Planting Trees or Forestation	S Branch Patapsco	02130908	183775.20	########	0.14
SH11APY000269	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	175904.56	########	1.69
SH11APY000270	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	173965.44	########	0.43
SH11APY000271	AX6325324	Planting Trees or Forestation	Rocky Gorge Dam	02131107	164096.24	########	0.34
SH11APY000272	AX6325324	Planting Trees or Forestation	Rocky Gorge Dam	02131107	163902.34	########	0.12
SH11APY000273	AX6325324	Planting Trees or Forestation	Rocky Gorge Dam	02131107	164196.06	########	0.24
SH11APY000274	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	174683.57	########	0.32
SH11APY000275	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164328.20	########	0.64
SH11APY000276	AX6325324	Planting Trees or Forestation	Patuxent River upper	02131104	162349.98	########	0.94
SH11APY000277	AX6325324	Planting Trees or Forestation	Patuxent River upper	02131104	162119.84	########	0.10
SH11APY000278	AX6325324	Planting Trees or Forestation	Patapsco River L N Br	02130906	169121.58	########	0.44
SH11APY000279	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164028.52	########	0.12
SH11APY000280	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164110.39	########	0.03
SH11APY000281	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164093.32	########	0.02
SH11APY000282	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	163981.26	########	0.05
SH11APY000283	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164013.57	########	0.06
SH11APY000284	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	163884.85	########	0.09
SH11APY000285	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	163715.32	########	0.15
SH11APY000286	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	163499.23	########	0.09
SH11APY000287	AX6325324	Planting Trees or Forestation	Patapsco River L N Br	02130906	170643.98	########	0.48
SH11APY000288	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	175299.36	########	0.25
SH11APY000289	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	167327.38	########	1.98
SH11APY000290	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164232.69	########	1.16
SH11APY000291	AX6325324	Planting Trees or Forestation	Rocky Gorge Dam	02131107	164083.55	########	0.08
SH11APY000292	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	164149.23	########	0.05
SH11APY000293	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	165481.35	########	0.44
SH11APY000294	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	167162.06	########	2.00
SH11APY000295	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	168379.45	########	0.10
SH11APY000296	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	182987.19	########	0.07
SH11APY000297	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	167537.54	########	1.54
SH11APY000298	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	174346.51	########	0.28
SH11APY000300	AX6325324	Planting Trees or Forestation	Little Patuxent River	02131105	174703.90	########	0.21
SH11APY000301	AX6325324	Planting Trees or Forestation	Middle Patuxent River	02131106	182698.81	########	0.03
SH11APY000302	MO8305171	Planting Trees or Forestation	Cabin John Creek	02140207	153900.95	########	0.19
SH11APY000303	MO8305171	Planting Trees or Forestation	Rock Creek	02140206	153826.36	########	0.14
SH11APY000305	MO8305171	Planting Trees or Forestation	Rock Creek	02140206	153865.25	########	0.13
SH11APY000306	MO8305171	Planting Trees or Forestation	Cabin John Creek	02140207	153797.74	########	0.11
SH11APY000308	MO8305171	Planting Trees or Forestation	Rock Creek	02140206	153916.66	########	0.32
SH11APY000309	MO8305171	Planting Trees or Forestation	Cabin John Creek	02140207	154012.48	########	0.08
SH11APY000310	MO8305171	Planting Trees or Forestation	Cabin John Creek	02140207	153977.22	########	0.04
SH11APY000311	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142551.88	########	0.49
SH11APY000312	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142404.91	########	0.68
SH11APY000313	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142668.38	########	0.41
SH11APY000314	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142503.55	########	0.33
SH11APY000315	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142138.13	########	0.02
SH11APY000316	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142209.21	########	0.83
SH11APY000317	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142250.69	########	0.02
SH11APY000318	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142157.29	########	0.29
SH11APY000319	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141981.22	########	0.34
SH11APY000320	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142044.86	########	0.33
SH11APY000321	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142005.44	########	0.30
SH11APY000322	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142019.19	########	0.82
SH11APY000323	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142147.34	########	0.40
SH11APY000324	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142055.53	########	0.58
SH11APY000325	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142100.14	########	0.16
SH11APY000326	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142218.93	########	0.02
SH11APY000327	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142023.80	########	0.11
SH11APY000328	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141867.56	########	0.50
SH11APY000329	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141918.04	########	0.09
SH11APY000330	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141796.24	########	0.47
SH11APY000332	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141829.31	########	0.03
SH11APY000333	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141704.31	########	0.88
SH11APY000334	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141812.39	########	0.75

Comprehensive List of Restoration Practices By FMIS Contract							
Table H-66: FMIS # Various Trees							
Unique BMP #		BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH11APY000335	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141885.20	########	0.25
SH11APY000336	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141929.31	########	0.40
SH11APY000337	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141382.06	########	1.10
SH11APY000338	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141875.39	########	0.32
SH11APY000339	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141902.43	########	0.09
SH11APY000340	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	141953.42	########	0.15
SH11APY000341	PG7455168	Planting Trees or Forestation	Anacostia River	02140205	142062.66	########	0.14
SH12APY000342	AX7235168	Planting Trees or Forestation	Patapsco River L N Br	02130906	172520.64	########	0.37
SH12APY000343	AX7235168	Planting Trees or Forestation	Patapsco River L N Br	02130906	172370.32	########	0.47
SH12APY000344	AX7235168	Planting Trees or Forestation	Patapsco River L N Br	02130906	172318.20	########	0.52
SH12APY000345	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	170843.48	########	0.21
SH12APY000346	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	170421.22	########	0.28
SH12APY000347	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	167183.80	########	0.20
SH12APY000348	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	164421.12	########	0.05
SH12APY000349	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	164320.34	########	0.06
SH12APY000350	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	164024.46	########	0.76
SH12APY000351	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	170486.61	########	0.46
SH12APY000352	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	165743.45	########	0.71
SH12APY000353	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	163076.56	########	0.10
SH12APY000354	AX7235168	Planting Trees or Forestation	Baltimore Harbor	02130903	163032.69	########	0.30
SH12APY000355	AX7235168	Planting Trees or Forestation	Patapsco River L N Br	02130906	166548.56	########	0.04
SH12APY000356	AX7235168	Planting Trees or Forestation	Patapsco River L N Br	02130906	166686.03	########	0.01
SH12APY000360	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193991.82	########	0.24
SH12APY000361	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193990.72	########	0.01
SH12APY000362	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	194122.32	########	0.12
SH12APY000363	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	194013.59	########	0.31
SH12APY000364	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193403.19	########	0.36
SH12APY000365	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193604.85	########	0.55
SH12APY000366	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193638.74	########	0.03
SH12APY000367	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193359.33	########	0.07
SH12APY000368	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193029.58	########	0.26
SH12APY000369	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	192514.29	########	0.50
SH12APY000370	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	192520.44	########	0.15
SH12APY000371	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	192390.48	########	0.12
SH12APY000372	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	191153.18	########	0.22
SH12APY000373	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	190921.91	########	0.08
SH12APY000374	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	190230.82	########	0.45
SH12APY000376	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	189685.35	########	0.21
SH12APY000410	BA6375124R	Planting Trees or Forestation	Jones Falls	02130904	193503.51	########	0.23
SH12APY000420	AX7235168	Planting Trees or Forestation	Patuxent River lower	02131101	97176.71	########	0.41
SH12APY000421	AX7235168	Planting Trees or Forestation	Patuxent River lower	02131101	96386.52	########	0.32
SH12APY000422	AX7235168	Planting Trees or Forestation	Patuxent River lower	02131101	96202.17	########	0.08
SH12APY000423	AX7235168	Planting Trees or Forestation	Patuxent River lower	02131101	96222.12	########	0.27
SH12APY000424	AX7235168	Planting Trees or Forestation	Zekiah Swamp	02140108	104953.97	########	0.16
SH12APY000425	AX7235168	Planting Trees or Forestation	Zekiah Swamp	02140108	104792.91	########	0.50
SH12APY000465	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	165602.11	########	0.11
SH12APY000466	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	167948.98	########	0.21
SH12APY000467	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	170170.46	########	0.23
SH12APY000468	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	176028.09	########	0.72
SH12APY000469	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	175849.24	########	0.40
SH12APY000470	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	176027.37	########	0.75
SH12APY000471	AX1555D24	Planting Trees or Forestation	Middle Patuxent River	02131106	165634.83	########	0.14
SH12APY000472	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	167881.39	########	0.08
SH12APY000473	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	165481.48	########	0.00
SH12APY000474	AX1555D24	Planting Trees or Forestation	Little Patuxent River	02131105	165508.03	########	0.01
SH12APY000475	AX1555D24	Planting Trees or Forestation	Anacostia River	02140205	152719.17	########	0.27
SH12APY000476	AX1555D24	Planting Trees or Forestation	Anacostia River	02140205	160324.21	########	0.14
SH12APY000477	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	160496.32	########	0.14
SH12APY000478	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	160849.67	########	0.12
SH12APY000479	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161542.96	########	0.08
SH12APY000480	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161560.72	########	0.11
SH12APY000481	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161666.50	########	0.31
SH12APY000482	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161662.47	########	0.15
SH12APY000483	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161645.88	########	0.11
SH12APY000484	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	161814.69	########	0.56
SH12APY000485	AX1555D24	Planting Trees or Forestation	Rocky Gorge Dam	02131107	162091.63	########	0.33
SH13APY000531	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194265.79	########	0.05
SH13APY000594	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194140.83	########	0.08
SH13APY001587	AX0805124	Planting Trees or Forestation	S Branch Patapsco	2130908	190400.08	########	0.56
SH13APY001590	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194201.17	########	0.12
SH13APY001591	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194251.40	########	0.09
SH13APY001592	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194311.55	########	0.04
SH13APY001593	BA9775A72	Planting Trees or Forestation	Jones Falls	02130904	194050.62	########	0.07
SH14APY000764	AX4885324	Planting Trees or Forestation	Bodkin Creek	02130902	161380.61	########	0.38
SH14APY000765	AX4885324	Planting Trees or Forestation	Bodkin Creek	02130902	161320.00	########	0.59
SH15APY000919	AX0715124	Planting Trees or Forestation	Patapsco River L N Br	02130906	166800.73	########	1.40
SH15APY000920	AX0715124	Planting Trees or Forestation	Baltimore Harbor	02130903	162973.93	########	0.16
SH15APY000921	AX0715124	Planting Trees or Forestation	Patapsco River L N Br	02130906	167805.35	########	0.27
SH15APY001230	AX0725124	Planting Trees or Forestation	Patapsco River L N Br	02130906	171518.32	########	0.11
SH15APY001231	AX4885324	Planting Trees or Forestation	Rock Creek	02140206	148540.53	########	0.53
SH15APY001232	AX4885324	Planting Trees or Forestation	Rock Creek	02140206	148455.88	########	0.12
SH15APY001233	AX0805124	Planting Trees or Forestation	Anacostia River	02140205	153710.87	########	0.06
SH15APY001234	AT0625124	Planting Trees or Forestation	Anacostia River	02140205	154433.73	########	0.22
SH15APY001235	AT0625124	Planting Trees or Forestation	Anacostia River	02140205	155422.99	########	0.22
SH15APY001236	AT0625124	Planting Trees or Forestation	Anacostia River	02140205	155297.19	########	0.02

Comprehensive List of Restoration Practices By FMIS Contract							
Table H-66: FMIS # Various Trees							
Unique BMP #		**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH16APY001383	AX7215168	Planting Trees or Forestation	Seneca Creek	02140208	167469.34	########	0.18
SH17APY001842	AW0775482	Planting Trees or Forestation	S Branch Patapsco	2130908	187364.52	########	0.08
SH17APY001843	AW0775482	Planting Trees or Forestation	S Branch Patapsco	2130908	187309.00	########	0.09
				Complete BMP Acreage Total			**61.54**
						BMP Count	**173**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-67: FMIS # WA2445182						
Unique BMP #	BMP Type	8-Digit Watershed Name	8-Digit Watershed Code	Northing	Easting	Impervious Treated (acres)
SH16RST210523	Bio-Swale	Little Tonoloway Creek	2140509	228765.94	298360.22	0.87
SH16RST210524	Bio-Swale	Little Tonoloway Creek	2140509	228593.23	298273.80	0.21
SH16RST210525	Bio-Swale	Little Tonoloway Creek	2140509	228446.77	298199.85	0.43
SH16RST210526	Bio-Swale	Little Tonoloway Creek	2140509	228376.61	298169.70	0.14
SH16RST210529	Bio-Swale	Little Tonoloway Creek	2140509	227999.78	298155.90	0.40
SH16RST210530	Bio-Swale	Little Tonoloway Creek	2140509	227401.87	298402.23	0.39
SH16RST210533	Bio-Swale	Potomac River WA Cnty	2140501	227166.98	298624.00	0.22
SH16RST210545	Bio-Swale	Tonoloway Creek	2140507	226504.22	300727.85	0.29
SH16RST210548	Bio-Swale	Potomac River WA Cnty	2140501	225716.43	301669.13	0.56
SH16RST210549	Bio-Swale	Potomac River WA Cnty	2140501	225665.92	301789.80	0.20
SH16RST210550	Bio-Swale	Potomac River WA Cnty	2140501	225577.53	302027.27	0.51
SH16RST210551	Bio-Swale	Potomac River WA Cnty	2140501	225556.58	302094.94	0.21
SH16RST210552	Bio-Swale	Potomac River WA Cnty	2140501	225490.18	302312.56	0.26
SH16RST210553	Bio-Swale	Potomac River WA Cnty	2140501	225446.49	302483.96	0.23
SH16RST210554	Bio-Swale	Potomac River WA Cnty	2140501	225194.40	303222.68	0.25
SH16RST210555	Bio-Swale	Potomac River WA Cnty	2140501	225127.58	303358.53	0.25
SH16RST210556	Bio-Swale	Potomac River WA Cnty	2140501	225065.86	303557.57	0.22
SH16RST210558	Bio-Swale	Potomac River WA Cnty	2140501	224993.29	303940.07	0.25
SH16RST210559	Bio-Swale	Potomac River WA Cnty	2140501	224983.49	303928.40	0.34
SH16RST210560	Bio-Swale	Potomac River WA Cnty	2140501	218259.33	312680.67	0.34
SH16RST210562	Bioretention	Potomac River WA Cnty	2140501	219478.42	311672.02	0.29
SH16RST210565	Bio-Swale	Licking Creek	2140506	221041.70	310048.77	0.48
SH16RST210566	Bio-Swale	Potomac River WA Cnty	2140501	220457.55	310546.17	0.13
SH16RST210567	Bio-Swale	Potomac River WA Cnty	2140501	220427.25	310571.21	0.13
SH16RST210568	Bio-Swale	Potomac River WA Cnty	2140501	220281.50	310689.12	0.37
SH16RST210569	Bio-Swale	Potomac River WA Cnty	2140501	220228.86	310741.82	0.09
SH16RST210571	Bio-Swale	Potomac River WA Cnty	2140501	219845.64	311222.11	0.05
SH16RST210572	Bio-Swale	Potomac River WA Cnty	2140501	219531.17	311616.92	0.83
SH16RST210573	Bio-Swale	Potomac River WA Cnty	2140501	218919.06	312099.36	1.23
SH16RST210574	Bio-Swale	Potomac River WA Cnty	2140501	218643.32	312305.72	0.09
SH16RST210575	Bio-Swale	Potomac River WA Cnty	2140501	219201.85	311903.49	0.86
SH16RST210576	Bio-Swale	Potomac River WA Cnty	2140501	224891.36	304340.66	0.77
SH16RST210577	Bio-Swale	Potomac River WA Cnty	2140501	224741.74	305001.91	0.67
SH16RST210578	Bio-Swale	Potomac River WA Cnty	2140501	224545.74	305569.56	0.58
SH16RST210579	Bio-Swale	Potomac River WA Cnty	2140501	224452.41	305709.64	0.57
SH16RST210580	Bio-Swale	Potomac River WA Cnty	2140501	224132.77	306077.22	0.79
SH16RST210581	Bio-Swale	Potomac River WA Cnty	2140501	224071.59	306146.89	0.80
SH16RST210582	Bio-Swale	Potomac River WA Cnty	2140501	223936.77	306302.34	0.39
SH16RST210584	Bio-Swale	Potomac River WA Cnty	2140501	221907.35	309018.75	0.38
SH16RST210585	Bio-Swale	Potomac River WA Cnty	2140501	221791.67	309132.70	0.36
SH16RST210586	Bio-Swale	Potomac River WA Cnty	2140501	221762.03	309162.09	0.17
SH16RST210587	Bio-Swale	Potomac River WA Cnty	2140501	221681.67	309252.45	0.17
SH16RST210588	Bio-Swale	Potomac River WA Cnty	2140501	221660.80	309274.76	0.63
SH16RST210589	Bio-Swale	Potomac River WA Cnty	2140501	221466.14	309530.65	0.63
SH16RST210590	Bio-Swale	Potomac River WA Cnty	2140501	221427.42	309586.59	0.43
SH16RST210591	Bio-Swale	Little Conococheague	2140505	220576.37	320883.86	0.32
SH16RST210592	Bio-Swale	Little Conococheague	2140505	220567.58	320927.81	0.43
SH16RST210593	Bio-Swale	Little Conococheague	2140505	220652.12	320528.58	1.48
SH16RST210594	Bio-Swale	Little Conococheague	2140505	220672.99	320580.07	0.25
SH16RST210595	Bio-Swale	Conococheague Creek	2140504	217718.04	331505.99	0.52
SH16RST210596	Bio-Swale	Conococheague Creek	2140504	217590.55	331743.19	0.70
SH16RST210598	Bio-Swale	Marsh Run	2140503	215600.90	334578.11	0.45
SH16RST210599	Bio-Swale	Marsh Run	2140503	215604.28	334737.50	0.38
SH16RST210600	Bio-Swale	Marsh Run	2140503	215610.22	335103.04	0.29
SH16RST210601	Bio-Swale	Marsh Run	2140503	215613.77	335314.43	0.56
SH16RST210602	Bio-Swale	Marsh Run	2140503	215594.84	335564.54	0.50
SH16RST210603	Bio-Swale	Marsh Run	2140503	215554.20	335828.13	0.17
SH16RST210604	Bio-Swale	Marsh Run	2140503	215547.53	335866.99	0.62
SH16RST210605	Bio-Swale	Marsh Run	2140503	215487.03	336263.77	0.48
SH16RST210606	Bio-Swale	Antietam Creek	2140502	215466.39	336442.79	0.37
SH16RST210609	Bio-Swale	Antietam Creek	2140502	214799.22	341473.98	0.36
SH16RST210610	Bio-Swale	Antietam Creek	2140502	214766.33	341516.53	0.30
SH16RST210612	Bio-Swale	Antietam Creek	2140502	214882.94	342012.44	1.17
SH16RST210613	Bio-Swale	Antietam Creek	2140502	214899.05	342259.45	0.27
SH16RST210614	Bio-Swale	Antietam Creek	2140502	214898.81	342295.07	0.45
SH16RST210615	Bio-Swale	Antietam Creek	2140502	214877.33	342556.57	0.57
SH16RST210616	Bio-Swale	Antietam Creek	2140502	214347.07	343583.30	0.46
SH16RST210617	Bio-Swale	Antietam Creek	2140502	213951.60	344067.53	1.07
SH16RST210618	Bio-Swale	Antietam Creek	2140502	212391.03	345990.28	0.50
SH16RST210619	Bio-Swale	Antietam Creek	2140502	212212.79	346123.45	0.85
					Complete BMP Acreage Total	**31.98**
					BMP Count	**70**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-68: FMIS # WA2655382						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST210961	Wet Pond - Wetland	Little Conococheague	2140505	220799.24	321136.44	0.93
					Complete BMP Acreage Total	**0.93**
					BMP Count	**1**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-69: FMIS # WA2655482						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH18RST210978	Bio-Swale	Conococheague Creek	2140504	220765.07	335341.72	0.50
SH18RST210979	Bio-Swale	Conococheague Creek	2140504	220824.56	335469.85	0.43
SH18RST210980	Submerged Gravel Wetlands	Conococheague Creek	2140504	220692.26	335510.34	0.74
SH18RST210981	Submerged Gravel Wetlands	Conococheague Creek	2140504	220736.08	335549.31	0.98
SH18RST210982	Bio-Swale	Conococheague Creek	2140504	220637.99	335565.51	0.41
SH18RST210983	Bio-Swale	Conococheague Creek	2140504	220578.37	335439.79	0.59
					Complete BMP Acreage Total	**3.65**
					BMP Count	**6**

Comprehensive List of Restoration Practices By FMIS Contract						
Table H-70: FMIS # WA2775182						
Unique BMP #	**BMP Type**	**8-Digit Watershed Name**	**8-Digit Watershed Code**	**Northing**	**Easting**	**Impervious Treated (acres)**
SH17APY001548	Planting Trees or Forestation	Potomac River WA Cnty	2140501	202437.11	335579.99	5.33
SH17APY001549	Planting Trees or Forestation	Antietam Creek	2140502	201619.55	336108.80	1.62
SH17APY001550	Planting Trees or Forestation	Potomac River WA Cnty	2140501	201383.82	335401.87	0.80
SH17APY001551	Planting Trees or Forestation	Antietam Creek	2140502	201950.99	336110.26	1.56
SH18APY001863	Planting Trees or Forestation	Conococheague Creek	2140504	223756.25	328050.82	8.79
SH18APY001864	Planting Trees or Forestation	Marsh Run	2140503	207542.43	334431.47	4.75
SH18APY001865	Planting Trees or Forestation	Antietam Creek	2140502	212864.71	345375.99	9.67
SH18APY001866	Planting Trees or Forestation	Antietam Creek	2140502	200454.53	337664.74	0.80
SH18APY001869	Planting Trees or Forestation	Antietam Creek	2140502	212723.42	345159.82	4.59
SH18APY001870	Planting Trees or Forestation	Conococheague Creek	2140504	224026.21	328244.97	1.13
SH18APY001871	Planting Trees or Forestation	Marsh Run	2140503	207843.06	334540.55	2.83
					Complete BMP Acreage Total	**41.87**
					BMP Count	**11**

Appendix I

Little Catoctin Creek Watershed Monitoring Report

Appendix I

Appendix I

Little Catoctin Creek Watershed Monitoring Report

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

Little Catoctin Creek Watershed Monitoring Implementation Document

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

October 2018

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1 Introduction

The stream restoration of Little Catoctin Creek (LCC) is currently under design by the Maryland Department of Transportation State Highway Administration (MDOT SHA) Water Programs Division (WPD). The restoration extents originate at MDOT SHA bridge structure number 10081 along MD 180 (Jefferson Pike) and continues downstream approximately 3,100 LF of the existing channel. MDOT SHA is in the process of monitoring the physical, chemical, and biological features of the project stream for five years: This report documents the findings from the second year of monitoring per the NPDES/MS4 Assessment of Controls for Stream Restoration of Little Catoctin Creek at U.S. 340.

The following sections of this yearly report include activities for chemical, biological, and physical monitoring for the pre-restoration baseline between July 2017 and June 2018.

2 Study Area

The Little Catoctin Creek watershed occupies 17.72 square miles (11,340.3 acres) in the southwestern corner of Frederick County in the Blue Ridge physiographic province (Figure 1). It flows 8.5 stream-miles southeast from its headwaters on the eastern side of South Mountain to the mouth east of the town of Brunswick and drains directly into the Potomac River. Land use in the watershed is primarily agricultural. Approximately 20 percent of the watershed draining to the study reach is forested. Impervious surface comprises less than 3 percent of the watershed (SHA 2016).

The study area is located north of the town of Rosemont between US-340 at the upstream end and Petersville Road (MD-79) at the downstream end. Within the study area, Little Catoctin Creek flows through active and old pasture. Much of the riparian area (especially in reaches adjacent to MD-180) contains few trees – leaving much of the stream open to direct sunlight. Stream banks within the open pasture are steep and heavily eroded. Riffle and run habitats within the creek are predominantly cobble and gravel. Heavy deposits of fine silt and sand are found in pools and depositional areas.

3 Chemical Monitoring

Per the NPDES/MS4 Assessment of Controls monitoring plan, chemical monitoring of the Little Catoctin Creek was performed as specified in the chemical monitoring methodology. The monitoring efforts through Dec. 31, 2017 fall under phase CHEM 1 to establish pre-restoration conditions. Monitoring efforts beginning Jan. 1, 2018 through June 30, 2018 fall under phase CHEM 2, which establishes conditions during the construction phase. Data for stage, discharge, velocity, continuous water quality measurements, and discrete water quality measurements were recorded and reported on the U.S. Geological Survey's National Water Information Service (NWIS) and are available online here: https://www.waterqualitydata.us/. The chemical monitoring locations referenced in the following sections of the report can be found in Figure 1.

It is important to note that the FY18 monitoring period included a locally catastrophic flood event that occurred on May 15, 2018 and caused extensive damage to MDOT SHA infrastructure and USGS gauging equipment. During this event, areas west of Frederick received upwards of 7 inches of rainfall with a few hours time. USGS StreamStats software was used to model the significance of this flood, which returned an estimate that eclipses the maximum modeled 500 Year Peak Flood statistic at 5,940 cubic feet per second. The 500 Year Peak Flood statistic is the upper limit of this model run. The estimated official maximum peak flow, by way of indirect techniques and methods modeling, is 9,630 cubic feet per second at 01636846. A detailed summary of the storm event and resulting damage, including photodocumentation, can be found in Attachment C.

Figure 1. Chemical Monitoring Locations

3.1 Surface Water Stage/Discharge/Velocity

In September 2016, U.S. Geological Survey Site 01636845 (Little Catoctin Creek Near Rosemont, MD; upstream) was established (see Figure 2), which included a radar stage sensor and acoustic doppler velocity meter (ADVM) for velocity. Since the installation of the equipment, 57 discharge measurements have been recorded with a range of 0.49 cubic feet per second to 307 cubic feet per second. The combination of discharge and stage measurements (at different flows) has led to the development of the stage-discharge relationship for this site, which has been approved. Current and historic observations can be found online here: *https://nwis.waterdata.usgs.gov/md/nwis/uv/?site_no=01636845*

Figure 2. , U.S. Geological Survey Site 01636845 (Little Catoctin Creek Near Rosemont, MD; upstream)

In December 2016, U.S. Geological Survey Site 01636846 (Little Catoctin Creek at Rosemont, MD; downstream) was established (Figure 3) and instrumented with an ADVM to measure stream velocity. In September 2017, continuous monitoring at USGS site 01636846 was expanded to include continuous measures of stage for the computation of discharge by way of a bubbler-style unit. A move to measure discharge observations for this location was chosen in anticipation of the reconnection of groundwater flow-cells with the active channel bottom. This newly restored communication is a function of a floodplain-reconnection style restoration in an area with springs and seeps like that in and around the Little Catoctin Creek watershed. These additional inputs are quite capable of significantly increasing discharge between monitoring locations. Spatial and temporal inconsistency of these channel inputs renders future modeling for discharge values at 01636846 inappropriate. Since the installation of monitoring equipment at this location, 34 discharge measurements have been recorded with a measured range of 0.45 cubic feet per second to 108 cubic feet per second, which is extended by way of indirect computations to 9630 cubic feet per second. It should be noted that the substantial extent of erosion, coupled with instrument damage at 01636845 prevented indirect computation at this location. It is assumed that there is no appreciable inputs to flow between 01636845 and 01636846 during this extreme flood event. Current and historic observations can be found here:

https://waterdata.usgs.gov/nwis/inventory/?site_no=01636846&agency_cd=USGS

Figure 3. U.S. Geological Survey Site 01636846 (Little Catoctin Creek at Rosemont, MD; downstream)

3.2 Continuous Water Quality

In November 2016, a YSI EXO-2 Multiparameter Water Quality sonde was installed at site 01636845. In December 2016, a YSI EXO-2 Multiparameter Water Quality sonde was installed at site 01636846 (see Figures 3 and 4). Both sondes were programed to measure Temperature, Specific Conductivity, pH, and Turbidity on a 5-minute interval. Both sites have been operational since installation and data are available in near- real time on the NWIS website listed above. These data are approved through 08/13/2018 with a water-year closeout occurring October, 2018.

Figure 4. U.S. Geological Survey Site 01636846 (Little Catoctin Creek at Rosemont, MD; downstream) Continuous water quality measurements

3.3 Discrete Water Quality

The purpose of water-quality monitoring for this project is to fulfill monitoring requirements outlined in the NPDES/MS4 assessment of controls permit; facilitate the computation of loads or yields (nutrient and suspended-sediment); and attempt to relate any significant differences in loads to floodplain restoration design.

During storm events, rise, peak, and fall stages of the hydrograph are targeted for sample collection at both the upstream (01636845) and downstream (01636846) locations. From the period 01/24/2017 through 05/22/2018, a total of 13 complete sets of storm samples have been collected. If possible, depth-weighted equal width interval samples are collected at each site, however if the stream is not safe to wade, autosamplers are engaged to collect samples. In addition to storm samples, five sets of baseflow samples were collected on 02/23/2017, 8/24/2017, 9/26/2017, 11/29/2017, 1/26/2018, to capture conditions amid extended dry periods; typically three weeks without appreciable precipitation. An additional baseflow sample was collected at 01636846 on 12/20/2017, although no sample was collected at 01636845 due to conflict with landowner. Both the upstream site (01636845) and the downstream site (01636846) have two (2) ISCO Autosamplers, which were installed on 03/30/2017. Samples have been analyzed for nutrients, metals, bacteria and 5-day biological oxygen demand. It should be noted that VOC's are not collected from standard automated samplers as samples gas-off appreciably between collection and pickup. Grab samples are collected when stream is safe to wade. Additionally, the lab analysis of VOCs take an extended period of time to complete; therefore, samples collected late in the monitoring period may not be available for inclusion in the database during the given reporting year. Upon completion of analyses, results are uploaded into the U.S. Geological Survey's NWIS and are available for download at https://water.usgs.gov/owq/data.html#USGS. A variety of field and equipment blanks have also been performed over this time period for quality assurance.

Augmenting the event-mean-concentration sampling events throughout the year at Chemical Monitoring Stations 01636845 and 01636846 is a sampling protocol designed to capture seasonal effects and differences across varying levels of flows for surrogate modeling. Simple statistics for observations collected from both chemical monitoring stations across the period 01/01/2017 – 05/31/2018 are provided in Table 1**.** Monitoring continues through the construction phase.

Table 1. Summary statistics associated with observations collected at Chemical Monitoring Stations

Site	**1636845**					**1636846**				
	Min	**Max**	**Mean**	**Median**	**Count**	**Min**	**Max**	**Mean**	**Median**	**Count**
Total Dissolved Nitrogen, filtered, mg/l	2.08	8.02	4.05	4.05	74	1.99	8.34	3.84	3.74	68
Particulate Nitrogen, suspended, mg/l	0.036	8.04	1.26	0.734	74	0.044	11.588	1.11	0.458	68
Phosphorus, unfiltered, mg/l	0.0476	5.5738	1.2142	0.8246	74	0.0327	6.2192	1.052	0.5425	68
Suspended solids, unfiltered, mg/l	15	1,780	192	61	74	15	3330	208	41	68
Suspended-sediment concentration, mg/l	1	4,220	292	97	193	1	6730	383	154	185
Escherichia coli, most probable number per 100 ml	63	1,400,000	99,000	26,000	73	61	1,400,000	85,000	14,000	71

3.4 Floodplain Monitoring and Assessment (optional)

In December 2016, 127 felt-surfaced ceramic tiles were installed and surveyed across seven (7) floodplain-monitoring transects to quantify floodplain sediment accretion throughout the study reach (see Figure 1). Only 26 tiles showed measurable accumulation for the period 01/01/2017-01/29/2018, with no deposition observed outside the active channel. A lack of measurable accretion outside the active channel supports the notion that this reach of Little Catoctin Creek is functioning as a transport/throughflow reach and not a depositional zone for suspended sediment.

3.5 Bank Erosion Monitoring (optional)

Affiliated with each Floodplain Transect are nests of sediment-erosion monitoring pins used to quantify bank erosion throughout the reach. Measures of exposed bank-pin surfaces were made throughout the period 01/01/2017 – 02/15/2018 to estimate rates of erosion and explore spatial variability associated with erosion rates. Measurements were made throughout the period with collection typically occurring after notable storm-flows; for example, flows peaking around 90-100 cubic feet per second or greater. Qualitatively, the lower sections of the reach are experiencing the largest amounts of overall erosion.

4 Biological Monitoring

This section summarizes biological monitoring data collected from April 2016 to September 2017 by the MDNR Resource Assessment Service, and provides a preliminary synopsis of the baseline biological conditions present within Little Catoctin Creek. It was compiled to support MDOT SHA's MS4 reporting requirements (FY2018) for this restoration project. As outlined in the approved monitoring plan, no biological monitoring was scheduled to occur during the construction period, which began in January 2018 and will continue through January 2019; therefore, no benthic macroinvertebrate data were collected during spring 2018. However, this report presents results of the fish community assessments that occurred in September 2017, which were not included in the previous report. Biological monitoring of the post-restoration conditions will resume in spring 2019.

MDOT SHA and MDNR identified three stream reaches on Little Catoctin Creek to monitor over the course of the study to assess changes in biological condition and stream physical habitat quality associated with the restoration. The study reaches included:

1. Control reach located west of MD 180 (upstream of the planned restoration);
2. Restoration reach extending approximately 3,100 linear feet east of MD 180; and
3. Downstream reach located east (downstream) of the restoration reach.

Two sites were allocated to each of these study reaches (Figure 5). When possible, biological monitoring sites were co-located at proposed geomorphological transects (MDOT SHA) and chemical monitoring stations (USGS) to improve interpretation of all monitoring data over the course of the study. We also monitored a seventh site located on a small tributary entering the Control reach just west of MD 180 to assess its potential influence on conditions in the Little Catoctin Creek main stem. Only benthic macroinvertebrates were sampled at this site. Fish and physical habitat were not assessed at this site.

To provide an understanding of natural variability in stream biological conditions, DNR monitors 29 reference streams known as the Maryland Biological Stream Survey (MBSS) Sentinel site network (Saville et al. 2014). Although monitoring of these sites is not related to nor funded under this project, we will use data from these nearby reference sites to better interpret pre- and post-restoration biological conditions in Little Catoctin Creek. Specifically, annual data collected from the sites during the course of this project will allow us to differentiate natural changes in stream conditions occurring within the region from changes associated with the restoration. Two of these sites, Fifteen Mile Creek (FIMI-207-S) in Washington County,and Jones Falls (JONE-315-S) in Baltimore County, are of similar size to Little Catoctin Creek. We present data from these reference sites in this baseline report.

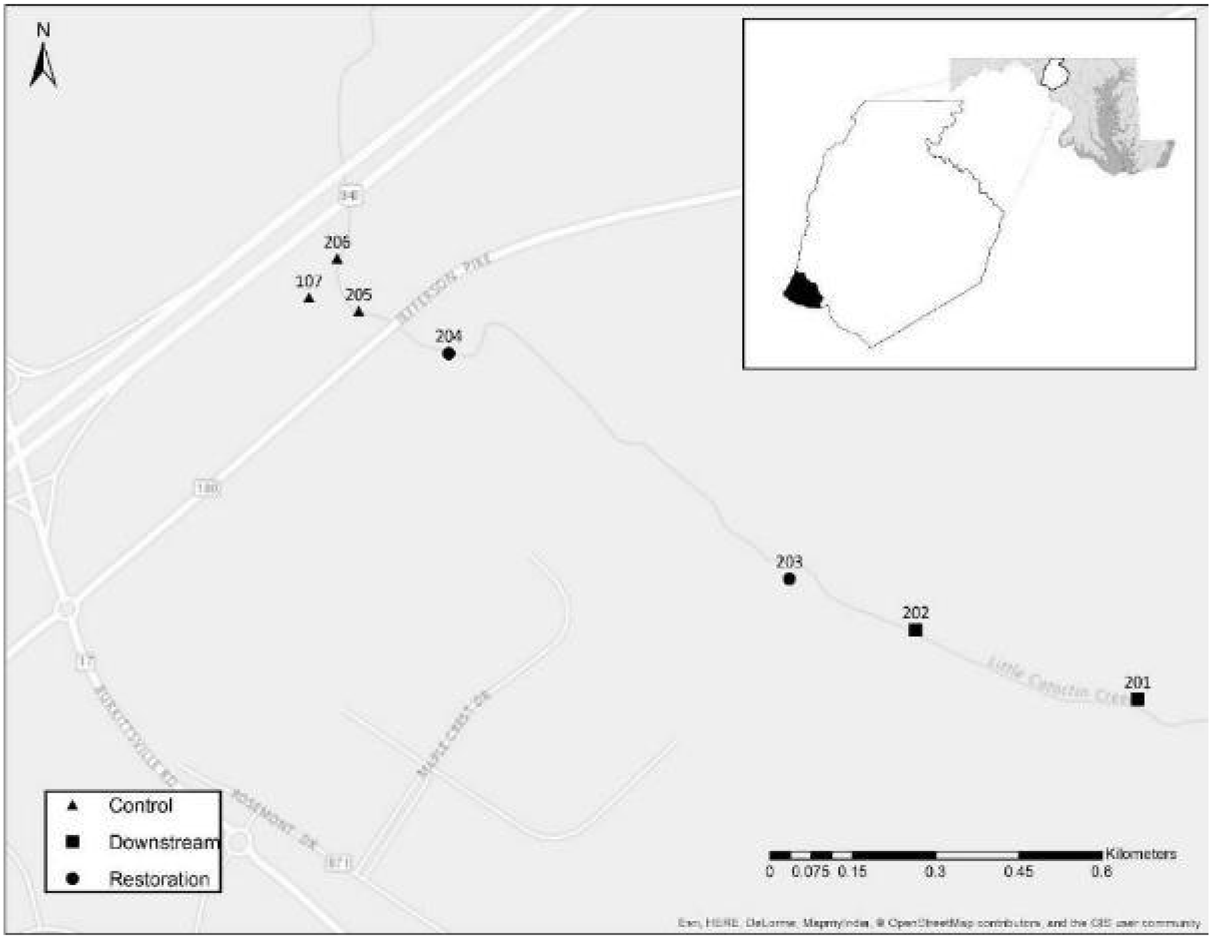

Figure 5. Locations of the seven biological monitoring sites in Little Catoctin Creek in Frederick County, Maryland

4.1 Methods

Biological and physical habitat assessments at all sites summarized in this report were conducted following Maryland Biological Stream Survey (MBSS) sampling protocols. Detailed descriptions of these protocols are provided by Stranko et al. (2014). However, a brief description of sampling protocols used for this project are as follows:

<u>Benthic Macroinvertebrates</u>: Benthic macroinvertebrates were collected during the MBSS spring index period (March 1 – April 30) using a 540 µm mesh D-shaped net. Twenty 0.09 m^2 sub-samples were collected from optimal benthic habitats in each site. The 20 sub-samples were allocated in proportion to the abundance of each optimal habitat type (e.g., riffle, woody debris) present and all sub-samples were combined into one composite sample and preserved in denatured ethanol. Each composite sample was processed at MDNR's benthic laboratory. A random sub-sample of at least 100 organisms were identified to genus or the lowest practical taxonomic level. A benthic index of biotic integrity (BIBI) was calculated following methods described in Southerland et al. (2008).

<u>Fish</u>: Fishes were collected during the MBSS summer index period (June 1 – September 30) using two-pass backpack electrofishing in a 75-meter section of stream closed at the upstream and downstream ends with 6 mm mesh block nets. All fishes collected were weighed in aggregate, identified to species, counted, and released. A fish index of biotic integrity (FIBI) was calculated following methods described in Southerland et al. (2008).

Physical Habitat: Several metrics representing various aspects of stream habitat quality were measured at each site. Instream habitat, epifaunal substrate, velocity/depth diversity, pool/glide/eddy quality, riffle/run quality were scored on a 0-20 scale following protocols similar to that of the EPA rapid bioassessment protocols (Barbour et al. 1999) and described in Stranko et al. (2014). These five metrics as well as embeddedness, stream bank erosion area, and bar formation/deposition were scored during the MBSS summer index period. Riparian buffer width was characterized during the MBSS spring index period. These data were used to calculate a physical habitat index (PHI) following methods described by Paul et al. (2002).

4.2 Summary of Pre-Restoration Biological and Physical Habitat Conditions

Biological and physical habitat data collected at all seven sites in 2016 and 2017 are summarized below. We compare conditions documented in the three study reaches and also present data collected during the same period from the two reference sites (MBSS Sentinel sites).

Biological Conditions:

A total of 78 benthic macroinvertebrate taxa were collected in the 100-organism subsamples in Little Catoctin Creek. Taxa richness at each site ranged from 12 to 32, with taxa richness generally decreasing in an upstream direction throughout the study reaches. The reference sites had a taxa richness of 27 and 29 at Jones Falls and of 17 and 38 at Fifteen Mile Creek in 2016 and 2017, respectively. The study reaches had from one to seven Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa in 2016, and from zero to three EPT taxa in 2017 (Table 4). Control sites had from zero to three EPT taxa, restoration reach sites had from zero to five EPT taxa, and downstream sites had from one to seven EPT taxa present. By comparison, the Jones Falls Sentinel site had 13 EPT taxa in 2016 and eight in 2017, while the Fifteen Mile Creek Sentinel site had 12 in 2016 and 24 in 2107. Presence of pollution-intolerant taxa showed a similar pattern in the study area, spanning from two to seven in 2016 and from one to three in 2016. Samples from the upstream control sites contained from one to three intolerant taxa, those from the restoration sites had from one to three intolerant taxa, and from the downstream sites contained from one to seven intolerant taxa. The Jones Falls Sentinel site had 12 intolerant taxa in 2016 and nine in 2017, and the Fifteen Mile Creek Sentinel site had 15 intolerant taxa in 2016 and 25 intolerant taxa in 2017. The presence of taxa tolerant to pollution held relatively steady across the study reach. Control sites had from seven to 14 tolerant taxa present, restoration reach sites had from 10 to 12 tolerant taxa present, and downstream sites had from eight to 15 tolerant taxa present. The Fifteen Mile Creek Sentinel site had two tolerant taxa present each year, and the Jones Falls Sentinel site had seven to eight tolerant taxa present.

BIBI scores varied little between years at sites in the study area and stayed between 1.25 and 2.25, with differences over time of 0.50 or less at a given site (Table 2). By comparison, there was a relatively large variation at the Fifteen Mile Creek site, which scored 3.00 in 2016 but reached 4.75 in 2017, the highest BIBI score since the site was first sampled in 2000. Annual BIBI scores at the Fifteen Mile Creek Sentinel site varied as much as 1.75 from 2000 through 2016. Jones Falls scored a BIBI of 4.00 in 2016 and 3.67 in 2017 (Table 3).

BIBI scores were variable at all study sites between years, but this variation was well within what would be considered normal for benthic macroinvertebrate communities. Similar variation has been documented at other MBSS Sentinel sites and can likely be attributed to biotic response to precipitation and other naturally occurring factors.

Table 2. Benthic and fish index of biotic integrity scores from the three study reaches in Little Catoctin Creek.

Reach	**Downstream**				**Restoration**				**Control**					
Site	**201**		**202**		**203**		**204**		**205**		**206**		**107**	
Year	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
BIBI	2.00	1.75	2.25	1.50	2.00	1.75	1.75	1.75	1.50	1.75	1.50	1.25	2.00	1.50
FIBI	4.33	4.00	3.33	3.67	3.33	3.67	3.33	3.00	3.00	3.33	3.33	3.00	NM	NM

NM = Not measured - only benthic macroinvertebrates sampled at this site.

Table 3. Benthic and fish index of biotic integrity scores from representative MBSS Sentinel sites.

	Reference Sites			
Site	**Fifteen Mile Creek**		**Jones Falls**	
Year	2016	2017	2016	2017
BIBI	3.00	4.75	4.00	3.67
FIBI	4.33	4.33	3.67	3.33

Table 4. Numbers of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa and pollution-intolerant and tolerant benthic macroinvertebrate taxa from the three study reaches in Little Catoctin Creek.

Reach	**Downstream**				**Restoration**				**Control**					
Site	**201**		**202**		**203**		**204**		**205**		**206**		**107**	
Year	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
No. EPT taxa	7	3	6	1	5	3	1	0	1	0	1	0	3	1
No. intolerant taxa	7	2	3	1	3	1	2	3	3	1	2	1	3	2
No. tolerant taxa	13	8	15	9	12	12	10	10	7	14	7	11	11	9

Twenty-three different fish species were collected from the study area over the two-year period. Of the fish species detected in the study reach, there were seven members of the sunfish (Centrarchidae) family, two of which were game fish, and nine members of the minnow (Cyprinidae) family, including bluehead chub, *Nocomis leptocephalus*, an introduced species. Other species collected included white sucker (*Catostomus commersoni*), yellow bullhead (*Ameiurus natalis*), greenside darter (*Etheostoma blennioides*), fantail darter (*Etheostoma flabellare*), banded killifish (*Fundulus diaphanus*), and American eel (*Anguilla rostrata*). Four of the species found in the study area are intolerant of pollution: central stoneroller (*Campostoma anomalum*), common shiner (*Luxilus cornutus*), bluehead chub (*Nocomis leptocephalus*), and river chub (*Nocomis micropogon*). No federally- or state-listed (rare, threatened or endangered) fish species were detected at the study sites at any time during the monitoring period. Each site contained between 13 and 18 species. Fish assemblages were comparable to those found in the reference sites during the study period.

FIBI scores ranged from Fair to Good in Little Catoctin Creek, with the highest score (4.33) observed in the downstream reach in 2016 (Table 2). In a similar pattern to the BIBI scores, the lowest FIBI scores (3.00) were observed in the control reach and the upstream site within the restoration reach.

As reflected in the BIBI and FIBI scores, benthic macroinvertebrate communities appear to be in poorer condition than the fish communities present in each of the three study reaches of Little Catoctin Creek. Benthic macroinvertebrate and fish communities may in some cases respond differently to stressors. Although all the factors affecting benthic macroinvertebrate communities in the study area are not understood at this time, the presence of heavy deposits of fine silt and sand within Little Catoctin Creek has likely contributed to the lower biological integrity scores.

Physical Habitat Conditions:

As described previously, Little Catoctin Creek within the study area flows through predominantly agricultural lands consisting of crops and active and inactive pasture. The riparian areas adjacent to the monitoring sites had, in most cases, minimal coverage of trees and other woody vegetation. Riparian buffer widths measured at these sites varied from zero (no vegetated buffer) to at least 50 meters (Table 5). As a result, much of the streambed within the study reaches was open with minimal shading of stream substrates and aquatic habitats. The percent of the stream channel shaded by riparian vegetation was highest in the downstream reach and decreased upstream.

Eroded stream bank area measurements were the highest within the restoration reach below MD-180. Fine sediments eroding from stream banks and other sources are found throughout the depositional areas within the study area – especially within the restoration and control reaches. Depositional bar formation ranged from severe (downstream reach) to minimal (control reach).

Table 5. Physical habitat metrics and physical habitat index scores measured at each site within the three study reaches of Little Catoctin Creek. Metrics scores on a scale of 0 – 20 unless otherwise noted.

	Downstream				**Restoration**				**Control**			
Site	**201**		**202**		**203**		**204**		**205**		**206**	
Year	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
Instream Habitat Quality	15	12	18	15	16	14	13	11	15	10	12	8
Epifaunal Substrate Quality	15	15	17	12	15	12	16	12	12	11	11	11
Velocity/Depth Diversity	14	12	14	12	14	12	13	13	13	9	12	11
Pool/Glide/Eddy Quality	15	13	17	15	16	15	12	12	13	9	11	11
Riffle/Run Quality	16	13	16	12	16	14	17	12	16	15	11	13
Bar Formation (severity score)	Sev	Sev	Min	Min	Mod	Mod	Min	Min	Min	N	Min	N
Embeddedness (%)	40	50	25	55	25	25	15	25	30	20	40	25
Shading (%)	60	70	40	35	20	35	20	35	10	25	15	20
Minimum Riparian Buffer Width (m)	30	33	7	30	50	50	0	33	4	8	5	5
Bank Erosion (total area m^2)	118	80	35	46	137	97	91	82	69	123	51	0
Physical Habitat Index (0-100)	73	77	77	66	76	65	44	57	35	39	40	43

Sev = Severe   Min = Minor
Mod = Moderate   N = None

Epifaunal substrate quality, a qualitative measure of habitat available to benthic macroinvertebrates, ranged from sub-optimal to optimal within the study area. The highest quality habitat was again observed in the downstream reach and lowest quality benthic habitat was observed in the control reach. In comparison to reference conditions, benthic macroinvertebrate habitat quality within Little Catoctin Creek is similar to that observed during the same time period in Jones Falls and of higher quality than observed in Fifteen Mile Creek.

Physical habitat index scores for each site showed a downstream to upstream pattern of decreasing habitat quality with highest index scores measured in the downstream reach and lowest scores measured in the control reach. Instream habitat quality, a qualitative measure of habitat available for stream fishes, generally ranged from sub-optimal to optimal within the study area. Fish habitat was generally of higher quality in the downstream reach, where the highest FIBI scores were documented. In comparison to reference conditions, fish habitat quality within Little Catoctin Creek is similar to that observed during the same time period in Jones Falls and of higher quality than observed in Fifteen Mile Creek (Table 6).

Table 6. Physical habitat metrics and physical habitat index scores measured at reference MBSS Sentinel sites.

Site	**Fifteen Mile Creek**		**Jones Falls**	
Year	**2016**	**2017**	**2016**	**2017**
Instream Habitat Quality	9	10	16	16
Epifaunal Substrate Quality	10	10	17	17
Velocity/Depth Diversity	8	9	14	15
Pool/Glide/Eddy Quality	8	9	15	14
Riffle/Run Quality	8	12	15	16
Bar Formation (severity score)	Severe	Severe	Moderate	Moderate
Embeddedness (%)	0	0	25	30
Shading (%)	40	65	60	75
Minimum Riparian Buffer Width (m)	33	36	50	50
Bank Erosion (total area m^2)	120	133	36	75
Physical Habitat Index (0-100)	37	58	83	83

4.3 Photo Log of Sampling Locations

PRFR-107-X-2017 midpoint looking downstream

PRFR-107-X-2017 midpoint looking upstream

PRFR-201-X-2017 midpoint downstream

PRFR-201-X-2017 midpoint upstream

PRFR-202-X-2017 Midpoint looking downstream

PRFR-202-X-2017 midpoint looking upstream

PRFR-203-X-2017 Midpoint looking downstream

PRFR-203-X-2017 Midpoint looking upstream

PRFR-204-X-2017 midpoint downstream

PRFR-204-X-2017 midpoint upstream

PRFR-205-X-2017 midpoint downstream

PRFR-205-X-2017 midpoint upstream

PRFR-206-X-2016 Midpoint looking downstream

PRFR-206-X-2016 Midpoint looking upstream

4.4 Next Steps

This report summarizes those data collected and finalized from April 2016 – September 2017, and as such, is an assessment of baseline, pre-restoration conditions of Little Catoctin Creek. An in-depth benthic macroinvertebrate community analysis including data from the supplemental 100-organism subsample is underway; results of this analysis will be made available in an update to this report. Biological monitoring by DNR will resume in spring 2019 following completion of construction.

5 Physical Monitoring

5.1 Methods

A geomorphic assessment was performed at six (6) locations throughout the study area; three (3) within the project reach, one (1) upstream of the project limits and two (2) downstream of the project limits (see Attachment A). The initial geomorphic survey from September 2017 included five (5) monitoring locations for establishing a baseline for the pre-restoration project area. An additional monitoring location was added in 2018 to monitor changes in the channel downstream of the project area. Two surveys have been conducted during the current monitoring period; one in January 2018 to assess annual changes in the channel morphology to document pre-construction conditions, and another in July/August 2018 to assess changes resulting from an extreme flood event that occurred in May 2018, whereby flooding occurred beyond the 100-year floodplain. Cross sections 1, 5, and 6 are located outside of the project limits and will remain intact for post-construction monitoring. Cross sections 2, 3, and 4 are located within the project limits and will be re-established after construction has been completed. These cross sections will be monumented for additional post-construction monitoring. Cross section locations are shown in the plan sheets at the end of this appendix.

For each surveyed cross section the total area, bankfull channel dimensions, water surface slope, and riffle surface material are compared. Bankfull was identified in the field in 2017 only. To compare with the following year's surveys these calls were adjusted. The slope breaks in the cross-section survey data indicated that bench features were being created at an elevation about 0.95 to 1.10 feet above the water surface in many sections. Using this information, bankfull was either presumed at an elevation within this range above the water surface (incised channel, no bankfull indicator), or selected at a slope break/bench feature that was created at this elevation (Table 7). Top of bank elevation was selected at a fixed elevation in each cross-section to allow for comparison (Table 7). Cross-sectional area was calculated using the specific bankfull elevation for each section. Top of bank area was calculated using a fixed elevation around the low bank height for each section to quantify erosion occurring throughout the entire cross section.

Table 7: Bankfull and Top of Bank elevations used for calculations

Cross Section	Bankfull Elevation (ft)	Top of Bank Elevation (ft
XS 1	419.7	423.4
XS 2	417.1	420.29
XS 3	407.6	409.57
XS 4	401.1	405.49
XS 5	399.7	403.46
XS 6	397.5	400.0

The cross section, thalweg profile, and riffle pebble count data collected in September 2017, January/April 2018 and July/August 2018 were compared to depict the bank erosion and channel morphological changes during this period. Additionally, cross section and profiles estimated from the topographical survey performed in 2015 are provided for general comparison purposes only. These data do not have the resolution of the geomorphic survey section data; therefore, caution is recommended when drawing conclusions based on this data. A brief discussion about each section is included below.

On May 15th, 2018, there was an estimated 9,630 CFS peak discharge at the USGS Gage 01636846 within the limits of the physical monitoring section. The data between January/April 2018 and July/August 2018 reflect changes largely due to this extreme storm event.

5.2 Results

Geomorphic assessments results and comparisons over time are presented below for each cross section survey reach. Field survey data results can be found in Attachment B.

Cross Section 1 – Upstream Control Site

At Cross Section 1 the left bank has eroded 1.2 feet between 2017 and 2018 while the right bank has aggraded vertically 0.4 feet (Figure 6). Sediment appears to shift regularly through the bottom of the channel in this depositional reach.

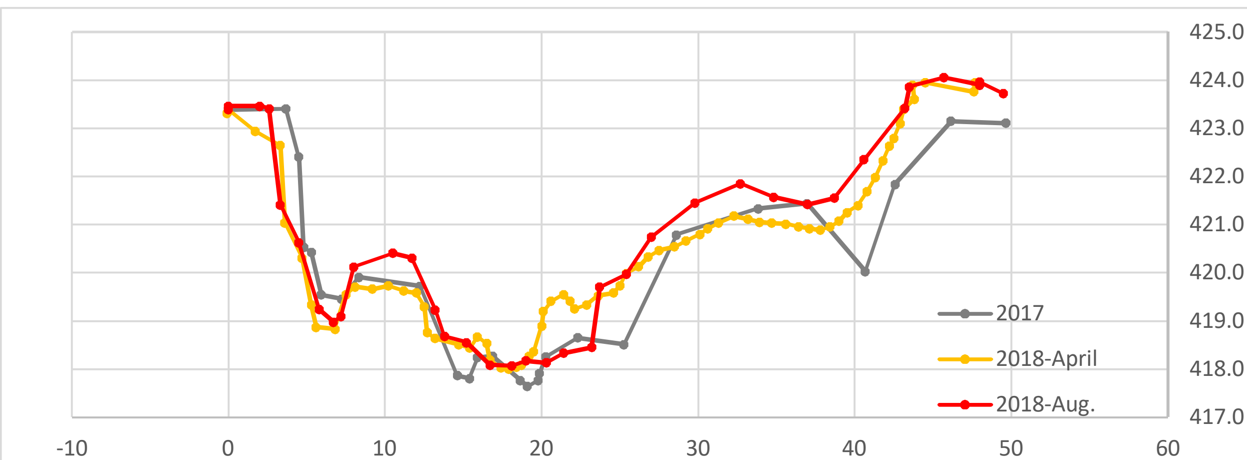

Figure 6. Cross Section 1 Comparison

A grade control feature appears to have formed between 2017 and April 2018 at station 1+10 (**Error! Reference source not found.**). With the exception of a large depositional feature filling in the pool between station 0+70 and 0+90, the profile has remained largely unchanged between April and August of 2018.

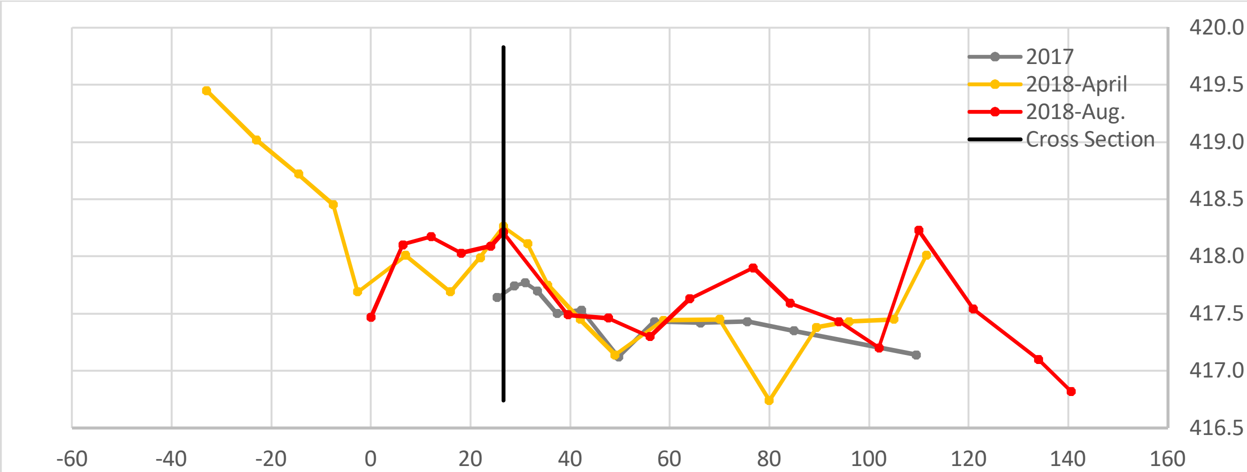

Figure 7. Profile 1 Comparison

The channel material appears to have coarsened between 2017 and 2018 (Figure 8). The D50 and D84 increases from 12.3mm (medium gravel) and 31.3mm (coarse gravel) in 2017 to 33mm (very coarse gravel) and 62mm (very coarse gravel) in 2018. It has remained unchanged after the May 15th storm.

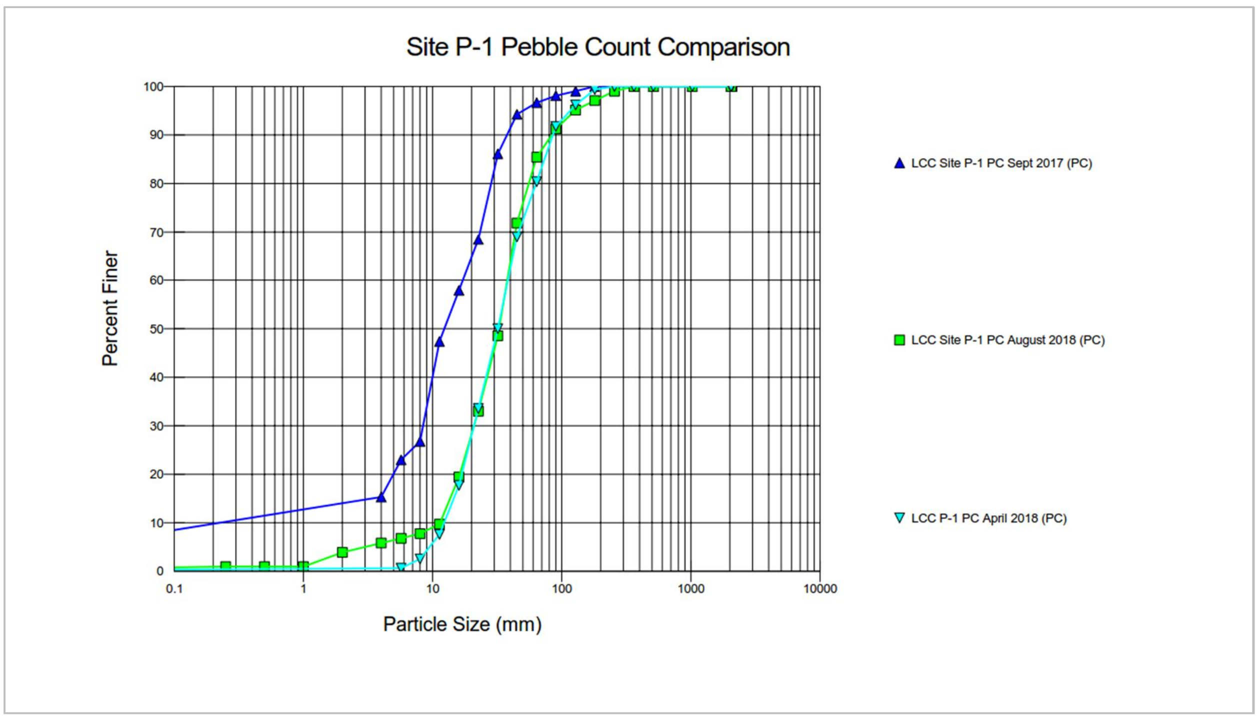

Figure 8. Section 1 Riffle Bed Material Comparison

<u>Cross Section 2 – Restoration Reach</u>

The left bank of Cross Section 2 has eroded approximately four (4) feet between January and July of 2018, exposing two vertical (2) feet of the left pin (Figure 9). Review of the section over time indicates that the gravel deposition along the banks of the channel is regularly mobilized –the 2017 survey shows a widened channel when compared to 2015. From 2017 to 2018, bed material has aggraded on the right bank. The erosion of the right bank between 2015 and 2017 cannot be confirmed. Photos show this is deposited bed material.

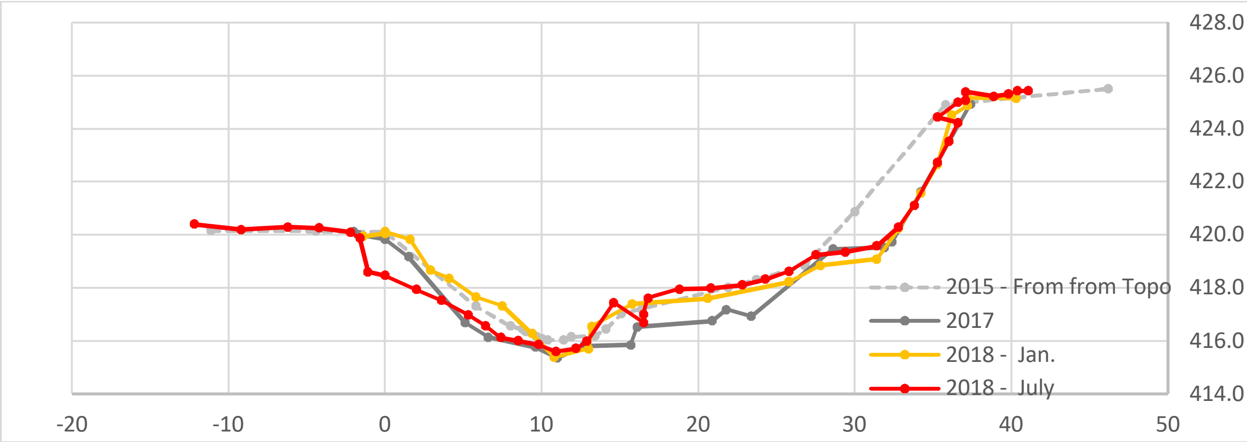

Figure 9. Cross Section 2 Comparison

Throughout the profile, the pools and riffles have demonstrated adjustment of grade features (Figure 10). The overall grade has flattened from 1.9% in 2017 to 1% in 2018 when comparing the water surface slope. The grade control feature that appears in July 2018 is the downstream end of the scour pool immediately downstream of the MD 180 bridge.

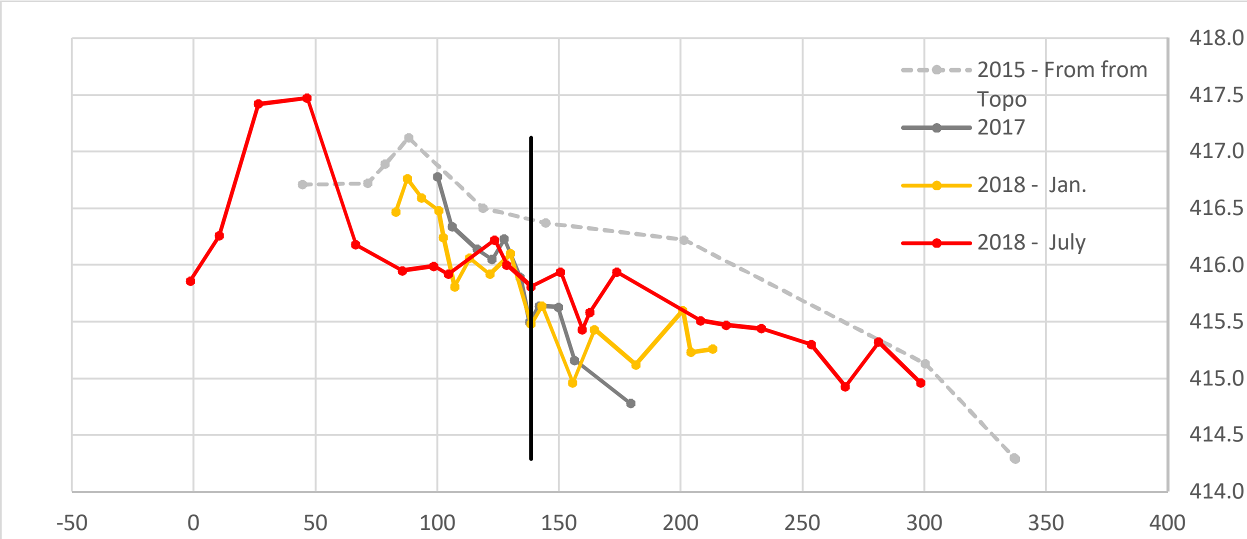

Figure 10. Profile 2 Comparison

Comparison of the channel material below indicates that the riffle material has slightly coarsened but remains a gravel/cobble channel (Figure 11). The exposed bedrock has been partially buried.

