FREDERICK COUNTY PUBLIC SCHOOLS

Municipal Separate Storm Sewer System (MS4) Program Plan – VAR040113

For

Millbrook High School / Redbud Elementary School Campus

<u>Prepared For</u>
Frederick County Public Schools
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PERMIT HISTORY

The Frederick County Public Schools' "Millbrook HS / Redbud Run ES Campus" MS4 has been covered by the VPDES General Permit since construction of both schools was completed in 2003. Reissuance of the General Permit, site improvements, program audits or changes to permitting criteria, are reflected in a program plan update or iteration[1], as summarized below[2].

[1] Full versions of each iteration of the Program Plan are on file with DEQ and available upon request.

[2] Permit History has been added to the program plan's August 2023 Iteration. Best efforts were used to establish previous document versions; however, some iterations may not be listed.

- 2003 – Permit Issued (VAR040113) – Prepared by FCPS
- 2008 – Permit Reissue – Prepared by FCPS
- 2013 – Permit Reissue – Prepared by FCPS
- 2015 – Permit Reissue – Prepared by FCPS
- 10/2018 – Permit Reissue – Prepared by FCPS / OWPR Inc.
- 8/4/2023 – Program Audit Response (12/18/2019) – Prepared by Pennoni Associates, Inc.
- 10/1/2023 – Permit Reissue – Prepared by Pennoni Associates, Inc.
- **10/25/2024 - Program Plan Update - Prepared by Pennoni Associates, Inc.**

OVERVIEW

Purpose and Objective:
The purpose of this small Municipal Storm Sewer System (MS4) Program Plan is to develop, implement, and enforce strategies designed to reduce the discharge of pollutants from the Millbrook High School / Redbud Run Elementary School Campus to the maximum extent practicable by both education and action. The MS4 Program Plan is designed to provide a framework to facilitate this education and action through utilization of the six Minimum Control Measures (MCM) defined in the General VPDES Permit as:

MCM #1 - Public Education and Outreach
MCM #2 - Public Involvement and Participation
MCM #3 - Illicit Discharge Detection and Elimination
MCM #4 - Construction Site Stormwater Runoff Control
MCM #5 - Post-Construction Stormwater Management for New Development and Development on Prior Developed Lands.
MCM #6 - Pollution Prevention and Good Housekeeping for Facilities Owned or Operated by the Permittee Within the MS4 Service Area

Regulation of stormwater discharges provides an opportunity to monitor, report, repair, and maintain clean waters downstream of developed areas. It also gives opportunities for educating the public about the importance of clean water, and potential stormwater pollutants. Areas of concern where pollutants may be discharged into the downstream waters can be identified and monitored. In essence, it provides a mechanism for owners and operators of MS4s to understand and take responsibility for the stormwater that is being discharged.

Local TMDL:
Currently the Millbrook High School / Redbud Run Elementary School Campus does not discharge directly to a water body with a Board approved Total Maximum Daily Load (TMDL). As such, no waste load allocations (WLA) have been assigned to the FCPS MS4. Therefore, implementation of the best management practices (BMPs) outlined in this plan is consistent with the provisions of an iterative MS4 Program which constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable" (MEP), protects water quality in the absence of a TMDL waste load allocation, ensures compliance by FCPS with water quality standards, and satisfies the appropriate water quality requirements of the Clean Water Act (CWA) and regulations in the absence of a TMDL WLA.

Chesapeake Bay TMDL:
The MS4 is located within the Chesapeake Bay watershed, and therefore is part of the Chesapeake Bay TMDL. Action plans have been developed to meet the Phase I and Phase II reduction requirements. Phase I was designed and constructed and came online in 2018. A draft Phase II Action Plan has been developed and will be finalized by the end of 2018. Construction plans and specifications are scheduled to be developed and bid in the spring of 2019, and construction is planned for summer of 2019.

Roles and Responsibilities:

Responsibility	Title	Name
Oversight of all activities	Director of Facilities Services	Brian Davis
Oversight of inspections	Assistant Director of Facilities Services	TBD
Documentation and reporting	Millbrook High School Principal	Joanne Altendorf
Documentation and reporting	Redbud Run Elementary School Principal	Joseph Strong
Website and communication	Coordinator of Policy and Communications	Steve Edwards
Training and reporting	Supervisor of Fleet Services	TBD
Training and reporting	Coordinator of Custodial Services	Dale Patton
Training and reporting	Director of Frederick County Parks and Rec.	Jason Robertson

Written Agreements:
Frederick County Public Schools has a written agreement with the Frederick County Parks and Recreation Department for the maintenance of all the lawn areas at Millbrook High School and Redbud Run Elementary School. Maintenance includes mowing, fertilizing, liming, aerating, herbicide application, pesticide application, etc. required to maintain healthy lawn areas. A copy of this agreement is included in the Appendix.

1.0 MCM #1 - PUBLIC EDUCATION AND OUTREACH

Purpose and Description:
The purpose of this section is threefold:

- Increase the public's knowledge of how to reduce stormwater pollution, placing priority on reducing impacts to impaired waters and other local water pollution concerns.
- Increase the public's knowledge of hazards associated with illegal discharges and improper disposal of waste, including pertinent legal implications.
- Implement a diverse program with strategies that are targeted toward individuals or groups most likely to have significant stormwater impacts.

Stormwater Issues:
The three high-priority water quality issues that the education efforts will be focused on are:

- Pollution Control
  - Automotive fluids
  - Recycling
  - Litter
  - Pet Waste
- Nutrient / Sediment Pollution
  - Fertilizers (nutrient loading)
  - Erosion Control (sediment loading)
- Stormwater Management / Water Conservation
  - Bio-retention
  - Rainwater re-use
  - Water conservation
  - "Green" initiatives

Rationale:
The stormwater issues above were selected as issues that would resonate with the intended audience. These issues are applicable to the audience, and recommendations can be easily implemented into everyday life. The goal is to have the most effective education and application as possible.

Audience:
For the purpose of the MS4 Program Plan the target audience or "public" that will be reached includes the students, faculty/staff, and parents at both Redbud Run Elementary School and Millbrook High School.

1.1 School Curriculum *(Curriculum Materials)*

Description:
The target audience for this BMP is the student body at Redbud Run Elementary School and Millbrook High School.

The current FCPS elementary science curriculum includes educational opportunities for children in each grade to learn about stormwater, pollution, and conservation.

The current FCPS high school curriculum for Biology I, AP Biology, Earth Science I, and Earth Science II includes educational opportunities for high school students to learn about stormwater, pollution, and conservation in the classroom as well as in the lab or field.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. FCPS will evaluate the curriculum content in conformance with its current curriculum evaluation schedule and make any appropriate revisions as necessary.

Measurable Goals:
The goal of this BMP is to have as many FCPS elementary and high school students as possible exposed to curriculum containing relevant material discussing stormwater, pollution, and conservation.

Items to be included in the Annual Report:
1. A list of the relevant science classes taught at each school.
2. A list of the high-priority stormwater issues which were addressed in each class.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal

1.2 School Newsletters *(Traditional Written Materials)*

Description:
The target audience for this BMP is the faculty, staff, and parents at Redbud Run Elementary School and Millbrook High School.

Both schools produce newsletters which inform their audiences about school related activities and concerns. The newsletters shall include a quarterly section on stormwater or environmental issues. If there are no activities or articles to include in the column on a particular newsletter, a simple reference to the websites or brochures produced by the EPA, DCR, DEQ, or the Lord Fairfax Soil and Water Conservation District would be sufficient.

Articles could be reused every 4 years at the high school and every 6 years at the elementary school as the students and parents who are the majority of the "public" audience will be new to the campus.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. The section on stormwater or environmental issues will be included in each school's newsletter quarterly.

Measurable Goals:
The goal of this BMP is to distribute four newsletters per year (quarterly) with articles addressing stormwater or environmental issues.

Items to be included in the Annual Report:
1. Copies of the school newsletters which include articles on stormwater or environmental issues.
2. A list of the high-priority stormwater issues which were addressed in each newsletter.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal

1.3 School Websites *(Media Materials)*

Description:
The target audience for this BMP is the faculty, staff, parents, and students at Redbud Run Elementary School and Millbrook High School.

Each school has its own individual website which is used to disseminate information. The websites for each school include a link to the "After the Storm" brochure produced by the Environmental Protection Agency on their home pages.

The websites could be improved by including a link specifically for stormwater or environmental information with an attractive icon on the home page. This link could direct the user to an environmental page which would include the brochure from the EPA previously mentioned as well as any other pertinent brochures that are published by DCR, DEQ, or the Lord Fairfax Soil and Water Conservation District. The link could also include actual photos of Redbud Run, Ash Hollow Run, and the onsite wetlands with brief descriptions of each area and its importance to the ecosystem.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis with improvements over the permit cycle. The school websites should be updated annually to ensure that the content is current, relevant and appealing.

Measurable Goals:
The goal of this BMP is to update the stormwater section of the websites annually with new information, photos, icons, links, etc. as appropriate to ensure that the content is current, relevant and appealing.

Items to be included in the Annual Report:
1. Printed copies of the pages of the school websites showing the links and items concerning stormwater and environmental issues.
2. A list of the high-priority stormwater issues which were addressed on the website.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal
Coordinator of Policy and Communications

2.0 MCM #2 - PUBLIC INVOLVEMENT AND PARTICIPATION

Purpose and Description:
The purpose of this section is to accomplish the following:

- Provide a mechanism for the public to report potential illicit discharges, improper disposal, or spills to the MS4, complaints regarding land disturbing activities, or other potential stormwater pollution concerns.
- Provide a mechanism for the public to provide input on the permittee's MS4 program plan and to receive public input or complaints.
- Provide a mechanism for FCPS to respond to public input received on the MS4 program plan or complaints and maintain documentation of public input received on the MS4 program and FCPS's response.
- Implement no less than four activities per year to provide an opportunity for public involvement to improve water quality and support local restoration and clean-up projects.

Applicability:
As an entity focusing on education, Frederick County Public Schools is uniquely equipped to facilitate public involvement and participation on stormwater impacts. Frederick County Public Schools will promote or sponsor events to involve as many of the target audience as possible.

Audience:
For the purpose of the MS4 Program Plan the target audience or “public” that will be reached includes the students, faculty/staff, and parents at both Redbud Run Elementary School and Millbrook High School.

Accountability:
The MS4 Program Plan as well as the Annual Reports will also be available to the public for review at any time.

2.1 Stormwater Website

Description:
The purpose of this BMP is to provide the general public as well as the faculty, staff, parents, and students at Redbud Run Elementary School and Millbrook High School access to the MS4 Program Plan and the Annual Report. The website also provides a mechanism for the public to provide any comments on the Program Plan and to report any illicit discharges, improper disposal, or spills to the MS4, complaints regarding land disturbing activities, and other potential stormwater pollution concerns.

The MS4 Program Plan will be reviewed and updated annually as necessary. A link to the latest Program Plan in PDF format will be included on each school's website as well as the main FCPS Stormwater website. A notice will be included in the school newsletters whenever a new Program Plan is uploaded to the website. The website will also include an online form which the public can use to submit comments on the Program Plan.

A link to the Annual Reports will be included on each school's website as well as the main FCPS website. A notice will be included in the school newsletters whenever the Annual Report is uploaded to the website.

Website Address:
https://www.frederickcountyschoolsva.net/Domain/628

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. The Program Plan will be evaluated for effectiveness annually and revisions made as necessary. The Program Plan will be uploaded to the website within 30 days of its completion.

Measurable Goals:
The goal of this BMP is to have public access and comment available at each school's website as well as the main FCPS website through a link to the PDF copy of the MS4 Program Plan as well as an online comment form. Hard copies of the MS4 Program Plan will be kept at the FCPS Facilities Services Department for review as well. The Annual Report will be uploaded to the website within 30 days of submittal to DEQ.

Items to be included in the Annual Report:
1. A summary of public input received.
2. A web link to the FCPS Stormwater website.
3. List of changes to be made to the MS4 Program Plan.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal
FCPS Assistant Director of Facilities Services
Coordinator of Policy and Communications

2.2 Activity Participation

Description:
The campus shall participate, sponsor, or promote a minimum of four activities aimed at increasing public participation in stormwater and environmental issues. Activities may include stream cleanup, field days, recycling activities, storm drain stenciling, tree planting, wetland plantings, riparian buffer delineation and signage, riparian buffer plantings, etc. Efforts should be made to include as many of the faculty, staff, and students as well as parents, as possible.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. At least one staff meeting per year should include an evaluation of the previous year activities and ideas for the current school year.

Measurable Goals:
The goal of this BMP is to involve a majority of the faculty, staff, students, and parents in a minimum of four environmentally based activities each year.

Items to be included in the Annual Report:
1. A list of activities from the current year including a description of the event, the date of the event, and an approximate number of participants.
2. An evaluation of each event’s effectiveness.
3. A list of proposed activities for the following year.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal

2.3 Public Reporting Procedures

Description:
FCPS shall establish a means for the public to notify the MS4 permitee of any illicit discharges, stormwater pollution concerns, or complains related to land disturbance activities. FCPS will provide a fill-in form on the MS4 website to facilitate general questions and comments pertaining to the MS4. This form, in conjunction with downloadable forms for Illicit discharge reporting, and erosion & sediment control issue reporting, provides the public several ways to notify the MS4 of any issues.

See Appendix A4

Website Links

MS4 Program
https://www.frederickcountyschoolsva.net/Domain/628

MS4 Comment Form
https://docs.google.com/forms/d/e/1FAIpQLSdf5tONtTmYOc4bzXepVNlB5C4y_aKghBsbPXaxVJ1khKxN-A/viewform

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. At least one staff meeting per year should include an evaluation of the previous year activities and ideas for the current school year.

Measurable Goals:
The goal of this BMP is to establish a means for the public to notify the MS4 permitee of any illicit discharges, stormwater pollution concerns, or complains related to land disturbance activities.

3.0 MCM #3 - ILLICIT DISCHARGE DETECTION AND ELIMINATION

Purpose and Description:
As an educational facility with only two main buildings and associated parking areas, the potential for illicit discharges on campus is very minimal. There are a few areas of the campus which could have the potential for an illicit discharge, and those have been identified on the storm drain map of the campus. These areas will be checked on a regular basis, as well as a general review of the campus. The activities which occur on the campus, however, are very benign. The campus is also closely monitored to ensure that individuals do not enter the site and engage in activities which would cause illicit discharges.

See Appendix A2

3.1 Storm Drain Map and Information Table

Description:
Frederick County Public Schools maintains a Storm Drain Map which clearly locates all MS4 outfalls, storm drain inlets, storm drain outlets, stormwater management facilities, and waters of the United States. The Storm Drain Map also includes the locations of potential illicit discharge areas which have been identified as well as the HUC's and information concerning impaired streams. The Storm Drain Map shall be updated any time any additional storm drain BMP's are added.

In addition to the Storm Drain Map FCPS maintains a BMP Information Table which includes the latitude and longitude, regulated acreage, receiving waters, 6th order HUC, impaired waters, predominant land use, and EPA approved TMDL for each stormwater management BMP within the MS4 regulated area.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. The Storm Drain Map and Information Table shall be reviewed and updated as necessary to reflect new construction and/or any changes to the storm drain system throughout the permit cycle.

Measurable Goals:
The goal of this BMP is to maintain an up to date Storm Drain Map and Information Table including all the information required by the permit. A copy is included in the Appendix of the Program Plan and a copy shall be maintained at the Facilities Services Department.

Items to be included in the Annual Report:
1. Documentation of any new construction or changes in the storm drain system accompanied by an updated Storm Drain Map and Information Table.

Responsible Party:
FCPS Assistant Director of Facilities Services

3.2 Dry Weather Screening

Description:
The purpose of this BMP is to facilitate inspections of the critical areas identified on the Storm Drain Map as locations which have a higher risk of illicit discharges. The custodial staff at each school will be responsible for walking through and inspecting each of the areas on a quarterly basis, documenting any indications that there has been an illicit discharge. If evidence of an illicit discharge is found, the staff will notify the Facilities Services Department immediately for further investigation and clean up in accordance with the state permit requirements.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP quarterly on an ongoing basis.

Measurable Goals:
The goal of this BMP is to detect and eliminate or reduce illicit discharges and their impact on the surface waters through regular inspections of areas of high risk for illicit discharges.

Items to be included in the Annual Report:
1. A list of the number of inspections and dates of each.
2. A summary of each illicit discharge found during inspections including the following:
    a. Description of the illicit discharge.
    b. Date that the discharge was observed, reported, or both.
    c. How the investigation was resolved, including any follow-up.
    d. Resolution of the investigation and the date the investigation was closed.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal
FCPS Assistant Director of Facilities Services

3.3 Illicit Discharge Reporting

Description:
The purpose of this BMP is to facilitate the public reporting of suspected illicit discharges. In order to facilitate this FCPS shall:

1. Install signage at each of the high hazard areas shown on the Storm Drain Map, directing the public to report any suspected illicit discharges by either reporting them to the main school office or calling the Facilities Services Department.
2. Add a note on each school's website asking the public to watch for and report any suspected illicit discharges and provide contact information for reporting to the Facilities Services Department.
3. Add a note in each school's newsletter asking the public to watch for and report any suspected illicit discharges and provide contact information for reporting to the Facilities Services Department.

All reports will be directed to the Facilities Services Department to be investigated and addressed as necessary.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis.

Measurable Goals:
The goal of this BMP is to provide a mechanism for the public to report illicit discharges so that they can be addressed and eliminated or their impact on surface waters reduced.

Items to be included in the Annual Report:

1. A summary of each reported illicit discharge including the following:
    a. Description of the illicit discharge.
    b. Date that the discharge was observed, reported, or both.
    c. How the investigation was resolved, including any follow-up.
    d. Resolution of the investigation and the date the investigation was closed.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal
FCPS Assistant Director of Facilities Services
Coordinator of Policy and Communications

3.4 Public Reporting of Erosion and Sediment Control Issues

Description:
The purpose of this BMP is to facilitate the public reporting of suspected erosion and sediment control issues. In order to facilitate this FCPS shall

1. Install temporary signage at the construction entrance, the construction trailer, or any other highly visible location adjacent to the construction activity. The signage shall direct the public to report any suspected erosion and sediment control issues by either reporting them to the main school office or calling the Facilities Services Department.
2. Post a reporting form on each school's website that the public can access and complete online.

All reports will be directed to the Facilities Services Department to be investigated and addressed as necessary.

Schedule and Evaluation:
Frederick County Public Schools will implement this BMP on an ongoing basis whenever projects are being constructed on campus.

Measurable Goals:
The goal of this BMP is to provide a mechanism for the public to report suspected erosion and sediment control issues so that they can be addressed and eliminated or their impact on surface waters reduced.

Items to be included in the Annual Report:

1. A summary of each reported erosion and sediment control issue including the following:
   a. Description of the erosion and sediment control issue.
   b. Date that the issue was observed, reported, or both.
   c. How the investigation was resolved, including any follow-up.
   d. Resolution of the investigation and the date the investigation was closed.

Responsible Party:
Redbud Run E.S. Principal
Millbrook H.S. Principal
FCPS Assistant Director of Facilities Services
Coordinator of Policy and Communications

4.0 MCM #4 - CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Purpose and Description:
The Millbrook High School / Redbud Run Elementary School Campus is a completely developed campus with all facilities required for an elementary and high school. There are no regular, current, or planned construction activities. Most construction which may occur on campus is very small in scale and would be performed by Frederick County Public Schools staff. Smaller projects would be regulated by FCPS staff certified as a Responsible Land Disturber. If for some reason there was a larger project, the Frederick County Stormwater Ordinance as implemented by the Frederick County Public Works Department would govern the construction.

Projects which have land disturbance are classified into 3 categories:

A. **Land Disturbance equal to or greater than one acre:** Are subject to Frederick County Public Works Dept (VSMP Authority) and shall be permitted, bonded, inspected and documented in accordance with the Public Works Dept's standards and practices.

B. **Land Disturbance greater than 10,000 SqFt but less than one acre:** Are subject to Frederick County Public Works minimum Erosion and Sediment controls and Land Disturbance Permit policy and procedures and shall be permitted, bonded, inspected and documented in accordance with the Public Works Dept's standards and practices.

C. **Land Disturbance less than 10,000 SqFt:** Managed locally by FCPS – Erosion and Sediment control inspections and reporting shall occur at significant milestones, such as the establishment of controls, and upon completion and stabilization, and after significant rainfall events. Inspection forms are provided as a part of Appendix A13.

4.1 Erosion and Sediment Control Design

Description:
The basic requirements of the construction site stormwater runoff control are currently met by the existing Stormwater Management Ordinance of Frederick County, Virginia. Frederick County reviews and approves erosion and sediment control plans, issues land disturbance permits, and performs inspections. In addition, FCPS has resolved the following as their policy:

EROSION AND SEDIMENT CONTROL REQUIREMENTS: *Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of the current State and Local "minimum land disturbance" areas shall be required to provide erosion and sediment control plans (E&S Plans) for the project. The E&S plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. E&S plans shall be designed in accordance with applicable State and Local laws and regulations, using current technologies and methods as appropriate. The design firm shall be responsible for obtaining E&S plan approvals from all applicable State and Local agencies.*

On projects which involve the disturbance of land equal to or greater than one acre, the Contractor selected for the project shall be responsible for obtaining a Virginia Stormwater Management Program (VSMP) permit from the Frederick County Public Works Department and shall be responsible for compiling a Stormwater Pollution Prevention Plan (SWPPP) as required by the VSMP permit. The design firm shall be available to provide information as necessary to assist the Contractor in obtaining the VSMP permit and compiling the SWPPP.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis whenever construction projects are being planned on campus.

Measurable Goals:
A written policy added to the FCPS procurement standards. Erosion Control Plans approved by Frederick County. VPDES permits for any projects disturbing one or more acres. Stormwater Pollution Prevention Plan as applicable.

Items to be included in the Annual Report:
1. Total number of regulated land disturbing activities.
2. Total number of acres disturbed.
3. Copy of the Erosion and Sediment Control Plan approval letter from Frederick County.

Responsible Party:
FCPS Assistant Director of Facilities Services

4.2 Erosion and Sediment Control for Construction

Description:
The basic requirements of the construction site stormwater runoff control are currently met by the existing Stormwater Management Ordinance of Frederick County, Virginia. Frederick County reviews and approves erosion and sediment control plans, issues land disturbance permits, and performs inspections. In addition, FCPS has resolved the following as their policy:

EROSION AND SEDIMENT CONTROL REQUIREMENTS: *Contractors working on FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide erosion and sediment control for the project. The Contractor shall have a Responsible Land Disturber (RLD) currently registered with the Virginia Department of Environmental Quality on staff and on site at all times that construction activities are taking place. The Contractor shall be responsible for obtaining all required erosion control or land disturbance permits from all applicable State and Local agencies, and shall schedule all required inspections with the permitting agencies. The Contractor shall be responsible for the installation, maintenance, and removal of all temporary erosion and sediment control measures for the project.*

On projects which involve the disturbance of land equal to or greater than one acre, the Contractor selected for the project shall be responsible for obtaining a Virginia Stormwater Management Program (VSMP) permit from the Frederick County Public Works Department and shall be responsible for compiling a Stormwater Pollution Prevention Plan (SWPPP) as required by the VSMP permit. The design firm for the project shall be available to provide information as necessary to assist the Contractor in obtaining the VSMP permit and compiling the SWPPP.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis whenever projects are being constructed on campus.

Measurable Goals:
A written policy added to the FCPS procurement standards. Land Disturbance Permit from Frederick County. VPDES permits for any projects disturbing one or more acres. Stormwater Pollution Prevention Plan as applicable.

Items to be included in the Annual Report:
1. Total number of regulated land disturbing activities.
2. Total number of acres disturbed.
3. Copy of the Land Disturbance Permits from Frederick County.
4. Total number of inspections conducted.
5. Summary of enforcement actions taken.

Responsible Party:
FCPS Assistant Director of Facilities Services

4.3 Erosion and Sediment Control for Small Projects

Description:
Frederick County Public Schools shall have one or more individuals on staff that have completed the Responsible Land Disturber training and received certification. These individuals shall perform inspections and oversight on smaller FCPS projects which may not require an erosion control plan under the Frederick County ordinance. Inspections shall be performed in accordance with the Virginia Erosion and Sediment Control Handbook.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis whenever small projects are being constructed on campus.

Measurable Goals:
At least one, but preferably two staff members shall be registered as an RLD.

Items to be included in the Annual Report:
1. Total number of small non-regulated land disturbing activities.
2. Total number of acres disturbed.
3. Total number of inspections conducted.
4. Summary of enforcement actions taken.
5. Copy of the RLD certificate for each individual registered.

Responsible Party:
FCPS Assistant Director of Facilities Services

4.4 Clerk of the Works for VSMP Projects

Description:
In the event that there is a larger construction project which requires a VSMP permit on campus, Frederick County Public Schools shall employ the services of a "Clerk of the Works" who shall act as the Owner's representative and shall be on site on a daily basis to monitor the construction. This individual shall have the following responsibilities:

- Ensure that the Contractor obtains all necessary permits and adheres to the requirements of those permits.
- Complete the Responsible Land Disturber training and receive certification so that they may ensure inspections are being performed correctly and when necessary.
- Track land-disturbing activities associated with the project.
- Maintain records of all permits, inspections, violations, remediation, etc. that occurs during the project.

Schedule and Evaluation:
Frederick County Public Schools will implement this BMP on an ongoing basis whenever VSMP projects are being constructed on campus.

Measurable Goals:
Each VSMP project shall be monitored by a Clerk of the Works to keep records and ensure permits are obtained and permit requirements are met.

Items to be included in the Annual Report:
1. Total number of VSMP projects on campus.
2. Total number of acres disturbed.
3. Total number of inspections conducted.
4. Summary of enforcement actions taken.
5. Documentation of the Clerk of the Works employed on each project.
6. Copy of the RLD certificate for each Clerk of the Works.

Responsible Party:
FCPS Assistant Director of Facilities Services

5.0 MCM #5 - POST-CONSTRUCTION STORMWATER MANAGEMENT FOR NEW DEVELOPMENT AND DEVELOPMENT ON PRIOR DEVELOPED LANDS

Purpose and Description:
The Millbrook High School / Redbud Run Elementary School Campus is a completely developed campus with all facilities required for an elementary and high school. When the campus was developed, stormwater management BMP's were installed to control the quantity of stormwater runoff. These BMP's are regularly maintained and inspected to ensure their continued effectiveness. There are no regular, current, or planned development activities which would require additional stormwater management BMP's. In the unusual event that a development activity does occur in the future, the Frederick County Stormwater Ordinance as implemented by the Frederick County Public Works Department would govern the project. Frederick County Public Schools has committed to require designers working on campus projects to meet the requirements of the Frederick County Stormwater Ordinance. Frederick County Public Schools will maintain an inventory of the stormwater management BMP's on campus, adding any new facilities when they are constructed.

Actions:

1. August 2020 – The Permitee' s engineering consultant, prepared a site plan which proposes improvements in response to a DEQ audit issued 12-18-2019. Subsequently, the as-built plans were certified in 2021, upon completion of the improvements. Certified as-built plans and site photos are attached to the Program Plan as Appendix A15

5.1 Stormwater Management Facilities Design

Description:
The requirements for stormwater management facilities design are currently met by the existing Stormwater Management Ordinance of Frederick County, Virginia. Frederick County reviews and approves stormwater management plans, issues stormwater permits, and performs inspections. In addition, FCPS has resolved the following as their policy:

STORMWATER MANAGEMENT REQUIREMENTS: *Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide stormwater management plans (SWM Plans) for the project. The SWM plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. SWM plans shall be designed to address both stormwater quality and stormwater quantity in accordance with applicable State and Local laws and regulations, and shall use current technologies and methods such as Low Impact Development (LID) as appropriate. The design firm shall be responsible for obtaining SWM plan approvals from all applicable State and Local agencies.*

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis whenever construction projects are being planned on campus.

Measurable Goals:
A written policy added to the FCPS procurement standards. Stormwater Management Plans approved by Frederick County. VPDES permits for any projects disturbing more than one acre. Stormwater Pollution Prevention Plan as applicable.

Items to be included in the Annual Report:
1. Total number of regulated land disturbing activities.
2. Total number of acres disturbed.
3. Copy of the Stormwater Management Plan approval letter from Frederick County.

Responsible Party:
FCPS Assistant Director of Facilities Services

5.2 Stormwater Management Facilities Inventory

Description:
FCPS shall maintain an updated electronic database or spreadsheet of the stormwater management facilities on the Millbrook High School / Redbud Run Elementary School campus. The database shall include the following:

1. Stormwater management facility type.
2. General description of its location including latitude and longitude.
3. Acres treated by the facility, including total acres as well as a breakdown of pervious and impervious acres.
4. The date the facility was brought online (MM/YYYY).
5. The sixth order hydrologic unit code (HUC).
6. Whether the facility is operator owned or privately owned.
7. Whether the facility is part of a TMDL.
8. Whether a maintenance agreement exists if the facility is privately owned.
9. The date of the most recent inspection.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis.

Measurable Goals:
The goal of this BMP is to keep an up to date record of all stormwater facilities and to track the inspections and maintenance required to ensure that they maintain their functionality.

Items to be included in the Annual Report:
1. An updated copy of the electronic database or spreadsheet.
2. Confirmation statement indicating that the information has been electronically reported to the DEQ BMP Warehouse.

Responsible Party:
FCPS Assistant Director of Facilities Services

5.3 Stormwater Management Facilities Inspections and Maintenance

Description:
The existing stormwater management facilities are designed to control post-development runoff rates. To maximize the benefits of these existing facilities, care must be taken to be sure that they are well maintained and in good working order. In order to facilitate this maintenance, FCPS will annually inspect all of the stormwater management facilities on campus. An inspection form is located in the appendix. Required maintenance shall be implemented jointly between the FCPS Facilities Services Department and the Frederick County Recreation Department as they maintain the lawn areas for FCPS.

In addition to the annual inspections of the stormwater management facilities, FCPS has developed an inspection checklist for all stormwater BMPs, including all inlets and outfalls, on the Millbrook High School / Redbud Run Elementary School Campus. Facilities Services staff will annually inspect all on campus stormwater BMPs for evidence of illicit discharges, erosion, trash at inlets, sediment build up, and other maintenance items which would hinder the function of these BMPs. Required maintenance will be performed by the Facilities Services Department.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis.

Measurable Goals:
The goal of this BMP is to annually document inspections and maintenance performed on all stormwater management facilities on the Millbrook High School / Redbud Run Elementary School campus.

Items to be included in the Annual Report:
1. The date the inspection was performed and by whom.
2. A list of any maintenance projects (other than regular grass mowing) which were completed with the dates they were performed.

Responsible Party:
FCPS Assistant Director of Facilities Services
Director of Frederick County Parks and Recreation Department

6.0 MCM #6 - POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR FACILITIES OWNED OR OPERATED BY THE PERMITTEE WITHIN THE MS4 SERVICE AREA

Purpose and Description:
As an educational facility the Millbrook High School / Redbud Run Elementary School campus is closely monitored and well maintained. Since the main activities on campus are education and athletics, there are very few pollution producing activities. Frederick County Public Schools utilizes environmentally friendly cleaning products whenever possible, and staff are trained not to dump used materials into the storm drain system. A database of materials used on campus is maintained on line and includes instructions on proper use and clean-up procedures. Bus drivers are trained on fueling procedures and spill clean-up. The Frederick County Parks and Recreation Department is responsible for maintenance of the lawn areas and athletic fields on campus. The Parks and Recreation staff are trained in application of fertilizers and pesticides which may be used on campus as well as spill clean-up procedures and reporting. The Parks and Recreation Department has a Nutrient Management Plan which it utilizes for the campus which is included in the Appendix.

6.1 Operations and Maintenance

Description:
The Facilities Services Department utilizes an online service which maintains a database of all materials which are used on campus. This database is intended to inform staff of the proper use of materials such as cleaners, de-icing material, herbicides, pesticides, fertilizers, etc. Implementation of these procedures shall minimize or prevent pollutant discharge from daily operations such as road and parking lot maintenance, equipment maintenance, application, as well as the storage, transport, and disposal of pesticides, herbicides, fertilizers, and cleaners. The database information shall include the proper use, storage, and disposal procedures for these materials. This information shall be utilized in the Facilities Services Department staff training program.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. The database shall be updated as necessary whenever new products are added to the daily operations and maintenance program.

Measurable Goals:
The goal of this BMP is to maintain written use, storage, and disposal procedures for all potentially hazardous materials that are used in the daily operation and maintenance of the campus facilities.

Items to be included in the Annual Report:
1. A summary report of any changes to the materials database or the daily operational procedures.

Responsible Party:
FCPS Assistant Director of Facilities Services

6.2 Nutrient Management

Description:
The Frederick County Parks and Recreation Department is responsible for maintaining the lawn areas at all Frederick County Public Schools. The Parks and Recreation Department has a current Nutrient Management Plan which it implements on all lawn areas which it maintains on the Millbrook High School / Redbud Run Elementary School Campus. The nutrient management plan shall be kept up to date and implemented annually.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis. The nutrient management plan shall be evaluated and updated if necessary on an annual basis.

Measurable Goals:
The goal of this BMP is to maintain an up to date nutrient management plan and implement it on all lawn areas on campus.

Items to be included in the Annual Report:
1. The total acreage of land where the nutrient management plan is required.
2. The total acreage of land where the nutrient management plan has been implemented.

Responsible Party:
FCPS Assistant Director of Facilities Services
Director of Frederick County Parks and Recreation Department

6.3 Training Programs

Description:
FCPS Facilities Services Department, FCPS Transportation Department, and the Frederick County Parks and Recreation Department shall implement training programs which train staff in proper product application, spill prevention, spill remediation, and spill reporting. With the exception of the annual training provided for the bus drivers and Parks and Recreation staff indicated in items 1-2, Frederick County Public Schools shall provide the training indicated in items 3-6 only when new staff are hired, when new products are introduced, or when new procedures are introduced.

1. Bus Parking / Fueling: The bus parking / fueling is an area of concern as there is the potential for fluid leaks from parked buses as well as fuel spillage from the fueling area. These concerns are addressed by means of bus driver training and the driver's handbook.
   a. Drivers are required by law to fill out a daily pre-trip inspection which requires them to check for fluid leaks of any kind. Problems found during this inspection are to be reported to the shop for necessary repairs.
   b. Fueling areas are equipped with a storage bin containing Stay Dry absorbent material to be used in the unlikely event of a fuel spill. Drivers are responsible for the clean-up, but are also offered the assistance of both the transportation and school custodial staff if necessary. Any spent absorbent materials are to be cleaned up and disposed of properly.

   Train bus drivers on pre-trip inspections and fuel spill procedures.

2. Lawn Care / Grounds: The lawns and field areas at the schools are maintained by the Frederick County Parks and Recreation Department. Department personnel are trained in the application and use of all chemicals and fertilizers which are used in the maintenance of the lawn areas. The Parks and Recreation Department shall supply documentation of training programs and certifications for Department personnel who will be applying any chemicals or fertilizers on the lawn and field areas.

3. Shop Areas: The shop areas at the high school have the potential for illicit discharge of materials such as solvents, oils, and automotive fluids. Faculty and students are informed and instructed on proper use and disposal of these shop related materials. Train shop teachers and custodial staff on chemical and oil clean up and spill procedures for the shop areas.

4. Building Maintenance: Regular building maintenance can involve paints, solvents, and other materials which could cause serious concern if spillage or wash out enters the storm drain system. Maintenance personnel are trained in the proper disposal of these materials and any non-FCPS contractors working at the schools are required to follow proper disposal procedures. Train Facilities Services staff on the proper use of paints, solvents, and other chemicals used in maintenance operations. Training should include proper clean up and spill procedures.

5. Loading Dock: The loading dock areas contain the dumpsters for solid waste, and are areas where maintenance and equipment cleaning can occur. Training is in place for custodial and kitchen staff on proper procedures for disposal of spent cleaning supplies and solid waste materials. Employees are directed in this training to not to wash materials into the storm sewer system. Train custodial and kitchen staff on proper disposal of solid waste and cleaning supply disposal and wash out.

6. Ice Melt / Snow Removal: The Facilities Services Department handles all snow removal and chemical / sand application for the schools. The type and quantity of material used is documented, and proper application is instructed. Train Facilities Services staff in the proper application and use of ice melting chemicals, sand, or other materials used in snow / ice removal.

Schedule and Evaluation:
Frederick County Public Schools will continue to implement this BMP on an ongoing basis.

Measurable Goals:
The goal of this BMP is to provide staff training in the proper use of materials, as well as spill prevention, remediation, and reporting.

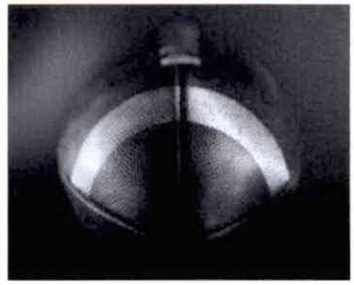
Items to be included in the Annual Report:
1. Summary report of training events including the following:
    a. Name of event (i.e. custodial training, bus driver training, etc.)
    b. Event sponsor
    c. Summary of content
    d. Date of event
    e. Number of employees present

Responsible Party:
FCPS Assistant Director of Facilities Services
FCPS Supervisor of Fleet Services
Director of Frederick County Parks and Recreation Department

APPENDIX

A1 Cooperative Use Agreement

Cooperative Use Agreement



County School Board of Frederick County, Virginia
and
County of Frederick, Parks and Recreation Department

September 2016

COUNTY SCHOOL BOARD OF FREDERICK COUNTY, VIRGINIA
AND
COUNTY OF FREDERICK, PARKS AND RECREATION DEPARTMENT
AGREEMENT OF COOPERATION

THIS AGREEMENT, superceding all prior cooperative use agreements, dated as of December 21, 2016, by and between School Board of Frederick County, Virginia for all schools (the School Board) and the County of Frederick, Parks and Recreation Department (the Parks and Recreation Department) recites and provides:

RECITALS

WHEREAS, it is the desire of the School Board and the Parks and Recreation Department to encourage the maximum use of school facilities consistent with the educational requirements of each school, in order to foster youth and civic activities and to contribute to the well-being of Frederick County; and

WHEREAS, to the greatest extent possible, school facilities should be made available outside of school hours for worthwhile after-school, community, educational, recreational, civic and cultural activities; and

WHEREAS, to the greatest extent possible, park facilities and professional expertise should be made available outside of park use for worthwhile educational and maintenance activities; and

WHEREAS, the School Board and the Parks and Recreation Department share these common interests and possess capabilities for the sharing of resources of each agency; and

WHEREAS, the use by each party for specified purposes of properties belonging to the other is lawful and is in the public interest by virtue of resulting economics in the use of space and of public monies; and

WHEREAS, the past actions of the School Board and the Parks and Recreation Department have supported the school/recreation concept and each party desires to pursue an even higher level of cooperation;

NOW, THEREFORE, for and in consideration of the mutual promises contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree to the following practices concerning:

1. Use of school facilities by county-approved activities and parks and recreational facilities for all school-approved activities;

2. Use of school facilities by the parks and recreation basicREC program;

3. The maintenance of school grounds and new transportation facility by the Parks and Recreation Department; and;

4. Other specific items.

I. Use of School and Park Facilities

The use of school property is in accordance with school board policy, and the use of parks and recreation property is in accordance with parks and recreation department policy. A list of all facilities by school and parks included in this agreement is shown in Appendix A.