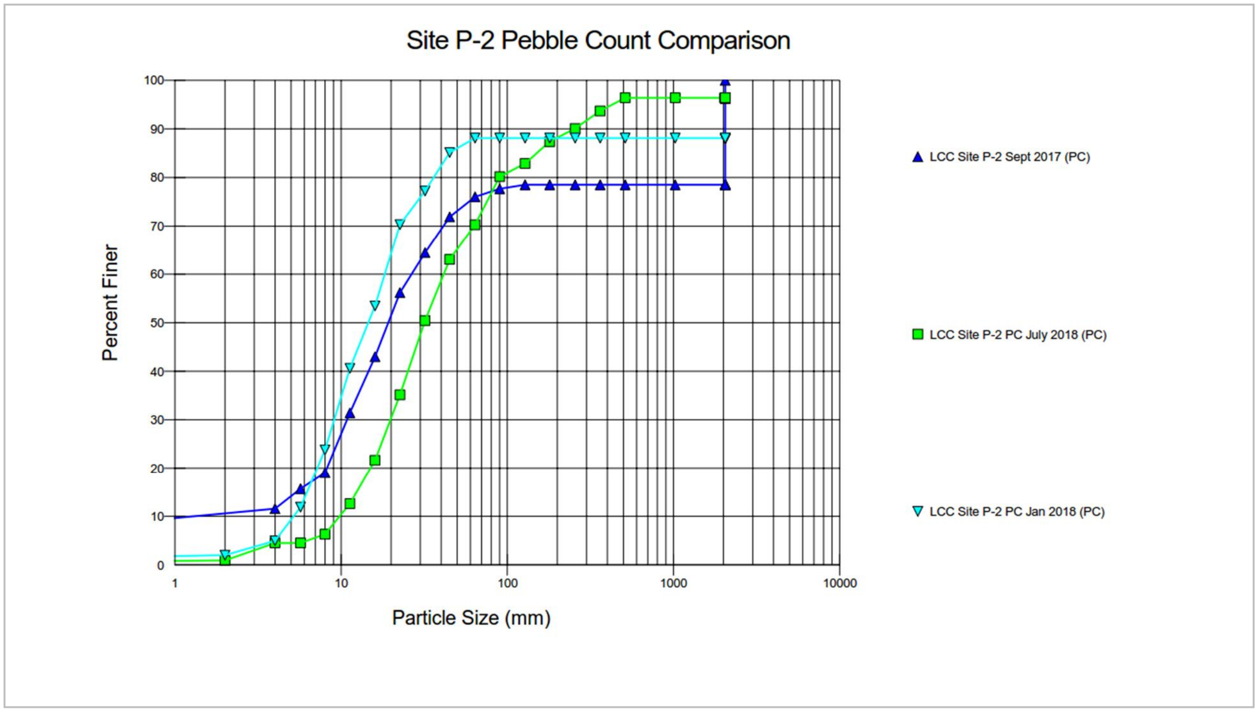

Figure 11. Section 2 Riffle Bed Material Comparison

<u>Cross Section 3 - Restoration Reach</u>

Changes from January to July of 2018 included 2-4 inches of fine sediment deposited on the right floodplain (Figure 12). Minor erosion and a small depositional bar at the left toe was documented. The channel section appeared stable. The apparent channel shift from 2015 to 2017 cannot be confirmed and is likely due to differences in data resolution.

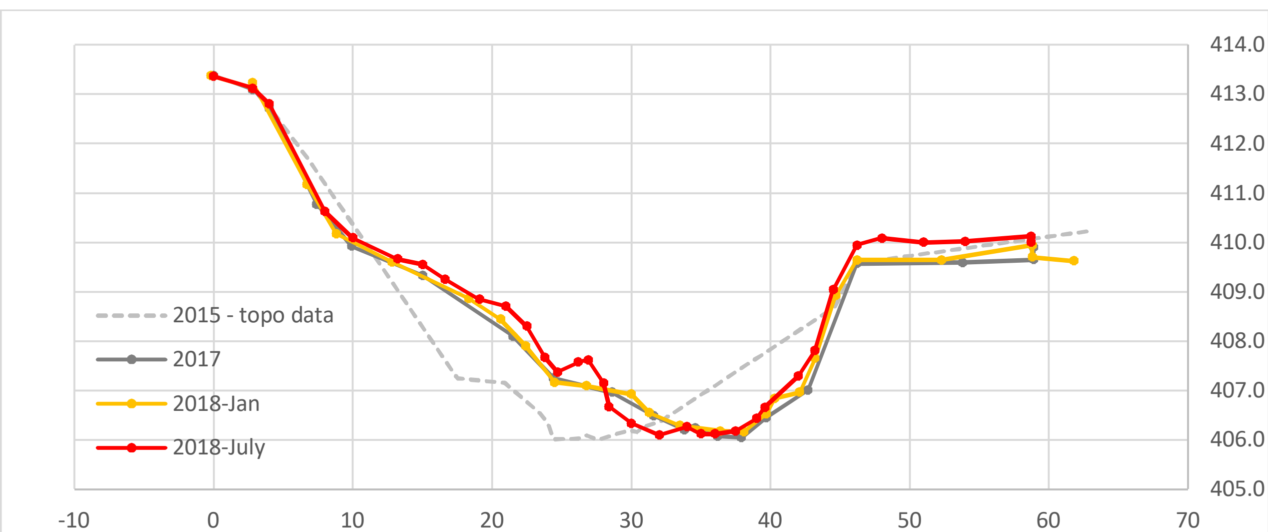

Figure 12. Cross Section 3 Comparison

The overall channel bed morphology appears unchanged during the monitoring period (Figure 8). The slope for this reach is 0.94%.

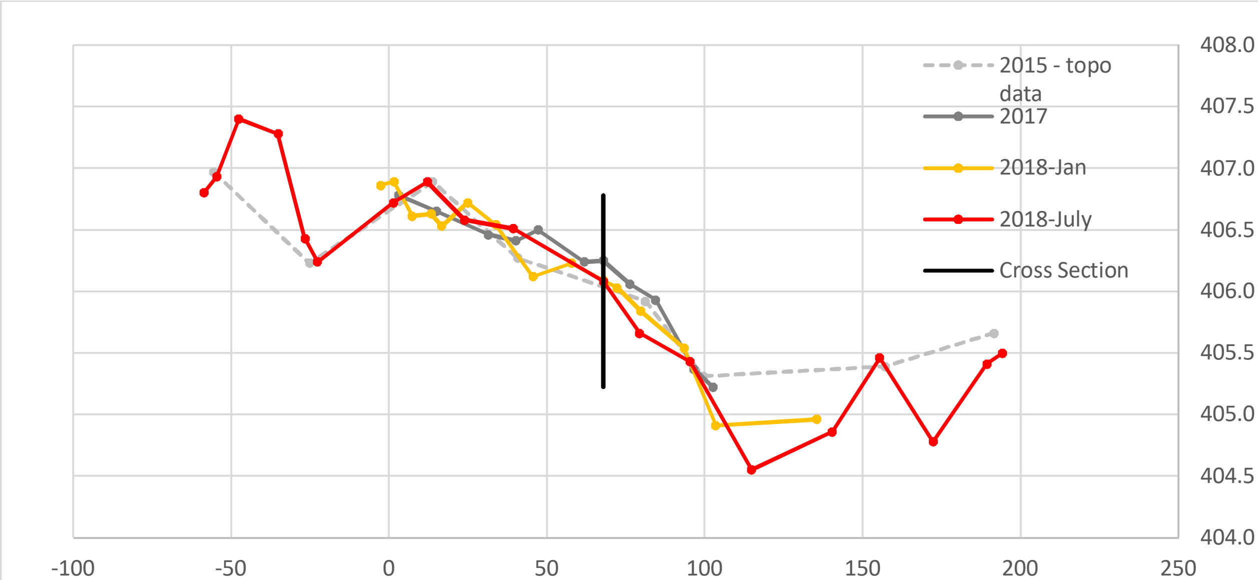

Figure 13. Profile 3 Comparison

The riffle material has remained a fine/medium gravel with cobble and has coarsened since 2017. The D50 and D84 increased from 10.8mm (medium gravel) and 20.9mm (coarse gravel) in 2017 to 21mm (coarse gravel) and 67mm (small cobble) in 2018 (Figure 14).

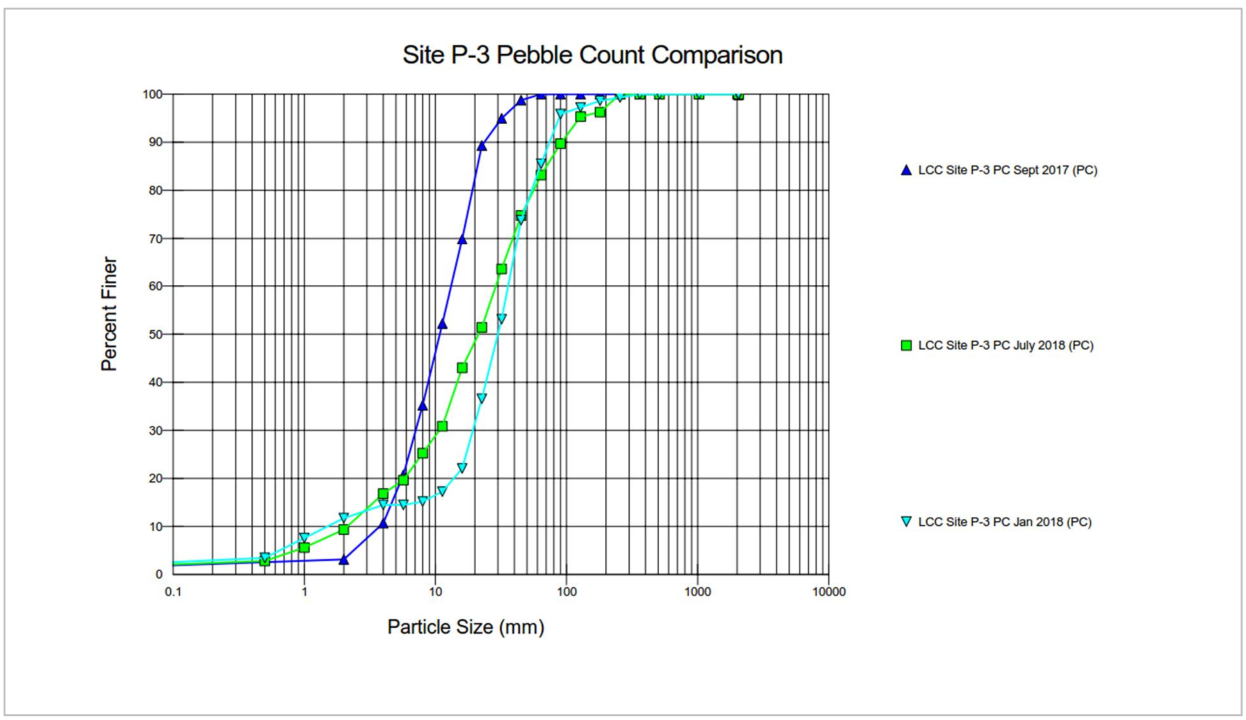

Figure 14. Section 3 Riffle Bed Material Comparison

Cross Section 4 - Restoration Reach

This section is highly unstable. The left pin was exposed by two feet and the right bank has eroded by four feet between January and July of 2018. A large gravel bar has formed on the left bank and the entire channel has shifted over the past two years (Figure 15).

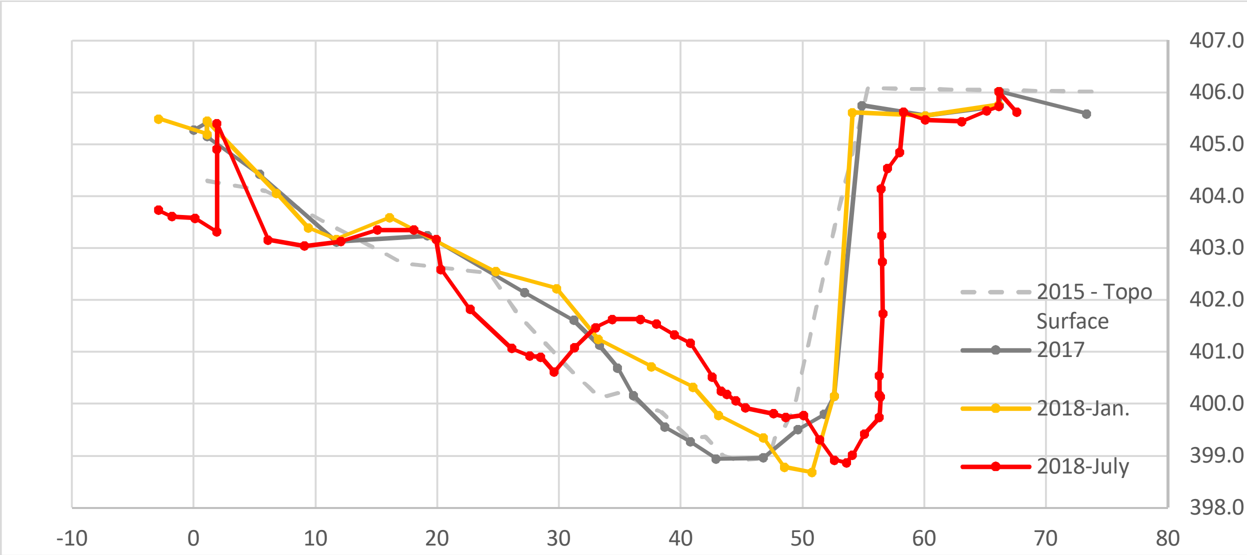

Figure 15. Cross Section 4 Comparison

The original section was surveyed at a riffle in 2017 but the migration of the channel has formed a pool at the cross section (Figure 16). The upstream riffle has migrated approximately 70 feet. While the channel bed thalweg has remained at approximately the same elevation, the area is a pool and the downstream channel has aggraded.

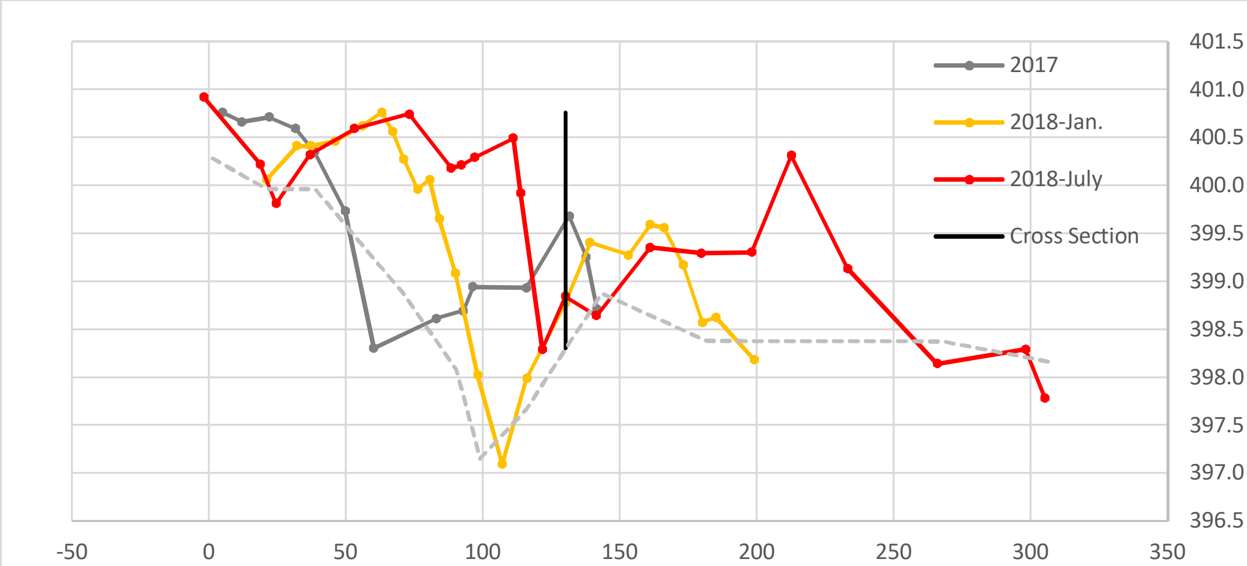

Figure 16. Profile 4 Comparison

Pebble counts were performed at the upstream riffle rather than in the pool at the monitoring location (Figure 17). This indicates that although the channel is migrating, the material of the grade control riffle feature is predominantly gravel throughout each survey. The D50 increased slightly from 13.6mm (medium gravel) in 2017 to 20mm (coarse gravel) in 2018. The D84 also increased slightly from 32.4mm (very coarse gravel) in 2017 to 42mm (very coarse gravel) in 2018.

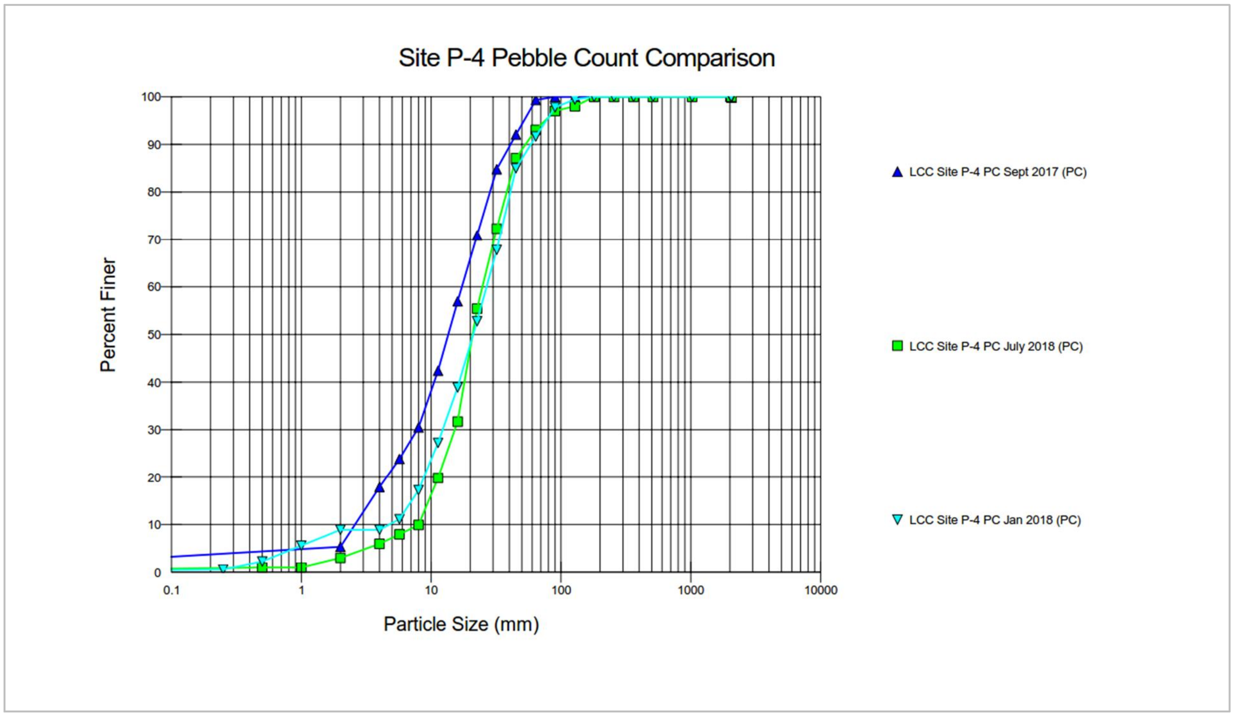

Figure 17. Section 4 Riffle Bed Material Comparison

Cross Section 5 - Downstream Reach

The left toe has scoured down approximately one foot between April 2018 and August 2018 (Figure 18), which likely occurred during the extreme flooding event in May 2018. The rest of the channel remained largely unchanged during the monitoring period, and both banks are fully vegetated.

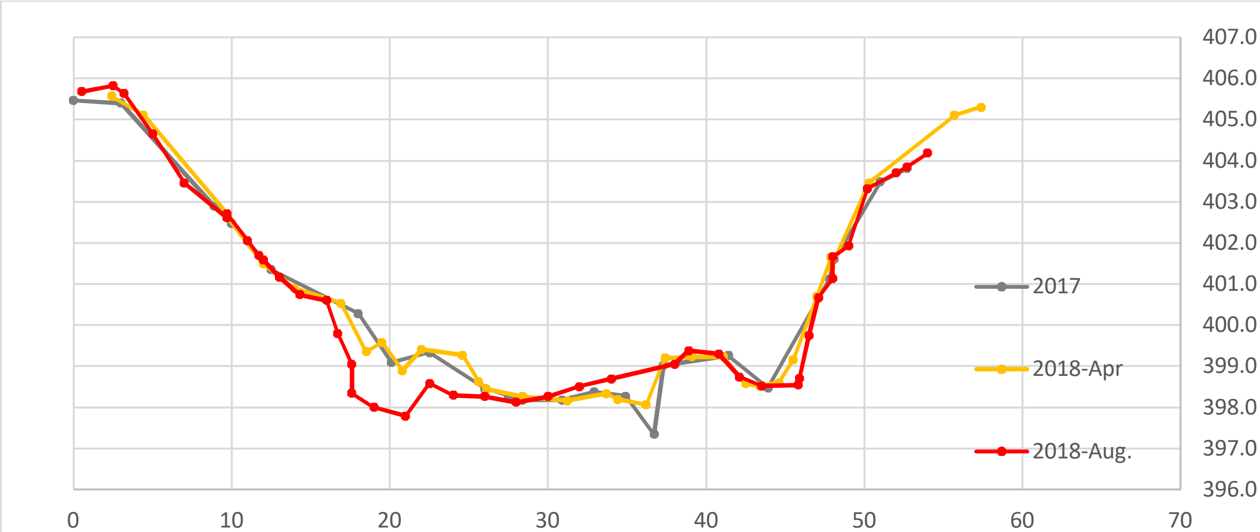

Figure 18. Cross Section 5 Comparison

The profile has significantly reduced in slope between April and August of 2018 (Figure 19). This is likely due partially to the extreme storm event in May 2018 causing the riffle feature to migrate downstream and also due to another major storm in August 2018, which occurred just after completion of a constructed cross vane immediately upstream. The scour pool for a constructed cross vane is immediately upstream of the profile, and the area upstream of Station 0+60 received flows approaching 1800 cfs through a confined section of the floodplain which caused further shifts in the bed profile as the channel responded to changes in channel geometry.

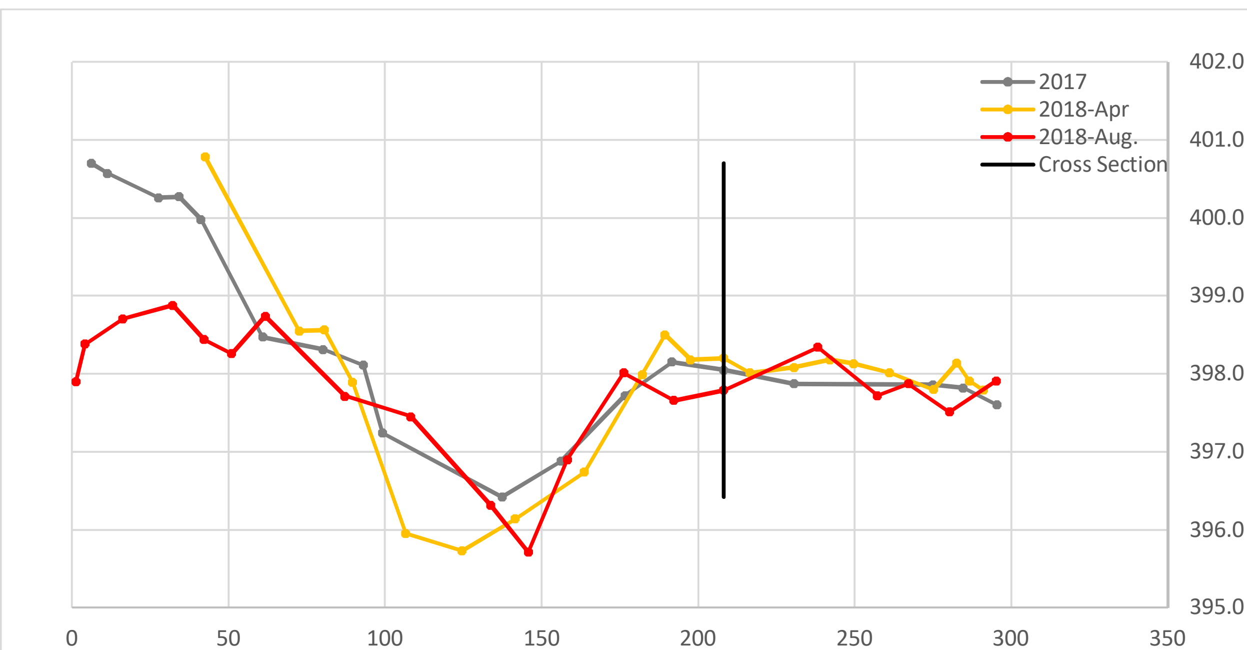

Figure 19. Profile 5 Comparison

The riffle material appears to have coarsened since 2017 but remains dominated by fine gravel and cobbles. In 2017, the D50 and D84 was 9.1mm (medium gravel) and 28.6mm (coarse gravel), respectively. While in 2018, the D50 increased slightly to 17mm (coarse gravel) and the D84 increased substantially to 73mm (small cobble). This suggests the deposition of larger bed material in the study area of Profile 5 (Figure 20).

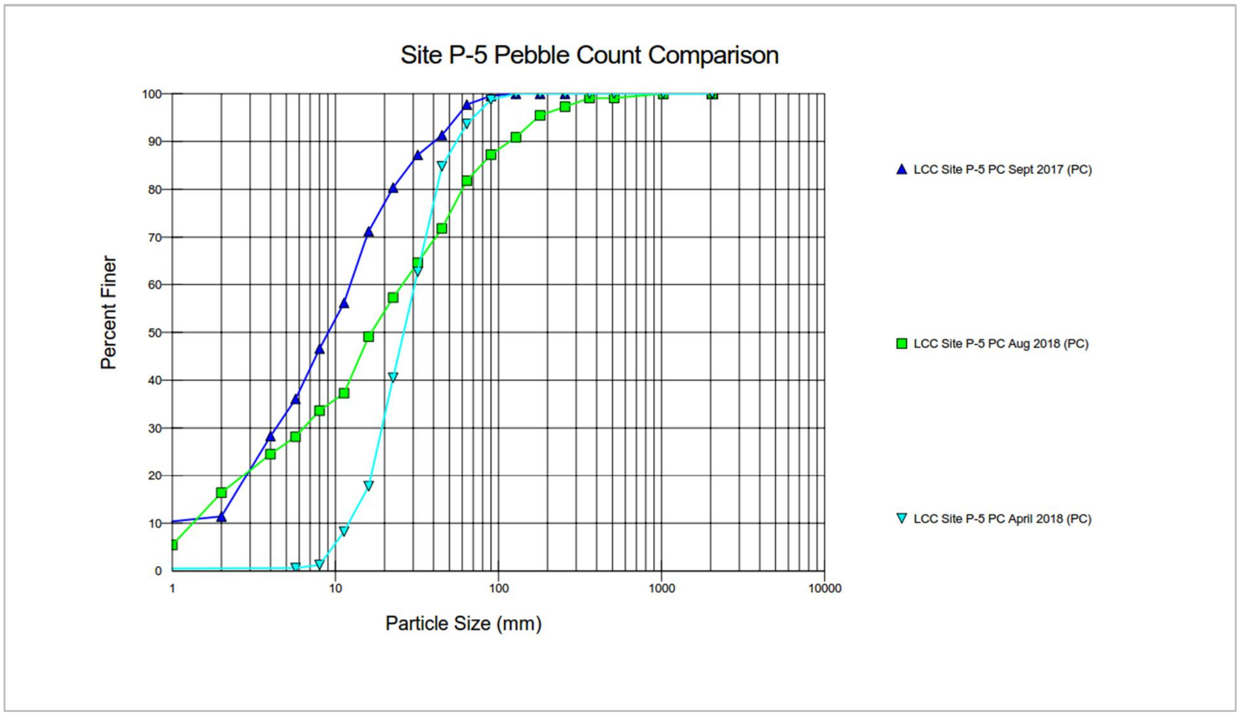

Figure 20. Section 5 Riffle Bed Material Comparison

Cross Section 6 - Downstream Reach

This channel was established and surveyed in April 2018 and surveyed again in August of 2018. This section has eroded significantly on the left bank where the monument pin is now exposed by 1.5 feet (Figure 21). The soil here is primarily loosely consolidated sand. The right bank has undercut by approximately three feet. The entire channel bed has aggraded by approximately 3 – 4 inches across the section. It is likely that the majority of changes observed can be directly attributed to the extreme flood event that occurred in May 2018.

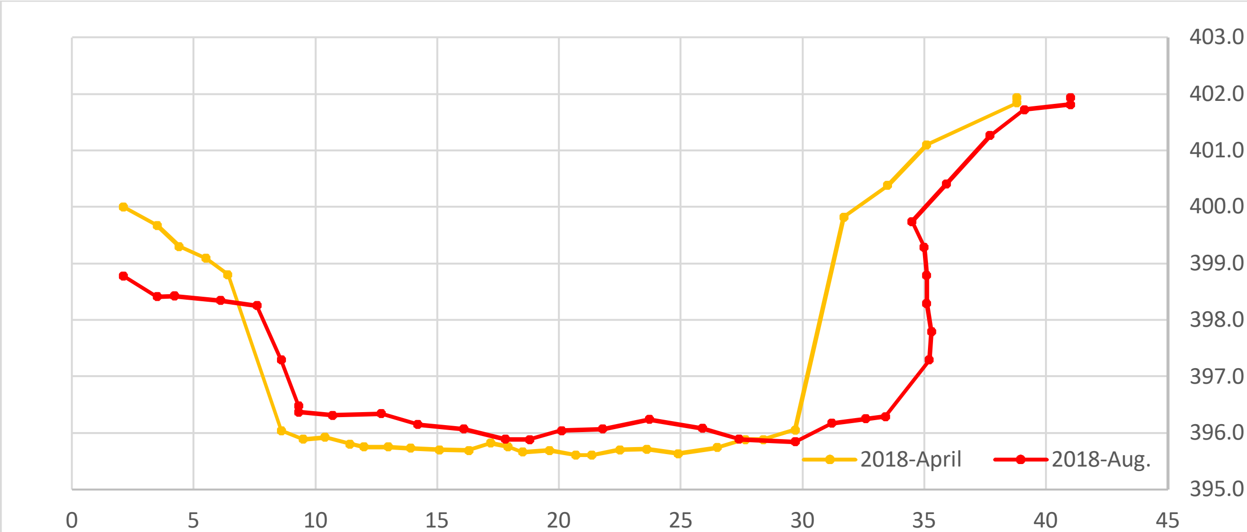

Figure 21. Cross Section 6 Comparison. Note: Elevations are not set to known datum.

The profile survey shows that the upstream pool and the lower portion of the riffle where the cross section was taken have aggraded (Figure 22). The entire profile remains at approximately the same slope, 0.45% in April 2018, and 0.48% in August 2018.

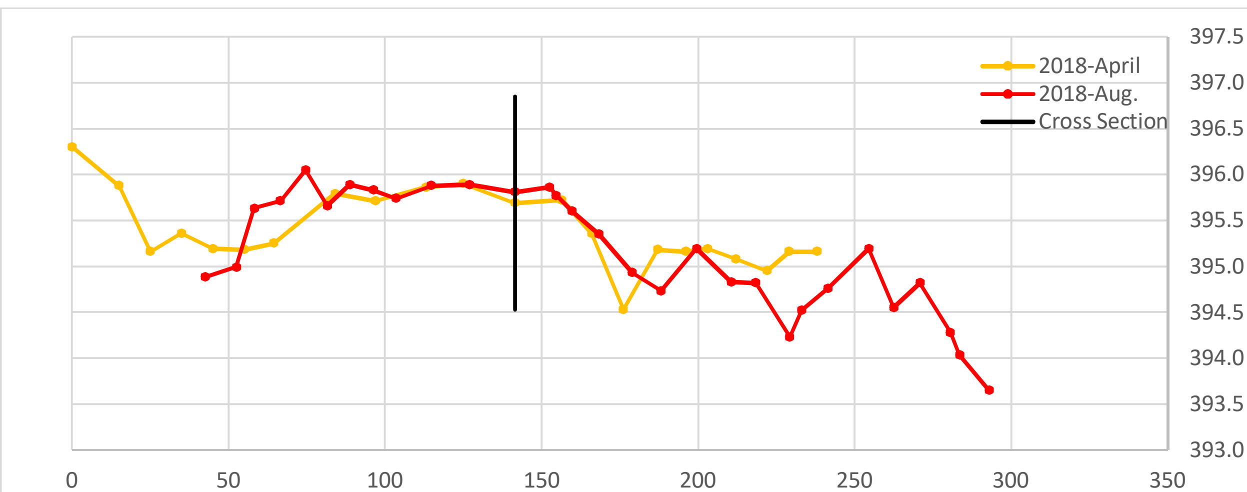

Figure 22. Profile 6 Comparison

The riffle material is unchanged between April and August of 2018. The reach maintained a D50 in the coarse gravel category and a D84 in the small cobble category, only differing a few millimeters between the surveys. (Figure 23).

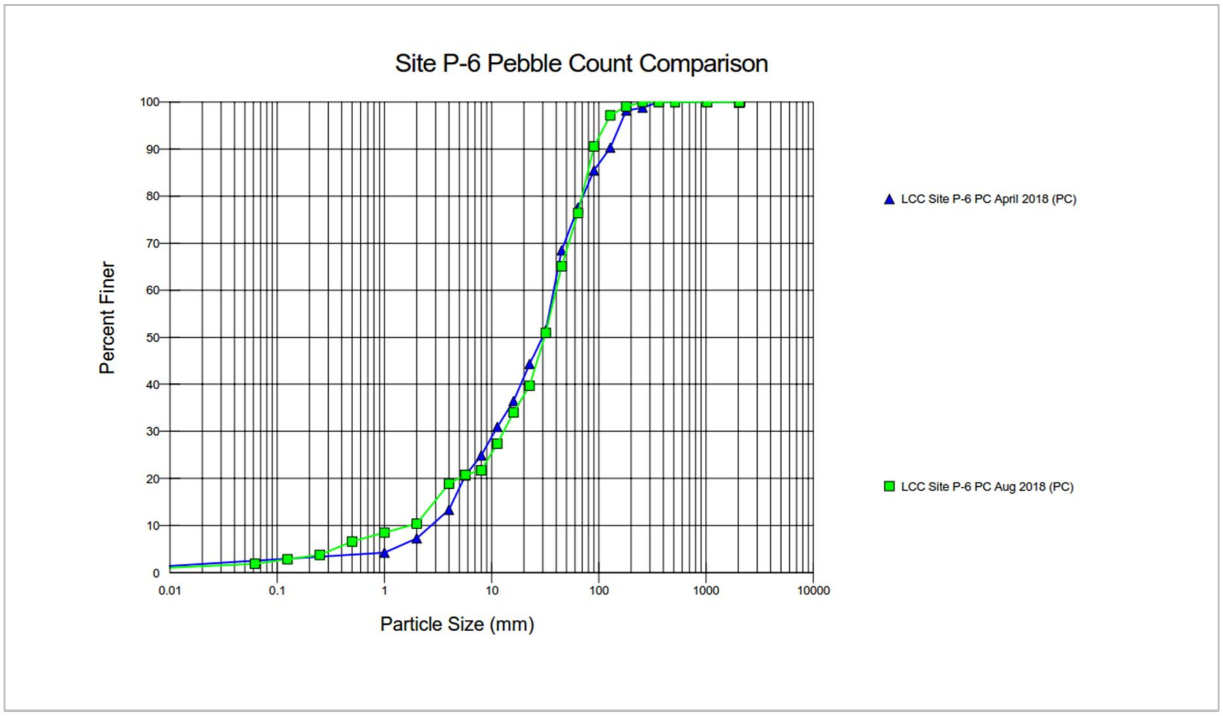

Figure 23. Section 6 Riffle Bed Material Comparison

5.3 Discussion

Following the pre-construction surveys, conducted from September 2017 through August 2018, there is substantial evidence of generally unstable geomorphic conditions in the monitored reaches of Little Catoctin Creek. With three separate geomorphic surveys conducted in the span of just one year, bank erosion, bed aggradation, and overall channel instability were all documented.

Beginning with the upstream control reach, Cross Section 1, there was minor erosion near the top of the left bank of about 1.5 feet. The channel was significantly impacted by increased deposition and aggradation on the right bank were the bank aggraded vertically by approximately one (1) foot. This deposition has led to the loss of bankfull cross-sectional area and top of bank area since 2017 (Table 9). As indicated by Table 10, the deposition in Section 1 consists of coarse particles such as larger gravel and small cobble that led to the increase in D50 and D84 values and associated size classes. Slope decreased over the course of the three surveys, possibly due to the aggradation and creation of a grade control structure at Station 110 that occurred between 2017 and 2018 (Table 8).

Cross Section 2 bankfull area and top of bank area decreased since 2017 (Table 9) indicating net deposition. The channel is highly unstable, with the left bank eroding approximately three (3) feet since 2017 (Figure 9). The right bank has aggraded vertically by one (1) foot creating a bench feature at the presumed bankfull stage (Figure 9). The bench caused both the width at bankfull and the width/depth ratio to decrease during the monitoring period (Table 9). The profile comparison in Figure 10 shows changing areas of scour to aggradation year-to-year, while the overall slope has stayed relatively consistent (Table 8). Bedrock that was present in 2017 has been buried by the influx of coarse gravel throughout this reach (Table 10).

Cross Section 3 saw an overall decrease in cross-sectional area and top of bank area compared to the initial survey in 2017 (Table 9). This was one of the more stable reaches from 2017 to 2018, although the toe of channel bed has eroded three (3) feet laterally (Figure 12). The combination of increased deposition on the right floodplain (about 0.4 feet) and a bench feature that formed on the left bank in 2018 led to a decrease in cross-section and top of bank areas (Figure 12). The particles throughout this section became coarser from 2017 to 2018. The D50 was coarse gravel in 2018, an increase from medium gravel in 2017. The D84 was small cobble in 2018, an increase from coarse gravel in 2017 (Table 10). Slope was generally unchanged in this reach (Table 8).

Cross Section 4 is very unstable, and the profile shows active migration of channel features with aggradation throughout much of the surveyed reach (Figure 16). The cross-section comparisons indicate that this section is highly unstable (Figure 15, Table 9). The erosion from January 2018 to July 2018 caused the left bank pin to become exposed by almost two (2) feet, while the right bank eroded approximately four (4) feet (Figure 15). This erosion near the left bank pin and right bank resulted in an increase in the top of bank area from 2017 to 2018 even though the bankfull cross-sectional area decreased in that same time span (Table 9). As a result of the extensive erosion, the bankfull width and the width/depth ratio has increased since 2017Table 9Table 7. The particle comparison for this section has been fairly consistent since the start of the survey in 2017, with only the D50 increasing one size class from medium gravel to coarse gravel (Table 10). The slope in this section has decreased by half possibly due to the aggradation at the station 2+12 pool, and the shifting of the bed features (Table 8, Figure 16).

The Cross Section 5 profile shows that the channel slope has flattened. This is due to the upstream riffle being regraded during stream restoration upstream of Station 70 (Figure 19). The cross section was stable from the initial survey in 2017 to the second survey in April 2018. The August 2018 survey shows approximately (1) foot of scour along the left bank toe and two (2) feet of lateral erosion along the left bank (Figure 18, Table 9). The cross-sectional area increased while the top of bank area increased by a much smaller amount, which indicates most of the changes are occurring at or below the bankfull stage (Table 9). Particles in Section 5 increased the D50 and D84 size classes from medium gravel and coarse gravel to coarse gravel and small cobble (Table 10).

Cross Section 6 was established in April 2018 and therefore only had two surveys conducted. The cross section in this reach experienced significant bank erosion from April 2018 to August 2018 (Figure 21). The left bank eroded 0.8 feet and the right bank eroded 3.5 feet (Figure 21). Although bank erosion occurred, the stream bed aggraded by 0.35 feet. The cross section had an increase in cross-sectional area, indicating a net loss of sediment (Table 9). The bankfull channel widened and aggraded, increasing the width and width/depth ratio and decreasing depth at bankfull stage (Table 9). The bed material particles were stable at this reach (Table 10). Slope in this reach remained stable during both 2018 surveys (Table 8).

Table 8: Profile slope comparison

Profile		**Water Surface Slope %**	**Profile**		**Water Surface Slope %**
Profile 1	Sep-17	0.76%	**Profile 4**	Sep-17	0.78%
	Apr-18	0.59%		Jan-18	0.65%
	Aug-18	0.40%		Jul-18	0.41%
Profile 2	Sep-17	1.15%	**Profile 5**	Sep-17	0.99%
	Jan-18	1.10%		Apr-18	0.94%
	Jul-18	1.09%		Aug-18	0.42%
Profile 3	Sep-17	1.27%	**Profile 6**	Apr-18	0.45%
	Jan-18	0.94%		Aug-18	0.48%
	Jul-18	0.94%			

Table 9. Cross-section dimensions comparison

		Bankfull					
		Cross-Sectional Area (ft^2)	**Width (ft)**	**Mean Depth (ft)**	**Max Depth (ft)**	**Width /Depth Ratio**	**Top of Bank Area (ft^2)***
XS 1	Sep 2017	19.5	16.9	1.2	2.1	14.6	143.6
	Apr 2018	13.5	19.9	0.7	1.7	29.5	137.0
	Aug 2018	15.3	13.5	1.1	1.6	11.8	123.7
	% Change	**-21.5**	**-20.1**	**-8.3**	**-23.8**	**-19.2**	**-13.9**
XS 2	Sep 2017	17.4	19.5	0.9	1.8	21.9	98.7
	Jan 2018	8.2	8.1	1.0	2.0	8	81.0
	Jul 2018	15.1	13.5	1.1	2.0	12.1	88.4
	% Change	**-13.2**	**-30.8**	**+22.2**	**+11.1**	**-44.7**	**-10.4**
XS 3	Sep 2017	19.7	20.5	1.0	1.6	21.2	70.4
	Jan 2018	18.2	20.0	0.9	1.5	22.0	67.2
	Jul 2018	18.1	18.9	1.0	1.5	19.8	64.1
	% Change	**-8.1**	**-7.8**	**0**	**-6.3**	**-6.6**	**-8.9**
XS 4	Sep 2017	30.6	19.7	1.6	2.2	12.7	197.3
	Jan 2018	25.4	19.7	1.3	2.6	15.3	184.5
	Jul 2018	26.9	24.5	1.1	2.5	22.2	226.4
	% Change	**-12.1**	**+24.4**	**-31.3**	**+13.6**	**+74.8**	**+14.7**
XS 5	Sep 2017	26.9	26.7	1.0	2.4	26.5	160.1
	Apr 2018	26.1	28.0	0.9	1.6	30.1	159.2
	Aug 2018	35.0	29.7	1.2	2.0	25.3	169.4
	% Change	**+30.1**	**+11.2**	**+20.0**	**-16.7**	**-4.5**	**+5.8**
XS 6	Apr 2018	38.2	23.0	1.7	1.9	13.9	101.9
	Aug 2018	35.5	26.9	1.3	1.7	20.3	112.5
	% Change	**-7.1**	**+16.9**	**-23.5**	**-10.5**	**+46.0**	**+10.4**

**Top of bank area calculated from an established fixed elevation unrelated to bankfull*

Table 10: Bed material particle comparison

Site		D50	Size Class	D84	Size Class
Section 1	Sep 2017	12.3	Medium gravel	31.3	Coarse gravel
	Apr 2018	32	Coarse gravel	71	Small cobble
	Aug 2018	33	Very coarse gravel	62	Very coarse gravel
Section 2	Sep 2017	19.2	Coarse gravel	5362.9	Bedrock
	Jan 2018	12	Medium gravel	27	Coarse gravel
	Jul 2018	30	Coarse gravel	98	Medium cobble
Section 3	Sep 2017	10.8	Medium gravel	20.9	Coarse gravel
	Jan 2018	30	Coarse gravel	61	Very coarse gravel
	Jul 2018	21	Coarse gravel	67	Small cobble
Section 4	Sep 2017	13.6	Medium gravel	32.4	Very coarse gravel
	Jan 2018	21	Coarse gravel	44	Very coarse gravel
	Jul 2018	20	Coarse gravel	42	Very coarse gravel
Section 5	Sep 2017	9.1	Medium gravel	28.6	Coarse gravel
	Apr 2018	26	Coarse gravel	44	Very coarse gravel
	Aug 2018	17	Coarse gravel	73	Small cobble
Section 6	Apr 2018	30	Coarse gravel	85	Small cobble
	Aug 2018	31	Coarse gravel	77	Small cobble

5.4 Representative Site Photographs

Photo 1 – Cross Section 1 facing upstream - August 2018

Photo 2 - Cross Section 1 facing downstream - August 2018

Photo 3 – Cross Section 2 facing upstream – August 2018

Photo 4 - Cross Section 2 showing erosion at left pin – August 2018

Photo 5 – Cross Section 3 facing downstream – July 2018

Photo 6 - Cross Section 3 facing the right bank – July 2018

Photo 7 – Cross Section 4 facing downstream showing eroding bank – July 2018

Photo 8 - Cross Section 4 facing the left bank showing exposed pin within gravel deposit – July 2018

Photo 9 – Cross Section 5 facing downstream

Photo 10 - Cross Section 5 facing upstream

6 References

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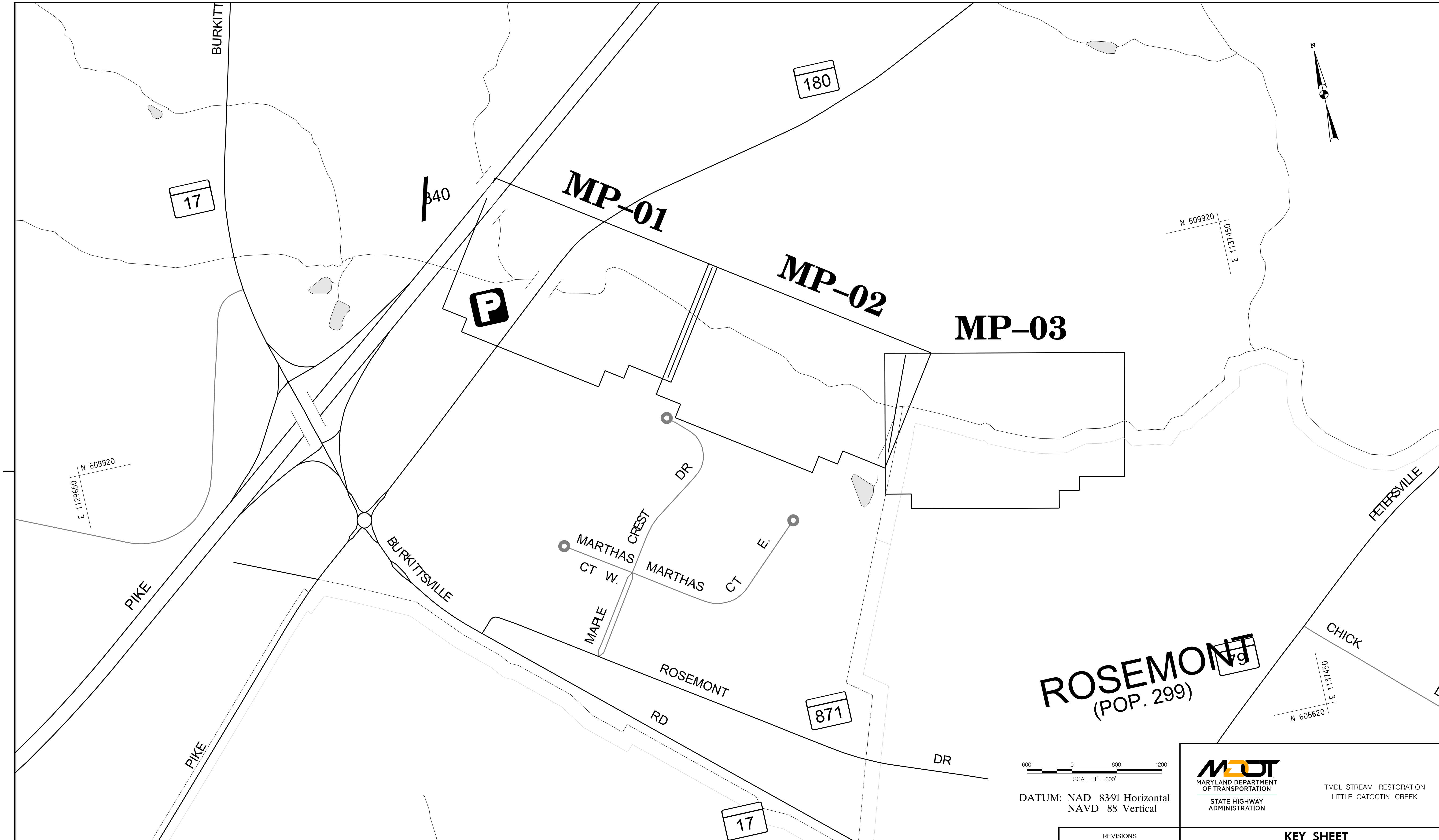
MONITORING LOCATIONS



600' 0 600' 1200'
SCALE: 1" = 600'

DATUM: NAD 83/91 Horizontal
NAVD 88 Vertical

MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

TMDL STREAM RESTORATION
LITTLE CATOCTIN CREEK

REVISIONS

KEY SHEET

SCALE 1" = 600' ADVERTISED DATE OCTOBER 2017 CONTRACT NO. AT62813

DESIGNED BY ______ COUNTY FREDERICK
DRAWN BY ______ LOGMILE ______
CHECKED BY ______
MDE/PRD ______

DRAWING NO. KY-01 OF 01 SHEET NO. 1 OF 4

PLOTTED: Tuesday, October 03, 2017 AT 03:39 PM
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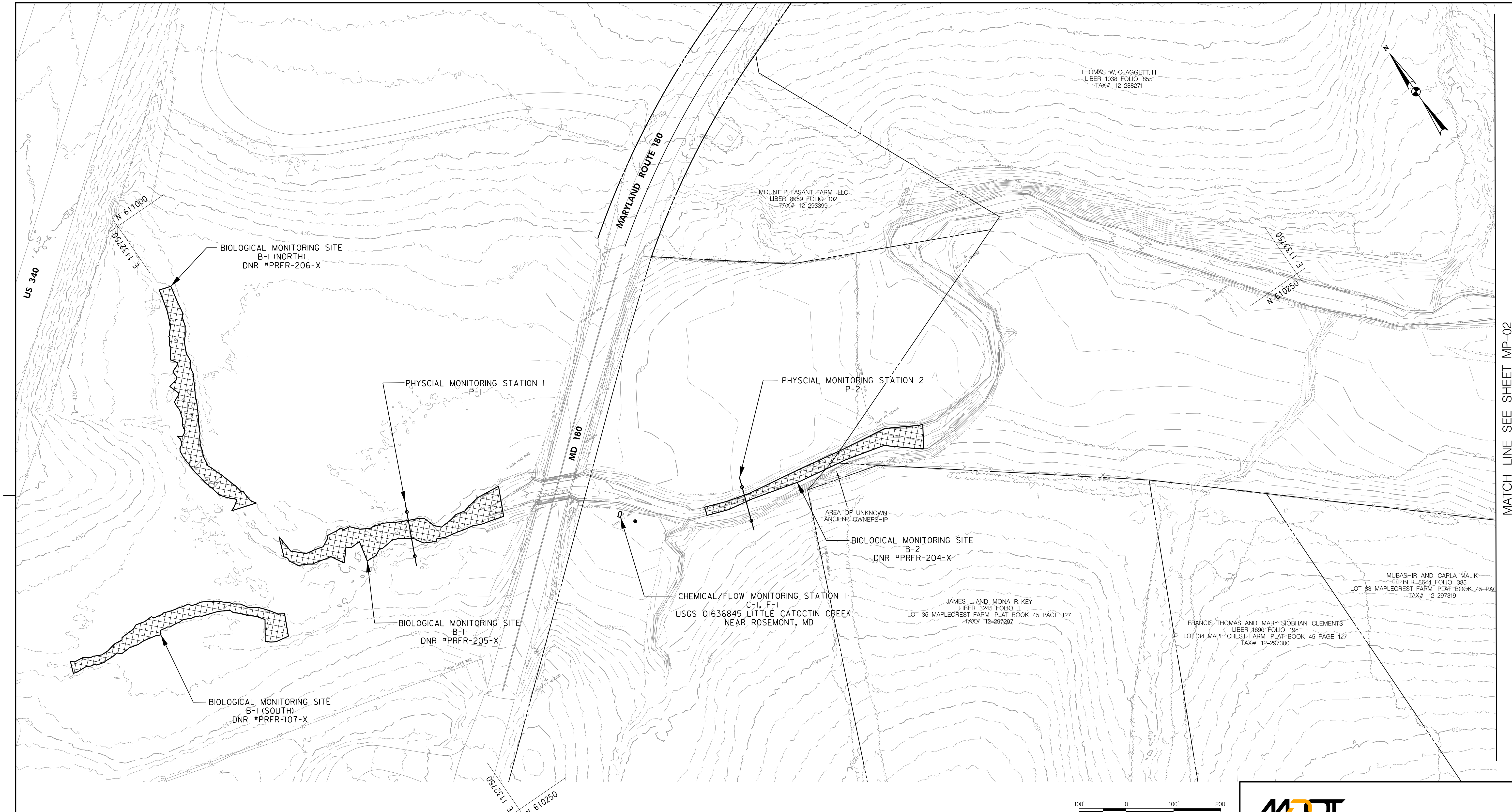

100' 0 100' 200'
SCALE: 1" = 100'

DATUM: NAD 83/91 Horizontal
NAVD 88 Vertical

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MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

TMDL STREAM RESTORATION
LITTLE CATOCTIN CREEK

REVISIONS

MONITORING LOCATION PLAN

SCALE 1" = 100' ADVERTISED DATE OCTOBER 2017 CONTRACT NO. AT62813

DESIGNED BY
DRAWN BY
CHECKED BY
MDE/PRD

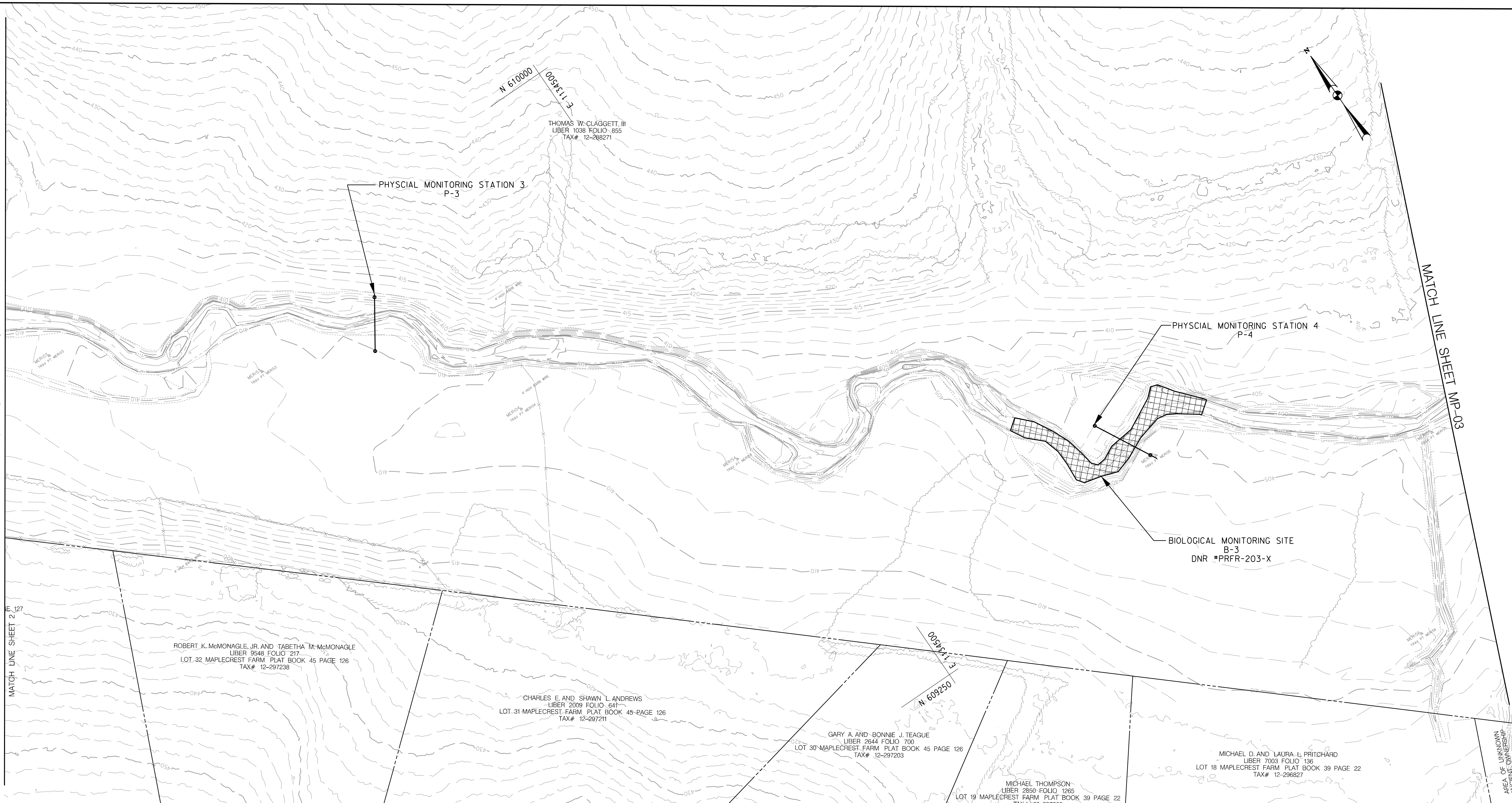
COUNTY FREDERICK
LOGMILE

DRAWING NO. MP-01 OF 03 SHEET NO. 2 OF 4

RK&K
Rummel, Klepper & Kahl, LLP
700 EAST PRATT STREET | BALTIMORE, MD 21202
SUITE 500 PH: (410) 728-2900
Engineers | Construction Managers | Planners | Scientists
www.rkk.com

BY: dblack -

PLOTTED: Tuesday, October 03, 2017 AT 02:40 PM
FILE: \\balsrv02\v2011\2011\11110_SHANEPA\Task41_TMDL Support\Assessmt_of_Cntrls\SR\CADD\Plans\pMP-0001_MD180.dgn



100' 0 100' 200'

SCALE: 1" = 100'

DATUM: NAD 83/91 Horizontal
NAVD 88 Vertical

E 1134000
N 609250

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

TMDL STREAM RESTORATION
LITTLE CATOCTIN CREEK

REVISIONS

MONITORING PLAN LOCATION

SCALE 1" = 100' ADVERTISED DATE OCTOBER 2017 CONTRACT NO. AT62813

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COUNTY FREDERICK

LOGMILE

DRAWING NO. MP-02 OF 03 SHEET NO. 3 OF 4

RK&K
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BY: dblack -

PLOTTED: Tuesday, October 03, 2017 AT 02:59 PM
FILE: \\balsrv02\v2011\2011\11110_SHANEPA\Task41_TMDL Support\Assessmt_of_Cntrls\SR\CADD\Plans\pMP-0002_MD180.dgn

100' 0 100' 200'
SCALE: 1" = 100'

DATUM: NAD 83/91 Horizontal
NAVD 88 Vertical

MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

TMDL STREAM RESTORATION
LITTLE CATOCTIN CREEK

REVISIONS

MONITORING PLAN LOCATIONS

SCALE 1" = 100' ADVERTISED DATE OCTOBER 2017 CONTRACT NO. AT62813

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MDE/PRD

COUNTY FREDERICK
LOGMILE

DRAWING NO. MP-03 OF 03 SHEET NO. 4 OF 4

E 1135250
N 608500

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Engineers | Construction Managers | Planners | Scientists
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BY: caln -

PLOTTED: Wednesday, September 19, 2018 AT 09:04 AM
FILE: \\file\projects\Active\2017-19 BCS 2014-09H Env Design-Permitting, WSP\Task 4 LCC MS 4 Monitoring\2018 Pre-con Monitoring\CAD\pMP-0003_MD180.dgn

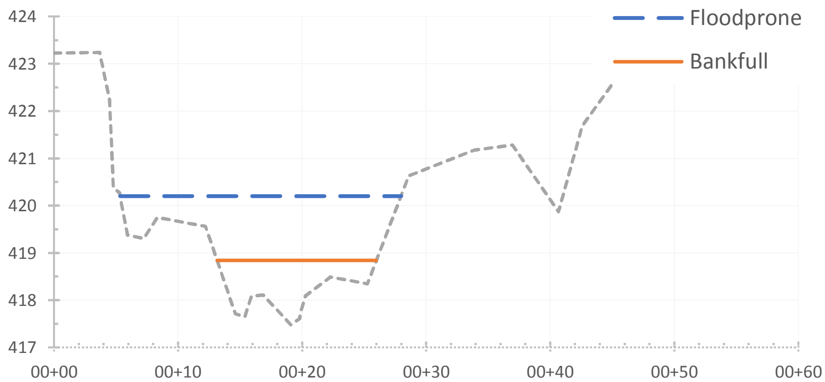
GEOMORPHIC DATA

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-1

Date: September 28, 2017

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	12.83 ft	
BF Max Depth:	1.36 ft	
BF Area:	9.17 ft²	
BF R_h:	0.66 ft	
BF WP:	13.88 ft	
BF W/D Ratio:	9.44	*A, E, G*
FP Width:	22.64 ft	
Entrenchment:	1.76	*B*
Slope:	0.76%	*D, C, E, F*
Sinuosity:	1.35	*B, C, F, G*
Manning's n:	0.030	
BF Discharge:	30.08 ft³/s	
BF Velocity:	3.28 ft/s	
BF Boundary Shear Stress:	0.313 lbs/ft²	
Critical Shear Stress:	0.132 lbs/ft²	

Most Probable Classification → F

Is Benchmark in XS Data?	Yes	
	↓Use This ↓	
Benchmark Elev:	423.23	
Station for Benchmark:	00+00.0	
RH at Benchmark:	5.01	6.20
Bankfull RH/Elevation:	9.40	418.84
Floodprone RH/Elevation:		420.20

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*BF Wetted Perimeter (ft)*	*BF Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					13.88	9.17	12.83	23.85
1	00+00.0	5.01	LPIN	423.23	0.00	0.00	0.00	0.00
2	00+03.7	5.00		423.24	0.00	0.00	0.00	0.00
3	00+04.5	6.00		422.24	0.00	0.00	0.00	0.00
4	00+04.8	7.87		420.37	0.00	0.00	0.00	0.00
5	00+05.3	7.97		420.27	0.00	0.00	0.00	0.00
6	00+05.9	8.86		419.38	0.00	0.00	0.00	0.58
7	00+07.2	8.94		419.30	0.00	0.00	0.00	1.31
8	00+08.3	8.49		419.75	0.00	0.00	0.00	1.08
9	00+12.2	8.68		419.56	0.00	0.00	0.00	3.90
10	00+14.6	10.53		417.71	1.86	0.83	1.47	2.41
11	00+15.4	10.59		417.65	0.77	0.89	0.77	0.77
12	00+15.9	10.16		418.08	0.67	0.50	0.51	0.51
13	00+16.9	10.13		418.11	0.95	0.71	0.95	0.95
14	00+18.6	10.63		417.61	1.85	1.74	1.78	1.78
15	00+19.1	10.76		417.48	0.47	0.58	0.45	0.45
16	00+19.8	10.63		417.61	0.72	0.92	0.71	0.71

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+19.9	10.49		417.75	0.16	0.09	0.08	0.08
18	00+20.3	10.15		418.09	0.52	0.36	0.39	0.39
19	00+22.3	9.75		418.49	2.07	1.12	2.03	2.03
20	00+25.3	9.89		418.35	2.97	1.25	2.97	2.97
21	00+28.6	7.61		420.63	0.87	0.18	0.72	2.72
22	00+33.9	7.07		421.17	0.00	0.00	0.00	0.00
23	00+37.0	6.96		421.28	0.00	0.00	0.00	0.00
24	00+40.7	8.37		419.87	0.00	0.00	0.00	0.87
25	00+42.6	6.56		421.68	0.00	0.00	0.00	0.34
26	00+46.2	5.25		422.99	0.00	0.00	0.00	0.00
27	00+49.6	5.29	RPIN	422.95	0.00	0.00	0.00	0.00
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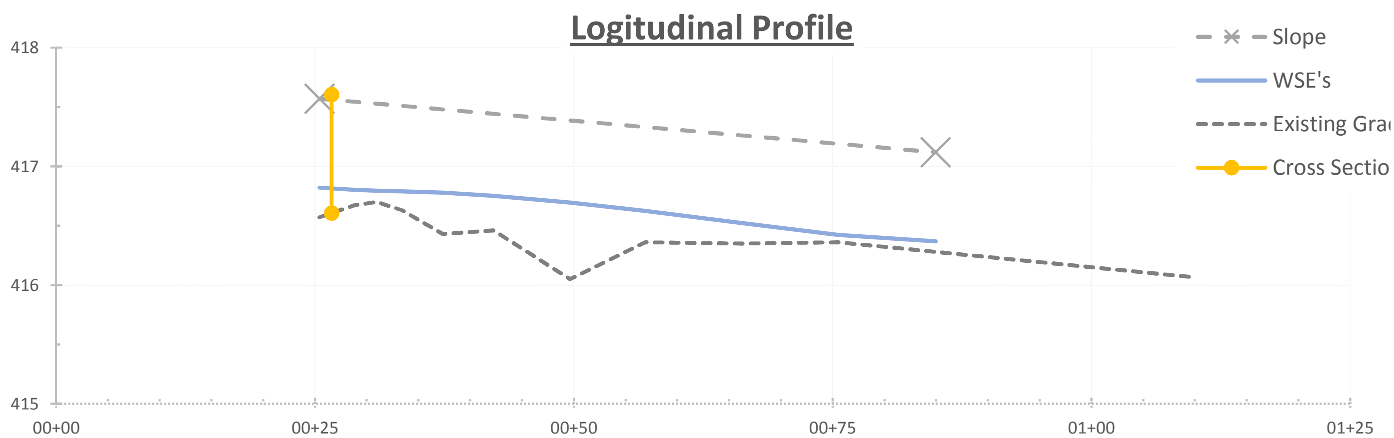
Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-1**

Date: September 28, 2017



					WSE
Benchmark Elev:	415.70		Starting Station	00+25.4	416.82
Benchmark RH:	4.00		Ending Station	00+85.0	416.37
Cross Section Location:	00+26.6	El: 416.61	Slope	0.758%	
	00+26.6	417.61			

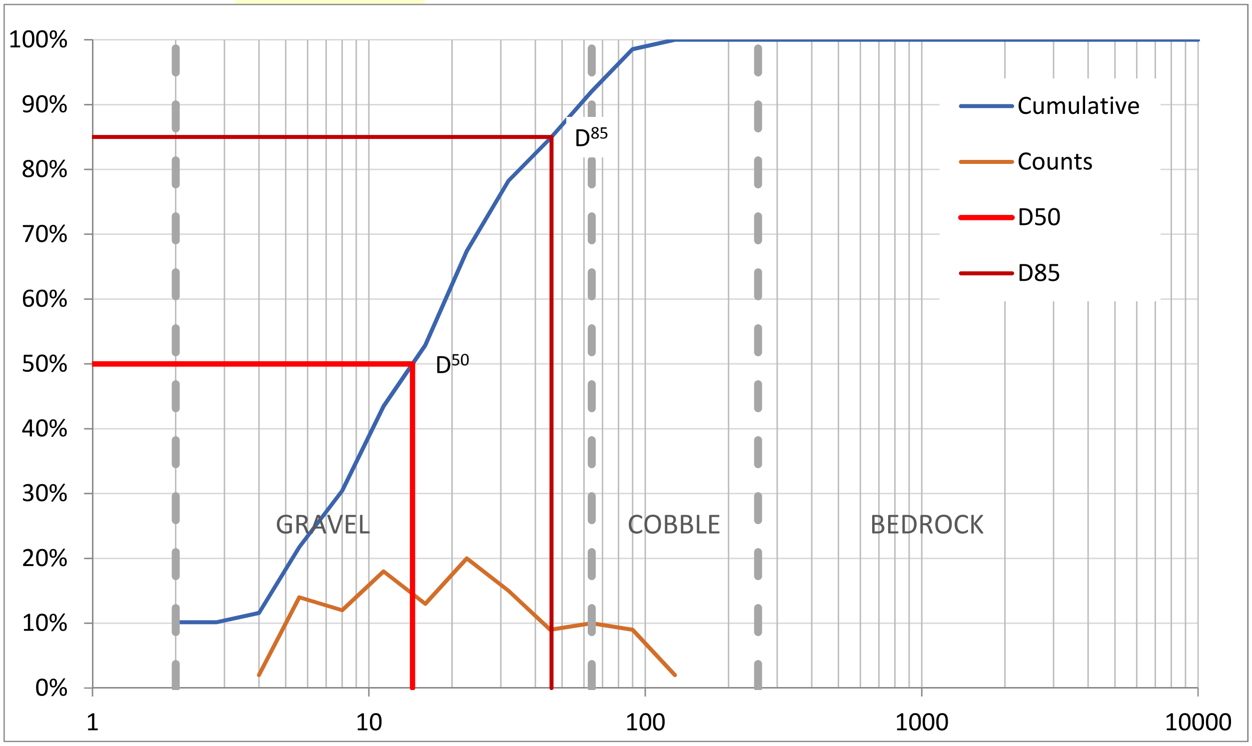
Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Adj. Elev (ft)*	*Water Depth (ft)*	*Adj. WS Elev (ft)*
1	00+25.4	3.13	416.57	0.25	416.82
2	00+28.8	3.03	416.67	0.13	416.80
3	00+31.0	3.00	416.70	0.10	416.80
4	00+33.4	3.07	416.63	0.16	416.79
5	00+37.4	3.27	416.43	0.35	416.78
6	00+42.3	3.24	416.46	0.29	416.75
7	00+49.7	3.65	416.05	0.65	416.70
8	00+56.9	3.34	416.36	0.26	416.62
9	00+66.2	3.35	416.35	0.17	416.52
10	00+75.6	3.34	416.36	0.06	416.42
11	00+85.0	3.42	416.28	0.09	416.37
12	01+09.5	3.63	416.07		
13					
14					
15					
16					
17					
18					

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-1

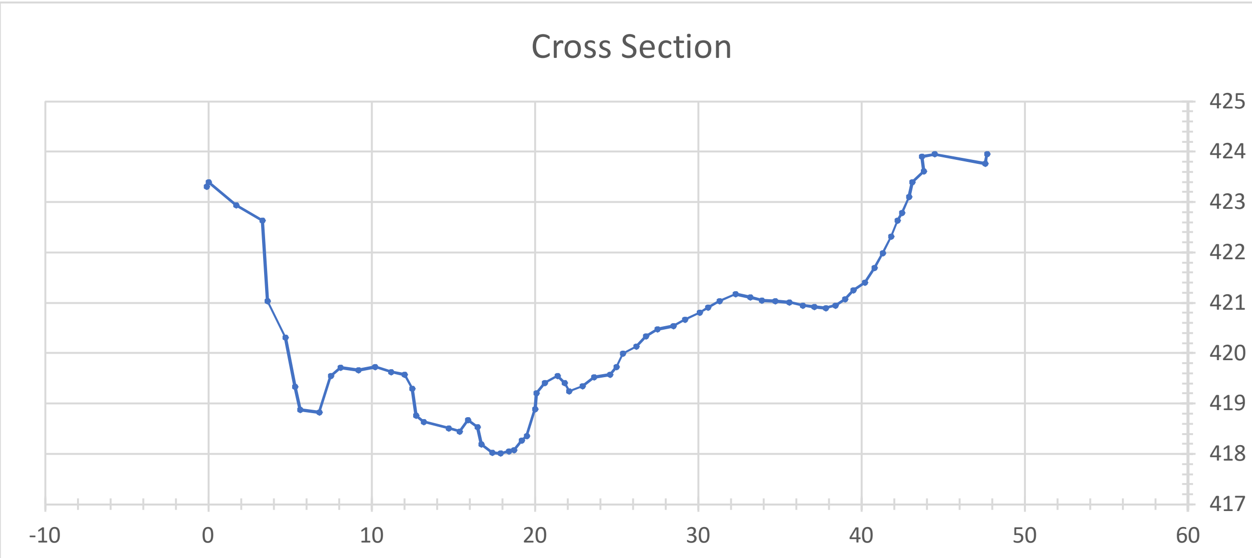
Date: September 28, 2017

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			0.0	0.0
		Unconsolidate < D ≤ 0.063			0.0	0.0
	Sand	0.063 < D ≤ 2	2		0.0	0.0
Gravel	VF Gravel	2 < D ≤ 2.8	2.8	2	1.0	1.0
		2.8 < D ≤ 4	4	30	14.4	15.3
	Fine Gravel	4 < D ≤ 5.6	5.6	16	7.7	23.0
		5.6 < D ≤ 8	8	8	3.8	26.8
	Med. Gravel	8 < D ≤ 11.2	11.3	43	20.6	47.4
		11.2 < D ≤ 16	16	22	10.5	57.9
	Coarse Gravel	16 < D ≤ 22.4	22.6	22	10.5	68.4
		22.4 < D ≤ 31.5	32	37	17.7	86.1
	VC Gravel	31.5 < D ≤ 45	45.3	17	8.1	94.3
		45 < D ≤ 63	64	5	2.4	96.7
Cobble	Sm. Cobble	63 < D ≤ 90	90	3	1.4	98.1
		90 < D ≤ 128	128	2	1.0	99.0
	Lg. Cobble	128 < D ≤ 180	180	2	1.0	100.0
		180 < D ≤ 256	256		0.0	100.0
Boulder	Sm. Boulder	256 < D ≤ 362	362		0.0	100.0
		362 < D ≤ 512	512		0.0	100.0
	Med. Boulder	512 < D ≤ 724	724		0.0	100.0
		724 < D ≤ 1024	1024		0.0	100.0
	Lg. Boulder	1024 < D ≤ 1450	1450		0.0	100.0
		1450 < D ≤ 2048	2048		0.0	100.0
	VL Boulder	2048 < D ≤ 2900	2900		0.0	100.0
		2900 < D ≤ 4096	4096		0.0	100.0
	Bedrock	> 10000	10000		0.0	100.0
			Totals	209		

D^{16} =	4.1 mm	16	**Andrews 1994**	
D^{35} =	9.2 mm	35	Tc* = 0.00356	
D^{50} =	12.3 mm	50	Tc = 0.132 lb/ft²	(Boundary Shear from Shields)
D^{65} =	20.2 mm	65	d = 0.1156 ft	
D^{85} =	31.3 mm	85	S = 3.00%	
D^{95} =	50.4 mm	95		
D^{i} =	180.0 mm			



Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 1 - Cross Section Monitoring
Date: 4/26/2018



Benchmark Elevation: 423.39 LPIN
Height of Instrument: 429.24

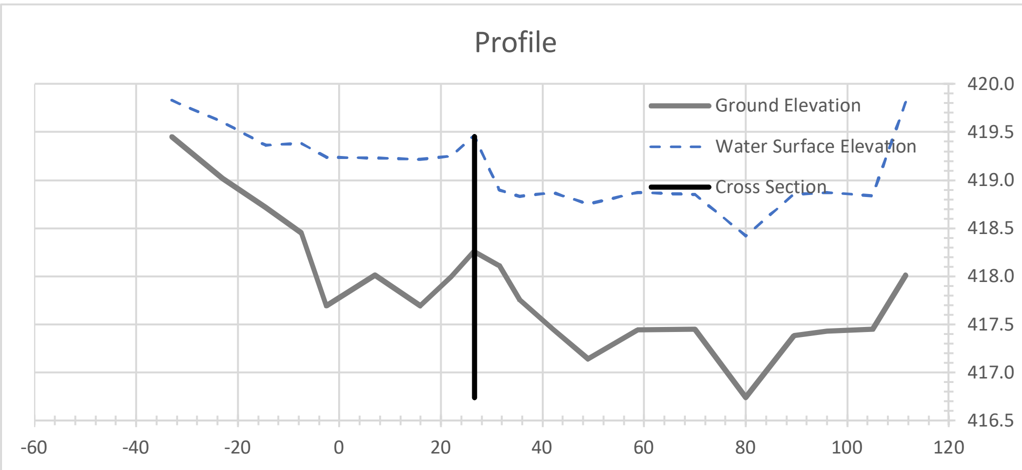
	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	1.20	5.93	-0.10	423.31	
2	1.30	5.85	0.00	423.39	LPIN
3	3.00	6.30	1.70	422.94	
4	4.60	6.60	3.30	422.64	
5	4.90	8.20	3.60	421.04	
6	6.00	8.93	4.70	420.31	
7	6.60	9.91	5.30	419.33	
8	6.90	10.37	5.60	418.87	
9	8.10	10.41	6.80	418.83	
10	8.80	9.69	7.50	419.55	
11	9.40	9.53	8.10	419.71	
12	10.50	9.58	9.20	419.66	
13	11.50	9.51	10.20	419.73	
14	12.50	9.62	11.20	419.62	
15	13.30	9.66	12.00	419.58	
16	13.80	9.94	12.50	419.30	
17	14.00	10.48	12.70	418.76	

18	14.50	10.60	13.20	418.64
19	16.00	10.73	14.70	418.51
20	16.70	10.80	15.40	418.44
21	17.20	10.57	15.90	418.67
22	17.80	10.71	16.50	418.53
23	18.00	11.05	16.70	418.19
24	18.70	11.21	17.40	418.03
25	19.20	11.23	17.90	418.01
26	19.70	11.19	18.40	418.05
27	20.00	11.16	18.70	418.08
28	20.50	10.97	19.20	418.27
29	20.80	10.88	19.50	418.36
30	21.30	10.35	20.00	418.89
31	21.40	10.04	20.10	419.20
32	21.90	9.83	20.60	419.41
33	22.70	9.69	21.40	419.55
34	23.10	9.83	21.80	419.41
35	23.40	9.99	22.10	419.25
36	24.20	9.90	22.90	419.34
37	24.90	9.72	23.60	419.52
38	25.90	9.66	24.60	419.58
39	26.30	9.51	25.00	419.73
40	26.70	9.25	25.40	419.99
41	27.50	9.11	26.20	420.13
42	28.10	8.91	26.80	420.33
43	28.80	8.77	27.50	420.47
44	29.80	8.70	28.50	420.54
45	30.50	8.58	29.20	420.66
46	31.40	8.44	30.10	420.80
47	31.90	8.33	30.60	420.91
48	32.60	8.21	31.30	421.03
49	33.60	8.06	32.30	421.18
50	34.50	8.13	33.20	421.11
51	35.20	8.19	33.90	421.05
52	36.00	8.21	34.70	421.03
53	36.90	8.23	35.60	421.01
54	37.70	8.29	36.40	420.95
55	38.40	8.32	37.10	420.92
56	39.10	8.35	37.80	420.89
57	39.70	8.29	38.40	420.95
58	40.30	8.17	39.00	421.07
59	40.80	7.99	39.50	421.25
60	41.50	7.84	40.20	421.40
61	42.10	7.55	40.80	421.69
62	42.60	7.26	41.30	421.98
63	43.10	6.92	41.80	422.32
64	43.50	6.61	42.20	422.63
65	43.80	6.45	42.50	422.79
66	44.20	6.14	42.90	423.10

67	44.40	5.85	43.10	423.39	
68	45.10	5.63	43.80	423.61	
69	45.00	5.34	43.70	423.90	
70	45.80	5.29	44.50	423.95	
71	48.90	5.48	47.60	423.76	
72	49.00	5.29	47.70	423.95	RPIN

Note: RH lowered 3 feet due to rod error

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 1 - Profile Monitoring
Date: 4/26/2018



Benchmark Elevation	423.39
Rod Height at BM	5.85
HI from Benchmark Elev.	429.24

Cross Section Station	59.6		Slope:	0.0059		
XS Station Adjustment	-33			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	26.6	26.60	Start Sta.	55.00	22	419.25
	416.74	419.45	End Sta.	122.50	89.5	418.85

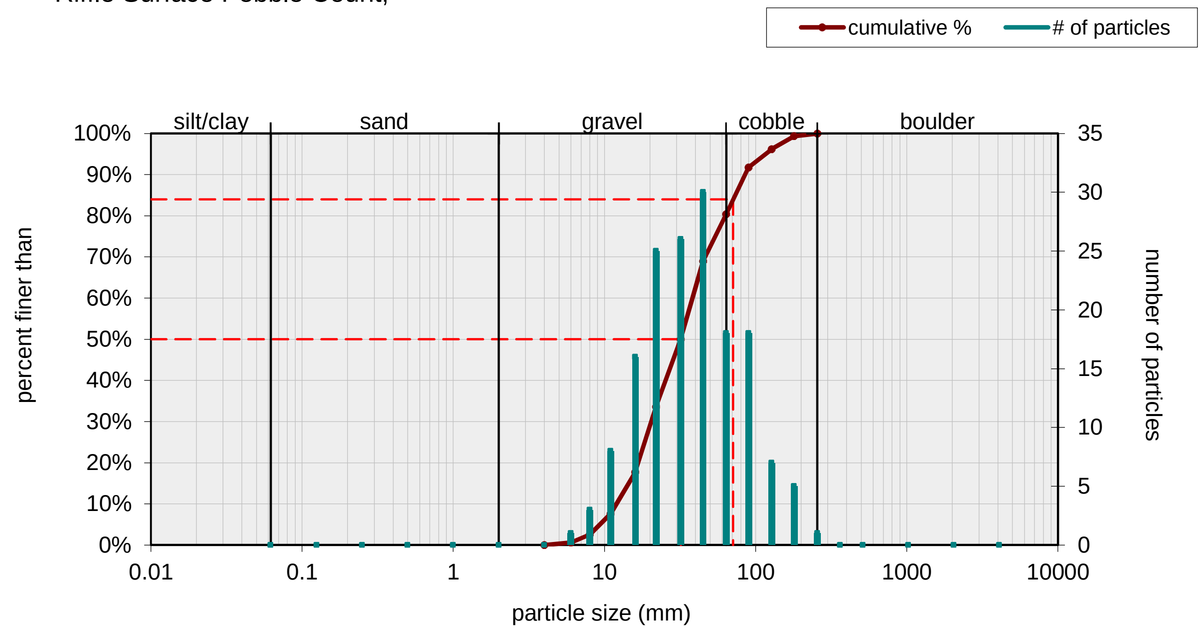
Survey Data					Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	9.79	0.38	Depth	-33.00	419.45	419.83	
2	10.00	10.22	0.58	Depth	-23.00	419.02	419.60	
3	18.50	10.52	0.64	Depth	-14.50	418.72	419.36	
4	25.50	10.79	0.93	Depth	-7.50	418.45	419.38	
5	30.40	11.55	1.55	Depth	-2.60	417.69	419.24	
6	40.00	11.23	1.22	Depth	7.00	418.01	419.23	
7	49.00	11.55	1.53	Depth	16.00	417.69	419.22	
8	55.00	11.25	1.26	Depth	22.00	417.99	419.25	
9	59.60	10.98	1.20	Depth	26.60	418.26	419.46	
10	64.50	11.13	0.79	Depth	31.50	418.11	418.90	
11	68.50	11.49	1.08	Depth	35.50	417.75	418.83	
12	75.00	11.79	1.42	Depth	42.00	417.45	418.87	XS-1
13	82.00	12.10	1.61	Depth	49.00	417.14	418.75	
14	91.70	11.80	1.43	Depth	58.70	417.44	418.87	
15	103.00	11.79	1.40	Depth	70.00	417.45	418.85	
16	113.00	12.50	1.68	Depth	80.00	416.74	418.42	
17	122.50	11.86	1.47	Depth	89.50	417.38	418.85	
18	129.00	11.81	1.44	Depth	96.00	417.43	418.87	
19	138.00	11.79	1.39	Depth	105.00	417.45	418.84	
20	144.50	11.23	1.80	Depth	111.50	418.01	419.81	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	0
very fine gravel	2 - 4	0
fine gravel	4 - 6	1
fine gravel	6 - 8	3
medium gravel	8 - 11	8
medium gravel	11 - 16	16
coarse gravel	16 - 22	25
coarse gravel	22 - 32	26
very coarse gravel	32 - 45	30
very coarse gravel	45 - 64	18
small cobble	64 - 90	18
medium cobble	90 - 128	7
large cobble	128 - 180	5
very large cobble	180 - 256	1
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		158
bedrock	---------------------	
clay hardpan	---------------------	
detritus/wood	---------------------	
artificial	---------------------	
total count:		158

Note: Site P-1 April 2018 RK&K

Riffle Surface Pebble Count, ---

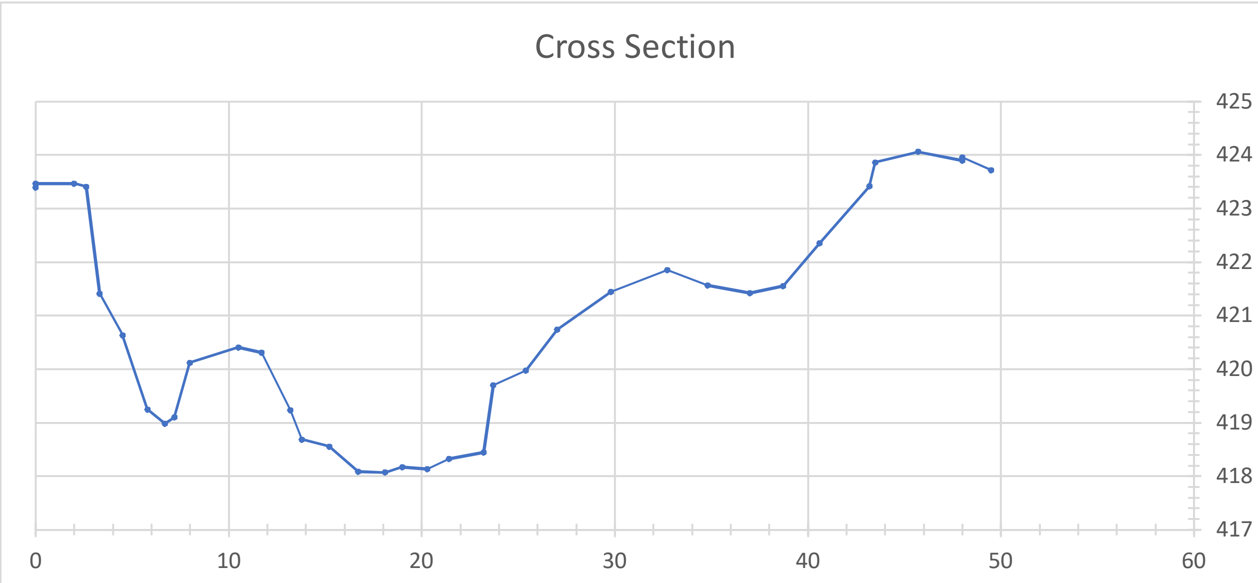


Size (mm)		
D16	15	3.4
D35	23	12
D50	32	17
D65	42	20
D84	71	29
D95	120	39

Size Distribution	
mean	32.6
dispersion	2.2
skewness	0.01

Type	
silt/clay	0%
sand	0%
gravel	80%
cobble	20%
boulder	0%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 1 - Cross Section Monitoring
Date: 8/9/2018

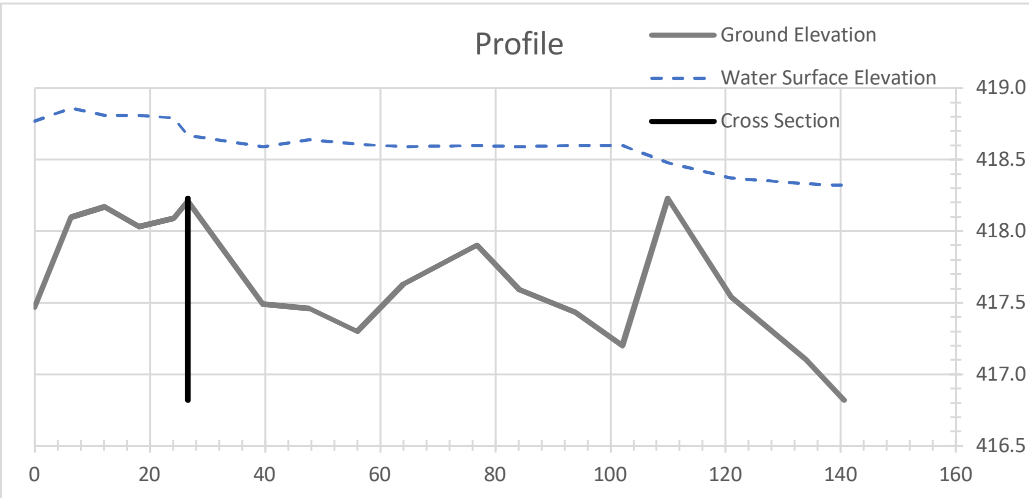


Benchmark Elevation: 423.39 LPIN
Height of Instrument: 428.78

Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Section Comparison Data Station (ft)	Section Comparison Data Elevation (ft)	Notes
1	0	5.39	0	423.39	LPIN
2	0	5.32	0	423.46	LPIN-gnd
3	2	5.32	2	423.46	
4	2.6	5.37	2.6	423.41	LTOB
5	3.3	7.37	3.3	421.41	
6	4.5	8.15	4.5	420.63	
7	5.8	9.54	5.8	419.24	
8	6.7	9.8	6.7	418.98	
9	7.2	9.68	7.2	419.1	
10	8	8.66	8	420.12	
11	10.5	8.37	10.5	420.41	
12	11.7	8.47	11.7	420.31	
13	13.2	9.55	13.2	419.23	
14	13.8	10.1	13.8	418.68	LEW
15	15.2	10.23	15.2	418.55	
16	16.7	10.69	16.7	418.09	
17	18.1	10.71	18.1	418.07	TH

18	19	10.61	19	418.17	
19	20.3	10.65	20.3	418.13	
20	21.4	10.45	21.4	418.33	
21	23.2	10.33	23.2	418.45	REW
22	23.7	9.08	23.7	419.7	
23	25.4	8.81	25.4	419.97	
24	27	8.04	27	420.74	
25	29.8	7.33	29.8	421.45	
26	32.7	6.93	32.7	421.85	
27	34.8	7.21	34.8	421.57	
28	37	7.36	37	421.42	
29	38.7	7.23	38.7	421.55	
30	40.6	6.43	40.6	422.35	
31	43.2	5.36	43.2	423.42	
32	43.5	4.92	43.5	423.86	
33	45.7	4.72	45.7	424.06	
34	48	4.88	48	423.9	RPIN-gnd
35	48	4.82	48	423.96	RPIN
36	49.5	5.06	49.5	423.72	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 1 - Profile Monitoring
Date: 8/9/2018



Benchmark Elevation	423.39
Rod Height at BM	5.39
HI from Benchmark Elev.	428.78

Cross Section Station	26.6			Slope:	0.0040		
XS Station Adjustment	0			Survey Sta.	Adjust Sta.	WS Elev.	
XS Crossing Processed	26.6	26.60	Start Sta.	6.40	6.4	418.86	
	416.82	418.23	End Sta.	140.60	140.6	418.32	

Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Water (ft)	Depth or Surface	Adjusted Station (ft)	Ground Elevation (ft)	Water Surface Elevation	Notes
	Survey Data				Profile Comparison Data			
1	0.00	11.31	1.30	Depth	0.00	417.47	418.77	Dmax
2	6.40	10.68	0.76	Depth	6.40	418.10	418.86	OG
3	12.10	10.61	0.64	Depth	12.10	418.17	418.81	OG
4	18.10	10.75	0.78	Depth	18.10	418.03	418.81	Riffle
5	24.10	10.69	9.99	Surface	24.10	418.09	418.79	Riffle
6	26.60	10.57	10.11	Surface	26.60	418.21	418.67	XS-1
7	39.60	11.29	1.10	Depth	39.60	417.49	418.59	Micropool
8	47.70	11.32	1.18	Depth	47.70	417.46	418.64	Micropool
9	56.00	11.48	1.31	Depth	56.00	417.30	418.61	Micropool
10	64.00	11.15	0.96	Depth	64.00	417.63	418.59	Micropool
11	76.80	10.88	0.70	Depth	76.80	417.90	418.60	high point
12	84.20	11.19	1.00	Depth	84.20	417.59	418.59	Micropool
13	94.00	11.35	1.17	Depth	94.00	417.43	418.60	Micropool
14	102.00	11.58	1.40	Depth	102.00	417.20	418.60	Large
15	110.00	10.55	0.25	Depth	110.00	418.23	418.48	Riffle
16	121.00	11.24	0.83	Depth	121.00	417.54	418.37	Riffle
17	134.00	11.68	1.23	Depth	134.00	417.10	418.33	End Riffle
18	140.60	11.96	1.50	Depth	140.60	416.82	418.32	Riffle Start

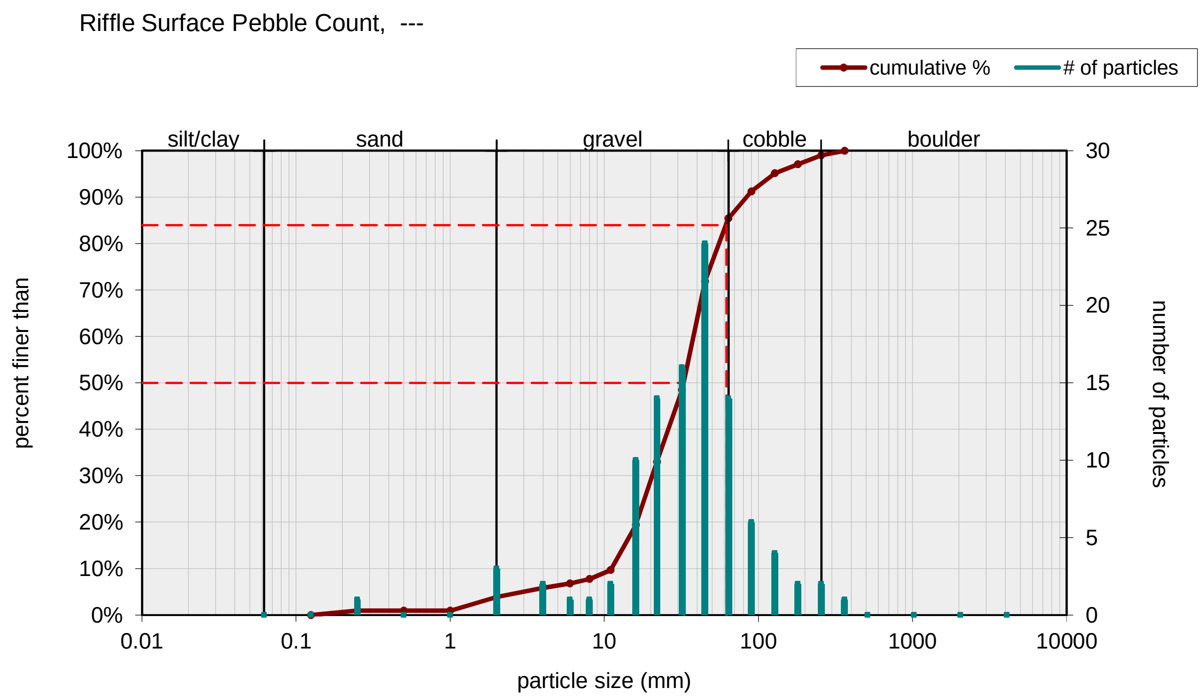
1) Individual Pebble Count

Two individual samples may be entered below. Select sample type for each.

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	1
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	3
very fine gravel	2 - 4	2
fine gravel	4 - 6	1
fine gravel	6 - 8	1
medium gravel	8 - 11	2
medium gravel	11 - 16	10
coarse gravel	16 - 22	14
coarse gravel	22 - 32	16
very coarse gravel	32 - 45	24
very coarse gravel	45 - 64	14
small cobble	64 - 90	6
medium cobble	90 - 128	4
large cobble	128 - 180	2
very large cobble	180 - 256	2
small boulder	256 - 362	1
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		103
bedrock	-------------	
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		103

Note: Site P-1 August 2018 WSP



Size (mm)	
D16	14
D35	23
D50	33
D65	41
D84	62
D95	130

Size Distribution	
mean	29.5
dispersion	2.1
skewness	-0.06

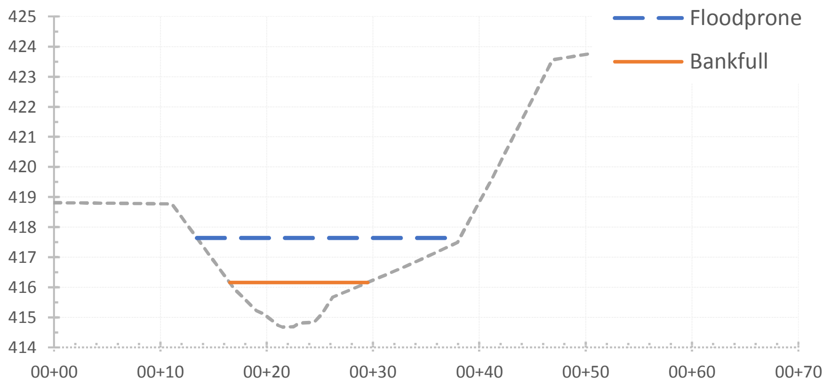
Type	
silt/clay	0%
sand	4%
gravel	82%
cobble	14%
boulder	1%

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-2

Date: November 24, 2015

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	12.99 ft	
BF Max Depth:	1.48 ft	
BF Area:	10.77 ft²	
BF R_h:	0.80 ft	
BF WP:	13.47 ft	
BF W/D Ratio:	8.78	*A, E, G*
FP Width:	24.72 ft	
Entrenchment:	1.90	*B*
Slope:	1.15%	*D, C, E, F*
Sinuosity:	1.35	*B, C, F, G*
Manning's n:	0.032	
BF Discharge:	46.42 ft³/s	
BF Velocity:	4.31 ft/s	
BF Boundary Shear Stress:	0.576 lbs/ft²	
Critical Shear Stress:		

Most Probable Classification ➔ F

Is Benchmark in XS Data? Yes

↓Use This ↓

Benchmark Elev:	418.77	
Station for Benchmark:	00+11.1	
RH at Benchmark:	5.39	6.20
Bankfull RH/Elevation:	8.00	416.16
Floodprone RH/Elevation:		417.64

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*BF Wetted Perimeter (ft)*	*BF Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					13.47	10.77	12.99	24.72
1	00+00.0	5.35		418.81	0.00	0.00	0.00	0.00
2	00+06.7	5.37		418.79	0.00	0.00	0.00	0.00
3	00+11.1	5.39	LPIN	418.77	0.00	0.00	0.00	0.00
4	00+16.9	8.20		415.96	0.46	0.04	0.42	3.49
5	00+19.1	8.94		415.22	2.24	1.20	2.11	2.11
6	00+19.9	9.06		415.10	0.82	0.81	0.81	0.81
7	00+20.1	9.15		415.01	0.24	0.24	0.22	0.22
8	00+20.8	9.34		414.82	0.75	0.91	0.73	0.73
9	00+21.1	9.42		414.74	0.30	0.40	0.29	0.29
10	00+21.5	9.48		414.68	0.39	0.57	0.39	0.39
11	00+22.5	9.47		414.69	1.03	1.52	1.03	1.03
12	00+23.0	9.35		414.81	0.49	0.68	0.48	0.48
13	00+24.5	9.32		414.84	1.45	1.94	1.45	1.45
14	00+25.2	9.06		415.10	0.75	0.83	0.70	0.70
15	00+26.2	8.49		415.67	1.19	0.81	1.05	1.05
16	00+27.5	8.31		415.85	1.26	0.50	1.25	1.25

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+33.0	7.48		416.68	2.08	0.32	2.06	5.52
18	00+34.8	7.19		416.97	0.00	0.00	0.00	1.80
19	00+37.9	6.67		417.49	0.00	0.00	0.00	3.17
20	00+41.1	4.63	RPIN	419.53	0.00	0.00	0.00	0.23
21	00+46.9	0.60		423.56	0.00	0.00	0.00	0.00
22	00+57.3	0.00		424.16	0.00	0.00	0.00	0.00
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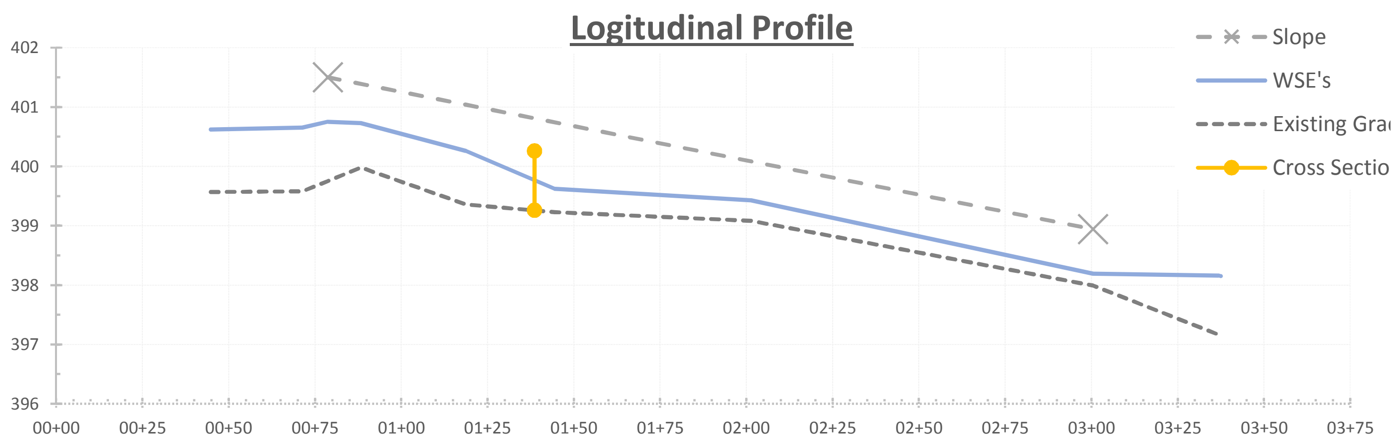
Project: **Little Catoctin Creek**

Project Number: **11102.48**

Site Name/Number: **P-2**

Date: November 24, 2015



					WSE
Benchmark Elev:	402.69		Starting Station	00+78.7	400.75
Benchmark RH:	2.29		Ending Station	03+00.5	398.19
Cross Section Location:	01+38.6	399.26	Slope	1.154%	
	01+38.6	400.259658			

Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+44.8	5.41	399.57	1.05	400.62
2	00+71.4	5.40	399.58	1.07	400.65
3	00+78.7	5.23	399.75	1.00	400.75
4	00+88.3	5.00	399.98	0.75	400.73
5	01+18.8	5.62	399.36	0.90	400.26
6	01+44.5	5.75	399.23	0.39	399.62
7	02+01.4	5.90	399.08	0.35	399.43
8	03+00.5	6.99	397.99	0.20	398.19
9	03+37.0	7.82	397.16	1.00	398.16
10	03+37.5	7.83	397.15	1.00	398.15
11					
12					
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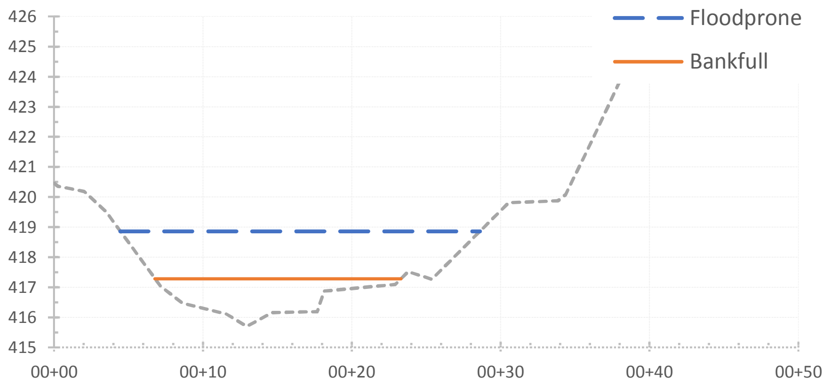
Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-2

Date: September 28, 2017

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	16.60 ft	
BF Max Depth:	1.58 ft	
BF Area:	13.07 ft²	
BF R_h:	0.75 ft	
BF WP:	17.34 ft	
BF W/D Ratio:	10.51	A, E, G
FP Width:	24.17 ft	
Entrenchment:	1.46	B
Slope:	1.97%	D, C, E, F
Sinuosity:	1.35	B, C, F, G
Manning's n:	0.032	
BF Discharge:	70.74 ft³/s	
BF Velocity:	5.41 ft/s	
BF Boundary Shear Stress:	0.927 lbs/ft²	
Critical Shear Stress:	0.188 lbs/ft²	

Most Probable Classification → F

Is Benchmark in XS Data?	Yes	
	↓Use This ↓	
Benchmark Elev:	420.46	
Station for Benchmark:	00+00.0	
RH at Benchmark:	4.82	6.20
Bankfull RH/Elevation:	8.00	417.28
Floodprone RH/Elevation:		418.86

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*BF Wetted Perimeter (ft)*	*BF Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					17.34	13.07	16.60	24.17
1	00+00.0	4.82	LPIN	420.46	0.00	0.00	0.00	0.00
2	00+00.3	4.93		420.35	0.00	0.00	0.00	0.00
3	00+02.0	5.10		420.18	0.00	0.00	0.00	0.00
4	00+03.5	5.77		419.51	0.00	0.00	0.00	0.00
5	00+07.1	8.24		417.04	0.43	0.04	0.35	2.69
6	00+08.6	8.80		416.48	1.57	0.76	1.47	1.47
7	00+11.6	9.17		416.11	2.96	2.90	2.94	2.94
8	00+13.0	9.58		415.70	1.46	1.92	1.40	1.40
9	00+14.7	9.12		416.16	1.77	2.31	1.71	1.71
10	00+17.7	9.09		416.19	3.03	3.35	3.03	3.03
11	00+18.1	8.41		416.87	0.81	0.33	0.44	0.44
12	00+22.9	8.18		417.10	4.82	1.42	4.81	4.81
13	00+23.8	7.76		417.52	0.40	0.03	0.36	0.84
14	00+25.4	8.01		417.27	0.07	0.00	0.06	1.61
15	00+30.6	5.47		419.81	0.02	0.00	0.02	3.23
16	00+33.9	5.41		419.87	0.00	0.00	0.00	0.00

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+34.4	5.20		420.08	0.00	0.00	0.00	0.00
18	00+36.2	3.33		421.95	0.00	0.00	0.00	0.00
19	00+39.4	0.00		425.28	0.00	0.00	0.00	0.00
20								
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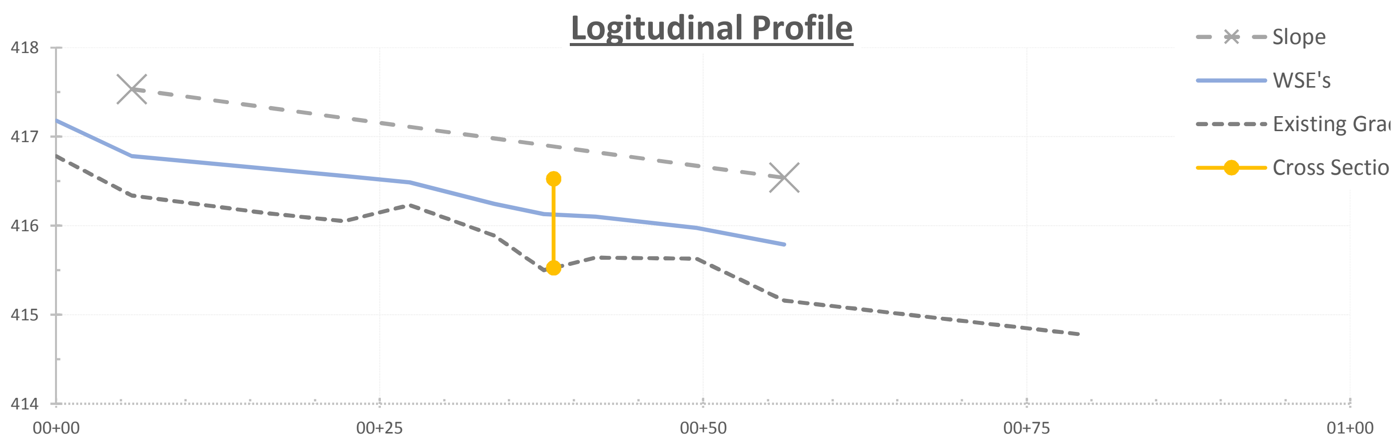
Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-2**

Date: September 28, 2017



					WSE
Benchmark Elev:	416.78		Starting Station	00+05.9	416.78
Benchmark RH:	5.00		Ending Station	00+56.3	415.79
Cross Section Location:	00+38.4	415.53	Slope	1.971%	
	00+38.4	416.526316			

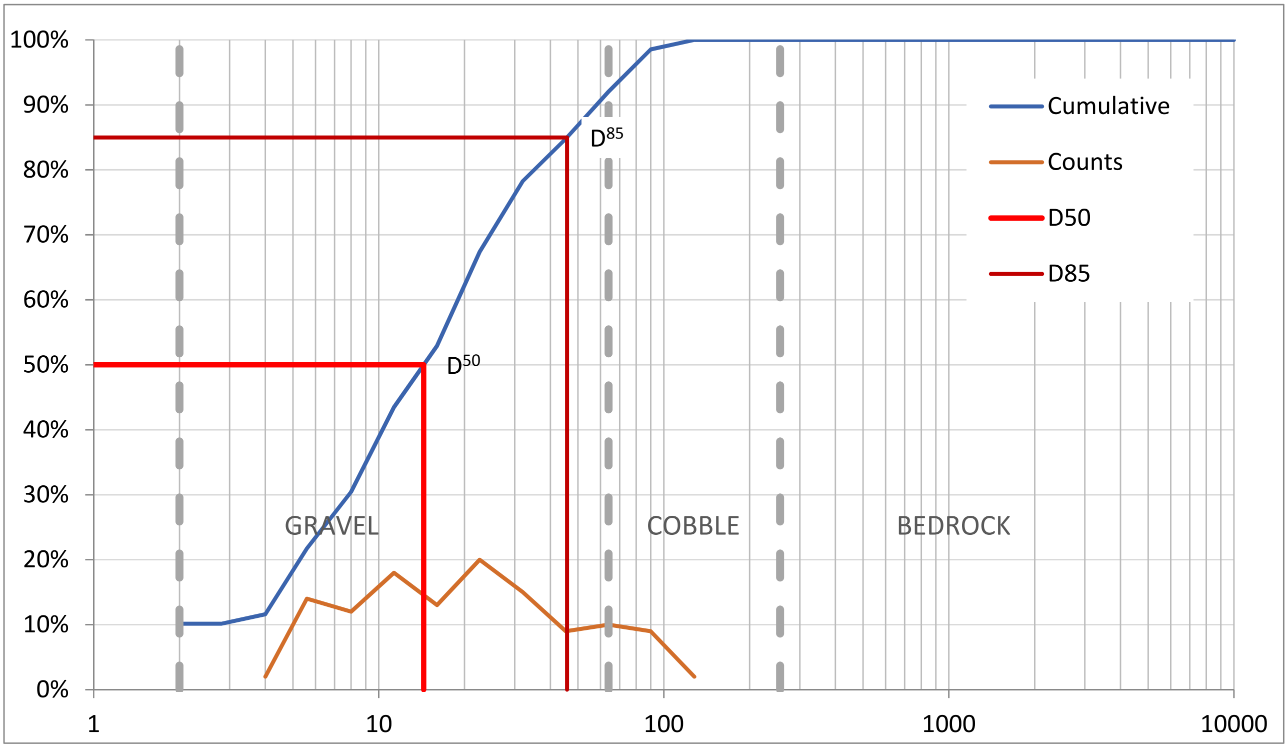
Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+00.0	5.00	416.78	0.40	417.18
2	00+05.9	5.44	416.34	0.44	416.78
3	00+16.2	5.64	416.14	0.50	416.64
4	00+22.3	5.73	416.05	0.51	416.56
5	00+27.3	5.55	416.23	0.25	416.48
6	00+33.9	5.89	415.89	0.36	416.25
7	00+37.7	6.28	415.50	0.63	416.13
8	00+41.7	6.14	415.64	0.46	416.10
9	00+49.5	6.15	415.63	0.35	415.98
10	00+56.3	6.62	415.16	0.63	415.79
11	00+79.2	7.00	414.78		
12					
13					
14					
15					
16					
17					
18					

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-2

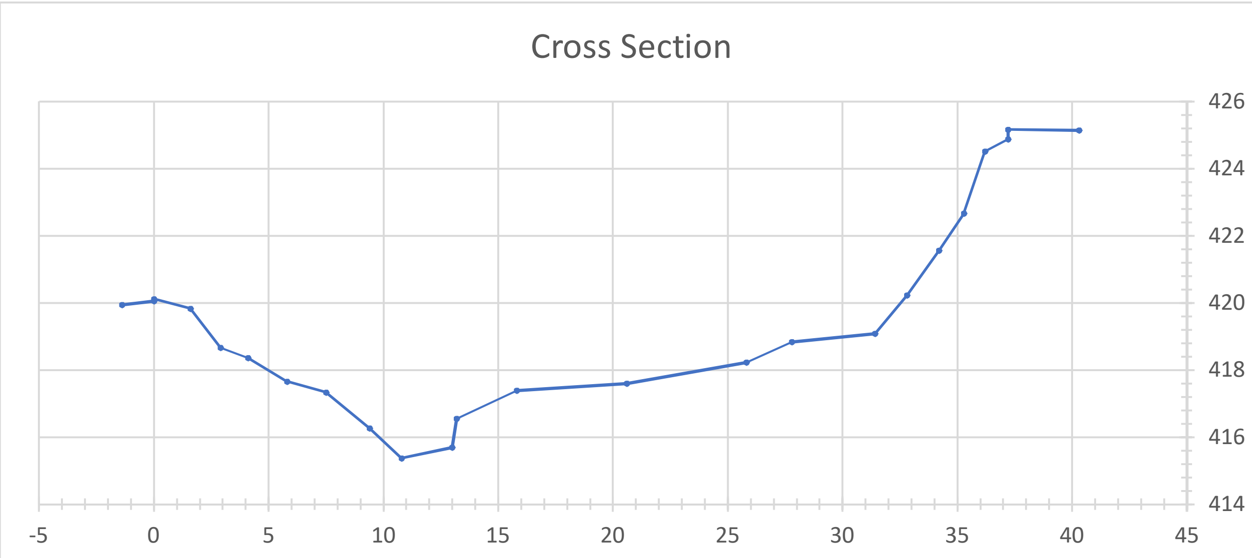
Date: September 28, 2017

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			0.0	0.0
		Unconsolidate < D ≤ 0.063			0.0	0.0
	Sand	0.063 < D ≤ 2	2		0.0	0.0
Gravel	VF Gravel	2 < D ≤ 2.8	2.8	10	8.3	8.3
		2.8 < D ≤ 4	4	4	3.3	11.6
	Fine Gravel	4 < D ≤ 5.6	5.6	5	4.1	15.7
		5.6 < D ≤ 8	8	4	3.3	19.0
	Med. Gravel	8 < D ≤ 11.2	11.3	15	12.4	31.4
		11.2 < D ≤ 16	16	14	11.6	43.0
	Coarse Gravel	16 < D ≤ 22.4	22.6	16	13.2	56.2
		22.4 < D ≤ 31.5	32	10	8.3	64.5
	VC Gravel	31.5 < D ≤ 45	45.3	9	7.4	71.9
		45 < D ≤ 63	64	5	4.1	76.0
Cobble	Sm. Cobble	63 < D ≤ 90	90	2	1.7	77.7
		90 < D ≤ 128	128	1	0.8	78.5
	Lg. Cobble	128 < D ≤ 180	180		0.0	78.5
		180 < D ≤ 256	256		0.0	78.5
Boulder	Sm. Boulder	256 < D ≤ 362	362		0.0	78.5
		362 < D ≤ 512	512		0.0	78.5
	Med. Boulder	512 < D ≤ 724	724		0.0	78.5
		724 < D ≤ 1024	1024		0.0	78.5
	Lg. Boulder	1024 < D ≤ 1450	1450		0.0	78.5
		1450 < D ≤ 2048	2048		0.0	78.5
	VL Boulder	2048 < D ≤ 2900	2900		0.0	78.5
		2900 < D ≤ 4096	4096		0.0	78.5
	Bedrock	> 10000	10000	26	21.5	100.0
			Totals	121		

D^{16} =	5.8 mm	16	**Andrews 1994**	
D^{35} =	12.6 mm	35	Tc* = 0.00714	
D^{50} =	19.2 mm	50	Tc = 0.188 lb/ft²	(Boundary Shear from Shields)
D^{65} =	32.8 mm	65	d = 0.1547 ft	
D^{85} =	5362.9 mm	85	S = 3.20%	
D^{95} =	8124.5 mm	95		
D^{i} =	128.0 mm			



Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 2 - Cross Section Monitoring
Date: 1/31/2018

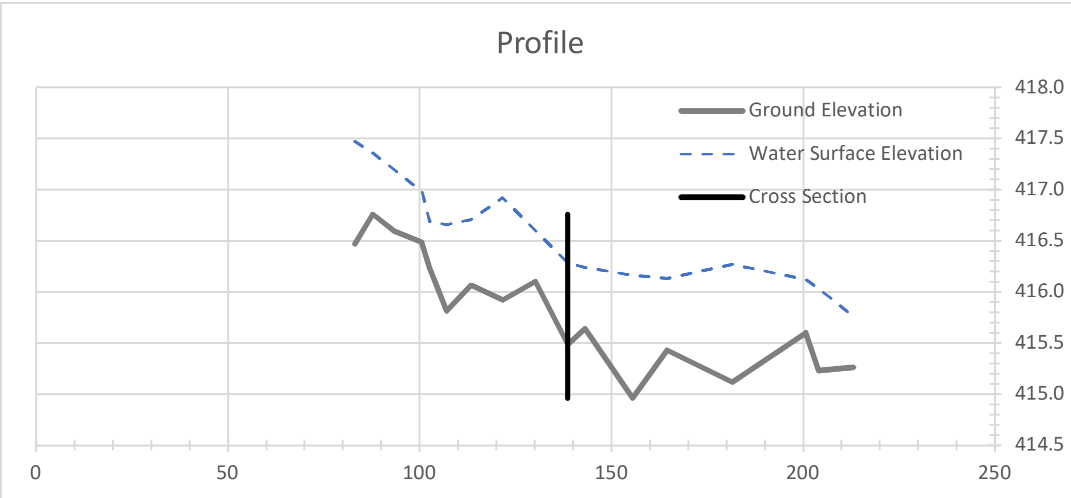


Benchmark Elevation: 420.11 LPIN
Height of Instrument: 428.34

Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Section Comparison Data Station (ft)	Elevation (ft)	Notes
1	0.00	8.40	-1.40	419.94	
2	1.40	8.29	0.00	420.05	
3	1.40	8.23	0.00	420.11	LPIN
4	3.00	8.52	1.60	419.82	
5	4.30	9.68	2.90	418.66	
6	5.50	9.99	4.10	418.35	
7	7.20	10.69	5.80	417.65	
8	8.90	11.02	7.50	417.32	
9	10.80	12.07	9.40	416.27	EOW
10	12.20	12.97	10.80	415.37	
11	14.40	12.64	13.00	415.70	
12	14.60	11.80	13.20	416.54	
13	17.20	10.95	15.80	417.39	
14	22.00	10.75	20.60	417.59	
15	27.20	10.12	25.80	418.22	
16	29.20	9.50	27.80	418.84	
17	32.80	9.26	31.40	419.08	

18	34.20	8.11	32.80	420.23	
19	35.60	6.79	34.20	421.55	
20	36.70	5.68	35.30	422.66	
21	37.60	3.84	36.20	424.50	
22	38.60	3.48	37.20	424.86	
23	38.60	3.18	37.20	425.16	RPIN
24	41.70	3.20	40.30	425.14	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 2 - Profile Monitoring
Date: 1/31/2018



Benchmark Elevation	420.11					
Rod Height at BM	8.23					
HI from Benchmark Elev.	428.34					
Cross Section Station	68		Slope:	0.0110		
XS Station Adjustment	70.6			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	138.6	138.60	Start Sta.	17.10	87.7	417.36
	414.96	416.76	End Sta.	130.20	200.8	416.12

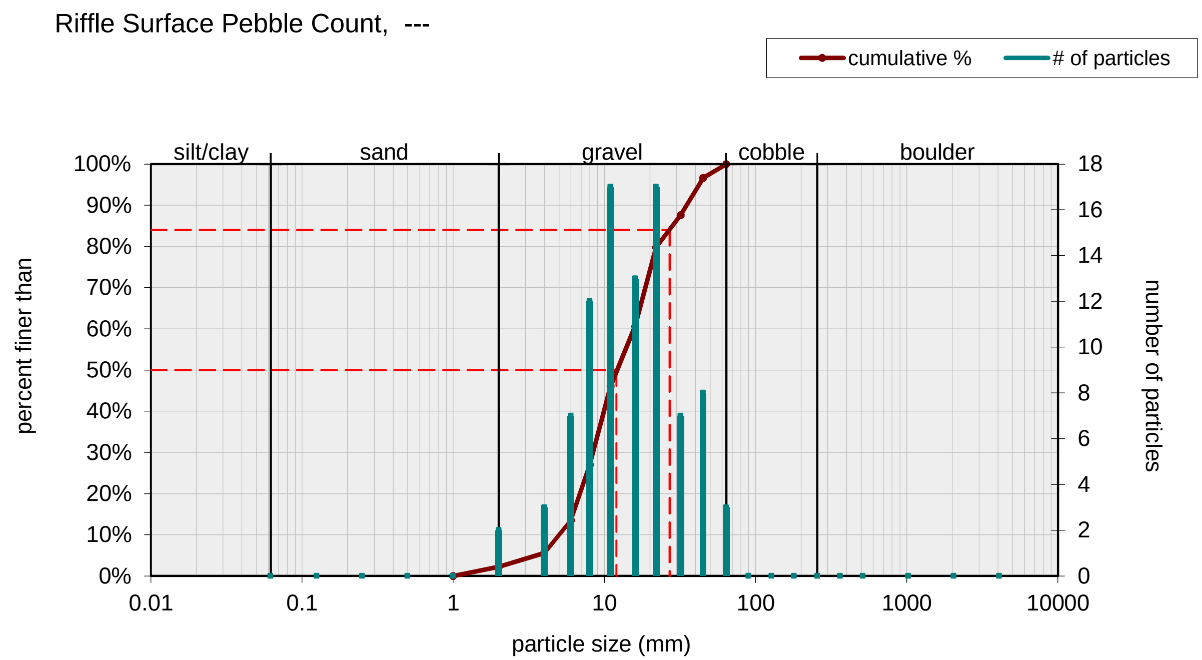
	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	12.50	11.87	1.00	Depth	83.10	416.47	417.47	
2	17.10	11.58	0.60	Depth	87.70	416.76	417.36	
3	23.00	11.75	0.60	Depth	93.60	416.59	417.19	
4	30.00	11.86	0.50	Depth	100.60	416.48	416.98	
5	32.00	12.10	0.45	Depth	102.60	416.24	416.69	
6	36.50	12.53	0.85	Depth	107.10	415.81	416.66	
7	42.80	12.28	0.65	Depth	113.40	416.06	416.71	
8	51.00	12.42	1.00	Depth	121.60	415.92	416.92	
9	59.50	12.24	0.50	Depth	130.10	416.10	416.60	
10	68.00	12.86	0.80	Depth	138.60	415.48	416.28	
11	72.50	12.70	0.60	Depth	143.10	415.64	416.24	XS-2
12	85.00	13.38	1.20	Depth	155.60	414.96	416.16	
13	94.00	12.91	0.70	Depth	164.60	415.43	416.13	
14	111.00	13.22	1.15	Depth	181.60	415.12	416.27	
15	130.20	12.74	0.52	Depth	200.80	415.60	416.12	
16	133.50	13.11	0.80	Depth	204.10	415.23	416.03	
17	142.50	13.08	0.50	Depth	213.10	415.26	415.76	

18	25.1	9.88	12.9	416.09	
19	26.8	8.41	14.6	417.56	On boulder
20	28.7	9.16	16.5	416.81	R Toe
21	28.7	8.86	16.5	417.11	REW
22	29	8.25	16.8	417.72	
23	31	7.9	18.8	418.07	
24	33	7.87	20.8	418.1	
25	35	7.75	22.8	418.22	
26	36.5	7.53	24.3	418.44	Gravel
27	38	7.23	25.8	418.74	
28	39.7	6.61	27.5	419.36	Terrace
29	41.6	6.5	29.4	419.47	
30	43.6	6.27	31.4	419.7	Terrace End
31	45	5.56	32.8	420.41	
32	46	4.74	33.8	421.23	Small ledge
33	47.5	3.12	35.3	422.85	
34	48.2	2.32	36	423.65	
35	48.8	1.62	36.6	424.35	
36	47.5	1.42	35.3	424.55	
37	48.8	0.85	36.6	425.12	RTOB
38	49.3	0.79	37.1	425.18	RPIN @ gnd.
39	49.3	0.46	37.1	425.51	RPIN
40	51.1	0.64	38.9	425.33	
41	52	0.55	39.8	425.42	
42	52.6	0.43	40.4	425.54	
43	53.3	0.42	41.1	425.55	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	2
very fine gravel	2 - 4	3
fine gravel	4 - 6	7
fine gravel	6 - 8	12
medium gravel	8 - 11	17
medium gravel	11 - 16	13
coarse gravel	16 - 22	17
coarse gravel	22 - 32	7
very coarse gravel	32 - 45	8
very coarse gravel	45 - 64	3
small cobble	64 - 90	0
medium cobble	90 - 128	0
large cobble	128 - 180	0
very large cobble	180 - 256	0
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		89
bedrock		12
clay hardpan		
detritus/wood		
artificial		
total count:		101

Note: Site P-2 January 2018 RK&K

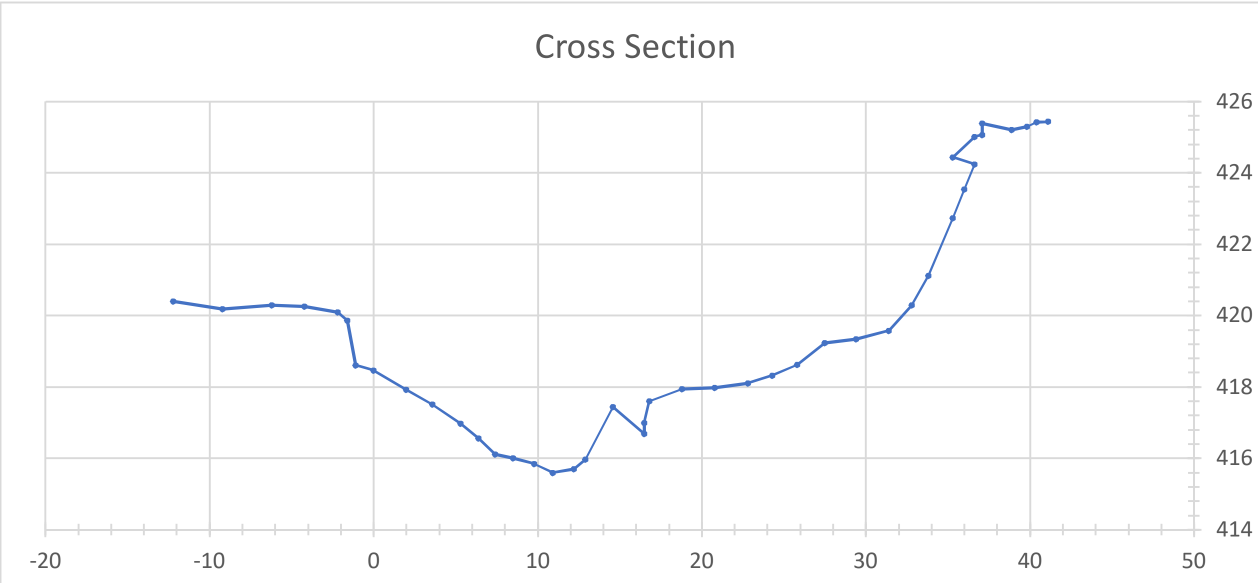


Size (mm)		
D16	6.3	3.4
D35	9.1	12
D50	12	17
D65	17	20
D84	27	29
D95	42	39

Size Distribution	
mean	13.0
dispersion	2.1
skewness	0.05

Type			
silt/clay	0%	bedrock	12%
sand	2%		
gravel	86%		
cobble	0%		
boulder	0%		

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 2 - Cross Section Monitoring
Date: 7/30/2018

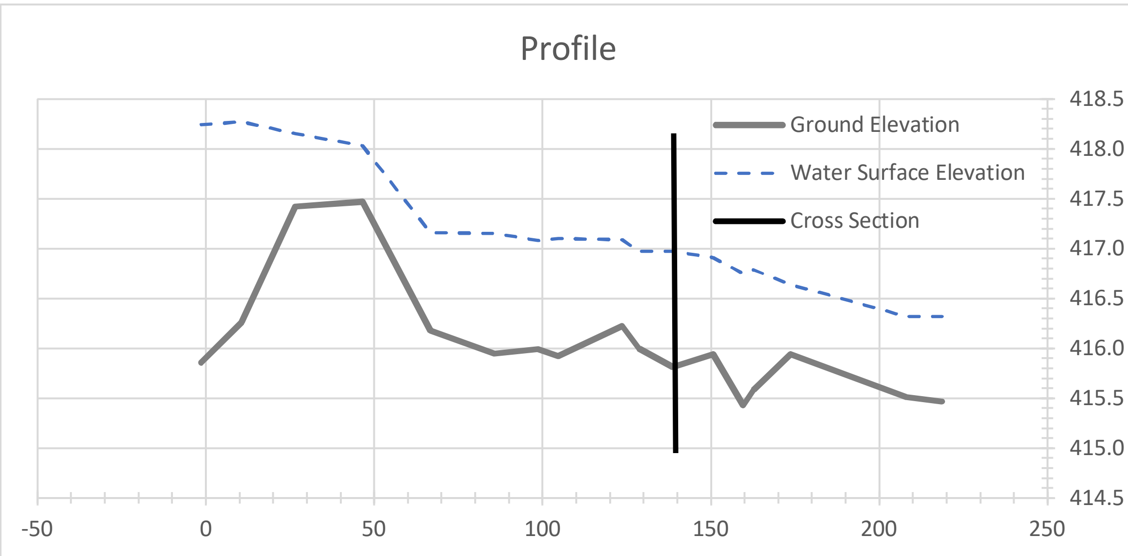


Benchmark Elevation: 425.39 RPIN LPIN scoured and leaning
Height of Instrument: 425.85

	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	0	5.45	-12.2	420.4	
2	3	5.66	-9.2	420.19	
3	6	5.56	-6.2	420.29	
4	8	5.6	-4.2	420.25	
5	10	5.75	-2.2	420.1	
6	10.6	5.98	-1.6	419.87	LTOB
7	11.1	7.25	-1.1	418.6	Toe
8	12.2	7.39	0	418.46	LPIN
9	14.2	7.92	2	417.93	Gravel
10	15.8	8.33	3.6	417.52	
11	17.5	8.87	5.3	416.98	LEW
12	18.6	9.28	6.4	416.57	L Toe
13	19.6	9.73	7.4	416.12	
14	20.7	9.85	8.5	416	
15	22	10	9.8	415.85	
16	23.1	10.25	10.9	415.6	
17	24.4	10.14	12.2	415.71	

18	25.1	9.88	12.9	415.97	
19	26.8	8.41	14.6	417.44	On boulder
20	28.7	9.16	16.5	416.69	R Toe
21	28.7	8.86	16.5	416.99	REW
22	29	8.25	16.8	417.6	
23	31	7.9	18.8	417.95	
24	33	7.87	20.8	417.98	
25	35	7.75	22.8	418.1	
26	36.5	7.53	24.3	418.32	Gravel
27	38	7.23	25.8	418.62	
28	39.7	6.61	27.5	419.24	Terrace
29	41.6	6.5	29.4	419.35	
30	43.6	6.27	31.4	419.58	Terrace End
31	45	5.56	32.8	420.29	
32	46	4.74	33.8	421.11	Small ledge
33	47.5	3.12	35.3	422.73	
34	48.2	2.32	36	423.53	
35	48.8	1.62	36.6	424.23	
36	47.5	1.42	35.3	424.43	
37	48.8	0.85	36.6	425	RTOB
38	49.3	0.79	37.1	425.06	RPIN @ gnd.
39	49.3	0.46	37.1	425.39	RPIN
40	51.1	0.64	38.9	425.21	
41	52	0.55	39.8	425.3	
42	52.6	0.43	40.4	425.42	
43	53.3	0.42	41.1	425.43	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 2 - Profile Monitoring
Date: 7/30/2018



Benchmark Elevation	425.39
Rod Height at BM	0.46
HI from Benchmark Elev.	425.85

Cross Section Station	140		Slope:	0.0109		
XS Station Adjustment	-1.4			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	138.6	0.00	Start Sta.	48.00	46.6	418.03
	414.93	417.47	End Sta.	175.00	173.6	416.64

	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	9.99	7.61	Surface	-1.40	415.86	418.24	Pool
2	12.00	9.59	7.58	Surface	10.60	416.26	418.27	
3	28.00	8.43	7.70	Surface	26.60	417.42	418.15	Riffle
4	48.00	8.38	7.82	Surface	46.60	417.47	418.03	Riffle
5	68.00	9.67	8.69	Surface	66.60	416.18	417.16	Run
6	87.00	9.90	8.70	Surface	85.60	415.95	417.15	Micropool
7	100.00	9.86	8.77	Surface	98.60	415.99	417.08	Micropool
8	106.00	9.93	8.75	Surface	104.60	415.92	417.10	Bedrock
9	125.00	9.63	8.76	Surface	123.60	416.22	417.09	Riffle Strat
10	130.00	9.85	8.88	Surface	128.60	416.00	416.97	Riffle
11	140.00	10.04	8.88	Surface	138.60	415.81	416.97	XS-2 / Micropool

12	152.00	9.91	8.94	Surface	150.60	415.94	416.91	Riffle
13	161.00	10.42	9.10	Surface	159.60	415.43	416.75	Run
14	164.00	10.27	9.06	Surface	162.60	415.58	416.79	Local climax
15	175.00	9.91	9.21	Surface	173.60	415.94	416.64	Riffle Start
16	209.50	10.34	9.53	Surface	208.10	415.51	416.32	Riffle End
17	220.00	10.38	9.53	Surface	218.60	415.47	416.32	Local low point
18	234.50	10.41	9.65	Surface	233.10	415.44	416.20	Riffle Start
19	255.00	10.55	9.70	Surface	253.60	415.30	416.15	Riffle End
20	269.00	10.92	9.80	Surface	267.60	414.93	416.05	Pool
21	282.70	10.53	9.90	Surface	281.30	415.32	415.95	Riffle Start
22	300.00	10.89	10.31	Surface	298.60	414.96	415.54	Grade change

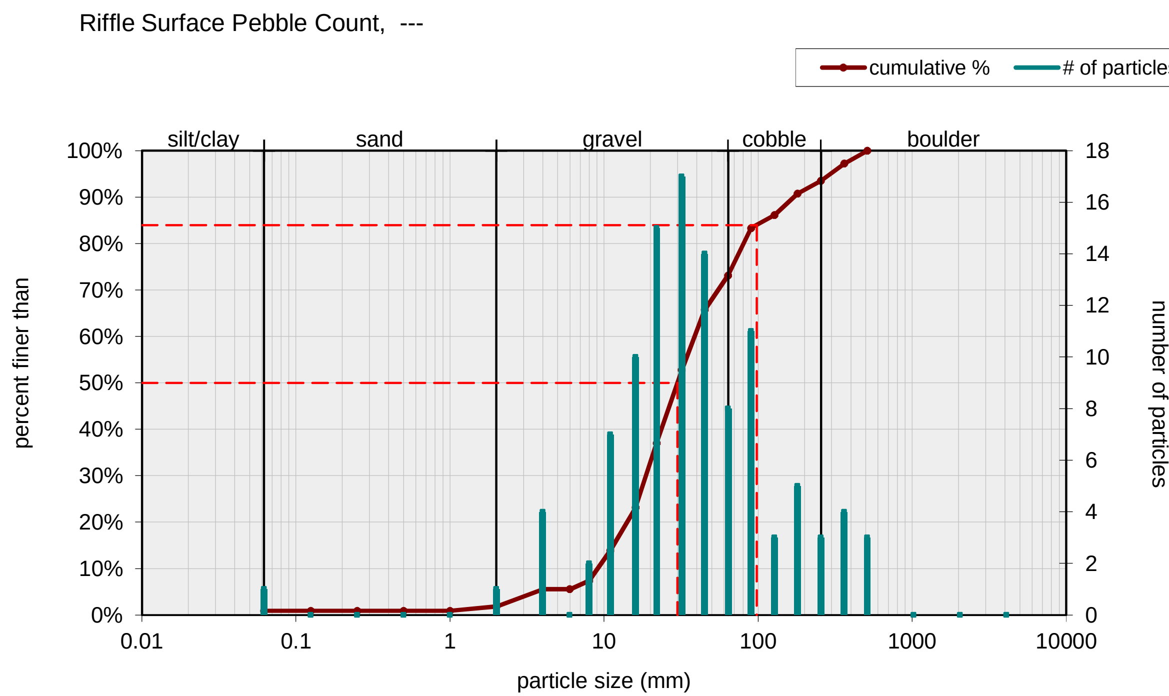
1) Individual Pebble Count

Two individual samples may be entered below. Select sample type for each.