A. Scheduling of School and Park Facilities

1. Planning Timetable

The following facilities' planning timetable for scheduling indoor facilities and outdoor facilities will be as follows:

a. Planning deadlines

By July 1 - Agencies send lists of activities and facilities needed to each other for the months of September, October, November and December.

By Nov. 1 - Agencies send lists of activities and facilities needed to each other for the months of January, February and March.

By Jan. 1 - Agencies send lists of activities and facilities needed to each other for the months of April and May.

By Mar. 1 - Agencies send lists of activities and facilities needed to each other for the months of June, July and August.

By July 20, November 20, January 20, and March 20 –
Parks and Recreation will send a list to the School Principal of the scheduled dates, times, and groups using school facilities. Concurrently, the School Board office will send a list to the Parks and Recreation Department of all scheduled dates, times, and groups using park facilities. Each month an updated list will be sent to the Principal or Program Supervisor.

b. Changes due to inclement weather or emergencies

When schools are closed early or closed during the day for inclement weather, emergency, etc., selected Parks and Recreation activities or programs such as before and after school programs and community centers may remain open. Parks & Rec staff shall notify school personnel when park facilities are not available due to inclement weather.

Snow removal at Parks & Rec.'s community centers will be at the discretion of Director of Facilities Services or designee.

If all after-school activities are canceled, buildings are closed to all but BasicRec and community centers. Circumstances may warrant the canceling of certain Parks & Recreation events, which will be discussed between the two organizations when they develop.

c. Scheduling priorities

If an event must be canceled and rescheduled on the night of the other's activity for reasons of emergency, acts of God, etc., the school principal will contact the Parks and Recreation Department as soon as possible, and vice versa.

In the scheduling of said school facilities, school events and programs, as defined by school board authority and action, shall have first priority; and recreation programs established by the Parks and Recreation Department shall have second priority; and any other events by other groups or agencies shall have third priority. Any activities scheduled outside of the timetable shall be mutually agreed on by the Parks and Recreation Department and the School Principals.

In the scheduling of park facilities, park and recreation programs and their youth sports partners shall have first priority; school activities shall have second priority and all other groups third priority, with the exception of specified soccer and softball fields at Sherando Park (SHS Softball will have access to one field after 5 p.m.) during pre, post, or regular season play where the schools shall have first priority.

2. Normal Hours of Operation*

a. School Facilities

1. Indoor Facilities

The use of the school for recreation programs will be Sunday through Saturday. Normal daily operations shall be from the dismissal of school, which includes after-school programs, or after the school athletic program until 11:00 p.m. weekdays (with the exception of Section II below), Saturdays & Sundays - 8:00 a.m. to 11:00 p.m.

<u>Summer Hours</u>

Monday - Sunday - 8:00 a.m. - 11:00 p.m.

Maintenance of all facilities and school programs will take priority when scheduling the use of these facilities.

2. Outdoor Facilities
    (a) Lighted Fields
        Weekdays - From the end of school functions until 11:00 p.m.
        Weekends - 8:00 a.m. - 11:00 p.m.
    (b) Unlighted Fields
        Weekdays - From the end of school functions until dark.
        Weekends - 8:00 a.m. - Dark
        <u>Summer Hours</u>
        Monday - Sunday - 8:00 a.m. - Until Dark

b. Designated Parks & Recreation areas located in certain schools

1. Sherando Community Center—office space, community rooms, racquetball courts, and weight room; 8:00 a.m. – 11:00 p.m. daily.
2. Orchard View Elementary School—office space; 8:00 a.m. – 11:00 p.m. daily; Gymnasium—3:30*--11:00 p.m. daily, 8 a.m.-11:00 p.m. Sat./Sun.
3. Evendale Elementary School—Parks & Rec. area (activities room, demo lab, multipurpose room, office, lobby); 8 a.m.—11 p.m. daily; Gymnasium—3:30*--11:00 p.m. daily, 8 a.m.-11:00 p.m. Sat./Sun.
4. Gainesboro Elementary School— Parks & Rec. area (activities room, demo lab, multipurpose room, office, lobby); 8 a.m.—11 p.m. daily Gymnasium—3:30*--11:00 p.m. daily, 8 a.m.-11:00 p.m. Sat./Sun.
5. Greenwood Mill Elementary School— Parks & Rec. area (activities room, demo lab, multipurpose room, office, lobby); 8 a.m.—11 p.m. daily Gymnasium—3:30*--11:00 p.m. daily, 8 a.m.-11:00 p.m. Sat./Sun.

Facilities that host the Parks & Rec.'s BasicRec program may have extended morning hours.
**Time may fluctuate due to the conclusion of scheduled after-school programs.*

c. Parks and Recreation Facilities

1. Indoor Facilities
    The use of park buildings for school programs will be Sunday through Saturday 8:00 a.m. - 11:00 p.m.

d. Any exception to these guidelines must be approved by the designees of the School Board and the Parks and Recreation Department. In the event of conflicts or the need for additional facility use by either party, the two agencies will work together to resolve any potential situations.

3. Maintenance and Improvements of School and Park Indoor Facilities

Maintenance of all school facilities will be the responsibility of Frederick County Public School's (FCPS) personnel. In facilities that have a Parks & Recreation area, FCPS's staff will be responsible for heavy floor maintenance (buffing, stripping, and finishing) in the Parks and Recreation area. All other custodial services (cleaning) will be completed by Parks and Recreation staff. FCPS Facilities Services Department will supply cleaning equipment and chemicals for use by Parks & Recreation's staff. No chemicals will be used unless approved by FCPS Facilities Services Department. In all other facilities, the school custodial staff assigned to the facility shall perform routine maintenance and cleaning use and shall be available for service during use.

II. basicREC, Summer basicREC and basicRec ASE (After School Extras)

A. During the school year, Parks & Recreation provides a recreational extended day school age program in designated schools where community need and interest are established. During the summer, Parks & Recreation offers a similar program for school-age children.

B. School facilities listed in Appendix B will be made available for before and after school use during the school year and certain sites for the summer program. Certain elementary schools, upon the agreement of the current administrator, will host the basicRec ASE program in the afternoon. There will be no charge to the Parks & Recreation department for space or utilities associated with these facilities.

C. The school board shall provide snow removal of the parking lots and walkways of the schools-at the discretion of the Director of Facilities Service or designee, where a basicREC program is operating a snow day camp (8 a.m-6 p.m.). Fees for snow removal will be invoiced.

D. Access to Frederick County Public Schools' facility will be scheduled through the principal. In emergency situations, the School Principal will notify the Superintendent of Schools' designee so accommodations can be made.

III. Maintenance of School Grounds by the Parks and Recreation Department

The athletic field maintenance classifications herein are addressed in Appendix D. Maintenance and preparation of all outdoor facilities on both park and school property will be the responsibility of the Parks & Recreation Department except as identified.

A. Grounds Maintenance
Parks and Recreation will maintain all designated outdoor facilities year-round. This includes general grounds and maintenance field preparation for high school athletic events, and maintenance and operation of automated in-ground irrigation systems. (See Appendix C). Clean up of all outside events will be the responsibility of the agency using the fields. If additional cleanup is needed by FCPS staff, the agency hosting the event will be invoiced.

B. Mechanical and electrical repairs will be handled by the agency owning the property. This does not preclude the exchange of expertise and knowledge in these instances.

C. Snow removal from school property will be handled by school personnel. Snow removal from park facilities will be handled by the Virginia Department of Transportation, or by mutual written agreement.

D. Improvements - Any new additions or changes that require new funding will be handled as described below.

1. Outdoor Facilities - Improvements of turf and hard surface courts will be agreed upon and dealt with on a case-by-case basis at budget time between the Parks and Recreation Department and the School Board.

2. Indoor School Facilities - Will be the responsibility of the School Board with the exception of the community use facilities which will be reviewed by both agencies.

IV. Other Specific Items

A. Utilities

1. Parks and Recreation will be responsible for utility costs for all park facilities included in Appendix A.
2. School Board will be responsible for utility costs for all school facilities.

B. Damages (Indoors and Outdoors)

1. Damage caused by any activities shall be reported to the building Principal or Park Manager as soon as possible.
2. The facility owner (School Board or Parks and Recreation Department) will make necessary repairs in a timely manner so as not to interrupt scheduled activities..
3. Direct costs will be billed to the agency causing the damage. All conflicts regarding responsibility for repair will be resolved by the Parks & Recreation Director and the Superintendent of Schools or their designees.

C. Equipment

Arrangements for the use of school equipment or the use of outside equipment brought on site shall be made in accordance with Policy and Regulation 721, *Equal Access to School Facilities, Students and Staff,* by the Parks and Recreation Department personnel through the principal/designee. Arrangements for the use of Parks and Recreation equipment shall be made by school personnel through the Program Supervisor.

D. Planning, Review, and Coordination

The Parks and Recreation Department and the School Board will share information pertaining to improvements, changes, and updates relating to planning for facility improvement. This channel of communication should be between the Superintendent of Schools (or designee) and the Director of Parks and Recreation (or designee).

E. Evaluation

After the effective date of this Agreement, the agencies will develop an annual evaluation schedule.

F. Cost Determination

The Parks and Recreation department agrees to pay for the use of facilities charges as outlined in school board policy and regulation # 721 Equal Access to School Facilities, Students, and Staff (Appendix G), as well as any school personnel costs associated with an event. The school board agrees to pay for any indoor use of park facilities as outlined in Parks and Recreation Fee Schedule (Appendix F). A quarterly invoice will be prepared by the facility owner and submitted to the scheduled party for payment. For timely accounting entry for the fiscal year end, the quarterly invoices shall follow the schedule listed below:

1st quarter – June 1 through August 31
2nd quarter – September 1 through November 30
3rd quarter – December 1 through February 28
4th quarter – March 1 through May 31

EXCEPTION: As noted under Section II, there is no charge for the space and utilities associated with the basicREC program.

G. Information Dissemination

In order to keep youth aware of the opportunities available to them, the school system shall develop guidelines for the effective distribution of Parks and Recreation literature/information to school-age youth which shall have minimal interference into school operations.

H. Storage

Where feasible, the school system will provide storage space for Parks and Recreation equipment and supplies, the details of which shall be agreed upon by the Principal and Parks and Recreation Director. Future school development will consider the addition of storage space dedicated to Parks and Recreation use.

I. Insurance

Frederick County Public Schools and the Frederick County Parks and Recreation Department shall each carry appropriate coverage through their respective governing bodies for property, theft, and liability for all sites owned by that entity.

Frederick County Parks and Recreation (FCPRD) shall furnish to the Frederick County Public Schools (FCPS) a certificate of insurance for liability for all Parks and Recreation activities conducted on school property. In turn, FCPS shall do the same for FCPRD.

From time to time, FCPRD may authorize a third party to conduct a FCPRD-sponsored program or activity on school property, or authorize a third party to use school property to conduct their own program or activity. In all cases involving medium to high risk potential, FCPRD will require the third party to have insurance coverage as described below. If the activity is determined by FCPRD to be a low risk activity, FCPRD may authorize and exempt the third party from the insurance requirement. Low risk activities are those that present minimal risk of personal injury, illness, property damage, and/or financial loss. Examples include meetings, speeches, presentations, film showings. When appropriate, liability waivers from the participants are encouraged.

FCPRD agrees to collect and ensure the third party's certificate of insurance, which shall name both FCPRD and FCPS as additional insured, demonstrates coverage for public liability of not less than $1 million per occurrence for bodily injury and $2 million annual aggregate. Coverage for property damage of $200,000 for any one accident and an aggregate of $500,000 is also required. This coverage requirement can be met by a policy with either separate limits as stated above or by one with a Combined Single Limit (CSL). The coverage policy of the third party shall be underwritten by a company licensed to do business in the Commonwealth of Virginia and cannot be cancelled without a 30-day notice of commitment to FCPS and FCPRD.

Additionally, FCPRD agrees to require the third party to protect, indemnify, and defend and save harmless, the School Board of Frederick County, its officers and employees, and Board of Supervisors of the County of Frederick, its officers and employees, from any and all claims, liabilities, and damages, including professional fees, directly or indirectly related to the use of the premises by the third party.

J. Communication

The Superintendent of Schools and the Director of Parks and Recreation will each appoint a designee that will work to resolve and interpret any problems or differences that occur as a result of the agreement.

K. Supervision

The Parks and Recreation Department will be responsible for all FCPRD sponsored activities scheduled for both indoor and outdoor facilities and the School Board will be responsible for all school sponsored activities scheduled for both indoor and outdoor facilities.

L. THE EFFECTIVE DATE OF THIS AGREEMENT IS December 21, 2016.

This Agreement was approved by the County School Board of Frederick County, Virginia and the County of Frederick, Parks and Recreation Department on December 21, 2016.

Superintendent, Frederick County Public Schools

County Administrator, County of Frederick

Chairman, School Board of Frederick County

Chairman, Frederick County Board of Supervisors

Neither party shall have the right to assign this contract to another party without first obtaining the written consent of the other party. Any addendums to this contract will require the same signatures that were required to enact it.

APPROVED AS TO FORM

COUNTY ATTORNEY

Facilities Available for Use

High Schools-MHS, JWHS, SHS		Elementary Schools-APR, AES, BHES, EES, GES, GMES, IHES, MES, OVES, RRES, SES	
Areas	**Schools**		
Auxiliary Football Practice Field	MHS	**Areas**	**Schools**
uxiliary Gym	All High Schools	PE Field (Baseball)	AES, MES, OVES, RRES, SES
Baseball Practice/Football Practice Fields	JWH, MHS	PE Field (Soccer)	AES, MES, OVES, RRES
Baseball Stadium Field	All High Schools	PE Fields	EES, GES, GMES, IHES, SES
Cafeteria	All High Schools	PE Lower Field	BHES
Classrooms	All High Schools	PE Upper Field (Soccer)	BHES
Commons Area	MHS, SHS	Soccer Field	EES, GES, GMES
Football Stadium Field *	All High Schools	Track	AES, BHES, IHES, OVES, RRES, SES
Lower Football Practice Field	JWHS		
Main Gym	All High Schools		
Outdoor Basketball Courts	SHS	**Clearbrook Park**	
Practice Fields	SHS	**Areas**	
Soccer/Multipurpose Field	JWHS, MHS	Cole Field	
Softball/Practice Football Field	JWHS, MHS	Franklin Field	
Stage/Auditorium	All High Schools	Frey Field	
Tennis Courts	All High Schools	Field #4	
Track	All High Schools	Log Cabin	
Wrestling Room	All High Schools	Picnin Shelters	
Middle Schools-ABMS, FCMS, JWMS, REAMS		Swimming Pool	
Art Room	REAMS	Beach Volley Court	
Cafeteria	All Middle Schools	**Sherando Park**	
Classrooms	All Middle Schools	**Areas**	
Football Field *	All Middle Schools	Fields: #1, #2, #4, #5, #6, #7, #8	
Gym	All Middle Schools	Bennington Field	
Open Field along Aylor Road	REAMS	Soccer Fields: #1, #2, #3, #4	
Physical Education Field	FCMS, JWMS	Picnic Shelters	
Practice Area (Modular Classroom)	REAMS	Swimming Pool	
Practice Area East	REAMS	Beach Volleyball Court	
Practice Fields	AREBMS	Disc Golf Court	
Track	All Middle Schools	**Community Center**	
Wrestling Room	All Middle Schools	**Areas**	
Elementary Schools-APR, AES, BHES, EES, GES, GMES, IHES, MES, OVES, RRES, SES		Office	
Cafeteria	All Schools	Courts; #1, #2	
Elementary Schools-APR, AES, BHES, EES, GES, GMES, IHES, MES, OVES, RRES, SES		**Community Center Areas**	
Cafeteria/Stage	RRES	Weight Room	
Gym	OVES, RRES	Multipurpose Room	
Gym/Cafeteria	EES, GES, GMES,	Kitchen Side	
Gym/Stage	APR, AES, IHES, MES, SES	Mirror Side	

basicREC and Summer basicREC sites
(which include teacher workdays and scheduled/unscheduled snow days):

Apple Pie Ridge Elementary (APR)
Armel Elementary (AES)
Bass-Hoover Elementary (BHES)
Evendale Elementary (EES)
Gainesboro Elementary (GES)
Greenwood Mill Elementary (GMES)
Indian Hollow Elementary (IHES)
Middletown Elementary (MES)
Orchard View Elementary (OVES)
Redbud Run Elementary (RRES)
Stonewall Elementary (SES)

basicRec ASE

Certain elementary sites of which the current building administrator has agreed to allow Parks and Rec. to use their facility for this program.

Grounds Maintenance Overview

Planned Maintenance Tasks:

Grass cutting of all areas
Reseed athletic fields as needed
Lime athletic fields as needed
Aeration of athletic fields as needed
Fertilizing athletic fields as needed
Deep-tine aeration and top dressing soccer, football, and baseball fields as needed
In-Field Preparation; Daily dragging when needed, field-lining for high school games
Operating Irrigation Systems
Weed control on concrete/asphalt areas

Maintenance Tasks do not include the following:

Site/Field Renovation or Improvements
Snow Removal
Parking Lot Maintenance
Utilities Maintenance
Fence Maintenance (unless damaged by agency)
Bleacher Maintenance
Running Track Maintenance
Storm Water Management Systems
Building Maintenance
Playgrounds Maintenance Mulching/pruning of trees and shrubs

Areas Not Included in Grounds Maintenance Proposal:

Support Facilities West, Facilities Services, and NREP (Smithfield)

Facility Field Inventory

See Appendix E for class definitions and maintenance.

Facility	Description	Use	Proposed Maintenance Program
Dowell J. Howard Center	Grass Open Area		Class B Turf
JWHS-Football Stadium	Football Field Soccer Field	JWHS Football; JWHS Soccer	Class A Turf (Athletic Field)
JWHS-Baseball Stadium	Baseball Field	JWHS Football; All Baseball	Class A Turf (Athletic Field)
JWHS-Soccer/Multipurpose	Soccer Field	JWHS Physical Ed.; JWHS Soccer; Recreation Soccer	Class A Turf (Athletic Field)
JWHS Baseball field Practice Field	Baseball Practice Field	JWHS Physical Ed.; JWHS Football Practice; All Baseball	Class A Turf (Athletic Field)
JWHS Softball Field	Softball	JWHS Physical Ed.; JWHS Football Practice; All Baseball	Class A Turf (Athletic Field)
JWHS Practice Field	Football Field	JWHS Physical Ed.; JWHS Football	Class A Turf (Athletic Field)
MHS-Football Stadium	Football Field Soccer Field	MHS Football; MHS Soccer	Class A Turf (Athletic Field)
MHS-Varsity Baseball	Baseball Field	MHS Baseball; All Baseball	Class A Turf (Athletic Field)
MHS-Baseball Practice Field	Baseball Practice Field	MHS Physical Ed.; MHS Football Practice; All Baseball	Class A Turf (Athletic Field)
MHS-Varsity Softball	Softball Field	MHS Softball; All Softball	Class A Turf (Athletic Field)
MHS-Practice Field	Softball Field	MHS Physical Ed; All Softball	Class A Turf (Athletic Field)
MHS-Practice Field #1	Football Practice	MHS Physical Ed.; MHS Football	Class A Turf (Athletic Field)
MHS-Practice Field #2	Football Practice	MHS Physical Ed.; MHS Football	Class A Turf (Athletic Field)
MHS-Practice Field #3	Football Practice	MHS Physical Ed.; MHS Football	Class A Turf (Athletic Field)
SHS Football Stadium	Football Practice	SHS Physical Ed.; SHS Football	Class A Turf (Athletic Field)
SHS Practice Field #1	Football Practice	SHS Physical Ed.; SHS Football	Class A Turf (Athletic Field)
SHS Practice Field #2	Football Practice	SHS Physical Ed.; SHS Football	Class A Turf (Athletic Field)
SHS Baseball Field	Baseball Practice	SHS Baseball	Class A Turf (Athletic Field)
Senseny Road/NREP	Grass Open Area		Class B Turf
ABMS.-Football Field	Football Field	ABMS Football; ABMS Track/Field	Class A. Turf (Athletic Field)
ABMS Physical Ed. Field	Physical Ed. Field	ABMS Physical Ed. BRYSA Soccer	Class B. Turf (Athletic Field)
FCMS-Physical Ed. Field	Physical Ed. Field	FCMS Physical Ed.; BRYSA Soccer	Class A. B Turf (Athletic Field)
FCMS-Football Field	Football Field	FCMS Football; FCPRD	Class A Turf

Facility	Description	Use	Proposed Maintenance Program
JWMS Physical Ed. Field	Physical Ed. Field	Physical Ed Football; Baseball; Soccer	Class B Turf (Athletic Field)
JWMS Football Field	Football Field	Football; Track/Field	Class A Turf (Athletic Field)
REAMS Area by Modular Classroom	Field by Modular Classroom	Physical Ed.; Soccer	Class B Turf (Athletic Field)
REAMS Football Field	Football Field	Football; Track/Field; Physical Ed.	Class A Turf (Athletic Field)
REAMS Softball Field	Softball Field	Physical Ed.; Baseball	Class B Turf (General Grounds)
Apple Pie Ridge Elementary School	Grass Open Area	Physical Ed.	Class B Turf
Armel Elem. Soccer Field	Soccer Field	Physical Ed.; Soccer	Class B Turf (Athletic Field)
Bass-Hoover Physical Ed. Field	Upper (south) Physical Ed. Field	Physical Ed.; Soccer; Baseball	Class B Turf
Bass-Hoover Physical Ed. Field	Lower (north) Physical Ed. Field	Baseball	Class B Turf
Evendale Elem. Soccer Field	Soccer Field	Physical Ed.; Soccer	Class B Turf
Gainesboro Elem.	Baseball Field		Class B Turf
Gainesboro Elem. Soccer Field	Soccer Field		Class B Turf
Greenwood Mill Elem.	Soccer Field		Class B Turf
Indian Hollow Elem.	Baseball Field	Physical Ed.; Soccer; Baseball	Class B Turf
Middletown Elem. Baseball	Baseball Field	Physical Ed.; Baseball	Class B Turf
Middletown Soccer	Soccer Field	Physical Ed.; Soccer	Class B Turf
Orchard View Elem. Softball	Softball Field	Physical Ed.	Class B Turf
Orchard View Elem. Soccer 1	Soccer Field	Physical Ed.	Class B Turf
Orchard View Elem. Soccer 2	Soccer Field	Physical Ed.	Class B Turf
Redbud Run Elem. Baseball	Baseball Field	Redbud Run Physical Ed.; All Baseball	Class A Turf (Athletic Field)
Redbud Run Elem. Soccer	Soccer Field	Physical Ed.; Soccer	Class B Turf (Athletic Field)
Stonewall Elem.	Baseball Field	Physical Ed.; Baseball	Class A Turf (Athletic Field)
James Wood HS	Detention Pond		Class C Turf
Bass-Hoover	Detention Pond		Class C Turf
Orchard View	Detention Pond		Class C Turf

ATHLETIC FIELD & GROUNDS MAINTENANCE STANDARDS

SCOPE OF WORK

This work shall include all labor, materials, equipment, supplies and services necessary to maintain the athletic turf, grounds and landscaping at the school sites included in this report.

GENERAL INFORMATION

Class A Turf – Athletic facilities that are used for games.

Class B Turf – High traffic areas/parking lots

Class C Turf - Detention Ponds/Rough Areas

MOWING – CLASS A & B TURF

Grass shall be cut to a height of 2 inches and at no time will the height be above 3 inches. FCPRD reserves the right to change mowing heights based upon weather conditions.

Class B Turf will be cut to a height of 3"and will not be above 4".

Equipment used to cut turf areas will be sufficiently sharp enough to cut the grass plant cleanly without damaging or pulling it up.

Clippings are to be removed from mulched areas, sidewalks, or roadways.

FCPRD will take whatever steps necessary to ensure that no tire marks, grass stains, oil or gas stains are left on any sidewalks or curbs.

FCPS will remove trash and debris from the site before mowing and trimming begin.

Class C Turf will be cut one time per year with a rotary cutter.

TRIMMING – CLASS A & B TURF

Grass will be trimmed around all trees, fences, playground equipment, benches, landscape timbers, drop inlets and manhole covers to the same height as the lawn areas surrounding them.

Trimming will be done after each mowing or FCPRD may opt to use a non-controlled commercial herbicide (i.e. Round Up).

Herbicide will be applied in accordance with the manufacturers' recommendations and only when the ambient temperature is within 60 degrees and 85 degrees.

Spraying will not be done when the vegetation is wet or rain is expected within the next 6 hours and the equipment used will not exceed an operating pressure of 30 lbs./sq. inch. If spraying is used, vegetation will be controlled no more than 6" away from either side of fences or around any plants or structures.

AERATION – CLASS A TURF

Class A turf will be shallow-tine aerated as needed during the spring and fall growing seasons. Deep tine aeration will be completed at least once every four years or when renovation plans are implemented.

Aeration plugs will be dragged within 48 hours of the completed aeration process.

FERTILIZATION AND LINING – CLASS A TURF

Turf areas will be fertilized according to soil testing results with at least 4 lbs. of nitrogen /1000 sq. feet being applied annually.

OVERSEEDING – CLASS A TURF

Class A Turf will receive cool season grass overseeding on an as needed basis and at least one time per year.

Class A Turf will receive a grass seed blend of Kentucky Bluegrass and Perennial Rye grass.

Class B Turf will receive a grass seed blend of Turf Type Tall Fescue and Kentucky Bluegrass on an as needed basis.

LIMING – CLASS A TURF

Lime will be applied in such a manner as to avoid damage to playground equipment, trees, shrubs, and other structures and provide for an even and uniform distribution.

Pulverized agricultural limestone may be substituted for pelletized if weather conditions are such that adjoining properties are not affected.

HERBICIDES/ INSECTICIDES/ FUNGICIDES

Class A turf will receive treatments of herbicides, insecticides, and fungicides when athletic field programming and weather condition permit. The application of these pesticides will be completed when the condition of the turf would dictate their usage in accordance to established best management policies.

Appendix F

Frederick County Park and Recreation
Fees and Charges

FY 2016-2017

	Resident	Non-resident	
Baseball and Softball Fields			
Practice	$10	$15	*per hr*
Game	$20	$25	*per hr/ 2 hr min*
Tournament (9am-11pm)	$150	$190	*per reservation*
Lights	$15	$15	*per hr*
Soccer Fields			
Sherando 1-4	$25	$40	*per hr*
Sherando	$15	$25	*per hr*
Open Space			
Per acre	$62	$93	*per day*
Disc Golf Course	$103	$155	*per day*
Paddleboat-30 minute ride	$2	$2	*per person*
Racquetball Courts	$7	$7	*per hr*
Weight Room	$2	$2	*per hr*
Gymnasium	$25	$40	*per hr/2hr min*
Greenwood/Gainesboro/Evendale			
Activity Room	$15	$30	per hr/2hr min
Gainesboro/Evendale			
Wooden Floor Room	$12	$27	per hr/2hr min
Sherando			
Activity Room w/Kitchen	$20	$35	per hr/2hr min
Swimming Pool			
Under 3	Free	Free	
3 and older	$4	$4	entry
Last Hr.	$1	$1	entry
Rent Entire Pool	$200	$250	2hr rental

Frederick County Park and Recreation
Fees and Charges

FY 2016-2017

Shelters			
30 Capacity			
Lock Gazebo (SH)	$41	$56	per day
Lawrence Shelter (CB)	$41	$56	per day
75 Capacity			
FFA (SH)	$52	$68	per day
Abex (SH)	$52	$68	per day
Key Club (SH)	$52	$68	per day
JW Colonel (CB)	$52	$68	per day
Rubbermaid (CB)	$52	$68	per day
Antique Car (CB)	$52	$68	per day
Brill (CB)	$52	$68	per day
150 Capacity	$63	$79	per day
Ruritan (SH)	$63	$79	per day
Sandy (SH)	$63	$79	per day
Kiwanis II (CB)	$63	$79	per day
Lions Club (CB)	$63	$79	per day
200 Capacity			
Lions Club (SH)	$74	$91	per day
Kiwanis I (CB)	$74	$91	per day
Discounts			
20% off for 50 or more hours rented of baseball/softball/soccer or gymnasium			
20% off 10 or more visits for weight room or racquetball court			
Fees effective January 1, 2016			

Frederick County Public Schools

OPERATIONS AND FINANCE

Equal Access to School Facilities, Students, and Staff

Student Use of School Facilities

A. School Clubs

Frederick County Public Schools does not sponsor or recognize student social clubs. However, schools may sponsor clubs that are an outgrowth of the curricula and programs. Time may be designated for these clubs to meet.

Each school-sponsored (curriculum-related) club must have a set of by-laws, objectives, program of work or activities, budget, list of members, and list of officers. The information is due in the office of the school principal by the announced date each year.

B. Clubs Not Sponsored by the School

Under the supervision of the principal or designee, school student groups/clubs[1] not sponsored by the school (non-curriculum related) may use school facilities in accordance with the Federal Equal Access Act and other applicable law. For purposes of this regulation, the school board adopts a limited public forum[2] so that non-curriculum related student groups may use school facilities during non-instructional time with the following conditions.

1. All secondary (grades 6 – 12) non-curriculum related and student groups will be granted equal access to or an opportunity to conduct meetings at school facilities without regard to the religious, political, philosophical, or other content of the speech at such meetings.

2. Meeting requests shall be submitted at least five (5) school days in advance to the principal or designee.

3. Meeting requests shall be approved on a first-come, space available basis.

4. Meetings shall be voluntary, student-initiated and student directed. The meetings may not be directed, controlled, conducted, or regularly attended by non-school persons. School officials shall attend the meetings only for non-participatory, custodial purposes. Designated custodial adults shall be School Board employees.

5. Meetings may not interfere with other educational activities. The principal or designee retains authority to maintain order, discipline, and to protect the well-being of students and faculty.

6. For purposes of this regulation the following definitions will be used.

"Non-curriculum related student group" means any student group[1] that does not directly relate to the body of courses offered by the school. For example, the subject matter of the group actually is not taught or soon will be taught in a regularly offered course; the subject matter of the group does not concern the body of the courses as a whole; if participation in the group is not required for a particular course; or participation in the group does not result in academic credit.

"Non-instructional time" is the time set aside by the school immediately before actual classroom instruction begins or immediately after actual classroom instruction ends.

II. Community Use of School Facilities

A. Eligible Organizations

Responsible, recognized, local persons, organizations, agencies, and institutions are eligible to apply for use of school facilities.

Requirements of the regular school program shall receive first consideration in the use of school facilities. After these requirements are met, school-related organizations (see Appendix A) and events shall have first priority; Frederick County Parks and Recreation Department activities and organizations shall have second priority; and other organizations and events shall have last priority.

Curriculum-related organizations shall have priority over non-curriculum related organizations, and approved child and youth groups shall have priority over adult groups.

In the event of a local emergency or disaster, school officials will cooperate with local, state, and federal authorities as well as disaster relief organizations in making school facilities available for shelters.

B. Use of School- and Non-school-owned Equipment

School equipment may be lent to responsible community groups of a worthy educational, civic, or charitable purpose when the following conditions are met:

1. The group borrowing the equipment agrees to accept responsibility for repairing or replacing any equipment damaged or lost while in its possession;

2. The equipment is not both unusually expensive and subject to easy damage;

3. The equipment is in good condition;

4. The group will provide a competent operator(s) for any machine lent and will provide all training on the setup, use, and breakdown of the equipment. If outside equipment is approved and brought to the facility, the community group will provide competent operator(s) who have been trained on setup, use, and breakdown of said equipment.

5. At the discretion of the principal, an organization may be required to pay the designated hourly rate for a school employee to operate school- or non-school-owned equipment.

6. Equipment that is brought in by community groups must also meet the conditions listed above.

C. Application and Approval

Frederick County Public Schools' use of facilities application shall be completed online. Information and directions on how to become a requester and submit a request for use of facilities may be found at www.frederick.k12.va.us (Link: Community Facility Use)

1. Permission for the use of school facilities may be given only during the current fiscal school year. Applications submitted beyond the current fiscal school year will be approved pending and will not be activated until after the approval of the budget for, or by July 1 of, the next fiscal school year. For first-time users, prepayment may be required; if so, please make payment payable to the Frederick County School Board (if a fee is to be charged) and include Schedule ID number of request on remittance.

2. When a fee for Frederick County Public Schools staff is required, the hourly fee for hours will be calculated as reported and approved by the principal or his/her designee. After the event, the applicant/requester will receive an invoice for the incurred fees. Upon receipt of invoice, payment to Frederick County School Board for the full amount is to be submitted to Finance Department with Schedule ID number of event noted on remittance. Failure to pay incurred fees may result in prepayment before an event or denial of use of facility.

3. The applicant/requester will place reliable persons in charge of all activities, be responsible for damage caused by the group or by others involved with or admitted for the event, and provide police protection, if necessary, to maintain order and protect school property.

The names of the responsible person(s) will be listed under the "Additional Information" section of the online application form at the time of the request submission.

4. Unless otherwise exempted, before any application is approved and activated, each applicant/requester must furnish a certificate of insurance to FCPS verifying public liability coverage.

   i. Coverage requirements:
      1. Liability coverage shall not be less than $1 million per person for bodily injury and $2 million annual aggregate.
      2. Coverage for property damage of $200,000 for any one accident and an aggregate of $500,000 is also required.
      3. Any policy required by this regulation shall meet the following requirements (at a minimum):
         - Underwritten by a company licensed to do business in the Commonwealth of Virginia
         - Cannot be cancelled without a 30-day notice of commitment to Frederick County Public Schools
         - Frederick County Public Schools must be listed as an additional insured and be a certificate holder

   ii. The following language shall be on the certificate: "By endorsement to the policy(ies) listed above, and attached hereto, Frederick County Public Schools, its elected and appointed officials, agents, and employees are listed as additional insured under this policy and this insurance coverage shall be primary over any other insurance or self-insurance in force."

   iii. Additionally, by accepting the terms of agreement in the online use of facilities application, the applicant/requester agrees to protect, indemnify, and defend and save harmless, the School Board of Frederick County, its officers and employees, from any and all claims, liabilities, and damages, including professional fees, directly or indirectly related to the use of the premises and any FCPS equipment and non-school owned equipment, by the applicant/requester individual or organization.

If the applicant/requester plans to use businesses or individuals, hereinafter referred to as vendors, during or for a requested event, the applicant/requester shall obtain a certificate of liability insurance from all vendors per insurance requirements listed above (# 4.). A copy of the certificate of liability insurance from vendors shall be submitted to the Facilities Services Department for review and archiving.

5. The application for the use of school facilities shall not be considered approved until the applicant/requester has received notice (via e-mail) that the request has been approved and activated.

6. In the event a scheduled meeting is canceled, notification must be given at least twenty-four hours before the scheduled time, or a fee will be charged. Exceptions may be made for cancellations due to inclement weather. Any field prep requested shall be the responsibility of the applicant/requester to be arranged with Frederick County Parks and Recreation Department.

D. Rules and Conditions

Conditions under which school buildings and grounds in the division may be used for non-school activities are the following:

1. No organization may use the buildings or grounds at any time or in any manner that will interfere with the regular program of the school.

2. The school board or its representatives must have free access to all facilities at all times.

3. The right to revoke a permit at any time is reserved by the school authorities.

4. Any organization desiring to move special properties into the school or grounds prior to or on the date of rehearsal or performance must obtain permission from the principal. All flats, curtains, and costumes must be treated for fire-retardation.

5. Putting up decorations or scenery or moving pianos is prohibited unless special permission is granted.

6. Permission for bringing equipment such as concession stands, trucks, or carnival equipment on school property must be requested in writing thirty days in advance before a formal agreement can be considered.

7. The parking of automobiles shall be restricted to designated areas.

8. The organization that uses the building and grounds shall be responsible for the conduct of its members.

9. Compensation for any damage done to school property shall be provided by the sponsoring organization.

10. Consumption of soft drinks shall be limited to such section or sections of the building as designated by the school authorities.

11. Frederick County School Board policy prohibits the use of tobacco products and electronic cigarettes by staff, patrons, or other persons on school property, in school vehicles, and at school-sponsored activities, both indoors and outdoors, at all times.

12. No one may possess, consume or serve any alcoholic beverage in or on school property, except for religious congregations using wine for sacramental purposes only.

13. The possession of a controlled substance, imitation controlled substance or marijuana, as defined in Code of Virginia Section 18.2-247, on school property is prohibited.

14. A custodian or other school employee shall be on duty for all activities in the building. The presence of a custodian on duty does not relieve the organization of responsibility for any damage to the property.
For outside events being held on stadium fields, it shall be at the discretion of the principal/designee if a custodian/staff member remains present at the facility for the entire event.

15. Premises are rented with the understanding that tipping of custodians or other school personnel is not permitted.

16. Except by special permission, a group shall not be permitted to remain after twelve midnight.

17. Building keys will not be provided to any group except in a declared emergency.

18. No chairs or seats will be placed in aisles, and people will not be permitted to block exits.

19. The sale of chances on school property by any student organization or individual student is prohibited.

20. Bingo parties are prohibited; however, bingo may be included in PTO fun fairs.

Equal Access to School Facilities, Students, and Staff

21. A school kitchen may not be used by an outside organization unless a ServSafe certified Frederick County Public Schools employee is present to supervise all of the activities within the kitchen area. The use of any school refrigeration (refrigerators and freezers) for the storage of non-school food products is prohibited unless approved by the Supervisor of Food Services.

E. Fees

1. School organizations (see Appendix A), school-related youth groups, American Red Cross Bloodmobile, organizations providing disaster relief or public health services during emergencies, and other activities providing a bonafide broad-based community service will not be charged rental. All other groups will be charged as either profit or non-profit. Non-profit organizations will be required to demonstrate status by providing appropriate documents.

2. Fundraising activities by community service organizations will be charged rental.

3. Organizations will be charged one-half the regular rental of an auditorium or multipurpose room for a rehearsal when the organization has rented the facility for the actual activity on a subsequent date.

4. Frederick County Public Schools Staff. For most facility use, the organization shall be charged an hourly fee, which will be reviewed annually, for any Frederick County Public Schools employee assigned to the event/activity. If work for an event/activity is done on school time by the employee and requires the employee to spend additional time away from his/her normal duties, the organization will be billed for this time.

5. If a facility chooses to waive or reduce fees for an organization, it will be the responsibility of the facility to reimburse any fees incurred by custodial staff other school staff if applicable.

Fees for Use of School Facilities *(See Attached Table)*

[1] Definition: In this section, groups/clubs means any group or organization intended to serve young people under the age of 21.

[2] Rule: For the purpose of this section, an elementary school or secondary school has a *limited public forum* whenever the school involved grants an offering to, or opportunity for, one or more outside youth or community groups to meet on school premises or in school facilities before or after the hours during which attendance at the school is compulsory.

Equal Access to School Facilities, Students, and Staff

Legal Reference:

Code of Virginia, Section 22.1-131, 4.1-309
20 USC, §§ 4071 and 7905.

Approved: September 2, 1975
Amended: December 20, 1982
Amended: February 1, 1983
Amended: March 1, 1983
Amended: September 16, 1985
Amended: September 15, 1993
Amended: June 16, 2004
Amended: June 29, 2005
Amended: November 30, 2005
Amended: July 22, 2009
Amended: May 26, 2011
Amended: June 20, 2012
Amended: January 15, 2014
Amended: July 1, 2014
Amended: July 1, 2016
Amended: July 11, 2016

Frederick County Public Schools
Fee Schedule

Location/Type of Room or Area	Profit Groups	Nonprofit Groups/ Local Government
Fees	**Per Hour (*2 hr. minimum*)**	**Per Hour (*2 hr. minimum*)**
Auditorium (High Schools & JWMS)	$64.00	$32.00
Auxiliary Gym/No Locker Rm. (High Schools)	$44.00	$22.00
Baseball Field/Softball (High Schools)	$26.00	$13.00
Baseball Practice Fields (JWHS, MHS)	$16.00	$8.00
Cafeteria (without kitchen)/Commons Area (High Schools & Middle Schools)	$26.00	$13.00
Classroom (All Schools)	$14.00	$7.00
Computer Lab (High Schools)	$38.00	$19.00
Football/Soccer Field (Middle Schools)	$16.00	$8.00
Football/Soccer Practice Field (High Schools)	$16.00	$8.00
Gymnasium (Elementary Schools)	$26.00	$13.00
Gymnasium/No Locker Rm. (High Schools & Middle Schools)	$60.00	$30.00
Kitchen (All Schools)	N/A	$19.00
Lights/Field Use (High Schools)	$12.00	$12.00
Multipurpose Rm., Cafeteria, Library (Elementary Schools)	$20.00	$10.00
Multipurpose Rm., Wrestling Rm. & Library (High Schools & Middle Schools)	$26.00	$13.00
Open Area/Playfield/Track (Elementary Schools)	$0.0	$0.0
Parking Lot (All Schools)	*Determined on an individual basis*	$0.0
Practice Field (Middle Schools)	$16.00	$8.00
Tennis Courts with Lights (High Schools)	$0.0	$0.0
Track (High Schools & Middle Schools)	$16.00	$8.00

Custodial, A/V technician, Food Services, and Event Monitor fees are established on an annual basis. See "Additional Fees for Use of Facility" under document tab on Community Use website for current fees of the above mentioned personnel.

School-Related Organizations

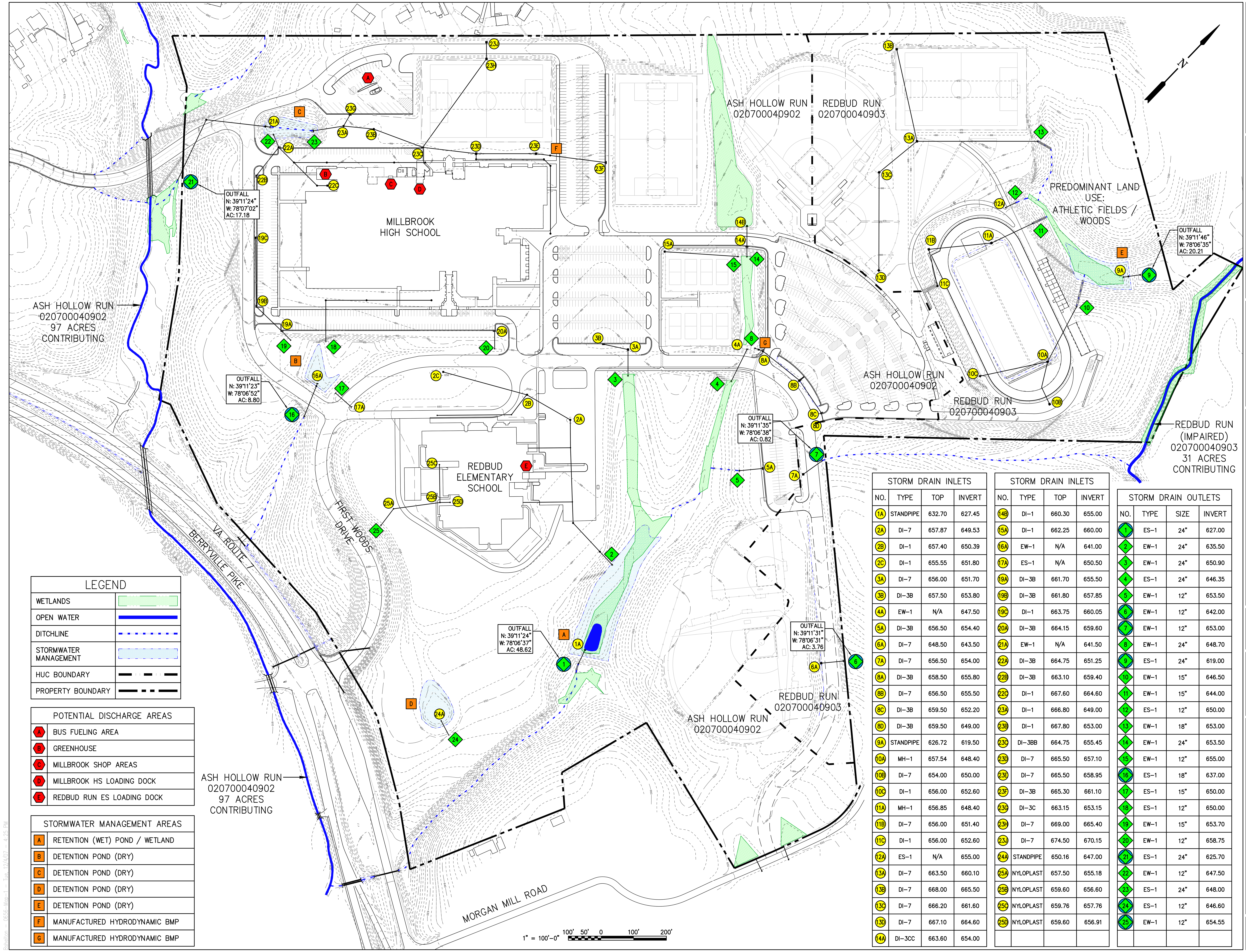
School-related organizations, as referred to under the Frederick County School Policy Manual, regulation 721R, Equal Access to School Facilities, Students, and Staff shall refer to the following organizations:

- **FCPS Parent Teacher Student Organizations (PTSO, PTO, PTA)**
- **FCPS Alumni Groups**
- **FCPS Booster Groups**
- **FCPS Athletic Associations**
- **Destination Imagination Teams**
- **PAVAN Governor's School**
- **Migrant Education Program**
- **Kaplan Test Prep**
- **Lord Fairfax Community College**
- **Programs coordinated through the Frederick County Public Schools' Office of Staff Development**

The school board or superintendent of schools may designate other organizations as school-related if their purpose or function is determined to be school related. Newly designated organizations will be added to the list at the beginning of the next regularly scheduled interval (i.e. July 1, November 1, January 1, and March 1).

(Note: The definition of school-related organizations for the purposes of school board regulation 721R does not include organizations such as the Boy Scouts, Girl Scouts, or 4-H Clubs. Therefore, the Frederick County Parks & Recreation use of school facilities would take priority over these groups. However, every effort will be made to accommodate the use of facilities requests made on behalf of Boy Scouts, Girl Scouts, and 4-H activities serving Frederick County students.)

A2 Storm Drain Map



LEGEND

WETLANDS	
OPEN WATER	
DITCHLINE	
STORMWATER MANAGEMENT	
HUC BOUNDARY	
PROPERTY BOUNDARY	

POTENTIAL DISCHARGE AREAS

A	BUS FUELING AREA
B	GREENHOUSE
C	MILLBROOK SHOP AREAS
D	MILLBROOK HS LOADING DOCK
E	REDBUD RUN ES LOADING DOCK

STORMWATER MANAGEMENT AREAS

A	RETENTION (WET) POND / WETLAND
B	DETENTION POND (DRY)
C	DETENTION POND (DRY)
D	DETENTION POND (DRY)
E	DETENTION POND (DRY)
F	MANUFACTURED HYDRODYNAMIC BMP
G	MANUFACTURED HYDRODYNAMIC BMP

STORM DRAIN INLETS

NO.	TYPE	TOP	INVERT
1A	STANDPIPE	632.70	627.45
2A	DI–7	657.87	649.53
2B	DI–1	657.40	650.39
2C	DI–1	655.55	651.80
3A	DI–7	656.00	651.70
3B	DI–3B	657.50	653.80
4A	EW–1	N/A	647.50
5A	DI–3B	656.50	654.40
6A	DI–7	648.50	643.50
7A	DI–7	656.50	654.00
8A	DI–3B	658.50	655.80
8B	DI–7	656.50	655.50
8C	DI–3B	659.50	652.20
8D	DI–3B	659.50	649.00
9A	STANDPIPE	626.72	619.50
10A	MH–1	657.54	648.40
10B	DI–7	654.00	650.00
10C	DI–1	656.00	652.60
11A	MH–1	656.85	648.40
11B	DI–7	656.00	651.40
11C	DI–1	656.00	652.60
12A	ES–1	N/A	655.00
13A	DI–7	663.50	660.10
13B	DI–7	668.00	665.50
13C	DI–7	666.20	661.60
13D	DI–7	667.10	664.60
14A	DI–3CC	663.60	654.00

STORM DRAIN INLETS

NO.	TYPE	TOP	INVERT
14B	DI–1	660.30	655.00
15A	DI–1	662.25	660.00
16A	EW–1	N/A	641.00
17A	ES–1	N/A	650.50
19A	DI–3B	661.70	655.50
19B	DI–3B	661.80	657.85
19C	DI–1	663.75	660.05
20A	DI–3B	664.15	659.60
21A	EW–1	N/A	641.50
22A	DI–3B	664.75	651.25
22B	DI–3B	663.10	659.40
22C	DI–1	667.60	664.60
23A	DI–1	666.80	649.00
23B	DI–1	667.80	653.00
23C	DI–3BB	664.75	655.45
23D	DI–7	665.50	657.10
23E	DI–7	665.50	658.95
23F	DI–3B	665.30	661.10
23G	DI–3C	663.15	653.15
23H	DI–7	669.00	665.40
23J	DI–7	674.50	670.15
24A	STANDPIPE	650.16	647.00
25A	NYLOPLAST	657.50	655.18
25B	NYLOPLAST	659.60	656.60
25C	NYLOPLAST	659.76	657.76
25D	NYLOPLAST	659.60	656.91

STORM DRAIN OUTLETS

NO.	TYPE	SIZE	INVERT
1	ES–1	24"	627.00
2	EW–1	24"	635.50
3	EW–1	24"	650.90
4	ES–1	24"	646.35
5	EW–1	12"	653.50
6	EW–1	12"	642.00
7	EW–1	12"	653.00
8	EW–1	24"	648.70
9	ES–1	24"	619.00
10	EW–1	15"	646.50
11	EW–1	15"	644.00
12	ES–1	12"	650.00
13	EW–1	18"	653.00
14	EW–1	24"	653.50
15	EW–1	12"	655.00
16	ES–1	18"	637.00
17	ES–1	15"	650.00
18	ES–1	12"	650.00
19	EW–1	15"	653.70
20	EW–1	12"	658.75
21	ES–1	24"	625.70
22	EW–1	12"	647.50
23	ES–1	24"	648.00
24	ES–1	12"	646.60
25	EW–1	12"	654.55

No.	Description	Date

Revisions

ZMM ARCHITECTS ENGINEERS

MILLBROOK HIGH SCHOOL
REDBUD RUN ELEMENTARY
SMALL MS4 PERMIT
FREDERICK COUNTY
VIRGINIA

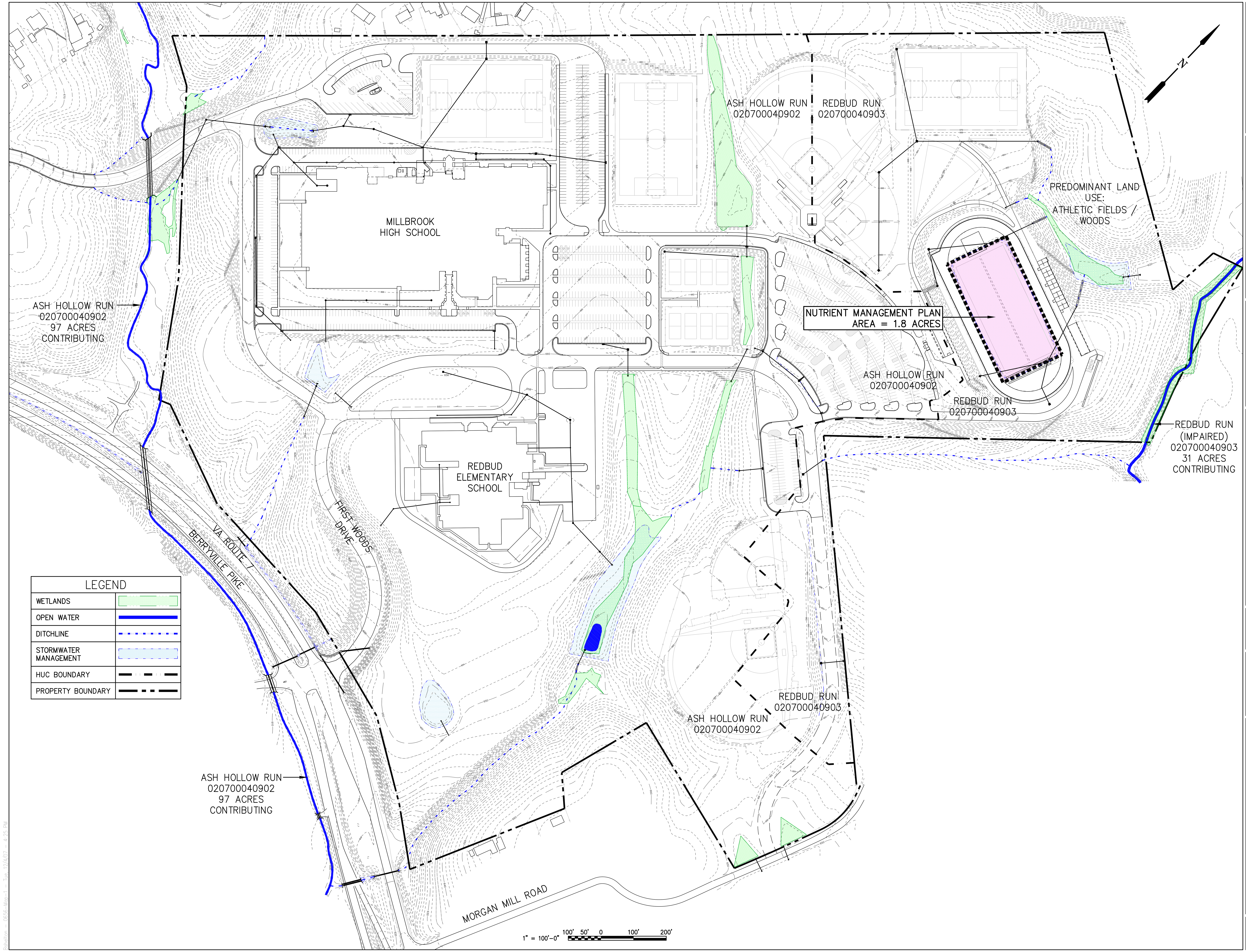
Comm. No. 2020–079
Date 24 SEP 20

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

STORM DRAIN MAP

SD1

A3 Nutrient Management Map



No.	Description	Date
	Revisions	

OWPR ARCHITECTS AND ENGINEERS
200 Country Club Dr. SW
Plaza One · Building E
Blacksburg, Virginia 24060
P: 540-552-2151
F: 540-951-0219
www.owpr.com

MILLBROOK HIGH SCHOOL
REDBUD RUN ELEMENTARY
SMALL MS4 PERMIT

FREDERICK COUNTY VIRGINIA

Comm. No. 2019-110
Date 20 MAY 20

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

NUTRIENT MANAGEMENT PLAN

NMP1

A4 Illicit Discharge Inspection Form

MILLBROOK/REDBUD CAMPUS MS4
ILLICIT DISCHARGE INSPECTION FORM

Name of Inspector: ____

Date: ____________________ Facility: ________________________________

Loading Dock:	**Yes**	**No**	**Action Taken/Comments**
Area free of improper collection of solid waste and spills			
Staining in area from previous spills/cleanup			
Materials and equipment available for spill clean up			
Chemical Storage Area:			
Area free of improper storage of chemicals			
Chemicals stored in proper containers and labeled			
Materials and equipment available for spill cleanup			
Fueling Areas:			
All chemicals properly stored and labeled			
Materials and equipment available for spill cleanup and disposal of solid waste			
Electrical hazards present			
Fuel leaks/spills			
Fire extinguisher up to date			
Shop Areas			
Chemical stored in proper containers and labeled			
Materials and equipment available for spill cleanup and disposal of solid waste			

A5 Illicit Discharge Reporting Form

Illicit Discharge Reporting Form

Redbud Run/Millbrook Campus

Name: ☐ Phone No.: ☐

Date: ☐ Time Discharge Reported: ☐

Location of Discharge: ☐

Where was discharge found?
- ○ Open Ditch
- ○ Stream
- ○ Pipe Outfall
- ○ Other

If other, describe: ☐

What type of incident reported-check all that apply.
- ☐ Dumping down a storm drain
- ☐ Suspicious discharge from pipe into stream
- ☐ Water in stream is an unusual color
- ☐ Suspicious suds or other substance floating on water
- ☐ Fish or other aquatic creature appeared to have died

Date Facilities Services contacted: ☐

Name of Person who took report. ☐

Investigation Notes (to be completed by Facilities Services)

Initial Investigation Date ☐ Investigators: ☐

No investigation made ☐ Reason: ☐

Referred to different department/agency: ☐ Department/ Agency: ☐

Investigated: No action necessary ☐

Investigated: Requires action ☐ Description of actions: ☐

Hours between call and investigation:		Hours to close incident:	
Date case closed:			
NOTES:			

A6 FCPS Contract Requirements for Designers

Frederick County Public Schools

GENERAL TERMS AND CONDITIONS
ADDENDUM FOR ARCHITECTURAL AND/OR ENGINEERING DESIGN FIRMS

These general terms, conditions, and instructions apply to all purchases and are part of each solicitation and every contract awarded by FCPS for Architectural and/or Engineering design services, unless otherwise specified in such solicitation or contract. The Purchasing function of the Finance Department is responsible for the purchasing activity of Frederick County Public Schools and its governing body, the Frederick County Public School Board, or both. Bidder/Offeror or their authorized representatives are expected to inform themselves fully as to the conditions, requirements, and specifications before submitting bids/proposals: failure to do so will be at the bidder's/offeror's own risk.

These general terms, conditions and instructions are subject to all applicable Federal, State and local statutes, policies, resolutions, and regulations (collectively "laws"), and are to be interpreted so as to be consistent with such laws. In the case of irreducible conflict, these general terms and conditions are preempted by applicable laws.

EROSION AND SEDIMENT CONTROL REQUIREMENTS: Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of the current State and Local "minimum land disturbance" areas shall be required to provide erosion and sediment control plans (E&S Plans) for the project. The E&S plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. E&S plans shall be designed in accordance with applicable State and Local laws and regulations, using current technologies and methods as appropriate. The design firm shall be responsible for obtaining E&S plan approvals from all applicable State and Local agencies.

On projects which involve the disturbance of over one acre of land, the Contractor selected for the project shall be responsible for obtaining a Virginia Stormwater Management Program (VSMP) permit from the Frederick County Public Works Department and shall be responsible for compiling a Stormwater Pollution Prevention Plan (SWPPP) as required by the VSMP permit. The design firm shall be available to provide information as necessary to assist the Contractor in obtaining the VSMP permit and compiling the SWPPP.

STORMWATER MANAGEMENT REQUIREMENTS: Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide stormwater management plans (SWM Plans) for the project. The SWM plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. SWM plans shall be designed to address both stormwater quality and stormwater quantity in accordance with applicable State and Local laws and regulations, and shall use current technologies and methods such as Low Impact Development (LID) as appropriate. The design firm shall be responsible for obtaining SWM plan approvals from all applicable State and Local agencies.

A7 FCPS Contract Requirements for Contractors

Frederick County Public Schools

GENERAL TERMS AND CONDITIONS

ADDENDUM FOR CONSTRUCTION CONTRACTS INVOLVING LAND DISTURBANCE

These general terms, conditions, and instructions apply to all purchases and are part of each solicitation and every contract awarded by FCPS for Construction Involving Land Disturbance, unless otherwise specified in such solicitation or contract. The Purchasing function of the Finance Department is responsible for the purchasing activity of Frederick County Public Schools and its governing body, the Frederick County Public School Board, or both. Bidder/Offeror or their authorized representatives are expected to inform themselves fully as to the conditions, requirements, and specifications before submitting bids/proposals: failure to do so will be at the bidder's/offeror's own risk.

These general terms, conditions and instructions are subject to all applicable Federal, State and local statutes, policies, resolutions, and regulations (collectively "laws"), and are to be interpreted so as to be consistent with such laws. In the case of irreducible conflict, these general terms and conditions are preempted by applicable laws.

EROSION AND SEDIMENT CONTROL REQUIREMENTS: Contractors working on FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide erosion and sediment control for the project. The Contractor shall have a Responsible Land Disturber (RLD) currently registered with the Virginia Department of Conservation and Recreation on staff and on site at all times that construction activities are taking place. The Contractor shall be responsible for obtaining all required erosion control or land disturbance permits from all applicable State and Local agencies, and shall schedule all required inspections with the permitting agencies. The Contractor shall be responsible for the installation, maintenance, and removal of all temporary erosion and sediment control measures for the project.

On projects which involve the disturbance of over one acre of land, the Contractor selected for the project shall be responsible for obtaining a Virginia Stormwater Management Program (VSMP) permit from the Frederick County Public Works Department and shall be responsible for compiling a Stormwater Pollution Prevention Plan (SWPPP) as required by the VSMP permit. The design firm for the project shall be available to provide information as necessary to assist the Contractor in obtaining the VSMP permit and compiling the SWPPP.

A8 Erosion and Sediment Control Inspection Form

INSPECTION REPORT

Sheet ____ of____

Project Name:____ File No.______________

Inspection Date:______________ Time:____________ Inspected by: ______________________

STAGE OF CONSTRUCTION

____ Pre-Construction Conference ____ Rough Grading ____ Finish Grading
____ Clearing and Grubbing ____ Building Construction ____ Final Stabilization

==

INSPECTION CHECKLIST

Yes	No	NA		
[]	[]	[]	*MS-1	Have all denuded areas requiring temporary or permanent stabilization been stabilized? Seeded? yes/no Mulched? yes/no Graveled? yes/no
[]	[]	[]	MS-2	Are soil stockpiles adequately stabilized with seeding and/or sediment trapping measures?
[]	[]	[]	MS-3	Does permanent vegetation provide adequate stabilization?
[]	[]	[]	MS-4	Have sediment trapping facilities been constructed as a first step in LDA?
[]	[]	[]	MS-5	For perimeter sediment trapping measures, are earthen structures stabilized?
[]	[]	[]	MS-6	Are sediment basins installed where needed?
[]	[]	[]	MS-7	Are finished cut and fill slopes adequately stabilized?
[]	[]	[]	MS-8&9	Are on-site channels and outlets adequately stabilized?
[]	[]	[]	MS-10	Do all operational storm sewer inlets have adequate inlet protection?
[]	[]	[]	MS-11	Are stormwater conveyance channels adequately stabilized with channel lining and/or outlet protection?
[]	[]	[]	MS-12	Is in-stream construction conducted using measures to minimize channel damage?
[]	[]	[]	MS-13	Are temporary stream crossings of non-erodible material installed where applicable?
[]	[]	[]	MS-15	Is necessary restabilization of in-stream construction complete?
[]	[]	[]	MS-16	Are utility trenches stabilized properly?
[]	[]	[]	MS-17	Are soil and mud kept off public roadways at intersections with site access roads?
[]	[]	[]	MS-18	Have all temporary control structures that are no longer needed been removed?
[]	[]	[]		Have all control structure repairs and sediment removal been performed?
[]	[]	[]	MS-19	Are properties and waterways downstream from development adequately protected from erosion and sediment deposition due to increases in peak stormwater runoff?

*** Refers to the minimum standards of the Virginia Erosion and Sediment Control Regulations (VR 625-02-00).**

==

Comments:____

____

____

____

Verbal/Written notification given to: ___________________________________

Report by: ________________________________ Date: ________________

A9 BMP Inventory

MILLBROOK / REDBUD CAMPUS SMALL MS4
PERMANENT BMP LIST

BMP Name (per SD Map)	BMP Type	Acres Treated	County	State Hydrologic Unit Code	Waters of the US
SWM Area A	Retention Pond/Wetland	48.62	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
SWM Area B	Detention Pond (dry)	8.80	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
SWM Area C	Detention Pond (dry)	17.18	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
SWM Area D	Detention Pond (dry)	3.01	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
SWM Area E	Detention Pond/Wetland	20.21	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #1	Outlet Protection	48.62	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #2	Outlet Protection	4.26	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #3	Outlet Protection	5.05	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #4	Outlet Protection	22.89	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #5	Outlet Protection	0.63	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #6	Outlet Protection	2.77	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #7	Outlet Protection	0.33	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #8	Outlet Protection	5.37	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #9	Outlet Protection	20.21	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #10	Outlet Protection	2.86	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #11	Outlet Protection	2.43	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #12	Outlet Protection	0.96	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #13	Outlet Protection	7.10	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Outlet #14	Outlet Protection	14.95	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #15	Outlet Protection	0.20	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #16	Outlet Protection	8.80	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #17	Outlet Protection	0.60	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run

MILLBROOK / REDBUD CAMPUS SMALL MS4
PERMANENT BMP LIST

BMP Name (per SD Map)	BMP Type	Acres Treated	County	State Hydrologic Unit Code	Waters of the US
Storm Drain Outlet #18	Outlet Protection	1.96	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #19	Outlet Protection	2.45	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #20	Outlet Protection	0.35	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #21	Outlet Protection	17.18	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #22	Outlet Protection	2.44	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #23	Outlet Protection	13.69	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #24	Outlet Protection	4.61	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Outlet #25	Outlet Protection	0.41	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #1A	SD Inlet	48.62	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #2A	SD Inlet	3.13	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #2B	SD Inlet	1.71	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #2C	SD Inlet	1.13	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #3A	SD Inlet	5.05	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #3B	SD Inlet	4.50	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #4A	SD Inlet	22.89	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #5A	SD Inlet	0.63	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #6A	SD Inlet	2.77	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #7A	SD Inlet	0.33	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #8A	SD Inlet	5.37	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #8B	SD Inlet	4.04	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #8C	SD Inlet	1.32	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #8D	SD Inlet	0.10	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run

MILLBROOK / REDBUD CAMPUS SMALL MS4 PERMANENT BMP LIST					
BMP Name (per SD Map)	BMP Type	Acres Treated	County	State Hydrologic Unit Code	Waters of the US
Storm Drain Inlet #9A	SD Inlet	20.21	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #10A	SD Inlet	2.79	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #10B	SD Inlet	0.61	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #10C	SD Inlet	0.55	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #11A	SD Inlet	2.43	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #11B	SD Inlet	0.79	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #11C	SD Inlet	0.38	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #12A	SD Inlet	0.96	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #13A	SD Inlet	7.10	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #13B	SD Inlet	0.88	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #13C	SD Inlet	4.59	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #13D	SD Inlet	1.06	Frederick	PU 18 - Opequon Creek Redbud Run	Redbud Run
Storm Drain Inlet #14A	SD Inlet	14.95	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #14B	SD Inlet	14.63	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #15A	SD Inlet	0.20	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #16A	SD Inlet	8.80	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #17A	SD Inlet	0.60	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #19A	SD Inlet	2.45	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #19B	SD Inlet	0.92	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #19C	SD Inlet	0.76	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #20A	SD Inlet	0.35	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #21A	SD Inlet	17.18	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run

MILLBROOK / REDBUD CAMPUS SMALL MS4 PERMANENT BMP LIST					
BMP Name (per SD Map)	BMP Type	Acres Treated	County	State Hydrologic Unit Code	Waters of the US
Storm Drain Inlet #22A	SD Inlet	2.44	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #22B	SD Inlet	0.25	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #22C	SD Inlet	0.56	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23A	SD Inlet	13.69	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23B	SD Inlet	12.36	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23C	SD Inlet	11.73	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23D	SD Inlet	6.69	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23E	SD Inlet	3.89	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23F	SD Inlet	3.05	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23G	SD Inlet	1.17	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23H	SD Inlet	4.21	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #23J	SD Inlet	2.87	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #24A	SD Inlet	4.61	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #25A	SD Inlet	0.11	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #25B	SD Inlet	0.08	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #25C	SD Inlet	0.12	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run
Storm Drain Inlet #25D	SD Inlet	0.10	Frederick	PU 17 - Abrams Creek Ash Hollow Run	Ash Hollow Run

A10 BMP Inspection and Maintenance Checklist

MILLBROOK / REDBUD CAMPUS SMALL MS4

DETENTION BMP A OPERATION MAINTENANCE CHECKLIST

ITEM	YES / NO	REPAIR	INVESTIGATE	Inspector Name: ____________________ Inspection Date: ____________________ COMMENTS
I. EMBANKMENT				
A. Crest				
1. Visual settlement				
2. Misalignment				
3. Cracking				
B. Upstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
C. Downstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
D. Abutments				
1. Erosion				
2. Seepage				
3. Cracks				
E. Drainage, Seepage Control				
1. Internal drains flowing				
2. Seepage at toe				
II. EMERGENCY SPILLWAY				
1. Eroding or backcutting				
2. Obstructed				
3. Leaking				
4. Operational				

MILLBROOK / REDBUD CAMPUS SMALL MS4
DETENTION BMP A OPERATION MAINTENANCE CHECKLIST

III. PRINCIPAL SPILLWAY BARREL				
1. Seepage into conduit				
2. Debris present				
3. Displaced or offset joints				
IV. OUTLET PROTECTION / STILLING BASIN				
1. Obstructed				
2. Adequate riprap				
3. Undercutting at outlet				
4. Outlet channel scour				
V. BASIN & UPLAND BUFFER AREA				
A. Low Flow Channel				
1. Erosion				
2. Adequate vegetation				
3. Obstructed				
B. Basin Bottom & Side Slope				
1. Erosion				
2. Adequate stabilization				
3. Sediment accumulation				
4. Floating debris				
5. High water marks				
6. Shoreline protection				
C. Inflow Channels / Pipes				
1. Erosion				
2. Adequate stabilization				
3. Undercutting				
D. Sediment Forebay				
1. Sediment accumulation				
2. Stable overflow into basin				
E. Upland Landscaping				
F. Aquatic Landscaping				

MILLBROOK / REDBUD CAMPUS SMALL MS4

DETENTION BMP B OPERATION MAINTENANCE CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
I. EMBANKMENT				
A. Crest				
1. Visual settlement				
2. Misalignment				
3. Cracking				
B. Upstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
C. Downstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
D. Abutments				
1. Erosion				
2. Seepage				
3. Cracks				
E. Drainage, Seepage Control				
1. Internal drains flowing				
2. Seepage at toe				
II. EMERGENCY SPILLWAY				
1. Eroding or backcutting				
2. Obstructed				
3. Leaking				
4. Operational				

MILLBROOK / REDBUD CAMPUS SMALL MS4
DETENTION BMP B OPERATION MAINTENANCE CHECKLIST

III. PRINCIPAL SPILLWAY BARREL				
1. Seepage into conduit				
2. Debris present				
3. Displaced or offset joints				
IV. OUTLET PROTECTION / STILLING BASIN				
1. Obstructed				
2. Adequate riprap				
3. Undercutting at outlet				
4. Outlet channel scour				
V. BASIN & UPLAND BUFFER AREA				
A. Low Flow Channel				
1. Erosion				
2. Adequate vegetation				
3. Obstructed				
B. Basin Bottom & Side Slope				
1. Erosion				
2. Adequate stabilization				
3. Sediment accumulation				
4. Floating debris				
5. High water marks				
6. Shoreline protection				
C. Inflow Channels / Pipes				
1. Erosion				
2. Adequate stabilization				
3. Undercutting				
D. Sediment Forebay				
1. Sediment accumulation				
2. Stable overflow into basin				
E. Upland Landscaping				
F. Aquatic Landscaping				

MILLBROOK / REDBUD CAMPUS SMALL MS4
DETENTION BMP C OPERATION MAINTENANCE CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
I. EMBANKMENT				
A. Crest				
1. Visual settlement				
2. Misalignment				
3. Cracking				
B. Upstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
C. Downstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
D. Abutments				
1. Erosion				
2. Seepage				
3. Cracks				
E. Drainage, Seepage Control				
1. Internal drains flowing				
2. Seepage at toe				
II. EMERGENCY SPILLWAY				
1. Eroding or backcutting				
2. Obstructed				
3. Leaking				
4. Operational				

MILLBROOK / REDBUD CAMPUS SMALL MS4
DETENTION BMP C OPERATION MAINTENANCE CHECKLIST

III. PRINCIPAL SPILLWAY BARREL				
1. Seepage into conduit				
2. Debris present				
3. Displaced or offset joints				
IV. OUTLET PROTECTION / STILLING BASIN				
1. Obstructed				
2. Adequate riprap				
3. Undercutting at outlet				
4. Outlet channel scour				
V. BASIN & UPLAND BUFFER AREA				
A. Low Flow Channel				
1. Erosion				
2. Adequate vegetation				
3. Obstructed				
B. Basin Bottom & Side Slope				
1. Erosion				
2. Adequate stabilization				
3. Sediment accumulation				
4. Floating debris				
5. High water marks				
6. Shoreline protection				
C. Inflow Channels / Pipes				
1. Erosion				
2. Adequate stabilization				
3. Undercutting				
D. Sediment Forebay				
1. Sediment accumulation				
2. Stable overflow into basin				
E. Upland Landscaping				
F. Aquatic Landscaping				

MILLBROOK / REDBUD CAMPUS SMALL MS4

DETENTION BMP D OPERATION MAINTENANCE CHECKLIST

ITEM	YES / NO	REPAIR	INVESTIGATE	Inspector Name: ______ Inspection Date: ______ COMMENTS
I. EMBANKMENT				
A. Crest				
1. Visual settlement				
2. Misalignment				
3. Cracking				
B. Upstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
C. Downstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
D. Abutments				
1. Erosion				
2. Seepage				
3. Cracks				
E. Drainage, Seepage Control				
1. Internal drains flowing				
2. Seepage at toe				
II. EMERGENCY SPILLWAY				
1. Eroding or backcutting				
2. Obstructed				
3. Leaking				
4. Operational				

MILLBROOK / REDBUD CAMPUS SMALL MS4
DETENTION BMP D OPERATION MAINTENANCE CHECKLIST

III. PRINCIPAL SPILLWAY BARREL				
1. Seepage into conduit				
2. Debris present				
3. Displaced or offset joints				
IV. OUTLET PROTECTION / STILLING BASIN				
1. Obstructed				
2. Adequate riprap				
3. Undercutting at outlet				
4. Outlet channel scour				
V. BASIN & UPLAND BUFFER AREA				
A. Low Flow Channel				
1. Erosion				
2. Adequate vegetation				
3. Obstructed				
B. Basin Bottom & Side Slope				
1. Erosion				
2. Adequate stabilization				
3. Sediment accumulation				
4. Floating debris				
5. High water marks				
6. Shoreline protection				
C. Inflow Channels / Pipes				
1. Erosion				
2. Adequate stabilization				
3. Undercutting				
D. Sediment Forebay				
1. Sediment accumulation				
2. Stable overflow into basin				
E. Upland Landscaping				
F. Aquatic Landscaping				

MILLBROOK / REDBUD CAMPUS SMALL MS4

DETENTION BMP E OPERATION MAINTENANCE CHECKLIST

Inspector Name: ____________________

Inspection Date: ____________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
I. EMBANKMENT				
A. Crest				
1. Visual settlement				
2. Misalignment				
3. Cracking				
B. Upstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
C. Downstream Slope				
1. Erosion				
2. Adequate groundcover				
3. Trees, shrubs, or other				
4. Cracks, settlements, or bulges				
5. Rodent holes				
D. Abutments				
1. Erosion				
2. Seepage				
3. Cracks				
E. Drainage, Seepage Control				
1. Internal drains flowing				
2. Seepage at toe				
II. EMERGENCY SPILLWAY				
1. Eroding or backcutting				
2. Obstructed				
3. Leaking				
4. Operational				

MILLBROOK / REDBUD CAMPUS SMALL MS4

DETENTION BMP E OPERATION MAINTENANCE CHECKLIST

III. PRINCIPAL SPILLWAY BARREL				
1. Seepage into conduit				
2. Debris present				
3. Displaced or offset joints				
IV. OUTLET PROTECTION / STILLING BASIN				
1. Obstructed				
2. Adequate riprap				
3. Undercutting at outlet				
4. Outlet channel scour				
V. BASIN & UPLAND BUFFER AREA				
A. Low Flow Channel				
1. Erosion				
2. Adequate vegetation				
3. Obstructed				
B. Basin Bottom & Side Slope				
1. Erosion				
2. Adequate stabilization				
3. Sediment accumulation				
4. Floating debris				
5. High water marks				
6. Shoreline protection				
C. Inflow Channels / Pipes				
1. Erosion				
2. Adequate stabilization				
3. Undercutting				
D. Sediment Forebay				
1. Sediment accumulation				
2. Stable overflow into basin				
E. Upland Landscaping				
F. Aquatic Landscaping				

A11 Storm Drain Inspection and Maintenance Checklist

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 1A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 2A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 2B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 2C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 3A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 3B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 4A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 5A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 6A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 7A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 8A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 8B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 8C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 8D				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 9A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ____________________

Inspection Date: ____________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 10A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 10B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 10C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 11A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 11B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 11C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 12A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 13A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 13B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 13C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 13D				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 14A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 14B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 15A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 16A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________________

Inspection Date: ______________________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 17A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 19A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 19B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

ITEM	YES / NO	REPAIR	INVESTIGATE	Inspector Name: ____________________ Inspection Date: ____________________ COMMENTS
Structure 19C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 20A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 21A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 22A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 22B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 22C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 23A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 23D				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23E				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23F				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 23G				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23H				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 23J				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 24A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 25A				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 25B				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN INLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________

Inspection Date: ______________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 25C				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
Structure 25D				
A. Sediment / Debris				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				
4. Positive Drainage into Inlet				
B. Structural Damage				
1. Inlet Opening				
2. Inside of Structure				
3. Pipe Connections				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN OUTLETS MAINTENANCE INSPECTION CHECKLIST

ITEM	YES / NO	REPAIR	INVESTIGATE	Inspector Name: ______________________________ Inspection Date: ______________________________ COMMENTS
Structure 1				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 2				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 3				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 4				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 5				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN OUTLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 6				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 7				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 8				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 9				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 10				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN OUTLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 11				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 12				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 13				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 14				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 15				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				

MILLBROOK / REDBUD CAMPUS SMALL MS4
STORM DRAIN OUTLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ___________________________________

Inspection Date: ___________________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 16				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 17				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 18				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 19				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 20				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				

MILLBROOK / REDBUD CAMPUS SMALL MS4

STORM DRAIN OUTLETS MAINTENANCE INSPECTION CHECKLIST

Inspector Name: ______________________________

Inspection Date: ______________________________

ITEM	YES / NO	REPAIR	INVESTIGATE	COMMENTS
Structure 21				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 22				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 23				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 24				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				
Structure 25				
A. Sediment / Debris Build-up				
B. Structural Damage				
C. Adequate Riprap				
D. Undercutting at Outlet				
E. Outlet Channel Scour				

A12 Chesapeake Bay TMDL Action Plan – Phase 1

FREDERICK COUNTY PUBLIC SCHOOLS

CHESAPEAKE BAY TMDL ACTION PLAN

For

Millbrook High School / Redbud Elementary School Campus

<u>Prepared For</u>
Frederick County Public Schools
1415 Amherst Street
Winchester, VA 22604
540-662-3888

<u>Prepared By</u>
OWPR, Inc.
200 Country Club Drive
Plaza 1, Building E
Blacksburg, VA 24060
540-552-2151

July 1, 2015
(Revised December 10, 2015)

Table of Contents

PLAN PURPOSE AND OBJECTIVE

The Millbrook High School / Redbud Run Elementary School campus has been designated as a small Municipal Storm Sewer System (MS4), and is located in the Potomac River Basin portion of the Chesapeake Bay watershed. As such it is included in the overall Chesapeake Bay TMDL, and in accordance with the General VPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems, it is required to develop a Chesapeake Bay TMDL Action Plan in order to meet the requirements of the overall TMDL. The Action Plan is required to provide a review of the current MS4 program, which demonstrates its ability to ensure compliance with the Special Condition, and include the means and methods the permittee will use to meet the 5.0% of the Level 2 (L2) scoping run reduction for existing development by the end of the first permit cycle. This TMDL Action Plan has been prepared in accordance with the requirements of Guidance Memo No. 15-2005 “Chesapeake Bay TMDL Special Condition Guidance” as amended and dated 05/18/2015. The ten elements required as noted in GM15-2005 are as follows:

1. Current program and existing legal authority.
2. New or modified legal authority.
3. Means and methods to address discharges from new sources.
4. Estimated existing source loads and calculated total pollutant of concern (POC) required reductions.
5. Means and methods to meet the required reductions and schedule.
6. Means and methods to offset increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014.
7. Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014.
8. A list of future projects, and associated acreage that qualify as grandfathered.
9. An estimate of the expected cost to implement the necessary reductions.
10. Public comments on draft Action Plan.