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	1
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	1
very fine gravel	2 - 4	4
fine gravel	4 - 6	0
fine gravel	6 - 8	2
medium gravel	8 - 11	7
medium gravel	11 - 16	10
coarse gravel	16 - 22	15
coarse gravel	22 - 32	17
very coarse gravel	32 - 45	14
very coarse gravel	45 - 64	8
small cobble	64 - 90	11
medium cobble	90 - 128	3
large cobble	128 - 180	5
very large cobble	180 - 256	3
small boulder	256 - 362	4
small boulder	362 - 512	3
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		108
bedrock	-------------	4
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		112

Note: Site P-2 July 2018 WSP



Size (mm)	
D16	12
D35	21
D50	30
D65	44
D84	98
D95	290

Size Distribution	
mean	34.3
dispersion	2.9
skewness	0.06

Type			
silt/clay	1%	bedrock	4%
sand	1%		
gravel	69%		
cobble	20%		
boulder	6%		

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-3

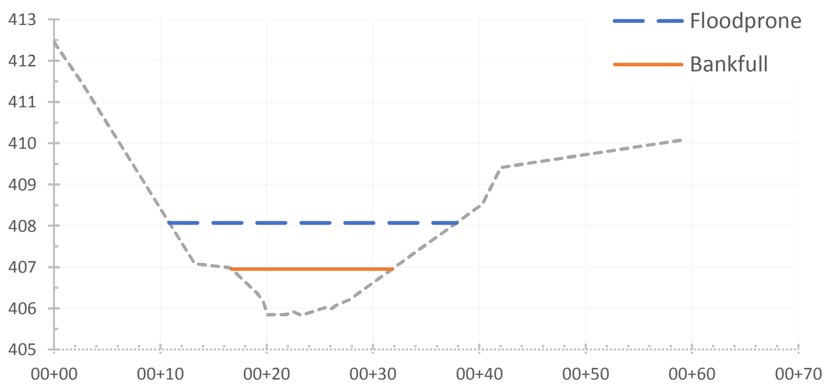
Date: November 30, 2015

ver. 1.0

		Rogen Classification
BF Width:	15.11 ft	
BF Max Depth:	1.12 ft	
BF Area:	10.72 ft²	
BF R_h:	0.69 ft	
BF WP:	15.43 ft	
BF W/D Ratio:	13.50	*B, C, F*
FP Width:	27.02 ft	
Entrenchment:	1.79	*B*
Slope:	1.27%	*D, C, E, F*
Sinuosity:	1.35	*B, C, F, G*
Manning's n:	0.032	
BF Discharge:	44.08 ft³/s	
BF Velocity:	4.11 ft/s	
BF Boundary Shear Stress:	0.550 lbs/ft²	
Critical Shear Stress:		

Most Probable Classification → F

Cross Section



Is Benchmark in XS Data? Yes

↓Use This ↓

Benchmark Elev:	411.43	
Station for Benchmark:	00+02.7	
RH at Benchmark:	1.02	6.20
Bankfull RH/Elevation:	5.50	406.95
Floodprone RH/Elevation:		408.07

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*BF Wetted Perimeter (ft)*	*BF Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					15.43	10.72	15.11	27.02
1	00+00.0	0.00		412.45	0.00	0.00	0.00	0.00
2	00+02.7	1.02		411.43	0.00	0.00	0.00	0.00
3	00+13.2	5.37		407.08	0.00	0.00	0.00	2.39
4	00+16.6	5.47		406.98	0.00	0.00	0.00	3.32
5	00+19.1	6.08		406.37	2.47	0.70	2.41	2.53
6	00+19.7	6.28		406.17	0.60	0.39	0.57	0.57
7	00+20.1	6.61		405.84	0.54	0.41	0.43	0.43
8	00+21.9	6.60		405.85	1.79	1.98	1.79	1.79
9	00+22.5	6.53		405.92	0.61	0.65	0.61	0.61
10	00+23.3	6.62		405.83	0.77	0.82	0.76	0.76
11	00+25.6	6.43		406.02	2.33	2.38	2.32	2.32
12	00+26.1	6.47		405.98	0.49	0.47	0.49	0.49
13	00+26.5	6.38		406.07	0.45	0.41	0.44	0.44
14	00+28.0	6.22		406.23	1.50	1.19	1.49	1.49
15	00+28.3	6.15		406.30	0.30	0.20	0.29	0.29
16	00+40.3	3.93		408.52	3.58	1.14	3.52	9.58

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+42.0	3.04		409.41	0.00	0.00	0.00	0.00
18	00+58.9	2.38		410.07	0.00	0.00	0.00	0.00
19								
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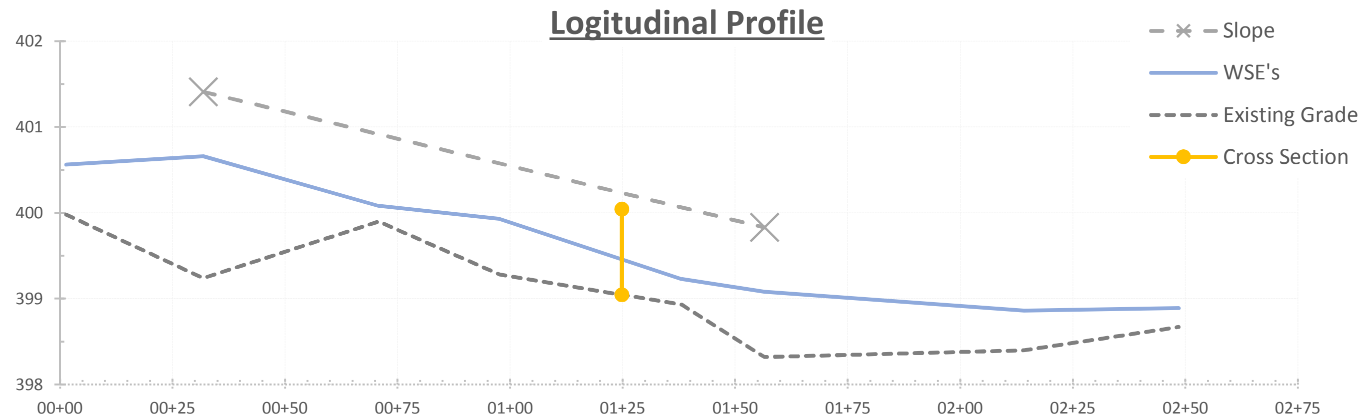
Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-3**

Date: November 30, 2015



Benchmark Elev:	402.69		Starting Station	00+31.8	WSE 400.66
Benchmark RH:	2.29		Ending Station	01+56.5	399.08
Cross Section Location:	01+24.8	399.04	Slope	1.267%	
	01+24.8	400.04			

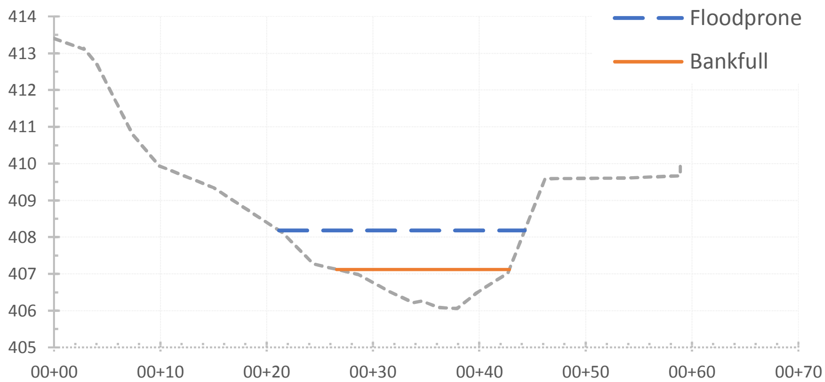
Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+01.4	5.00	399.98	0.58	400.56
2	00+31.8	5.74	399.24	1.42	400.66
3	00+70.8	5.08	399.90	0.18	400.08
4	00+97.7	5.70	399.28	0.65	399.93
5	01+38.1	6.05	398.93	0.30	399.23
6	01+56.5	6.66	398.32	0.76	399.08
7	02+14.2	6.58	398.40	0.46	398.86
8	02+48.5	6.31	398.67	0.22	398.89
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-3**

Date: 09/19/2017 (collected)

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	16.25 ft	
BF Max Depth:	1.06 ft	
BF Area:	9.57 ft²	
BF R_h:	0.58 ft	
BF WP:	16.45 ft	
BF W/D Ratio:	15.33	*B, C, F*
FP Width:	23.09 ft	
Entrenchment:	1.42	*B*
Slope:	1.23%	*D, C, E, F*
Sinuosity:	1.35	*B, C, F, G*
Manning's n:	0.032	
BF Discharge:	34.54 ft³/s	
BF Velocity:	3.61 ft/s	
BF Boundary Shear Stress:	0.449 lbs/ft²	
Critical Shear Stress:	0.117 lbs/ft²	
Most Probable Classification →		F

Is Benchmark in XS Data?	Yes	
	↓Use This ↓	
Benchmark Elev:	413.11	
Station for Benchmark:	00+02.8	
RH at Benchmark:	5.01	6.20
Bankfull RH/Elevation:	11.00	407.12
Floodprone RH/Elevation:		408.18

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*Bf Wetted Perimeter (ft)*	*Bf Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					16.45	9.57	16.25	23.09
1	00+00.0	4.72		413.40	0.00	0.00	0.00	0.00
2	00+02.8	5.01		413.11	0.00	0.00	0.00	0.00
3	00+02.8	4.98	LPIN	413.14	0.00	0.00	0.00	0.00
4	00+04.0	5.39		412.73	0.00	0.00	0.00	0.00
5	00+07.4	7.33		410.79	0.00	0.00	0.00	0.00
6	00+09.9	8.18		409.94	0.00	0.00	0.00	0.00
7	00+15.0	8.77		409.35	0.00	0.00	0.00	0.00
8	00+21.5	10.00		408.12	0.00	0.00	0.00	0.32
9	00+24.4	10.85		407.27	0.00	0.00	0.00	2.90
10	00+28.6	11.14		406.98	2.03	0.14	2.03	4.20
11	00+31.6	11.61	EOW	406.51	3.04	1.13	3.00	3.00
12	00+33.8	11.90		406.22	2.22	1.66	2.20	2.20
13	00+34.6	11.86		406.26	0.80	0.70	0.80	0.80
14	00+36.2	12.03		406.09	1.61	1.51	1.60	1.60
15	00+37.9	12.06		406.06	1.70	1.78	1.70	1.70
16	00+39.7	11.65	EOW	406.47	1.85	1.54	1.80	1.80

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*Bf Wetted Perimeter (ft)*	*Bf Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
17	00+42.7	11.09		407.03	3.05	1.11	3.00	3.00
18	00+46.2	8.53		409.59	0.15	0.01	0.12	1.57
19	00+53.8	8.51		409.61	0.00	0.00	0.00	0.00
20	00+58.9	8.45		409.67	0.00	0.00	0.00	0.00
21	00+58.9	8.20	RPIN	409.92	0.00	0.00	0.00	0.00
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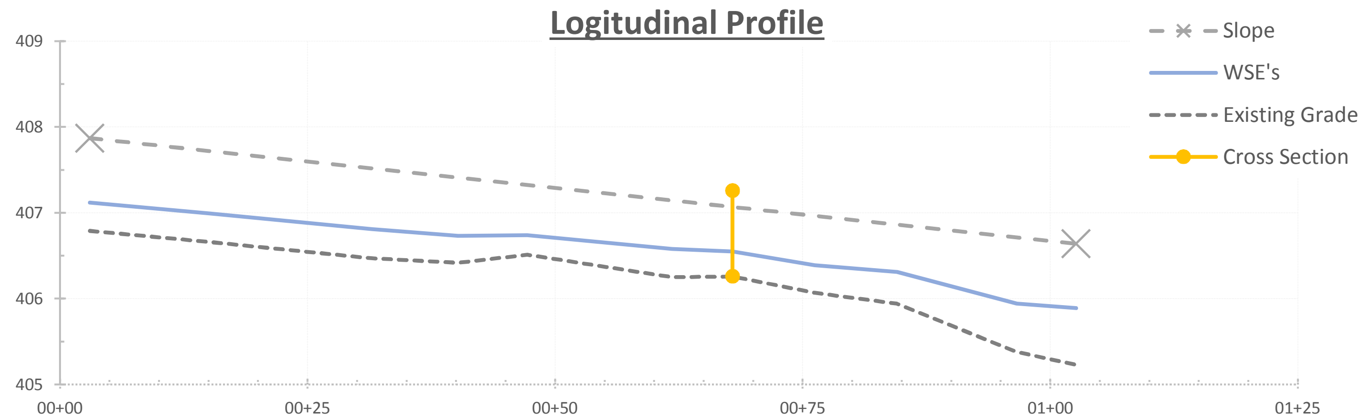
Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-3**

Date: 09/19/2017 (collected)



				WSE
Benchmark Elev:	406.26	Starting Station	00+03.0	407.12
Benchmark RH:	11.85	Ending Station	01+02.6	405.89
Cross Section Location:	00+67.9	406.26	Slope	1.235%
	00+67.9	407.26		

Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+03.0	11.32	406.79	0.33	407.12
2	00+15.1	11.45	406.66	0.33	406.99
3	00+31.5	11.64	406.47	0.34	406.81
4	00+40.2	11.69	406.42	0.31	406.73
5	00+47.2	11.60	406.51	0.23	406.74
6	00+61.8	11.86	406.25	0.33	406.58
7	00+67.9	11.85	406.26	0.29	406.55
8	00+76.2	12.04	406.07	0.32	406.39
9	00+84.5	12.17	405.94	0.37	406.31
10	00+96.6	12.73	405.38	0.56	405.94
11	01+02.6	12.88	405.23	0.66	405.89
12					
13					
14					
15					
16					
17					
18					
19					
20					

Project: **Little Catoctin Creek**

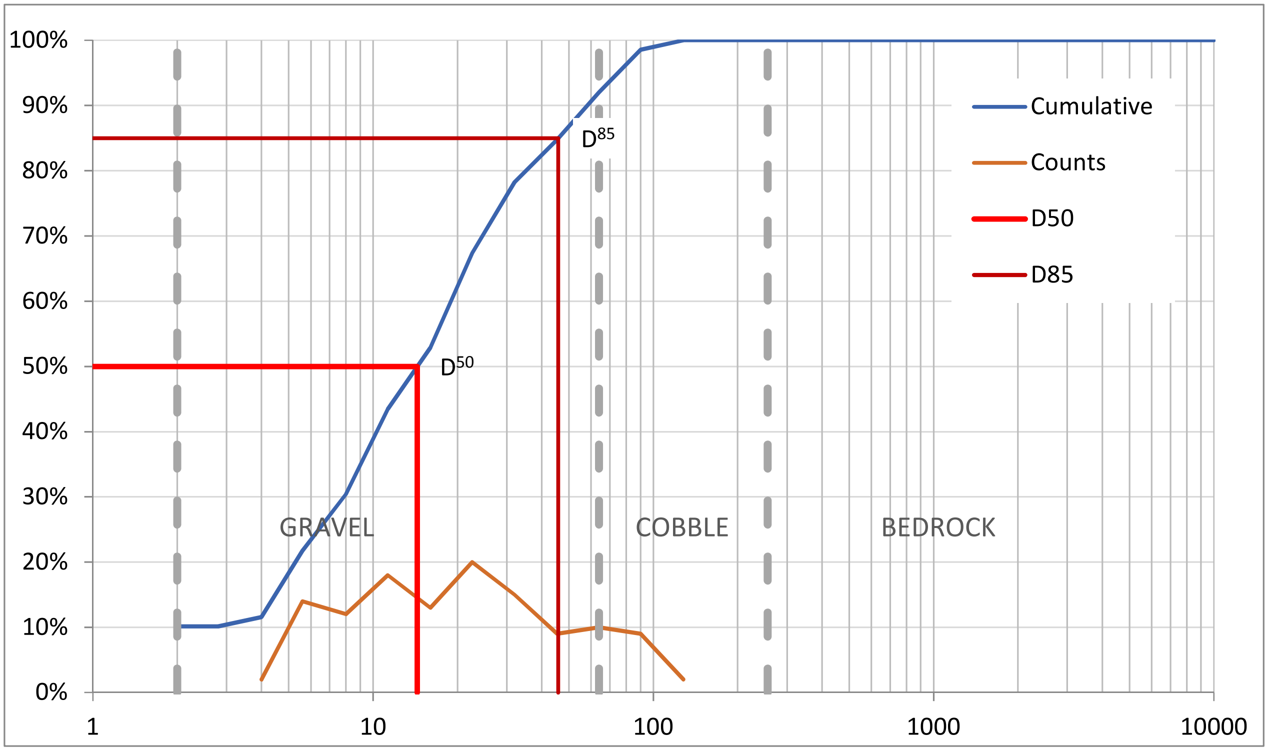
Project Number: **11102.48**

Site Name/Number: **P-3**

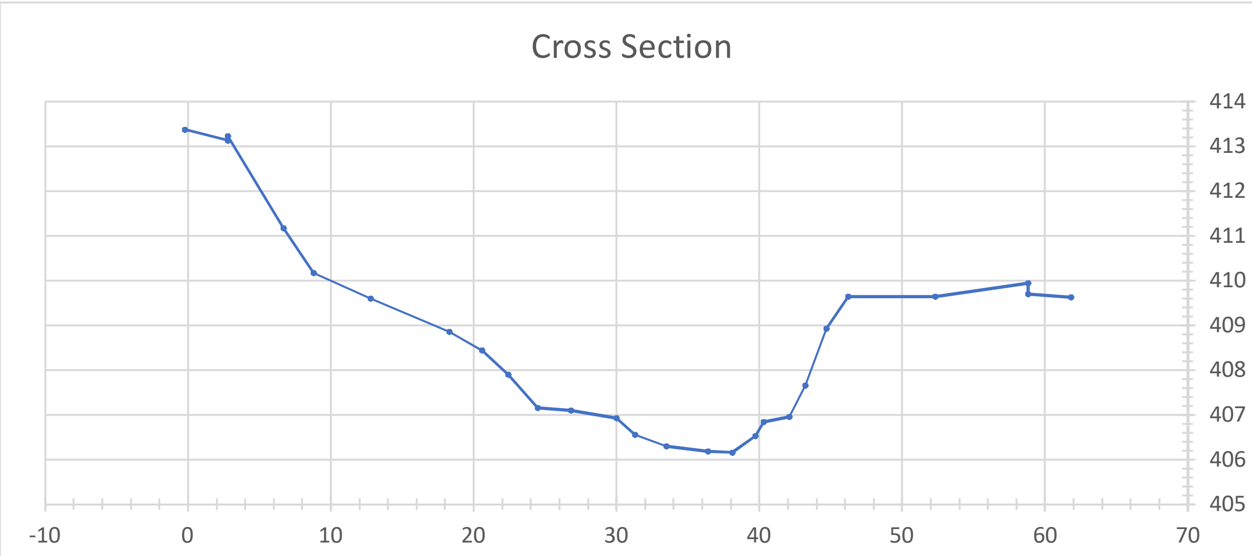
Date: 09/19/2017 (collected)

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			0.0	0.0
		Unconsolidate < D ≤ 0.063			0.0	0.0
	Sand	0.063 < D ≤ 2	2	5	3.1	3.1
Gravel	VF Gravel	2 < D ≤ 2.8	2.8	4	2.5	5.7
		2.8 < D ≤ 4	4	8	5.0	10.7
	Fine Gravel	4 < D ≤ 5.6	5.6	16	10.1	20.8
		5.6 < D ≤ 8	8	23	14.5	35.2
	Med. Gravel	8 < D ≤ 11.2	11.3	27	17.0	52.2
		11.2 < D ≤ 16	16	28	17.6	69.8
	Coarse Gravel	16 < D ≤ 22.4	22.6	31	19.5	89.3
		22.4 < D ≤ 31.5	32	9	5.7	95.0
	VC Gravel	31.5 < D ≤ 45	45.3	6	3.8	98.7
		45 < D ≤ 63	64	2	1.3	100.0
Cobble	Sm. Cobble	63 < D ≤ 90	90		0.0	100.0
		90 < D ≤ 128	128		0.0	100.0
	Lg. Cobble	128 < D ≤ 180	180		0.0	100.0
		180 < D ≤ 256	256		0.0	100.0
Boulder	Sm. Boulder	256 < D ≤ 362	362		0.0	100.0
		362 < D ≤ 512	512		0.0	100.0
	Med. Boulder	512 < D ≤ 724	724		0.0	100.0
		724 < D ≤ 1024	1024		0.0	100.0
	Lg. Boulder	1024 < D ≤ 1450	1450		0.0	100.0
		1450 < D ≤ 2048	2048		0.0	100.0
	VL Boulder	2048 < D ≤ 2900	2900		0.0	100.0
		2900 < D ≤ 4096	4096		0.0	100.0
	Bedrock	> 10000	10000		0.0	100.0
			Totals	159		

D^{16} =	4.8 mm	16	**Andrews 1994**		
D^{35} =	8.0 mm	35	Tc* =	0.00317	
D^{50} =	10.8 mm	50	Tc =	0.117 lb/ft²	(Boundary Shear from Shields)
D^{65} =	14.5 mm	65	d =	0.0965 ft	
D^{85} =	20.9 mm	85	S =	3.20%	
D^{95} =	32.1 mm	95			
D^{i} =	180.0 mm				



Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 3 - Cross Section Monitoring
Date: 1/31/2018

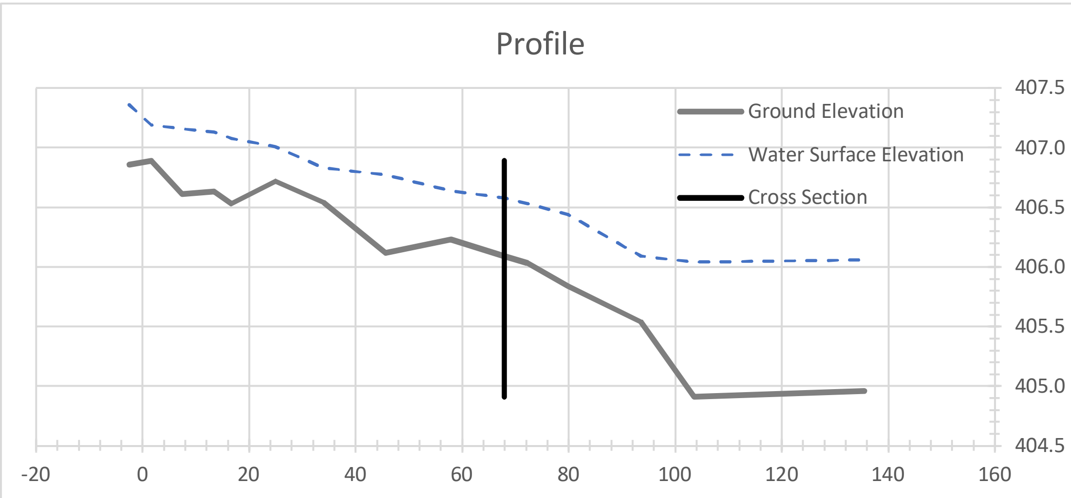


Benchmark Elevation: 413.12 LPIN
Height of Instrument: 415.46

Pnt Num	Survey Data Station (ft)	Survey Data Survey Rod Height (ft)	Section Comparison Data Station (ft)	Section Comparison Data Elevation (ft)	Notes
1	0.00	2.09	-0.20	413.37	
2	3.00	2.34	2.80	413.12	LPIN
3	3.00	2.23	2.80	413.23	
4	6.90	4.29	6.70	411.17	
5	9.00	5.29	8.80	410.17	
6	13.00	5.86	12.80	409.60	
7	18.50	6.60	18.30	408.86	
8	20.80	7.02	20.60	408.44	
9	22.60	7.56	22.40	407.90	
10	24.70	8.30	24.50	407.16	
11	27.00	8.37	26.80	407.09	
12	30.20	8.54	30.00	406.92	
13	31.50	8.91	31.30	406.55	LEW
14	33.70	9.17	33.50	406.29	
15	36.60	9.28	36.40	406.18	
16	38.30	9.30	38.10	406.16	
17	39.90	8.93	39.70	406.53	REW

18	40.50	8.62	40.30	406.84	
19	42.30	8.50	42.10	406.96	
20	43.40	7.81	43.20	407.65	
21	44.90	6.54	44.70	408.92	
22	46.40	5.82	46.20	409.64	
23	52.50	5.82	52.30	409.64	
24	59.00	5.52	58.80	409.94	RPIN
25	59.00	5.76	58.80	409.70	
26	62.00	5.84	61.80	409.62	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 3 - Profile Monitoring
Date: 1/31/2018



Benchmark Elevation	413.12						
Rod Height at BM	2.34						
HI from Benchmark Elev.	415.46						
Cross Section Station	75.4			Slope:	0.0094		
XS Station Adjustment	-7.5				Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	67.9		67.90	Start Sta.	5.00	-2.5	407.36
		404.91	406.89	End Sta.	143.00	135.5	406.06

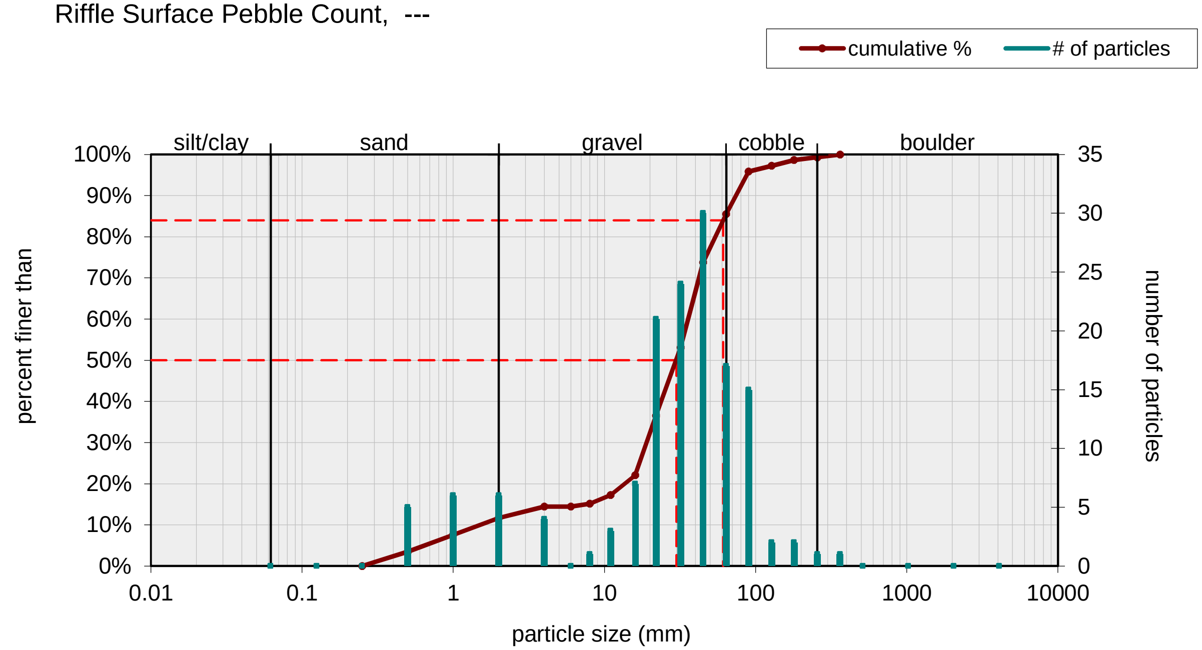
Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Water (ft)	Depth or Surface	Adjusted Station (ft)	Ground Elevation (ft)	Water Surface Elevation	Notes
	Survey Data				Profile Comparison Data			
1	5.00	8.60	0.50	Depth	-2.50	406.86	407.36	
2	9.10	8.57	0.30	Depth	1.60	406.89	407.19	
3	14.90	8.85	0.55	Depth	7.40	406.61	407.16	
4	20.90	8.83	0.50	Depth	13.40	406.63	407.13	
5	24.20	8.93	0.55	Depth	16.70	406.53	407.08	
6	32.40	8.74	0.29	Depth	24.90	406.72	407.01	
7	41.40	8.92	0.29	Depth	33.90	406.54	406.83	
8	53.10	9.34	0.65	Depth	45.60	406.12	406.77	
9	65.40	9.23	0.41	Depth	57.90	406.23	406.64	
10	75.40	9.37	0.49	Depth	67.90	406.09	406.58	XS-3 - Assumed
11	79.80	9.43	0.50	Depth	72.30	406.03	406.53	
12	87.30	9.62	0.60	Depth	79.80	405.84	406.44	
13	101.00	9.92	0.55	Depth	93.50	405.54	406.09	
14	111.00	10.55	1.13	Depth	103.50	404.91	406.04	
15	143.00	10.50	1.10	Depth	135.50	404.96	406.06	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	5
coarse sand	0.5 - 1	6
very coarse sand	1 - 2	6
very fine gravel	2 - 4	4
fine gravel	4 - 6	0
fine gravel	6 - 8	1
medium gravel	8 - 11	3
medium gravel	11 - 16	7
coarse gravel	16 - 22	21
coarse gravel	22 - 32	24
very coarse gravel	32 - 45	30
very coarse gravel	45 - 64	17
small cobble	64 - 90	15
medium cobble	90 - 128	2
large cobble	128 - 180	2
very large cobble	180 - 256	1
small boulder	256 - 362	1
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		145
bedrock	---------------------	
clay hardpan	---------------------	
detritus/wood	---------------------	
artificial	---------------------	
total count:		145

Note: Site P-3 January 2018 RK&K

Riffle Surface Pebble Count, ---

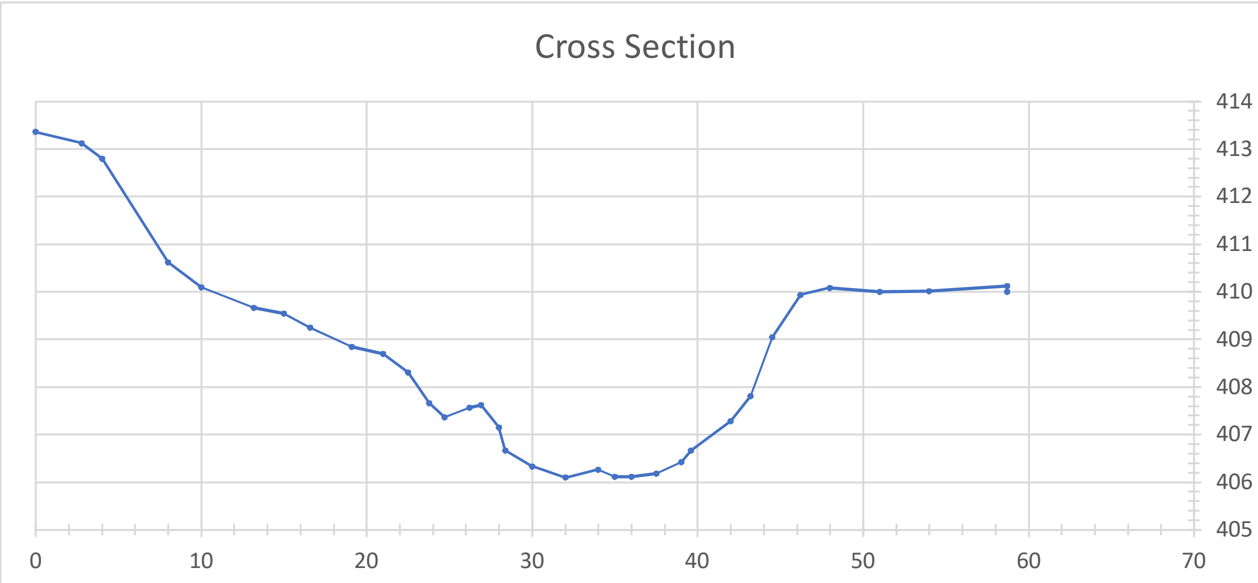


Size (mm)		
D16	9.1	3.4
D35	21	12
D50	30	17
D65	39	20
D84	61	29
D95	87	39

Size Distribution	
mean	23.6
dispersion	2.7
skewness	-0.12

Type	
silt/clay	0%
sand	12%
gravel	74%
cobble	14%
boulder	1%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 3 - Cross Section Monitoring
Date: 7/30/2018

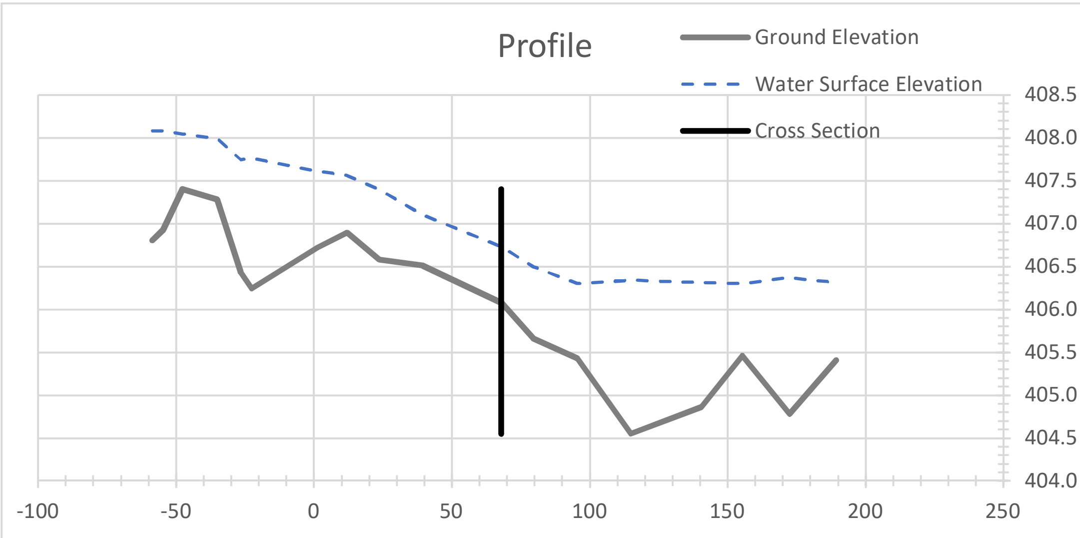


Benchmark Elevation: 413.12 LPIN
Height of Instrument: 415.12

	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	0	1.76	0	413.36	
2	2.8	2	2.8	413.12	LPIN
3	4	2.32	4	412.8	
4	8	4.5	8	410.62	
5	10	5.03	10	410.09	
6	13.2	5.46	13.2	409.66	
7	15	5.57	15	409.55	
8	16.6	5.87	16.6	409.25	BKF (from 2015)
9	19.1	6.28	19.1	408.84	
10	21	6.42	21	408.7	
11	22.5	6.82	22.5	408.3	LTOB
12	23.8	7.46	23.8	407.66	
13	24.7	7.75	24.7	407.37	End Terrace
14	26.2	7.55	26.2	407.57	BKF (from 2017)
15	26.9	7.5	26.9	407.62	Terrace end
16	28	7.97	28	407.15	
17	28.4	8.45	28.4	406.67	LEW/L Toe

18	30	8.79	30	406.33	
19	32	9.02	32	406.1	
20	34	8.86	34	406.26	
21	35	9	35	406.12	
22	36	9	36	406.12	
23	37.5	8.94	37.5	406.18	
24	39	8.69	39	406.43	R Toe
25	39.6	8.46	39.6	406.66	REW
26	42	7.83	42	407.29	Grade change
27	43.2	7.31	43.2	407.81	
28	44.5	6.08	44.5	409.04	
29	46.2	5.18	46.2	409.94	RTOB
30	48	5.04	48	410.08	
31	51	5.12	51	410	
32	54	5.1	54	410.02	
33	58.7	5	58.7	410.12	
34	58.7	5.12	58.7	410	RPIN

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 3 - Profile Monitoring
Date: 7/30/2018



Benchmark Elevation	413.12
Rod Height at BM	2
HI from Benchmark Elev.	415.12

Cross Section Station	126.5		Slope:	0.0094		
XS Station Adjustment	-58.6			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	67.9	67.90	Start Sta.	60.00	1.4	407.61
	404.55	407.40	End Sta.	199.00	140.4	406.31

	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	8.32	1.28	Depth	-58.60	406.80	408.08	
2	4.00	8.19	1.15	Depth	-54.60	406.93	408.08	
3	11.00	7.72	0.64	Depth	-47.60	407.40	408.04	
4	23.50	7.84	7.13	Surface	-35.10	407.28	407.99	
5	32.00	8.69	7.38	Surface	-26.60	406.43	407.74	
6	36.00	8.88	1.52	Depth	-22.60	406.24	407.76	
7	60.00	8.40	7.51	Surface	1.40	406.72	407.61	
8	70.80	8.23	7.56	Surface	12.20	406.89	407.56	
9	82.50	8.54	7.73	Surface	23.90	406.58	407.39	
10	98.00	8.61	8.02	Surface	39.40	406.51	407.10	
11	126.50	9.04	8.39	Surface	67.90	406.08	406.73	XS-3
12	138.00	9.46	8.62	Surface	79.40	405.66	406.50	
13	154.00	9.69	8.82	Surface	95.40	405.43	406.30	
14	173.50	10.57	1.79	Depth	114.90	404.55	406.34	
15	199.00	10.26	1.45	Depth	140.40	404.86	406.31	
16	214.00	9.66	0.84	Depth	155.40	405.46	406.30	
17	231.00	10.34	1.59	Depth	172.40	404.78	406.37	
18	248.00	9.71	0.90	Depth	189.40	405.41	406.31	
19	253.00	9.62	0.78	Depth	194.40	405.50	406.28	

1) Individual Pebble Count

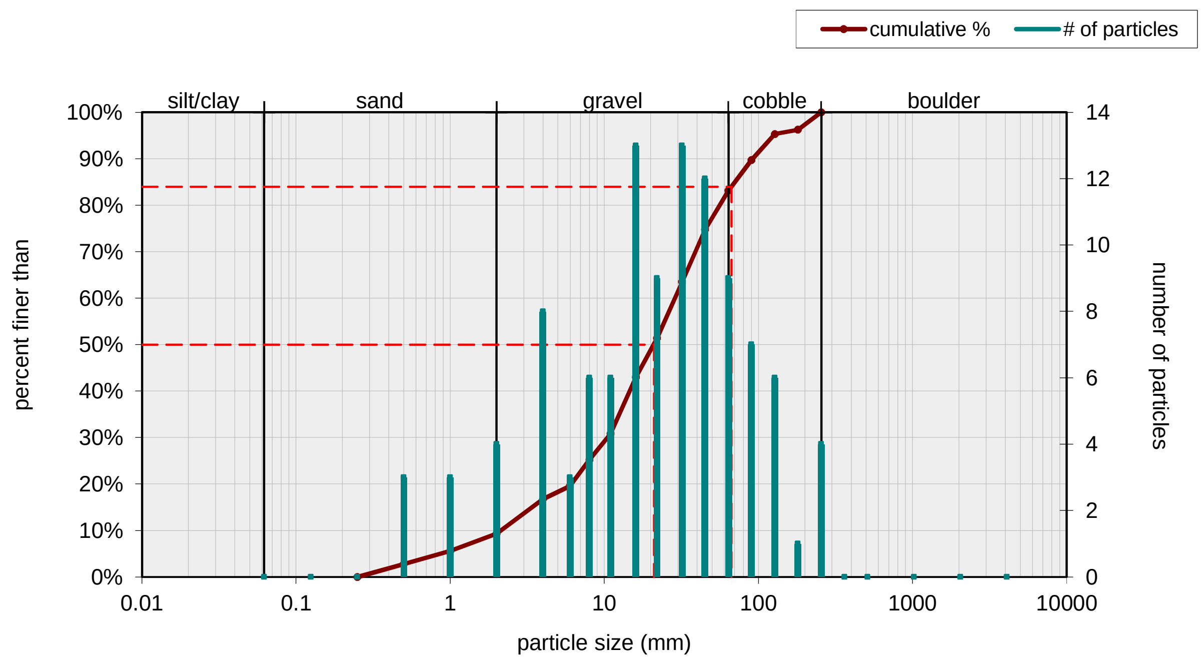
Two individual samples may be entered below. Select sample type for each.

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	3
coarse sand	0.5 - 1	3
very coarse sand	1 - 2	4
very fine gravel	2 - 4	8
fine gravel	4 - 6	3
fine gravel	6 - 8	6
medium gravel	8 - 11	6
medium gravel	11 - 16	13
coarse gravel	16 - 22	9
coarse gravel	22 - 32	13
very coarse gravel	32 - 45	12
very coarse gravel	45 - 64	9
small cobble	64 - 90	7
medium cobble	90 - 128	6
large cobble	128 - 180	1
very large cobble	180 - 256	4
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		107
bedrock	-------------	
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		107

Note: Site P-3 July 2018 WSP

Riffle Surface Pebble Count, ---



Size (mm)	
D16	3.7
D35	13
D50	21
D65	33
D84	67
D95	130

Size Distribution	
mean	15.7
dispersion	4.4
skewness	-0.11

Type	
silt/clay	0%
sand	9%
gravel	74%
cobble	17%
boulder	0%

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-4

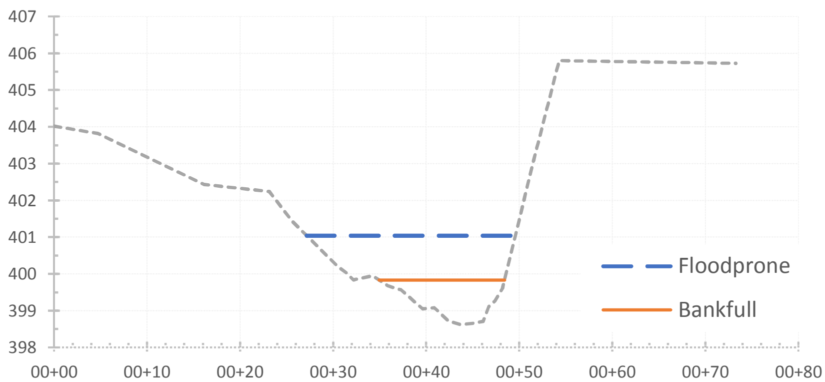
Date: December 4, 2015

ver. 1.0

		Rogen Classification
BF Width:	13.47 ft	
BF Max Depth:	1.21 ft	
BF Area:	9.63 ft²	
BF R_h:	0.69 ft	
BF WP:	13.90 ft	
BF W/D Ratio:	11.13	A, E, G
FP Width:	22.43 ft	
Entrenchment:	1.67	B
Slope:	0.57%	D, C, E, F
Sinuosity:	1.35	B, C, F, G
Manning's n:	0.032	
BF Discharge:	26.56 ft³/s	
BF Velocity:	2.76 ft/s	
BF Boundary Shear Stress:	0.248 lbs/ft²	
Critical Shear Stress:		

Most Probable Classification → F

Cross Section



Is Benchmark in XS Data? Yes

↓Use This ↓

Benchmark Elev:	403.82	
Station for Benchmark:	00+04.8	
RH at Benchmark:	1.98	6.20
Bankfull RH/Elevation:	5.97	399.83
Floodprone RH/Elevation:		401.04

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
					13.90	9.63	13.47	22.43
1	00+00.0	1.78		404.02	0.00	0.00	0.00	0.00
2	00+04.8	1.98	LPIN	403.82	0.00	0.00	0.00	0.00
3	00+16.1	3.37		402.43	0.00	0.00	0.00	0.00
4	00+23.2	3.56		402.24	0.00	0.00	0.00	0.00
5	00+25.6	4.37		401.43	0.00	0.00	0.00	0.00
6	00+30.5	5.60		400.20	0.00	0.00	0.00	3.33
7	00+31.4	5.77		400.03	0.00	0.00	0.00	0.93
8	00+32.2	5.96		399.84	0.00	0.00	0.00	0.77
9	00+34.2	5.85		399.95	0.00	0.00	0.00	2.05
10	00+35.9	6.13		399.67	0.98	0.08	0.97	1.69
11	00+37.3	6.23		399.57	1.40	0.29	1.40	1.40
12	00+39.6	6.75		399.05	2.34	1.19	2.28	2.28
13	00+40.9	6.72		399.08	1.29	0.99	1.29	1.29
14	00+42.4	7.08		398.72	1.55	1.40	1.51	1.51
15	00+43.7	7.18		398.62	1.27	1.47	1.27	1.27
16	00+45.2	7.14		398.66	1.49	1.77	1.49	1.49

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+46.2	7.09		398.71	0.99	1.13	0.99	0.99
18	00+46.7	6.69		399.11	0.70	0.53	0.58	0.58
19	00+47.4	6.54		399.26	0.66	0.41	0.64	0.64
20	00+48.2	6.19		399.61	0.91	0.33	0.84	0.84
21	00+51.5	2.72		403.08	0.30	0.02	0.21	1.37
22	00+54.3	0.00		405.80	0.00	0.00	0.00	0.00
23	00+73.3	0.07		405.73	0.00	0.00	0.00	0.00
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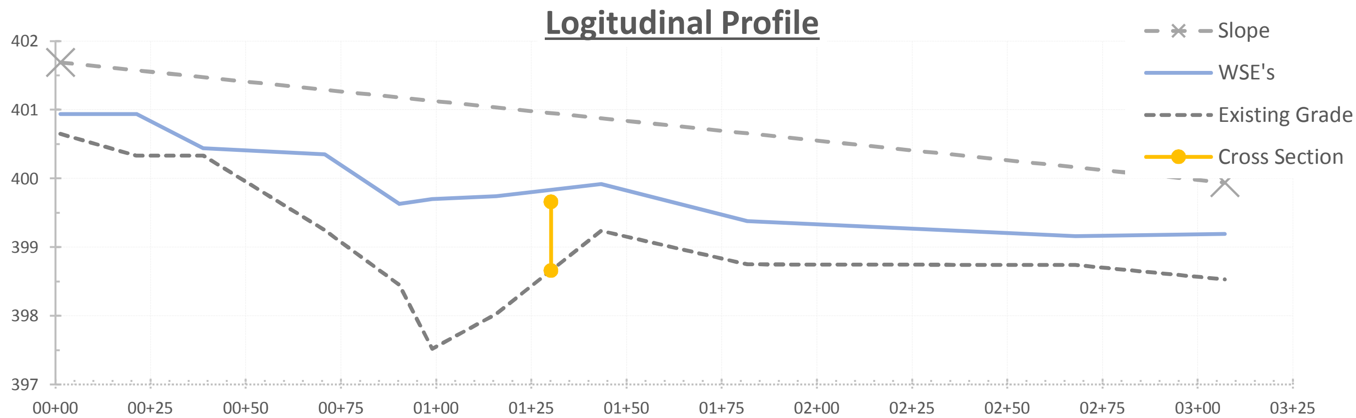
Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-4

Date: December 4, 2015



					WSE
Benchmark Elev:	398.66		Starting Station	00+01.3	400.94
Benchmark RH:	6.99		Ending Station	03+07.1	399.19
Cross Section Location:	01+30.1	El: 398.66	Slope	0.572%	
	01+30.1	399.66			

Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+01.3	5.00	400.65	0.29	400.94
2	00+21.2	5.32	400.33	0.61	400.94
3	00+38.8	5.32	400.33	0.11	400.44
4	00+70.7	6.40	399.25	1.10	400.35
5	00+90.3	7.20	398.45	1.18	399.63
6	00+98.9	8.13	397.52	2.18	399.70
7	01+15.7	7.62	398.03	1.71	399.74
8	01+43.3	6.41	399.24	0.68	399.92
9	01+81.7	6.90	398.75	0.63	399.38
10	02+67.8	6.91	398.74	0.42	399.16
11	03+07.1	7.12	398.53	0.66	399.19
12					
13					
14					
15					
16					
17					
18					
19					
20					

Project: **Little Catoctin Creek**

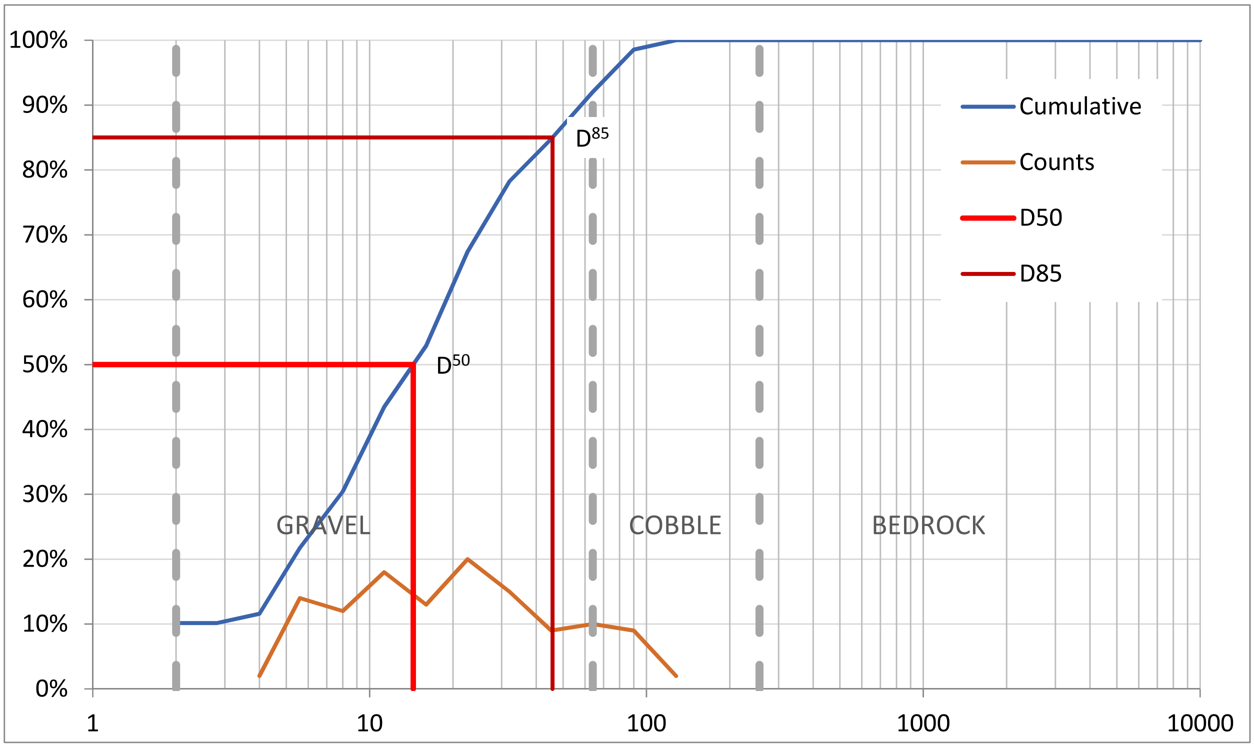
Project Number: **11102.48**

Site Name/Number: **P-4**

Date: December 4, 2015

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			#DIV/0!	#DIV/0!
		Unconsolidate < D ≤ 0.063			#DIV/0!	#DIV/0!
	Sand	0.063 < D ≤ 2	2		#DIV/0!	#DIV/0!
Gravel	VF Gravel	2 < D ≤ 2.8	2.8		#DIV/0!	#DIV/0!
		2.8 < D ≤ 4	4		#DIV/0!	#DIV/0!
	Fine Gravel	4 < D ≤ 5.6	5.6		#DIV/0!	#DIV/0!
		5.6 < D ≤ 8	8		#DIV/0!	#DIV/0!
	Med. Gravel	8 < D ≤ 11.2	11.3		#DIV/0!	#DIV/0!
		11.2 < D ≤ 16	16		#DIV/0!	#DIV/0!
	Coarse Gravel	16 < D ≤ 22.4	22.6		#DIV/0!	#DIV/0!
		22.4 < D ≤ 31.5	32		#DIV/0!	#DIV/0!
	VC Gravel	31.5 < D ≤ 45	45.3		#DIV/0!	#DIV/0!
		45 < D ≤ 63	64		#DIV/0!	#DIV/0!
Cobble	Sm. Cobble	63 < D ≤ 90	90		#DIV/0!	#DIV/0!
		90 < D ≤ 128	128		#DIV/0!	#DIV/0!
	Lg. Cobble	128 < D ≤ 180	180		#DIV/0!	#DIV/0!
		180 < D ≤ 256	256		#DIV/0!	#DIV/0!
Boulder	Sm. Boulder	256 < D ≤ 362	362		#DIV/0!	#DIV/0!
		362 < D ≤ 512	512		#DIV/0!	#DIV/0!
	Med. Boulder	512 < D ≤ 724	724		#DIV/0!	#DIV/0!
		724 < D ≤ 1024	1024		#DIV/0!	#DIV/0!
	Lg. Boulder	1024 < D ≤ 1450	1450		#DIV/0!	#DIV/0!
		1450 < D ≤ 2048	2048		#DIV/0!	#DIV/0!
	VL Boulder	2048 < D ≤ 2900	2900		#DIV/0!	#DIV/0!
		2900 < D ≤ 4096	4096		#DIV/0!	#DIV/0!
	Bedrock	> 10000	10000		#DIV/0!	#DIV/0!
			Totals	0		

D^{16} =	#N/A	16	**Andrews 1994**		
D^{35} =	#N/A	35	Tc* =	#N/A	
D^{50} =	#N/A	50	Tc =	#N/A	(Boundary Shear from Shields)
D^{65} =	#N/A	65	d =	#N/A	
D^{85} =	#N/A	85	S =	#N/A	
D^{95} =	#N/A	95			
D^{i} =	180.0 mm				

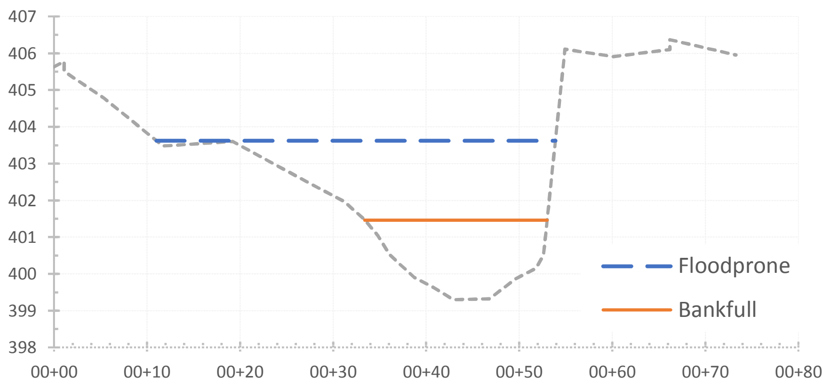


Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-4

Date: 9/19/2017 (collected)

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	19.59 ft	
BF Max Depth:	2.16 ft	
BF Area:	30.05 ft²	
BF R_h:	1.46 ft	
BF WP:	20.65 ft	
BF W/D Ratio:	9.07	*A, E, G*
FP Width:	42.86 ft	
Entrenchment:	2.19	*B*
Slope:	0.78%	*D, C, E, F*
Sinuosity:	1.35	*B, C, F, G*
Manning's n:	0.032	
BF Discharge:	159.07 ft³/s	
BF Velocity:	5.29 ft/s	
BF Boundary Shear Stress:	0.712 lbs/ft²	
Critical Shear Stress:	0.143 lbs/ft²	

Most Probable Classification → F

Is Benchmark in XS Data? Yes

↓Use This ↓

Benchmark Elev:	406.10	
Station for Benchmark:	00+66.2	
RH at Benchmark:	6.06	6.20
Bankfull RH/Elevation:	10.70	401.46
Floodprone RH/Elevation:		403.62

Pnt Num	*Station (ft)*	*Rod Height (ft)*	*Notes*	*Adj. Elev (ft)*	*BF Wetted Perimeter (ft)*	*BF Area (ft²)*	*BF Top Width (ft)*	*FP Top Width (ft)*
					20.65	30.05	19.59	42.86
1	00+00.0	6.53		405.63	0.00	0.00	0.00	0.00
2	00+01.1	6.38	LPIN	405.78	0.00	0.00	0.00	0.00
3	00+01.1	6.65		405.51	0.00	0.00	0.00	0.00
4	00+05.4	7.38		404.78	0.00	0.00	0.00	0.00
5	00+11.7	8.68		403.48	0.00	0.00	0.00	0.68
6	00+19.2	8.56		403.60	0.00	0.00	0.00	7.50
7	00+27.2	9.66		402.50	0.00	0.00	0.00	8.00
8	00+31.2	10.19		401.97	0.00	0.00	0.00	4.00
9	00+33.3	10.67		401.49	0.00	0.00	0.00	2.10
10	00+34.8	11.11		401.05	1.46	0.29	1.40	1.50
11	00+36.1	11.64	EOW	400.52	1.40	0.88	1.30	1.30
12	00+38.7	12.25		399.91	2.67	3.24	2.60	2.60
13	00+40.8	12.53		399.63	2.12	3.55	2.10	2.10
14	00+42.9	12.86		399.30	2.13	4.19	2.10	2.10
15	00+46.8	12.84		399.32	3.90	8.39	3.90	3.90
16	00+49.6	12.30		399.86	2.85	5.24	2.80	2.80

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+51.8	12.01		400.15	2.22	3.20	2.20	2.20
18	00+52.6	11.65	EOW	400.51	0.88	0.90	0.80	0.80
19	00+54.9	6.05		406.11	1.03	0.19	0.39	1.28
20	00+60.1	6.25		405.91	0.00	0.00	0.00	0.00
21	00+66.2	6.06		406.10	0.00	0.00	0.00	0.00
22	00+66.2	5.79	RPIN	406.37	0.00	0.00	0.00	0.00
23	00+73.3	6.21		405.95	0.00	0.00	0.00	0.00
24								
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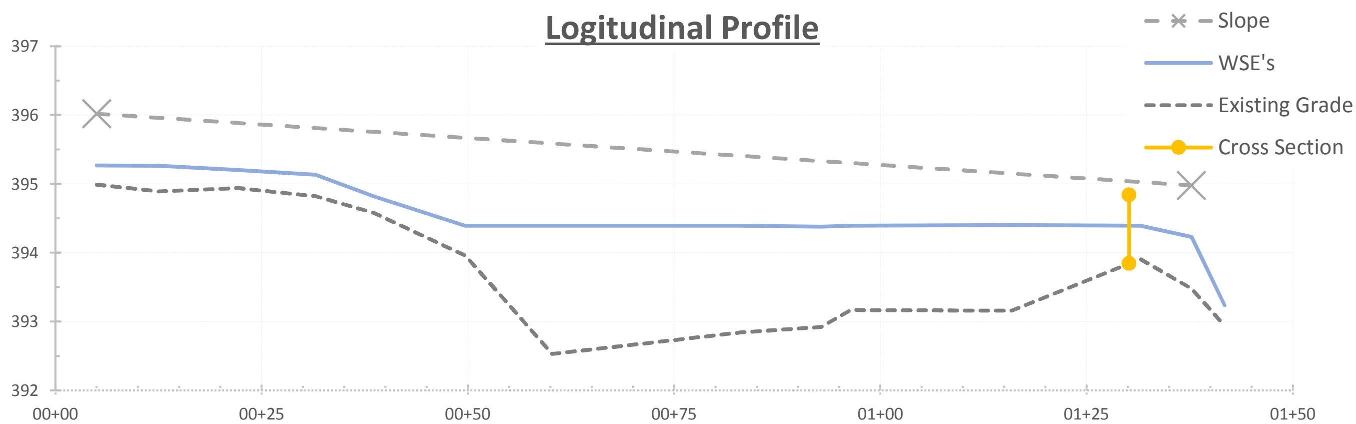
Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-4

Date: 9/19/2017 (collected)



					WSE
Benchmark Elev:	401.03		Starting Station	00+05.0	395.27
Benchmark RH:	5.00		Ending Station	01+37.7	394.23
Cross Section Location:	01+30.1	El: 393.84	Slope	0.784%	
	01+30.1	394.84			