Since the Millbrook HS / Redbud ES campus is a small MS4 which is currently developed in its existing condition, some of the elements which would apply to a municipal type MS4 will not apply. Each element is still included and discussed in the Action Plan to verify whether or not it is applicable.

1.0 Current Program and Existing Authority

General Permit Section I.C.2.a.(1)
A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan. FCPS also has the legal authority as owner of the property to make changes to the site amenities, existing stormwater structures, and create new stormwater BMP's. FCPS owns and maintains all of the existing stormwater BMP's and will maintain ownership and maintenance responsibility of any proposed stormwater BMP's required by this Action Plan to ensure compliance with this special condition.

2.0 New or Modified Legal Authority

General Permit Section I.C.2.a.(2)
The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan as well as any additional requirements included in this Action Plan. No new or modified legal authorities are required.

3.0 Means and Methods to Address Discharges from New Sources

General Permit Section I.C.2.a.(3)
The means and methods that will be utilized to address discharges into the MS4 from new sources.

The Millbrook High School / Redbud Run Elementary School Campus is a completely developed campus with all facilities required for an elementary and high school. When the campus was developed, stormwater management BMP's were installed to control the quantity of stormwater runoff. These BMP's are regularly maintained and inspected to ensure their continued effectiveness. There are no regular, current, or planned development activities which would require additional stormwater management BMP's. In the unusual event that a development activity does occur in the future, the Frederick County Stormwater Ordinance as implemented by the Frederick County Public Works Department would govern the project. The Frederick County Public Works Department has a Stormwater Ordinance which follows the requirements of the VSMP regulations. Frederick County Public Schools has committed to require designers working on campus projects to meet the requirements of the Frederick County Stormwater Ordinance and has included the following statement in their standard contract with Architect/Engineering firms: "Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide stormwater management plans (SWM Plans) for the project. The SWM plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. SWM plans shall be designed to address both stormwater quality and stormwater quantity in accordance with applicable State and Local laws and regulations, and shall use current technologies and methods such as Low Impact Development (LID) as appropriate. The design firm shall be responsible for obtaining SWM plan approvals from all applicable State and Local agencies.

4.0 Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions

General Permit Section I.C.2.a.(4) and General Permit Section I.C.2.a.(5)
An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable [Table/Tables} in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream loading rate.

A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable [Table/Tables] in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.

Frederick County Public Schools has AutoCAD files of the existing conditions at the Millbrook HS / Redbud Run ES Campus property from which the existing impervious and pervious areas have been calculated. Additionally, recent aerial photographs, GIS information, and field observations were used to determine the areas which could be designated as "forested". These areas were reviewed and appear to be in compliance with the criteria for "forested" areas set forth in Guidance Memo 15-2005. When the campus was developed, there were also several wetland areas mapped on campus. Most of these areas are within the "forested" areas, but there are also some which are outside the "forested" areas. Maps showing these designated areas are included at the end of this report.

The areas calculated from these maps are as follows:

Total MS4 Area =	128.41 acres
Forested Area =	32.25 acres
Wetland Area =	0.31 acres
Total Regulated Area =	95.85 acres

Regulated Impervious Area =	34.31 acres
Regulated Pervious Area =	61.54 acres
Total Regulated Area =	95.85 acres

Existing source loads were calculated using the above areas in Table 2b for the Potomac River Basin.
Total POC reductions were calculated using the above areas in Table 3b for the Potomac River Basin.
The total pollutant removal required for the first permit cycle was then tabulated as follows:

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	16.86	578.47
Regulated Urban Pervious		61.54	10.07	619.71
Regulated Urban Impervious	Phosphorus	34.31	1.62	55.58
Regulated Urban Pervious		61.54	0.41	25.23
Regulated Urban Impervious	Total Suspended Solids	34.31	1,171.32	40,187.99
Regulated Urban Pervious		61.54	175.80	10,818.73

Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	0.07587	2.60
Regulated Urban Pervious		61.54	0.03021	1.86
Regulated Urban Impervious	Phosphorus	34.31	0.01296	0.44
Regulated Urban Pervious		61.54	0.00148625	0.09
Regulated Urban Impervious	Total Suspended Solids	34.31	11.7132	401.88
Regulated Urban Pervious		61.54	0.769125	47.33

Total Pollutant Removal Required for First Permit Cycle

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)		Total Reduction Required First Permit Cycle (lbs/yr)
Total Regulated Area	Nitrogen	95.85		4.46
Total Regulated Area	Phosphorus	95.85		0.54
Total Regulated Area	Total Suspended Solids	95.85		449.21

5.0 Means and Methods to Meet the Required Reductions and Schedule

General Permit Section I.C.2.a.(6)
The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.

Frederick County Public Schools proposes to convert one of the existing dry detention ponds on campus into an extended detention pond. The detention pond is located between the Millbrook High School service drive and bus fueling area. It serves approximately half of the roof area of Millbrook High School building, most of the bus parking area, the bus fueling area, and the service area. There are approximately 2.69 acres of offsite area which also drain to the detention pond. For calculation purposes, only the onsite regulated areas were included in the pollutant removal calculations. A map of the drainage area to the detention pond is included at the end of this report.

The areas calculated are as follows:

Regulated Impervious Area =	7.43 acres
Regulated Pervious Area =	7.06 acres
Total Regulated Area =	14.49 acres

The removal rates were determined from *Table V.C.1 – Chesapeake Bay Program BMP's, Established Efficiencies*. The dry detention pond has existing efficiencies of 5% / 10% / 10% for TN / TP / TSS respectively. These removal rates are subtracted from the efficiencies for the proposed dry extended detention pond (20% / 20% / 60%) to determine the additional pollutant removal which will occur by upgrading the dry pond to extended detention. The resultant efficiencies used in the calculations are (15% / 10% / 50% for TN / TP / TSS).

The resulting pollutant removal is well above the required quantities. Pollutant removal above and beyond the amount required for this permit cycle will be credited toward the requirements of next permit cycle.

Construction of the BMP improvements is proposed to begin as soon as possible, but no later than the summer of 2018.

BMP Options - Convert Dry Pond "C" to Extended Detention Pond

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	7.43	16.86	125.27
Regulated Urban Pervious		7.06	10.07	71.09
Regulated Urban Impervious	Phosphorus	7.43	1.62	12.04
Regulated Urban Pervious		7.06	0.41	2.89
Regulated Urban Impervious	Total Suspended Solids	7.43	1,171.32	8,702.91
Regulated Urban Pervious		7.06	175.80	1,241.15

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	14.49	15%	29.45
Total Regulated Area	Phosphorus	14.49	10%	1.49
Total Regulated Area	Total Suspended Solids	14.49	50%	4,972.03

6.0 Means and Methods to Offset Increased Loads From New Sources Initiating Construction Between July 1, 2009 and June 30, 2014

General Permit Section I.C.2.a.(7)
The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize the [applicable table] in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

Frederick County Public Schools did not have any projects over one acre which began construction between July 1, 2009 and June 30, 2014 within the regulated MS4 boundary. Frederick County Public Schools performed a small addition project at Redbud Run Elementary School in 2013; however this project was less than 1 acre in size and did not require VSMP permitting. The additional impervious area created by this addition has been included in the overall impervious area calculated under section 4, and therefore the pollutants of concern are being reduced appropriately.

7.0 Means and Methods to Offset Increased Loads From Grandfathered Projects That Begin Construction After July 1, 2014

General Permit Section I.C.2.a.(8)
The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.

Frederick County Public Schools does not have any grandfathered projects over one acre which began construction after July 1, 2014 within the regulated MS4 boundary.

8.0 A List of Future Projects, and Associated Acreage That Qualify as Grandfathered

General Permit Section I.C.2.a.(10)
A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48.

Frederick County Public Schools does not have any grandfathered projects within the regulated MS4 boundary.

9.0 An Estimate of the Expected Cost to Implement the Necessary Reductions

General Permit Section I.C.2.a.(11)
An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle.

In order to convert the existing dry detention pond to a dry extended detention pond, the following items will need to be added to the existing pond:

- Pre-treatment forebays at pond inlets
- Micropool at the pond outlet structure
- Add a non-clogging low flow orifice at the outlet structure
- Add protective fencing

TMDL ACTION PLAN - MILLBROOK/REDBUD MS4

PROJECT DESCRIPTION:
Millbrook/Redbud TMDL
Commission Number:
1371

DATE:
7/6/2015

OWPR
ARCHITECTS AND ENGINEERS

Item	Quantit	Unit	Cost/Unit	Item Cost	Comment
CONSTRUCTION					
Mobilization	1	LS	$1,500.00	$1,500.00	
Add new restrictor plate	1	EA	$500.00	$500.00	
Raise overflow top	1	EA	$2,500.00	$2,500.00	*With slot for 2/10 storms*
Add forebays	2	EA	$2,500.00	$5,000.00	*Rip rap special outlet protection*
Excavate micropool	1	EA	$2,500.00	$2,500.00	*With rip rap*
Fencing (4' high clf)	400	LF	$10.00	$4,000.00	*From guardrail to guardrail*
Subtotal				$16,000.00	

Design	25%			$4,000.00	
Construction Admin	25%			$4,000.00	
Contingency	25%			$4,000.00	

ESTIMATED PROJECT TOTAL	**$28,000**

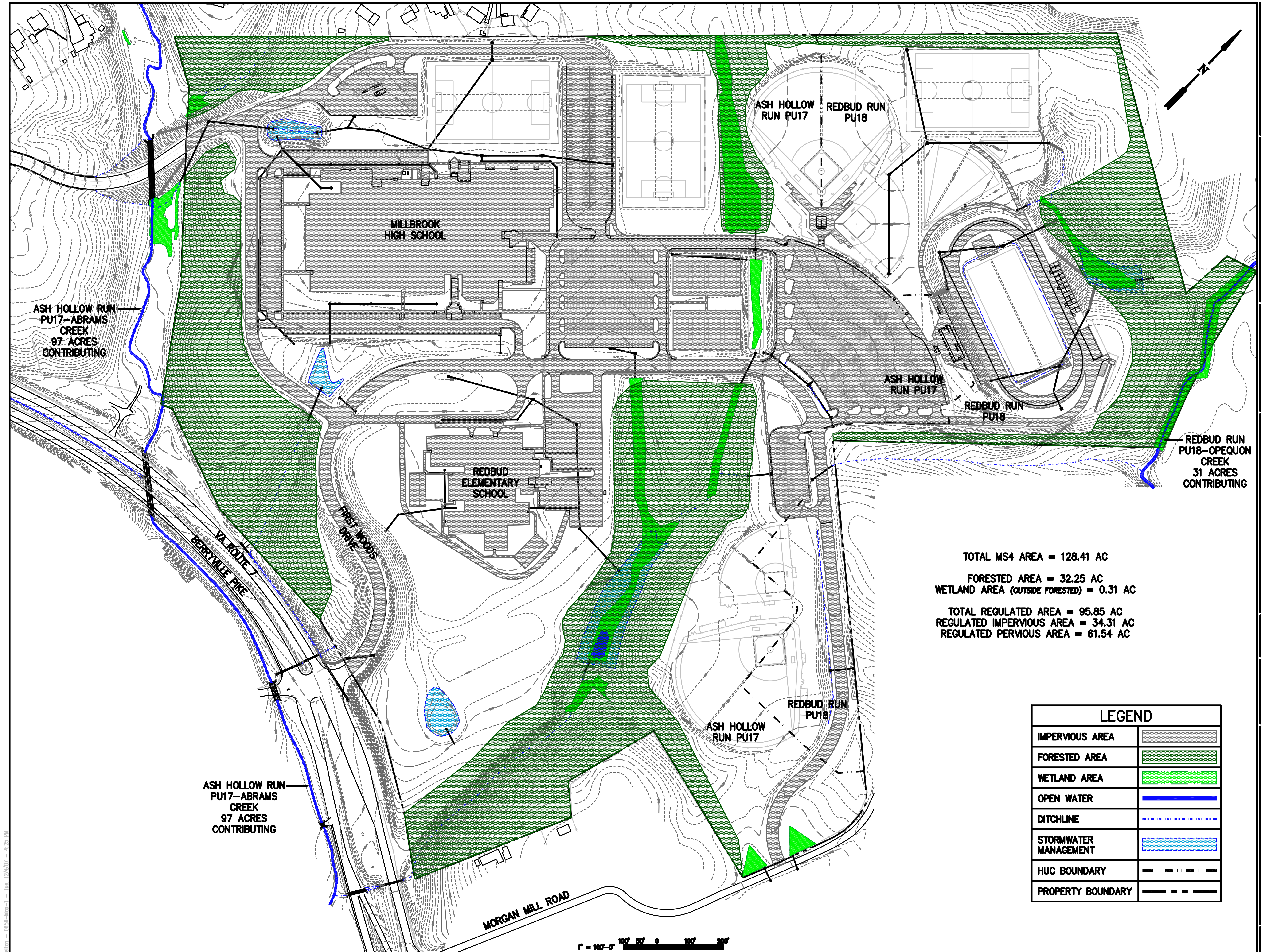
10.0 Public Comments on Draft Action Plan

General Permit Section I.C.2.a.(12)
General Permit Requirements: An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.
Phase 1 Permit Requirements: An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan; and, a list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

Frederick County Public Schools posted the draft TMDL Action Plan to its website in early July 2015 and sent an announcement via e-mail and on its Facebook page that it was available for public review and comment. The draft TMDL Action Plan will remain on the FCPS website until September 11, 2015 at which time all public comments will be compiled, reviewed, and any changes to the TMDL Action Plan made prior to the annual report due on October 1, 2015.

No comments were received during the public comment period, and therefore no resulting revisions were made to the draft TMDL Action Plan.

11.0 Appendix



No. | Description | Date
Revisions

OWPR ARCHITECTS AND ENGINEERS
200 Country Club Dr. SW, Plaza One - Building E, Blacksburg, Virginia 24060
P: 540-552-2151 F: 540-951-0219 www.owpr.com

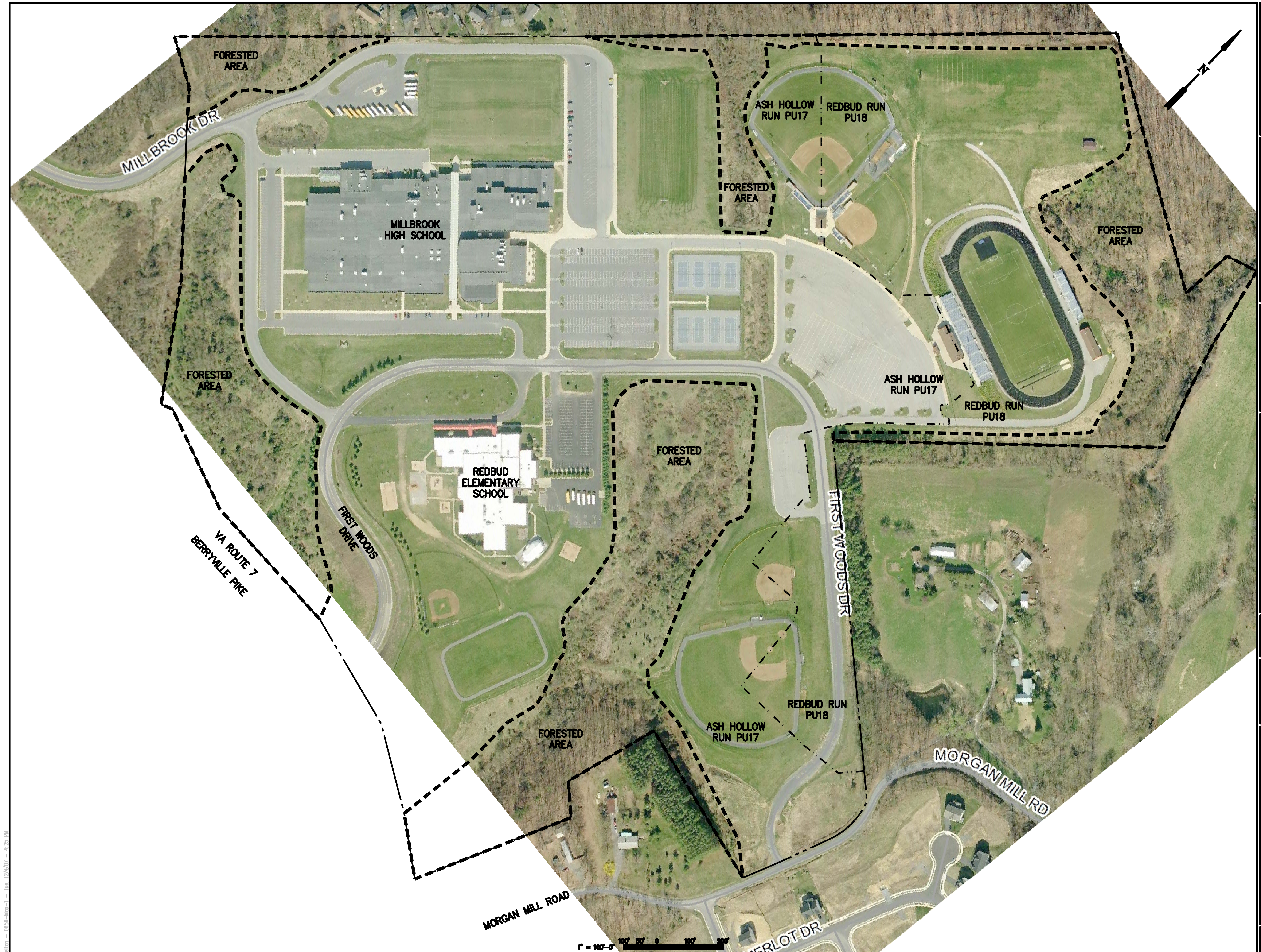
CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 1371
Date 01 JUL 15

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

TMDL AREA MAP

TMDL1



Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

Comm. No. 1371
Date 01 JUL 15

CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

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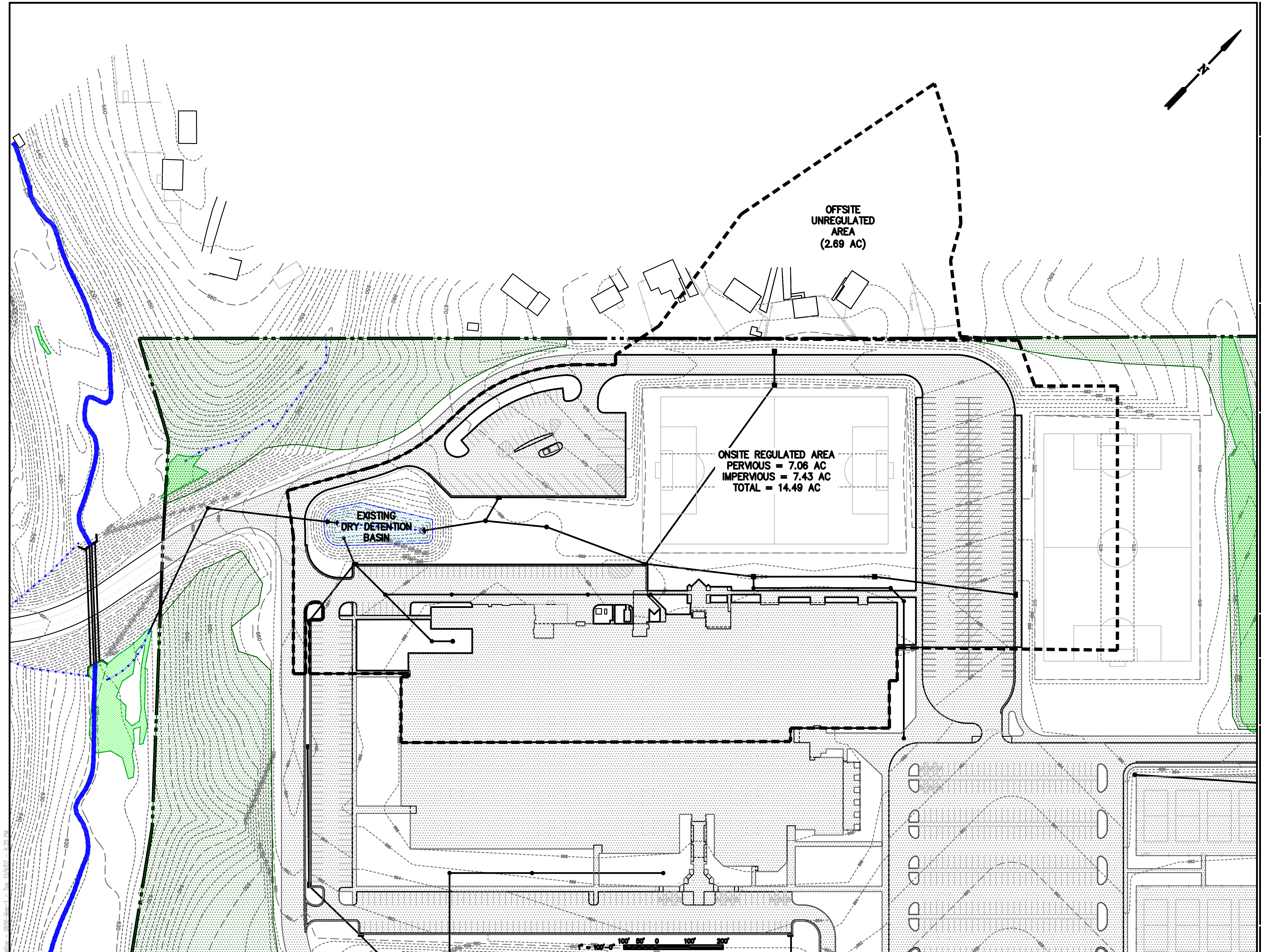
No.	Description	Date
Revisions		

TMDL AERIAL MAP

TMDL2



Revisions
No. | Description | Date

OWPR ARCHITECTS AND ENGINEERS

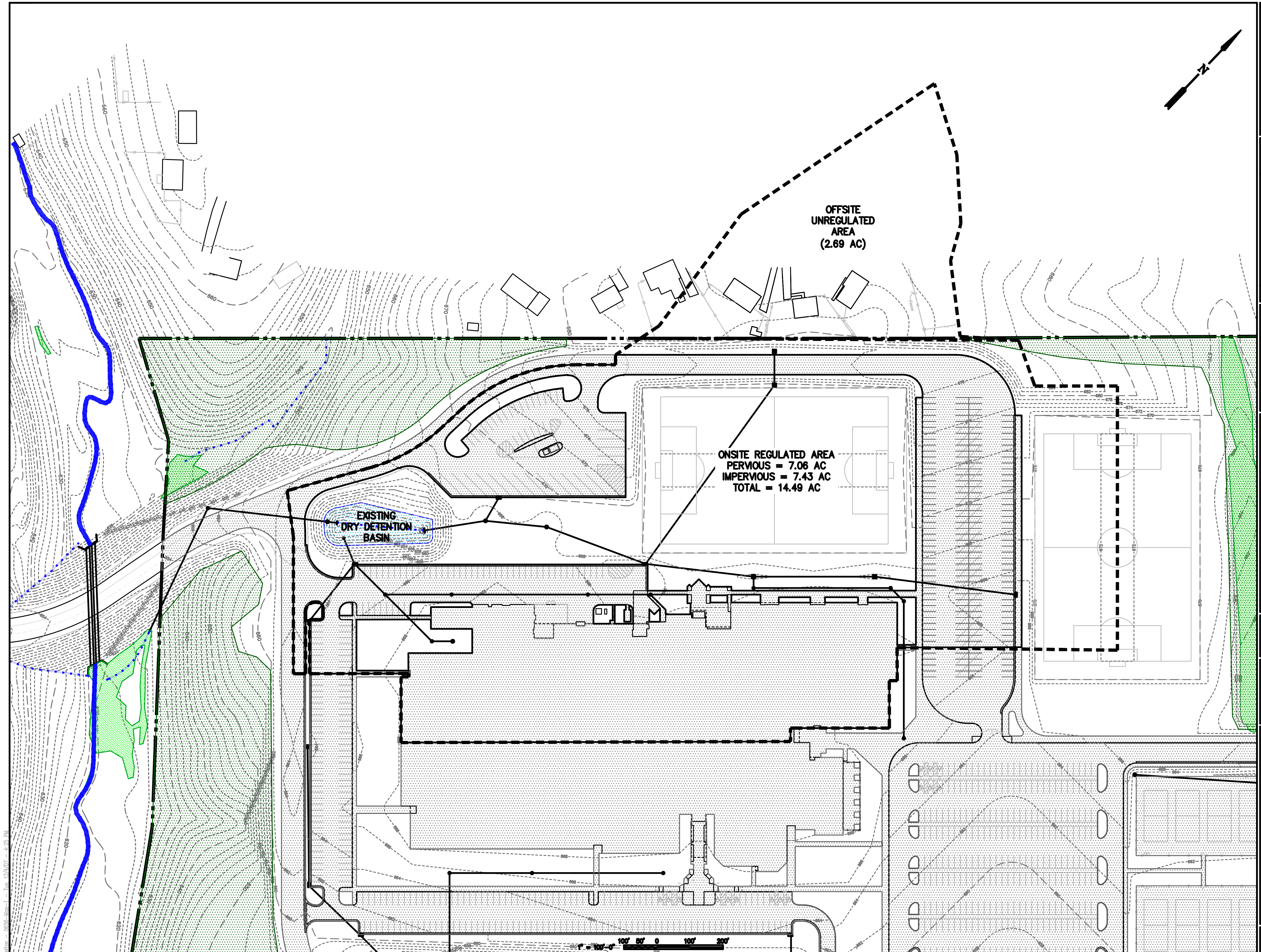
CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY
VIRGINIA

Comm. No. 1371
Date 01 JUL 15

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

SWM BMP AREA MAP

TMDL3



No. Description Date
Revisions

OWPR ARCHITECTS AND ENGINEERS

CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 1371
Date 01 JUL 15

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

SWM BMP AREA MAP

TMDL3

VIRGINIA DCR STORMWATER DESIGN SPECIFICATION No. 15

EXTENDED DETENTION (ED) POND

VERSION 2.0
January 1, 2013

SECTION 1: DESCRIPTION

An Extended Detention (ED) Pond relies on 24 to 36 hour detention of stormwater runoff after each rain event. An under-sized outlet structure restricts stormwater discharge so it backs up and is stored within the basin. The temporary ponding enables particulate pollutants to settle out and reduces the maximum peak discharge to the downstream channel, thereby reducing the effective shear stress on banks of the receiving stream. ED differs from stormwater detention as ED is designed to achieve a minimum drawdown time, rather than a maximum peak rate of flow. A design maximum peak rate of flow, or peak discharge, is commonly used to meet channel protection or flood control requirements and often only detains flows for a few minutes or hours. However, in some cases, detention designed for channel protection using the “energy balance” method described in the Virginia Stormwater Management Program (VSMP) regulations (4VAC50-60-66) may result in extended drawdown times. Therefore, designers are encouraged to evaluate the channel protection detention drawdown as compared to the ED requirements in order to optimize the design to meet both criteria.

ED ponds rely on gravitational settling as their primary pollutant removal mechanism. Consequently, they generally provide fair-to-good removal for particulate pollutants, but low or negligible removal for soluble pollutants, such as nitrate and soluble phosphorus. The use of ED alone generally results in the lowest overall pollutant removal rate of any single stormwater treatment option. Alternatively, an ED component is combined with wet ponds (Design Specification No 14) and constructed wetlands (Design Specification No 15) to help maximize pollutant removal rates of those practices.

Designers should note that an ED pond is typically the final element in the roof to stream pollutant removal sequence and provides limited volume reduction credit (Level 2 only), and **should therefore be considered *only* if there is remaining Treatment Volume or Channel Protection Volume to manage after all other upland runoff reduction practices have been considered and properly credited.**

SECTION 2: PERFORMANCE

Table 15.1. Summary of Stormwater Functions Provided by ED Ponds

Stormwater Function	Level 1 Design	Level 2 Design
Annual Runoff Volume Reduction (RR)	0%	15%
Total Phosphorus (TP) EMC Reduction[1] by BMP Treatment Process	15%	15%
Total Phosphorus (TP) Mass Load Removal	15%	31%
Total Nitrogen (TN) EMC Reduction[1] by BMP Treatment Process	10%	10%
Total Nitrogen (TN) Mass Load Removal	10%	24%
Channel Protection	Yes; storage volume can be provided to accommodate the full Channel Protection Volume (CP_V)	
Flood Mitigation	Yes; flood control storage can be provided above the maximum extended detention volume	
[1] Change in event mean concentration (EMC) through the practice. The actual nutrient mass load removed is the product of the removal rate and the runoff reduction rate (see Table 1 in the *Introduction to the New Virginia Stormwater Design Specifications*).		

Sources: CWP and CSN (2008); CWP (2007)

Leadership in Energy and Environmental Design (LEED®). The LEED® point credit system designed by the U.S. Green Building Council (USGBC) and implemented by the Green Building Certification Institute (GBCI) awards points related to site design and stormwater management. Several categories of points are potentially available for new development and redevelopment projects. **Chapter 6** of the 2013 *Virginia Stormwater Management Handbook* (2nd Edition) provides a more thorough discussion of the site planning process and design considerations as related to Environmental Site Design and potential LEED credits. However, VDCR is not affiliated with the USGBC or GBCI and any information on applicable points provided here is based only on basic compatibility. **Designers should research and verify scoring criteria and applicability of points as related to the specific project being considered through USGBC LEED resources.**

***Table 15.2. Potential LEED® Credits for Extended Detention Ponds*[1]**

Credit Category	Credit No.	Credit Description
Sustainable Sites	SS6.1	Stormwater Design: Quantity Control
[1] Actual site design and/or BMP configuration may not qualify for the credits listed. Alternatively, the project may actually qualify for credits not listed here. Designers should consult with a qualified individual (LEED AP) to verify credit applicability.		

SECTION 3: LEVEL 1 AND 2 DESIGN TABLE

As the last practice in the treatment train, ED Ponds can serve the dual function of providing the final runoff volume and pollutant load reduction needed on the development site, while also providing the detention storage required to meet the channel protection and flood control requirements. Designers may therefore choose to go with the baseline design (Level 1) or may choose to maximize the volume and pollutant load reduction by incorporating an enhanced design (Level 2). To qualify for the higher nutrient reduction rates associated with the Level 2 design, ED ponds must be designed with a Treatment Volume (*Tv*) equal to 1.25(R_v)(A), as well as other specific design elements. **Table 15.3** lists the criteria for the Level 1 and 2 designs. See **Section 6** for more detailed design guidelines.

Table 15.3. Extended Detention (ED) Pond Criteria

Level 1 Design (RR:0; TP:15; TN:10)	Level 2 Design (RR:15; TP:15; TN:10)
Tv = [(1.0) (Rv) (A)] / 12 – the volume reduced by an upstream BMP	Tv = [(1.25) (R_v) (A)] / 12 – the volume reduced by an upstream BMP
A minimum of 15% of the Tv in the permanent pool (forebay, micropool) **Section 6.5**	A minimum of 40% of Tv in the permanent pool (15% in forebays and micropool, and 25% in constructed wetlands) **Sections 6.2 and 6.5**
Length/Width ratio *OR* flow path = 2:1 or more; Length of the shortest flow path / overall length = 0.4 or more. **Section 6.3**	Length/Width ratio *OR* flow path = 3:1 or more; Length of the shortest flow path / overall length = 0.7 or more. **Section 6.3**
Average Tv ED time = 24 hours or less. **Section 6.2**	Average Tv ED time = 36 hours. **Section 6.2**
Vertical Tv ED fluctuation may exceed 4 feet. **Section 6.3**	Maximum vertical Tv ED limit of 4 feet. **Section 6.3**
Turf cover on floor **Section 6.7**	Trees, shrubs, and herbaceous plants in upper elevations, and emergent plants in wet features **Section 6.7**
Forebay and micropool **Section 6.5**	Incudes additional cells or features (deep pools, wetlands, etc.) **Sections 6.2 and 6.5**

SECTION 4: TYPICAL DETAILS

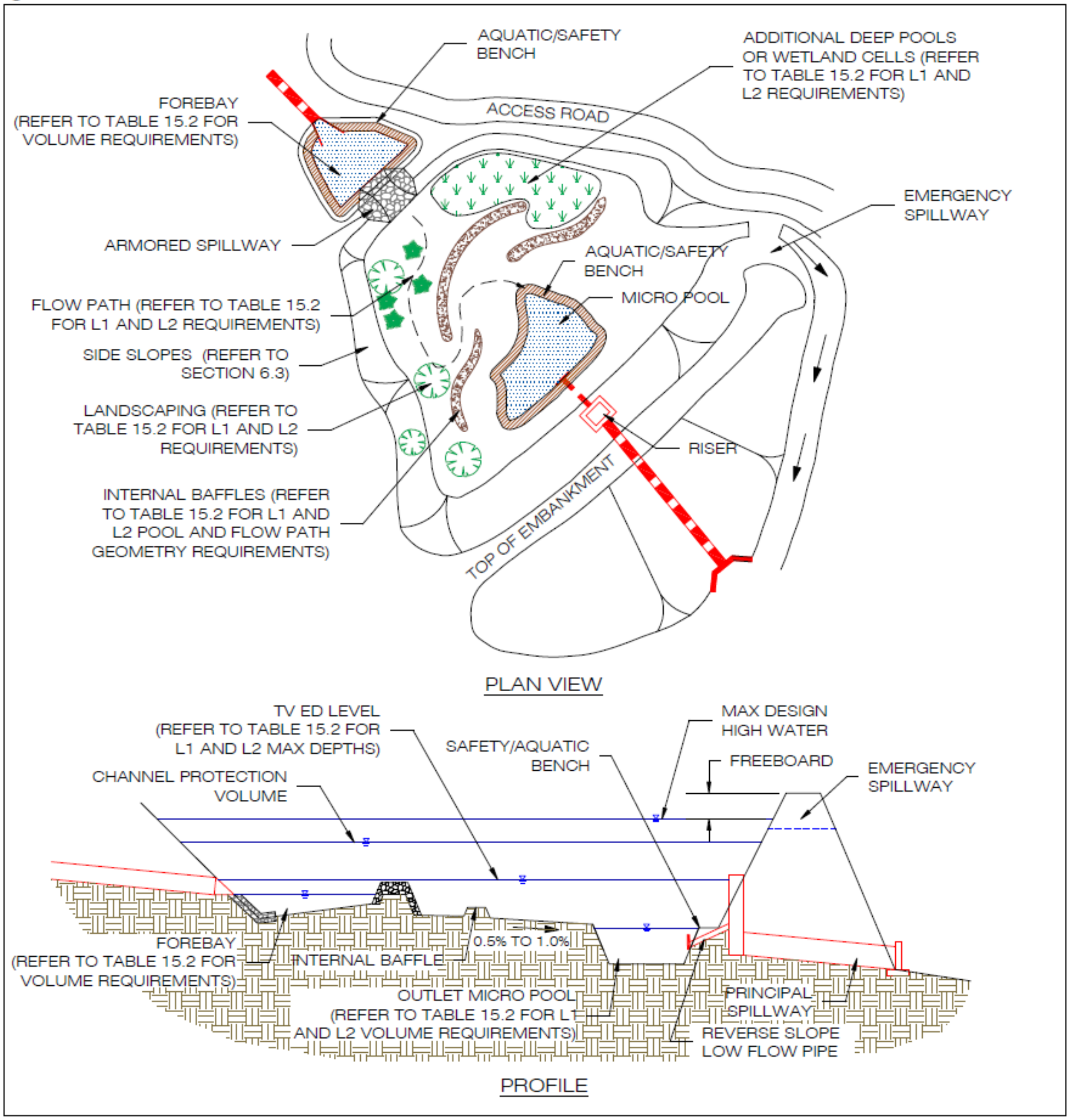


Figure 15.1. Typical Extended Detention Pond Plan and Profile

SECTION 5: PHYSICAL FEASIBILITY & DESIGN APPLICATIONS

The following feasibility criteria should be evaluated when ED ponds are considered as the final practice in a treatment train. Many of these items will be influenced by the type of ED Pond being considered (refer to Design Applications at the end of this section).

Space Required. A typical ED pond requires a footprint of 1% to 3% of its contributing drainage area, depending on the impervious cover, pond geometry, etc.

Contributing Drainage Area (CDA). A minimum contributing drainage area of 10 acres is recommended for ED ponds, in order to sustain a permanent micropool to protect against clogging. ED may still work with drainage areas less than 10 acres, but designers should be aware that these “pocket” ponds will typically (1) have very small orifices that will be prone to clogging, and (2) may generate more maintenance requirements.

Available Hydraulic Head. The depth of an ED pond is usually determined by the amount of hydraulic head available at the site. The bottom elevation is normally the invert of the existing downstream conveyance system to which the ED pond discharges. Typically, a minimum of 4 to 6 feet is needed for a water quality ED pond, and up to 10 feet of head (or more) may be needed for an ED pond to provide channel protection and flood control.

Minimum Setbacks. Local subdivision and zoning ordinances and design criteria should be consulted to determine minimum setbacks for impoundments to property lines, structures, and wells. Generally, ED ponds should be set back at least 10 feet from property lines, 25 feet from building foundations, 35 feet from septic system fields, and 50 feet from private wells.

Depth-to-Water Table and Bedrock. ED ponds are not allowed if the water table or bedrock will be within 2 feet of the floor of the pond. Refer to **Section 7** for design variations when encountering high water table, bedrock, or karst topography

Soils. The permeability of soils is seldom a design constraint for ED ponds. Infiltration through the bottom of the pond is encouraged unless it will impair the integrity of the embankment. Soil explorations should to be conducted at the proposed pond embankment to estimate infiltration rates and properly design the embankment cut-off trench.

An initial soil exploration should be conducted to rule out infiltration as a preferred practice and to rule out the presence of karst topography. The ED Basin should be the option of last resort if karst topography is present. Refer to **Section 7** for additional guidance when designing near karst topography. At a minimum, an impermeable clay or (preferably) geosynthetic liner in accordance with Stormwater Design Specification No. 13 (Constructed Wetlands) will be required.

Trout Streams. Pond practices have a tendency to raise the water temperature in receiving streams. Therefore, the use of ED ponds in watersheds containing trout streams is restricted to situations where upland runoff reduction practices cannot meet the full Channel Protection Volume requirement. In these instances, a an ED pond must (1) be designed with a maximum 12 hour detention time (to avoid excessive warming of runoff), (2) have a minimum outlet micro-pool volume sufficient to prevent clogging, (3) be planted with trees so it becomes fully shaded and (4) be located outside of any required stream buffers.

Perennial Streams. Locating ED ponds on perennial streams is typically not allowed and will require a Section 401 and Section 404 permit from the appropriate state or federal regulatory agency.

Design Applications

ED can be combined as a design element within other stormwater treatment practices (e.g., wet ponds, and constructed wetlands) to enhance their performance and appearance. Similarly, other design variations can be incorporated into the ED pond; e.g., bioretention, infiltration, sand filters, etc., located within the overall footprint but housed in a separate cell, where the maximum allowable CDA, among other design limitations as required by the criteria of that particular practice, can be addressed. In such cases, the designer should clearly document the design concept and "hybrid" performance credit (if applicable) for review by the plan approving authority (or the Virginia BMP Clearinghouse for broader application).

The traditional (and most common) design applications for ED include:

- Micropool ED
- Wet ED Pond (covered in Stormwater Design Specification No.14, Wet Ponds)
- Limited ED above Wetlands (covered Stormwater Design Specification No. 13, Constructed Wetlands)

Figure 15.1 above illustrates ED pond design variations. While ED ponds can provide for channel and flood protection, they will rarely provide adequate runoff volume reduction and pollutant removal to serve as a stand-alone water quality compliance strategy. Therefore, designers should always maximize the use of upland runoff reduction practices, (e.g., rooftop disconnections, small-scale infiltration, rainwater harvesting, bioretention, grass channels and dry swales) that reduce runoff at its source (rather than merely treating the runoff at the terminus of the storm drain system). Upland runoff reduction practices can be used to satisfy most or all of the runoff reduction requirements at most sites. However, an ED pond may still be needed to provide any remaining channel protection requirements. Upland runoff reduction practices will greatly reduce the size, footprint and cost of the downstream ED pond.

SECTION 6: DESIGN CRITERIA

6.1. Overall Sizing

The ED Pond is designed to hold the design *Tv* within the water volume below the normal pool elevation of any micropools, forebays and wetland areas (minimum of 15% for ED Level 1, and 40% for Level 2), as well as the temporary extended detention storage volume above the normal pool. To qualify for the higher nutrient reduction rates associated with the Level 2 design, the ED pond must be designed with a *Tv* that is 25% greater than the *Tv* for the Level 1 design [i.e., $1.25(R_v)(A)$], (additional Channel Protection Volume is not required).

Designers should use the BMP design treatment volume, Tv_{BMP} (defined as the treatment volume based on the contributing drainage area, Tv_{DA}, less any volume reduced by upstream runoff reduction practices) to size and design the wet features and extended detention volume. If additional detention storage is proposed for channel protection and/or flood control, designers should use the adjusted curve number reflective of the volume reduction provided by the upstream practices as well as the ED pond (Level 2) to calculate the developed condition energy balance detention requirements. (Refer to Chapter 11 of the Virginia Stormwater Handbook.

6.2. Treatment Volume Drawdown and Detention Design

Methods for calculating the required orifice size for achieving the target drawdown of the *Tv* for the Level 1 (24 hours) and Level 2 (36 hours) design can be found in the Engineering Calculations chapter of the current Virginia Stormwater Management Handbook. Similarly, the hydraulic design of the multi-stage riser to meet the channel protection and flooding protection design goals can also be found in the Virginia Stormwater Management Handbook.

Treatment Volume (water quality) Storage. The total *Tv* storage may be provided by a combination of the permanent pool (in the form of forebays, micropools, and wetland areas) and ED storage in accordance with the Level 1 and Level 2 design volume allocations. Refer to **Section 6.5** for forebays and micropools.

Constructed wetlands added to achieve a Level 2 design should be connected to the forebays or the micropool with a transition zone. Refer to **Design Specification No. 13: Wetlands** for criteria on the appropriate depth, side slopes, and other design features for the wetland pool component.

Vertical Extended Detention Limits. The maximum *Tv* ED water surface elevation may not extend more than 5 feet above the basin floor or normal pool elevation for a Level 1 design, or 4 feet for a Level 2 design. The maximum vertical elevation for ED and channel protection detention over shallow wetlands is 1 foot. The bounce effect is not as critical for larger flood control storms (e.g., the 10-year design storm), and these events can exceed the 5 foot vertical limit if they are managed by a multi-stage outlet structure.

6.3. Internal Design Geometry

Side Slopes. Side slopes leading to the ED pond should generally have a gradient no steeper than 4H:1V; or 3H:1V with safety bench. The mild slopes promote better establishment and growth of vegetation and provide for easier maintenance and a more natural appearance.

Long Flow Path. ED pond designs should have an irregular shape and a long flow path from inlet to outlet to increase water residence time, treatment pathways, and pond performance. In terms of flow path geometry, there are two design considerations: (1) the overall flow path through the pond, and (2) the length of the shortest flow path (Hirschman et al., 2009):

- he overall flow path can be represented as the length-to-width ratio *OR* the flow path ratio (refer to Figure 2 of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site for additional information). These ratios must be at least 2L:1W for Level 1 designs and 3L:1W for Level 2 designs. Internal berms, baffles, or topography can be used to extend flow paths and/or create multiple pond cells.
- The shortest flow path represents the distance from the closest inlet to the outlet (the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia

Stormwater BMP Clearinghouse web site). The ratio of the shortest flow to the overall length must be at least 0.4 for Level 1 designs and 0.7 for Level 2 designs. In some cases – due to site geometry, storm sewer infrastructure, or other factors – some inlets may not be able to meet these ratios. However, the drainage area served by these "closer" inlets should constitute no more than 20% of the total contributing drainage area.

Safety Features. Several design features of impounding structures are intended to provide elements of safety:

- **Safety Bench** is a minimum 10 foot wide bench with a minimal cross slope (2%) located immediately above the extended detention design high water; slopes below the safety bench should be no steeper than 3:1.
- **Aquatic Bench** is located on the perimeter of all wet features: forebays, micropools, wetland pools and graded from a depth of 0 to 18 inches (maximum). The width of the aquatic bench should be 4 to 6 feet for forebays and 6 to 10 feet for micropools. The width should increase accordingly for larger variations of these features.
- Safety benches and aquatic benches should be landscaped with vegetation that hinders or prevents access to the pool.
- The principal spillway opening must be designed and constructed to prevent access by small children.
- End walls above pipe outfalls greater than 48 inches in diameter must be fenced to prevent a safety hazard.
- An emergency spillway and associated freeboard must be provided in accordance with applicable local or state dam safety requirements. The emergency spillway must be located so that downstream structures will not be impacted by spillway discharges.

6.4. Required Geotechnical Testing

Soil explorations should be conducted within the footprint of the proposed embankment, in the vicinity of the proposed outlet, and in at least two locations within the proposed ED pond treatment area. Soil boring data is needed to (1) determine the physical characteristics of the excavated material to determine its adequacy as structural fill or other use, (2) determine the need and appropriate design depth of the embankment cut-off trench, (3) provide data for structural designs of the outlet works (e.g., bearing capacity and buoyancy), (4) determine the depth to groundwater and bedrock and (5) evaluate potential infiltration losses (and the potential need for a liner).

Additional guidance on geotechnical criteria for impoundment facilities can be found in **Appendix A: Earthen Embankments** of the Introduction to the New Virginia Stormwater Design Specifications, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Guidance on soil explorations in general can be found in **Appendix 8-A** of **Stormwater Design Specification No. 8 (Infiltration).**

6.5. Pretreatment Forebay and Micropool

Sediment forebays are considered to be an integral design feature to maintain the longevity of ED ponds. A forebay must be located at each major inlet to trap sediment and preserve the capacity of the main treatment cell.

Refer to **Appendix D: Sediment Forebays** of the Introduction to the New Virginia Stormwater Design Specifications, as posted on the Virginia Stormwater BMP Clearinghouse web site for design forebay design information, at the following web address:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Other forms of pre-treatment for sheet flow and concentrated flow for minor inflow points should be designed consistent with pretreatment criteria found in Design Spec No. 9: Bioretention.

6.6. Conveyance and Overflow

No Pilot Channels. Micropool ED ponds shall not have a low flow pilot channel, but instead must be constructed in a manner whereby flows are evenly distributed across the pond bottom, to promote the maximum infiltration possible.

Internal Slope. The maximum longitudinal slope through the pond should be approximately 0.5% to 1% to promote positive flow through the ED pond.

Principal Spillway. The principal spillway shall be designed with acceptable anti-flotation, anti-vortex, and trash rack devices. The spillway must generally be accessible from dry land. Refer to **Appendix B: Principal Spillways** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Non-Clogging Low Flow Orifice. ED Ponds with drainage areas of 10 acres or less, where small diameter outlet pipes are typical, are prone to chronic clogging by organic debris and sediment. Orifices less than 3 inches in diameter may require extra attention during design to minimize the potential for clogging. Designers should always look at upstream conditions to assess the potential for higher sediment and woody debris loads. The risk of clogging in outlet pipes with small orifices can be reduced by:

- Providing a micropool at the outlet structure. The depth of the micropool should be at least 4 feet deep, and be equipped with an aquatic bench for safety purposes. The aquatic bench should be 4 to 6 feet wide and range from a depth of 0 to 18 inches below the water surface. The volume of the outlet micropool should be equal to (or larger) than the largest forebay. The depth of the micropool should not draw down by more than 2 feet during a 30 day summer drought (for a water balance calculation method, see **Section 6.2** of Stormwater Design Specification No 13: Constructed Wetlands). The following represent design options intended to improve the performance of the outlet structure:

  - Use a reverse-sloped pipe that extends to a mid-depth of the permanent pool or micropool; or
  - Install a downturned elbow or half-round CMP over a riser orifice (circular, rectangular, V-notch, etc.) to pull water from below the micropool surface.
  -
- Providing an over-sized forebay to trap sediment, trash and debris before it reaches the ED pond's low-flow orifice.
- Installing a trash rack to screen the low-flow orifice.
- When a micropool is not feasible, perforated pipe(s) under a gravel blanket with an orifice control at the end in the riser structure can be used to control the outflow. Designers must verify the capacity of the perforated pipe and the orifice control, as well as the relative maintenance frequency, including visual indicators, for maintaining the design peak flows.

Emergency Spillway. ED ponds must be constructed with overflow capacity to pass the 100-year design storm event through either the Primary Spillway (with two feet of freeboard to the settled top of embankment) or a vegetated or armored Emergency Spillway (with at least one foot of freeboard to the settled top of embankment). **Appendix C: Emergency Spillways** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Adequate Outfall Protection. The design must specify an outfall that will be stable for the maximum (pipe-full) design discharge (the 10-year design storm event or the maximum flow when surcharged during the emergency spillway design event, whichever is greater). The channel immediately below the pond outfall must be modified to prevent erosion and conform to natural dimensions in the shortest possible distance. Outlet protection should be provided consistent with state or local guidance.

Inlet Protection. Inlet areas should be stabilized to ensure that non-erosive conditions exist during storm events up to the overbank flood event (i.e., the 10-year storm event). Inlet pipe inverts should generally be located at or slightly below the forebay pool elevation.

On-Line ED Ponds must be designed to detain the required *Tv* and either manage or be capable of safely passing larger storm events conveyed to the pond (e.g., 1-year channel protection detention, 10-year flood protection, and/or the 100-year design storm event). Adequate design freeboard between the maximum design water surface elevation and the top of the embankment must be provided in accordance with Design Specification **Appendix A: Earthen Embankments** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Dam Safety Permits. ED ponds with high embankments or large drainage areas and impoundments may be regulated under the Virginia Dam Safety Act (§ 10.1-606.1 et seq., Code of Virginia) and the Virginia Dam Safety Regulations (4 VAC 50-20 et seq.). Refer to **Design Specification Appendix A: Earthen Embankments** for additional information.

6.7. Landscaping and Planting Plan

A landscaping plan must be provided that indicates the methods used to establish and maintain vegetative coverage within the ED pond and its buffer. Minimum elements of a plan include the following:

- Delineation of pondscaping zones within both the pond and buffer
- Selection of corresponding plant species
- The planting plan
- The sequence for preparing the wetland bed, if one is incorporated with the ED pond (including soil amendments, if needed)
- Sources of native plant material
- The landscaping plan should provide elements that promote diverse wildlife and waterfowl use within the stormwater wetland and buffers.
- The planting plan should allow the pond to mature into a native forest in the right places, but yet keep mowable turf along the embankment and all access areas. The wooded wetland concept proposed by Cappiella *et al*., (2005) may be a good option for many ED ponds.
- Woody vegetation may not be planted or allowed to grow within 15 feet of the toe of the embankment nor within 25 feet from the principal spillway structure.
- A vegetated buffer of native plants that requires minimal maintenance should be provided that extends at least 25 feet outward from the maximum water surface elevation of the ED pond. Permanent structures (e.g., buildings) should not be constructed within the buffer area. Existing trees should be preserved in the buffer area during construction.
- The soils in the stormwater buffer area are often severely compacted during the construction process. The density of these compacted soils can be so great that it effectively prevents root penetration and, therefore, may lead to premature mortality or loss of vigor. As a rule of thumb, planting holes should be three times deeper and wider than the diameter of the rootball for ball-and-burlap stock, and five times deeper and wider for container-grown stock.
- Avoid species that require full shade, or are prone to wind damage. Extra mulching around the base of trees and shrubs is strongly recommended as a means of conserving moisture and suppressing weeds.

For more guidance on planting trees and shrubs in ED pond buffers, consult Cappiella et al (2006) and **Appendix E: Landscaping** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:.

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

6.8. Maintenance Features

Good maintenance access is needed so crews can remove sediments from the forebay, alleviate clogging and make riser repairs. The following ED pond maintenance items can be addressed during design, in order to make on-going maintenance easier:

- Adequate maintenance access must extend to the forebay, micropool, any safety benches, riser, and outlet structure and must have sufficient area to allow vehicles to turn around.

- The riser should be located within the embankment for maintenance access, safety and aesthetics. Access to the riser should be provided by lockable manhole covers and manhole steps within easy reach of valves and other controls.
- Access roads must (1) be constructed of materials that can withstand the expected frequency of use, (2) have a minimum width of 12 feet, and (3) have a profile grade that does not exceed 15%. Steeper grades are allowable if appropriate stabilization techniques are used, such as gravel or other material.
- A maintenance right-of- way or easement must extend to the ED pond from a public or private road.
- The designer should check to see whether sediments can be spoiled (deposited) on-site or must be hauled away.

6.9. ED Pond Material Specifications

ED ponds are generally constructed with materials obtained on-site, except for the plant materials, inflow and outflow devices (e.g., piping and riser materials), possibly stone for inlet and outlet stabilization, and filter fabric for lining banks or berms.

The basic material specifications for **Earthen Embankments**, **Principal Spillways**, **Vegetated Emergency Spillways** and **Sediment Forebays** shall be as specified in **Appendices A through D** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site, at the following URL:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

SECTION 7: REGIONAL & SPECIAL CASE DESIGN ADAPTATIONS

7.1. Karst Terrain

Karst regions are found in much of the Ridge and Valley province of the Virginia. The presence of karst complicates both land development in general and stormwater design in particular. Designers should always conduct geotechnical investigations in areas of karst terrain to assess this risk and rule out the presence of karst during the project planning stage. If these studies indicate that less than 3 feet of vertical separation exists between the bottom of the ED pond and the underlying soil-bedrock interface, ED ponds should not be used due to the risk of sinkhole formation and groundwater contamination, (see CSN Technical Bulletin No. 1, 2008, and Appendix 6-C of Chapter 6 of the Virginia Stormwater Management Handbook, 2010). If ED ponds are used, they must have an acceptable liner in accordance with the guidance provided in Section 7.1 of Stormwater Design Specification No. 13 (Constructed Wetlands).

7.2. Coastal Plain

The lack of sufficient hydraulic head and the presence of a high water table of many coastal plain sites significantly constrain the application of ED ponds. Excavating ponds below the water table creates what are known as dugout ponds where the water quality volume is displaced by groundwater, reducing the pond's mixing and treatment efficiency and creating nuisance conditions. In general, ***shallow constructed wetlands are a superior alternative to ED ponds in coastal plain settings***.

7.3. Steep Terrain

The use of ED ponds is highly constrained at development sites with steep terrain.

7.4. Cold Climate and Winter Performance

Winter conditions can cause freezing problems within inlets, flow splitters, and ED outlet pipes, due to ice formation. The following design adjustments are recommended for ED ponds installed in higher elevations and colder climates:

- Do not submerge inlet pipes.
- Provide a minimum 1% slope for inlet pipes to discourage standing water and potential ice formation in upstream pipes.
- Place all pipes below the frost line to prevent frost heave and pipe freezing.
- Locate low flow orifices in the micropool so they withdraw at least 6 inches below the typical ice layer.
- Place trash racks at a shallow angle to prevent ice formation.
- If winter road sanding is prevalent in the contributing drainage area, increase the forebay size to 25% of the total *Tv* to accommodate additional sediment loadings.

7.5. Linear Highway Sites

ED ponds are poorly suited to treat runoff within open channels located in the highway right of way, unless storage is available in a cloverleaf interchange or in an expanded right-of-way. Guidance for pond construction in these areas is provided in VDOT's annual stormwater management specifications, as reviewed and approved annually by DCR. Additional guidance can be found in Profile Sheet SR-5 in Schueler et al (2007).

SECTION 8: CONSTRUCTION

8.1. Construction Sequence

The following is a typical construction sequence to properly install a dry ED pond. The steps may be modified to reflect different dry ED pond designs, site conditions, and the size, complexity and configuration of the proposed facility.

Step 1: Use of ED pond as an E&S Control. An ED pond may serve as a sediment basin during project construction. If this is done, the volume should be based on the more stringent sizing rule (erosion and sediment control requirement vs. water quality treatment requirement). Installation of the permanent riser should be initiated during the construction phase, and design elevations should be set with final cleanout of the sediment basin and conversion to the post-construction

ED pond in mind. The bottom elevation of the ED pond should be lower than the bottom elevation of the temporary sediment basin.

The construction notes should clearly indicate that the facility will be dewatered, dredged and re-graded to design dimensions after the original site construction is complete. Appropriate procedures should be implemented to prevent discharge of turbid waters when the basin is being converted into an ED pond.

Step 2: Stabilize the Drainage Area. Final grading and construction of ED pond components should only be constructed after the contributing drainage area to the pond is stabilized.

Step 3: Assemble Construction Materials on-site, make sure they meet design specifications, and prepare any staging areas.

Step 5: Install E&S Controls prior to construction, including temporary de-watering devices and stormwater diversion practices. All areas surrounding the pond that are graded or denuded during construction must be planted with turf grass, native plantings, or other approved methods of soil stabilization.

Step 4: Clear and Strip the project area to the desired sub-grade.

Step 6: Excavate the Core Trench and Install the Spillway Pipe.

Step 7: Install the Riser or Outflow Structure and ensure the top invert of the overflow weir is constructed level at the design elevation.

Step 8: Construct the Embankment and any Internal Berms in 8 to 12-inch lifts, or as directed by geotechnical recommendations, and compact as required with appropriate equipment.

Step 9: Excavate/Grade until the appropriate elevation and desired contours are achieved for the bottom and side slopes of the ED pond.

Step 10: Construct the Emergency Spillway in cut or structurally stabilized soils.

Step 11: Install Outlet Protection, including emergency and primary outlet apron protection.

Step 12: Stabilize Exposed Soils with temporary seed mixtures appropriate for the pond buffer. All areas above the normal pool elevation should be permanently stabilized by hydroseeding or seeding over straw.

Step 13: Plant the Pond Buffer Area, following the pondscaping plan (see **Section 6.7**).

8.2. Construction Inspection

Multiple inspections are critical to ensure that stormwater ponds are properly constructed. Inspections are recommended during the following stages of construction:

- Pre-construction meeting
- Initial site preparation (including installation of E&S controls)
- Excavation/Grading (interim and final elevations)
- Installation of the embankment, the riser/primary spillway, and the outlet structure
- Implementation of the pondscaping plan and vegetative stabilization
- Final inspection (develop a punch list for facility acceptance)

A construction phase inspection checklist for ED Ponds can be accessed at the end of this specification.

In order to facilitate maintenance, the contractor should measure the actual constructed pond depth at three areas within the micropool or other water feature and mark and geo-reference them on an as-built drawing. This simple data set will enable maintenance inspectors to determine pond sediment deposition rates in order to schedule sediment cleanouts.

Upon final inspection and acceptance, the GPS coordinates for all ED Ponds should be logged for entry into the VSMP Authority’s maintenance tracking database.

SECTION 9: MAINTENANCE

9.1. Maintenance Agreements

The Virginia Stormwater Management regulations (4 VAC 50-60) specify the circumstances under which a maintenance agreement must be executed between the owner and the VSMP authority, and sets forth inspection requirements, compliance procedures if maintenance is neglected, notification of the local program upon transfer of ownership, and right-of-entry for local program personnel.

- Restrictive covenants or other mechanism enforceable by the VSMP authority must be in place to help ensure that ED ponds are maintained, as well as to pass the knowledge along to any subsequent property owners.
- Access to ED ponds should be covered by a drainage easement to allow access by the VSMP authority to conduct inspections and perform maintenance when necessary.
- All ED ponds must include a long term maintenance agreements consistent with the provisions of the VSMP regulations, and must include the recommended maintenance tasks and a copy of an annual inspection checklist.
- The maintenance agreement should also include contact information for owners to get local or state assistance to solve common nuisance problems, such as mosquito control, geese, invasive plants, vegetative management and beaver removal.

9.2. Maintenance Inspections

Maintenance of ED ponds is driven by annual inspections that evaluate the condition and performance of the pond, including the following:

- Measure sediment accumulation levels in forebay.

- Monitor the growth of wetlands, trees and shrubs planted. Record the species and their approximate coverage, and note the presence of any invasive plant species.
- Inspect the condition of stormwater inlets to the pond for material damage, erosion or undercutting.
- Inspect the banks of upstream and downstream channels for evidence of sloughing, animal burrows, boggy areas, woody growth, or gully erosion that may undermine embankment integrity.
- Inspect pond outfall channel for erosion, undercutting, rip-rap displacement, woody growth, etc.
- Inspect condition of principal spillway and riser for evidence of spalling, joint failure, leakage, corrosion, etc.
- Inspect condition of all trash racks, reverse sloped pipes or flashboard risers for evidence of clogging, leakage, debris accumulation, etc.
- Inspect maintenance access to ensure it is free of woody vegetation, and check to see whether valves, manholes and locks can be opened and operated.
- Inspect internal and external side slopes of the pond for evidence of sparse vegetative cover, erosion, or slumping, and make needed repairs immediately.

Based on inspection results, specific maintenance tasks will be triggered. Example maintenance inspection checklists for ED Ponds can be accessed in Appendix C of Chapter 9 of the *Virginia Stormwater Management Handbook* (2010).

9.3. Common Ongoing Maintenance Tasks

ED ponds are prone to clogging at the ED low-flow orifice. This component of the pond's plumbing should be inspected at least twice a year. The constantly changing water levels in ED ponds make it difficult to mow or manage vegetative growth. The bottom of ED ponds often become soggy, and water-loving trees such as willows may take over. The maintenance plan should clearly outline how vegetation in the pond and its buffer will be managed or harvested in the future. Periodic mowing of the stormwater buffer is only required along maintenance rights-of-way and the embankment. The remaining buffer can be managed as a meadow (mowing only periodically to sustain healthy growth) or forest.

The maintenance plan should schedule a shoreline cleanup at least once a year to remove trash and floatables that tend to accumulate in the forebay, micropool, and on the bottom of ED ponds.

Frequent sediment removal from the forebay is essential to maintain the function and performance of an ED pond. For planning purposes maintenance plans should anticipate cleanouts every 5 to 7 years, or when inspections indicate that 50% of the forebay capacity has been filled. (Absent an upstream eroding channel or other source of sediment, the frequency of sediment removal should decrease as the drainage area stabilizes.) As noted above, the designer should also check to see whether removed sediments can be spoiled (deposited) on-site or must be hauled away. Sediments excavated from ED ponds are typically not considered toxic or hazardous, and can be safely disposed by either land application or land filling.

SECTION 10: COMMUNITY AND ENVIRONMENTAL CONCERNS

ED Ponds can generate the following community and environmental concerns that need to be addressed during design.

Aesthetics. ED ponds tend to accumulate sediment and trash, which residents are likely to perceive as unsightly and creating nuisance conditions. Fluctuating water levels in ED ponds also create a difficult landscaping environment. In general, designers should avoid designs that rely solely on *dry* ED ponds.

Existing Wetlands. ED ponds should never be constructed within existing *natural* wetlands, nor should they inundate or otherwise change the hydroperiod of existing wetlands.

Existing Forests. Designers can expect a great deal of neighborhood opposition if they do not make a concerted effort to save mature trees during pond design and construction. Designers should also be aware that even modest changes in inundation frequency can kill upstream trees (Wright *et al.,* 2007).

Stream Warming Risk. ED ponds have less risk of stream warming than other pond options, but they can warm streams if they are un-shaded or contain significant surface area in shallow pools. If an ED pond discharges to temperature-sensitive waters, it should be forested, contain the minimum pools to prevent clogging, and have a detention time of no longer than 24 hours. If a level 2 design with 36 hours is necessary, the additional detention time may be allowed if sufficient landscaping with an emphasis on shade is provided.

Safety Risk. ED ponds are generally considered to be safer than other pond options, since they have few deep pools. Maximum side-slopes and unfenced headwalls, however, can still create some safety risks. Gentle side slopes and safety benches graded near the water line of any water feature should be provided to avoid potentially dangerous drop-offs, especially where ED ponds are located near residential areas.

Mosquito Risk. The fluctuating water levels within ED ponds have potential to create conditions that lead to mosquito breeding. Mosquitoes tend to be more prevalent in irregularly flooded ponds than in ponds with a permanent pool (Santana *et al*., 1994). Designers can minimize the risk by combining ED with a wet pond or wetland.

Sample Construction Inspection Checklist for Extended Detention (ED) Ponds: The following checklist provides a basic outline of the anticipated items for the construction inspection of an ED pond. Inspectors should review the plans carefully, and adjust these items and the timing of inspection verification as needed to ensure the intent of the design and the inspection is met. Finally, users of this information may wish to incorporate these items into a VSMP Authority Construction Checklist format consistent with the format used for erosion and sediment control and BMP construction inspections.

Pre-Construction Meeting

☐ Pre-construction meeting with the contractor designated to install the ED pond has been conducted.

☐ Identify the tentative schedule for construction and verify the requirements and schedule for interim inspections and sign-off.

☐ Subsurface investigation and soils report supports the placement of an ED pond in the proposed location.

☐ Impervious cover has been constructed/installed and area is free of construction equipment, vehicles, material storage, etc.

☐ All pervious areas of the contributing drainage areas have been adequately stabilized with a thick layer of vegetation and erosion control measures have been removed.

☐ **Certification of Stabilization Inspection:** Inspector certifies that the drainage areas are adequately stabilized in order to convert the sediment pond or trap (if used for sediment control) into a permanent ED pond.

Construction of ED Pond Embankment and Principal Spillway

☐ Stormwater has been diverted around or through the area of the ED pond embankment to a stabilized conveyance; and perimeter erosion control measures to protect the facility during construction have been installed.

☐ Materials for construction of the embankment and principal spillway are available and meet the specifications of the approved plans.

☐ Construction of key trench, principal spillway, including the riser and barrel, anti-seepage controls, outlet protection, etc., is built in accordance with approved plans.

☐ Geotechnical analysis and approval of the core (if required) and embankment material has been provided, and the material has been placed in lifts and compacted in accordance with the approved plans.

☐ **Certification of Embankment and Principal Spillway Inspection:** Inspector certifies that each element of the embankment and principal spillway has been constructed in accordance with the approved plans.

Excavation of ED Pond

☐ Excavation of the ED pond geometry (including bottom shape and length:width ratio, side slopes, etc.) achieves the elevations in accordance with approved plans.

☐ Excavation of internal micro-topographic features: micro-pool outlet, forebays, etc., is in accordance with approved plans.

☐ Impermeable liner, when required, meets project specifications and is placed in accordance with manufacturers specifications.

☐ **Certification of Excavation Inspection:** Inspector certifies that the excavation has achieved all the appropriate grades, grade transitions, and ED pond geometry as shown on the approved plans.

Landscaping Plan and Stabilization

☐ Exposed soils on pond bottom, side slopes, and buffer areas are stabilized with specified seed mixtures, stabilization matting, mulch, etc., in accordance with approved plans.

☐ Appropriate number and spacing of plants are installed and protected on the aquatic bench and pond buffer in accordance with the approved plans.

☐ All erosion and sediment control practices have been removed.

☐ Follow-up inspection and as-built survey/certification has been scheduled.

☐ GPS coordinates have been documented for the ED pond installation.

SECTION 11: REFERENCES

Cappiella, K., T. Schueler and T. Wright. 2006. *Urban Watershed Forestry Manual: Part 2: Conserving and Planting Trees at Development Sites*. USDA Forest Service. Center for Watershed Protection. Ellicott City, MD.

Cappiella, K. et al . 2007. *Urban Watershed Forestry Manual: Part 3: Urban Tree Planting Guide*. USDA Forest Service. Center for Watershed Protection. Ellicott City, MD.

Cappiella, K., L. Fraley-McNeal, M. Novotney and T. Schueler. 2008. "The Next Generation of Stormwater Wetlands." *Wetlands and Watersheds Article No. 5*. Center for Watershed Protection. Ellicott City, MD.

Center for Watershed Protection. 2004. *Pond and Wetland Maintenance Guidebook*. Ellicott City, MD.

Hirschman, D., L. Woodworth and S. Drescher. 2009. *Technical Report: Stormwater BMPs in Virginia's James River Basin: An Assessment of Field Conditions & Programs*. Center for Watershed Protection. Ellicott City, MD.

Maryland Department of Environment (MDE). 2000. *Maryland Stormwater Design Manual*. Baltimore, MD. Available online at: http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp

Schueler, T., D. Hirschman, M. Novotney and J. Zielinski. 2007. *Urban Stormwater Retrofit Practices*. Manual 3 in the Urban Subwatershed Restoration Manual Series. Center for Watershed Protection, Ellicott City, MD.

Virginia Department of Conservation and Recreation (DCR). 1999. *Virginia Stormwater Management Handbook. Volumes 1 and 2*. Division of Soil and Water Conservation. Richmond, VA.

A13 Chesapeake Bay TMDL Action Plan – Phase 1 – Addendum 1

From: Selengut, Jeffrey (DEQ)
To: Bill Shelton
Subject: RE: 2017-013 FCPS MS4 TMDL Action Plan Revision
Date: Thursday, February 1, 2018 9:30:32 AM

Bill,

This look fine.

From: Bill Shelton [mailto:bshelton@owpr.com]
Sent: Friday, January 26, 2018 3:49 PM
To: Selengut, Jeffrey (DEQ) <Jeffrey.Selengut@deq.virginia.gov>
Cc: John Lee <leejo@fcpsk12.net>; Diane Robinson <robinsod@fcpsk12.net>
Subject: RE: 2017-013 FCPS MS4 TMDL Action Plan Revision

Jeff,

Thank you for your review of our proposed revision to the TMDL Action Plan for Frederick County Public Schools. As discussed this morning, we have calculated an adjusted value for the Nitrogen removal utilizing the "Retrofit Pollutant Removal Adjustor Curve for Total Nitrogen" from the "Chesapeake Bay TMDL Guidance" document.

Since the First Defense BMP is a hydrodynamic structure, it is designed to remove pollutants in a "mechanical" fashion instead of utilizing storage to settle out the pollutants. The BMP is designed for the 1 inch – 24 hour SCS rainfall event for water quality. In order to determine the "Runoff Storage" volume required to calculate the "Runoff Depth Treated", this rainfall event was calculated, and the resulting hydrograph volume was used as the effective "Runoff Storage" volume.

Utilizing this number, the "Runoff Depth Treated" was calculated, and then the corresponding percentage of removal was determined from the equation for the "Retrofit Pollutant Removal Adjustor Curve for Total Nitrogen".

This revised Nitrogen removal rate was then used to calculate the removal. The Nitrogen removed meets the required quantity.

Corresponding documentation is attached.

Please let me know if you have any questions or need an additional information.

Thanks, and have a great weekend!
Bill

200 Country Club Dr. SW
Plaza One • Building E
Blacksburg, Virginia 24060
P: 540-552-2151 Ext. 230
F: 540-951-0219

ARCHITECTS AND ENGINEERS
William A. Shelton, PE
Civil Engineer
Vice-President
Registered in: VA, WV, NC

C: 540-392-1115
Email: bshelton@owpr.com

www.owpr.com
5550 Winchester Avenue
Berkeley Business Park
Suite 5
Martinsburg, WV 25401
P: 304-620-2379

From: Bill Shelton
Sent: Wednesday, January 24, 2018 2:05 PM
To: Jeffrey Selengut <jeffrey.selengut@deq.virginia.gov>
Cc: John Lee <leejo@fcpsk12.net>; Diane Robinson <robinsod@fcpsk12.net>
Subject: 2017-013 FCPS MS4 TMDL Action Plan Revision

Jeff,

Attached for your consideration, please find our requested revision to the approved TMDL Action Plan for Frederick County Public Schools.

Please feel free to give me a call or email me if you have any questions.

Thanks,
Bill

ARCHITECTS AND ENGINEERS
William A. Shelton, PE
Civil Engineer
Vice-President
Registered in: VA, WV, NC

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FREDERICK COUNTY PUBLIC SCHOOLS

CHESAPEAKE BAY TMDL ACTION PLAN <u>ADDENDUM 1</u>

For

Millbrook High School / Redbud Elementary School Campus

<u>Prepared For</u>
Frederick County Public Schools
1415 Amherst Street
Winchester, VA 22604
540-662-3888

<u>Prepared By</u>
OWPR, Inc.
200 Country Club Drive
Plaza 1, Building E
Blacksburg, VA 24060
540-552-2151

January 24, 2018

OWPR
ARCHITECTS AND ENGINEERS

January 24, 2018

Jeffrey Selengut
MS4 Permit Writer
Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

RE: FCPS – Millbrook HS / Redbud Run ES - TMDL Action Plan Revision

Dear Mr. Selengut:

Frederick County Public Schools operates a small MS4 for the Millbrook High School and Redbud Elementary School, and I assist in the administration of their Program Plan. As part of their Program Plan, they have adopted an approved TMDL Action Plan (dated December 10, 2015). This plan currently involves converting an existing detention pond to an extended detention pond to meet the required pollutant reduction for this permit cycle.

FCPS would like to revise the TMDL Action Plan and install one manufactured hydrodynamic BMP in the existing underground storm drainage system in lieu of constructing the extended detention pond. The manufactured BMP will be located adjacent to the large paved bus loop at Millbrook High School and will treat nearly all the runoff from the paved area. The manufactured BMP which is being proposed is the Hydro International – First Defense BMP.

Utilizing the allowable removal rates for the First Defense, it will remove approximately two times the required amount of nitrogen and total suspended solids, and well over the required amount of phosphorus.

Reasons for the proposed revisions are as follows:

1. The extended detention pond requires extensive grading and landscaping modifications which will be costly and time consuming to construct.

2. Establishing the required vegetation would be difficult and require extensive maintenance which the school system is not able to provide.

3. Constructing the extended detention pond would disturb more area than installing the manufactured BMP.

4. Long term maintenance of the extended detention pond would be more intensive than the manufactured BMP.

5. Installation of the manufactured BMP would be approximately 1/3 the cost of constructing the extended detention pond.

We trust that these revisions and the attached TMDL Action Plan Addendum 1 will be found to be acceptable. Please let us know if any additional information is required, or if there are any other comments or questions.

Sincerely,

William A. Shelton, P.E.
Vice-President

CC: John Lee

Attachments: As noted

▪ 200 Country Club Drive SW ▪ Building E ▪ Blacksburg, Virginia 24060 ▪ P: 540-552-2151 ▪ F: 540-951-0219 ▪
▪ 5550 Winchester Avenue ▪ Berkeley Business Park ▪ Suite 5 ▪ Martinsburg, West Virginia ▪ P: 304.381.8541▪
▪ www.owpr.com ▪

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

September 4, 2014

Ms. Lisa Lemont, CPSWQ
Hydro International
94 Hutchins Drive
Portland, Maine 04102

Re: Assignment of Removal Efficiencies for Total Phosphorus-Downstream Defender® and First Defense®

Dear Ms Lemont,

Thank you for your submittals of the Manufactured Treatment Devices (MTD) Registration Forms and supporting documentation for the Downstream Defender® and First Defense® treatment devices. The MTD information provided was reviewed for the purpose of assigning pollutant removal efficiencies for total phosphorus (TP) for each treatment device. This review was performed in accordance with the Guidance Memo Number 14-2009 titled "Interim Use of Stormwater Manufactured Treatment Devices (MTDs) to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria, Part IIB Water Quality Design Requirements". The review process included the analysis of the documents submitted and any other publically available reports.

In addition to the registration forms, performance studies were also submitted for review. These studies are in support of the approval letters from the State of New Jersey that certifies Downstream Defender® and First Defense® has a removal rate of 50% total suspended solids. Consistent with Guidance Memo Number 14-2009, Downstream Defender® and First Defense® are receiving an event mean concentration percent TP removal efficiency of 20%. As stated in the guidance memo, this information will be posted on the Virginia Stormwater Clearinghouse website. This MTD and the assigned removal efficiency can be manually added into Virginia Runoff Reduction spreadsheet to demonstrate compliance with Runoff Reduction Method.