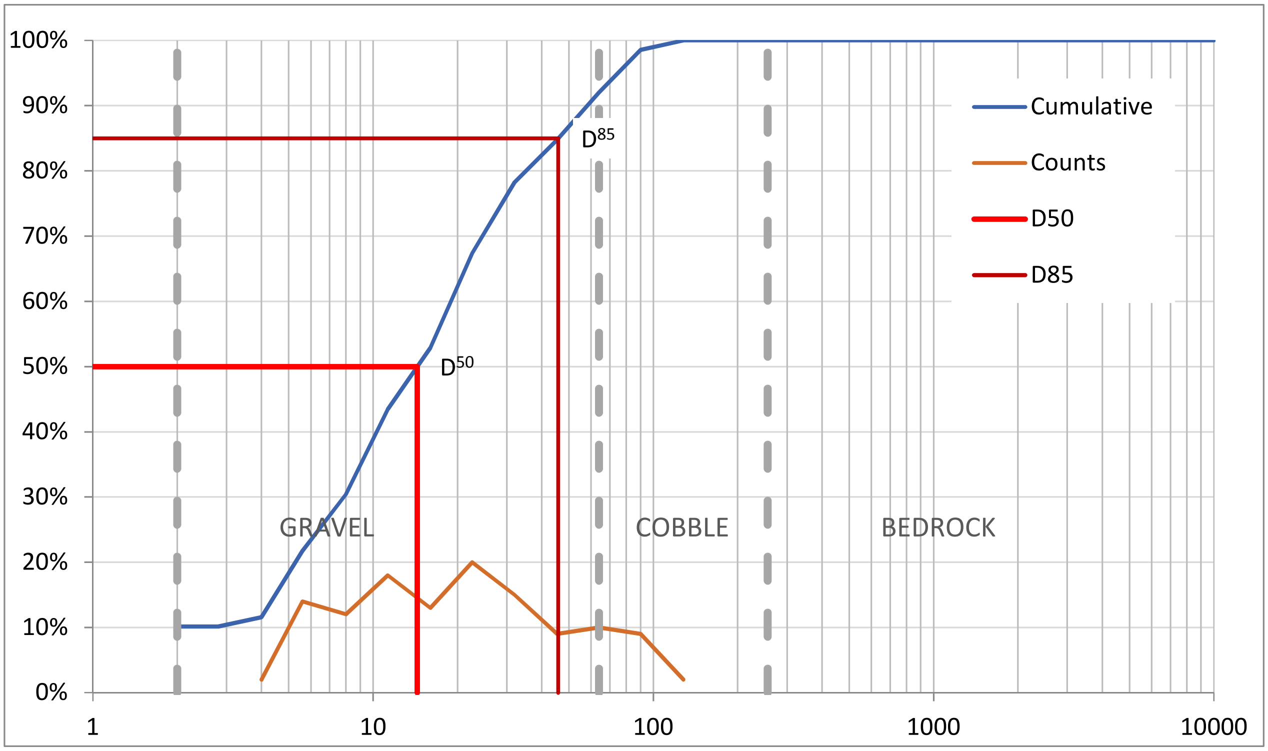
Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+05.0	11.04	394.99	0.28	395.27
2	00+12.6	11.14	394.89	0.37	395.26
3	00+22.0	11.09	394.94	0.26	395.20
4	00+31.6	11.21	394.82	0.31	395.13
5	00+38.6	11.45	394.58	0.24	394.82
6	00+49.7	12.07	393.96	0.43	394.39
7	00+60.2	13.50	392.53	1.86	394.39
8	00+83.0	13.19	392.84	1.55	394.39
9	00+92.8	13.11	392.92	1.46	394.38
10	00+96.4	12.86	393.17	1.22	394.39
11	01+15.9	12.87	393.16	1.24	394.40
12	01+31.5	12.12	393.91	0.48	394.39
13	01+37.7	12.55	393.48	0.75	394.23
14	01+41.7	13.09	392.94	0.30	393.24
15					
16					
17					
18					
19					
20					

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-4

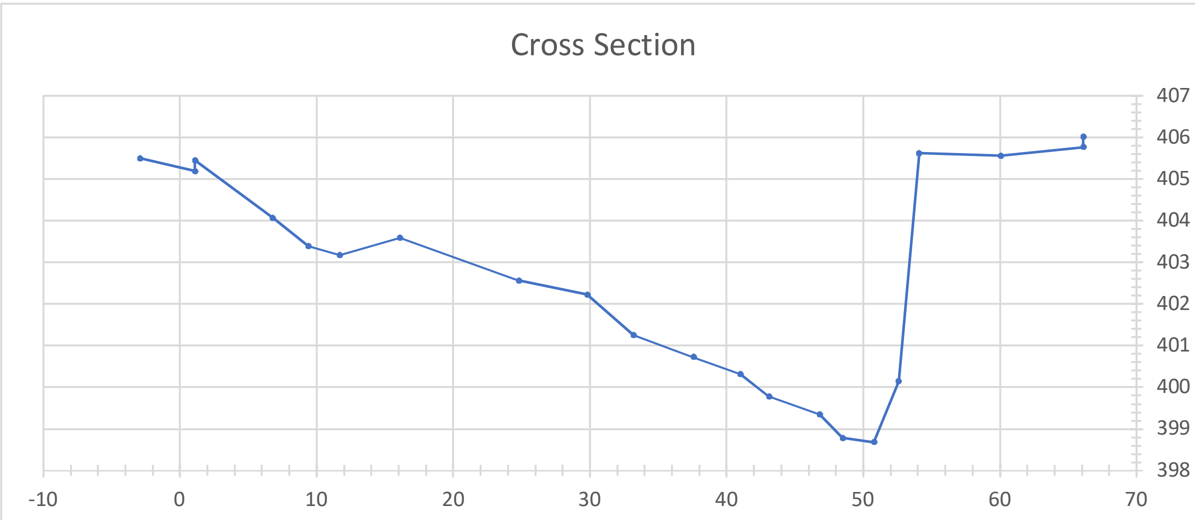
Date: 9/19/2017 (collected)

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			0.0	0.0
		Unconsolidate < D ≤ 0.063			0.0	0.0
	Sand	0.063 < D ≤ 2	2	8	5.3	5.3
Gravel	VF Gravel	2 < D ≤ 2.8	2.8	9	6.0	11.3
		2.8 < D ≤ 4	4	10	6.6	17.9
	Fine Gravel	4 < D ≤ 5.6	5.6	9	6.0	23.8
		5.6 < D ≤ 8	8	10	6.6	30.5
	Med. Gravel	8 < D ≤ 11.2	11.3	18	11.9	42.4
		11.2 < D ≤ 16	16	22	14.6	57.0
	Coarse Gravel	16 < D ≤ 22.4	22.6	21	13.9	70.9
		22.4 < D ≤ 31.5	32	21	13.9	84.8
	VC Gravel	31.5 < D ≤ 45	45.3	11	7.3	92.1
		45 < D ≤ 63	64	11	7.3	99.3
Cobble	Sm. Cobble	63 < D ≤ 90	90	1	0.7	100.0
		90 < D ≤ 128	128		0.0	100.0
	Lg. Cobble	128 < D ≤ 180	180		0.0	100.0
		180 < D ≤ 256	256		0.0	100.0
Boulder	Sm. Boulder	256 < D ≤ 362	362		0.0	100.0
		362 < D ≤ 512	512		0.0	100.0
	Med. Boulder	512 < D ≤ 724	724		0.0	100.0
		724 < D ≤ 1024	1024		0.0	100.0
	Lg. Boulder	1024 < D ≤ 1450	1450		0.0	100.0
		1450 < D ≤ 2048	2048		0.0	100.0
	VL Boulder	2048 < D ≤ 2900	2900		0.0	100.0
		2900 < D ≤ 4096	4096		0.0	100.0
	Bedrock	> 10000	10000		0.0	100.0
			Totals	151		

D^{16} =	3.6 mm	16	**Andrews 1994**	
D^{35} =	9.1 mm	35	Tc* = 0.00387	
D^{50} =	13.6 mm	50	Tc = 0.143 lb/ft²	(Boundary Shear from Shields)
D^{65} =	19.5 mm	65	d = 0.1179 ft	
D^{85} =	32.4 mm	85	S = 3.20%	
D^{95} =	52.1 mm	95		
D^{i} =	180.0 mm			



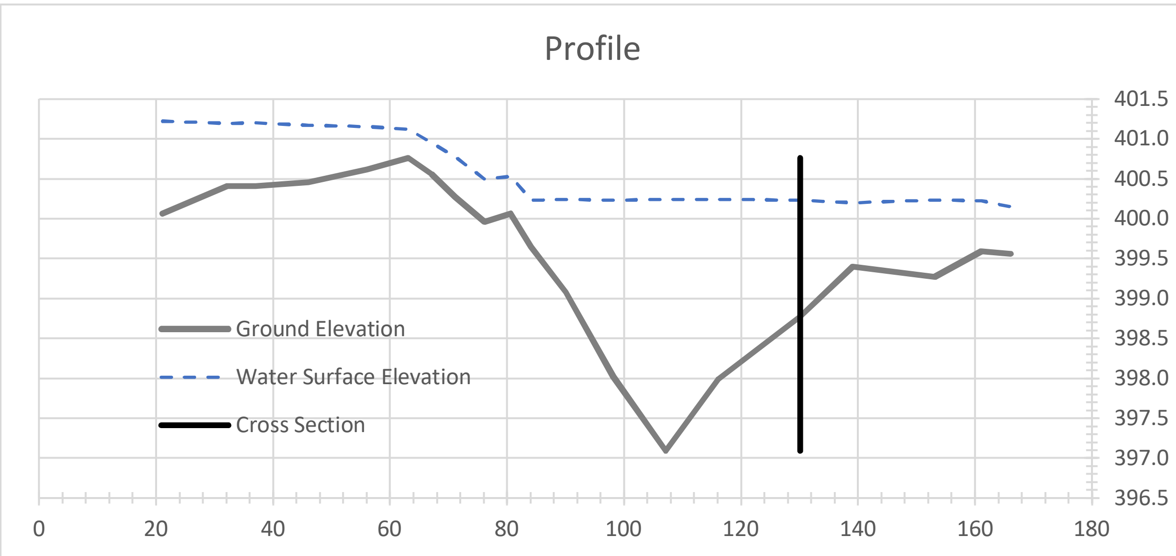
Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 4 - Cross Section Monitoring
Date: 1/31/2018



Benchmark Elevation: 406.01 RPIN
Height of Instrument: 410.91

	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	0.00	5.42	-2.90	405.49	
2	4.00	5.72	1.10	405.19	
3	4.00	5.46	1.10	405.45	LPIN
4	9.70	6.85	6.80	404.06	
5	12.30	7.52	9.40	403.39	
6	14.60	7.74	11.70	403.17	
7	19.00	7.32	16.10	403.59	
8	27.70	8.36	24.80	402.55	
9	32.70	8.69	29.80	402.22	
10	36.10	9.66	33.20	401.25	
11	40.50	10.19	37.60	400.72	
12	43.90	10.59	41.00	400.32	LEW
13	46.00	11.13	43.10	399.78	
14	49.70	11.57	46.80	399.34	
15	51.40	12.13	48.50	398.78	
16	53.70	12.23	50.80	398.68	
17	55.50	10.76	52.60	400.15	REW
18	57.00	5.30	54.10	405.61	
19	63.00	5.36	60.10	405.55	
20	69.00	5.15	66.10	405.76	
21	69.00	4.90	66.10	406.01	RPIN

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 4 - Profile Monitoring
Date: 1/31/2018



Benchmark Elevation	406.01
Rod Height at BM	4.9
HI from Benchmark Elev.	410.91

Cross Section Station	109		Slope:	#N/A		
XS Station Adjustment	21.1			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	130.1	130.10	Start Sta.	0.00	21.1	401.22
	397.09	400.76	End Sta.	178.00	#N/A	#N/A

	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	10.85	1.16	Depth	21.10	400.06	401.22	
2	11.00	10.50	0.78	Depth	32.10	400.41	401.19	
3	16.00	10.50	0.79	Depth	37.10	400.41	401.20	
4	25.00	10.45	0.71	Depth	46.10	400.46	401.17	
5	35.00	10.29	0.53	Depth	56.10	400.62	401.15	
6	42.00	10.15	0.36	Depth	63.10	400.76	401.12	
7	46.00	10.35	9.96	Surface	67.10	400.56	400.95	
8	50.00	10.64	10.13	Surface	71.10	400.27	400.78	
9	55.00	10.95	10.41	Surface	76.10	399.96	400.50	
10	59.50	10.85	10.38	Surface	80.60	400.06	400.53	
11	63.00	11.26	0.58	Depth	84.10	399.65	400.23	

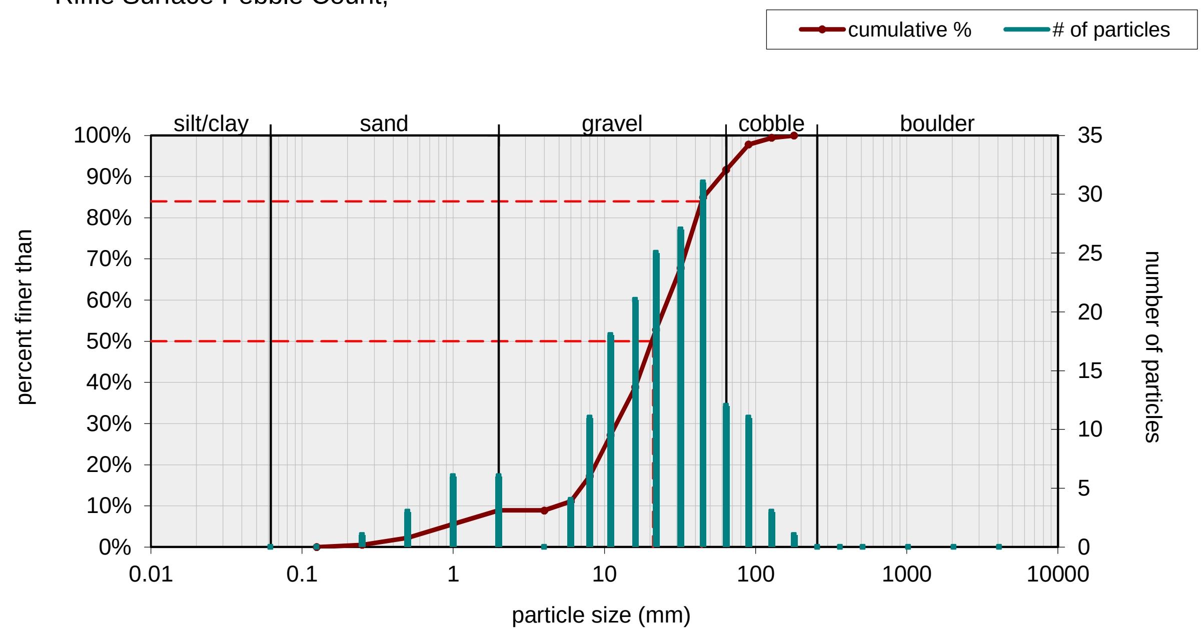
12	69.00	11.83	1.16	Depth	90.10	399.08	400.24	
13	77.00	12.89	2.21	Depth	98.10	398.02	400.23	
14	86.00	13.82	3.15	Depth	107.10	397.09	400.24	
15	95.00	12.92	2.25	Depth	116.10	397.99	400.24	
16	109.00	12.14	1.46	Depth	130.10	398.77	400.23	
17	118.00	11.51	0.80	Depth	139.10	399.40	400.20	
18	132.00	11.64	0.96	Depth	153.10	399.27	400.23	
19	140.00	11.32	0.63	Depth	161.10	399.59	400.22	
20	145.00	11.35	10.76	Surface	166.10	399.56	400.15	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	1
medium sand	0.25 - 0.5	3
coarse sand	0.5 - 1	6
very coarse sand	1 - 2	6
very fine gravel	2 - 4	0
fine gravel	4 - 6	4
fine gravel	6 - 8	11
medium gravel	8 - 11	18
medium gravel	11 - 16	21
coarse gravel	16 - 22	25
coarse gravel	22 - 32	27
very coarse gravel	32 - 45	31
very coarse gravel	45 - 64	12
small cobble	64 - 90	11
medium cobble	90 - 128	3
large cobble	128 - 180	1
very large cobble	180 - 256	0
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
	total particle count:	180
bedrock	---------------------	
clay hardpan	---------------------	
detritus/wood	---------------------	
artificial	---------------------	
	total count:	180

Note: Site P-4 January 2018 RK&K

Riffle Surface Pebble Count, ---

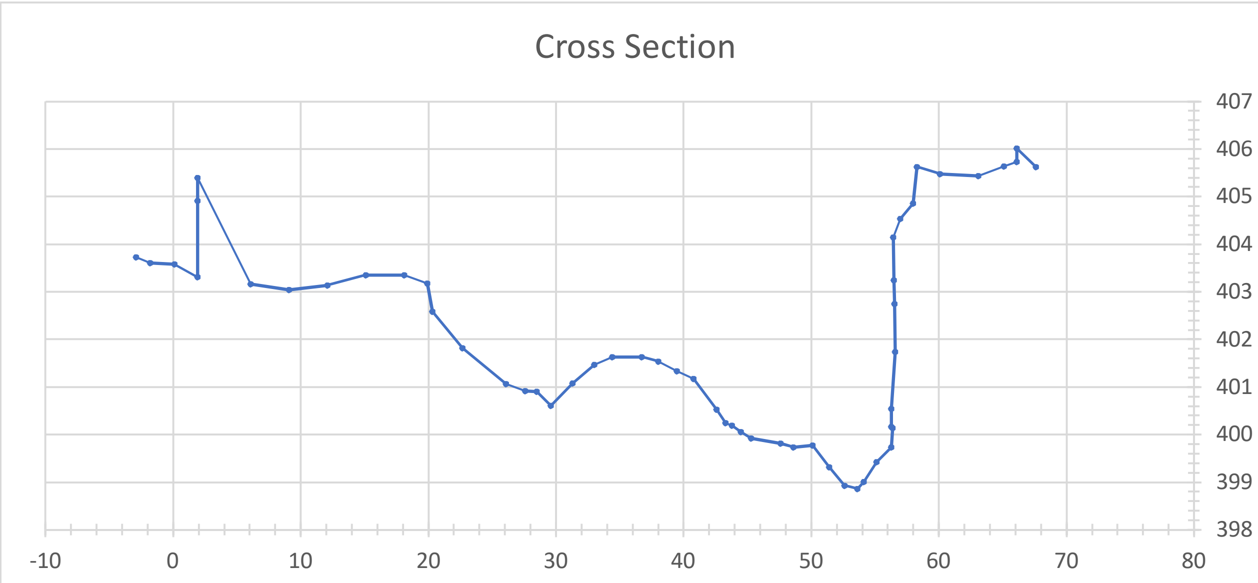


Size (mm)		
D16	7.6	3.4
D35	14	12
D50	21	17
D65	30	20
D84	44	29
D95	77	39

Size Distribution	
mean	18.3
dispersion	2.4
skewness	-0.07

Type	
silt/clay	0%
sand	9%
gravel	83%
cobble	8%
boulder	0%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 4 - Cross Section Monitoring
Date: 7/27/2018

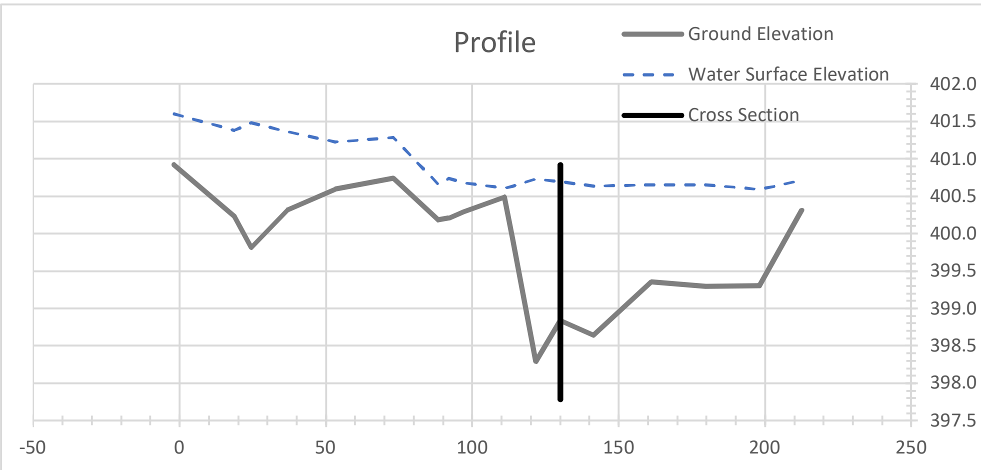


Benchmark Elevation: 406.01 RPIN
Height of Instrument: 411.49

Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Section Comparison Data Station (ft)	Elevation (ft)	Notes
1	0	7.76	-2.9	403.73	
2	1.1	7.88	-1.8	403.61	
3	3	7.91	0.1	403.58	
4	4.8	8.18	1.9	403.31	LPIN @ ground
5	4.8	6.58	1.9	404.91	LPIN Top (bent)
6	4.8	6.09	1.9	405.4	LPIN
7	9	8.33	6.1	403.16	
8	12	8.45	9.1	403.04	
9	15	8.36	12.1	403.13	
10	18	8.14	15.1	403.35	
11	21	8.14	18.1	403.35	
12	22.8	8.32	19.9	403.17	LTOB
13	23.2	8.9	20.3	402.59	
14	25.6	9.67	22.7	401.82	Start of deposition
15	29	10.42	26.1	401.07	
16	30.5	10.57	27.6	400.92	
17	31.4	10.59	28.5	400.9	

18	32.5	10.88	29.6	400.61	EOW in bottom of depression
19	34.2	10.41	31.3	401.08	on sand
20	35.9	10.02	33	401.47	Top of sand bar
21	37.3	9.86	34.4	401.63	Top of sand bar
22	39.6	9.86	36.7	401.63	Top of sand bar
23	40.9	9.95	38	401.54	
24	42.4	10.16	39.5	401.33	
25	43.7	10.32	40.8	401.17	
26	45.5	10.97	42.6	400.52	LEW
27	46.2	11.24	43.3	400.25	
28	46.7	11.3	43.8	400.19	
29	47.4	11.43	44.5	400.06	
30	48.2	11.57	45.3	399.92	
31	50.5	11.68	47.6	399.81	
32	51.5	11.75	48.6	399.74	
33	53	11.71	50.1	399.78	
34	54.3	12.18	51.4	399.31	
35	55.5	12.57	52.6	398.92	
36	56.5	12.63	53.6	398.86	TH
37	57	12.48	54.1	399.01	
38	58	12.07	55.1	399.42	
39	59.2	11.75	56.3	399.74	Bottom of bank
40	59.3	11.35	56.4	400.14	
41	59.2	11.32	56.3	400.17	
42	59.2	10.95	56.3	400.54	REW
43	59.5	9.75	56.6	401.74	
44	59.45	8.75	56.55	402.74	
45	59.4	8.25	56.5	403.24	
46	59.33	7.35	56.43	404.14	
47	59.9	6.96	57	404.53	
48	60.9	6.64	58	404.85	
49	61.2	5.87	58.3	405.62	
50	63	6.02	60.1	405.47	
51	66	6.05	63.1	405.44	
52	68	5.85	65.1	405.64	
53	69	5.76	66.1	405.73	
54	69	5.48	66.1	406.01	
55	70.5	5.87	67.6	405.62	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 4 - Profile Monitoring
Date: 7/27/2018



Benchmark Elevation	406.01
Rod Height at BM	5.48
HI from Benchmark Elev.	411.49

Cross Section Station	132		Slope:	0.0041			
XS Station Adjustment	-1.9				Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	130.1	130.10	Start Sta.	0.00	-1.9	401.6	
	397.78	400.92	End Sta.	307.10	305.2	400.35	

	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	10.57	9.89	Surface	-1.90	400.92	401.60	
2	20.60	11.27	10.11	Surface	18.70	400.22	401.38	
3	26.40	11.68	10.01	Surface	24.50	399.81	401.48	
4	38.80	11.17	10.13	Surface	36.90	400.32	401.36	
5	55.00	10.90	10.27	Surface	53.10	400.59	401.22	
6	75.00	10.75	10.21	Surface	73.10	400.74	401.28	
7	90.30	11.31	10.83	Surface	88.40	400.18	400.66	
8	94.00	11.28	10.75	Surface	92.10	400.21	400.74	
9	98.90	11.20	10.81	Surface	97.00	400.29	400.68	
10	113.00	11.00	10.88	Surface	111.10	400.49	400.61	
11	115.70	11.57	10.86	Surface	113.80	399.92	400.63	
12	123.60	13.20	2.44	Depth	121.70	398.29	400.73	
13	132.00	12.65	1.85	Depth	130.10	398.84	400.69	
14	143.30	12.85	1.99	Depth	141.40	398.64	400.63	
15	163.00	12.14	1.30	Depth	161.10	399.35	400.65	
16	181.70	12.20	1.36	Depth	179.80	399.29	400.65	
17	200.00	12.19	1.29	Depth	198.10	399.30	400.59	
18	214.50	11.18	0.40	Depth	212.60	400.31	400.71	
19	235.00	12.36	11.23	Surface	233.10	399.13	400.26	
20	267.80	13.35	2.21	Depth	265.90	398.14	400.35	
21	300.00	13.20	1.73	Depth	298.10	398.29	400.02	
22	307.10	13.71	2.57	Depth	305.20	397.78	400.35	

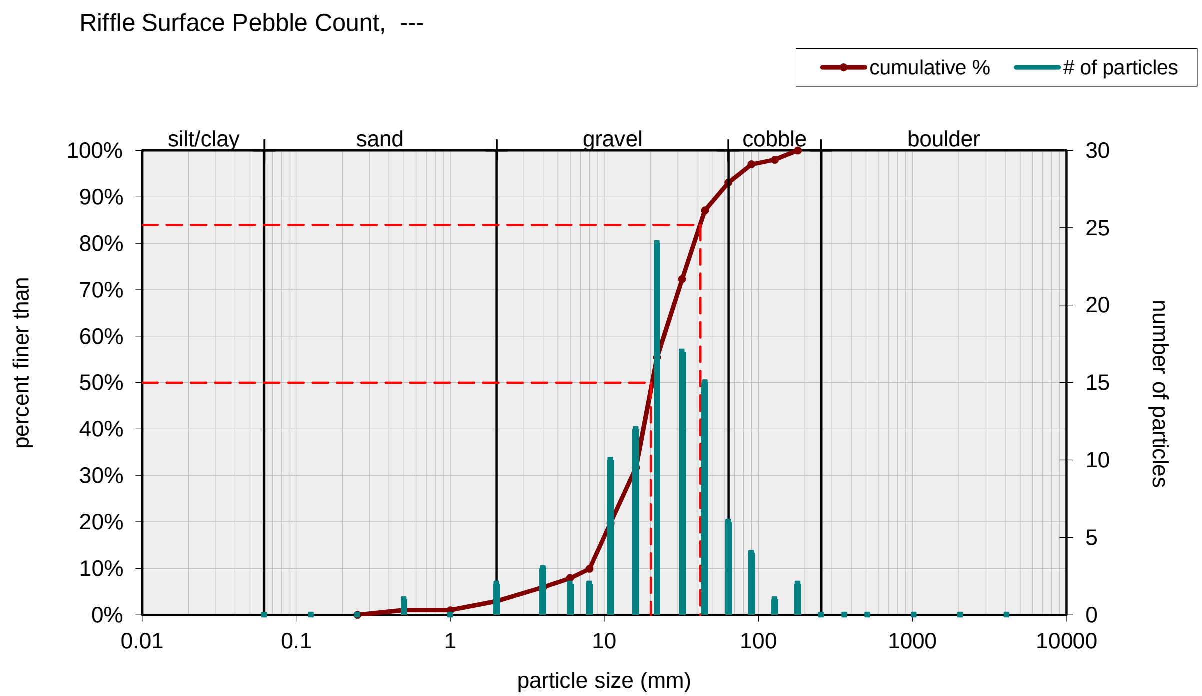
1) Individual Pebble Count

Two individual samples may be entered below. Select sample type for each.

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	1
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	2
very fine gravel	2 - 4	3
fine gravel	4 - 6	2
fine gravel	6 - 8	2
medium gravel	8 - 11	10
medium gravel	11 - 16	12
coarse gravel	16 - 22	24
coarse gravel	22 - 32	17
very coarse gravel	32 - 45	15
very coarse gravel	45 - 64	6
small cobble	64 - 90	4
medium cobble	90 - 128	1
large cobble	128 - 180	2
very large cobble	180 - 256	0
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		101
bedrock	-------------	
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		101

Note: Site P-4 July 2018 WSP



Size (mm)	
D16	9.7
D35	17
D50	20
D65	27
D84	42
D95	76

Size Distribution	
mean	20.2
dispersion	2.1
skewness	0.00

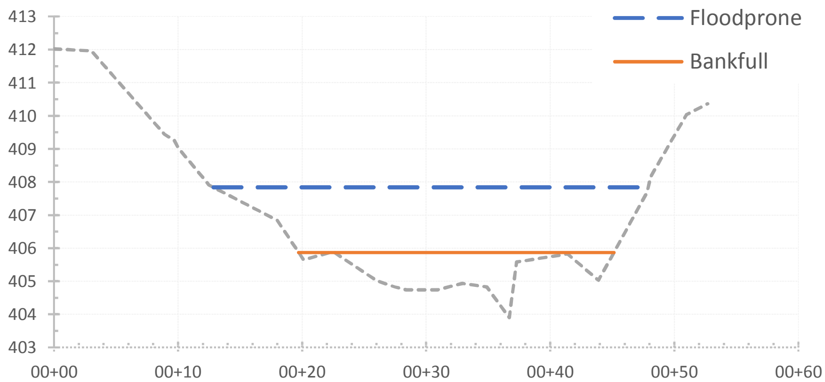
Type	
silt/clay	0%
sand	3%
gravel	90%
cobble	7%
boulder	0%

Project: **Little Catoctin Creek**
Project Number: **11102.48**
Site Name/Number: **P-5**

Date: 9/19/2017 (collected)

ver. 1.0

Cross Section



		Rogen Classification
BF Width:	25.15 ft	
BF Max Depth:	1.97 ft	
BF Area:	15.31 ft²	
BF R_h:	0.56 ft	
BF WP:	27.15 ft	
BF W/D Ratio:	12.77	B, C, F
FP Width:	35.04 ft	
Entrenchment:	1.39	A, F, G
Slope:	0.99%	D, C, E, F
Sinuosity:	1.20	A
Manning's n:	0.032	
BF Discharge:	48.55 ft³/s	
BF Velocity:	3.17 ft/s	
BF Boundary Shear Stress:	0.350 lbs/ft²	
Critical Shear Stress:	0.100 lbs/ft²	
Most Probable Classification ➔	F	

Is Benchmark in XS Data?	Yes	
	↓Use This ↓	
Benchmark Elev:	409.26	100.00
Station for Benchmark:	00+09.7	
RH at Benchmark:	8.61	6.20
Bankfull RH/Elevation:	12.00	405.87
Floodprone RH/Elevation:		407.84

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
					27.15	15.31	25.15	35.04
1	00+00.0	5.85		412.02	0.00	0.00	0.00	0.00
2	00+03.0	5.91		411.96	0.00	0.00	0.00	0.00
3	00+08.9	8.42		409.45	0.00	0.00	0.00	0.00
4	00+09.7	8.61	LPIN	409.26	0.00	0.00	0.00	0.00
5	00+10.0	8.83		409.04	0.00	0.00	0.00	0.00
6	00+12.5	9.96		407.91	0.00	0.00	0.00	0.00
7	00+18.0	11.03		406.84	0.00	0.00	0.00	5.14
8	00+20.1	12.22		405.65	0.45	0.04	0.39	2.10
9	00+22.5	11.98		405.89	2.21	0.24	2.20	2.40
10	00+26.0	12.85	EOW	405.02	3.52	1.45	3.42	3.50
11	00+27.5	13.04		404.83	1.51	1.42	1.50	1.50
12	00+28.4	13.13		404.74	0.90	0.98	0.90	0.90
13	00+30.9	13.13		404.74	2.50	1.41	2.50	2.50
14	00+32.9	12.94		404.93	2.01	2.07	2.00	2.00
15	00+34.9	13.04		404.83	2.00	1.98	2.00	2.00
16	00+36.7	13.97	EOW	403.90	2.03	2.71	1.80	1.80

Pnt Num	Station (ft)	Rod Height (ft)	Notes	Adj. Elev (ft)	BF Wetted Perimeter (ft)	BF Area (ft²)	BF Top Width (ft)	FP Top Width (ft)
17	00+37.3	12.29		405.58	1.78	0.68	0.60	0.60
18	00+41.4	12.05		405.82	4.11	0.70	4.10	4.10
19	00+43.9	12.84		405.03	2.62	1.11	2.50	2.50
20	00+47.8	10.20		407.67	1.50	0.52	1.24	3.90
21	00+48.1	9.71	RPIN	408.16	0.00	0.00	0.00	0.10
22	00+51.0	7.83		410.04	0.00	0.00	0.00	0.00
23	00+52.7	7.50		410.37	0.00	0.00	0.00	0.00
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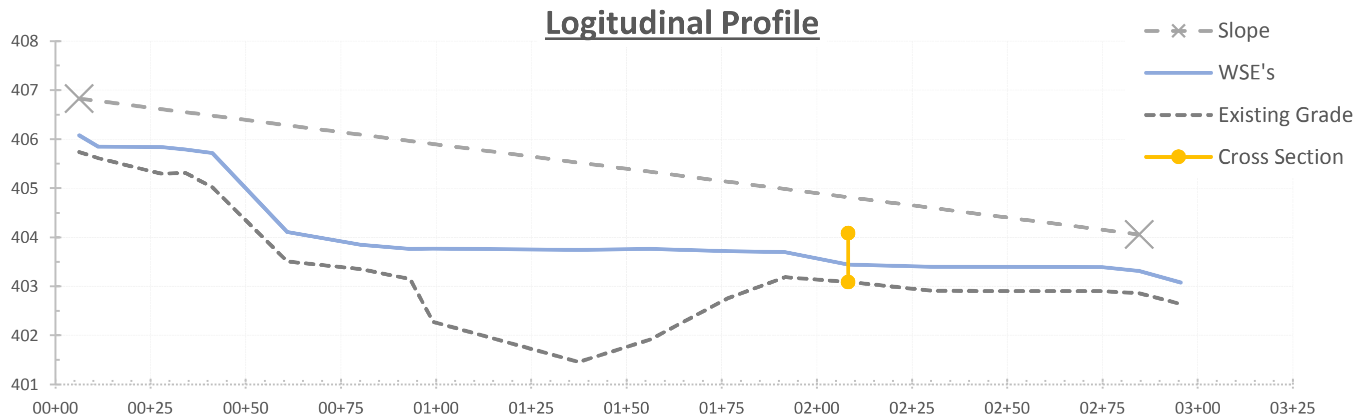
Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-5

Date: 9/19/2017 (collected)



					WSE
Benchmark Elev:	403.90		Starting Station	00+06.2	406.08
Benchmark RH:	6.05		Ending Station	02+84.6	403.31
Cross Section Location:	02+08.2	El: 403.09	Slope	0.995%	
	02+08.2	404.09			

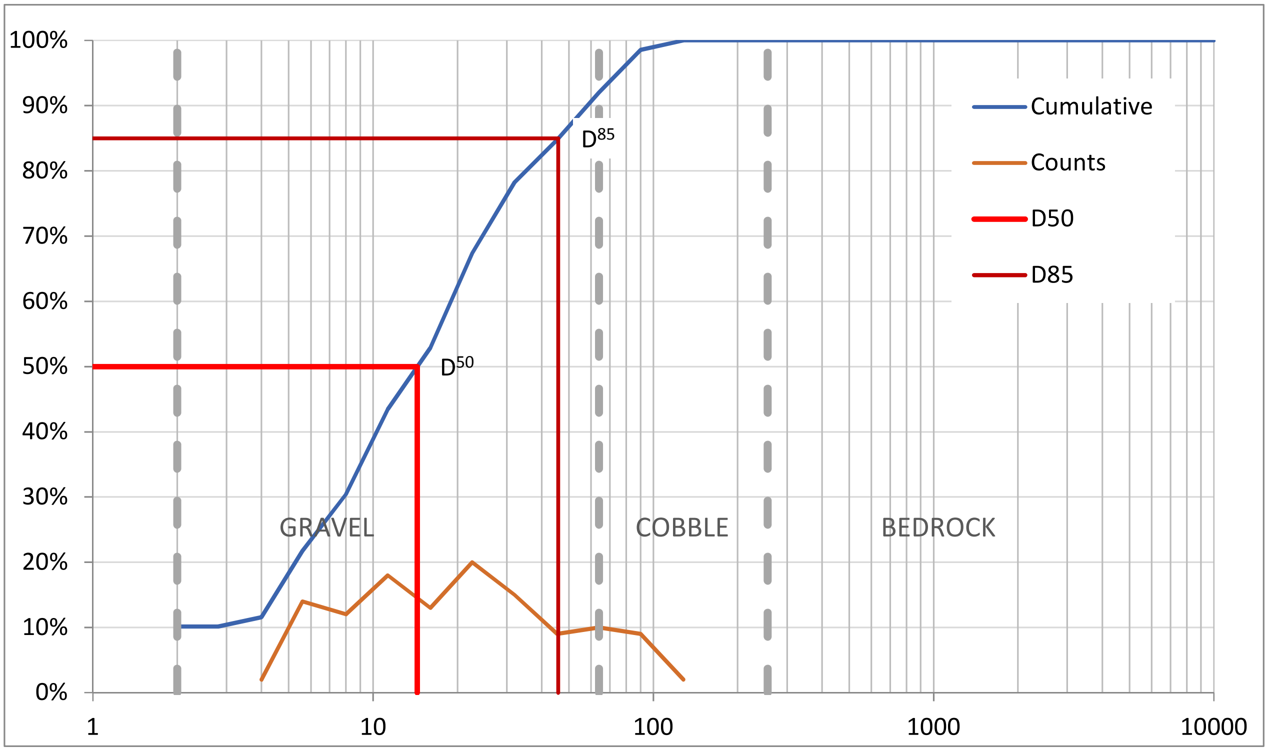
Pnt Num	Station (ft)	Rod Height (ft)	Adj. Elev (ft)	Water Depth (ft)	Adj. WS Elev (ft)
1	00+06.2	4.21	405.74	0.34	406.08
2	00+11.3	4.34	405.61	0.24	405.85
3	00+27.6	4.65	405.30	0.54	405.84
4	00+34.2	4.64	405.31	0.48	405.79
5	00+41.2	4.93	405.02	0.70	405.72
6	00+60.9	6.44	403.51	0.60	404.11
7	00+80.2	6.60	403.35	0.50	403.85
8	00+93.1	6.80	403.15	0.61	403.76
9	00+99.2	7.67	402.28	1.49	403.77
10	01+37.4	8.49	401.46	2.28	403.74
11	01+56.2	8.03	401.92	1.84	403.76
12	01+76.6	7.19	402.76	0.96	403.72
13	01+91.6	6.76	403.19	0.51	403.70
14	02+08.2	6.86	403.09	0.35	403.44
15	02+30.7	7.04	402.91	0.49	403.40
16	02+74.9	7.05	402.90	0.49	403.39
17	02+84.6	7.09	402.86	0.45	403.31
18	02+95.5	7.31	402.64	0.44	403.08
19					
20					

Project: Little Catoctin Creek
Project Number: 11102.48
Site Name/Number: P-5

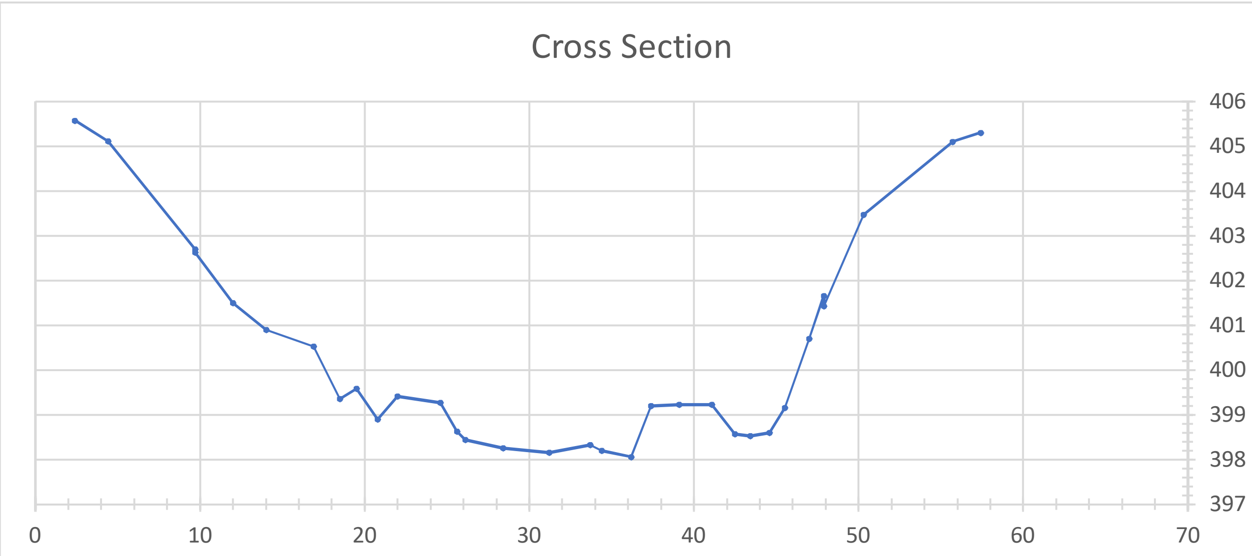
Date: 9/19/2017 (collected)

	Class Name	Particle Size Class (mm)		Study Total	Study by Size %	Study Cumulative %
	Silt/Clay	Consolidated < D ≤ 0.063			0.0	0.0
		Unconsolidate < D ≤ 0.063			0.0	0.0
	Sand	0.063 < D ≤ 2	2	25	11.4	11.4
Gravel	VF Gravel	2 < D ≤ 2.8	2.8	17	7.8	19.2
		2.8 < D ≤ 4	4	20	9.1	28.3
	Fine Gravel	4 < D ≤ 5.6	5.6	17	7.8	36.1
		5.6 < D ≤ 8	8	23	10.5	46.6
	Med. Gravel	8 < D ≤ 11.2	11.3	21	9.6	56.2
		11.2 < D ≤ 16	16	33	15.1	71.2
	Coarse Gravel	16 < D ≤ 22.4	22.6	20	9.1	80.4
		22.4 < D ≤ 31.5	32	15	6.8	87.2
	VC Gravel	31.5 < D ≤ 45	45.3	9	4.1	91.3
		45 < D ≤ 63	64	14	6.4	97.7
Cobble	Sm. Cobble	63 < D ≤ 90	90	4	1.8	99.5
		90 < D ≤ 128	128	1	0.5	100.0
	Lg. Cobble	128 < D ≤ 180	180		0.0	100.0
		180 < D ≤ 256	256		0.0	100.0
Boulder	Sm. Boulder	256 < D ≤ 362	362		0.0	100.0
		362 < D ≤ 512	512		0.0	100.0
	Med. Boulder	512 < D ≤ 724	724		0.0	100.0
		724 < D ≤ 1024	1024		0.0	100.0
	Lg. Boulder	1024 < D ≤ 1450	1450		0.0	100.0
		1450 < D ≤ 2048	2048		0.0	100.0
	VL Boulder	2048 < D ≤ 2900	2900		0.0	100.0
		2900 < D ≤ 4096	4096		0.0	100.0
	Bedrock	> 10000	10000		0.0	100.0
			Totals	219		

D^{16} =	2.4 mm	16	**Andrews 1994**		
D^{35} =	5.3 mm	35	Tc* =	0.00271	
D^{50} =	9.1 mm	50	Tc =	0.100 lb/ft²	(Boundary Shear from Shields)
D^{65} =	13.9 mm	65	d =	0.0824 ft	
D^{85} =	28.6 mm	85	S =	3.20%	
D^{95} =	55.3 mm	95			
D^{i} =	180.0 mm				



Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 5 - Cross Section Monitoring
Date: 4/23/2018

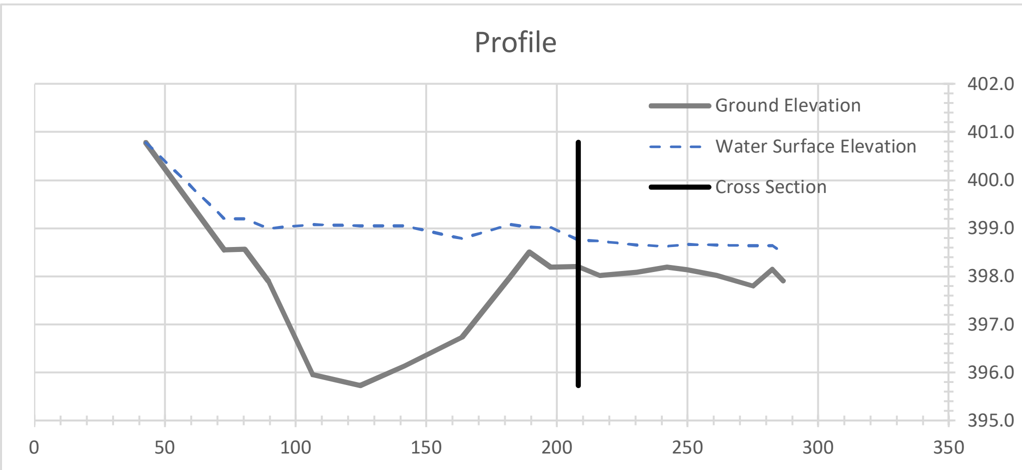


Benchmark Elevation: 402.70 LPIN
Height of Instrument: 411.16

	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	1.00	5.59	2.40	405.57	
2	3.00	6.05	4.40	405.11	
3	8.30	8.46	9.70	402.70	LPIN
4	8.30	8.54	9.70	402.62	LPIN gnd
5	10.60	9.67	12.00	401.49	
6	12.60	10.27	14.00	400.89	
7	15.50	10.63	16.90	400.53	
8	17.10	11.81	18.50	399.35	
9	18.10	11.58	19.50	399.58	
10	19.40	12.27	20.80	398.89	
11	20.60	11.75	22.00	399.41	
12	23.20	11.89	24.60	399.27	
13	24.20	12.53	25.60	398.63	LEW
14	24.70	12.72	26.10	398.44	
15	27.00	12.90	28.40	398.26	
16	29.80	13.00	31.20	398.16	
17	32.30	12.83	33.70	398.33	

18	33.00	12.97	34.40	398.19	
19	34.80	13.10	36.20	398.06	REW
20	36.00	11.96	37.40	399.20	
21	37.70	11.93	39.10	399.23	
22	39.70	11.93	41.10	399.23	
23	41.10	12.59	42.50	398.57	
24	42.00	12.64	43.40	398.52	
25	43.20	12.56	44.60	398.60	
26	44.10	12.00	45.50	399.16	
27	45.60	10.46	47.00	400.70	
28	46.50	9.51	47.90	401.65	RPIN
29	46.50	9.74	47.90	401.42	
30	48.90	7.70	50.30	403.46	
31	54.30	6.06	55.70	405.10	
32	56.00	5.86	57.40	405.30	

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 5 - Profile Monitoring
Date: 4/23/2018



Benchmark Elevation	402.7
Rod Height at BM	8.46
HI from Benchmark Elev.	411.16

Cross Section Station	165.6	Slope:	0.0094		
XS Station Adjustment	42.6		Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	208.2	Start Sta.	0.00	42.6	400.78
		End Sta.	244.00	286.6	398.49

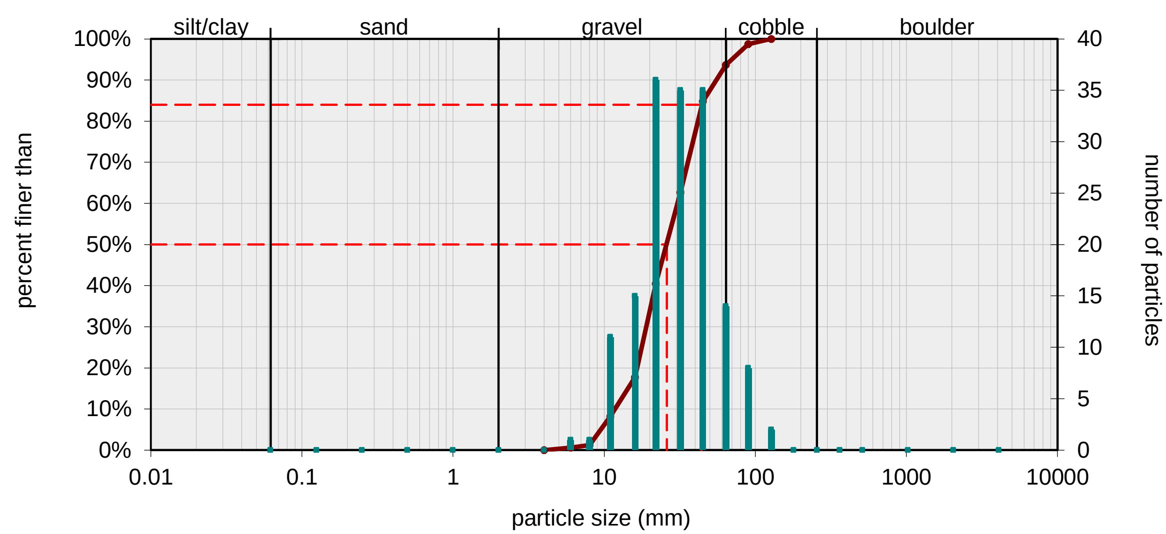
Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Water (ft)	Depth or Surface	Adjusted Station (ft)	Ground Elevation (ft)	Water Surface Elevation	Notes
	Survey Data				Profile Comparison Data			
1	0.00	10.38	0.00	Depth	42.60	400.78	400.78	No WSEL
2	30.00	12.61	0.65	Depth	72.60	398.55	399.20	
3	38.00	12.60	0.63	Depth	80.60	398.56	399.19	
4	47.00	13.27	1.10	Depth	89.60	397.89	398.99	
5	64.00	15.21	3.12	Depth	106.60	395.95	399.07	
6	82.00	15.43	3.32	Depth	124.60	395.73	399.05	
7	99.00	15.02	2.91	Depth	141.60	396.14	399.05	
8	121.00	14.42	2.04	Depth	163.60	396.74	398.78	
9	139.50	13.17	1.08	Depth	182.10	397.99	399.07	
10	146.80	12.66	0.52	Depth	189.40	398.50	399.02	
11	155.00	12.98	0.83	Depth	197.60	398.18	399.01	
12	165.60	12.96	0.56	Depth	208.20	398.20	398.76	XS-5
13	174.00	13.15	0.72	Depth	216.60	398.01	398.73	
14	188.00	13.08	0.57	Depth	230.60	398.08	398.65	
15	199.50	12.98	0.45	Depth	242.10	398.18	398.63	
16	207.00	13.03	0.53	Depth	249.60	398.13	398.66	
17	218.50	13.15	0.64	Depth	261.10	398.01	398.65	
18	232.50	13.36	0.84	Depth	275.10	397.80	398.64	
19	240.00	13.02	0.50	Depth	282.60	398.14	398.64	
20	244.00	13.25	0.58	Depth	286.60	397.91	398.49	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	0
very coarse sand	1 - 2	0
very fine gravel	2 - 4	0
fine gravel	4 - 6	1
fine gravel	6 - 8	1
medium gravel	8 - 11	11
medium gravel	11 - 16	15
coarse gravel	16 - 22	36
coarse gravel	22 - 32	35
very coarse gravel	32 - 45	35
very coarse gravel	45 - 64	14
small cobble	64 - 90	8
medium cobble	90 - 128	2
large cobble	128 - 180	0
very large cobble	180 - 256	0
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		158
bedrock	---------------------	
clay hardpan	---------------------	
detritus/wood	---------------------	
artificial	---------------------	
total count:		158

Note: Site P-5 April 2018 RK&K

Riffle Surface Pebble Count, ---

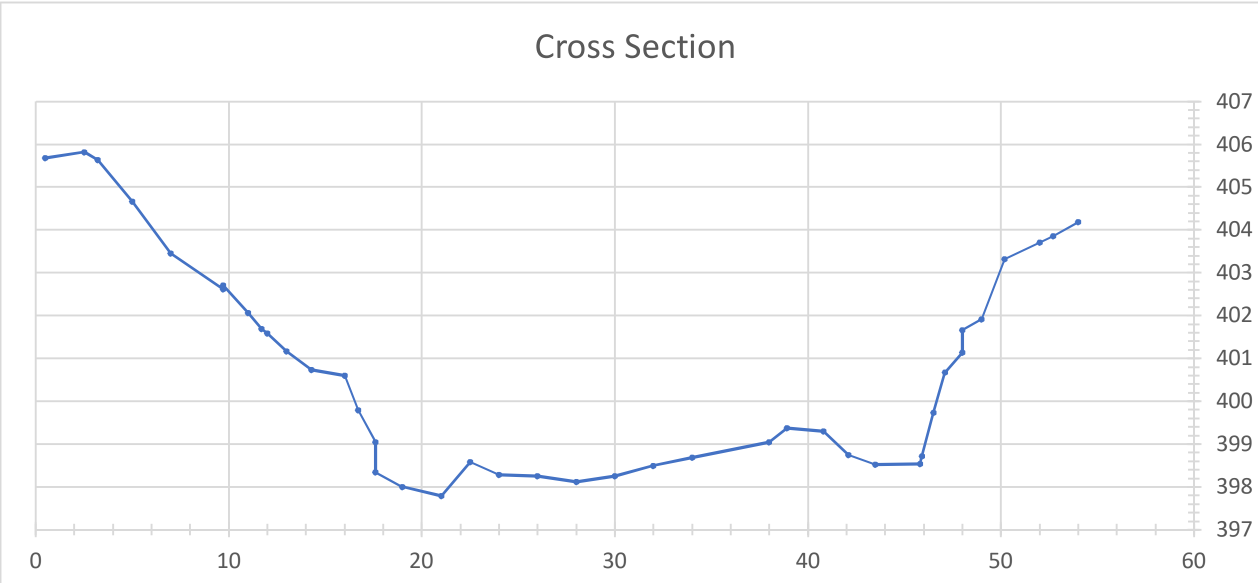


Size (mm)			
D16	15	3.4	
D35	20	12	
D50	26	17	
D65	33	20	
D84	44	29	
D95	70	39	

Size Distribution	
mean	25.7
dispersion	1.7
skewness	-0.01

Type	
silt/clay	0%
sand	0%
gravel	94%
cobble	6%
boulder	0%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 5 - Cross Section Monitoring
Date: 8/7/2018

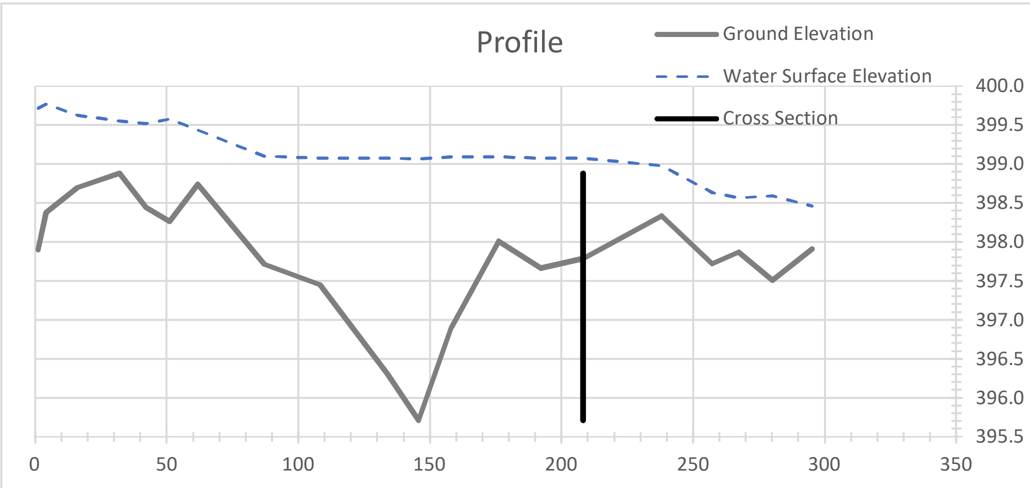


Benchmark Elevation: 402.70 LPIN
Height of Instrument: 408.39

	Survey Data		Section Comparison Data		
Pnt Num	Survey Data Station	Survey Rod Height	Station	Elevation	Notes
	(ft)	(ft)	(ft)	(ft)	
1	0.5	2.71	0.5	405.68	
2	2.5	2.57	2.5	405.82	
3	3.2	2.76	3.2	405.63	LTOB
4	5	3.73	5	404.66	
5	7	4.93	7	403.46	
6	9.7	5.78	9.7	402.61	LPIN gnd
7	9.7	5.69	9.7	402.7	LPIN
8	11	6.33	11	402.06	
9	11.7	6.7	11.7	401.69	
10	12	6.8	12	401.59	
11	13	7.22	13	401.17	
12	14.3	7.65	14.3	400.74	
13	16	7.79	16	400.6	
14	16.7	8.6	16.7	399.79	
15	17.6	9.35	17.6	399.04	LEW
16	17.6	10.05	17.6	398.34	
17	19	10.39	19	398	

18	21	10.6	21	397.79	
19	22.5	9.81	22.5	398.58	
20	24	10.1	24	398.29	
21	26	10.13	26	398.26	
22	28	10.27	28	398.12	
23	30	10.13	30	398.26	
24	32	9.89	32	398.5	
25	34	9.7	34	398.69	
26	38	9.34	38	399.05	
27	38.9	9.01	38.9	399.38	
28	40.8	9.09	40.8	399.3	
29	42.1	9.65	42.1	398.74	
30	43.5	9.87	43.5	398.52	
31	45.8	9.85	45.8	398.54	
32	45.9	9.68	45.9	398.71	REW
33	46.5	8.65	46.5	399.74	
34	47.1	7.72	47.1	400.67	
35	48	7.26	48	401.13	RPIN gnd
36	48	6.73	48	401.66	RPIN
37	49	6.47	49	401.92	
38	50.2	5.07	50.2	403.32	RTOB
39	52	4.69	52	403.7	
40	52.7	4.54	52.7	403.85	
41	54	4.21	54	404.18	

Project:	Little Catoctin Creek Monitoring
Project Number:	BCS 2014-09H
Site:	Section 5 - Profile Monitoring
Date:	8/7/2018



Benchmark Elevation	402.7
Rod Height at BM	5.69
HI from Benchmark Elev.	408.39

Cross Section Station	208		Slope:	0.0042		
XS Station Adjustment	0.2			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	208.2	208.20	Start Sta.	61.50	61.7	399.44
	395.71	398.88	End Sta.	295.00	295.2	398.46

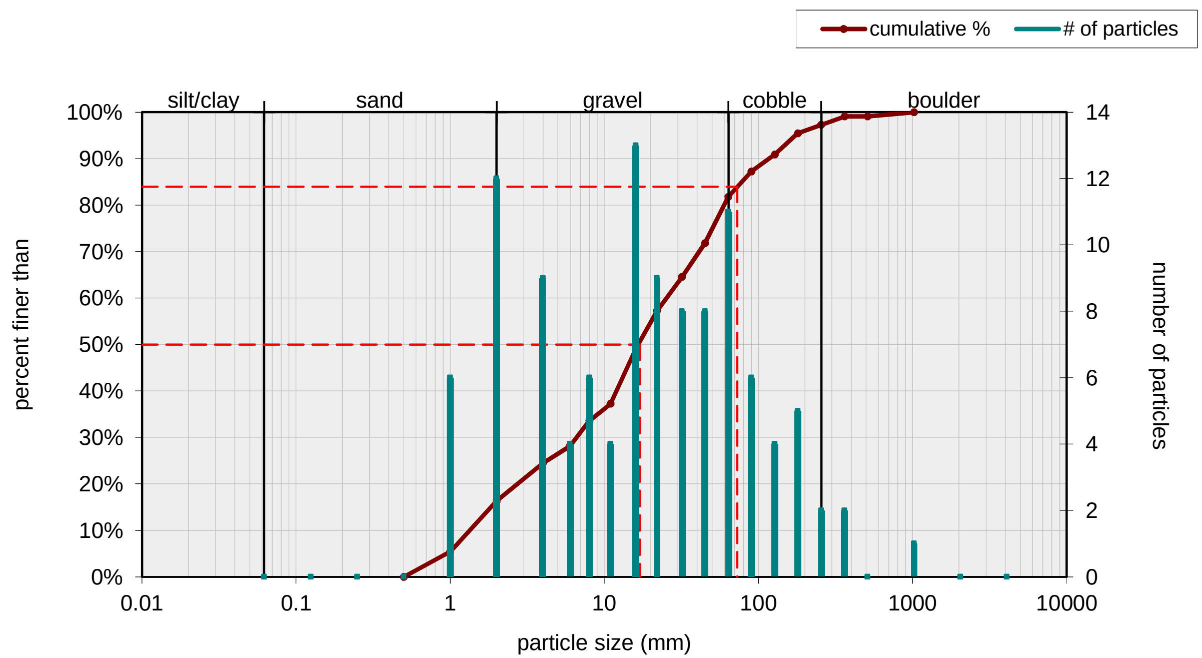
	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	1.00	10.49	1.82	Depth	1.20	397.90	399.72	P
2	4.00	10.01	1.39	Depth	4.20	398.38	399.77	G
3	16.00	9.69	0.93	Depth	16.20	398.70	399.63	R-start
4	32.00	9.51	8.84	Surface	32.20	398.88	399.55	R-end
5	42.00	9.95	1.08	Depth	42.20	398.44	399.52	P
6	50.80	10.13	1.32	Depth	51.00	398.26	399.58	Mpool
7	61.50	9.65	8.95	Surface	61.70	398.74	399.44	R-start
8	87.00	10.68	1.39	Depth	87.20	397.71	399.10	R-end
9	108.00	10.94	1.63	Depth	108.20	397.45	399.08	U-end
10	133.60	12.08	2.77	Depth	133.80	396.31	399.08	P
11	145.50	12.68	3.36	Depth	145.70	395.71	399.07	P
12	158.00	11.49	2.19	Depth	158.20	396.90	399.09	P
13	176.00	10.38	1.08	Depth	176.20	398.01	399.09	P
14	192.00	10.73	1.42	Depth	192.20	397.66	399.08	G
15	208.00	10.60	1.29	Depth	208.20	397.79	399.08	XS-5
16	238.00	10.05	9.41	Surface	238.20	398.34	398.98	R-start
17	257.00	10.67	0.91	Depth	257.20	397.72	398.63	R-end
18	267.00	10.52	9.82	Surface	267.20	397.87	398.57	micro p
19	280.00	10.88	1.08	Depth	280.20	397.51	398.59	R-start
20	295.00	10.48	9.93	Surface	295.20	397.91	398.46	R-mid

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	6
very coarse sand	1 - 2	12
very fine gravel	2 - 4	9
fine gravel	4 - 6	4
fine gravel	6 - 8	6
medium gravel	8 - 11	4
medium gravel	11 - 16	13
coarse gravel	16 - 22	9
coarse gravel	22 - 32	8
very coarse gravel	32 - 45	8
very coarse gravel	45 - 64	11
small cobble	64 - 90	6
medium cobble	90 - 128	4
large cobble	128 - 180	5
very large cobble	180 - 256	2
small boulder	256 - 362	2
small boulder	362 - 512	0
medium boulder	512 - 1024	1
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		110
bedrock	-------------	
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		110

Note: Site P-5 August 2018 WSP

Riffle Surface Pebble Count, ---

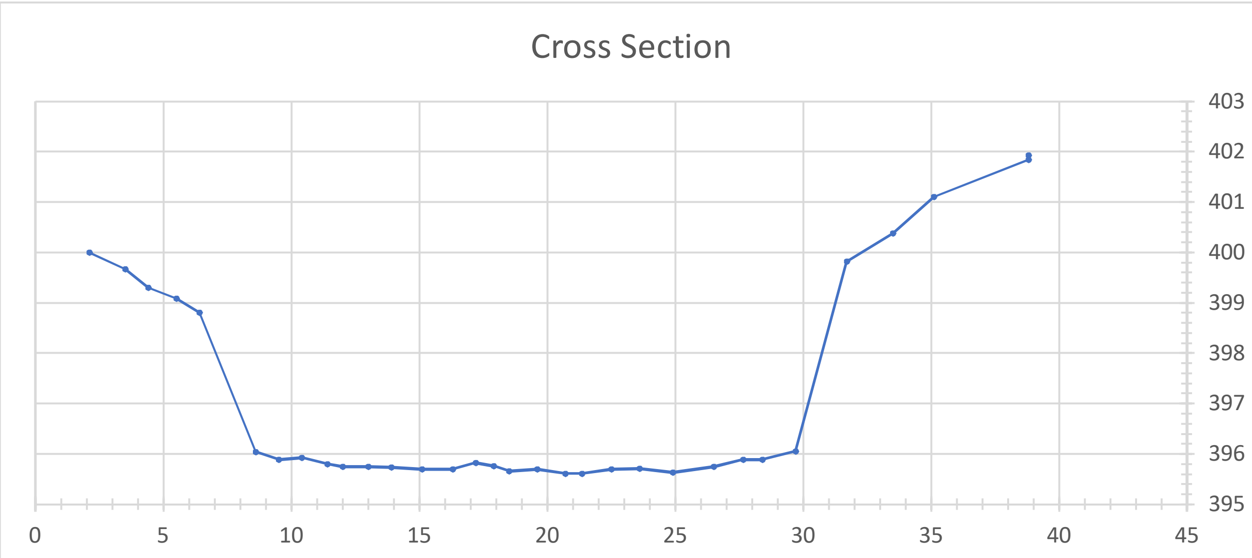


Size (mm)	
D16	2
D35	9
D50	17
D65	33
D84	73
D95	170

Size Distribution	
mean	12.1
dispersion	6.4
skewness	-0.12

Type	
silt/clay	0%
sand	16%
gravel	65%
cobble	15%
boulder	3%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 6 - Cross Section Monitoring
Date: 4/23/2018