If you have any questions regarding this information, please contact Robert E. Cooper, P.E. at (804) 698-4033 or e-mail at Robert.Cooper@deq.virginia.gov.

Sincerely;

Fred K. Cunningham
Director
Office of Water Permits

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	16.86	578.47
Regulated Urban Pervious		61.54	10.07	619.71
Regulated Urban Impervious	Phosphorus	34.31	1.62	55.58
Regulated Urban Pervious		61.54	0.41	25.23
Regulated Urban Impervious	Total Suspended Solids	34.31	1,171.32	40,187.99
Regulated Urban Pervious		61.54	175.80	10,818.73

Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	0.07587	2.60
Regulated Urban Pervious		61.54	0.03021	1.86
Regulated Urban Impervious	Phosphorus	34.31	0.01296	0.44
Regulated Urban Pervious		61.54	0.00148625	0.09
Regulated Urban Impervious	Total Suspended Solids	34.31	11.7132	401.88
Regulated Urban Pervious		61.54	0.769125	47.33

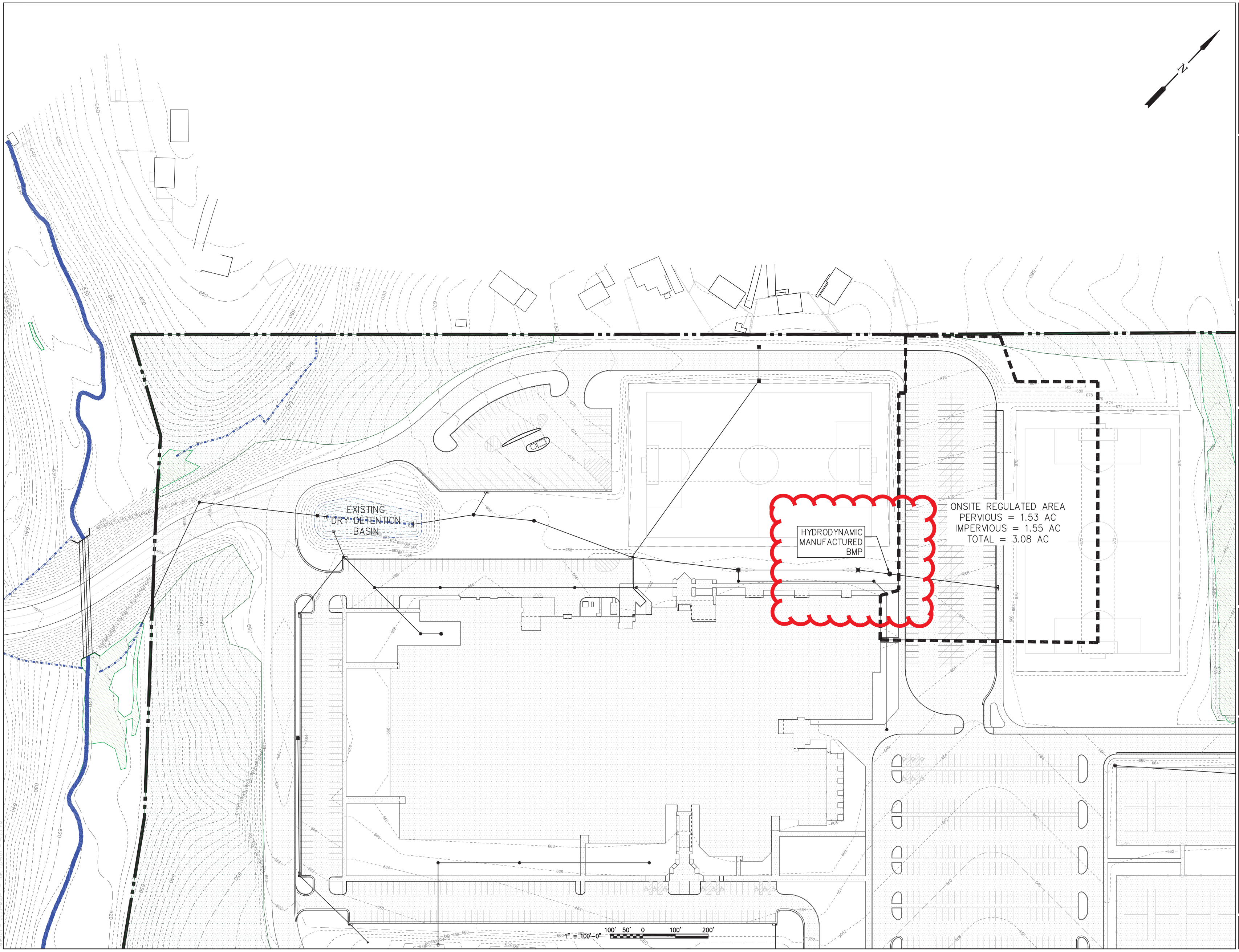
Total Pollutant Removal Required for First Permit Cycle

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)		Total Reduction Required First Permit Cycle (lbs/yr)
Total Regulated Area	Nitrogen	95.85		4.46
Total Regulated Area	Phosphorus	95.85		0.54
Total Regulated Area	Total Suspended Solids	95.85		449.21

BMP Options - Add Manufactured Hydrodynamic BMP at Bus Loop

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	1.55	16.86	26.13
Regulated Urban Pervious		1.53	10.07	15.41
Regulated Urban Impervious	Phosphorus	1.55	1.62	2.51
Regulated Urban Pervious		1.53	0.41	0.63
Regulated Urban Impervious	Total Suspended Solids	1.55	1,171.32	1,815.55
Regulated Urban Pervious		1.53	175.80	268.97

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	3.08	20%	8.31
Total Regulated Area	Phosphorus	3.08	20%	0.63
Total Regulated Area	Total Suspended Solids	3.08	50%	1,042.26



No.	Description	Date

Revisions

OWPR
ARCHITECTS AND ENGINEERS

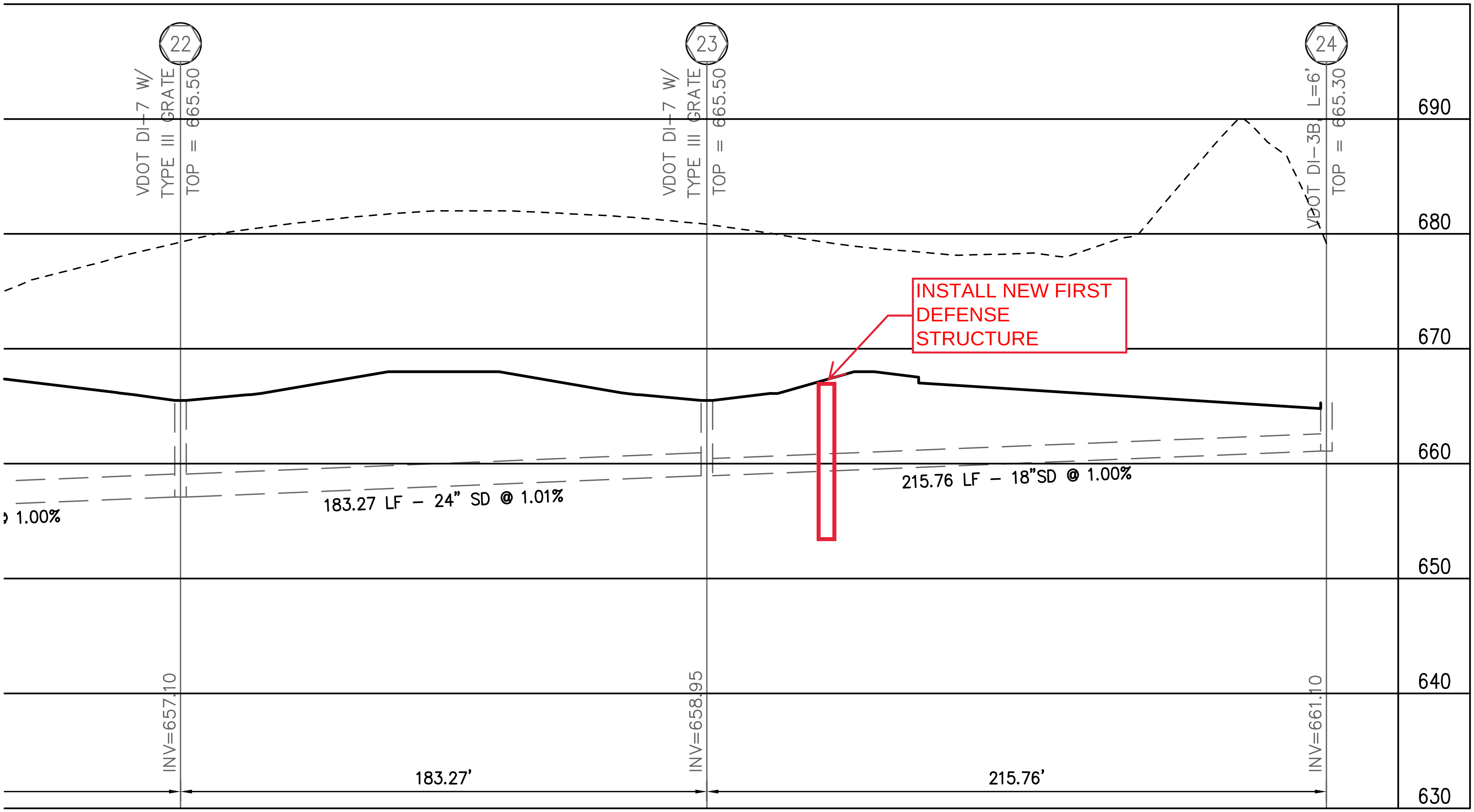
CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 1371
Date 01 JUL 15

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

SWM BMP AREA MAP

TMDL3


22
VDOT DI–7 W/
TYPE III GRATE
TOP = 665.50
23
VDOT DI–7 W/
TYPE III GRATE
TOP = 665.50
24
VDOT DI–3B, L=6'
TOP = 665.30
690
680
670
660
650
640
630
INSTALL NEW FIRST
DEFENSE
STRUCTURE
1.00%
183.27 LF – 24" SD @ 1.01%
215.76 LF – 18"SD @ 1.00%
INV=657.10
INV=658.95
INV=661.10
183.27'
215.76'

Stormwater Solutions

Stormwater Separator

Online Sizing Calculator Project Summary

Hydro International ®

Project Details

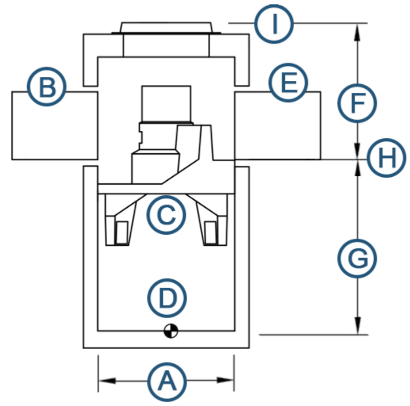
Millbrook HS MS4
Frederick County, VA
United States
Application: Primary Treatment
Development Type: Redevelopment

Contact Details

William Shelton
OWPR, Inc.
Blacksburg, VA, 24060
United States

First Defense High Capacity Specification

A	Vortex Chamber Diameter	4 ft
B	Maximum Inlet Pipe Diameter	24"
C	Oil Storage Capacity	191 gal
D	Sediment Storage Capacity	1.28 yd³
E	Outlet Pipe Diameter	24"
F	Minimum Stormdrain Depth	3.73 ft
G	Standard Depth	5.47 ft



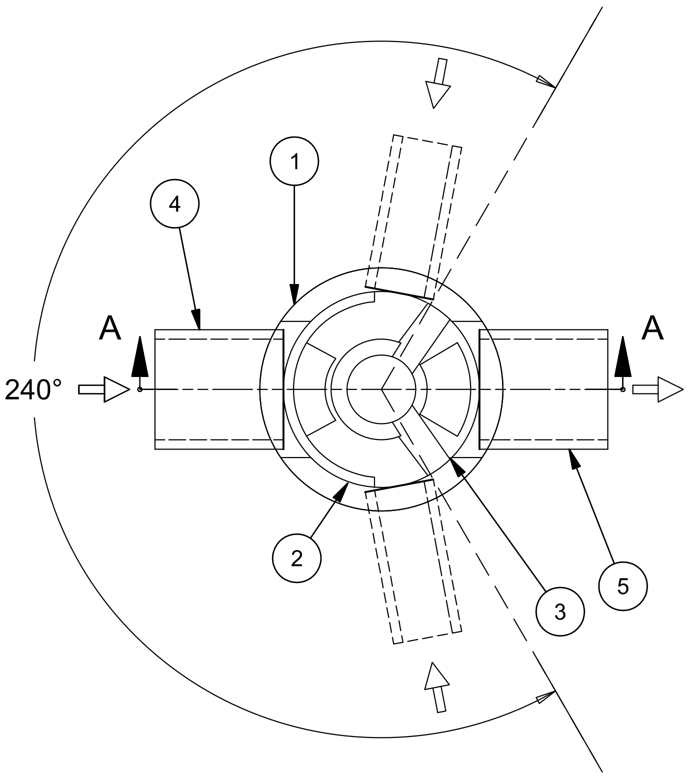
List Of Stormwater Separators On Project

Page 1 of 1

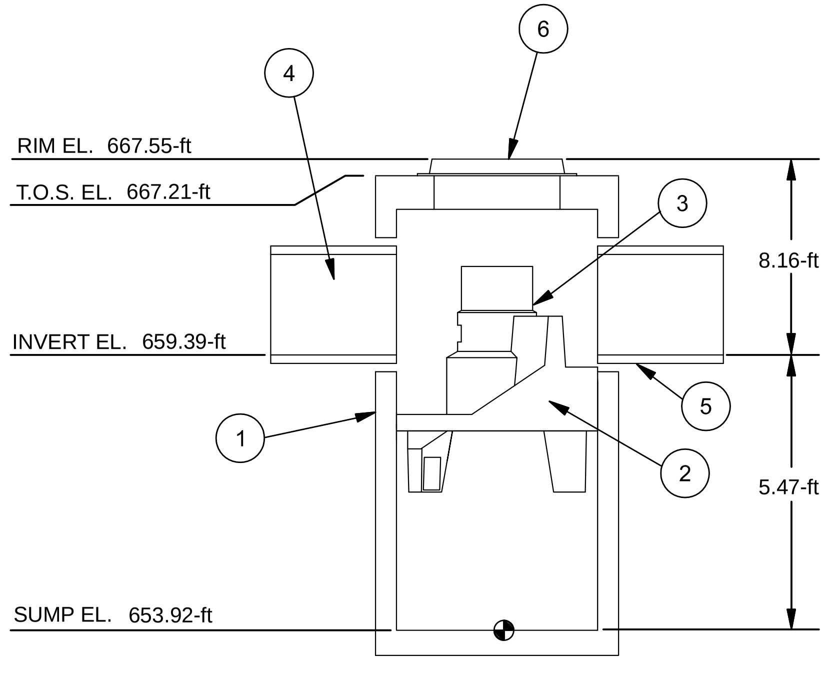
Reference Name / Site Designation:	First Defense 1	First Defense High Capacity Size	4-ft
Sizing Method:	Regulatory Agency	First Defense High Capacity is Set:	Online
Regulatory Agency:	Virginia DEQ - 20% TP,	Rim Elevation (A):	667.55 ft
Water Quality Flow Rate:	50% TSS	Minimum Depth (B):	2.9 ft
Peak Flow Rate:	0.24 cfs	Invert Elevation of Outlet (C):	659.39 ft
Inlet Pipe Diameter:	7.06 cfs	Distance from Outlet Invert to Sump (D):	5.47 ft
Outlet Pipe Diameter:	18 in		
	18 in		

1 year 24 hour SCS
10 year Rational

Hydro International, Stormwater Solutions, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com Email: stormwaterinquiry@hydro-int.com



Inlet pipe(s) can enter anywhere within 240° arc.



SECTION A-A

Parts List		
ITEM	SIZE (in)	DESCRIPTION
1	48	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	18	INLET PIPE (BY OTHERS), MAX. 24 in.
5	18	OUTLET PIPE (BY OTHERS), MAX. 24 in.
6	30	GRATE

GENERAL NOTES:
1. General Arrangement drawings only. Contact Hydro International for site specific fabrication drawings.
2. The maximum diameter of the inlet & outlet pipes is 24 in. For larger pipes, please contact Hydro International for additional design assitance.
3. Multiple inlet pipes possible (refer to project plans).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plans).
5. Peak flow rate limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PRODUCT SPECIFICATIONS:
A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall remove greater than or equal to 80% of TSS at the water quality flow rate.
D. The treatment system shall convey the Peak On-line Flow Rates of up to 7.89 cfs without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of the maximum treatment flow rate for 106-micron particles.
E. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range

Notes

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REV	BY	DATE	DESCRIPTION
	RC	12/5/2014	FIRST ISSUE

REVISION HISTORY

Date	Scale
10/24/2017	1/4" = 1'0"

Drawn	Checked	Approved
RC		

FIRST DEFENSE ®
MODEL 4-HC ONLINE

First Defense 1

PROJECT NAME:

Millbrook HS MS4

PROJECT LOCATION:

Frederick County, VA

Hydro International ®

Stormwater Solutions
94 Hutchins Drive
Portland, Maine 04102
Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

CAD Ref: WEB SC FD-4HC

Project No. xx-xxxx

Drawing No. Rev. A

NOAA Atlas 14, Volume 2, Version 3
Location name: Winchester, Virginia, USA*
Latitude: 39.1913°, Longitude: -78.1137°
Elevation: 657.96 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.328 (0.293-0.367)	0.391 (0.349-0.438)	0.475 (0.424-0.531)	0.541 (0.481-0.604)	0.628 (0.555-0.698)	0.700 (0.616-0.776)	0.772 (0.676-0.854)	0.851 (0.740-0.940)	0.960 (0.827-1.06)	1.05 (0.894-1.16)
10-min	0.511 (0.456-0.572)	0.612 (0.547-0.686)	0.740 (0.660-0.828)	0.838 (0.745-0.935)	0.966 (0.854-1.07)	1.07 (0.939-1.18)	1.17 (1.02-1.29)	1.28 (1.11-1.41)	1.43 (1.23-1.57)	1.54 (1.31-1.70)
15-min	0.628 (0.561-0.704)	0.751 (0.671-0.842)	0.912 (0.814-1.02)	1.03 (0.920-1.15)	1.20 (1.06-1.33)	1.32 (1.17-1.47)	1.46 (1.27-1.61)	1.59 (1.38-1.76)	1.78 (1.53-1.96)	1.93 (1.64-2.13)
30-min	0.834 (0.745-0.935)	1.01 (0.902-1.13)	1.25 (1.12-1.40)	1.44 (1.28-1.61)	1.70 (1.50-1.89)	1.90 (1.68-2.11)	2.12 (1.85-2.34)	2.34 (2.04-2.58)	2.66 (2.29-2.93)	2.92 (2.48-3.21)
60-min	1.02 (0.912-1.14)	1.24 (1.11-1.39)	1.58 (1.41-1.77)	1.84 (1.64-2.05)	2.21 (1.96-2.46)	2.52 (2.22-2.79)	2.84 (2.48-3.14)	3.19 (2.77-3.52)	3.69 (3.18-4.07)	4.11 (3.50-4.53)
2-hr	1.21 (1.09-1.36)	1.47 (1.32-1.65)	1.88 (1.68-2.11)	2.21 (1.97-2.47)	2.70 (2.39-3.00)	3.10 (2.73-3.44)	3.54 (3.09-3.91)	4.01 (3.48-4.43)	4.72 (4.05-5.19)	5.30 (4.52-5.83)
3-hr	1.31 (1.18-1.47)	1.59 (1.42-1.78)	2.01 (1.80-2.25)	2.36 (2.10-2.64)	2.87 (2.54-3.19)	3.30 (2.91-3.66)	3.77 (3.30-4.16)	4.28 (3.72-4.72)	5.05 (4.33-5.55)	5.70 (4.84-6.26)
6-hr	1.64 (1.48-1.83)	1.97 (1.78-2.20)	2.47 (2.22-2.76)	2.89 (2.59-3.21)	3.50 (3.11-3.88)	4.02 (3.56-4.43)	4.58 (4.02-5.04)	5.20 (4.53-5.71)	6.12 (5.27-6.71)	6.90 (5.88-7.55)
12-hr	2.01 (1.81-2.24)	2.41 (2.18-2.69)	3.01 (2.72-3.35)	3.52 (3.16-3.90)	4.28 (3.81-4.72)	4.93 (4.36-5.41)	5.65 (4.95-6.19)	6.45 (5.60-7.04)	7.66 (6.56-8.34)	8.69 (7.35-9.45)
24-hr	2.38 (2.21-2.57)	2.86 (2.66-3.10)	3.57 (3.31-3.85)	4.15 (3.84-4.48)	5.01 (4.61-5.39)	5.73 (5.24-6.15)	6.51 (5.91-6.98)	7.34 (6.62-7.87)	8.57 (7.63-9.18)	9.58 (8.44-10.3)
2-day	2.75 (2.56-2.97)	3.30 (3.07-3.57)	4.11 (3.81-4.44)	4.79 (4.43-5.17)	5.78 (5.31-6.22)	6.62 (6.04-7.11)	7.52 (6.82-8.08)	8.50 (7.64-9.13)	9.94 (8.82-10.7)	11.1 (9.78-12.0)
3-day	2.93 (2.73-3.17)	3.52 (3.28-3.80)	4.38 (4.07-4.72)	5.09 (4.72-5.48)	6.12 (5.65-6.59)	6.99 (6.40-7.51)	7.91 (7.21-8.50)	8.91 (8.05-9.58)	10.4 (9.24-11.2)	11.6 (10.2-12.5)
4-day	3.12 (2.91-3.36)	3.74 (3.49-4.03)	4.64 (4.33-5.00)	5.39 (5.01-5.80)	6.46 (5.98-6.95)	7.35 (6.77-7.91)	8.31 (7.60-8.93)	9.33 (8.47-10.0)	10.8 (9.66-11.6)	12.0 (10.6-13.0)
7-day	3.63 (3.39-3.89)	4.34 (4.05-4.65)	5.32 (4.96-5.71)	6.11 (5.69-6.55)	7.21 (6.69-7.74)	8.11 (7.48-8.69)	9.03 (8.30-9.70)	10.0 (9.13-10.8)	11.3 (10.3-12.2)	12.4 (11.2-13.4)
10-day	4.14 (3.88-4.43)	4.93 (4.63-5.28)	5.96 (5.58-6.38)	6.79 (6.34-7.25)	7.92 (7.38-8.46)	8.82 (8.18-9.43)	9.75 (9.00-10.4)	10.7 (9.83-11.5)	12.0 (10.9-12.9)	13.0 (11.8-14.0)
20-day	5.60 (5.29-5.93)	6.61 (6.25-7.01)	7.77 (7.35-8.23)	8.67 (8.18-9.18)	9.85 (9.27-10.4)	10.8 (10.1-11.4)	11.6 (10.9-12.4)	12.5 (11.7-13.3)	13.6 (12.7-14.5)	14.5 (13.4-15.4)
30-day	6.88 (6.54-7.24)	8.08 (7.68-8.52)	9.33 (8.87-9.84)	10.3 (9.77-10.8)	11.5 (10.9-12.2)	12.5 (11.8-13.1)	13.4 (12.6-14.1)	14.2 (13.4-15.0)	15.3 (14.3-16.2)	16.1 (15.0-17.1)
45-day	8.61 (8.21-9.03)	10.1 (9.62-10.6)	11.5 (11.0-12.1)	12.5 (11.9-13.2)	13.8 (13.2-14.5)	14.8 (14.0-15.5)	15.6 (14.8-16.4)	16.4 (15.6-17.3)	17.4 (16.4-18.3)	18.1 (17.0-19.0)
60-day	10.3 (9.86-10.8)	12.0 (11.5-12.6)	13.6 (13.0-14.2)	14.7 (14.1-15.3)	16.0 (15.3-16.7)	17.0 (16.2-17.7)	17.8 (17.0-18.6)	18.6 (17.7-19.5)	19.5 (18.5-20.4)	20.1 (19.1-21.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

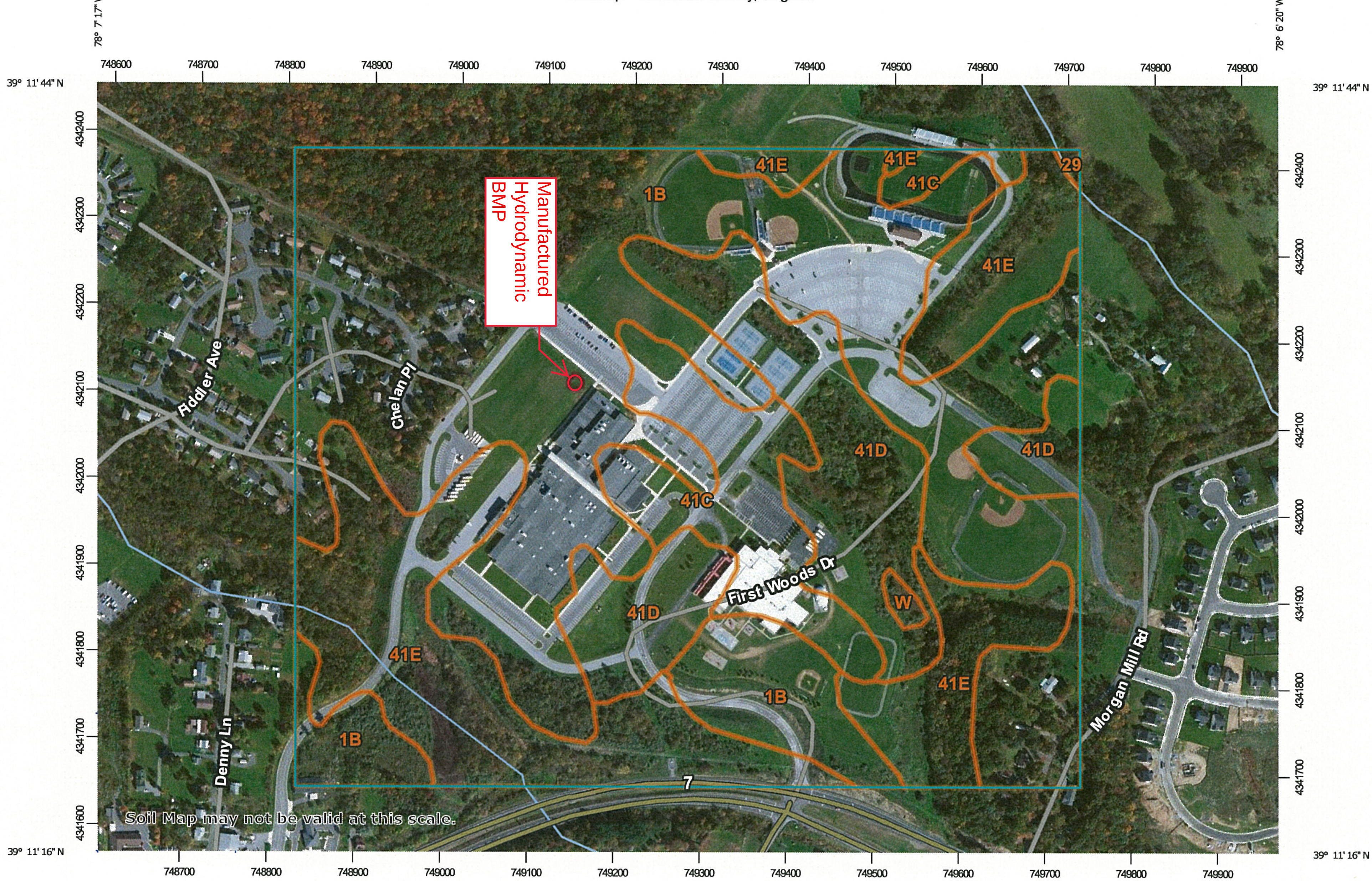
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.00	2.86	0.00	3.30	4.15	5.77	6.80	6.51
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Soil Map—Frederick County, Virginia



Map Scale: 1:6,240 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 300 600 1200 1800 Feet

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1B	Berks channery silt loam, 3 to 8 percent slopes	89.9	54.3%
29	Massanetta loam	0.2	0.1%
41C	Weikert-Berks channery silt loams, 8 to 15 percent slopes	13.4	8.1%
41D	Weikert-Berks channery silt loams, 15 to 25 percent slopes	23.4	14.1%
41E	Weikert-Berks channery silt loams, 25 to 65 percent slopes	38.3	23.1%
W	Water	0.5	0.3%
Totals for Area of Interest		**165.6**	**100.0%**

Frederick County, Virginia

1B—Berks channery silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2sgb5
Elevation: 320 to 3,570 feet
Mean annual precipitation: 37 to 50 inches
Mean annual air temperature: 47 to 56 degrees F
Frost-free period: 148 to 192 days
Farmland classification: Not prime farmland

Map Unit Composition

Berks and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Berks

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Upper third of mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Residuum weathered from shale and siltstone and/or fine grained sandstone

Typical profile

Ap - 0 to 7 inches: channery silt loam
Bw1 - 7 to 15 inches: channery silt loam
Bw2 - 15 to 28 inches: very channery silt loam
C - 28 to 36 inches: extremely channery silt loam
R - 36 to 46 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Dry Uplands (DU2)
Hydric soil rating: No

Minor Components

Brinkerton

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Frederick County, Virginia
Survey Area Data: Version 11, Sep 28, 2016

TR55 Tc Worksheet

Hyd. No. 1

First Defense

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.025		0.011		0.011		
Flow length (ft)	=	145.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.86		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**3.33**	**+**	**0.00**	**+**	**0.00**	**=**	**3.33**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.17		0.00		0.00		
Wetted perimeter (ft)	=	2.00		0.00		0.00		
Channel slope (%)	=	3.33		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	3.43		0.00		0.00		
Flow length (ft)		({0})200.0		0.0		0.0		
Travel Time (min)	**=**	**0.97**	**+**	**0.00**	**+**	**0.00**	**=**	**0.97**

Total Travel Time, Tc .... 4.30 min

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.236	2	720	873	------	------	------	First Defense

Hydrograph Report

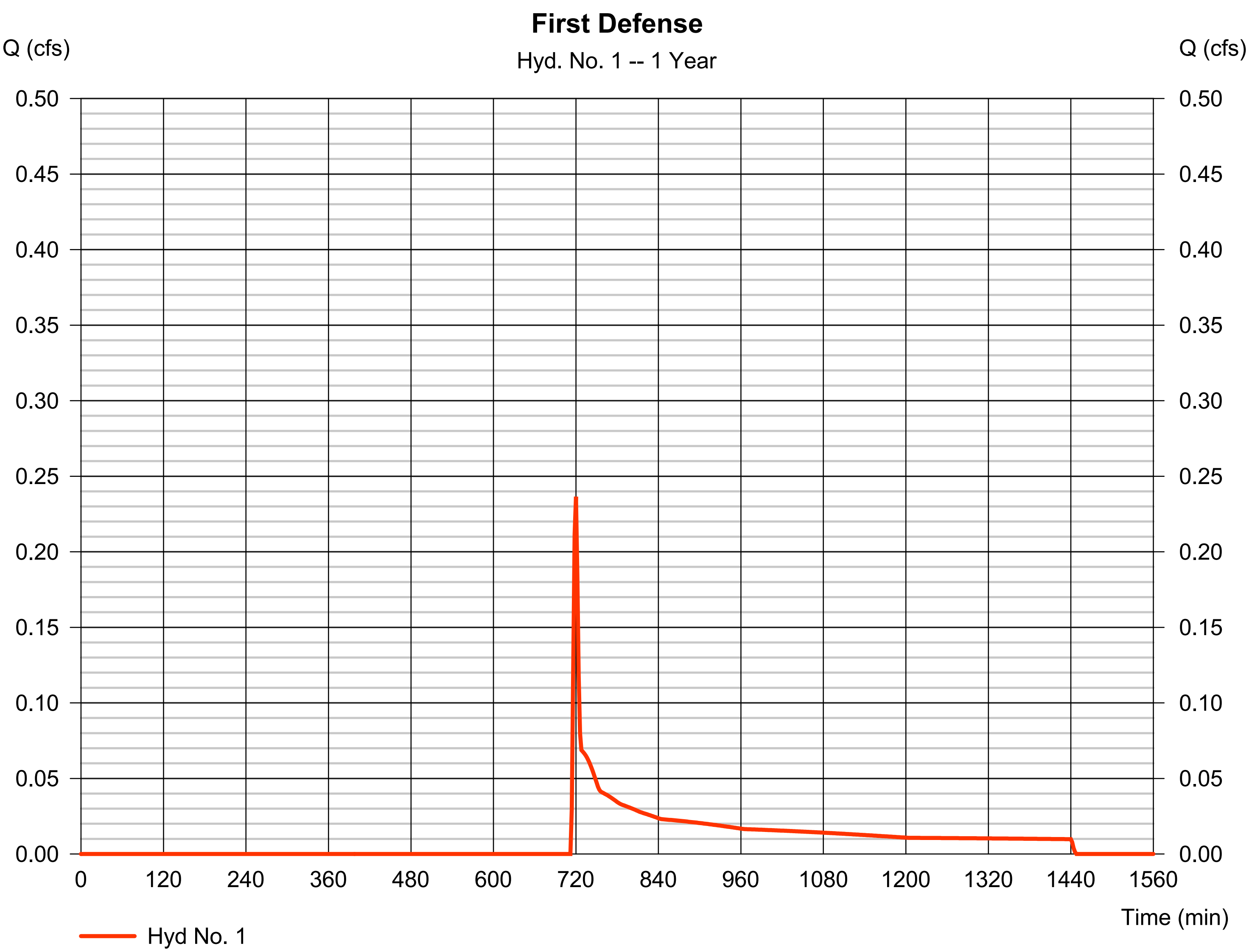
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11 Wednesday, 01 / 24 / 2018

Hyd. No. 1

First Defense

Hydrograph type	= SCS Runoff	Peak discharge	= 0.236 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 873 cuft
Drainage area	= 3.080 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.30 min
Total precip.	= 1.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.550 x 98) + (1.530 x 61)] / 3.080



RATIONAL METHOD

PROJECT NAME: Millbrook HS / Redbud ES MS4
SUB-AREA: 24

COVER	AREA (Ac)	C	CA
Woods	0.00	0.20	0.00
Field Grass	0.00	0.25	0.00
New Lawns & Slopes	1.53	0.30	0.46
Gravel or Future Development	0.00	0.65	0.00
Impervious	1.55	0.90	1.40
TOTALS	**3.08**		**1.85**

WEIGHTED "C" VALUE **0.60**

TIME OF CONCENTRATION:

OVERLAND FLOW:	
Length of Travel (ft):	145
"C" Value	0.30
Slope:	2.00%
TIME (min)	**15.80**

(From Seelye Chart)

CHANNEL FLOW:	
Length of Travel (ft):	200
Height (ft):	6.7
TIME (min)	**1.71**

(From Kirpich Eq'n)

TIME OF CONCENTRATION (min) **17.51**
(Minimum Tc = 5.0 minutes)

RAINFALL INTENSITY:

STORM FREQUENCY	I (in/hr)
2 Year	2.80
10 Year	3.81
100 Year	5.01

RUNOFF CALCULATIONS:

STORM FREQUENCY	CA	I (in/hr)	Q (cfs)
2 Year	1.85	2.80	**5.19**
10 year	1.85	3.81	**7.06**
100 Year	1.85	5.01	**11.62**

TMDL ACTION PLAN - MILLBROOK/REDBUD MS4

PROJECT DESCRIPTION: Millbrook/Redbud TMDL

DATE: 10/27/2017

Commission Number: 2017-013

OWPR ARCHITECTS AND ENGINEERS

Item	Quantit	Unit	Cost/Unit	Item Cost	Comment
CONSTRUCTION					
General Conditions / Mobilization	1	LS	$5,000.00	$5,000.00	
Erosion Control	1	LS	$1,500.00	$1,500.00	*Silt fence*
Excavation	150	CY	$20.00	$3,000.00	
Demo 18" SD	20	LF	$30.00	$600.00	
First Defense BMP	1	EA	$10,000.00	$10,000.00	
Connect to 18" SD	16	LF	$50.00	$800.00	
Backfill / Compaction	150	CY	$20.00	$3,000.00	
Restoration / Seeding	2500	SF	$1.00	$2,500.00	
Subtotal 1				$26,400.00	
Contingency	25%			$6,600.00	
Subtotal 2				$33,000.00	

Design / Const Admin	25%			$8,250.00	

ESTIMATED PROJECT TOTAL	**$41,250**

Modify TMDL Action Plan and obtain DEQ approval	$4,000.00	*This work to be performed under the P.O. for MS4 updates.*

Frederick County
Public Schools
... to ensure all students an excellent education

FREDERICK COUNTY PUBLIC SCHOOLS

CHESAPEAKE BAY
TMDL ACTION PLAN

For

Millbrook High School /
Redbud Elementary School Campus

<u>Prepared For</u>
Frederick County Public Schools
1415 Amherst Street
Winchester, VA 22604
540-662-3888

<u>Prepared By</u>
OWPR, Inc.
200 Country Club Drive
Plaza 1, Building E
Blacksburg, VA 24060
540-552-2151

July 1, 2015
(Revised December 10, 2015)

Table of Contents

PLAN PURPOSE AND OBJECTIVE

The Millbrook High School / Redbud Run Elementary School campus has been designated as a small Municipal Storm Sewer System (MS4), and is located in the Potomac River Basin portion of the Chesapeake Bay watershed. As such it is included in the overall Chesapeake Bay TMDL, and in accordance with the General VPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems, it is required to develop a Chesapeake Bay TMDL Action Plan in order to meet the requirements of the overall TMDL. The Action Plan is required to provide a review of the current MS4 program, which demonstrates its ability to ensure compliance with the Special Condition, and include the means and methods the permittee will use to meet the 5.0% of the Level 2 (L2) scoping run reduction for existing development by the end of the first permit cycle. This TMDL Action Plan has been prepared in accordance with the requirements of Guidance Memo No. 15-2005 "Chesapeake Bay TMDL Special Condition Guidance" as amended and dated 05/18/2015. The ten elements required as noted in GM15-2005 are as follows:

1. Current program and existing legal authority.
2. New or modified legal authority.
3. Means and methods to address discharges from new sources.
4. Estimated existing source loads and calculated total pollutant of concern (POC) required reductions.
5. Means and methods to meet the required reductions and schedule.
6. Means and methods to offset increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014.
7. Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014.
8. A list of future projects, and associated acreage that qualify as grandfathered.
9. An estimate of the expected cost to implement the necessary reductions.
10. Public comments on draft Action Plan.

Since the Millbrook HS / Redbud ES campus is a small MS4 which is currently developed in its existing condition, some of the elements which would apply to a municipal type MS4 will not apply. Each element is still included and discussed in the Action Plan to verify whether or not it is applicable.