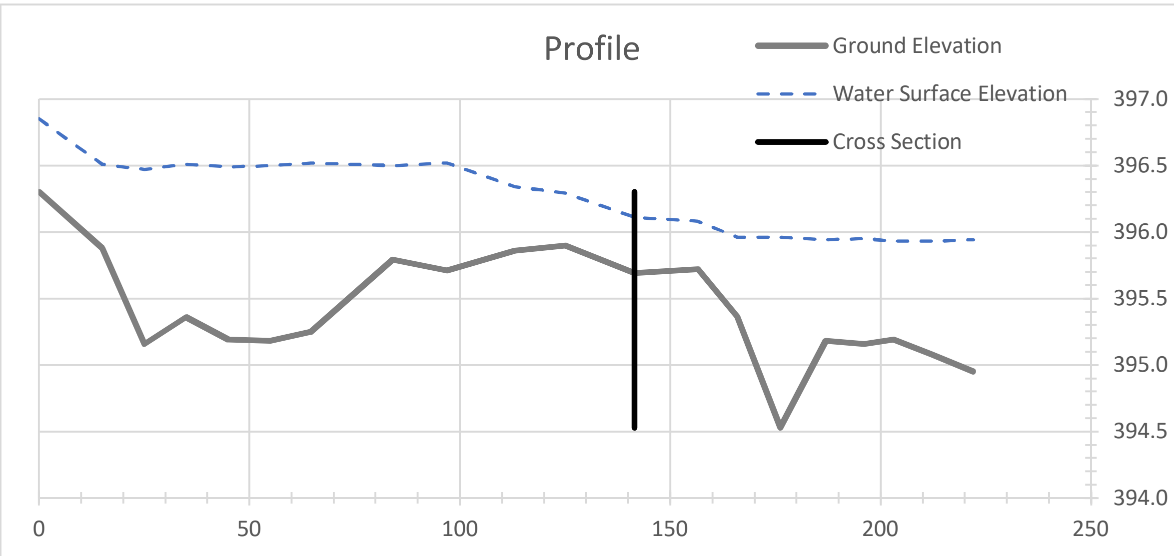


Benchmark Elevation: 400.00 LPIN
Height of Instrument: 405.04

Pnt Num	Survey Data: Survey Data Station (ft)	Survey Data: Survey Rod Height (ft)	Section Comparison Data: Station (ft)	Section Comparison Data: Elevation (ft)	Notes
1	2.10	5.04	2.10	400.00	LPIN
2	3.50	5.37	3.50	399.67	
3	4.40	5.74	4.40	399.30	
4	5.50	5.95	5.50	399.09	
5	6.40	6.24	6.40	398.80	
6	8.60	9.00	8.60	396.04	
7	9.50	9.15	9.50	395.89	
8	10.40	9.12	10.40	395.92	
9	11.40	9.24	11.40	395.80	
10	12.00	9.29	12.00	395.75	
11	13.00	9.29	13.00	395.75	
12	13.90	9.31	13.90	395.73	
13	15.10	9.34	15.10	395.70	
14	16.30	9.35	16.30	395.69	
15	17.20	9.22	17.20	395.82	
16	17.90	9.28	17.90	395.76	
17	18.50	9.38	18.50	395.66	

18	19.60	9.35	19.60	395.69	
19	20.70	9.43	20.70	395.61	
20	21.35	9.43	21.35	395.61	
21	22.50	9.34	22.50	395.70	
22	23.60	9.33	23.60	395.71	
23	24.90	9.41	24.90	395.63	
24	26.50	9.30	26.50	395.74	
25	27.65	9.16	27.65	395.88	
26	28.40	9.16	28.40	395.88	
27	29.70	8.99	29.70	396.05	
28	31.70	5.22	31.70	399.82	
29	33.50	4.66	33.50	400.38	
30	35.10	3.94	35.10	401.10	
31	38.80	3.20	38.80	401.84	
32	38.80	3.11	38.80	401.93	RPIN

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 6 - Profile Monitoring
Date: 4/23/2018



Benchmark Elevation	400					
Rod Height at BM	5.04					
HI from Benchmark Elev.	405.04					
Cross Section Station	141.5		Slope:	0.0045		
XS Station Adjustment	0			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	141.5	141.50	Start Sta.	97.00	97	396.52
	394.53	396.30	End Sta.	238.00	238	395.88

	Survey Data				Profile Comparison Data			
Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	8.74	0.55	Depth	0.00	396.30	396.85	
2	15.00	9.16	0.63	Depth	15.00	395.88	396.51	
3	25.00	9.88	1.31	Depth	25.00	395.16	396.47	
4	35.00	9.68	1.15	Depth	35.00	395.36	396.51	
5	45.00	9.85	1.30	Depth	45.00	395.19	396.49	
6	55.00	9.86	1.32	Depth	55.00	395.18	396.50	
7	64.50	9.79	1.27	Depth	64.50	395.25	396.52	
8	84.00	9.25	0.71	Depth	84.00	395.79	396.50	
9	97.00	9.33	0.81	Depth	97.00	395.71	396.52	
10	113.00	9.18	0.48	Depth	113.00	395.86	396.34	
11	125.00	9.14	0.39	Depth	125.00	395.90	396.29	XS-6

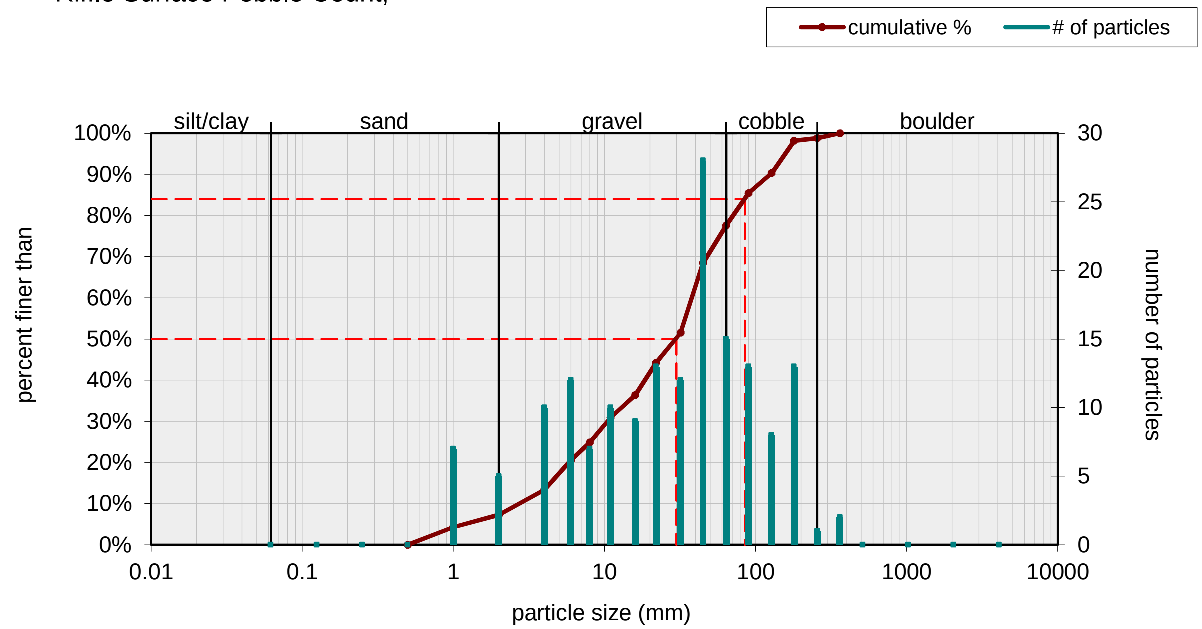
12	141.50	9.35	0.42	Depth	141.50	395.69	396.11	
13	156.50	9.32	0.36	Depth	156.50	395.72	396.08	
14	166.00	9.68	0.60	Depth	166.00	395.36	395.96	
15	176.10	10.51	1.43	Depth	176.10	394.53	395.96	
16	187.00	9.86	0.76	Depth	187.00	395.18	395.94	
17	196.00	9.88	0.79	Depth	196.00	395.16	395.95	
18	203.00	9.85	0.74	Depth	203.00	395.19	395.93	
19	212.00	9.96	0.85	Depth	212.00	395.08	395.93	
20	222.00	10.09	0.99	Depth	222.00	394.95	395.94	
21	229.00	9.88	0.76	Depth	229.00	395.16	395.92	
22	238.00	9.88	0.72	Depth	238.00	395.16	395.88	

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	0
very fine sand	0.062 - 0.125	0
fine sand	0.125 - 0.25	0
medium sand	0.25 - 0.5	0
coarse sand	0.5 - 1	7
very coarse sand	1 - 2	5
very fine gravel	2 - 4	10
fine gravel	4 - 6	12
fine gravel	6 - 8	7
medium gravel	8 - 11	10
medium gravel	11 - 16	9
coarse gravel	16 - 22	13
coarse gravel	22 - 32	12
very coarse gravel	32 - 45	28
very coarse gravel	45 - 64	15
small cobble	64 - 90	13
medium cobble	90 - 128	8
large cobble	128 - 180	13
very large cobble	180 - 256	1
small boulder	256 - 362	2
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		165
bedrock	---------------------	
clay hardpan	---------------------	
detritus/wood	---------------------	
artificial	---------------------	
total count:		165

Note: Site P-6 April 2018 RK&K

Riffle Surface Pebble Count, ---

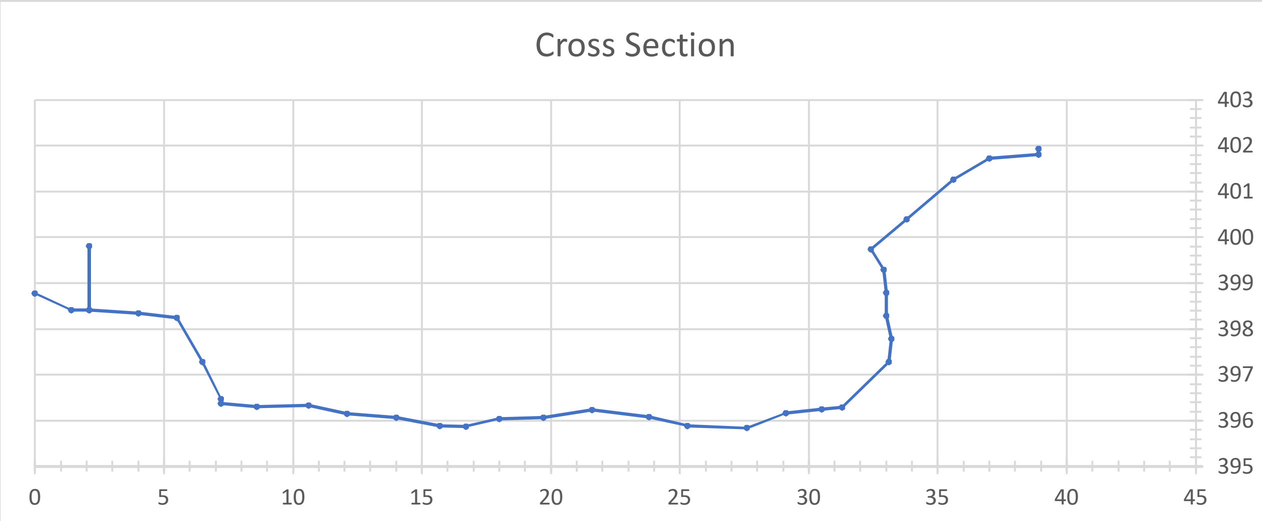


Size (mm)		
D16	4.6	3.4
D35	15	12
D50	30	17
D65	42	20
D84	85	29
D95	160	39

Size Distribution	
mean	19.8
dispersion	4.7
skewness	-0.16

Type	
silt/clay	0%
sand	7%
gravel	70%
cobble	21%
boulder	1%

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 6 - Cross Section Monitoring
Date: 8/9/2018

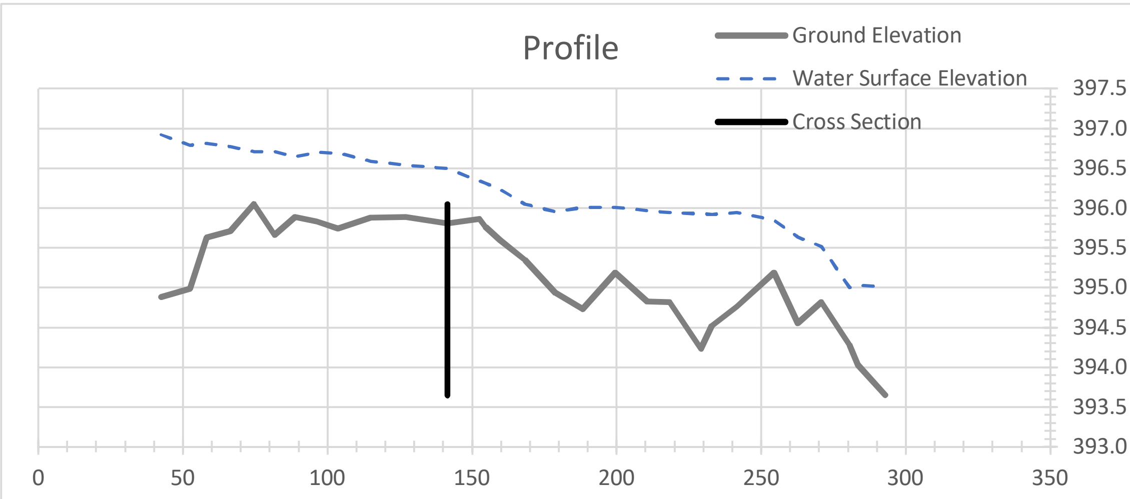


Benchmark Elevation: 401.93 RPIN
Height of Instrument: 404.18

Pnt Num	Survey Data Station (ft)	Survey Rod Height (ft)	Section Comparison Data Station (ft)	Elevation (ft)	Notes
1	0	5.4	0	398.78	
2	1.4	5.77	1.4	398.41	
3	2.1	5.76	2.1	398.42	
4	2.1	4.37	2.1	399.81	LPIN
5	2.1	5.76	2.1	398.42	Display Pt
6	4	5.84	4	398.34	
7	5.5	5.93	5.5	398.25	LTOB
8	6.5	6.89	6.5	397.29	
9	7.2	7.7	7.2	396.48	LEW
10	7.2	7.81	7.2	396.37	TOE
11	8.6	7.87	8.6	396.31	
12	10.6	7.84	10.6	396.34	
13	12.1	8.03	12.1	396.15	
14	14	8.11	14	396.07	
15	15.7	8.29	15.7	395.89	
16	16.7	8.3	16.7	395.88	Thalweg
17	18	8.14	18	396.04	
18	19.7	8.11	19.7	396.07	
19	21.6	7.94	21.6	396.24	Cobble/Gr. Dep
20	23.8	8.1	23.8	396.08	Cobble/Gr. Dep
21	25.3	8.29	25.3	395.89	
22	27.6	8.34	27.6	395.84	Down Tree
23	29.1	8.01	29.1	396.17	Down Tree

24	30.5	7.93	30.5	396.25	Toe
25	31.3	7.89	31.3	396.29	REW
26	33.1	6.89	33.1	397.29	U/C Bank
27	33.2	6.39	33.2	397.79	U/C Bank
28	33	5.89	33	398.29	U/C Bank
29	33	5.39	33	398.79	U/C Bank
30	32.9	4.89	32.9	399.29	RTOB
31	32.4	4.44	32.4	399.74	
32	33.8	3.78	33.8	400.4	
33	35.6	2.92	35.6	401.26	
34	37	2.46	37	401.72	
35	38.9	2.37	38.9	401.81	
36	38.9	2.25	38.9	401.93	RPIN

Project: Little Catoctin Creek Monitoring
Project Number: BCS 2014-09H
Site: Section 6 - Profile Monitoring
Date: 8/9/2018



Benchmark Elevation	401.93
Rod Height at BM	2.25
HI from Benchmark Elev.	404.18

Cross Section Station	99		Slope:	0.0048		
XS Station Adjustment	42.5			Survey Sta.	Adjust Sta.	WS Elev.
XS Crossing Processed	141.5	141.50	Start Sta.	32.10	74.6	396.71
	393.65	396.05	End Sta.	212.00	254.5	395.85

Survey Data

Profile Comparison Data

Pnt Num	*Survey Data Station (ft)*	*Survey Rod Height (ft)*	*Water (ft)*	*Depth or Surface*	*Adjusted Station (ft)*	*Ground Elevation (ft)*	*Water Surface Elevation*	*Notes*
1	0.00	9.30	2.04	Depth	42.50	394.88	396.92	Pool / Trib Conf
2	10.00	9.19	1.80	Depth	52.50	394.99	396.79	Pool / Trib Conf
3	15.80	8.55	1.18	Depth	58.30	395.63	396.81	
4	24.00	8.47	1.06	Depth	66.50	395.71	396.77	
5	32.10	8.13	0.66	Depth	74.60	396.05	396.71	Start Riffle
6	39.10	8.52	1.05	Depth	81.60	395.66	396.71	Mid Riffle
7	46.20	8.29	0.75	Depth	88.70	395.89	396.64	Riffle
8	53.80	8.35	0.87	Depth	96.30	395.83	396.70	
9	61.00	8.44	0.95	Depth	103.50	395.74	396.69	Mid Riffle
10	72.30	8.30	0.71	Depth	114.80	395.88	396.59	Mid Riffle
11	84.50	8.29	0.65	Depth	127.00	395.89	396.54	Mid Riffle
12	99.00	8.37	0.69	Depth	141.50	395.81	396.50	XS-6
13	110.00	8.32	0.48	Depth	152.50	395.86	396.34	Mid Run

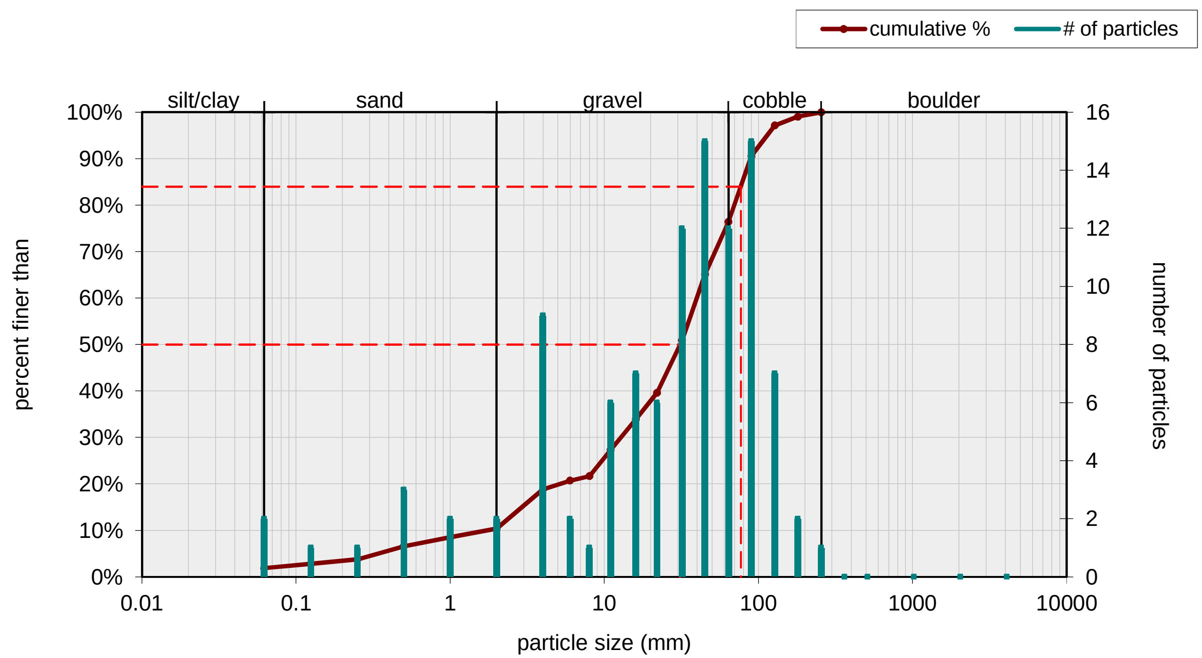
14	112.10	8.41	0.54	Depth	154.60	395.77	396.31	Mid Run
15	117.20	8.58	7.95	Surface	159.70	395.60	396.23	
16	125.80	8.83	0.70	Depth	168.30	395.35	396.05	Mid Run
17	136.50	9.25	1.02	Depth	179.00	394.93	395.95	End Run
18	145.70	9.45	1.28	Depth	188.20	394.73	396.01	Pool
19	157.00	8.99	0.82	Depth	199.50	395.19	396.01	Pool / High Pt
20	168.00	9.35	1.14	Depth	210.50	394.83	395.97	Pool
21	175.90	9.36	1.12	Depth	218.40	394.82	395.94	
22	186.70	9.95	1.70	Depth	229.20	394.23	395.93	
23	190.50	9.66	1.40	Depth	233.00	394.52	395.92	Start Glide
24	199.00	9.42	1.18	Depth	241.50	394.76	395.94	Bedrock
25	212.00	8.99	0.66	Depth	254.50	395.19	395.85	Start Riffle
26	220.00	9.63	8.54	Surface	262.50	394.55	395.64	
27	228.30	9.36	0.70	Depth	270.80	394.82	395.52	
28	238.10	9.90	0.72	Depth	280.60	394.28	395.00	End Riffle
29	241.00	10.15	1.00	Depth	283.50	394.03	395.03	
30	250.40	10.53	1.36	Depth	292.90	393.65	395.01	Pool

Riffle Surface

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	2
very fine sand	0.062 - 0.125	1
fine sand	0.125 - 0.25	1
medium sand	0.25 - 0.5	3
coarse sand	0.5 - 1	2
very coarse sand	1 - 2	2
very fine gravel	2 - 4	9
fine gravel	4 - 6	2
fine gravel	6 - 8	1
medium gravel	8 - 11	6
medium gravel	11 - 16	7
coarse gravel	16 - 22	6
coarse gravel	22 - 32	12
very coarse gravel	32 - 45	15
very coarse gravel	45 - 64	12
small cobble	64 - 90	15
medium cobble	90 - 128	7
large cobble	128 - 180	2
very large cobble	180 - 256	1
small boulder	256 - 362	0
small boulder	362 - 512	0
medium boulder	512 - 1024	0
large boulder	1024 - 2048	0
very large boulder	2048 - 4096	0
total particle count:		106
bedrock	-------------	
clay hardpan	-------------	
detritus/wood	-------------	
artificial	-------------	
total count:		106

Note: Site P-6 August 2018 WSP

Riffle Surface Pebble Count, ---



Size (mm)	
D16	3.2
D35	17
D50	31
D65	45
D84	77
D95	110

Size Distribution	
mean	15.7
dispersion	6.1
skewness	-0.25

Type	
silt/clay	2%
sand	8%
gravel	66%
cobble	24%
boulder	0%

STORM EVENT SUMMARY & PHOTOLOG

In the evening hours on the 15th of May 2018, slow moving thunderstorms trained across an occluded frontal boundary dumping torrential rainfall in central Maryland. Areas west of Frederick, MD and Frederick, MD itself, observed upwards of 5 – 7 inches of rainfall, with an official total of 6.56 inches near Frederick, MD. As pouring rains fell at dangerously high rates, water levels in Little Catoctin Creek flashed upwards rapidly. Maximum velocities within monitored cross-sections of the Little Catoctin Creek at USGS monitoring locations 01636845 and 01636846 exceeded 6 feet per second, jumping 4-times the observed velocity in less than 5 minutes from approximately 1.5 feet per second to over 6 feet per second. This locally catastrophic flood event quickly engulfed the Jefferson Pike Bridge crossing ripping the guardrail from its mounts, tearing asphalt from the surface; entraining 200 – 400-pound riprap boulders; and washing a vehicle downstream. Fortunately, a swift water rescue was successful, so no lives were lost during this event at this location; however, most of the monitoring equipment at 01636845 and 01636846 failed under the debris-flow style conditions of the flood event. A rain gauge typically 5 – 7 feet above normal creek levels was quickly inundated 30 minutes into the event; the radar gauge collecting stage from atop a 12 foot high mast was compromised and snapped soon after; and the water quality sonde and instream velocity units broken and smashed by the massive cobbles and boulders transported by raging floodwaters ceased to fully function throughout the entire event.

Remarkably, a turbidity probe at the 01636845 location and the velocity meter at 01636846 collected observations throughout the event. Automatic samplers were manually triggered in an attempt to collect as many samples as possible. In the days and months following this event, time-series for various parameters (temperature, turbidity, instream velocity) were stitched together, and indirect discharge values were computed. To put this event in perspective, USGS StreamStats software was used to model the significance of this flood. Modeled results from StreamStats returned an estimate that eclipses the maximum modeled 500 Year Peak Flood statistic at 5,940 cubic feet per second. The 500 Year Peak Flood statistic is the upper limit of this model run. The estimated official maximum peak flow, by way of indirect techniques and methods modeling, is 9,630 cubic feet per second at 01636846.

Damage estimates for equipment losses at 01636845 and 01646846 are upwards of $100,000. It took approximately three weeks for basic service to return, with some components of monitoring requiring 2-3 months to be completely restored. Impacts on the monitoring equipment at 01636845 are still being observed as the system conveys an abundance of newly transportable sediment within upstream channel sections past the monitoring locations and ultimately into the Potomac River. Below are some images that attempt to capture the damage and remarkable power of this event at Little Catoctin Creek near Rosemont, MD.

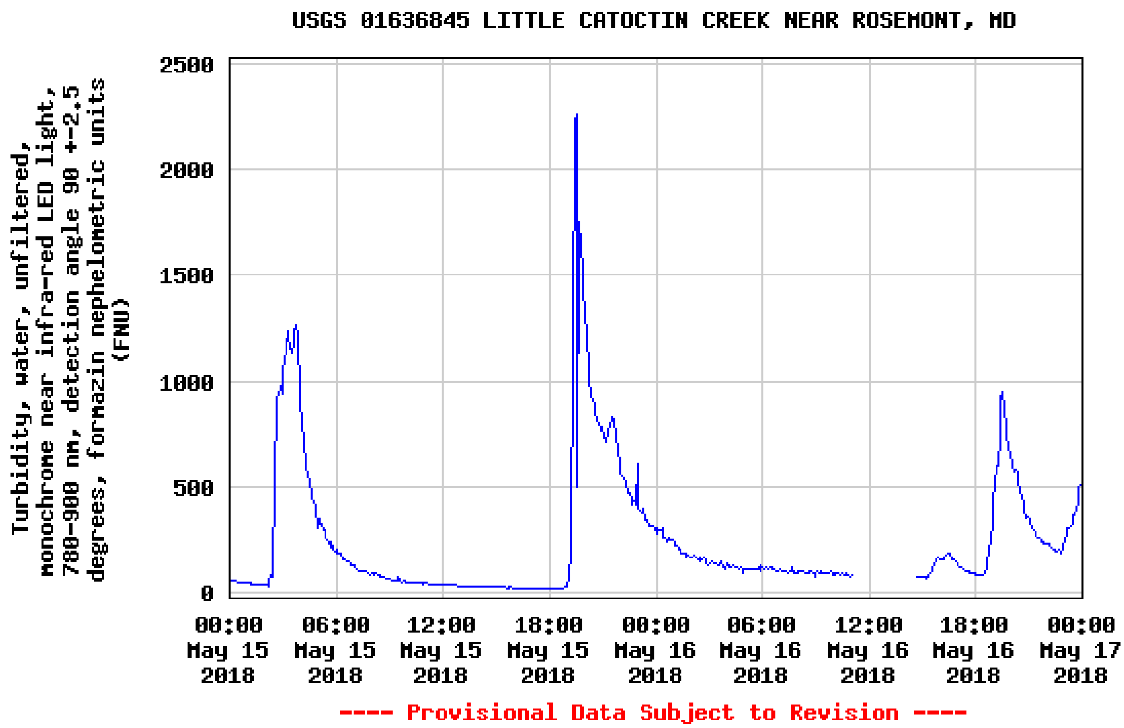


Figure 1 Provisional turbidity trace from USGS station 01636845 during the event providing evidence of storms training across the region.

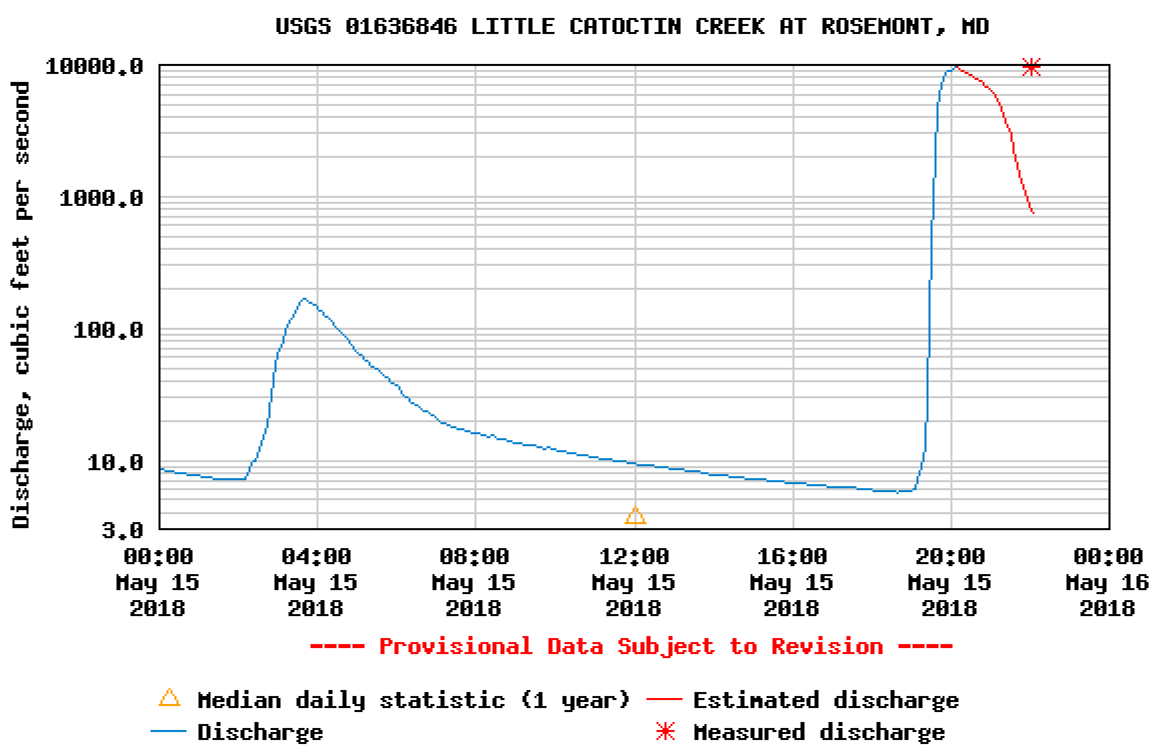


Figure 2 - Preliminary discharge trace for May 15, 2018 at USGS station 01636846. Red star denotes an indirect measure was used to estimate this peak flow.

Photo 3- Looking downstream at USGS station 01636845

Photo 4- USGS station 01636845

Photo 5 - Looking upstream from USGS station 01636845

Photo 6 - Remaining components of the EXO2 multiparameter sonde deployed at USGS station 01636845. Attached turbidity probe continued to take observations throughout the event

Photo 7 - Inundated rain gauge at USGS station 01636845

Photo 8 - Submerged vehicle hundreds of yards downstream from the Jefferson Pike Bridge crossing. Swiftwater rescue required to get vehicle occupant to safety.

9 - Section of Little Catoctin Creek looking downstream of USGS station 01636846 showing massive timber mats used to support heavy earth-moving equipment stacked against the banks of Little Catoctin Creek.

Appendix J

Assessment of Controls - Environmental Site Design for Interstate 70: Monitoring Report

Appendix J

Appendix J

Assessment of Controls – Environmental Site Design for Interstate 70: Monitoring Report

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

NPDES/MS4 Assessment of Controls - Environmental Site Design for Interstate 70

Year 1 Monitoring Report – FY 2018

September 14, 2018

Prepared For:

Maryland Department of Transportation

State Highway Administration

707 N Calvert Street

Baltimore, MD 21202

Prepared by:

Straughan Environmental, Inc.

10245 Old Columbia Road

Columbia, MD 21046

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1 Executive Summary

The Maryland Department of Transportation State Highway Administration (MDOT SHA) is currently planning the installation of several infiltration features within the existing SHA right-of-way along I-70. One bioretention facility is planned for the interior of the entrance ramp, and three bioswales/two grass swales are planned for the median of I-70 near the Marriottsville Road Interchange near Ellicott City, Maryland. The bioretention facility will capture runoff from Marriottsville Road and the east bound ramp to I-70 while the bioswales and grass swales will capture runoff from a portion of the I-70 east and west bound lanes. The facilities are expected to attenuate peak discharges, limit geomorphological change, and protect channel stability during runoff events within the receiving waterway, the Little Patuxent River (LPR).

MDOT SHA has developed a monitoring plan to determine the effectiveness of these facilities and make a conclusion about their utility for stormwater management. Straughan Environmental, Inc. (Straughan) is implementing the first four years of the monitoring plan, which includes continuous flow monitoring, physical monitoring of channel geomorphology, and sediment mobility assessment within the LPR. The continuous flow monitoring involves recording stream stage over time at three locations and recording flow volume and velocity over time in one location. The continuous flow monitoring before and after the installation of the proposed bioretention facilities will enable assessment of their ability to attenuate peak discharges. The physical monitoring includes surveys of two permanently established channel cross sections and a longitudinal profile of the monitoring reach, a portion of the LPR downstream of the outfall from the proposed bioretention facilities. The sediment mobility assessment includes two Wolman Pebble Count surveys at the monumented cross sections within the monitoring reach, which are used to determine boundary and critical shear stresses within the stream. Monitoring channel geomorphology before and after the installation of the proposed bioretention facilities will enable assessment of their ability to promote stability within the receiving channel. To capture conditions pre- and post-installation of the stormwater facilities, the monitoring will occur for a four-year period. Each year begins on July 1st and ends on June 30th. Physical monitoring is performed in June of each year to establish a baseline for the year and is then repeated within a given year following rainfall events in which 1.50 inches or more fall within a 24-hour period.

This report presents the results of the Year 1 monitoring effort. Year 1 began June 12th, 2018, and there were no qualifying rainfall events before the end of the record period on June 30th, 2018, so only baseline data were collected for Year 1. Given that only baseline physical monitoring was performed, conclusions about the effect of stormwater runoff on channel geomorphology and stability cannot yet be made. The sediment mobility assessment performed with the baseline data shows that currently the LPR is considered stable since the boundary shear stress is 20% greater than the critical shear stress. These results are presented in detail within the Year 1 Monitoring Report below.

2 Introduction

2.1 Project Description

MDOT SHA is currently planning, designing, and constructing stormwater best management practices (BMPs) with the intent to improve stormwater quality. The efforts are geared towards implementing the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) and Municipal Separate Storm Sewer System (MS4) impervious restoration requirements. In compliance with the MDOT SHA MS4 Phase I Permit Part IV.F, Assessment of Controls, Section 2, Stormwater Management Assessment, MDOT SHA is required to determine the effectiveness of BMPs for stream channel protection as implemented under the latest stormwater regulations.

Currently, Howard County is proposing dualization of the Marriottsville Road over Interstate 70 (I-70). The primary objective of the Howard County Marriottsville Road project is to alleviate roadway congestion. Currently, both the bridge and approaching roadways have only two lanes. Under proposed conditions, the bridge will be widened to accommodate four traffic lanes and two bike lanes. Both entrance ramps to I-70 will also be expanded to aid in controlling increased traffic. As a result, the watershed will experience an overall increase in impervious area that must be treated with stormwater management practices. Two bio-swales are proposed along the west side of Marriottsville Road north of the bridge and a micro-bioretention is proposed in the gore area north of the bridge along the east side of Marriottsville Road.

In addition to Howard County's proposed facilities, SHA has proposed two grass swales, three dry swales, and one bioretention facility along I-70 that treat a total of 5.21 acres of impervious area. The bioretention facility is located in the gore area southeast of the Marriottsville bridge. Grass swales A and B are adjacent to one another, spanning 1,500 feet, and flow to an inlet in the median. The three dry swales east of the bridge are also directly adjacent to one another and span a total of 1,626 feet. They also drain to inlets in the median. The bioswales and grass swales will capture runoff from a portion of the I-70 east- and west-bound lanes while the bioretention facility will capture runoff from Marriottsville Road and the east bound ramp of I-70 before the runoff flows to the Little Patuxent River (LPR). See Figure 1 for a map showing the drainage areas and BMP footprints. Note that upstream flow of the LPR passes underneath I-70 through a double eight-foot by seven-foot box culvert. Downstream of the culvert but upstream of the monitoring reach is where the proposed facilities outlet, a thirty-inch reinforced concrete pipe (RCP), converges with the LPR.

These BMPs are currently not designed for physical rain events above one inch. It is the intention of the designers that that level of treatment is the maximum extent practicable; therefore, the BMPs may not be reducing peak discharges for storms greater than one inch. The purpose and need for these facilities at the chosen site is primarily reducing impacts to water quality, not necessarily controlling water quantity, and may have limited influence on changes in channel stability. Since the size of the watershed draining to the LPR downstream of this site is large (1,249 acres) compared to the areas treated by the proposed BMPs, MDOT SHA does not anticipate significant impacts to the channel itself through implementation of these BMPs.

MDOT SHA has developed a comprehensive monitoring plan to assess the effectiveness of the BMPs to be implemented as a part of the dualization of the Marriottsville Road over I-70. Straughan has been tasked by MDOT SHA to perform physical monitoring of the Little Patuxent River near the I-70 / Marriottsville Road interchange in Howard County. The physical monitoring being performed by Straughan will last for a total of four years. The first two years will consist of pre-construction monitoring, and the final two years will be during construction of the proposed BMPs.

The primary goal of the physical monitoring is to answer several questions pertaining to their effectiveness and stream channel response:

- Will the peak discharge coming from controlled catchments be reduced once controls have been implemented?
- Will there be a geomorphological response to the Little Patuxent River once controls are in place?
- What are the thresholds for stream stability and do the catchment controls improve stream stability through peak discharge attenuation?
- Can a partnership with Howard County on a larger watershed monitoring plan increase the opportunity to observe a difference in discharge and channel stability?

This report presents Year 1 of the physical monitoring data that will be used to characterize baseline conditions before construction, to form a basis upon which to answer the questions from the monitoring plan and provide insight into the effectiveness of stormwater management practices for stream channel protection.

2.2 Site Description

The proposed BMPs and the monitoring project site are within the Little Patuxent River watershed (02131105) and the stream channel being assessed is the Little Patuxent River (LPR) main stem. The LPR is classified as surface-water use designation IV-P, *Recreational Trout Water and Public Water Supply*. Use IV-P waters allow any reasonable and lawful use if surface water is not adversely affected. Table 1 provides a summary of existing conditions for the LPR upstream watershed (MDOT SHA, October 2017). See Appendix A for the LPR watershed mapping, provided by MDOT SHA as a part of the project monitoring plan.

Land use data from 2010 were obtained from the Maryland Department of Planning (MDP) and visually verified in comparison to recent aerial imagery. In conjunction with Soil Survey Geographic Database (SSURGO) hydrologic soil group (HSG) classifications, the MDP land use categories were related to similar land use descriptions from the Natural Resource Conservation Service (NRCS) Technical Release 55 (TR55) to develop Runoff Curve Numbers (RCN) values. Soils data for the HSG were obtained from NRCS's Web Soil Survey, known as the SSURGO soils database.

Table 1. LPR Watershed Parameters

Total Drainage Area	1,248.90 Acres
	1.95 Mi^2
MDOT SHA Impervious Area	20.49 Acres
	1.64%
Total Impervious Area	110.21 Acres
	8.82%
2010 MDP RCN	74
Zoning RCN	77
Forest Cover	325.96 Acres
	26.10%

Physiographic provinces are geographic regions that are subdivided based on characteristic geomorphology. These are then subdivided into a hierarchical organization of the physiographic subdivisions of Province, Section, Region and District. The LPR watershed is entirely within the Piedmont Plateau Province, Piedmont Upland Section and the Harford Plateaus and Gorges Region. The upstream

LPR watershed is entirely within the Hampstead Upland District. The geology in this district is characterized as coarse-grained quartz schists (Loch Raven Schist) and fine-to-medium grained mafic schists (Piney Run, Pleasant Grove, and Prettyboy Formations), along with lesser amounts of metagraywacke, boulder gneiss, metaconglomerate, and isolated ultramafic bodies. The Hampstead Upland District is composed of rolling to hilly uplands interrupted by steep-walled gorges. Differential weathering of adjacent, contrasting lithologies produces distinctive ridges, hills, barrens, and valleys. Streams may have short segments of narrow, steep-sided valleys. (MDOT SHA, October 2017)

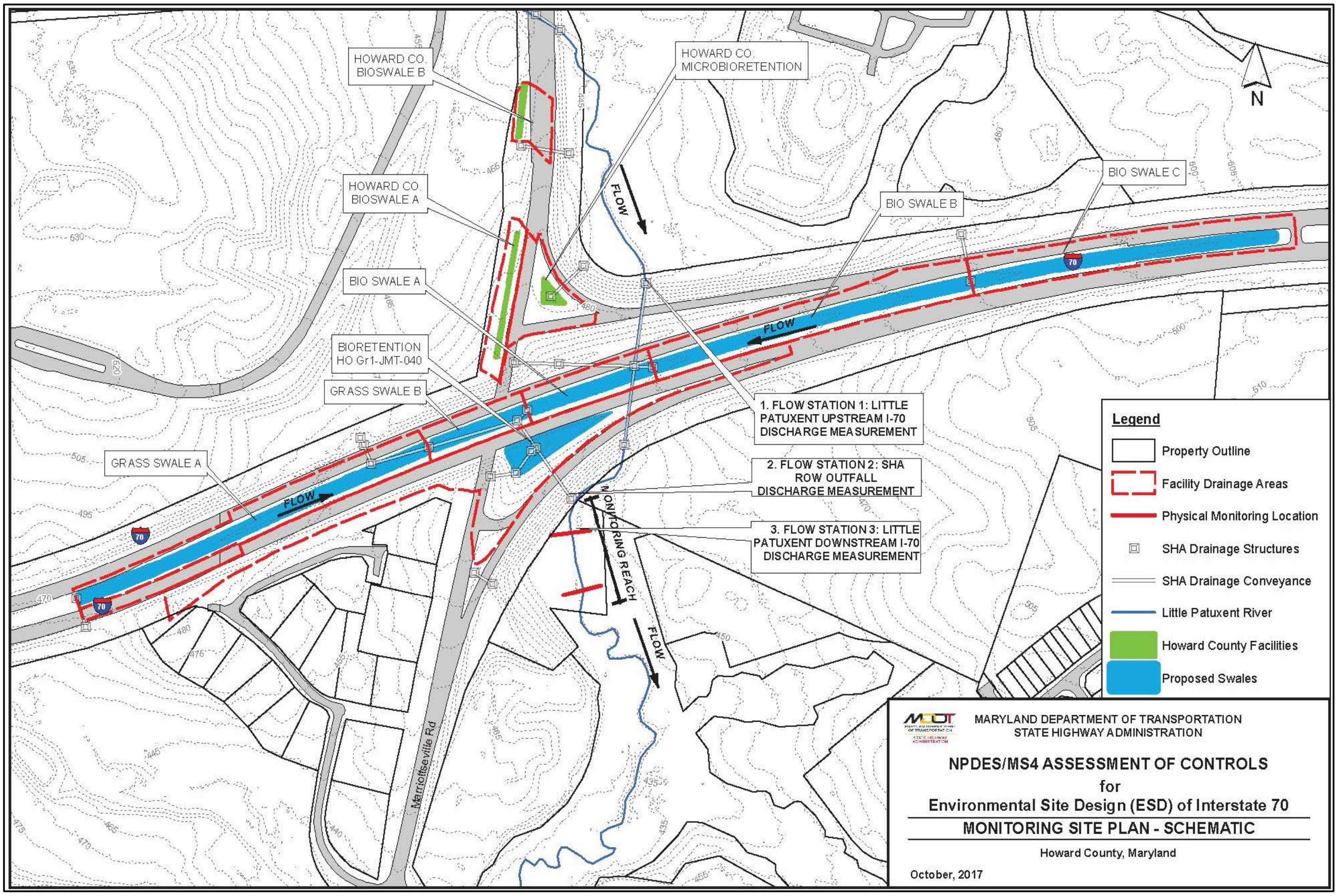

Figure 1. Physical Monitoring Locations (MDOT SHA, October 2017)

3 Monitoring

3.1 Objectives

Physical and continuous flow monitoring is being performed as outlined in the project monitoring plan. The physical monitoring of the LPR downstream of the proposed outfall locations is premised on comparing the anticipated motion of channel bed material with the capability of channel flows to initiate that motion. The physical monitoring plan aims to quantify the channel geomorphological characteristics of the LPR, quantify flow from the target catchments, and quantify overall flow at the receiving downstream channel. This is accomplished through sediment mobility analysis (critical shear stress) as compared to hydraulic parameters (boundary shear stress). When boundary shear stress is lower than critical shear stress, aggradation begins to occur.

A monitoring reach analysis for the LPR downstream of the proposed ESD facilities was established to serve as the boundary of the physical monitoring. The monitoring reach is located between the start and end of the longitudinal profile. The purpose of this monitoring reach analysis is to estimate the sediment threshold and hydraulic parameters of the stream channel for the LPR.

To obtain the information needed to perform the analysis, two cross sections and a longitudinal profile of the existing ground and water surface were surveyed. Annual surveys of the cross sections and profiles, along with surveys after significant rain events, will support an analysis of any erosion or aggradation of the LPR within the monitoring reach in response to pre- and post-construction discharges. A Wolman pebble count was performed, to be used in the sediment mobility assessment. Surveys and pebble-counts will occur annually as part of the baseline mobilization, at the beginning of the reporting year (mid-June), to capture pre- and post-BMP installation conditions over the term of the MS4 permit. Year 1 physical monitoring baseline mobilization was performed on June 13, 2018. Additional surveys and pebble counts may also be performed after significant storm events and/or abrupt changes to the stream channel, up to two events per monitoring year. Significant storm events are considered to be precipitation totals of more than or equal to 1.5 inches in a 24-hour period. No significant event occurred within the Year 1 monitoring cycle, which ended June 30, 2018.

Straughan established three flow monitoring stations throughout the study area for estimating discharge (Figure 2)**Error! Reference source not found.**. Flow Station 1 is the northern-most monitoring location and is located upstream of the other flow monitoring sites and I-70 at a double box culvert. Flow Station 1 was established to estimate discharge using a stage/discharge relationship to quantify the amount of flow entering the monitoring reach, which will allow for a comparison of the hydrologic response of the LPR to rain events between the other flow stations. Flow Station 2 is located at the outfall of the proposed infiltration facilities (includes discharge from the median bioswales). Flow Station 2 was established to estimate discharge using a stage/discharge relationship to quantify the amount of flow from the proposed ESD facilities outfall, which will be used to determine the magnitude of discharge attenuation or amplification from those facilities. Flow Station 3 is located at the receiving LPR channel (monitoring reach), downstream of both I-70 and the outfall of the proposed BMPs. Flow Station 3 was established downstream of Flow Station 1 and 2 to verify the estimated upstream discharges and calibrate the hydrologic response of the LPR within the monitoring reach with nearby rain gages and flow stations. Additionally, a rain gauge was established onsite to record local rainfall depths and precipitation patterns.

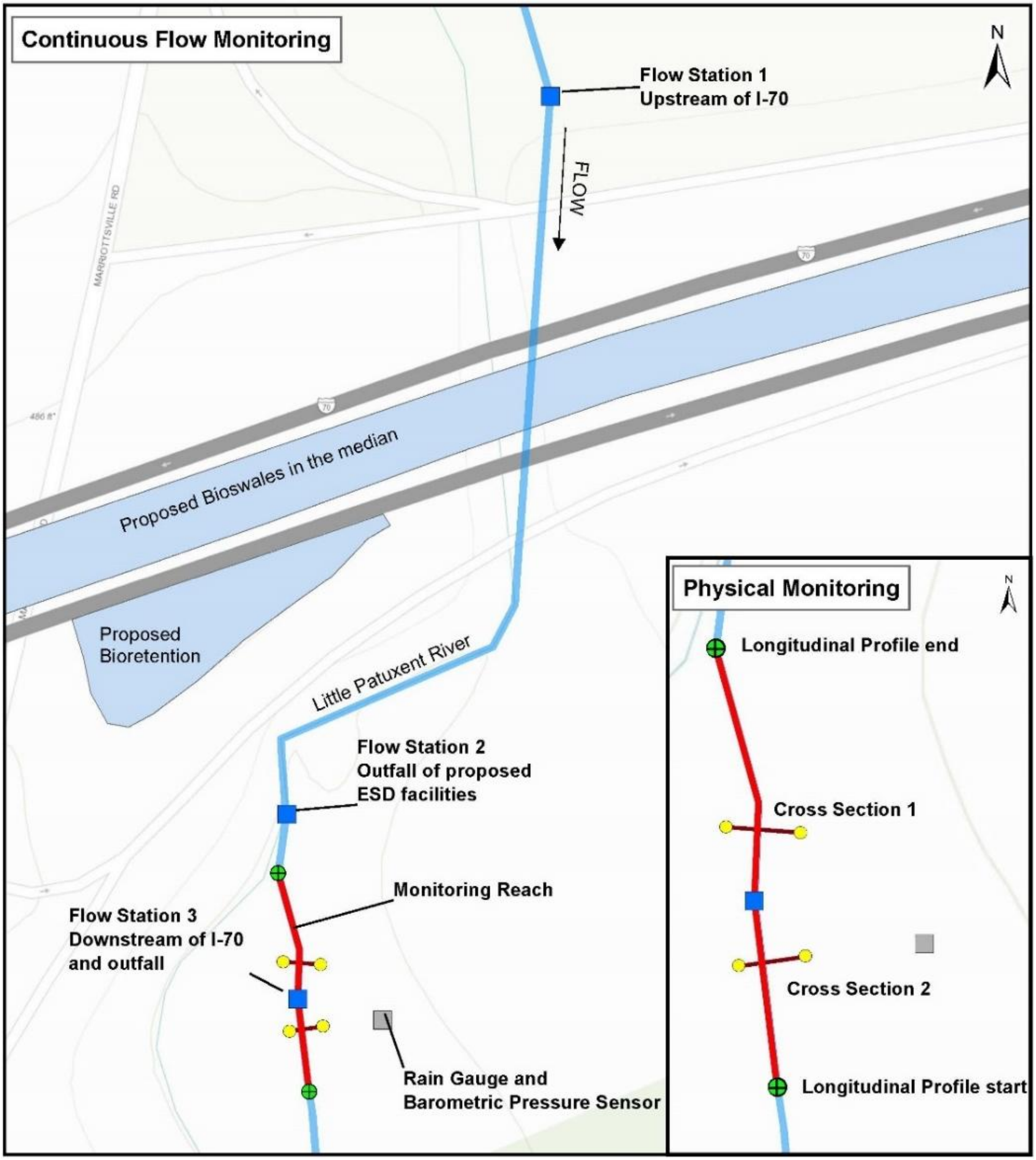

Figure 2. Continuous Flow and Physical Monitoring Locations

3.2 Methods

3.2.1 Continuous Flow and Precipitation Monitoring

Stage/Discharge: Water level and temperature are recorded at 10-minute intervals using Onset HOBO® U20L water level data loggers, which use pressure sensors to determine the stage (total water depth) inside the culvert at Flow Station 1 and outfall pipe at Flow Station 2. The water level logger housing is made from perforated PVC, mounted to the bottom of each structure (Figure 3). Discharge is calculated at each flow station using established stage/discharge relationships derived from the dimensions of each structure and the recorded stage measurements (Appendix D).

Figure 3. Depth logger mounted at box culvert bottom upstream of I-70 (left; Flow Station 1) and at the outfall of the proposed ESDs (right; Flow Station 2)

Discharge: Instream discharge was measured using a SonTek-IQ Standard acoustic Doppler area-velocity meter, which records velocity, area, and depth, and is capable of computing discharge and volume of total flow. The recording interval is 10 minutes. The meter was installed in the LPR receiving channel monitoring reach secured to a mounting plate, which was then staked into position onto the stream bed along the thalweg, which is the lowest elevation within a stream channel cross section (Figure 4). A cross section of the meter location was surveyed prior to installation in order to provide accurate data for the internal flow calculations performed by the unit.

Figure 4. Area-velocity meter within the monitoring reach, downstream of I-70 (Flow Station 3)

Barometric Pressure: Barometric pressure is recorded at 10-minute intervals using a single Onset HOBO® U20L pressure sensor and data logger. The logger records temperature and barometric pressure, which is used to compensate the flow station water level data loggers for atmospheric pressure. The data logger is suspended within a perforated PVC housing unit and is positioned at a central project location adjacent to the monitoring reach (Figure 5).

Precipitation: Precipitation is recorded using an Onset HOBO® RG3 rain gauge and data logging system, which is capable of recording precipitation rates up to 5 inches per hour. The system is comprised of a tipping-bucket rain gauge, where each bucket tip is equal to 0.01 inches of rainfall, coupled with an event data logger that records the date and time of each tip. The rain gauge is mounted on a post in an unobstructed area free from canopy cover (Figure 5).

Figure 5. Barometric sensor (left) & rain gauge (right)

3.2.2 Physical Monitoring

Longitudinal Profile and Water Surface Elevations (WSEL): The monitoring reach was surveyed during normal baseflow conditions to determine the elevations of the existing ground and water surface for the reach profile. The longitudinal profile starts in a pool downstream and ends in a pool upstream of the cross-section locations (Figures 2 and 6). Bed elevations and water-surface elevations were recorded along the thalweg approximately every ten feet and at key feature slope breaks (i.e., riffles, runs, pools and glides). The elevations were measured using a Spectra Precision Laser level and stadia rod. The full profile was surveyed from a single set-up location.

Figure 6. Longitudinal profile

Cross Sections: Two permanently monumented cross sections were established within representative riffle areas downstream of both I-70 and the outfall of the proposed ESDs (Figures 2 and 7). The riffles are used to find the normal flow conditions representative of the monitoring reach. Capped rebar monuments were installed for each cross section, and the locations and elevations of each were surveyed so that the physical monitoring data can be referenced to the Maryland State Plane, NAD 83, and NAVD 88 datums (Table 2).

Table 2. Cross Section Monument Benchmark Data

		Latitude (feet, NAD83)	**Longitude (feet, NAD83)**	**Elevation (feet, NAVD88)**
Cross Section 1	Left Bank Monument	39.303098	-76.898270	438.30
	Right Bank Monument	39.303107	-76.898389	438.72
Cross Section 2	Left Bank Monument	39.302945	-76.898261	437.76
	Right Bank Monument	39.302933	-76.898366	437.82

The cross sections were surveyed with a Spectra Precision Laser level and stadia rod. Survey pins were used to secure the survey measuring tape across the cross-section channel. Both the monumented bench marks and the pins were surveyed during the physical monitoring. Key features surveyed within the cross section include top of bank, edge of water, major slope breaks, and the thalweg.

Figure 7. Cross-section survey layout

Wolman Pebble Counts: Wolman Pebble Count surveys are performed to collect data for a sediment mobility assessment (described below). The surveys are performed at the two permanent cross sections. The Wolman Pebble Count procedure (Wolman, 1954) requires the observer to measure random pebbles of all size along a cross section. Pebbles are chosen at random by using a step-toe procedure. The observer takes one step into the water perpendicular to flow and, while averting his eyes, picks up the first pebble touching his index finger next to his big toe. The observer then measures the b-axis, or the intermediate axis, of the pebble. The observer takes another step across the stream, picks up and measures a pebble. This is repeated until he reaches the opposite side. In general, 100 measurements are needed in order to accurately quantify pebble distributions. Given the narrowness of the monitoring reach, this means crossing back and forth over the stream in a zig-zag pattern moving downstream from the first transect.

Sediment Mobility Assessment: The MDOT SHA monitoring plan provides the sediment mobility assessment approach and procedure for determining the stable channel threshold (MDOT SHA, October 2017), which is described in detail below.

> *The stable channel threshold, as defined in the project monitoring plan, is when boundary shear stress is twenty percent higher than the critical shear stress as determined from the project site's bed material. The methods used for determining boundary and critical shear stress are described below.*

A major premise of the sediment mobility analysis is that threshold conditions defined by any critical shear stress method represent a condition of very low transport rate (Wilcock, 1988). *The second assumption is that statically armored riffles satisfy the conditions of near-equal mobility; that is, the largest sediments in a sediment mixture require slightly higher shear stresses than do smaller sizes. Very large particles from colluvial material or large fragments of bedrock plucked from the streambed or bank during infrequent high flows may not be mobile, although they can effectively hide or shelter other smaller particles. The largest particles (D_i) on the bars or in the sub-surface represent the maximum size present in the bedload. Methods considered in the project monitoring plan for the computation of the critical dimensionless shear stress condition for marginal transport of a specific size fraction in mixed-grain sediments* (Andrews, 1995) *have the form:*

$$\tau^*_{ci} = a\,(D_1/D_2)^b$$

where τ^*_{ci} is the critical dimensionless shear stress for a very low transport rate for the specific size fraction in the matrix armor layer. This equation is used to estimate the conditions under which marginal transport will exist in the channel. An assumption is made that the minimum shear stress under bankfull conditions in the assessment riffle should be that which mobilizes the largest particles in the bedload. The variables D_1 and D_2 are representative sizes of the sediment samples. Using Andrews' 1995 equation, D_1 is equal to D_i identified below, and D_2 is the mean diameter particle size of the riffle surface using the Wolman pebble count method. Coefficient 'a' and exponent 'b' are 0.0376 and -0.994, respectively, for the equation.

The critical shear stress for marginal transport rate of the largest size fraction in the bedload corresponding to τ^*_{ci}, which relates shear stress to bedload material, is given as:

$$\tau_{ci} = \tau^*_{ci}\,(s\text{-}1)\,\gamma\,D_i$$

where τ_{ci} is the critical shear stress required to mobilize D_i, which represents the largest size fraction that is considered to be mobile, s is the specific gravity of the sediment (typically 2.65) and γ is the specific weight of water (62.4 psf). The average boundary shear stress produced by the threshold discharge over each assessment reach riffle was computed as described above.

The use of critical shear stress (τ_{ci}) and boundary shear stress (τ_b) methodologies provides a sound approach for estimating the threshold at the riffles studied. Our analysis for this monitoring plan aims to compare sediment mobility and threshold/ bankfull parameters on LPR. The methodology used for this analysis was derived by Andrews from specific bed-load data sets for streams located in the western United States and therefore may not be directly applicable to LPR. However, it provides an estimate of the expected shear stress required for mobility of coarse, mixed-grain sediments.

The energy slope (friction slope), Sf, for LPR was estimated for bankfull flow conditions based on field survey measurements. The slope is a critical parameter in determining threshold conditions. The range of slope over an assessment riffle is bound by 1) the water surface slope over just the riffle feature itself (maximum threshold slope) and 2) the water surface slope from the head of the study riffle to the head of the next riffle downstream (minimum threshold slope). Threshold conditions will typically occur somewhere between the minimum threshold slope and the maximum threshold slope. The sediment mobility analysis is used to determine the specific slope at which threshold conditions are met.

Channel roughness is caused primarily by the roughness of the channel bed. Estimates of Manning roughness coefficient, n, are based on the Limerinos relation given here as:

$$n = R_h^{1/6} * \frac{0.0926}{1.16 + 2LOG\frac{R_h}{D_{84}}}$$

where R_h *is the hydraulic radius (feet) and* D_{84} *(feet) is the particle size for which 84 percent of the particles are smaller based on the pebble count of the riffle surface* (Limerinos, 1970). *As indicated by this relationship, the n value changes with flow conditions. A Wolman pebble-counting method was used to describe the surface particle size distribution over the active channel portion of the riffle surface. Particle sizes necessary for roughness estimates (*$D_{84\ riffle}$*) and for evaluation of the bed surface mobility (*$D_{50\ riffle}$*) were measured through the pebble count analysis.*

The average boundary shear stress produced by the bankfull discharge over each riffle was computed as:

$$\tau_b = \gamma R_h Sf$$

where τ_b *is the cross section average boundary shear stress (in psf) over the riffle,* R_h *is the hydraulic radius, and Sf is the bankfull energy slope. Because the channel width-to-depth ratio was much less than 10 (bank resistance considered major at bankfull conditions) and backwater effects on the steep riffles were minor, the average boundary stress is a good approximation for the average stress on the active channel bed.*

4 Year 1 Monitoring Results

This section of the report summarizes data collected during Year 1, which began on June 12, 2018 and ended June 30, 2018. Continuous flows at all three locations were collected during this period. Flow Station 1, Flow Station 2, rain gauge and barometer were installed on June 12, 2018. Flow Station 3 was installed on June 14, 2018. Only baseline channel morphology data were collected for Year 1 since there were no qualifying rain events during the time period to precipitate repeated monitoring.

4.1 Continuous Flow Monitoring Results

4.1.1 Flow Station 1

Figures 8 through 11 summarize the results of the continuous flow monitoring for Flow Station 1 upstream of I-70 at the box culvert that conveys the LPR under I-70. The stage for this station has been increased by 0.156-inches to account for the thickness of the PVC cap that covers the bottom of the logger housing. Discharge was calculated by using Manning's equation to estimate the velocity. The flow area and slope were determined from the as-builts of the box culvert (Appendix E). The roughness value, n, used in the Manning's equation was determined from the sediment mobility assessment presented in Section 4.2.3. This value was used as the roughness coefficient instead of the box culvert material to more accurately estimate the total flow in the upstream reach. Flow Station 1 is located at the upstream interface of the channel and box culvert, so the flow is still representative of the LPR channel, except it has been spread out to enter the box culvert. Stage and discharge rating curves were developed using this information and provided in Appendix D. Table 3 provides a statistical breakdown of the data. Since the monitoring equipment is located at the interface of only one of the double box culverts, an assumption was made that the flow conditions are identical for the other box culvert so that a total discharge for the entire channel could be estimated. Total flow volume, Figure 11, was estimated to be 3,924,000 cubic feet. A quality check on the culvert was performed on June 21, 2018, after a 0.56-inch rain event. A measurement in the field at the culvert bottom was taken, before the logger was pulled for downloading at 10:24 AM. The measurement yielded a value of 1.5-inches. The data logger recorded a measurement at 10:20 AM 1.35-inches. When the stage is adjusted for the thickness of the PVC cap, the value is 1.5-inches. This aligns with the measured depth in the culvert at the time and confirms that the logger is functioning properly.