1.0 Current Program and Existing Authority

General Permit Section I.C.2.a.(1)
A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan. FCPS also has the legal authority as owner of the property to make changes to the site amenities, existing stormwater structures, and create new stormwater BMP's. FCPS owns and maintains all of the existing stormwater BMP's and will maintain ownership and maintenance responsibility of any proposed stormwater BMP's required by this Action Plan to ensure compliance with this special condition.

2.0 New or Modified Legal Authority

General Permit Section I.C.2.a.(2)
The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan as well as any additional requirements included in this Action Plan. No new or modified legal authorities are required.

3.0 Means and Methods to Address Discharges from New Sources

General Permit Section I.C.2.a.(3)
The means and methods that will be utilized to address discharges into the MS4 from new sources.

The Millbrook High School / Redbud Run Elementary School Campus is a completely developed campus with all facilities required for an elementary and high school. When the campus was developed, stormwater management BMP's were installed to control the quantity of stormwater runoff. These BMP's are regularly maintained and inspected to ensure their continued effectiveness. There are no regular, current, or planned development activities which would require additional stormwater management BMP's. In the unusual event that a development activity does occur in the future, the Frederick County Stormwater Ordinance as implemented by the Frederick County Public Works Department would govern the project. The Frederick County Public Works Department has a Stormwater Ordinance which follows the requirements of the VSMP regulations. Frederick County Public Schools has committed to require designers working on campus projects to meet the requirements of the Frederick County Stormwater Ordinance and has included the following statement in their standard contract with Architect/Engineering firms: "Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide stormwater management plans (SWM Plans) for the project. The SWM plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. SWM plans shall be designed to address both stormwater quality and stormwater quantity in accordance with applicable State and Local laws and regulations, and shall use current technologies and methods such as Low Impact Development (LID) as appropriate. The design firm shall be responsible for obtaining SWM plan approvals from all applicable State and Local agencies.

4.0 Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions

General Permit Section I.C.2.a.(4) and General Permit Section I.C.2.a.(5)
An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable [Table/Tables} in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream loading rate.

A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable [Table/Tables] in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.

Frederick County Public Schools has AutoCAD files of the existing conditions at the Millbrook HS / Redbud Run ES Campus property from which the existing impervious and pervious areas have been calculated. Additionally, recent aerial photographs, GIS information, and field observations were used to determine the areas which could be designated as “forested”. These areas were reviewed and appear to be in compliance with the criteria for “forested” areas set forth in Guidance Memo 15-2005. When the campus was developed, there were also several wetland areas mapped on campus. Most of these areas are within the “forested” areas, but there are also some which are outside the “forested” areas. Maps showing these designated areas are included at the end of this report.

The areas calculated from these maps are as follows:

Total MS4 Area =	128.41 acres
Forested Area =	32.25 acres
Wetland Area =	0.31 acres
Total Regulated Area =	95.85 acres

Regulated Impervious Area =	34.31 acres
Regulated Pervious Area =	61.54 acres
Total Regulated Area =	95.85 acres

Existing source loads were calculated using the above areas in Table 2b for the Potomac River Basin. Total POC reductions were calculated using the above areas in Table 3b for the Potomac River Basin. The total pollutant removal required for the first permit cycle was then tabulated as follows:

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	16.86	578.47
Regulated Urban Pervious		61.54	10.07	619.71
Regulated Urban Impervious	Phosphorus	34.31	1.62	55.58
Regulated Urban Pervious		61.54	0.41	25.23
Regulated Urban Impervious	Total Suspended Solids	34.31	1,171.32	40,187.99
Regulated Urban Pervious		61.54	175.80	10,818.73

Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	0.07587	2.60
Regulated Urban Pervious		61.54	0.03021	1.86
Regulated Urban Impervious	Phosphorus	34.31	0.01296	0.44
Regulated Urban Pervious		61.54	0.00148625	0.09
Regulated Urban Impervious	Total Suspended Solids	34.31	11.7132	401.88
Regulated Urban Pervious		61.54	0.769125	47.33

Total Pollutant Removal Required for First Permit Cycle

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)		Total Reduction Required First Permit Cycle (lbs/yr)
Total Regulated Area	Nitrogen	95.85		4.46
Total Regulated Area	Phosphorus	95.85		0.54
Total Regulated Area	Total Suspended Solids	95.85		449.21

5.0 Means and Methods to Meet the Required Reductions and Schedule

General Permit Section I.C.2.a.(6)
The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.

Frederick County Public Schools proposes to convert one of the existing dry detention ponds on campus into an extended detention pond. The detention pond is located between the Millbrook High School service drive and bus fueling area. It serves approximately half of the roof area of Millbrook High School building, most of the bus parking area, the bus fueling area, and the service area. There are approximately 2.69 acres of offsite area which also drain to the detention pond. For calculation purposes, only the onsite regulated areas were included in the pollutant removal calculations. A map of the drainage area to the detention pond is included at the end of this report.

The areas calculated are as follows:

Regulated Impervious Area =	7.43 acres
Regulated Pervious Area =	7.06 acres
Total Regulated Area =	14.49 acres

The removal rates were determined from *Table V.C.1 – Chesapeake Bay Program BMP's, Established Efficiencies*. The dry detention pond has existing efficiencies of 5% / 10% / 10% for TN / TP / TSS respectively. These removal rates are subtracted from the efficiencies for the proposed dry extended detention pond (20% / 20% / 60%) to determine the additional pollutant removal which will occur by upgrading the dry pond to extended detention. The resultant efficiencies used in the calculations are (15% / 10% / 50% for TN / TP / TSS).

The resulting pollutant removal is well above the required quantities. Pollutant removal above and beyond the amount required for this permit cycle will be credited toward the requirements of next permit cycle.

Construction of the BMP improvements is proposed to begin as soon as possible, but no later than the summer of 2018.

BMP Options - Convert Dry Pond "C" to Extended Detention Pond

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	7.43	16.86	125.27
Regulated Urban Pervious		7.06	10.07	71.09
Regulated Urban Impervious	Phosphorus	7.43	1.62	12.04
Regulated Urban Pervious		7.06	0.41	2.89
Regulated Urban Impervious	Total Suspended Solids	7.43	1,171.32	8,702.91
Regulated Urban Pervious		7.06	175.80	1,241.15

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	14.49	15%	29.45
Total Regulated Area	Phosphorus	14.49	10%	1.49
Total Regulated Area	Total Suspended Solids	14.49	50%	4,972.03

6.0 Means and Methods to Offset Increased Loads From New Sources Initiating Construction Between July 1, 2009 and June 30, 2014

General Permit Section I.C.2.a.(7)
The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize the [applicable table] in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

Frederick County Public Schools did not have any projects over one acre which began construction between July 1, 2009 and June 30, 2014 within the regulated MS4 boundary. Frederick County Public Schools performed a small addition project at Redbud Run Elementary School in 2013; however this project was less than 1 acre in size and did not require VSMP permitting. The additional impervious area created by this addition has been included in the overall impervious area calculated under section 4, and therefore the pollutants of concern are being reduced appropriately.

7.0 Means and Methods to Offset Increased Loads From Grandfathered Projects That Begin Construction After July 1, 2014

General Permit Section I.C.2.a.(8)
The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.

Frederick County Public Schools does not have any grandfathered projects over one acre which began construction after July 1, 2014 within the regulated MS4 boundary.

8.0 A List of Future Projects, and Associated Acreage That Qualify as Grandfathered

General Permit Section I.C.2.a.(10)
A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48.

Frederick County Public Schools does not have any grandfathered projects within the regulated MS4 boundary.

9.0 An Estimate of the Expected Cost to Implement the Necessary Reductions

General Permit Section I.C.2.a.(11)
An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle.

In order to convert the existing dry detention pond to a dry extended detention pond, the following items will need to be added to the existing pond:

- Pre-treatment forebays at pond inlets
- Micropool at the pond outlet structure
- Add a non-clogging low flow orifice at the outlet structure
- Add protective fencing

TMDL ACTION PLAN - MILLBROOK/REDBUD MS4

PROJECT DESCRIPTION:
Millbrook/Redbud TMDL
Commission Number:
1371

DATE:
7/6/2015

OWPR
ARCHITECTS AND ENGINEERS

Item	Quantit	Unit	Cost/Unit	Item Cost	Comment
			CONSTRUCTION		
Mobilization	1	LS	$1,500.00	$1,500.00	
Add new restrictor plate	1	EA	$500.00	$500.00	
Raise overflow top	1	EA	$2,500.00	$2,500.00	*With slot for 2/10 storms*
Add forebays	2	EA	$2,500.00	$5,000.00	*Rip rap special outlet protection*
Excavate micropool	1	EA	$2,500.00	$2,500.00	*With rip rap*
Fencing (4' high clf)	400	LF	$10.00	$4,000.00	*From guardrail to guardrail*
Subtotal				$16,000.00	

Design	25%			$4,000.00	
Construction Admin	25%			$4,000.00	
Contingency	25%			$4,000.00	

ESTIMATED PROJECT TOTAL	**$28,000**

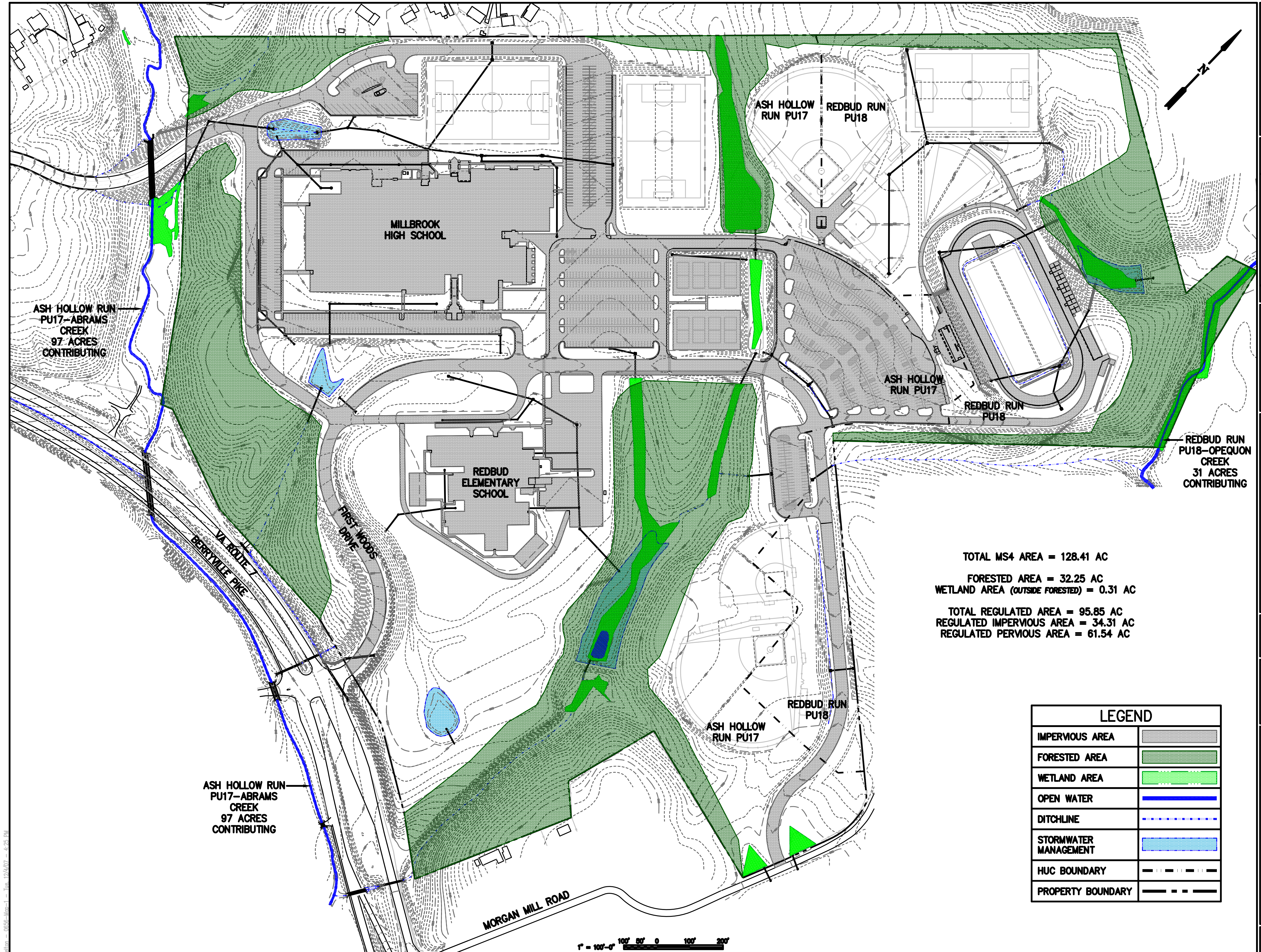
10.0 Public Comments on Draft Action Plan

General Permit Section I.C.2.a.(12)
General Permit Requirements: An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.
Phase 1 Permit Requirements: An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan; and, a list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

Frederick County Public Schools posted the draft TMDL Action Plan to its website in early July 2015 and sent an announcement via e-mail and on its Facebook page that it was available for public review and comment. The draft TMDL Action Plan will remain on the FCPS website until September 11, 2015 at which time all public comments will be compiled, reviewed, and any changes to the TMDL Action Plan made prior to the annual report due on October 1, 2015.

No comments were received during the public comment period, and therefore no resulting revisions were made to the draft TMDL Action Plan.

11.0 Appendix



No.	Description	Date
	Revisions	

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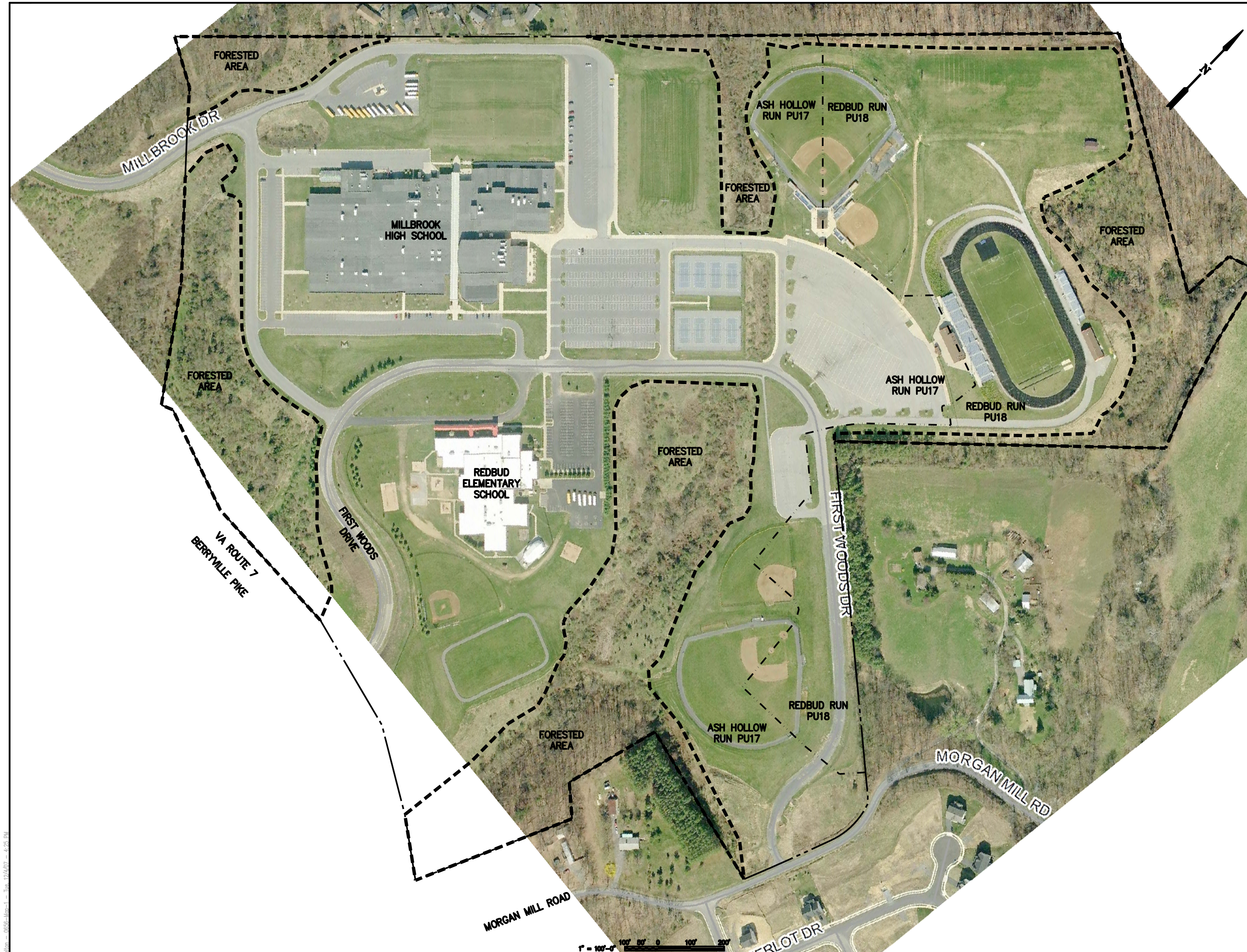
CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 1371
Date 01 JUL 15

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

TMDL AREA MAP

TMDL1



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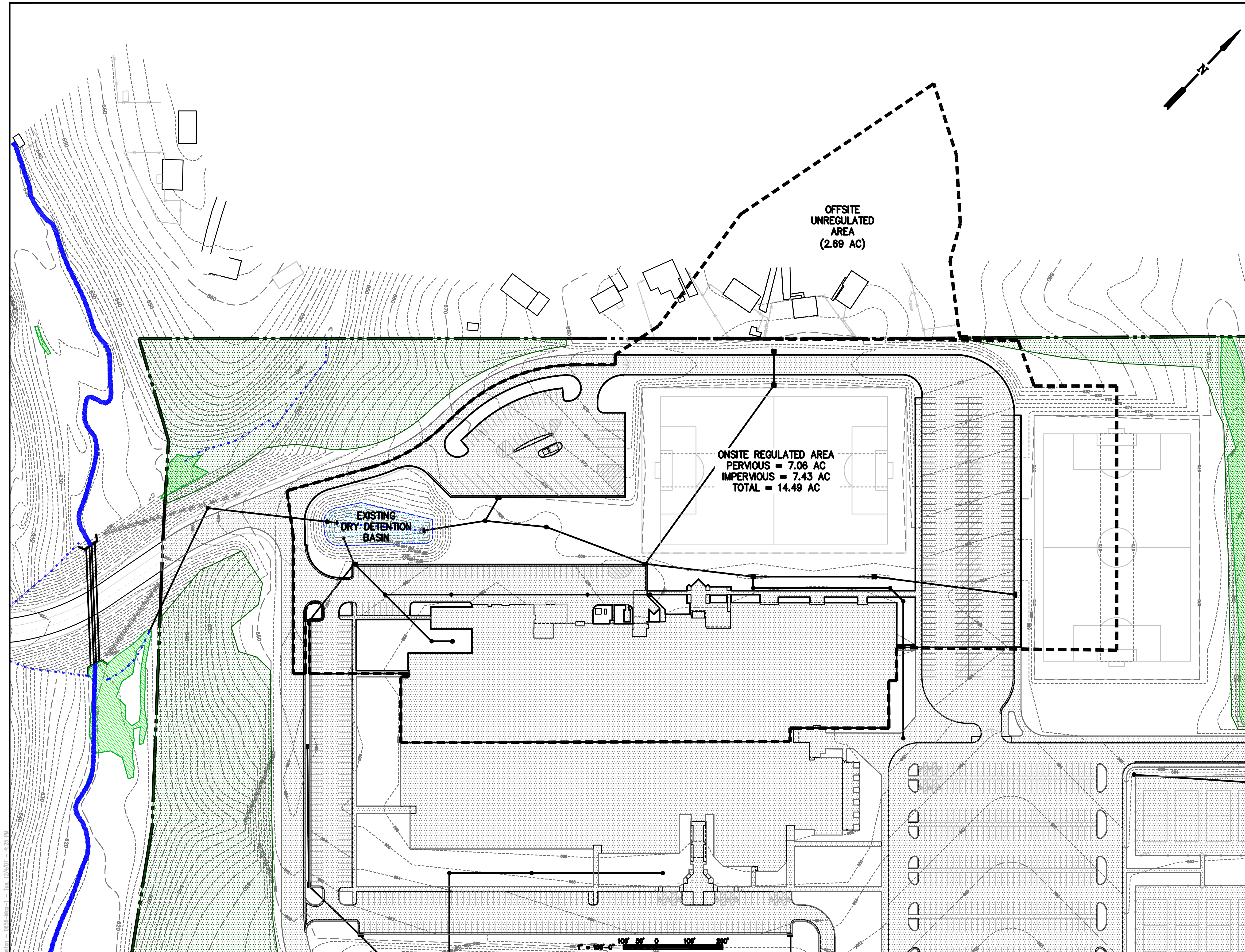
TMDL AERIAL MAP

TMDL2



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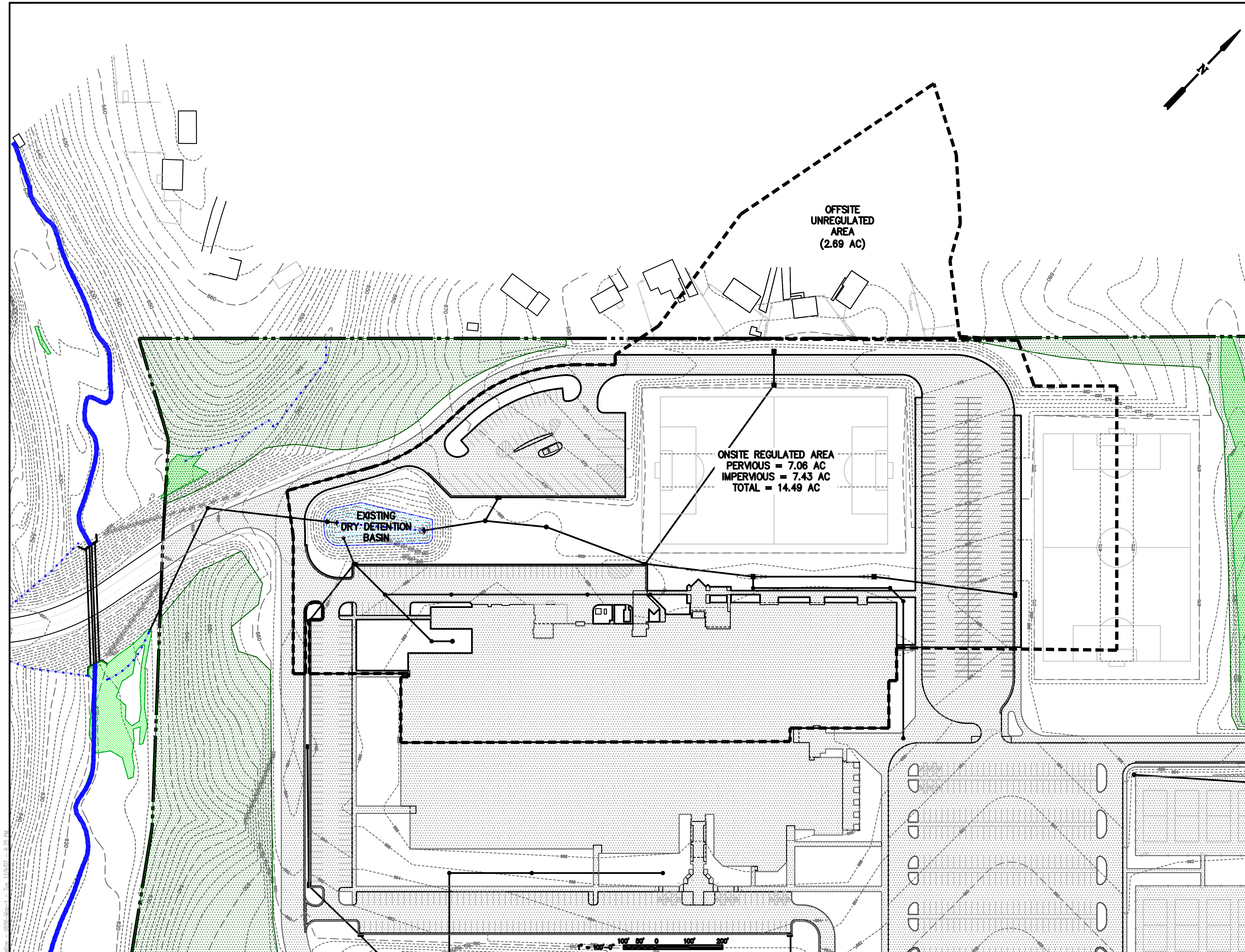
SWM BMP AREA MAP

TMDL3



Revisions

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SWM BMP AREA MAP

TMDL3

VIRGINIA DCR STORMWATER DESIGN SPECIFICATION No. 15

EXTENDED DETENTION (ED) POND

VERSION 2.0
January 1, 2013

SECTION 1: DESCRIPTION

An Extended Detention (ED) Pond relies on 24 to 36 hour detention of stormwater runoff after each rain event. An under-sized outlet structure restricts stormwater discharge so it backs up and is stored within the basin. The temporary ponding enables particulate pollutants to settle out and reduces the maximum peak discharge to the downstream channel, thereby reducing the effective shear stress on banks of the receiving stream. ED differs from stormwater detention as ED is designed to achieve a minimum drawdown time, rather than a maximum peak rate of flow. A design maximum peak rate of flow, or peak discharge, is commonly used to meet channel protection or flood control requirements and often only detains flows for a few minutes or hours. However, in some cases, detention designed for channel protection using the "energy balance" method described in the Virginia Stormwater Management Program (VSMP) regulations (4VAC50-60-66) may result in extended drawdown times. Therefore, designers are encouraged to evaluate the channel protection detention drawdown as compared to the ED requirements in order to optimize the design to meet both criteria.

ED ponds rely on gravitational settling as their primary pollutant removal mechanism. Consequently, they generally provide fair-to-good removal for particulate pollutants, but low or negligible removal for soluble pollutants, such as nitrate and soluble phosphorus. The use of ED alone generally results in the lowest overall pollutant removal rate of any single stormwater treatment option. Alternatively, an ED component is combined with wet ponds (Design Specification No 14) and constructed wetlands (Design Specification No 15) to help maximize pollutant removal rates of those practices.

Designers should note that an ED pond is typically the final element in the roof to stream pollutant removal sequence and provides limited volume reduction credit (Level 2 only), and **should therefore be considered *only* if there is remaining Treatment Volume or Channel Protection Volume to manage after all other upland runoff reduction practices have been considered and properly credited.**

SECTION 2: PERFORMANCE

Table 15.1. Summary of Stormwater Functions Provided by ED Ponds

Stormwater Function	Level 1 Design	Level 2 Design
Annual Runoff Volume Reduction (RR)	0%	15%
Total Phosphorus (TP) EMC Reduction[1] by BMP Treatment Process	15%	15%
Total Phosphorus (TP) Mass Load Removal	15%	31%
Total Nitrogen (TN) EMC Reduction[1] by BMP Treatment Process	10%	10%
Total Nitrogen (TN) Mass Load Removal	10%	24%
Channel Protection	Yes; storage volume can be provided to accommodate the full Channel Protection Volume (CP_V)	
Flood Mitigation	Yes; flood control storage can be provided above the maximum extended detention volume	
[1] Change in event mean concentration (EMC) through the practice. The actual nutrient mass load removed is the product of the removal rate and the runoff reduction rate (see Table 1 in the *Introduction to the New Virginia Stormwater Design Specifications*).		

Sources: CWP and CSN (2008); CWP (2007)

Leadership in Energy and Environmental Design (LEED®). The LEED® point credit system designed by the U.S. Green Building Council (USGBC) and implemented by the Green Building Certification Institute (GBCI) awards points related to site design and stormwater management. Several categories of points are potentially available for new development and redevelopment projects. **Chapter 6** of the 2013 *Virginia Stormwater Management Handbook* (2nd Edition) provides a more thorough discussion of the site planning process and design considerations as related to Environmental Site Design and potential LEED credits. However, VDCR is not affiliated with the USGBC or GBCI and any information on applicable points provided here is based only on basic compatibility. **Designers should research and verify scoring criteria and applicability of points as related to the specific project being considered through USGBC LEED resources.**

Table 15.2. Potential LEED® Credits for Extended Detention Ponds [1]

Credit Category	Credit No.	Credit Description
Sustainable Sites	SS6.1	Stormwater Design: Quantity Control

[1] Actual site design and/or BMP configuration may not qualify for the credits listed. Alternatively, the project may actually qualify for credits not listed here. Designers should consult with a qualified individual (LEED AP) to verify credit applicability.

SECTION 3: LEVEL 1 AND 2 DESIGN TABLE

As the last practice in the treatment train, ED Ponds can serve the dual function of providing the final runoff volume and pollutant load reduction needed on the development site, while also providing the detention storage required to meet the channel protection and flood control requirements. Designers may therefore choose to go with the baseline design (Level 1) or may choose to maximize the volume and pollutant load reduction by incorporating an enhanced design (Level 2). To qualify for the higher nutrient reduction rates associated with the Level 2 design, ED ponds must be designed with a Treatment Volume (*Tv*) equal to $1.25(R_v)(A)$, as well as other specific design elements. **Table 15.3** lists the criteria for the Level 1 and 2 designs. See **Section 6** for more detailed design guidelines.

Table 15.3. Extended Detention (ED) Pond Criteria

Level 1 Design (RR:0; TP:15; TN:10)	Level 2 Design (RR:15; TP:15; TN:10)
Tv = [(1.0) (Rv) (A)] / 12 – the volume reduced by an upstream BMP	Tv = [(1.25) (R_v) (A)] / 12 – the volume reduced by an upstream BMP
A minimum of 15% of the Tv in the permanent pool (forebay, micropool) **Section 6.5**	A minimum of 40% of Tv in the permanent pool (15% in forebays and micropool, and 25% in constructed wetlands) **Sections 6.2 and 6.5**
Length/Width ratio *OR* flow path = 2:1 or more; Length of the shortest flow path / overall length = 0.4 or more. **Section 6.3**	Length/Width ratio *OR* flow path = 3:1 or more; Length of the shortest flow path / overall length = 0.7 or more. **Section 6.3**
Average Tv ED time = 24 hours or less. **Section 6.2**	Average Tv ED time = 36 hours. **Section 6.2**
Vertical Tv ED fluctuation may exceed 4 feet. **Section 6.3**	Maximum vertical Tv ED limit of 4 feet. **Section 6.3**
Turf cover on floor **Section 6.7**	Trees, shrubs, and herbaceous plants in upper elevations, and emergent plants in wet features **Section 6.7**
Forebay and micropool **Section 6.5**	Incudes additional cells or features (deep pools, wetlands, etc.) **Sections 6.2 and 6.5**

SECTION 4: TYPICAL DETAILS

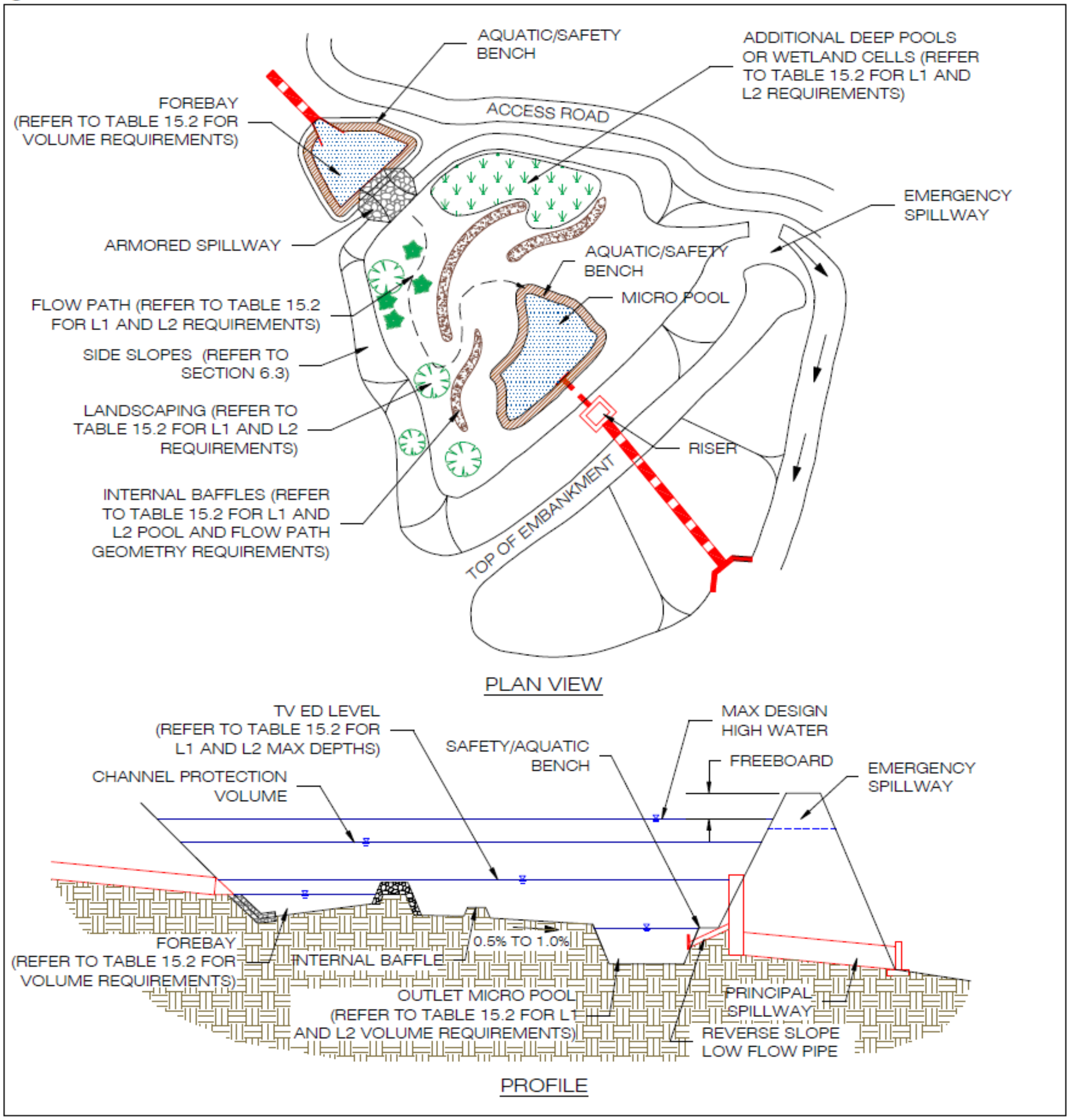

Figure 15.1. Typical Extended Detention Pond Plan and Profile

SECTION 5: PHYSICAL FEASIBILITY & DESIGN APPLICATIONS

The following feasibility criteria should be evaluated when ED ponds are considered as the final practice in a treatment train. Many of these items will be influenced by the type of ED Pond being considered (refer to Design Applications at the end of this section).

Space Required. A typical ED pond requires a footprint of 1% to 3% of its contributing drainage area, depending on the impervious cover, pond geometry, etc.

Contributing Drainage Area (CDA). A minimum contributing drainage area of 10 acres is recommended for ED ponds, in order to sustain a permanent micropool to protect against clogging. ED may still work with drainage areas less than 10 acres, but designers should be aware that these "pocket" ponds will typically (1) have very small orifices that will be prone to clogging, and (2) may generate more maintenance requirements.

Available Hydraulic Head. The depth of an ED pond is usually determined by the amount of hydraulic head available at the site. The bottom elevation is normally the invert of the existing downstream conveyance system to which the ED pond discharges. Typically, a minimum of 4 to 6 feet is needed for a water quality ED pond, and up to 10 feet of head (or more) may be needed for an ED pond to provide channel protection and flood control.

Minimum Setbacks. Local subdivision and zoning ordinances and design criteria should be consulted to determine minimum setbacks for impoundments to property lines, structures, and wells. Generally, ED ponds should be set back at least 10 feet from property lines, 25 feet from building foundations, 35 feet from septic system fields, and 50 feet from private wells.

Depth-to-Water Table and Bedrock. ED ponds are not allowed if the water table or bedrock will be within 2 feet of the floor of the pond. Refer to **Section 7** for design variations when encountering high water table, bedrock, or karst topography

Soils. The permeability of soils is seldom a design constraint for ED ponds. Infiltration through the bottom of the pond is encouraged unless it will impair the integrity of the embankment. Soil explorations should to be conducted at the proposed pond embankment to estimate infiltration rates and properly design the embankment cut-off trench.

An initial soil exploration should be conducted to rule out infiltration as a preferred practice and to rule out the presence of karst topography. The ED Basin should be the option of last resort if karst topography is present. Refer to **Section 7** for additional guidance when designing near karst topography. At a minimum, an impermeable clay or (preferably) geosynthetic liner in accordance with Stormwater Design Specification No. 13 (Constructed Wetlands) will be required.

Trout Streams. Pond practices have a tendency to raise the water temperature in receiving streams. Therefore, the use of ED ponds in watersheds containing trout streams is restricted to situations where upland runoff reduction practices cannot meet the full Channel Protection Volume requirement. In these instances, a an ED pond must (1) be designed with a maximum 12 hour detention time (to avoid excessive warming of runoff), (2) have a minimum outlet micro-pool volume sufficient to prevent clogging, (3) be planted with trees so it becomes fully shaded and (4) be located outside of any required stream buffers.

Perennial Streams. Locating ED ponds on perennial streams is typically not allowed and will require a Section 401 and Section 404 permit from the appropriate state or federal regulatory agency.

Design Applications

ED can be combined as a design element within other stormwater treatment practices (e.g., wet ponds, and constructed wetlands) to enhance their performance and appearance. Similarly, other design variations can be incorporated into the ED pond; e.g., bioretention, infiltration, sand filters, etc., located within the overall footprint but housed in a separate cell, where the maximum allowable CDA, among other design limitations as required by the criteria of that particular practice, can be addressed. In such cases, the designer should clearly document the design concept and "hybrid" performance credit (if applicable) for review by the plan approving authority (or the Virginia BMP Clearinghouse for broader application).

The traditional (and most common) design applications for ED include:

- Micropool ED
- Wet ED Pond (covered in Stormwater Design Specification No.14, Wet Ponds)
- Limited ED above Wetlands (covered Stormwater Design Specification No. 13, Constructed Wetlands)

Figure 15.1 above illustrates ED pond design variations. While ED ponds can provide for channel and flood protection, they will rarely provide adequate runoff volume reduction and pollutant removal to serve as a stand-alone water quality compliance strategy. Therefore, designers should always maximize the use of upland runoff reduction practices, (e.g., rooftop disconnections, small-scale infiltration, rainwater harvesting, bioretention, grass channels and dry swales) that reduce runoff at its source (rather than merely treating the runoff at the terminus of the storm drain system). Upland runoff reduction practices can be used to satisfy most or all of the runoff reduction requirements at most sites. However, an ED pond may still be needed to provide any remaining channel protection requirements. Upland runoff reduction practices will greatly reduce the size, footprint and cost of the downstream ED pond.