Table 3. Flow Station 1 Summary Statistics

	Stage (ft)	Discharge (ft^3/s)
Minimum	0.06	0.88
Maximum	0.32	13.35
Average	0.11	2.47

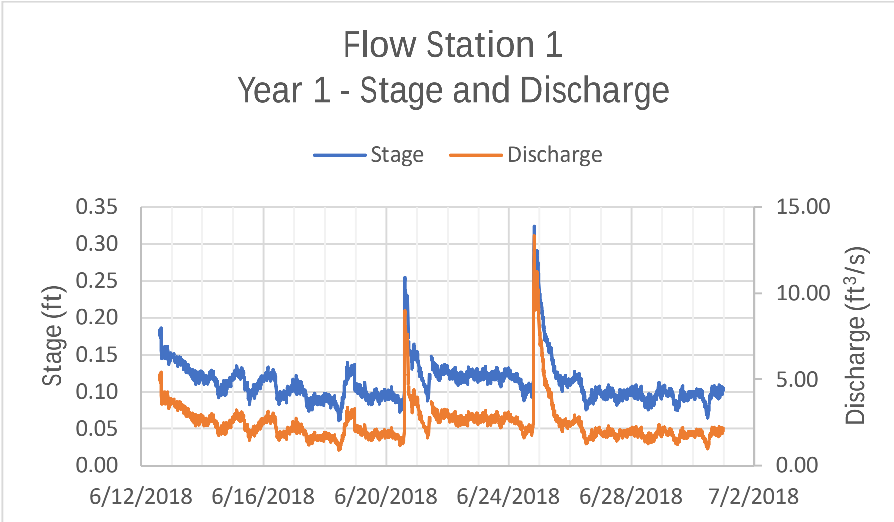

Figure 8. Stage and discharge at Flow Station 1 for Year 1

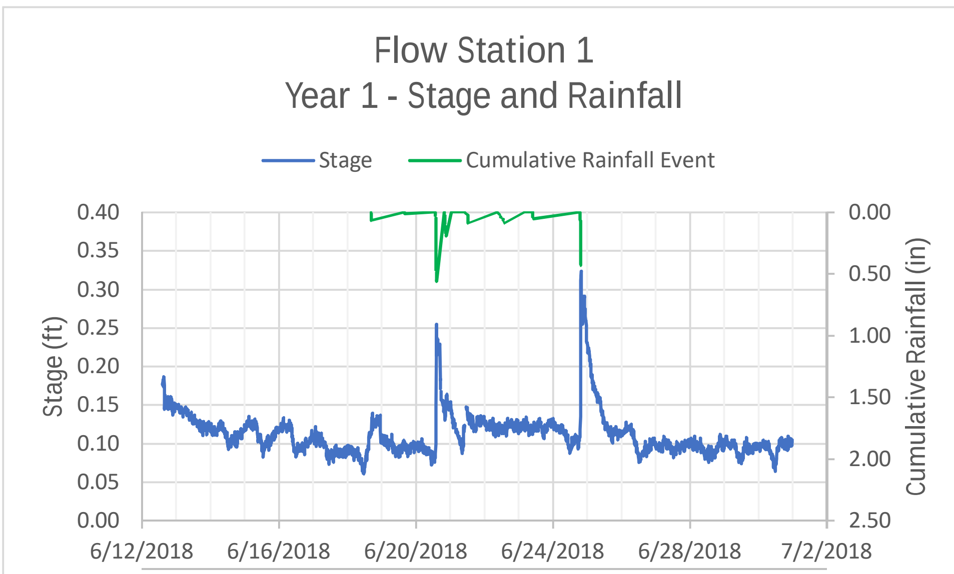

Figure 9. Stage and cumulative rainfall totals at Flow Station 1 for Year 1

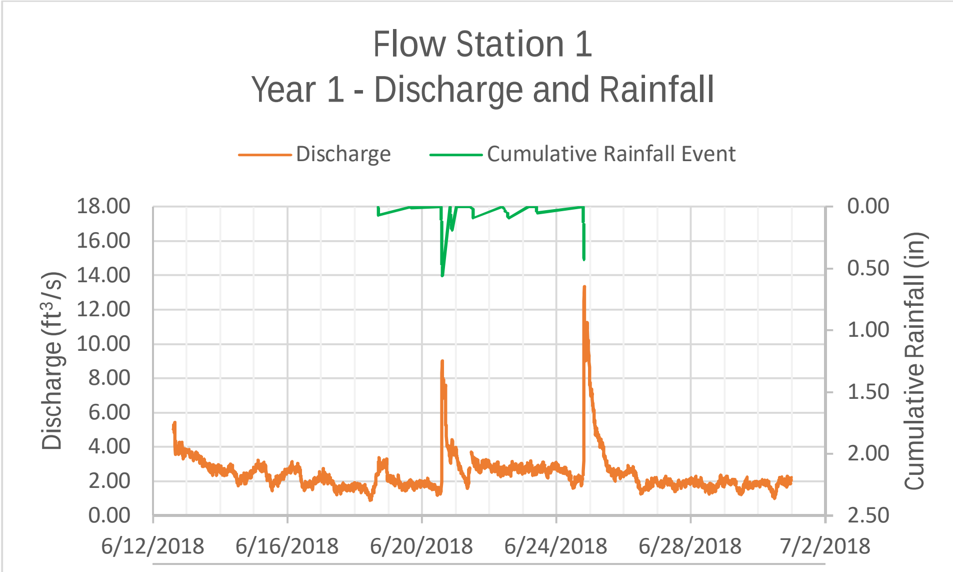

Figure 10. Discharge and cumulative rainfall totals at Flow Station 1 for Year 1

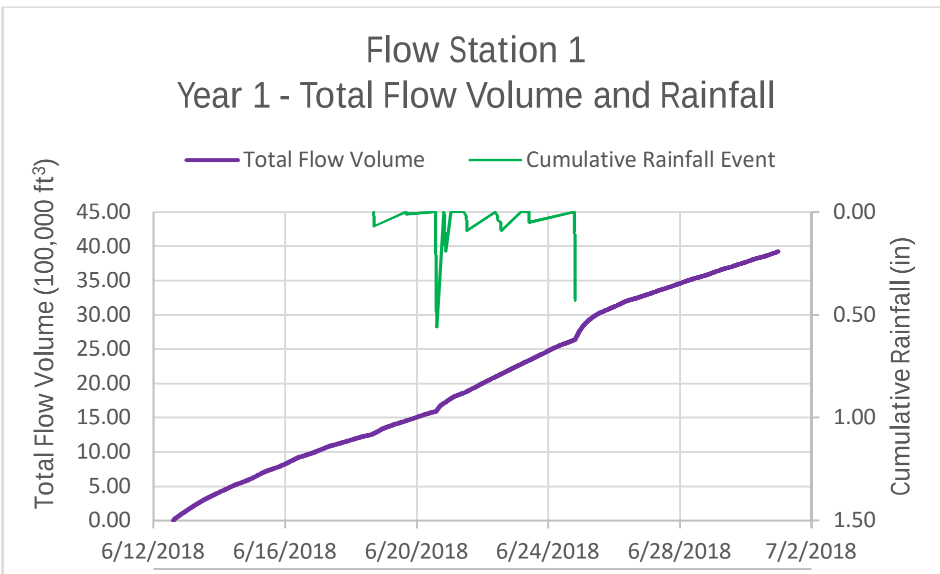

Figure 11. Total flow volume and cumulative rainfall at Flow Station 1 for Year 1

4.1.2 Flow Station 2

Figures 12 to 15 summarize the results of the continuous flow monitoring for Flow Station 2. The discharge was calculated by using Manning's equation to estimate the velocity, and the cross-sectional area and slope were determined from the as-builts for the outfall (see Appendix E). The roughness value, n, used in the Manning's equation was based on the concrete material of outfall pipe. Stage and discharge rating curves were developed using this information and provided in Appendix D. The outfall is typically dry unless there is a rain event at the inlets of the outfall. Values for stage below 0.00 feet, due to the barometric compensation from the project barometer, were omitted and are presented here as 0.00 feet. Values below 0.00 feet should be considered as no flow at the outfall. The stage for this station has been increased by 0.156-inches to account for the thickness of the PVC cap that covers the bottom of the logger housing. This correction is only applied during flow events so that the correction does account for depth when no water is in the outfall. Table 4 provides a statistical breakdown of the data. These statistics are based on data from flow situations only. Notably, there were two periods where a stage above zero were shown but no rainfall was recorded. Nearby rain gauges were examined to determine if the project rain gauge was not functioning properly, but no rain was recorded for these time periods either. A rain gauge two miles further east than the other gauges reported 0.24 inches of rainfall for these time periods. Because this outfall receives runoff from I-70, it is believed the runoff recorded occurred from a rain event somewhere within the drainage area of the outfall and but not above the other rain gauge locations. Total flow volume, Figure 15, was estimated to be 660 cubic feet.

Table 4. Flow Station 2 Summary Statistics

	Stage (ft)	Discharge (ft^3/s)
Minimum	0.014	0.003
Maximum	0.060	0.070
Average	0.022	0.009

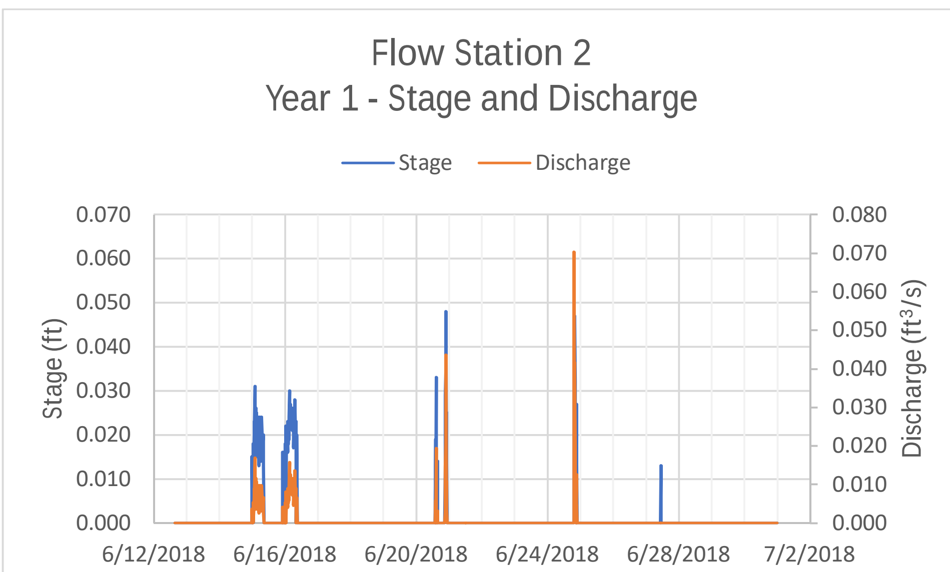

Figure 12. Stage and discharge at Flow Station 2 for Year 1

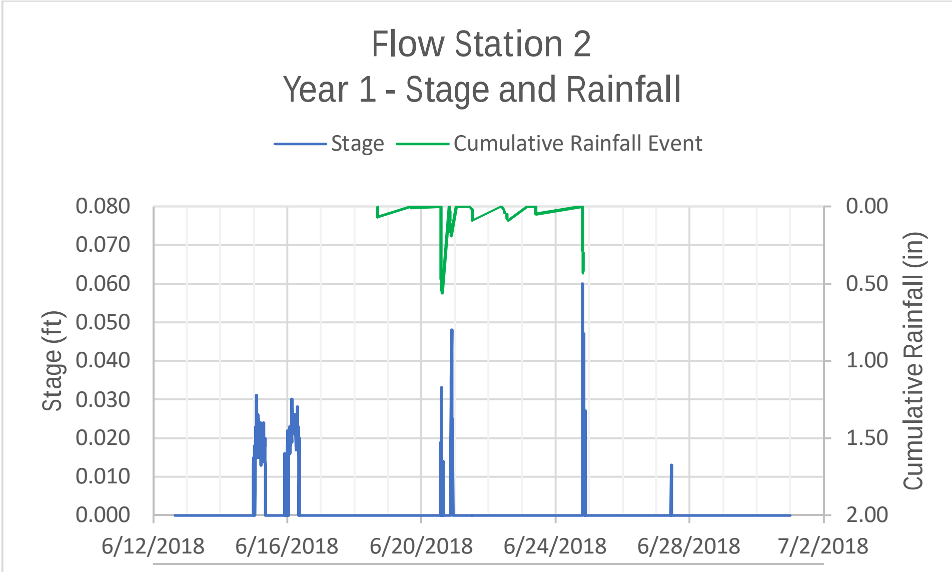

Figure 13. Stage and cumulative rainfall at Flow Station 2 for Year 1

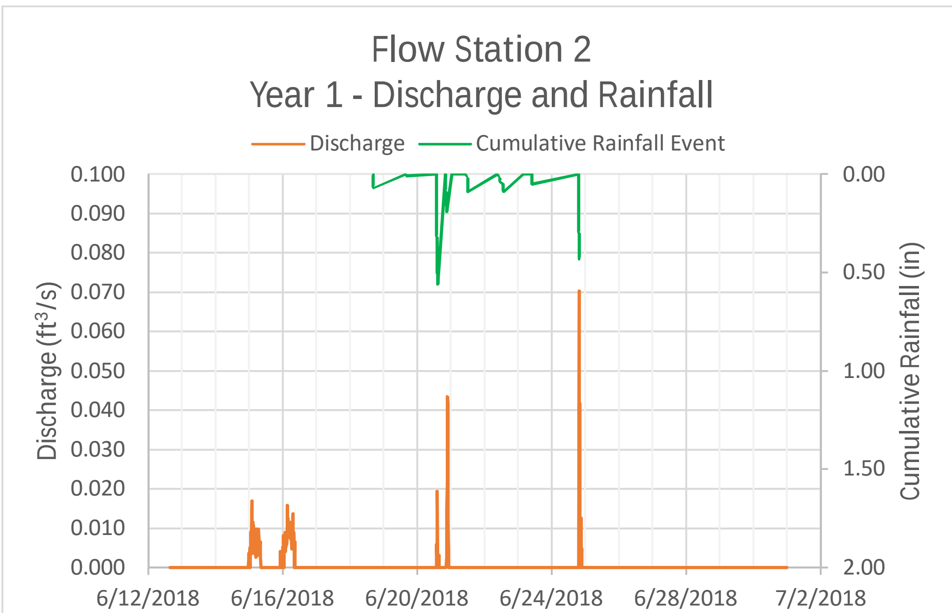

Figure 14. Discharge and cumulative rainfall at Flow Station 2 for Year 1

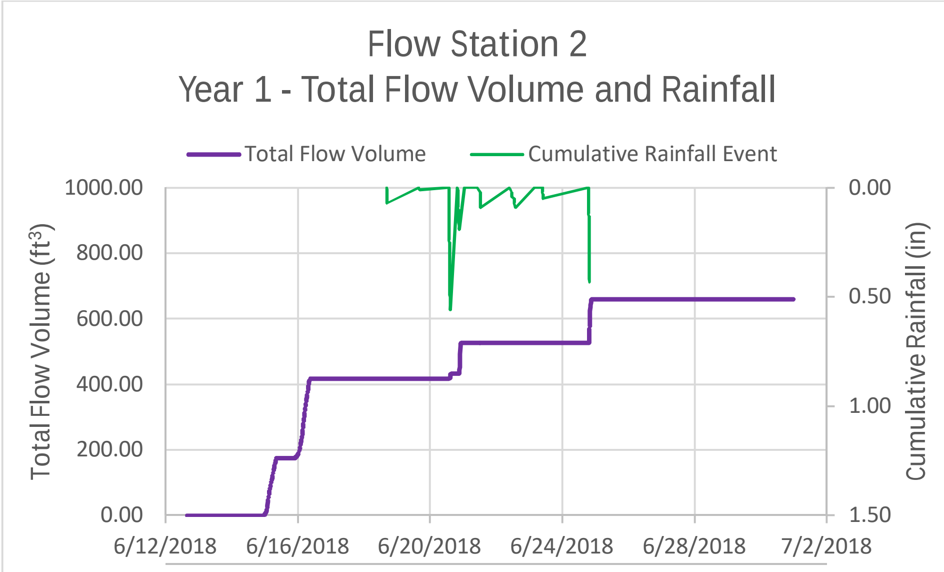

Figure 15. Total flow volume and rainfall at Flow Station 2 for Year 1

4.1.3 Flow Station 3

Figures 16 through 19 summarize the results of the continuous flow monitoring for Flow Station 3. A quality check was performed on June 21, 2018. There was a discrepancy between the recorded field measurement of 11.25-inches at 11:15AM and the reported stage of 13.2 inches at 11:16AM. The system configuration was review for the source of the error. Final calibration for the area-velocity meter occurred on June 27, 2018. The parameter adjusted for calibration was the difference in height of where the depth readings are taken and the bottom of the area-velocity meter and mounting plate. This affects what the area-velocity meter computes as stage for LPR. After correcting the system calculation for stage, the recorded value of 0.856 feet at 10:24AM on June 27, 2018. Comparing this value to the measured field measurement of 0.854 feet at 10:33AM confirms that the correction correctly calibrated the instrument. The corrected parameter is measurable, so this difference could be applied to the uncalibrated stage measurements to give a reasonable estimate of the actual stage measurement. This corrected stage measurement did have an effect on the average flow and total flow volume computed by the instrument, so these parameters were also corrected. A simple field test was performed on June 21, 2018 to determine if the velocity values were reasonable. A piece of paper was placed in the stream and was timed as it traveled along a measured distance. Two tests at two different intervals was performed, 25 feet and 10 feet. The estimated velocity of the water yielded an average value of 1.19 ft/sec. This value was compared to the area-velocity beam that was closest to the path the paper traveled along the stream. This was chosen because the average velocity calculated by the area-velocity meter uses 4 separate beams that cover the entire cross sections and different depths. The chosen beam is directed towards the water surface on the left side of the channel. The average value recorded during the test was 1.17 ft/sec which is comparable to the average value calculated from the field tests. Total flow volume, Figure 19, was estimated to be 3,362,393 cubic feet. Flow Station 3 total volume was compared to the upstream flow station, Flow Station 1's value. Flow Station 1 equated to 3,924,099 cubic feet. Comparing this to the 3,362,393 cubic feet recorded by Flow Station 3, and it appears as if there is an error. However, this is due to the fact that Flow Station 1 started recording on June 12, 2018 while Flow Station 3 was not established until June 14, 2018. When Flow Station 1's total volume was estimated during the time that Flow Station 3 was operating, a total volume of 3,377,133 cubic feet was calculated. This value aligns with the volume being reported at Flow Station 3. The discrepancy between the values is likely due to the velocity and the roughness factor from Flow Station 1 being estimated through Manning's equation, while the area-velocity meter uses measured area and velocity to calculate flow. Table 5 provides a statistical breakdown of the data.

Table 5. Flow Station 3 Summary Statistics

	Stage (ft)	Discharge (ft^3/s)
Minimum	0.76	0.67
Maximum	1.39	18.64
Average	0.87	2.39

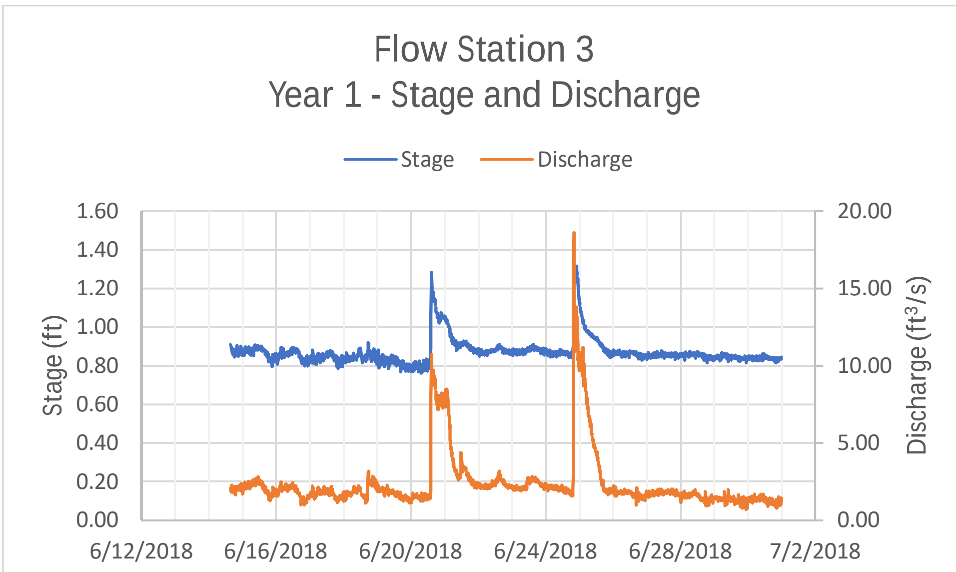

Figure 16. Stage and discharge at Flow Station 3 for Year 1

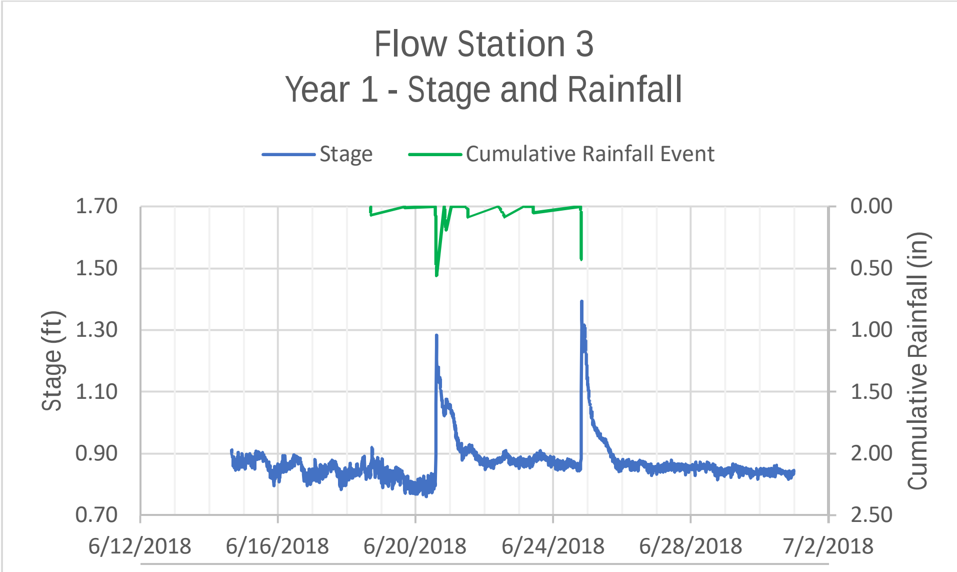

Figure 17. Stage and cumulative rainfall at Flow Station 3 for Year 1

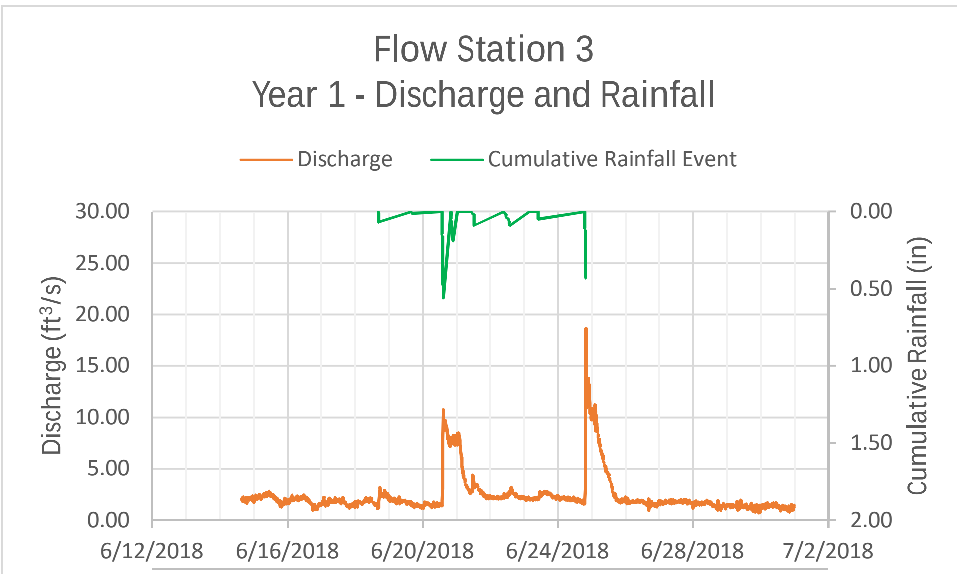

Figure 18. Discharge and cumulative rainfall at Flow Station 3 for Year 1

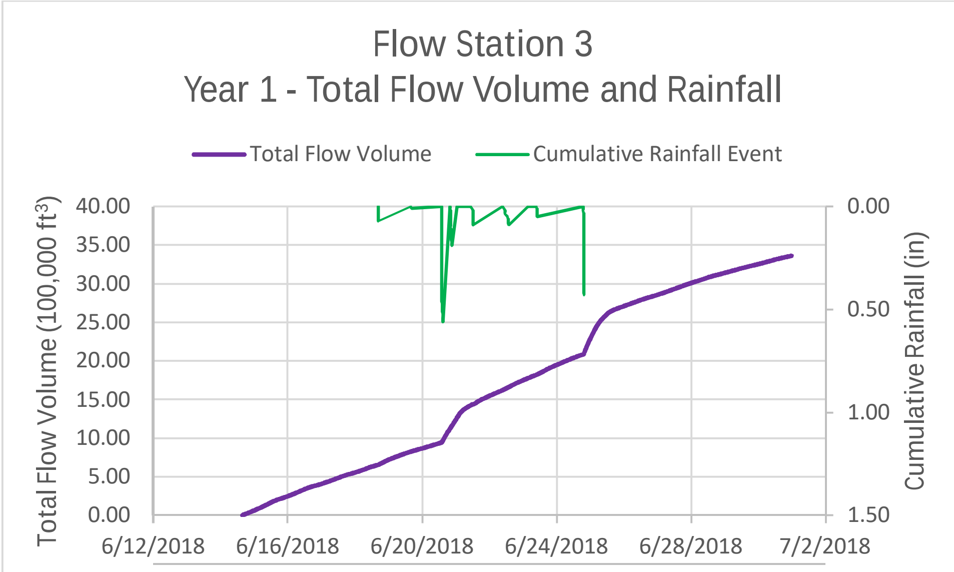

Figure 19. Total flow volume and cumulative rainfall at Flow Station 3 for Year 1

4.1.4 Precipitation

This section provides the results of the precipitation data collected from the on-site rain gauge. A single rain event was selected to present a representative account of the data collected and how they can be interpreted. Figure 20 shows data recorded on June 20, 2018. Using the raw data file containing tip timestamps and known amount of rain per tip (.01”), cumulative rainfall (primary axis) and intensity (secondary axis) were calculated.

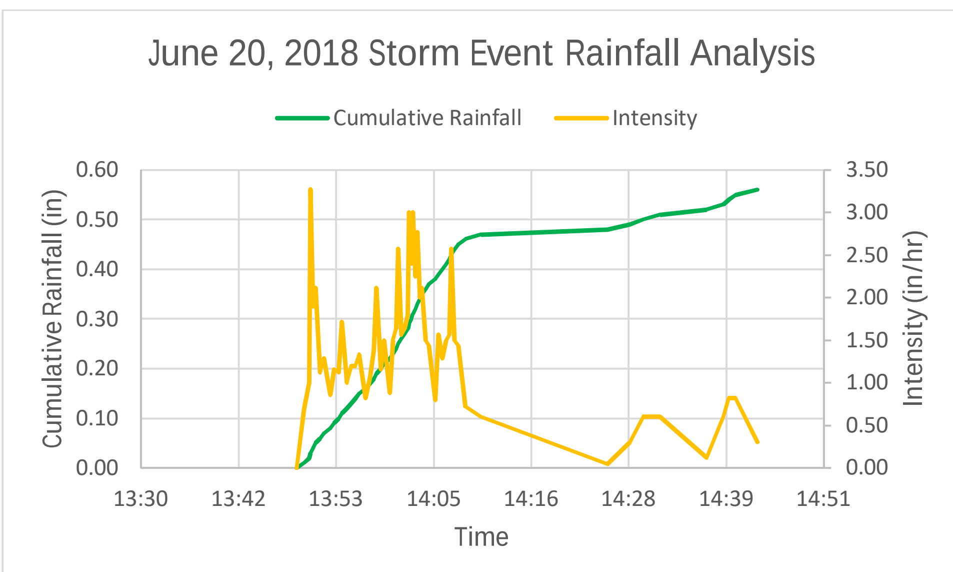

Figure 20. June 20, 2018 storm event rainfall analysis

To determine the validity of the results, Straughan compared this rain event to a near-by independent rain gauge. The closest rain gauge with readily available data is the Thompson Drive (KMDELLIC68) weather station from Weather Underground (https://www.wunderground.com/personal-weather-station/dashboard?ID=KMDELLIC68). The rain gauge is approximately 1.20 miles west of the project rain gauge and is considered comparable due to its proximity. Figure 21 shows the cumulative rainfall recorded by the Weather Underground rain gauge and the project rain gauge from the rain event on June 20, 2018. The lag between the events is explained by the difference in rain gauge locations. The difference between cumulative rainfall results is minimal and probably due to the path of the storm. Figure 22 below shows the cumulative rainfall totals for Year 1.

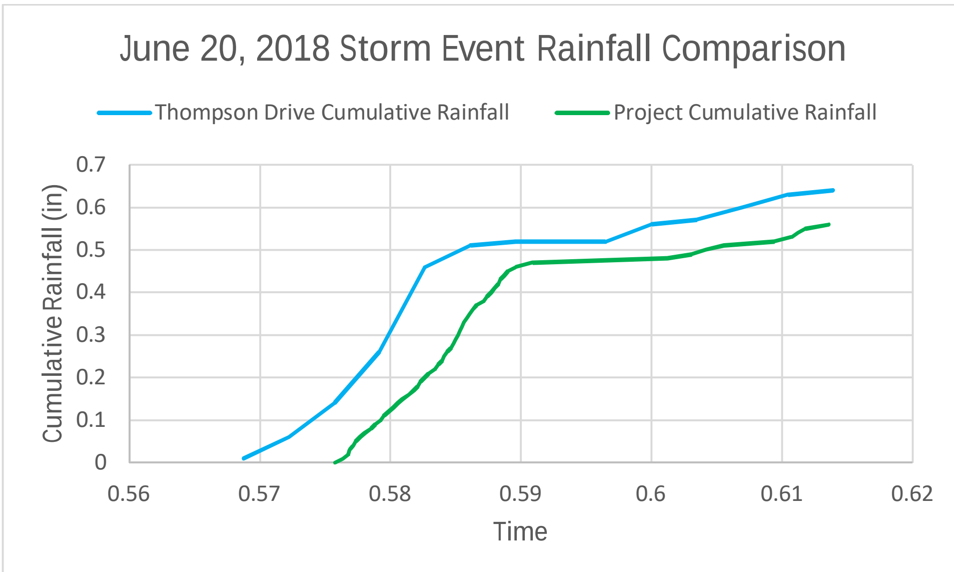

Figure 21. June 20, 2018 storm event rainfall comparison

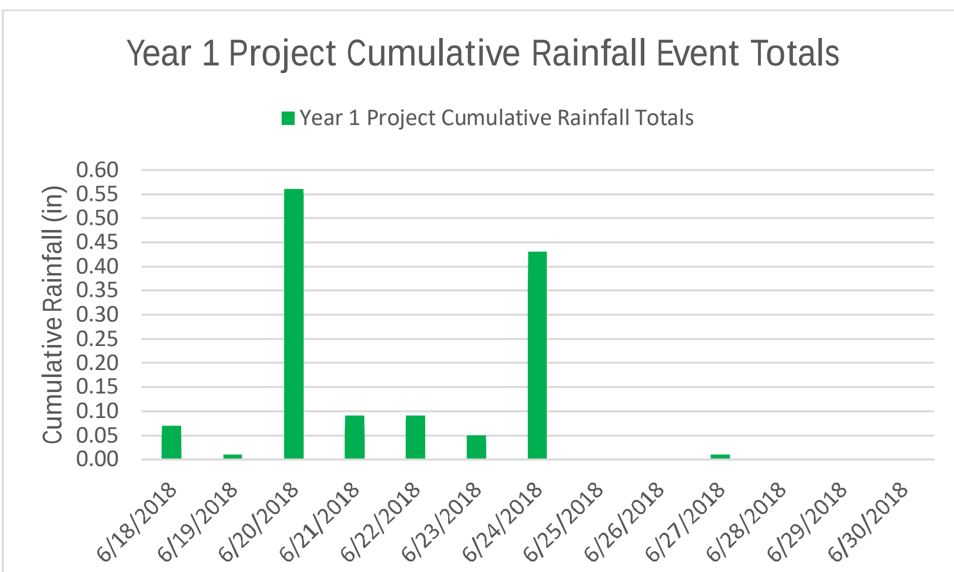

Figure 22. Year 1 Cumulative Rainfall Totals

4.1.5 Water Temperature

This section presents the water temperature recorded for the three flow stations. Since Flow Station 2 does not have continuous flow, only water temperatures when the stage was above 0.00 feet were used. This provides comparable results of water temperature at Flow Station 2, as opposed to a mix of water and air temperature. A quality check of the recorded water temperature values was performed on July 18, 2018. A YSI Professional Plus water quality instrument was used for a field measurement while on-site at Flow Station 3. The field measurement at 10:11 AM yielded a value of 20.3 degrees Celsius or 68.5 degrees Fahrenheit. Comparing this to the recorded value of 68.9 degrees Fahrenheit at 9:54 AM for Flow Station 3, the equipment is believed to be operating correctly. Furthermore, the parallel values recorded between Flow Station 1 and 3 also confirm that the temperature is being measured accurately. The difference in Flow Station 2 water temperature when compared to Flow Station 1 and Flow Station 3 is likely due to the fact that the water from Flow Station 2 is runoff from I-70. This runoff travels across dark-colored impervious surfaces, which has the ability to retain heat and therefore transfer this energy to the water as it travels across its surface. See Table 6 for a breakdown of these results.

Table 6. Water Temperature Summary Statistics for Year 1

	Flow Station 1	Flow Station 2	Flow Station 3
Minimum (°F)	61.1	59.2	62.1
Maximum (°F)	75.7	73.8	75.3
Average (°F)	68.1	62.3	68.3

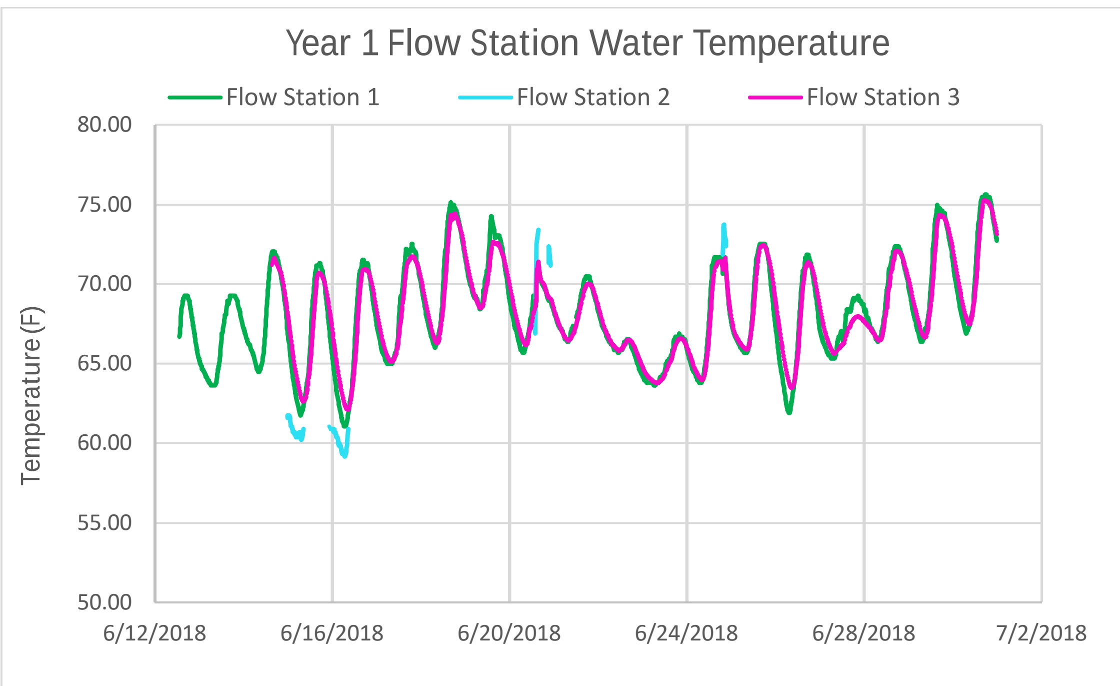

Figure 23. Year 1 Flow Station Water Temperature

4.2 Physical Monitoring Results

4.2.1 Cross Sections

Due to actively eroding banks and poor visual indicators, it was not possible to accurately identify the bankfull elevation in the field. Instead, regression equations that estimated the bankfull cross sectional area as a function of the upstream drainage area were used (Maryland Hydrology Panel, 2010). That area was then applied to the surveyed cross sections. The factors needed to determine the bankfull cross sectional area were drainage area and the hydro-physiographic region. The delineated drainage area was provided in the monitoring plan, and the hydro-physiographic region was determined to be the Piedmont providence in Maryland. Next, appropriate regression equations were taken from the *Maryland Stream Survey: Bankfull Discharge and Channel Characteristics of Streams in the Piedmont Hydrologic Region* (USFWS, 2002). The following equation was used to estimate the bankfull cross sectional area:

$$Cross\ Sectional\ Area = 17.42 * DA^{0.73}$$

Using this equation, the bankfull cross sectional area was estimated to be 28.36 ft^2. Using this, the surveyed cross-sectional bankfull width and mean depth were then estimated. Bankfull width for the upstream cross section, Cross Section 1 (CS-1), was estimated to be 16.86 feet, with a mean depth of 1.68 feet. Bankfull width for the downstream cross section, Cross Section 2 (CS-2), was estimated to be 14.44 feet, with a mean depth of 1.96 feet. See Table 7 for a breakdown of the results. Top of bank cross sectional area was also calculated for CS-1 and CS-2, which was determined to be 35.29 and 36.90 square feet, respectively.

Table 7. Bankfull estimation results

Reach	Bankfull Width (ft)	Mean Depth (ft)	Width/ Depth Ratio	Bankfull Area (ft^2)	Top of Bank Area (ft^2)
CS-1	16.86	1.68	10.04	28.36	35.29
CS-2	14.44	1.96	7.37	28.36	36.90

To present the surveyed cross section results, the Ohio Department of Natural Resources' *The Reference Reach Spreadsheet for Channel Survey Data Management* version 4.3L (Mecklenburg , 2006) was used. In this format, an average bankfull width and depth for the reach is used. Based on the results from the regression equations for bankfull width and depth, an average value of 15.65 feet for width and 1.82 feet for mean bankfull depth were used so that the computed bankfull characteristics were comparable between cross sections. The flood prone elevation, which is twice the bankfull depth, was also determined. See Table 8 for a summary of the results.

Table 8. Bankfull Elevation and Floodprone Elevation

Reach	Bankfull Elevation (ft)	Flood Prone Elevation (ft)
CS-1	437.00	438.77
CS-2	436.30	438.12

Survey 1 was performed on June 13, 2018. During quality checks for the cross-sectional data, an error was discovered based on the difference in calculated elevations of the monuments when compared to the GPS survey results. It was determined that the laser level used during Survey 1 was not self-leveling due to an incorrect setting. The data from the survey was analyzed to determine corrective actions. A correction function for the data was calculated using two assumptions. The first assumption is that the error for the right bank monument is zero. For Survey 1, the laser level was set-up along the right bank of the LPR. This would indicate that the error from the surveyed data points would increase linearly as the survey progressed further from the laser level. The second assumption was that the elevations calculated for the monuments is accurate. Using these assumptions, the difference between the survey left bank elevation and the GPS elevation was calculated. A linear function representing the survey error across the cross section was determined and used to correct the survey data points collected in the field.

To validate the results of this correction to Survey 1, another survey of the cross sections, Survey 2, was performed on August 7, 2018 using the proper self-leveling settings for the laser level. The results were referenced to NAVD 88 to see how they compared to the GPS estimated elevations. Cross Section 1 monument elevations were within 0.04 feet of the monument, while Cross Section 2 was within 0.12 feet. Depending on the GPS unit used, an accuracy of 0.2 feet can be expected. Because the survey results are within this range, it is believed that the results from the survey are reasonable. These were then overlaid with the Survey 1 to see how they compared. The top of bank elevations were determined to be comparable while change can be seen along the stream bottom, which is to be expected for an active stream. Based on these results and the accuracy to be expected from this type of physical monitoring, Survey 1 is believed to be acceptable and can be used as baseline survey for the project.

See Figures 24 and 25 below for these results. Additional survey of the cross section will be conducted in Year 2 after significant rain events and during baseline mobilizations in June 2019. See Appendix C for survey field data sheets.

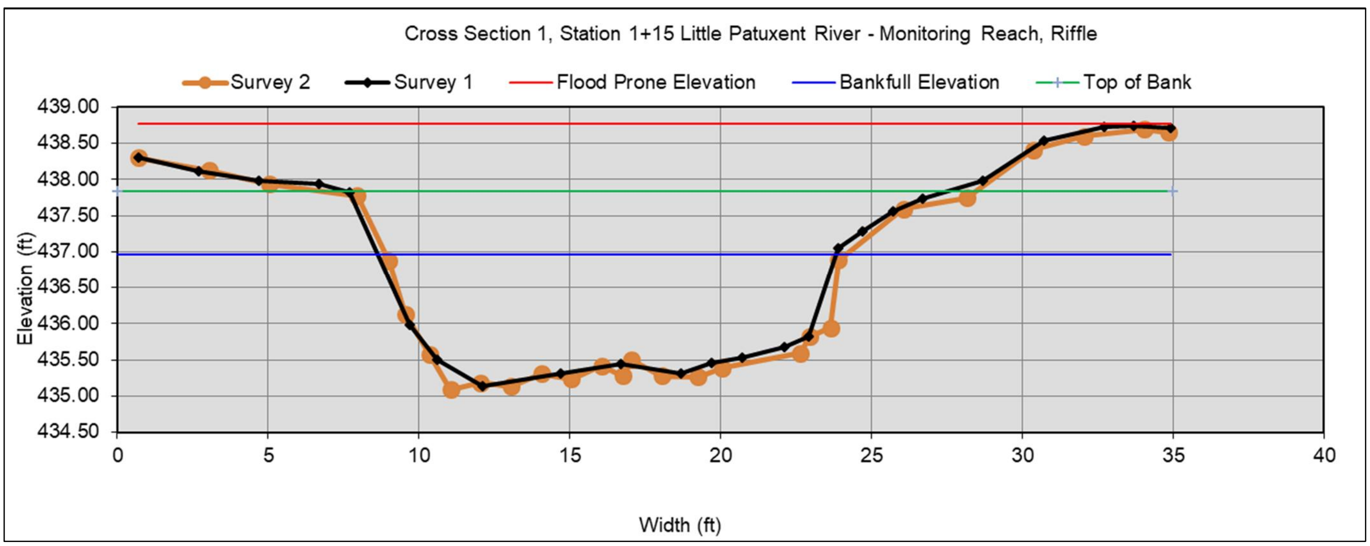

Figure 24. Cross Section 1, Year 1 Baseline Survey

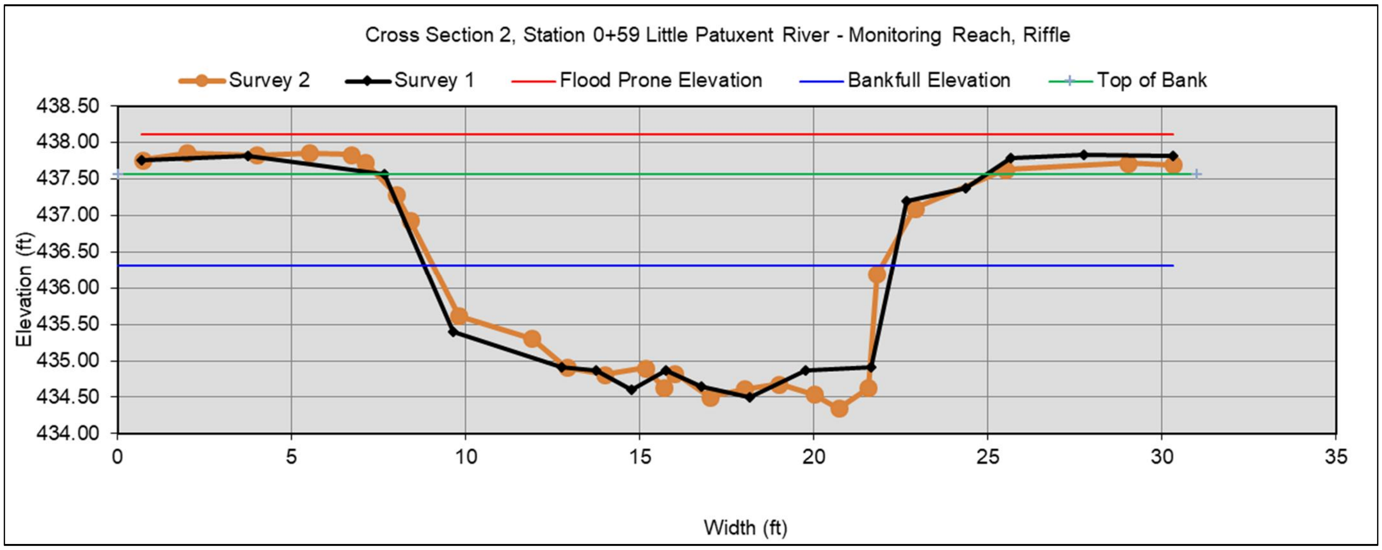

Figure 25. Cross Section 2, Year 1 Baseline Survey

4.2.2 Longitudinal Profile Survey

Longitudinal profiles of the LPR bed and water surface were surveyed for the Year 1 baseline survey. The baseline river bed and water-surface profiles for Year 1 are shown in Figure 26 below. Cross Section 1 is located at Station 115.0, and Cross Section 2 is located at Station 59.0. Water surface slope between CS-1 and CS-2 is shown below, which are both riffle features. See Appendix C for survey field data sheets.

Table 9. Baseline Bed and Water Surface Elevation Slopes for the Monitoring Reach

	River Bed Slope	Water Surface Slope
Year 1 Baseline	1.179%	1.196%

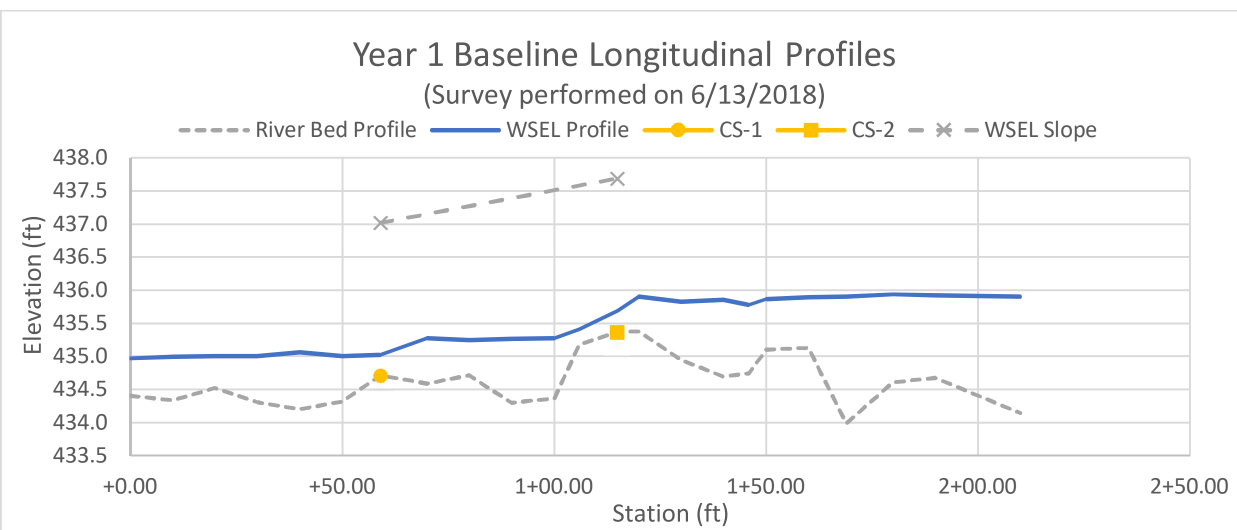

Figure 26. River Bed and Water Surface Elevation Profiles

4.2.3 Sediment Mobility Assessment

Results of the sediment mobility assessment are presented in this section. The assessment was performed for Cross Section 1 and Cross Section 2. The results of the Wolman pebble-count were also combined to provide a single representative riffle assessment for the monitoring reach. See Appendix C for the pebble count field data sheets. Table 10 presents the results of the Wolman pebble count and Table 11 presents the outcomes of the sediment mobility assessment for Cross Section 1, Cross Section 2, and the overall monitoring reach. As previously discussed earlier in the report, the monitoring reach is considered stable when the boundary shear stress is twenty percent greater than the critical shear stress. This section of the LPR is considered stable based on the results of the assessment. Based on the results, Cross Section 1 boundary shear stress is 75 percent greater than critical shear stress and Cross Section 2 boundary shear stress is 66 percent greater than critical shear stress. The overall monitoring reach, using the combined results from the Wolman Pebble count from Cross Station 1 and 2, has a boundary shear stress that is 70 percent greater than the critical shear stress. See Appendix F for the calculations for the sediment mobility assessment.

Table 10. Wolman Pebble Count Results

Cross Section 1 (Upstream)		**Cross Section 2 (Downstream)**		**Overall Monitoring Reach**	
Size (mm)		Size (mm)		Size (mm)	
D16	0.39	D16	13	D16	1.5
D35	2.1	D35	25	D35	18
D50	22	D50	33	D50	28
D65	35	D65	46	D65	42
D84	58	D84	76	D84	66
D95	89	D95	96	D95	94
Size Distribution		Size Distribution		Size Distribution	
mean	4.756049	mean	31.43247	mean	9.949874
dispersion	29.52331	dispersion	2.420746	dispersion	10.5119
skewness	-0.45131	skewness	-0.02414	skewness	-0.35051

Table 11. Sediment Mobility Assessment Results

	Cross Section 1	**Cross Section 2**	**Overall Monitoring Reach**
Critical Dimensionless Shear Stress	0.0094	0.0130	0.0113
Critical Shear Stress (psf)	0.2818	0.4218	0.3582
Average Boundary Shear Stress (psf)	1.1413	1.2444	1.1928

In addition to shear stress calculation, the Wolman pebble-count results were used to determine the channel roughness factor. As mentioned in the Flow Station 1 results section, the roughness factor *n* is used to convey characteristics about the wetted portion (bottom and sides) of the channel. See Table 12**Error! Reference source not found.Error! Reference source not found.** for the results of this calculation for Cross Section 1, Cross Section 2, and the overall monitoring reach. Ultimately, the overall reach result was used for Flow Station 1 roughness coefficient because this represents the ultimate LPR conditions. See Appendix F for the calculations of channel roughness.

Table 12. Channel roughness results

	Cross Section 1	**Cross Section 2**	**Overall Monitoring Reach**
Channel Roughness (n)	0.033	0.036	0.035

5 Discussion

5.1 Anomalies and Lessons Learned

Data likely impacted due to monitoring activity, including logger measurements that occurred during installation, data downloads, and maintenance periods, were removed from the data records presented in this report. These were periods when the equipment was being handled or adjusted; therefore, the data generated by the monitoring equipment may be inaccurate or unreliable. When reviewing the data logger records, these times were determined using the time frame referenced in the logbook that is used in the field while at the project locations. The Onset HOBO data loggers also have the ability to record date and time stamps of downloads, which was used to help sort and remove the invalid data records. Although impacted data were not presented in this report, all data points are being stored for review at a later date, if needed.

As discussed in section 4.1.3, the stage data recorded by the area-velocity meter needed correction during the calibration period occurring between June 14, 2018 and June 27, 2018. During the calibration period, a manual measurement of the stage directly adjacent to the area-velocity meter did not equal the values reported from the area-velocity meter logger. This was because the measured distance above the stream bed, which was programmed into the area-velocity meter system configuration, was incorrect. This distance was re-measured, and the area-velocity meter was re-programmed. The stage measurements shown were reduced by 0.18 feet. This adjustment provided an area-velocity meter stage that was within 0.018 feet of the measured stage in the field and is considered within a reasonable tolerance for error. This variance may also be due to the field measurements being directly adjacent to the area-velocity meter since the ground directly below the meter is inaccessible. The corrected stage data are presented in this report. Average flow and total flow volume were re-calculated using the corrected stage value.

5.2 Key Project Questions

The primary goal of the monitoring study is to answer several questions pertaining to ESD controls and stream channel response. The questions are as follows:

1. Will the peak discharge coming from controlled catchments be reduced once controls have been implemented?
2. Will there be geomorphological response to the LPR once controls are in place?
3. What are the thresholds for stream stability, and do the catchment controls improve stream stability through peak discharge attenuation?
4. Can a partnership with Howard County on a larger watershed monitoring plan increase the opportunity to observe a difference in discharge and channel stability?

The project is currently in its first year of monitoring, and the data that have been collected will be used to establish a baseline for the LPR stream characteristics. Since the proposed ESD controls have not been installed and the baseline data collection has not been completed, these questions cannot currently be answered or analyzed. Straughan will continue to monitor the physical characteristics of the LPR and record the data necessary to discuss these questions at a later stage of the project.

6 Conclusion

The Year 1 monitoring effort was limited in duration, and only one physical monitoring event was performed during this period, which is sufficient to establish pre-construction baseline conditions. However, without subsequent physical monitoring data no conclusions can be drawn about the overall effects of stormwater runoff on the Little Patuxent River without the presence of bioretention facilities along I-70. Overall, the project rain gauge is correlating well with a nearby rain gauge and the sediment mobility assessment indicates that the monitoring reach of the LPR is stable. For continuous flow monitoring, Flow Station 1 total flow volume is consistent with the total flow volume for Flow Station 3, suggesting that the equipment is functioning properly, and the estimated flow calculations are acceptable.

Monitoring for Year 2 is currently underway and will also be used to establish baseline, pre-construction conditions. Data collected after the first qualifying rain event will be useful in demonstrating the effects of current runoff conditions. Year 2 will be the last year of pre-construction monitoring. Monitoring during Year 3 and 4 will represent conditions during construction of the proposed infiltration facilities.

7 References

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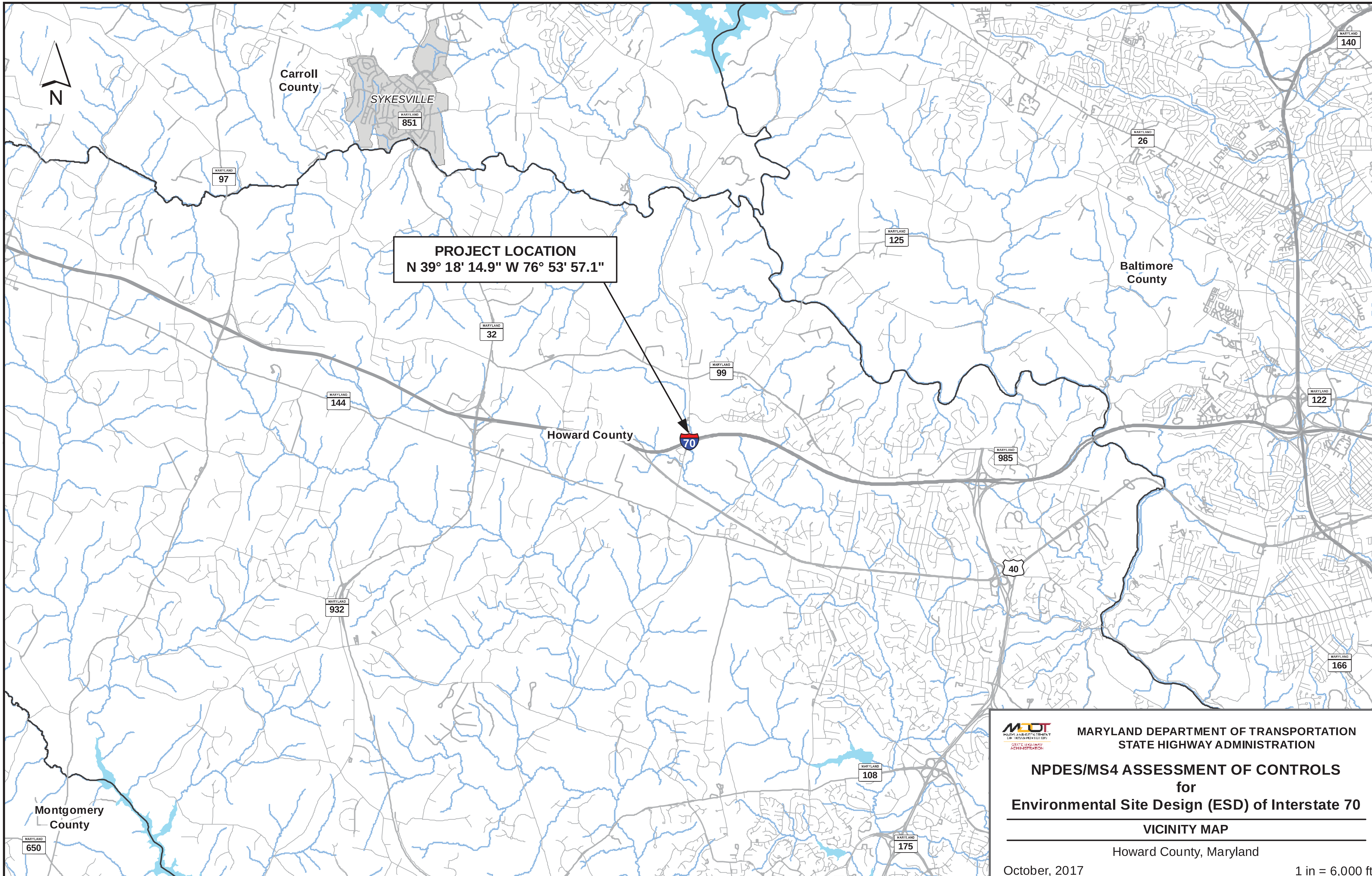
Appendix A

Little Patuxent River Project Mapping



MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

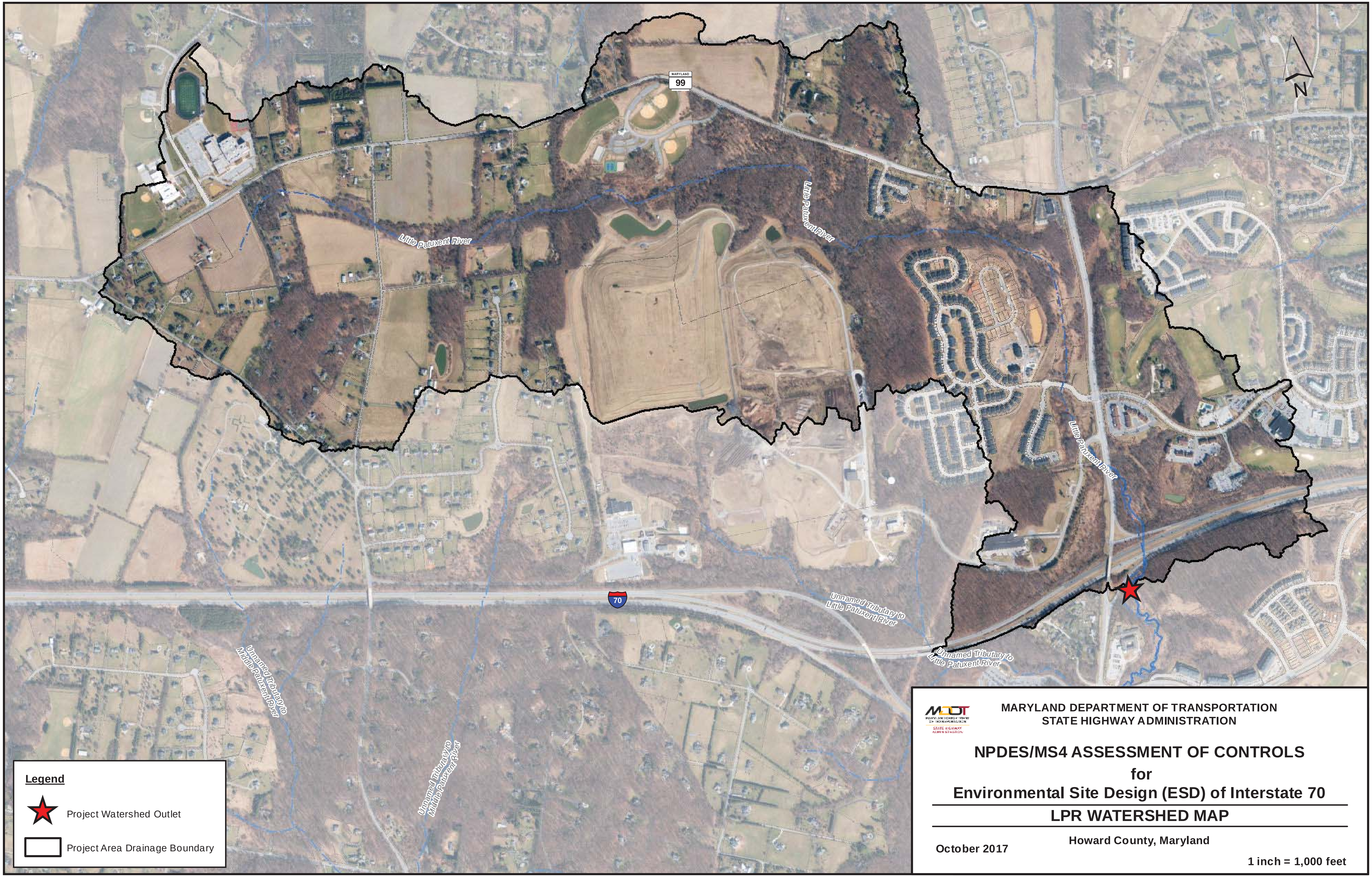
NPDES/MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70

VICINITY MAP

Howard County, Maryland

October, 2017

1 in = 6,000 ft



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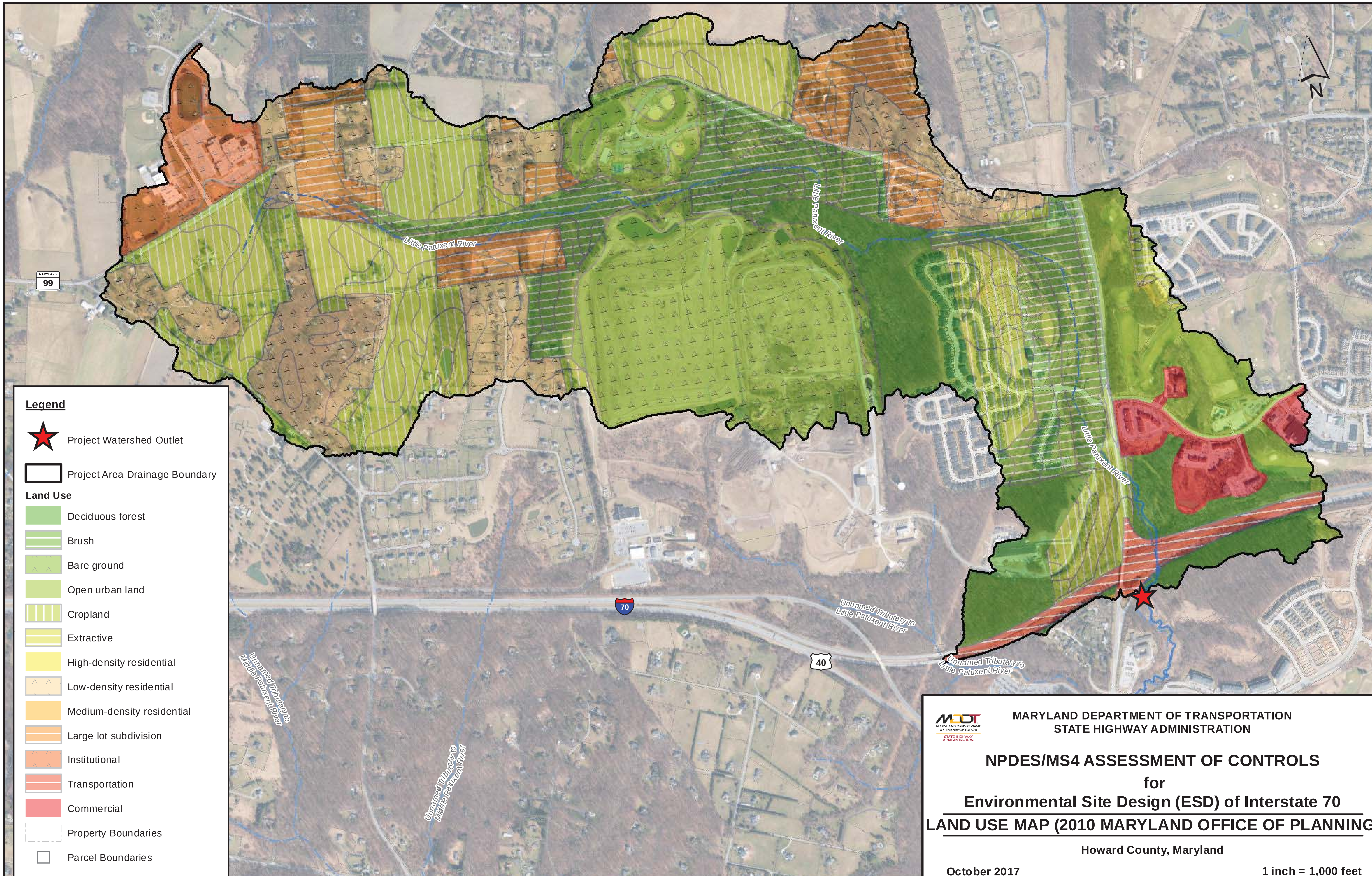
LPR WATERSHED MAP

October 2017

Howard County, Maryland

1 inch = 1,000 feet



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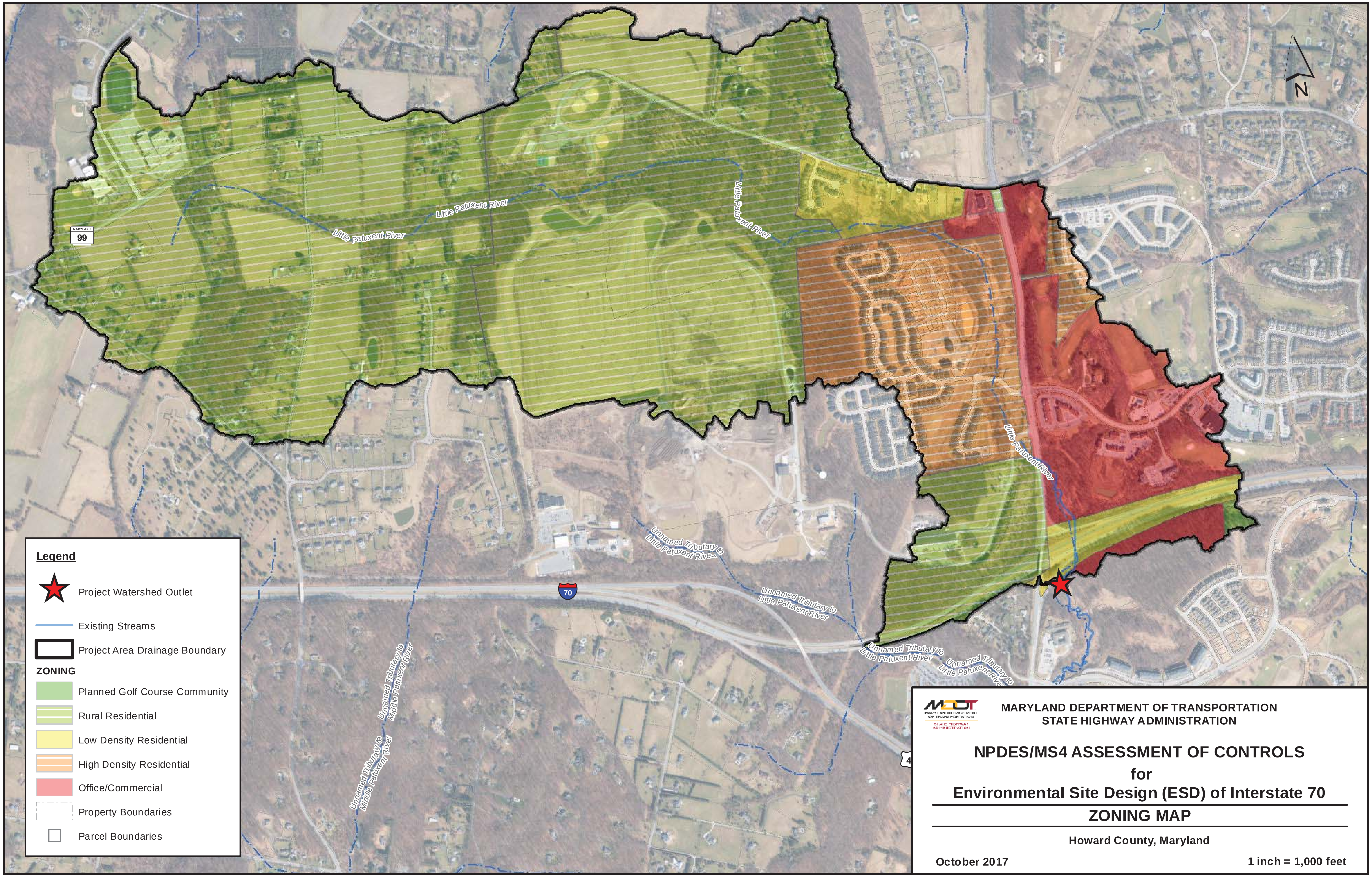
STATE HIGHWAY ADMINISTRATION

NPDES/MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70

LAND USE MAP (2010 MARYLAND OFFICE OF PLANNING)

Howard County, Maryland

October 2017 | 1 inch = 1,000 feet



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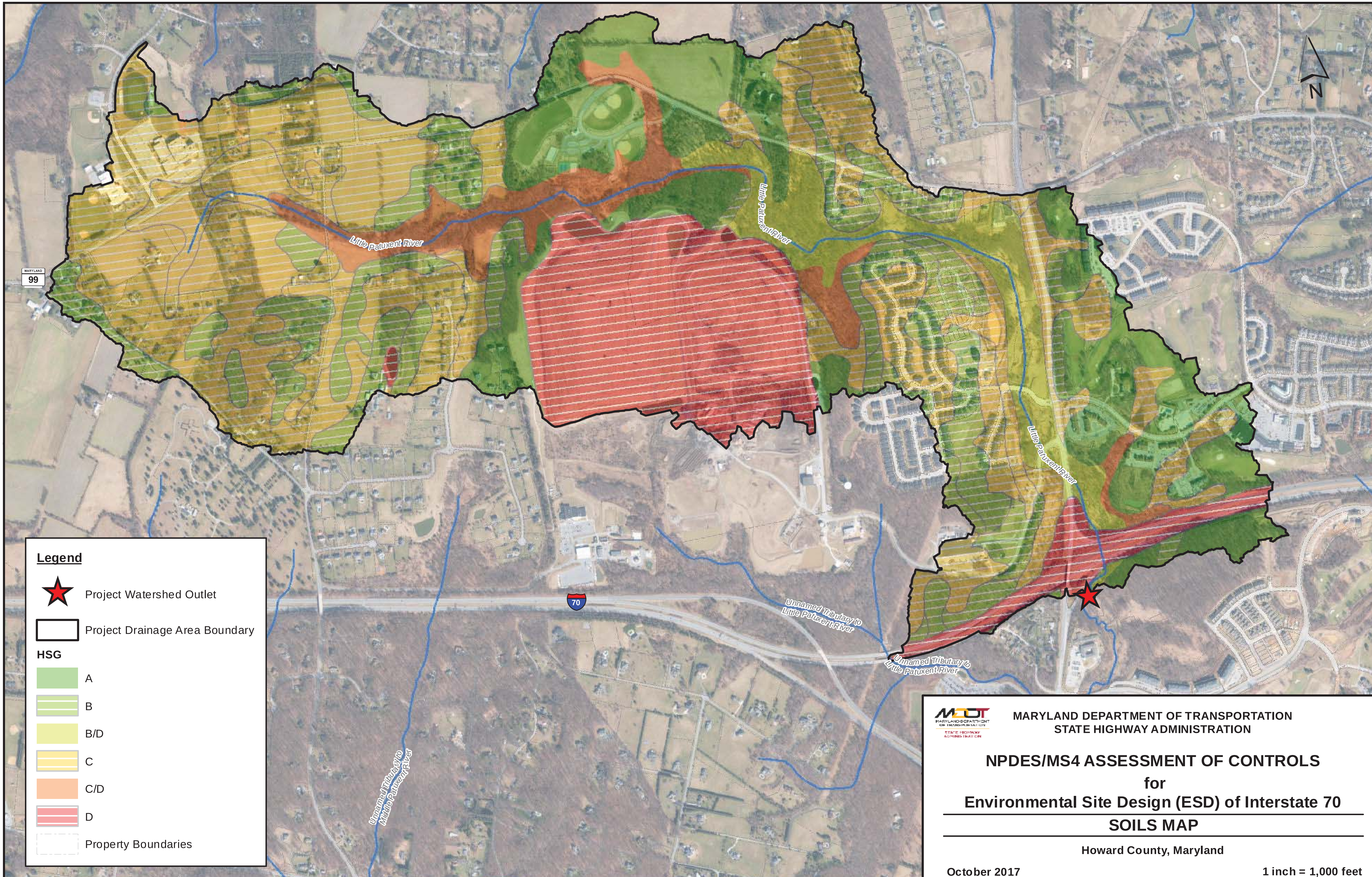
99
Little Patuxent River
Little Patuxent River
Little Patuxent River
Little Patuxent River
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Middle Patuxent River
Unnamed Tributary to Middle Patuxent River
70
Legend
Project Watershed Outlet
Existing Streams
Project Area Drainage Boundary
ZONING
Planned Golf Course Community
Rural Residential
Low Density Residential
High Density Residential
Office/Commercial
Property Boundaries
Parcel Boundaries
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
NPDES/MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70
ZONING MAP
Howard County, Maryland
October 2017
1 inch = 1,000 feet



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MARYLAND
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Little Patuxent River
Little Patuxent River
Little Patuxent River
70
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Little Patuxent River
Unnamed Tributary to Middle Patuxent River
Legend
Project Watershed Outlet
Project Drainage Area Boundary
HSG
A
B
B/D
C
C/D
D
Property Boundaries
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
NPDES/MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70
SOILS MAP
Howard County, Maryland
October 2017
1 inch = 1,000 feet

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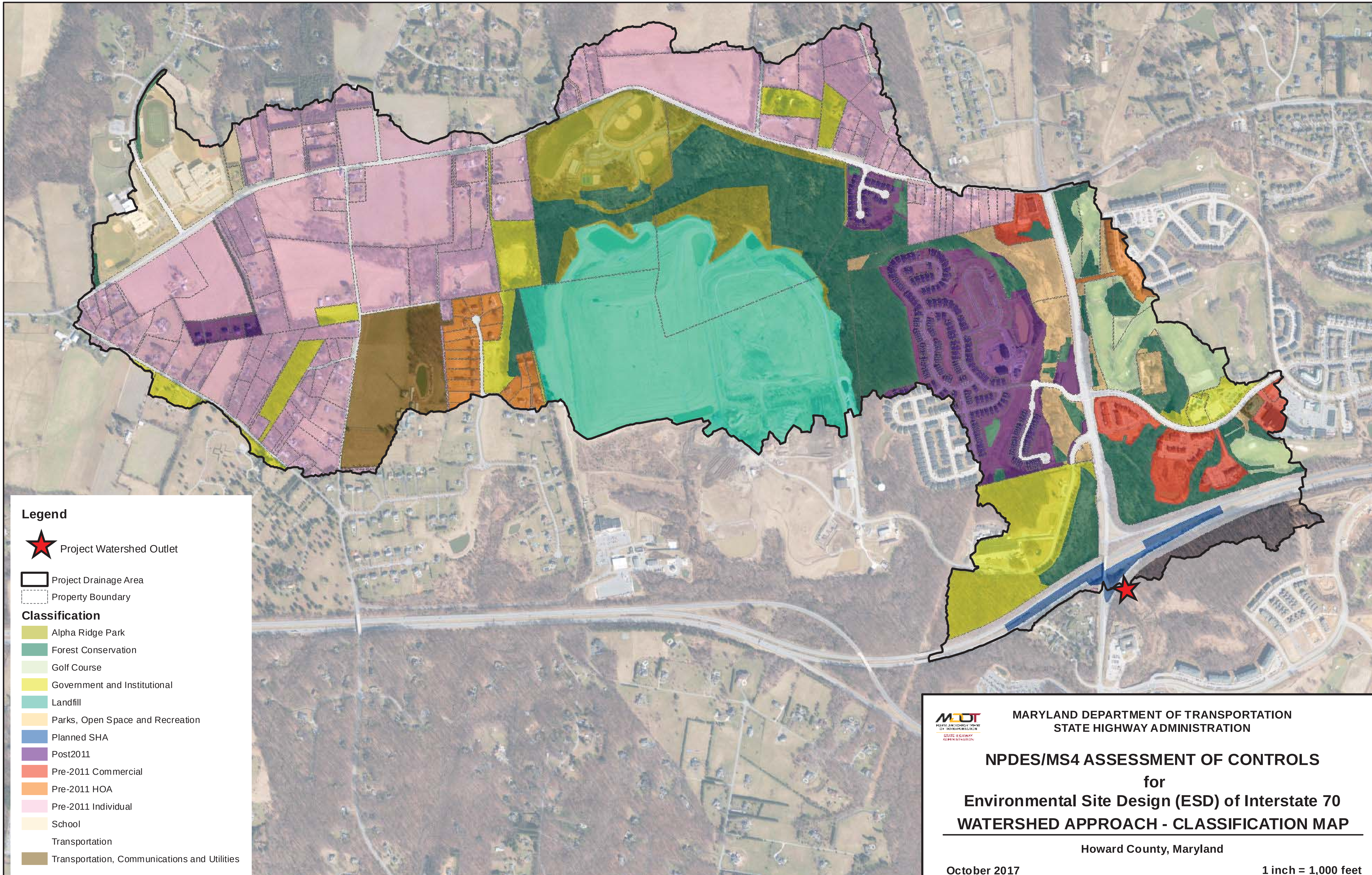
NPDES / MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70

SHA TMDL EFFORTS

Howard County, Maryland

August 31, 2016 **1 inch = 650 feet**



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NPDES/MS4 ASSESSMENT OF CONTROLS
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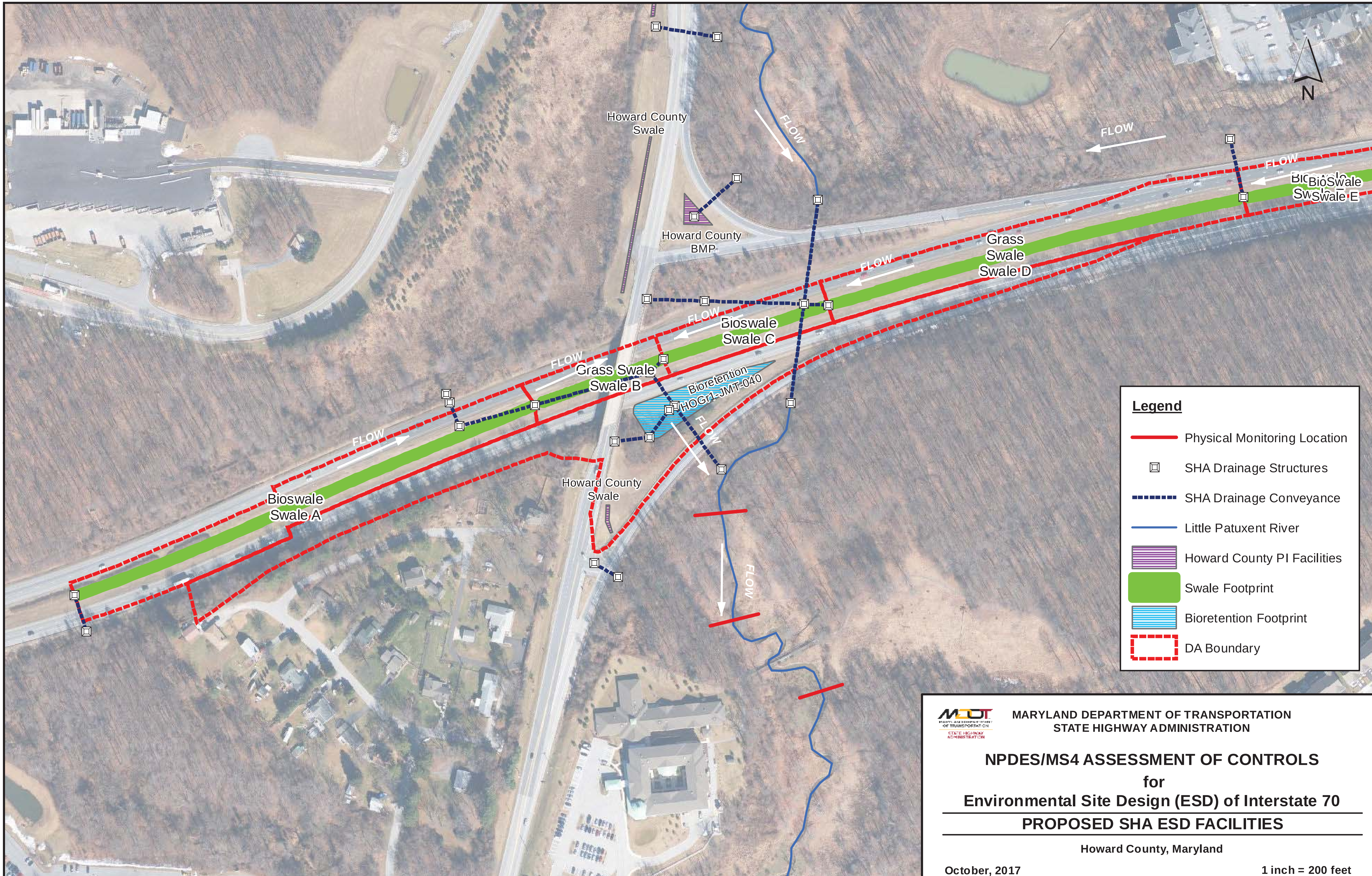
Environmental Site Design (ESD) of Interstate 70
WATERSHED APPROACH - CLASSIFICATION MAP

Howard County, Maryland

October 2017 — 1 inch = 1,000 feet



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NPDES/MS4 ASSESSMENT OF CONTROLS
for
Environmental Site Design (ESD) of Interstate 70

PROPOSED SHA ESD FACILITIES

Howard County, Maryland

October, 2017 — 1 inch = 200 feet

Appendix B

Photo Log

Photograph 1. 6/12/2018: Upstream of Flow Station 1, looking upstream

Photograph 2. 6/12/2018: Upstream of Flow Station 1, looking downstream

Photograph 3. 6/12/2018: Flow Station 1, depth logger housing

Photograph 4. 6/12/2018: Flow Station 1, facing downstream

Photograph 5. 6/12/2018: Flow Station 1, facing upstream

Photograph 6. 6/12/2018: Flow Station 2, depth logger housing

Photograph 7. 6/12/2018: Flow Station 2, facing upstream

Photograph 8. 6/12/2018: Flow Station 2, facing downstream

Photograph 9. 6/12/2018: Broken outfall apron at Flow Station 2

Photograph 10. 6/12/2018: Flow Station 2 confluence with LPR, facing upstream

Photograph 11. 6/12/2018: Flow Station 2 confluence with LPR, facing downstream

Photograph 12. 6/12/2018: Barometer (left) and rain gauge (right) set-up

Photograph 13. 6/13/2018: Longitudinal profile Station 0+00, facing downstream

Photograph 14. 6/13/2018: Longitudinal profile Station 0+90, pool

Photograph 15. 6/13/2018: Longitudinal profile Station 1+15, riffle

Photograph 16. 6/13/2018: Longitudinal profile Station 2+10, facing upstream

Photograph 17. 6/13/2018: Cross Section 1, looking from left bank (LB) to right bank (RB)

Photograph 18. 6/13/2018: Cross Section 1, facing downstream with LB on the left

Photograph 19. 6/13/2018: Cross Section 1, looking from RB to LB

Photograph 20. 6/13/2018: Cross Section 1, facing upstream

Photograph 21. 6/13/2018: Cross Section 1, LB

Photograph 22. 6/13/2018: Cross Section 1, RB

Photograph 23. 6/13/2018: Cross Section 2, looking from LB to RB

Photograph 24. 6/13/2018: Cross Section 2, looking downstream with LB on the left

Photograph 25. 6/13/2018: Cross Section 2, looking from RB to LB

Photograph 26. 6/13/2018: Cross Section 2, facing upstream

Photograph 27. 6/13/2018: Cross Section 2, LB

Photograph 28. 6/13/2018: Cross Section 2, RB

Photograph 29. 6/21/2018: Flow Station 3, area-velocity meter installation location, looking from LB

Photograph 30. 6/21/2018: Flow Station 3, area-velocity meter marine battery housing

Photograph 31. 6/21/2018: Flow Station 3, area-velocity meter display housing

Photograph 32. 6/21/2018: Flow Station 3 battery and display set-up

Photograph 33. 6/21/2018: Flow Station 3 marine battery site security set-up

Appendix C

Geomorphic Data

MARYLAND STREAM STUDY

CROSS SECTION "up Stream"

STREAM Little Patuxent River	DATE 6/18/18
USGS #	CREW JB/MD
FWS #	

Begin on left, facing downstream (all measurements are in feet unless otherwise noted)

NOTE	DIST.	ELEV. / DEPTH	NOTE	DIST.	ELEV. / DEPTH
Top of LP @ LB	0.0	5.58			
Ground @ LP	0.0	5.66			
LB MON	1.0	5.59			
LB	3.0	5.76			
LB	5.0	5.89			
LB	7.0	5.93			
TOB LB	8.0	~~6.20~~ 6.03			
Bank shelf	10.0	7.97			
EW	10.9	8.35			
AC	12.4	8.70	AC / Depth / WS	12.4	8.31
AC	15.0	8.51	AC / WS	15.0	8.25
AC	17.0	8.37	AC / WS	17.0	8.20
AC	19.0	8.50	AC / WS	19.0	8.20
AC	20.0	8.34	AC / WS	20.0	8.19
AC	21.0	8.26	AC / WS Depth	21.0	.15
EW	22.4	8.12			
Bank shelf	23.2	7.97			
TOB RB	24.2	6.74			
RB	25.0	6.50			
RB	26.0	6.21			
RB	27.0	6.04			
RB	29.0	5.77			
RB	31.0	5.21			
RB	33.0	5.01			
RB	34.0	4.99			
RB MON	35.2	5.01			
Ground @ RP	35.8	5.02			
Top of RP @ RB	35.8	4.76			
Height of Instrument		5.38			

STATION OR DISTANCE FROM GAGE

DIRECTION FROM GAGE

NOTATIONS

NOTE	ABBREV
Left	L
Right	R
Pin	P
Edge of Water	EW
Water Surface	WS
Active Channel	AC
Scour Line	SL
Bankfull	BF
Top of Bank	TOB
Monument	MON

ENTRENCHMENT

FLOODPRONE WIDTH

BANKFULL WIDTH

ENTRENCHMENT

GPS Coordinates

Left Monument

Latitude

Longitude

Error

Right Monument

Latitude

Longitude

Error

Instrument (Prop.#)

HI = 5.38

MARYLAND STREAM STUDY
CROSS SECTION   CS-1, upstream XS

STREAM Little Patuxent River	DATE 8/7/18
USGS #	CREW JB/BD
FWS #	

Begin on left, facing downstream (all measurements are in feet unless otherwise noted)

NOTE	DIST.	ELEV. / DEPTH	NOTE	DIST.	ELEV. / DEPTH
GR@ LP	Ø	5.75			
LP	Ø	5.605			
LB MON	0.65	5.725			
LB	3.0	5.40			
LB	5.0	6.09			
TOB LB	7.9	6.25			
LB shelf	8.45	7.155			
LB shelf	9.5	7.895			
EW LB	10.3	8.45			
AC	11.0	8.94	WS	11.0	8.47
AC	12.0	8.84	WS	12.0	8.50
AC	13.0	8.89	WS	13.0	8.47
AC	14.0	8.72	WS	14.0	8.505
AC	15.0	8.79	WS	15.0	8.44
AC	16.0	8.61	WS	16.0	8.41
AC	~~17.0~~				
AC	16.7	8.75	WS	16.7	8.42
AC	17.0	8.53	WS	17.0	8.44
AC	18.0	8.75	WS	18.0	8.40
AC	19.2	8.765	WS	19.2	8.40
AC	20.0	8.64	WS	20.0	8.40
~~AC~~ EW RB	22.6	8.43			
RB shelf	22.9	8.21			
RB shelf	23.6	8.08			
RB TOB	23.95	7.14			
RB	26.0	6.43			
RB	28.1	6.28			
RB	30.3	5.615			
RB	32.0	5.425			
RB	34.0	5.33			
RB MON	34.8	5.37			
RB RP	35.6	5.265			
G@ RP	35.6	5.4			

STATION OR DISTANCE FROM GAGE

DIRECTION FROM GAGE

NOTATIONS

NOTE	ABBREV
Left	L
Right	R
Pin	P
Edge of Water	EW
Water Surface	WS
Active Channel	AC
Scour Line	SL
Bankfull	BF
Top of Bank	TOB
Monument	MON

ENTRENCHMENT

FLOODPRONE WIDTH	
BANKFULL WIDTH	
ENTRENCHMENT	

GPS Coordinates

Left Monument	
Latitude	
Longitude	
Error	
Right Monument	
Latitude	
Longitude	
Error	

Instrument (Prop.#)
Laser Level

MARYLAND STREAM STUDY

CROSS SECTION Downstream Cross Section

STREAM Little Patuxent River	DATE 06/13/2018
USGS #	CREW J. Bishop J. Jahn
FWS #	

Begin on left, facing downstream (all measurements are in feet unless otherwise noted)

NOTE	DIST.	ELEV. / DEPTH	NOTE	DIST.	ELEV. / DEPTH
Top of Pin-LB	0.0	5.57			
Grd @ Pin-LB	0.0	5.64			
MON-LB	0.95	5.65			
FP-LB	4.0	5.59			
TOB-LB	7.9	5.84			
Bottom of Bank-LB	9.9	8.01			
EW-LB	13.0	8.50			
AC	14.0	8.55			
WS-depth	14.0	0.21			
AC	15.0	8.82			
WS-depth	15.0	0.396			
AC	16.0	8.55			
WS-depth	16.0	0.25			
AC	17.0	8.77			
WS-depth	17.0	0.34			
Thalweg	18.4	8.92			
WS-depth	18.4	0.50			
AC	20.0	8.55			
WS-depth	20.0	0.49			
EW-RB-BOB	21.9	8.51			
TOB-RB	22.9	6.23			
FP-RB	24.6	6.045			
FP-RB	25.9	5.64			
FP-RB	28.0	5.60			
MON-RB	30.55	5.61			
Grd @ Pin-RB	30.9	5.655			
Top of Pin-RB	30.9	5.51			

hoto
B
ravel
ar

and
ottom
of bank

STATION OR DISTANCE FROM GAGE

DIRECTION FROM GAGE

NOTATIONS

NOTE	ABBREV
Left	L
Right	R
Pin	P
Edge of Water	EW
Water Surface	WS
Active Channel	AC
Scour Line	SL
Bankfull	BF
Top of Bank	TOB
Monument	MON
Floodplain	FP
Ground	Grd
Bottom of Bank	BOB

ENTRENCHMENT

FLOODPRONE WIDTH

BANKFULL WIDTH

ENTRENCHMENT

GPS Coordinates

Left Monument

Latitude 39.30294262

Longitude -76.89826288

Error

Right Monument

Latitude 39.30292878

Longitude -76.89837044

Error

Instrument (Prop.#) Spectra Precision Laser LL600

Height of instrument: 64.25"
measured from ground to laser

GPS points - DS - Xsection - LB - PIN

DS - Xsection - LB - MON — (39.30294262, -76.89826288)

DS - X section - LB - PIN

DS - X section - LB - MON

└ (39.30292878, -76.89837044)

Photos
12 - from LB to RB
13 - facing DS
14 - from RB to LB
15 - facing US
16 - LB
17 - RB
18 - LB

HI = 5.38', same set up as XS-1

MARYLAND STREAM STUDY

CROSS SECTION CS-2, Downstream XS

STREAM Little Patuxent River	DATE 6/7/18
USGS #	CREW JB/BD
FWS #	

Begin on left, facing downstream (all measurements are in feet unless otherwise noted)

NOTE	DIST.	ELEV. / DEPTH	NOTE	DIST.	ELEV. / DEPTH
G @ LP	Ø	6.225			
LP	Ø	6.05			
LB MON	Ø.71	6.23			
LB	2.Ø	6.13			
LB	4.Ø	6.16			
LB	5.5	6.13			
TOB	6.7	6.155			
	7.1	6.255			
	8.Ø	6.7Ø			
	8.4	7.05			
BOB ~~TOB~~ LB	9.8	~~8.37~~ 8.37			
Bar	11.9	8.68			
EW	12.4	9.Ø8			
AC	14.Ø	9.178			
AC	15.15	9.04			
AC	15.7	9.36	WS	15.7	9.098
AC	16.Ø	9.16	WS	16.Ø	9.13
AC	17.Ø	9.49	WS	17.Ø	9.12
AC	18.Ø	9.375	WS	18.Ø	9.13
AC	19.Ø	9.31	WS	19.Ø	9.13
AC	2Ø.Ø	9.45	WS	~~14.6~~ 20.0	9.15
AC	20.7	9.64	WS	20.7	9.11
~~AC~~ EW/BOB	21.55	9.36	WS	21.55	9.07
	21.8Ø	7.8			
TOB RB	22.9	6.09			
RB	25.5	6.36			
	29.Ø	6.27			
RB MON	3Ø.3	6.29			
RP	31.4	6.22			
G @ RP	31.4	6.36			

STATION OR DISTANCE FROM GAGE	
DIRECTION FROM GAGE	

NOTATIONS	
NOTE	**ABBREV**
Left	L
Right	R
Pin	P
Edge of Water	EW
Water Surface	WS
Active Channel	AC
Scour Line	SL
Bankfull	BF
Top of Bank	TOB
Monument	MON

ENTRENCHMENT	
FLOODPRONE WIDTH	
BANKFULL WIDTH	
ENTRENCHMENT	

GPS Coordinates	
Left Monument	
Latitude	
Longitude	
Error	
Right Monument	
Latitude	
Longitude	
Error	

Instrument (Prop.#)
Laser level

US Pool GPS point ⇒ LP-US-end-210ft ✓
DS Pool GPS point ⇒ LP-DS-end-000ft ✓

MARYLAND STREAM STUDY
LONGITUDINAL PROFILE 12:00PM

STREAM: Little Patuxent River	DATE: 06/13/2018	CREW: J. Bishop, J. Kahn
USGS #	ALL MEASUREMENTS IN FEET UNLESS OTHERWISE NOTED.	
FWS #	REFERENCE POINT ELEVATION AND DESCRIPTION:	

Identifier	(ft) Backsight	Height of Instrument	(ft.) Station	Bed (ft) Surface Foresight	Bed Surface Elevation	Water (ft) Surface Foresight	Water Surface Elevation	Bankfull Foresight	Bankfull Elevation	Top of Bank Foresight	Top of Bank Elevation	Water Depth (ft) ~~Other Foresight~~	Water surface ~~Other~~ Elevation
US cross section RB — monument	4.73	57.25 in.	0	9.05		8.55						0.57	
Run		Ph 4 - Pool	10	9.11								0.65	
Run			20	8.93								0.48	
Run			30	9.14								0.69	
Run			40	9.25		8.39							
Run			50	9.13		8.45							
Riffle			59	8.74		8.43							
Run			70	8.865								0.69	
Run			80	8.74								0.54	
Photo 1, 2 — Pool			90	9.155								0.97	
Run			100	9.08								0.90	
Riffle			106	8.27		8.04							
Photo 3 — Riffle			115	8.08		7.76							
Run			120	8.075								0.53	
Run			130	8.5								0.88	
Pool			140	8.755								1.16	
Run			146	8.71		7.67							
Run			150	8.35								0.76	
Run			160	8.325								0.77	
Pool			169	9.465								1.92	
Run			180	8.84								1.33	
Run			190	8.78								1.25	
Pool			200	9.155								1.98	
Photo 5 — Pool			210	9.31								1.76	

BACKSIGHT

Upstream Cross section Right Bank monument	4.73

Cross#1

HHH HHH   HHH HHH III

MARYLAND STREAM STUDY
REACH AVERAGE PEBBLE COUNT

STREAM	US XS Little Patuxent River	DATE	6/14/18
USGS #		CREW	JB / MD
FWS #		PARTICLE TALLY COUNTS BY TRANSECT	

FEET	PARTICLE	MILLIMETERS		1	2	3	4	5	6	7	8	9	10	TOT#	ITEM%	%CUM
	Silt/Clay	< .062	S/C	IIII												
	Very Fine	.062 - .125	S	IIIIIII												
	Fine	.125 - .25	A	III												
	Medium	.25 - .50	N	IIIII												
	Coarse	.50 - 1.0	D	III												
	Vry Coarse	1.0 - 2	S	IIIIIIII	HH IIII	II										
	Very Fine	2 - 4		IIIII	III											
	Fine	4 - 6	G													
	Fine	6 - 8	R	I												
	Medium	8 - 12	A													
	Medium	12 - 16	V	I												
	Coarse	16 - 24	E	IIIIII	II											
	Coarse	24 - 32	L	IIIIII	IIIII											
	Vry Coarse	32 - 48	S	IIIIIIII	IIII											
	Vry Coarse	48 - 64		IIIIIIIII	IIIIIII	III										
0.21-0.31	Small	64 - 96	C	IIIIII												
0.31-0.42	Small	96 - 128	O	III												
0.42-0.63	Large	128 - 192	B													
0.63-0.84	Large	192 - 256	L													
0.84-1.26	Small	256 - 384	B													
1.26-1.68	Small	384 - 512	L													
1.68-3.36	Medium	512 - 1024	D													
3.36-6.72	Lrg	1024 - 2048	R													
6.72-13.43	Vry Lrg	2048-4096														
	Bedrock	>4096	BDRK													
	CHANNEL WIDTH AT TRANSECT															

	LENGTH			
REACH		PROPORTION	NO. UNITS	SAMPLED
POOL				
RIFFLE				
RUN				

TRANSECT	FEATURE	LENGTH	LOCATION	COUNT
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

cross #2
Downstream

4/+1 50

MARYLAND STREAM STUDY
REACH AVERAGE PEBBLE COUNT

STREAM	Little Patuxent River	**DATE**	6/14/18
USGS #		**CREW**	JB/MD
FWS #			

PARTICLE TALLY COUNTS BY TRANSECT

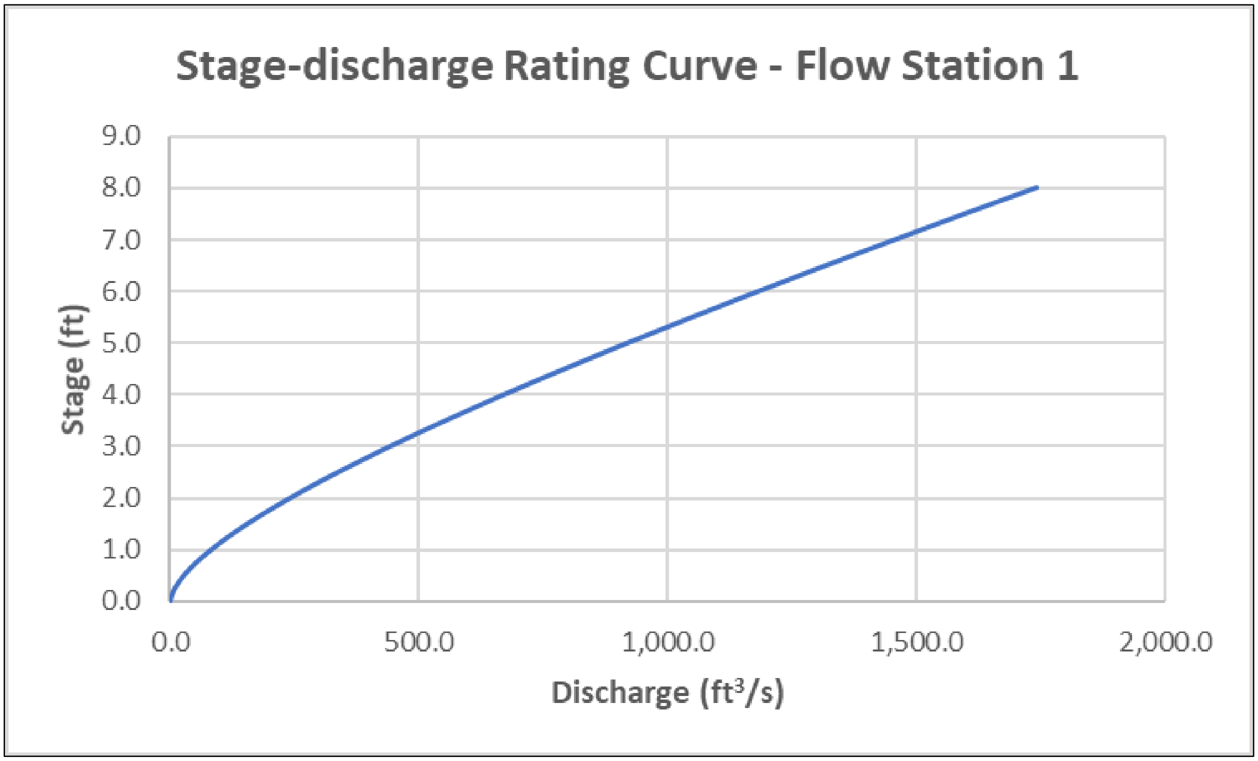
FEET	PARTICLE	MILLIMETERS		1	2	3	4	5	6	7	8	9	10	TOT#	ITEM%	%CUM
	Silt/Clay	< .062	S/C	I												
	Very Fine	.062 - .125	S													
	Fine	.125 - .25	A													
	Medium	.25 - .50	N													
	Coarse	.50 - 1.0	D	I												
	Vry Coarse	1.0 - 2	S	II												
	Very Fine	2 - 4		I												
	Fine	4 - 6	G													
	Fine	6 - 8	R	III												
	Medium	8 - 12	A	IIIIII	I											
	Medium	12 - 16	V	IIIIII												
	Coarse	16 - 24	E	IIIIIII	IIIIII	I										
	Coarse	24 - 32	L	IIIIIIII	IIIIIIII	IIII										
	Vry Coarse	32 - 48	S	IIIIIIII	IIIIIII	IIIIII										
	Vry Coarse	48 - 64		IIIIIII	III											
0.21-0.31	Small	64 - 96	C	IIIIIIII	IIIIIIIII	IIIII										
0.31-0.42	Small	96 - 128	O	IIII												
0.42-0.63	Large	128 - 192	B	I												
0.63-0.84	Large	192 - 256	L													
0.84-1.26	Small	256 - 384	B													
1.26-1.68	Small	384 - 512	L													
1.68-3.36	Medium	512 - 1024	D													
3.36-6.72	Lrg	1024 - 2048	R													
6.72-13.43	Vry Lrg	2048-4096														
	Bedrock	>4096	BDRK													
CHANNEL WIDTH AT TRANSECT																

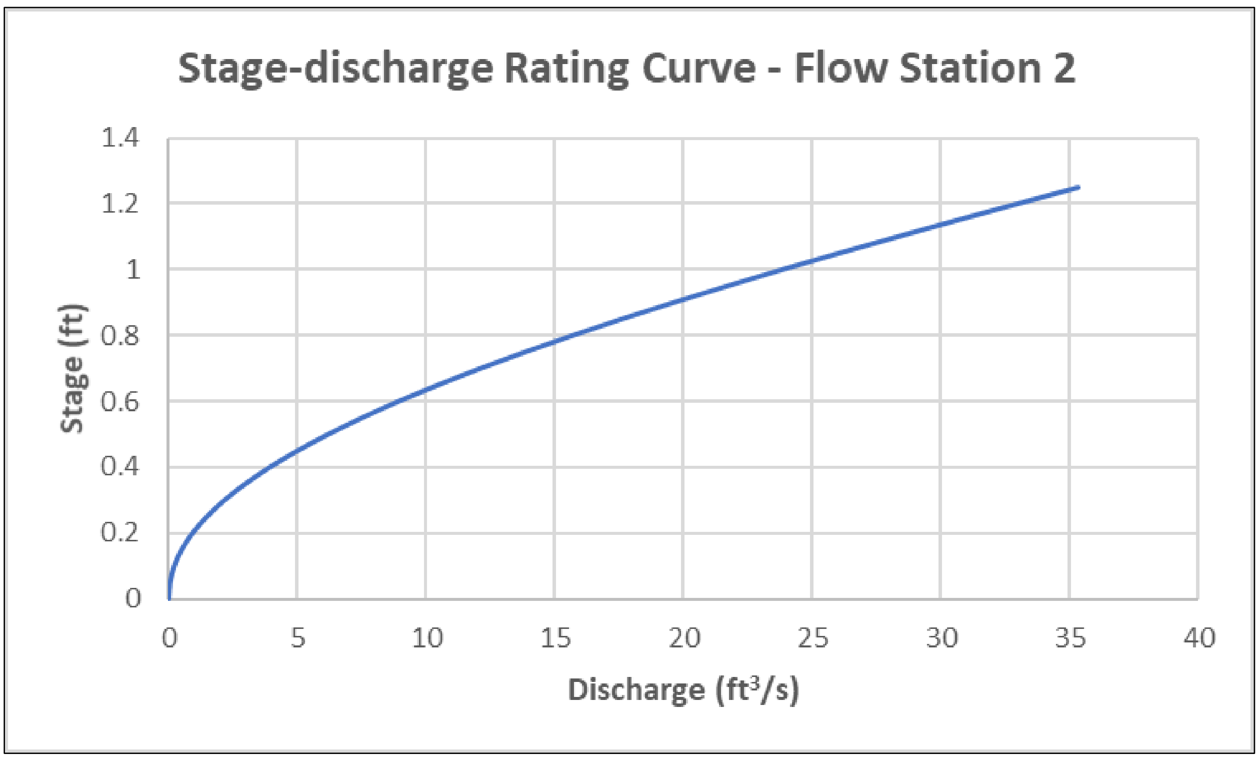
	LENGTH	PROPORTION	NO. UNITS	SAMPLED
REACH				
POOL				
RIFFLE				
RUN				

TRANSECT	FEATURE	LENGTH	LOCATION	COUNT
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Appendix D

Stage-Discharge Relationships

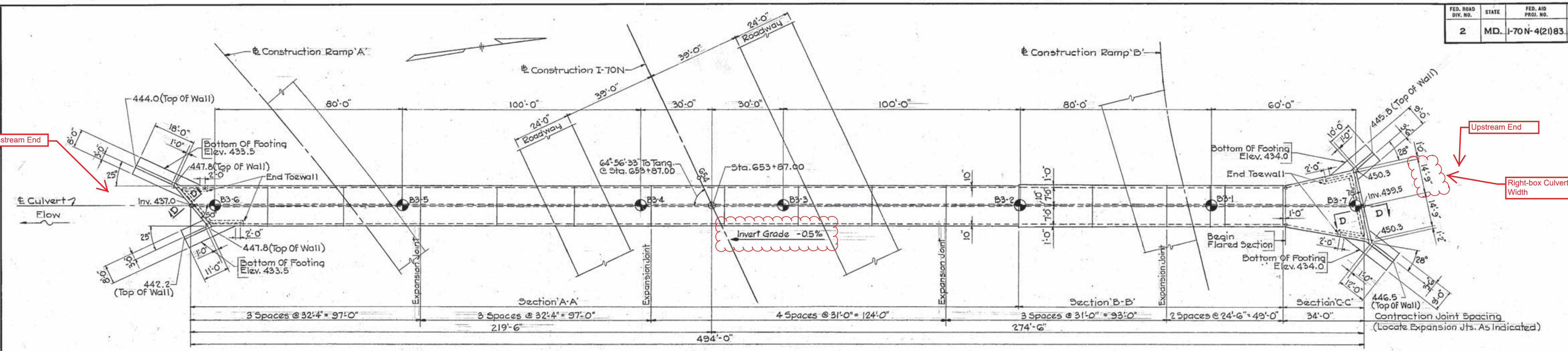

Stage-discharge Rating Curve - Flow Station 1
Stage (ft)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
500.0
1,000.0
1,500.0
2,000.0
Discharge (ft³/s)

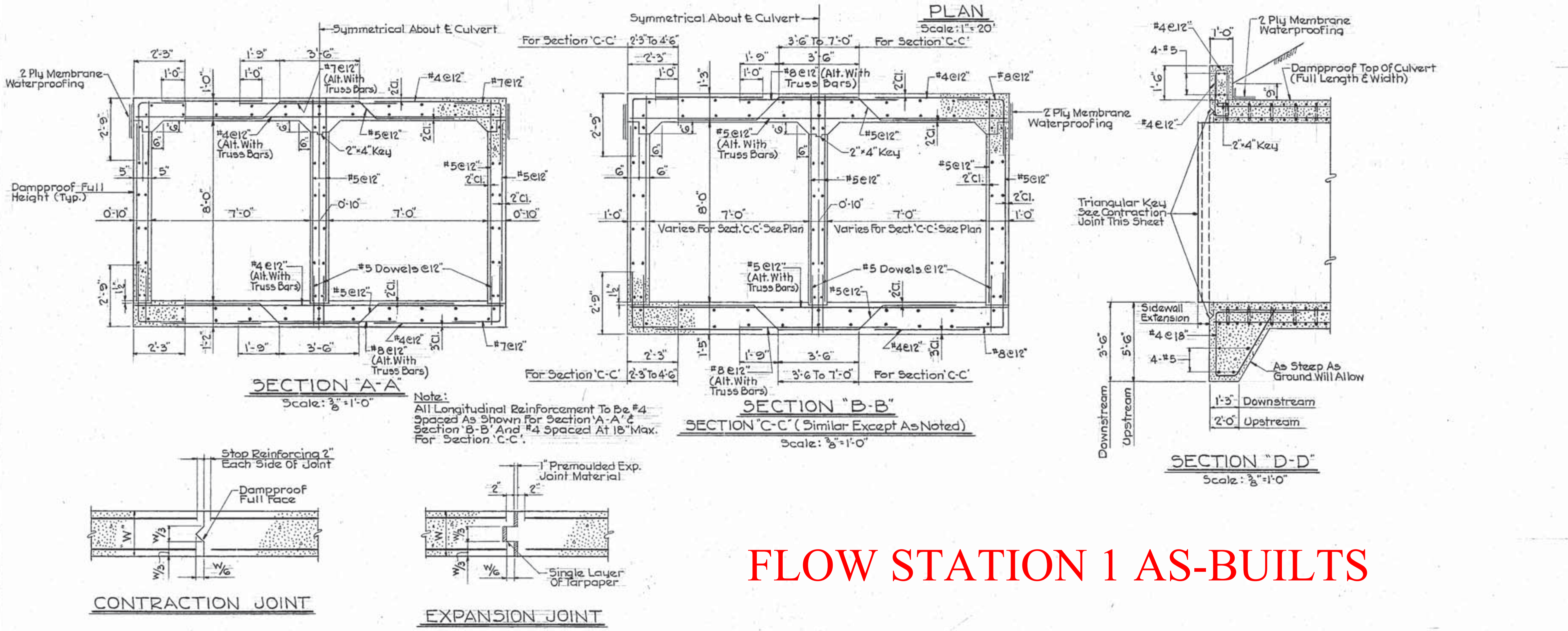

Stage-discharge Rating Curve - Flow Station 2
Stage (ft)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
30
35
40
Discharge (ft³/s)

Appendix E

Flow Station As-Builts

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
2	MD.	I-70N-4(21)83	71	85





ESTIMATED QUANTITIES

ITEM No	ITEM	UNIT	QUANTITY
303	Selected Backfill Using #6 Aggregate	C.Y.	130
304	Selected Backfill Using CR-6 Or Type 2 Sub-Base	C.Y.	130
401	Class #3 Excavation For Structures	C.Y.	3,200
446	Contingent Concrete For Box Culvert	C.Y.	5
428	Class C Concrete Subfoundation	C.Y.	5
431	Double 7.0Ft. x 8.0Ft. Reinf. Concrete Box Culv. At Sta. 653+	—	L.S.

GENERAL NOTES

SPECIFICATIONS: A.A.S.H.O. Standard Specifications For Highway Bridges, Dated 1961; And A.A.S.H.O. Interim Specifications, Dated 1961, 1962, 1963 And 1964 For Design. Maryland S.R.C. Specifications, Dated January 1962, Addenda And Errata Thereto; And "Special Provisions" For Materials And Construction.

LOADING: HS 20-44

CONCRETE: Class "A-1" f'c = 3,000 p.s.i., Class "C" f'c = 1,500 p.s.i. All Exposed Edges Shall Be Chamfered 3/4" x 3/4.

REINFORCING BARS: Reinforcing Steel Shall Be Deformed Bars Of Intermediate Grade. Allowable Design Stress 20,000 p.s.i. Splices And Embedment Shall Be 24 Diameters Unless Otherwise Noted.

BORINGS: Borings Are Numbered And Indicated Thus ⊕ For Boring Logs See Sheet No 72

SELECTED BACKFILL: Selected Backfill To Be Placed For Entire Length Of Culvert To Depth As Directed By The Engineer To Suit Field Conditions.

Maximum Design Foundation Pressure = 1.0 Tons/Sq. Ft.

FLOW STATION 1 AS-BUILTS

HYDRAULIC DATA

DRAINAGE AREA = 1.8 SQ. MI. = 1152 ACRES
STORMWATER DISCHARGE c. f. s. = 1350
TIDAL FLOW c. f. s. =
TOTAL MAXIMUM DISCHARGE c. f. s. = 1350
MAXIMUM FLOW DEPTH AT H. W. FEET = 9.75
OPENING BY TALBOT
OPENING TO H.W. SQ. FT. = 224□'
VELOCITY AT OUTLET FT. PER SEC. = 14.0

EXISTING STRUCTURE

TYPE
WATERWAY
UNDERCLEARANCE
DATE BUILT
OWNERSHIP
DISPOSITION
REMARKS

UTILITIES

STORM SEWERS
SANITARY SEWERS
WATER MAINS
GAS MAINS
ELECTRIC WIRES { OVERHEAD / UNDERGROUND }
OTHER

TRAFFIC DATA

TRAFFIC COUNT = DATE
DESIGN SPEED = m. p. h.

DATUM

REVISIONS

STATE OF MARYLAND
STATE ROADS COMMISSION
BALTIMORE, MD.
INTERSTATE ROUTE 70N
DOUBLE 7'-0" x 8'-0" BOX CULVERT
AT STA. 653+87
PLAN & SECTIONS

SCALE As Shown DATE April 11, 1966 CONTRACT H0-305-5-742

MADE BY W.F.H.
TRACED BY W.F.H.
CHECKED BY E.P.R.

CHIEF, BUREAU OF BRIDGES
5/16/66

SHEET No. 71 OF 85

BRIDGE No. 13128X0
Survey Book No.

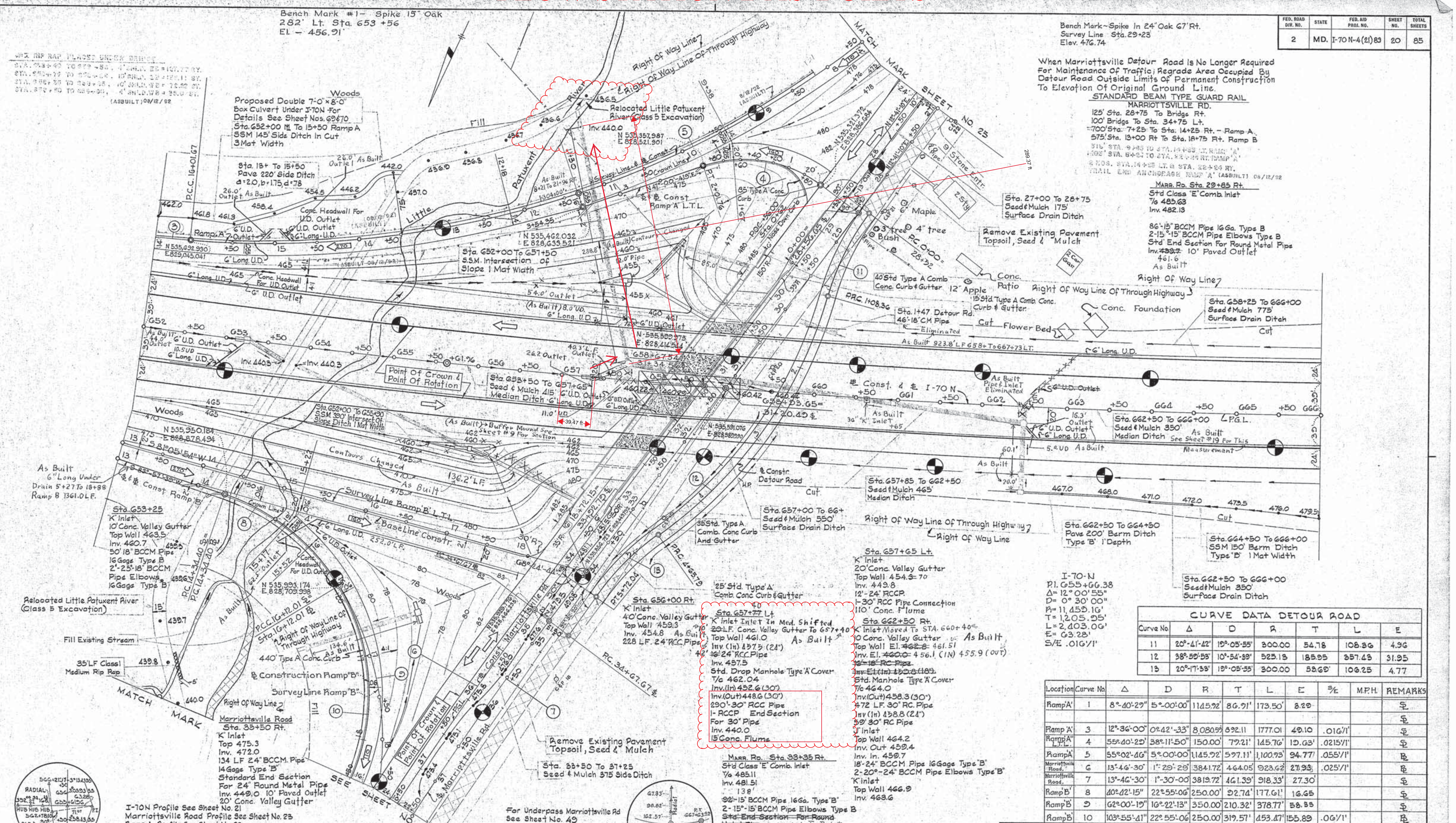
File No. 2 Pocket No. 13 Folder No. 4

INDEXED

K+E PHOENIX TRACING CLOTH 71997

FLOW STATION 2 AS-BUILTS

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
2	MD.	I-70N-4(21)83	20	85



I-70-N
P.I. 655+66.38
Δ= 12° 00' 55"
D= 0° 30' 00"
R= 11,459.16'
T= 1,205.95'
L= 2,403.06'
E= 63.28'
S/E .016'/1'

CURVE DATA DETOUR ROAD						
Curve No.	Δ	D	R	T	L	E
11	20°-41'-42"	19°-05'-55"	300.00	54.78	108.36	4.96
12	38°-59'-53"	10°-54'-39"	525.13	185.95	357.43	31.95
13	20°-17'-33"	19°-05'-55"	300.00	53.69'	106.25	4.77

Location	Curve No.	Δ	D	R	T	L	E	S/E	M.P.H.	REMARKS
Ramp 'A'	1	8°-40'-29"	5°-00'-00"	1145.92'	86.91'	173.50'	3.29			S
										S
Ramp 'A'	3	12°-36'-00"	0°-42'-33"	8,080.59	892.11	1777.01	49.10	.016'/1'		S
Ramp 'A' L.T.L.	4	55°-40'-29'	38°-11'-50"	150.00'	79.21'	145.76'	19.63'	.0215'/1'		S
Ramp 'A'	5	55°-02'-46"	5°-00'-00"	1,145.92'	597.11'	1,100.93'	94.77	.055'/1'		B
Marriottsville Road.	6	13°-46'-30"	1°-29'-29"	3841.72'	464.05	923.62'	27.93	.025'/1'		B
Marriottsville Road.	7	13°-46'-30"	1°-30'-00"	3819.72'	461.39'	918.33'	27.30'			S
Ramp 'B'	8	40°-42'-15"	22°-55'-06"	250.00'	92.74'	177.61'	16.65			S
Ramp 'B'	9	62°-00'-19"	16°-22'-13"	350.00'	210.32'	378.77'	58.35			S
Ramp 'B'	10	103°-55'-41"	22°-55'-06"	250.00'	319.57'	453.47'	155.89	.06'/1'		B

RUMMEL, KLEPPER & KAHL
CONSULTING ENGINEERS
BALTIMORE, MARYLAND

REVISIONS
AS BUILT 3-9-71
ASBUILT 08/12/92

STATE OF MARYLAND
STATE ROADS COMMISSION
INTERSTATE ROUTE 70N
ST. JOHNS LANE TO PINE ORCHARD

CONT. NO. H0-305-5-742 F. A. P. NO. I-70N-4(21)83 SHEET NO. 20 OF 85
PREL. TRAC. BY FINAL TRAC. BY

Appendix F

Sediment Mobility Assessment Calculations

CROSS SECTION 1

Critical Dimensionless Shear Stress	
$\tau^*_{ci} = a * (D_1/D_2)^b$	
D_1 = Largest size fraction considered mobile = D_i = D_{95}	89
D_2 = D_{50} bed matieral	22
a = constant	0.0376
b = constant	-0.994
τ^*_{ci}	0.009373

Critical Shear Stress, psf	
$\tau_{ci} = \tau^*_{ci} * (s-1) * \gamma * D_i$	
τ^*_{ci} = Critical Dimensionless Shear Stress	0.009372648
s = specific gravity for sediment	2.65
γ = specific weight of water, psf	62.4
D_1 = Largest size fraction considered mobile = D_i , ft	0.2920
τ_{ci} (psf)	0.2818

Average Boundary Shear Stress, psf	
$\tau_b = \gamma * Rh * S_f$	
γ = specific weight of water, psf	62.4
R_h = Bankfull Hydraulic Radius, ft	1.55
S_f = Bankfull energy slope, ft/ft	0.0118
τ_b , psf	1.1413

Channel Roughness	
$n = R_h^{1/6} * \frac{0.0926}{1.16 + 2LOG\frac{R_h}{D_{84}}}$	
R_h = Bankfull Hydraulic Radius, ft	1.55
D_{84} = Particle size larger than 84% other particles, ft	0.1903
n	0.033

Cross Section 1 Hydraulic Radius	
Flow Area	28.36
Wetted Perimeter	18.27
Rh	1.55

CROSS SECTION 2

Critical Dimensionless Shear Stress	
$\tau^*_{ci} = a * (D_1/D_2)^b$	
D_1 = Largest size fraction considered mobile = D_i = D_{95}	96
D_2 = D_{50} bed matieral	33
a = constant	0.0376
b = constant	-0.994
τ^*_{ci}	0.01301

Critical Shear Stress, psf	
$\tau_{ci} = \tau^*_{ci} * (s-1) * \gamma * D_i$	
τ^*_{ci} = Critical Dimensionless Shear Stress	0.01301
s = specific gravity for sediment	2.65
γ = specific weight of water, psf	62.4
D_1 = Largest size fraction considered mobile = D_i , ft	0.3150
τ_{ci} (psf)	0.4218

Average Boundary Shear Stress, psf	
$\tau_b = \gamma * Rh * S_f$	
γ = specific weight of water, psf	62.4
R_h = Bankfull Hydraulic Radius, ft	1.69
S_f = Bankfull energy slope, ft/ft	0.0118
τ_b , psf	1.2444

Channel Roughness	
$n = R_h^{1/6} * \frac{0.0926}{1.16 + 2LOG\frac{R_h}{D_{84}}}$	
R_h = Bankfull Hydraulic Radius, ft	1.69
D_{84} = Particle size larger than 84% other particles, ft	0.2493
n	0.036

Cross Section 2 Hydraulic Radius	
Flow Area	28.36
Wetted Perimeter	16.73
Rh	1.70

OVERALL MONITORING REACH

Critical Dimensionless Shear Stress	
$\tau^*_{ci} = a * (D_1/D_2)^b$	
D_1 = Largest size fraction considered mobile = D_i = D_{95}	94
D_2 = D_{50} bed matieral	28
a = constant	0.0376
b = constant	-0.994
τ^*_{ci}	0.01128

Critical Shear Stress, psf	
$\tau_{ci} = \tau^*_{ci} * (s-1) * \gamma * D_i$	
τ^*_{ci} = Critical Dimensionless Shear Stress	0.01128
s = specific gravity for sediment	2.65
γ = specific weight of water, psf	62.4
D_1 = Largest size fraction considered mobile = D_i , ft	0.3084
τ_{ci} (psf)	0.3582

Average Boundary Shear Stress, psf	
$\tau_b = \gamma * Rh * S_f$	
γ = specific weight of water, psf	62.4
R_h = Bankfull Hydraulic Radius, ft (average of CS-1 & CS-2	1.62
S_f = Bankfull energy slope, ft/ft	0.0118
τ_b , psf	1.1928

Channel Roughness	
$n = R_h^{1/6} * \frac{0.0926}{1.16 + 2LOG\frac{R_h}{D_{84}}}$	
R_h = Bankfull Hydraulic Radius, ft	1.62
D_{84} = Particle size larger than 84% other particles, ft	0.2165
n	0.035

Appendix K

Geospatial Database and Data Dictionary

Appendix K

Appendix K

Geospatial Database and Data Dictionary

MARYLAND DEPARTMENT OF TRANSPORTATION™

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Appendix K
SHA Annual Report GIS Database Submittal Data Dictionary

A Introduction

The NPDES Annual Report database submittal includes two ESRI geodatabases. MDOT SHA has provided the following geodatabases for submittal with the 2018 NPDES Annual Report:

Table K-1: SHA Geodatabases

Filename	Description	Specifications
MDOT_SHA_MDE_2018_geodatabase.mdb	MDE geodatabase for the FY2018 NPDES Annual Report (personal geodatabase)	Detailed *National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4), Geodatabase Design and User's Guide*, Version 1.1 published in April 2015
MDOT_SHA_NPDES_2018_geodatabase.gdb	SWM Infrastructure and Impervious Accounting datasets (file geodatabase)	Detailed in the *SHA's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit, Part IV.C,* which was provided to SHA on October 9, 2015
MDOT_SHA_Supplemental_2018_geodatabase.gdb	Commercial Industrial layer for MDOT SHA	Miscellaneous guidance document and MDE guidance identifying and determining the supplemental datasets

This database dictionary for the submittal incorporates a summary of modifications to the 2018 MDE geodatabase framework as well as a description of entities and attributes for the MDOT SHA NPDES 2018 geodatabase. Supplemental information for each layer is provided, as necessary, to detail the lineage of the datasets.

B File Formats

The 2018 Annual Report submittal geodatabases are exported from the enterprise SDE geodatabase environment into an ESRI geodatabase compatible with ArcGIS 10.0+.

C Contents

Within the "Databases" folder on the CD deliverable, the following ESRI geodatabases may be found:

- **MDOT_SHA_NPDES_2018_geodatabase.gdb**
- **MDOT_SHA_MDE_2018_geodatabase.mdb**
- **MDOT_SHA_Supplemental_2018_geodatabase.gdb**

D Data Projection

These geodatabase submittals have been re-projected from SHA's standard projection into the required projection for MDE, specifically NAD_1983_StatePlane_Maryland _FIPS_1900_Meters. The data within the submittal geodatabases are developed in the following original spatial projection: NAD_1983_StatePlane_Maryland _FIPS_1900_Feet.

E 2018 SHA NPDES Geodatabase (MDOT_SHA_NPDES_2018_geodatabase.gdb)

The geodatabase contains two core feature classes containing the spatial data relating to stormwater structures and conveyances. Each feature class is related through defined relationship classes to a set of tables that further describe the structure or conveyance. Additionally, the impervious surface layer is provided here as a feature class. The contents of the MDOT_SHA_NPDES_2018_geodatabase.gdb are detailed below in Table K-2.

Table K-2: MDOT SHA NPDES Geodatabase Contents

DATABASE SPATIAL LAYERS	TYPE	DESCRIPTION
STRUCTURES	Feature Class	Point feature class that stores the spatial representation and tabular information pertaining to storm water structures (i.e., inlets, manholes, outfalls, control structures). Information includes structure type, feature status, major outfall (T/F), and other overlay attributes such as watershed.
CONVEYANCE	Feature Class	Line feature class that stores the spatial representation and tabular information pertaining to storm water conveyance (i.e., pipe and ditch). Information includes conveyance type, feature status, invert elevations, and other overlay attributes such as watershed.
DATABASE TABLES	**TYPE**	**DESCRIPTION**
END_HEADWALL	Table	Contains the outfall and open upstream structures for a storm drain system, such as endsections, projection pipes, headwall, and endwalls. Information includes the type and material of the end structure.
INLET	Table	Contains the inlet features within the storm drain systems. Information includes the type and material of the inlet, the top of grate, and the length for COG and COS type inlets.
MANHOLE_CONN	Table	Contains the manhole and other connection features within the storm drain system. Information includes the material and top of manhole lid, when applicable.
DATABASE TABLES	**TYPE**	**DESCRIPTION**
PUMPSTN	Table	Contains the pump stations within the storm drain system. Information includes the station name, install date, number of pumps, and maximum capacity for the station.

Table K-2: MDOT SHA NPDES Geodatabase Contents

SWMRISER	Table	Contains the storm water BMP control structure, such as box risers and pipe barrel risers. Information includes the material, if a trash rack exists, riser type, and the stage storage elevation.
WEIR	Table	Contains the weirs and emergency spillways related to storm water BMP storage controls. Information includes the material, if a trash rack exists, and the stage storage elevation.
DITCH	Table	Contains the ditch features within the storm drain conveyance. Information included includes ditch material and dimensions.
PIPES	Table	Contains the pipe features within the storm drain conveyance. Information includes the type, length, and dimension of the pipe.

F 2018 MDOT SHA Supplemental Geodatabase

(MDOT_SHA_Supplemental_2018_geodatabase.gdb)

The geodatabase contains supplemental data provided to MDE, as follows:

MDOT_SHA_FY18_Commercial_Industrial

The MDOT SHA commercial and industrial layer

MDE should refer to the June 30, 2018 Baseline Revised Submittal for the Impervious Surface accounting layer and Right-of-Way layer geodatabase.

G 2018 SHA MDE Geodatabase

(MDOT_SHA_MDE_2018_geodatabase.mdb)

The geodatabase framework was altered in the following manner for the 2018 submission per MDE's request:

IMPL_COST – changed from short to long integer on all feature classes and tables where this attribute was present in the geodatabase.

H BMP / Structure System Numbering Convention

The BMP system numbering methodology applies a unique seven-digit identification number to each asset. The first two (2) digits indicate the county where the system is located. Table K-3 lists the county code numbers for Maryland. For county codes that begin with a zero (ex. Baltimore County 03), the leading zero is not dropped from any naming convention. The remaining five (5) digits represent the unique system number. For example, 130140 is system 140 located in Howard County (County Code 13).

Table K-3: Maryland County Codes

Code	Abbreviation	County Name	Code	Abbreviation	County Name
01	AL	Allegany	13	HO	Howard
02	AA	Anne Arundel	14	KE	Kent
03	BA	Baltimore	15	MO	Montgomery
04	CA	Calvert	16	PG	Prince Georges
05	CO	Caroline	17	QA	Queen Anne's

Table K-3: Maryland County Codes

Code	Abbreviation	County Name	Code	Abbreviation	County Name
06	CL	Carroll	18	SM	St. Mary's
07	CE	Cecil	19	SO	Somerset
08	CH	Charles	20	TA	Talbot
09	DO	Dorchester	21	WA	Washington
10	FR	Frederick	22	WI	Wicomico
11	GA	Garrett	23	WO	Worcester
12	HA	Harford	24	BC	Baltimore City
			99	SW	Statewide

The individual drainage structures located within a system receive a unique three (3) digit identification number. For example, 1300140.007 is the seventh (.007) structure in the 140th drainage system in Howard County.

Numbering begins with the most downstream structure, usually the outfall, which is assigned the structure number of .001. Structures are then numbered as the system is traced upstream. For initial data collection or adding new systems, the most downstream structure in any system should be numbered .001. This is convention only, and structures may be numbered out of sequence in the existing geodatabase. Each system that flows into a BMP is a separate system. The control structure and outfall for a stormwater BMP also starts a new system. Figures K-1 and K-2 (on the following page) show examples of system, structure, and BMP numbering.

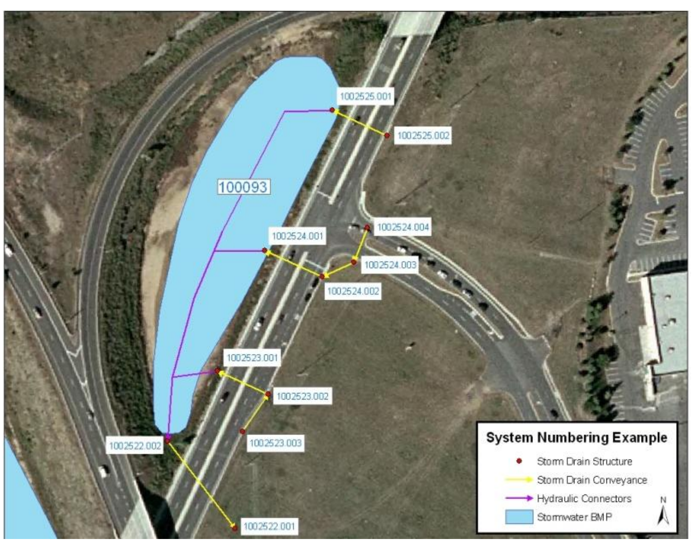

Figure K-1: System No. Ex. 1

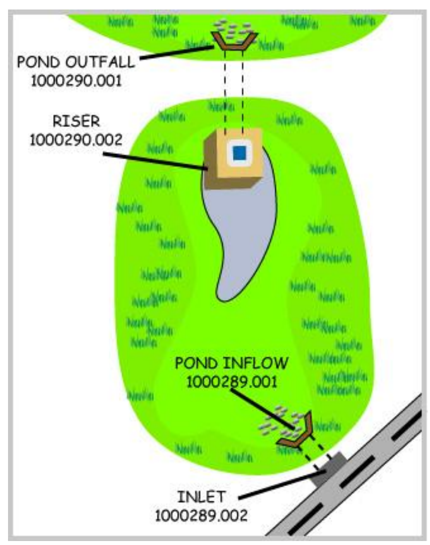

Figure K-2: System No. Ex. 2

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