SECTION 6: DESIGN CRITERIA

6.1. Overall Sizing

The ED Pond is designed to hold the design *Tv* within the water volume below the normal pool elevation of any micropools, forebays and wetland areas (minimum of 15% for ED Level 1, and 40% for Level 2), as well as the temporary extended detention storage volume above the normal pool. To qualify for the higher nutrient reduction rates associated with the Level 2 design, the ED pond must be designed with a *Tv* that is 25% greater than the *Tv* for the Level 1 design [i.e., $1.25(R_v)(A)$], (additional Channel Protection Volume is not required).

Designers should use the BMP design treatment volume, Tv_{BMP} (defined as the treatment volume based on the contributing drainage area, Tv_{DA}, less any volume reduced by upstream runoff reduction practices) to size and design the wet features and extended detention volume. If additional detention storage is proposed for channel protection and/or flood control, designers should use the adjusted curve number reflective of the volume reduction provided by the upstream practices as well as the ED pond (Level 2) to calculate the developed condition energy balance detention requirements. (Refer to Chapter 11 of the Virginia Stormwater Handbook.

6.2. Treatment Volume Drawdown and Detention Design

Methods for calculating the required orifice size for achieving the target drawdown of the *Tv* for the Level 1 (24 hours) and Level 2 (36 hours) design can be found in the Engineering Calculations chapter of the current Virginia Stormwater Management Handbook. Similarly, the hydraulic design of the multi-stage riser to meet the channel protection and flooding protection design goals can also be found in the Virginia Stormwater Management Handbook.

Treatment Volume (water quality) Storage. The total *Tv* storage may be provided by a combination of the permanent pool (in the form of forebays, micropools, and wetland areas) and ED storage in accordance with the Level 1 and Level 2 design volume allocations. Refer to **Section 6.5** for forebays and micropools.

Constructed wetlands added to achieve a Level 2 design should be connected to the forebays or the micropool with a transition zone. Refer to **Design Specification No. 13: Wetlands** for criteria on the appropriate depth, side slopes, and other design features for the wetland pool component.

Vertical Extended Detention Limits. The maximum *Tv* ED water surface elevation may not extend more than 5 feet above the basin floor or normal pool elevation for a Level 1 design, or 4 feet for a Level 2 design. The maximum vertical elevation for ED and channel protection detention over shallow wetlands is 1 foot. The bounce effect is not as critical for larger flood control storms (e.g., the 10-year design storm), and these events can exceed the 5 foot vertical limit if they are managed by a multi-stage outlet structure.

6.3. Internal Design Geometry

Side Slopes. Side slopes leading to the ED pond should generally have a gradient no steeper than 4H:1V; or 3H:1V with safety bench. The mild slopes promote better establishment and growth of vegetation and provide for easier maintenance and a more natural appearance.

Long Flow Path. ED pond designs should have an irregular shape and a long flow path from inlet to outlet to increase water residence time, treatment pathways, and pond performance. In terms of flow path geometry, there are two design considerations: (1) the overall flow path through the pond, and (2) the length of the shortest flow path (Hirschman et al., 2009):

- he overall flow path can be represented as the length-to-width ratio *OR* the flow path ratio (refer to Figure 2 of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site for additional information). These ratios must be at least 2L:1W for Level 1 designs and 3L:1W for Level 2 designs. Internal berms, baffles, or topography can be used to extend flow paths and/or create multiple pond cells.
- The shortest flow path represents the distance from the closest inlet to the outlet (the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia

Stormwater BMP Clearinghouse web site). The ratio of the shortest flow to the overall length must be at least 0.4 for Level 1 designs and 0.7 for Level 2 designs. In some cases – due to site geometry, storm sewer infrastructure, or other factors – some inlets may not be able to meet these ratios. However, the drainage area served by these "closer" inlets should constitute no more than 20% of the total contributing drainage area.

Safety Features. Several design features of impounding structures are intended to provide elements of safety:

- **Safety Bench** is a minimum 10 foot wide bench with a minimal cross slope (2%) located immediately above the extended detention design high water; slopes below the safety bench should be no steeper than 3:1.
- **Aquatic Bench** is located on the perimeter of all wet features: forebays, micropools, wetland pools and graded from a depth of 0 to 18 inches (maximum). The width of the aquatic bench should be 4 to 6 feet for forebays and 6 to 10 feet for micropools. The width should increase accordingly for larger variations of these features.
- Safety benches and aquatic benches should be landscaped with vegetation that hinders or prevents access to the pool.
- The principal spillway opening must be designed and constructed to prevent access by small children.
- End walls above pipe outfalls greater than 48 inches in diameter must be fenced to prevent a safety hazard.
- An emergency spillway and associated freeboard must be provided in accordance with applicable local or state dam safety requirements. The emergency spillway must be located so that downstream structures will not be impacted by spillway discharges.

6.4. Required Geotechnical Testing

Soil explorations should be conducted within the footprint of the proposed embankment, in the vicinity of the proposed outlet, and in at least two locations within the proposed ED pond treatment area. Soil boring data is needed to (1) determine the physical characteristics of the excavated material to determine its adequacy as structural fill or other use, (2) determine the need and appropriate design depth of the embankment cut-off trench, (3) provide data for structural designs of the outlet works (e.g., bearing capacity and buoyancy), (4) determine the depth to groundwater and bedrock and (5) evaluate potential infiltration losses (and the potential need for a liner).

Additional guidance on geotechnical criteria for impoundment facilities can be found in **Appendix A: Earthen Embankments** of the Introduction to the New Virginia Stormwater Design Specifications, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Guidance on soil explorations in general can be found in **Appendix 8-A** of **Stormwater Design Specification No. 8 (Infiltration).**

6.5. Pretreatment Forebay and Micropool

Sediment forebays are considered to be an integral design feature to maintain the longevity of ED ponds. A forebay must be located at each major inlet to trap sediment and preserve the capacity of the main treatment cell.

Refer to **Appendix D: Sediment Forebays** of the Introduction to the New Virginia Stormwater Design Specifications, as posted on the Virginia Stormwater BMP Clearinghouse web site for design forebay design information, at the following web address:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Other forms of pre-treatment for sheet flow and concentrated flow for minor inflow points should be designed consistent with pretreatment criteria found in Design Spec No. 9: Bioretention.

6.6. Conveyance and Overflow

No Pilot Channels. Micropool ED ponds shall not have a low flow pilot channel, but instead must be constructed in a manner whereby flows are evenly distributed across the pond bottom, to promote the maximum infiltration possible.

Internal Slope. The maximum longitudinal slope through the pond should be approximately 0.5% to 1% to promote positive flow through the ED pond.

Principal Spillway. The principal spillway shall be designed with acceptable anti-flotation, anti-vortex, and trash rack devices. The spillway must generally be accessible from dry land. Refer to **Appendix B: Principal Spillways** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Non-Clogging Low Flow Orifice. ED Ponds with drainage areas of 10 acres or less, where small diameter outlet pipes are typical, are prone to chronic clogging by organic debris and sediment. Orifices less than 3 inches in diameter may require extra attention during design to minimize the potential for clogging. Designers should always look at upstream conditions to assess the potential for higher sediment and woody debris loads. The risk of clogging in outlet pipes with small orifices can be reduced by:

- Providing a micropool at the outlet structure. The depth of the micropool should be at least 4 feet deep, and be equipped with an aquatic bench for safety purposes. The aquatic bench should be 4 to 6 feet wide and range from a depth of 0 to 18 inches below the water surface. The volume of the outlet micropool should be equal to (or larger) than the largest forebay. The depth of the micropool should not draw down by more than 2 feet during a 30 day summer drought (for a water balance calculation method, see **Section 6.2** of Stormwater Design Specification No 13: Constructed Wetlands). The following represent design options intended to improve the performance of the outlet structure:

  - Use a reverse-sloped pipe that extends to a mid-depth of the permanent pool or micropool; or
  - Install a downturned elbow or half-round CMP over a riser orifice (circular, rectangular, V-notch, etc.) to pull water from below the micropool surface.
  -
- Providing an over-sized forebay to trap sediment, trash and debris before it reaches the ED pond's low-flow orifice.
- Installing a trash rack to screen the low-flow orifice.
- When a micropool is not feasible, perforated pipe(s) under a gravel blanket with an orifice control at the end in the riser structure can be used to control the outflow. Designers must verify the capacity of the perforated pipe and the orifice control, as well as the relative maintenance frequency, including visual indicators, for maintaining the design peak flows.

Emergency Spillway. ED ponds must be constructed with overflow capacity to pass the 100-year design storm event through either the Primary Spillway (with two feet of freeboard to the settled top of embankment) or a vegetated or armored Emergency Spillway (with at least one foot of freeboard to the settled top of embankment). **Appendix C: Emergency Spillways** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Adequate Outfall Protection. The design must specify an outfall that will be stable for the maximum (pipe-full) design discharge (the 10-year design storm event or the maximum flow when surcharged during the emergency spillway design event, whichever is greater). The channel immediately below the pond outfall must be modified to prevent erosion and conform to natural dimensions in the shortest possible distance. Outlet protection should be provided consistent with state or local guidance.

Inlet Protection. Inlet areas should be stabilized to ensure that non-erosive conditions exist during storm events up to the overbank flood event (i.e., the 10-year storm event). Inlet pipe inverts should generally be located at or slightly below the forebay pool elevation.

On-Line ED Ponds must be designed to detain the required *Tv* and either manage or be capable of safely passing larger storm events conveyed to the pond (e.g., 1-year channel protection detention, 10-year flood protection, and/or the 100-year design storm event). Adequate design freeboard between the maximum design water surface elevation and the top of the embankment must be provided in accordance with Design Specification **Appendix A: Earthen Embankments** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Dam Safety Permits. ED ponds with high embankments or large drainage areas and impoundments may be regulated under the Virginia Dam Safety Act (§ 10.1-606.1 et seq., Code of Virginia) and the Virginia Dam Safety Regulations (4 VAC 50-20 et seq.). Refer to **Design Specification Appendix A: Earthen Embankments** for additional information.

6.7. Landscaping and Planting Plan

A landscaping plan must be provided that indicates the methods used to establish and maintain vegetative coverage within the ED pond and its buffer. Minimum elements of a plan include the following:

- Delineation of pondscaping zones within both the pond and buffer
- Selection of corresponding plant species
- The planting plan
- The sequence for preparing the wetland bed, if one is incorporated with the ED pond (including soil amendments, if needed)
- Sources of native plant material
- The landscaping plan should provide elements that promote diverse wildlife and waterfowl use within the stormwater wetland and buffers.
- The planting plan should allow the pond to mature into a native forest in the right places, but yet keep mowable turf along the embankment and all access areas. The wooded wetland concept proposed by Cappiella *et al*., (2005) may be a good option for many ED ponds.
- Woody vegetation may not be planted or allowed to grow within 15 feet of the toe of the embankment nor within 25 feet from the principal spillway structure.
- A vegetated buffer of native plants that requires minimal maintenance should be provided that extends at least 25 feet outward from the maximum water surface elevation of the ED pond. Permanent structures (e.g., buildings) should not be constructed within the buffer area. Existing trees should be preserved in the buffer area during construction.
- The soils in the stormwater buffer area are often severely compacted during the construction process. The density of these compacted soils can be so great that it effectively prevents root penetration and, therefore, may lead to premature mortality or loss of vigor. As a rule of thumb, planting holes should be three times deeper and wider than the diameter of the rootball for ball-and-burlap stock, and five times deeper and wider for container-grown stock.
- Avoid species that require full shade, or are prone to wind damage. Extra mulching around the base of trees and shrubs is strongly recommended as a means of conserving moisture and suppressing weeds.

For more guidance on planting trees and shrubs in ED pond buffers, consult Cappiella et al (2006) and **Appendix E: Landscaping** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site:.

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

6.8. Maintenance Features

Good maintenance access is needed so crews can remove sediments from the forebay, alleviate clogging and make riser repairs. The following ED pond maintenance items can be addressed during design, in order to make on-going maintenance easier:

- Adequate maintenance access must extend to the forebay, micropool, any safety benches, riser, and outlet structure and must have sufficient area to allow vehicles to turn around.

- The riser should be located within the embankment for maintenance access, safety and aesthetics. Access to the riser should be provided by lockable manhole covers and manhole steps within easy reach of valves and other controls.
- Access roads must (1) be constructed of materials that can withstand the expected frequency of use, (2) have a minimum width of 12 feet, and (3) have a profile grade that does not exceed 15%. Steeper grades are allowable if appropriate stabilization techniques are used, such as gravel or other material.
- A maintenance right-of- way or easement must extend to the ED pond from a public or private road.
- The designer should check to see whether sediments can be spoiled (deposited) on-site or must be hauled away.

6.9. ED Pond Material Specifications

ED ponds are generally constructed with materials obtained on-site, except for the plant materials, inflow and outflow devices (e.g., piping and riser materials), possibly stone for inlet and outlet stabilization, and filter fabric for lining banks or berms.

The basic material specifications for **Earthen Embankments**, **Principal Spillways**, **Vegetated Emergency Spillways** and **Sediment Forebays** shall be as specified in **Appendices A through D** of the *Introduction to the New Virginia Stormwater Design Specifications*, as posted on the Virginia Stormwater BMP Clearinghouse web site, at the following URL:

http://www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

SECTION 7: REGIONAL & SPECIAL CASE DESIGN ADAPTATIONS

7.1. Karst Terrain

Karst regions are found in much of the Ridge and Valley province of the Virginia. The presence of karst complicates both land development in general and stormwater design in particular. Designers should always conduct geotechnical investigations in areas of karst terrain to assess this risk and rule out the presence of karst during the project planning stage. If these studies indicate that less than 3 feet of vertical separation exists between the bottom of the ED pond and the underlying soil-bedrock interface, ED ponds should not be used due to the risk of sinkhole formation and groundwater contamination, (see CSN Technical Bulletin No. 1, 2008, and Appendix 6-C of Chapter 6 of the Virginia Stormwater Management Handbook, 2010). If ED ponds are used, they must have an acceptable liner in accordance with the guidance provided in Section 7.1 of Stormwater Design Specification No. 13 (Constructed Wetlands).

7.2. Coastal Plain

The lack of sufficient hydraulic head and the presence of a high water table of many coastal plain sites significantly constrain the application of ED ponds. Excavating ponds below the water table creates what are known as dugout ponds where the water quality volume is displaced by groundwater, reducing the pond's mixing and treatment efficiency and creating nuisance conditions. In general, ***shallow constructed wetlands are a superior alternative to ED ponds in coastal plain settings***.

7.3. Steep Terrain

The use of ED ponds is highly constrained at development sites with steep terrain.

7.4. Cold Climate and Winter Performance

Winter conditions can cause freezing problems within inlets, flow splitters, and ED outlet pipes, due to ice formation. The following design adjustments are recommended for ED ponds installed in higher elevations and colder climates:

- Do not submerge inlet pipes.
- Provide a minimum 1% slope for inlet pipes to discourage standing water and potential ice formation in upstream pipes.
- Place all pipes below the frost line to prevent frost heave and pipe freezing.
- Locate low flow orifices in the micropool so they withdraw at least 6 inches below the typical ice layer.
- Place trash racks at a shallow angle to prevent ice formation.
- If winter road sanding is prevalent in the contributing drainage area, increase the forebay size to 25% of the total *Tv* to accommodate additional sediment loadings.

7.5. Linear Highway Sites

ED ponds are poorly suited to treat runoff within open channels located in the highway right of way, unless storage is available in a cloverleaf interchange or in an expanded right-of-way. Guidance for pond construction in these areas is provided in VDOT's annual stormwater management specifications, as reviewed and approved annually by DCR. Additional guidance can be found in Profile Sheet SR-5 in Schueler et al (2007).

SECTION 8: CONSTRUCTION

8.1. Construction Sequence

The following is a typical construction sequence to properly install a dry ED pond. The steps may be modified to reflect different dry ED pond designs, site conditions, and the size, complexity and configuration of the proposed facility.

Step 1: Use of ED pond as an E&S Control. An ED pond may serve as a sediment basin during project construction. If this is done, the volume should be based on the more stringent sizing rule (erosion and sediment control requirement vs. water quality treatment requirement). Installation of the permanent riser should be initiated during the construction phase, and design elevations should be set with final cleanout of the sediment basin and conversion to the post-construction

ED pond in mind. The bottom elevation of the ED pond should be lower than the bottom elevation of the temporary sediment basin.

The construction notes should clearly indicate that the facility will be dewatered, dredged and re-graded to design dimensions after the original site construction is complete. Appropriate procedures should be implemented to prevent discharge of turbid waters when the basin is being converted into an ED pond.

Step 2: Stabilize the Drainage Area. Final grading and construction of ED pond components should only be constructed after the contributing drainage area to the pond is stabilized.

Step 3: Assemble Construction Materials on-site, make sure they meet design specifications, and prepare any staging areas.

Step 5: Install E&S Controls prior to construction, including temporary de-watering devices and stormwater diversion practices. All areas surrounding the pond that are graded or denuded during construction must be planted with turf grass, native plantings, or other approved methods of soil stabilization.

Step 4: Clear and Strip the project area to the desired sub-grade.

Step 6: Excavate the Core Trench and Install the Spillway Pipe.

Step 7: Install the Riser or Outflow Structure and ensure the top invert of the overflow weir is constructed level at the design elevation.

Step 8: Construct the Embankment and any Internal Berms in 8 to 12-inch lifts, or as directed by geotechnical recommendations, and compact as required with appropriate equipment.

Step 9: Excavate/Grade until the appropriate elevation and desired contours are achieved for the bottom and side slopes of the ED pond.

Step 10: Construct the Emergency Spillway in cut or structurally stabilized soils.

Step 11: Install Outlet Protection, including emergency and primary outlet apron protection.

Step 12: Stabilize Exposed Soils with temporary seed mixtures appropriate for the pond buffer. All areas above the normal pool elevation should be permanently stabilized by hydroseeding or seeding over straw.

Step 13: Plant the Pond Buffer Area, following the pondscaping plan (see **Section 6.7**).

8.2. Construction Inspection

Multiple inspections are critical to ensure that stormwater ponds are properly constructed. Inspections are recommended during the following stages of construction:

- Pre-construction meeting
- Initial site preparation (including installation of E&S controls)
- Excavation/Grading (interim and final elevations)
- Installation of the embankment, the riser/primary spillway, and the outlet structure
- Implementation of the pondscaping plan and vegetative stabilization
- Final inspection (develop a punch list for facility acceptance)

A construction phase inspection checklist for ED Ponds can be accessed at the end of this specification.

In order to facilitate maintenance, the contractor should measure the actual constructed pond depth at three areas within the micropool or other water feature and mark and geo-reference them on an as-built drawing. This simple data set will enable maintenance inspectors to determine pond sediment deposition rates in order to schedule sediment cleanouts.

Upon final inspection and acceptance, the GPS coordinates for all ED Ponds should be logged for entry into the VSMP Authority's maintenance tracking database.

SECTION 9: MAINTENANCE

9.1. Maintenance Agreements

The Virginia Stormwater Management regulations (4 VAC 50-60) specify the circumstances under which a maintenance agreement must be executed between the owner and the VSMP authority, and sets forth inspection requirements, compliance procedures if maintenance is neglected, notification of the local program upon transfer of ownership, and right-of-entry for local program personnel.

- Restrictive covenants or other mechanism enforceable by the VSMP authority must be in place to help ensure that ED ponds are maintained, as well as to pass the knowledge along to any subsequent property owners.
- Access to ED ponds should be covered by a drainage easement to allow access by the VSMP authority to conduct inspections and perform maintenance when necessary.
- All ED ponds must include a long term maintenance agreements consistent with the provisions of the VSMP regulations, and must include the recommended maintenance tasks and a copy of an annual inspection checklist.
- The maintenance agreement should also include contact information for owners to get local or state assistance to solve common nuisance problems, such as mosquito control, geese, invasive plants, vegetative management and beaver removal.

9.2. Maintenance Inspections

Maintenance of ED ponds is driven by annual inspections that evaluate the condition and performance of the pond, including the following:

- Measure sediment accumulation levels in forebay.

- Monitor the growth of wetlands, trees and shrubs planted. Record the species and their approximate coverage, and note the presence of any invasive plant species.
- Inspect the condition of stormwater inlets to the pond for material damage, erosion or undercutting.
- Inspect the banks of upstream and downstream channels for evidence of sloughing, animal burrows, boggy areas, woody growth, or gully erosion that may undermine embankment integrity.
- Inspect pond outfall channel for erosion, undercutting, rip-rap displacement, woody growth, etc.
- Inspect condition of principal spillway and riser for evidence of spalling, joint failure, leakage, corrosion, etc.
- Inspect condition of all trash racks, reverse sloped pipes or flashboard risers for evidence of clogging, leakage, debris accumulation, etc.
- Inspect maintenance access to ensure it is free of woody vegetation, and check to see whether valves, manholes and locks can be opened and operated.
- Inspect internal and external side slopes of the pond for evidence of sparse vegetative cover, erosion, or slumping, and make needed repairs immediately.

Based on inspection results, specific maintenance tasks will be triggered. Example maintenance inspection checklists for ED Ponds can be accessed in Appendix C of Chapter 9 of the *Virginia Stormwater Management Handbook* (2010).

9.3. Common Ongoing Maintenance Tasks

ED ponds are prone to clogging at the ED low-flow orifice. This component of the pond's plumbing should be inspected at least twice a year. The constantly changing water levels in ED ponds make it difficult to mow or manage vegetative growth. The bottom of ED ponds often become soggy, and water-loving trees such as willows may take over. The maintenance plan should clearly outline how vegetation in the pond and its buffer will be managed or harvested in the future. Periodic mowing of the stormwater buffer is only required along maintenance rights-of-way and the embankment. The remaining buffer can be managed as a meadow (mowing only periodically to sustain healthy growth) or forest.

The maintenance plan should schedule a shoreline cleanup at least once a year to remove trash and floatables that tend to accumulate in the forebay, micropool, and on the bottom of ED ponds.

Frequent sediment removal from the forebay is essential to maintain the function and performance of an ED pond. For planning purposes maintenance plans should anticipate cleanouts every 5 to 7 years, or when inspections indicate that 50% of the forebay capacity has been filled. (Absent an upstream eroding channel or other source of sediment, the frequency of sediment removal should decrease as the drainage area stabilizes.) As noted above, the designer should also check to see whether removed sediments can be spoiled (deposited) on-site or must be hauled away. Sediments excavated from ED ponds are typically not considered toxic or hazardous, and can be safely disposed by either land application or land filling.

SECTION 10: COMMUNITY AND ENVIRONMENTAL CONCERNS

ED Ponds can generate the following community and environmental concerns that need to be addressed during design.

Aesthetics. ED ponds tend to accumulate sediment and trash, which residents are likely to perceive as unsightly and creating nuisance conditions. Fluctuating water levels in ED ponds also create a difficult landscaping environment. In general, designers should avoid designs that rely solely on *dry* ED ponds.

Existing Wetlands. ED ponds should never be constructed within existing *natural* wetlands, nor should they inundate or otherwise change the hydroperiod of existing wetlands.

Existing Forests. Designers can expect a great deal of neighborhood opposition if they do not make a concerted effort to save mature trees during pond design and construction. Designers should also be aware that even modest changes in inundation frequency can kill upstream trees (Wright *et al.,* 2007).

Stream Warming Risk. ED ponds have less risk of stream warming than other pond options, but they can warm streams if they are un-shaded or contain significant surface area in shallow pools. If an ED pond discharges to temperature-sensitive waters, it should be forested, contain the minimum pools to prevent clogging, and have a detention time of no longer than 24 hours. If a level 2 design with 36 hours is necessary, the additional detention time may be allowed if sufficient landscaping with an emphasis on shade is provided.

Safety Risk. ED ponds are generally considered to be safer than other pond options, since they have few deep pools. Maximum side-slopes and unfenced headwalls, however, can still create some safety risks. Gentle side slopes and safety benches graded near the water line of any water feature should be provided to avoid potentially dangerous drop-offs, especially where ED ponds are located near residential areas.

Mosquito Risk. The fluctuating water levels within ED ponds have potential to create conditions that lead to mosquito breeding. Mosquitoes tend to be more prevalent in irregularly flooded ponds than in ponds with a permanent pool (Santana *et al*., 1994). Designers can minimize the risk by combining ED with a wet pond or wetland.

Sample Construction Inspection Checklist for Extended Detention (ED) Ponds: The following checklist provides a basic outline of the anticipated items for the construction inspection of an ED pond. Inspectors should review the plans carefully, and adjust these items and the timing of inspection verification as needed to ensure the intent of the design and the inspection is met. Finally, users of this information may wish to incorporate these items into a VSMP Authority Construction Checklist format consistent with the format used for erosion and sediment control and BMP construction inspections.

Pre-Construction Meeting

☐ Pre-construction meeting with the contractor designated to install the ED pond has been conducted.

☐ Identify the tentative schedule for construction and verify the requirements and schedule for interim inspections and sign-off.

☐ Subsurface investigation and soils report supports the placement of an ED pond in the proposed location.

☐ Impervious cover has been constructed/installed and area is free of construction equipment, vehicles, material storage, etc.

☐ All pervious areas of the contributing drainage areas have been adequately stabilized with a thick layer of vegetation and erosion control measures have been removed.

☐ **Certification of Stabilization Inspection:** Inspector certifies that the drainage areas are adequately stabilized in order to convert the sediment pond or trap (if used for sediment control) into a permanent ED pond.

Construction of ED Pond Embankment and Principal Spillway

☐ Stormwater has been diverted around or through the area of the ED pond embankment to a stabilized conveyance; and perimeter erosion control measures to protect the facility during construction have been installed.

☐ Materials for construction of the embankment and principal spillway are available and meet the specifications of the approved plans.

☐ Construction of key trench, principal spillway, including the riser and barrel, anti-seepage controls, outlet protection, etc., is built in accordance with approved plans.

☐ Geotechnical analysis and approval of the core (if required) and embankment material has been provided, and the material has been placed in lifts and compacted in accordance with the approved plans.

☐ **Certification of Embankment and Principal Spillway Inspection:** Inspector certifies that each element of the embankment and principal spillway has been constructed in accordance with the approved plans.

Excavation of ED Pond

☐ Excavation of the ED pond geometry (including bottom shape and length:width ratio, side slopes, etc.) achieves the elevations in accordance with approved plans.

☐ Excavation of internal micro-topographic features: micro-pool outlet, forebays, etc., is in accordance with approved plans.

☐ Impermeable liner, when required, meets project specifications and is placed in accordance with manufacturers specifications.

☐ **Certification of Excavation Inspection:** Inspector certifies that the excavation has achieved all the appropriate grades, grade transitions, and ED pond geometry as shown on the approved plans.

Landscaping Plan and Stabilization

☐ Exposed soils on pond bottom, side slopes, and buffer areas are stabilized with specified seed mixtures, stabilization matting, mulch, etc., in accordance with approved plans.

☐ Appropriate number and spacing of plants are installed and protected on the aquatic bench and pond buffer in accordance with the approved plans.

☐ All erosion and sediment control practices have been removed.

☐ Follow-up inspection and as-built survey/certification has been scheduled.

☐ GPS coordinates have been documented for the ED pond installation.

SECTION 11: REFERENCES

Cappiella, K., T. Schueler and T. Wright. 2006. *Urban Watershed Forestry Manual: Part 2: Conserving and Planting Trees at Development Sites*. USDA Forest Service. Center for Watershed Protection. Ellicott City, MD.

Cappiella, K. et al . 2007. *Urban Watershed Forestry Manual: Part 3: Urban Tree Planting Guide*. USDA Forest Service. Center for Watershed Protection. Ellicott City, MD.

Cappiella, K., L. Fraley-McNeal, M. Novotney and T. Schueler. 2008. "The Next Generation of Stormwater Wetlands." *Wetlands and Watersheds Article No. 5*. Center for Watershed Protection. Ellicott City, MD.

Center for Watershed Protection. 2004. *Pond and Wetland Maintenance Guidebook*. Ellicott City, MD.

Hirschman, D., L. Woodworth and S. Drescher. 2009. *Technical Report: Stormwater BMPs in Virginia's James River Basin: An Assessment of Field Conditions & Programs*. Center for Watershed Protection. Ellicott City, MD.

Maryland Department of Environment (MDE). 2000. *Maryland Stormwater Design Manual*. Baltimore, MD. Available online at:
http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp

Schueler, T., D. Hirschman, M. Novotney and J. Zielinski. 2007. *Urban Stormwater Retrofit Practices*. Manual 3 in the Urban Subwatershed Restoration Manual Series. Center for Watershed Protection, Ellicott City, MD.

Virginia Department of Conservation and Recreation (DCR). 1999. *Virginia Stormwater Management Handbook. Volumes 1 and 2*. Division of Soil and Water Conservation. Richmond, VA.

A14 Chesapeake Bay TMDL Action Plan – Phase 2

FREDERICK COUNTY PUBLIC SCHOOLS

CHESAPEAKE BAY
TMDL ACTION PLAN
PHASE II

For

Millbrook High School /
Redbud Elementary School Campus

<u>Prepared For</u>
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PLAN PURPOSE AND OBJECTIVE

The Millbrook High School / Redbud Run Elementary School campus has been designated as a small Municipal Storm Sewer System (MS4), and is located in the Potomac River Basin portion of the Chesapeake Bay watershed. As such it is included in the overall Chesapeake Bay TMDL, and in accordance with the General VPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems, it is required to develop a Chesapeake Bay TMDL Action Plan in order to meet the requirements of the overall TMDL. The Action Plan is required to provide a review of the current MS4 program, which demonstrates its ability to ensure compliance with the Special Condition, and include the means and methods the permittee will use to meet the (Phase II) 35.0% of the Level 2 (L2) scoping run reduction for existing development by the end of the second permit cycle. This TMDL Action Plan has been prepared in accordance with the requirements of Guidance Memo No. 15-2005 "Chesapeake Bay TMDL Special Condition Guidance" as amended and dated 05/18/2015. The ten elements required as noted in GM15-2005 are as follows:

1. Current program and existing legal authority.
2. New or modified legal authority.
3. Means and methods to address discharges from new sources.
4. Estimated existing source loads and calculated total pollutant of concern (POC) required reductions.
5. Means and methods to meet the required reductions and schedule.
6. Means and methods to offset increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014.
7. Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014.
8. A list of future projects, and associated acreage that qualify as grandfathered.
9. An estimate of the expected cost to implement the necessary reductions.
10. Public comments on draft Action Plan.

Since the Millbrook HS / Redbud ES campus is a small MS4 which is currently developed in its existing condition, some of the elements which would apply to a municipal type MS4 will not apply. Each element is still included and discussed in the Action Plan to verify whether or not it is applicable.

1.0 Current Program and Existing Authority

General Permit Section I.C.2.a.(1)
A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan. FCPS also has the legal authority as owner of the property to make changes to the site amenities, existing stormwater structures, and create new stormwater BMP's. FCPS owns and maintains all of the existing stormwater BMP's and will maintain ownership and maintenance responsibility of any proposed stormwater BMP's required by this Action Plan to ensure compliance with this special condition.

2.0 New or Modified Legal Authority

General Permit Section I.C.2.a.(2)
The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition.

Frederick County Public Schools currently has an extensive MS4 program plan for the Millbrook HS / Redbud Run ES Campus including each of the six required BMP's. The entire property regulated by the MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all of the requirements of the program plan as well as any additional requirements included in this Action Plan. No new or modified legal authorities are required.

3.0 Means and Methods to Address Discharges from New Sources

General Permit Section I.C.2.a.(3)
The means and methods that will be utilized to address discharges into the MS4 from new sources.

The Millbrook High School / Redbud Run Elementary School Campus is a completely developed campus with all facilities required for an elementary and high school. When the campus was developed, stormwater management BMP's were installed to control the quantity of stormwater runoff. These BMP's are regularly maintained and inspected to ensure their continued effectiveness. There are no regular, current, or planned development activities which would require additional stormwater management BMP's. In the unusual event that a development activity does occur in the future, the Frederick County Stormwater Ordinance as implemented by the Frederick County Public Works Department would govern the project. The Frederick County Public Works Department has a Stormwater Ordinance which follows the requirements of the VSMP regulations. Frederick County Public Schools has committed to require designers working on campus projects to meet the requirements of the Frederick County Stormwater Ordinance and has included the following statement in their standard contract with Architect/Engineering firms: "Architectural and/or Engineering design firms working on behalf of FCPS on projects involving an area of land disturbance in excess of current State and Local "minimum land disturbance" areas shall be required to provide stormwater management plans (SWM Plans) for the project. The SWM plans shall include all required narratives and calculations and shall be sealed by a licensed Professional Engineer (PE) registered in the Commonwealth of Virginia. SWM plans shall be designed to address both stormwater quality and stormwater quantity in accordance with applicable State and Local laws and regulations, and shall use current technologies and methods such as Low Impact Development (LID) as appropriate. The design firm shall be responsible for obtaining SWM plan approvals from all applicable State and Local agencies.

4.0 Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions

General Permit Section I.C.2.a.(4) and General Permit Section I.C.2.a.(5)
An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable [Table/Tables} in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream loading rate.

A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable [Table/Tables] in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.

Frederick County Public Schools has AutoCAD files of the existing conditions at the Millbrook HS / Redbud Run ES Campus property from which the existing impervious and pervious areas have been calculated. Additionally, recent aerial photographs, GIS information, and field observations were used to determine the areas which could be designated as "forested". These areas were reviewed and appear to be in compliance with the criteria for "forested" areas set forth in Guidance Memo 15-2005. When the campus was developed, there were also several wetland areas mapped on campus. Most of these areas are within the "forested" areas, but there are also some which are outside the "forested" areas. Maps showing these designated areas are included at the end of this report.

The areas calculated from these maps are as follows:

Total MS4 Area =	128.41 acres
Forested Area =	32.25 acres
Wetland Area =	0.31 acres
Total Regulated Area =	95.85 acres

Regulated Impervious Area =	34.31 acres
Regulated Pervious Area =	61.54 acres
Total Regulated Area =	95.85 acres

Existing source loads were calculated using the above areas in Table 2b for the Potomac River Basin. Total POC reductions were calculated using the above areas in Table 3b for the Potomac River Basin. The total pollutant removal required for the first permit cycle was then tabulated as follows:

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	16.86	578.47
Regulated Urban Pervious		61.54	10.07	619.71
Regulated Urban Impervious	Phosphorus	34.31	1.62	55.58
Regulated Urban Pervious		61.54	0.41	25.23
Regulated Urban Impervious	Total Suspended Solids	34.31	1,171.32	40,187.99
Regulated Urban Pervious		61.54	175.80	10,818.73

Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin (*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	0.07587	2.60
Regulated Urban Pervious		61.54	0.03021	1.86
Regulated Urban Impervious	Phosphorus	34.31	0.01296	0.44
Regulated Urban Pervious		61.54	0.00148625	0.09
Regulated Urban Impervious	Total Suspended Solids	34.31	11.7132	401.88
Regulated Urban Pervious		61.54	0.769125	47.33

Total Pollutant Removal Required for First Permit Cycle

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)		Total Reduction Required First Permit Cycle (lbs/yr)
Total Regulated Area	Nitrogen	95.85		4.46
Total Regulated Area	Phosphorus	95.85		0.54
Total Regulated Area	Total Suspended Solids	95.85		449.21

5.0 Means and Methods to Meet the Required Reductions and Schedule

General Permit Section I.C.2.a.(6)
The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.

Frederick County Public Schools proposes to install several manufactured hydrodynamic BMP's adjacent to large existing paved parking areas and impervious roof areas. The hydrodynamic BMP's will be installed by cutting them into the existing storm drain system downstream of existing storm drain inlets which serve large paved areas and impervious roof areas. Quantity and location of these structures will be adequate to meet the total 40% pollutant removal.

The removal rates will be determined from the BMP Clearinghouse and DEQ approved removal rates based on the BMP's selected.

The BMP's will be located in order to provide total pollutant removal at or above the required quantities.

Phase I pollutant removal was achieved by installation of a First Defense manufactured hydrodynamic BMP. The pollutant removal was above the amount required for the first permit cycle and the excess has been credited toward the requirements of this permit cycle.

The Phase II BMP's will be designed and bid so that construction can begin and be completed during summer when school is not in session. Construction shall be completed prior to the end of the permit cycle.

PHASE I - Add Manufactured Hydrodynamic BMP

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	1.55	16.86	26.13
Regulated Urban Pervious		1.53	10.07	15.41
Regulated Urban Impervious	Phosphorus	1.55	1.62	2.51
Regulated Urban Pervious		1.53	0.41	0.63
Regulated Urban Impervious	Total Suspended Solids	1.55	1,171.32	1,815.55
Regulated Urban Pervious		1.53	175.80	268.97

Subsource	Pollutant	Total Existing Acres Served by BMP (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	3.08	11%	4.57
Total Regulated Area	Phosphorus	3.08	20%	0.63
Total Regulated Area	Total Suspended Solids	3.08	50%	1,042.26

Total Pollutant Removal Required 40% (lbs/yr)	Phase I Pollutant Removal Required 5% (lbs/yr)	Phase I Pollutant Removed Achieved (lbs/yr)	Phase II Pollutant Removal Required (lbs/yr)
35.70	4.46	4.57	31.13
4.29	0.54	0.63	3.66
3,593.69	449.21	1,042.26	2,551.43

PHASE II - Add Manufactured Hydrodynamic BMPs

Subsource	Pollutant	Total Regulated Acres Served by BMPs (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	15.94	16.86	268.75
Regulated Urban Pervious		3.21	10.07	32.32
Regulated Urban Impervious	Phosphorus	15.94	1.62	25.82
Regulated Urban Pervious		3.21	0.41	1.32
Regulated Urban Impervious	Total Suspended Solids	15.94	1,171.32	18,670.84
Regulated Urban Pervious		3.21	175.80	564.32

Subsource	Pollutant	Total Existing Acres Served by BMPs (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	19.15	11%	33.12
Total Regulated Area	Phosphorus	19.15	20%	5.43
Total Regulated Area	Total Suspended Solids	19.15	50%	9,617.58

Total Pollutant Removal Required 40% (lbs/yr)	Phase I Pollutant Removal Required 5% (lbs/yr)	Phase I Pollutant Removed Achieved (lbs/yr)	Phase II Pollutant Removal Required (lbs/yr)	Phase II Pollutant Removal Achieved (lbs/yr)
35.70	4.46	4.57	31.13	33.12
4.29	0.54	0.63	3.66	5.43
3,593.69	449.21	1,042.26	2,551.43	9,617.58

Total Pollutant Removal Achieved 40% (lbs/yr)
37.69
6.06
10,659.84

6.0 Means and Methods to Offset Increased Loads From New Sources Initiating Construction Between July 1, 2009 and June 30, 2014

General Permit Section I.C.2.a.(7)
The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize the [applicable table] in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

Frederick County Public Schools did not have any projects over one acre which began construction between July 1, 2009 and June 30, 2014 within the regulated MS4 boundary. Frederick County Public Schools performed a small addition project at Redbud Run Elementary School in 2013; however this project was less than 1 acre in size and did not require VSMP permitting. The additional impervious area created by this addition has been included in the overall impervious area calculated under section 4, and therefore the pollutants of concern are being reduced appropriately.

7.0 Means and Methods to Offset Increased Loads From Grandfathered Projects That Begin Construction After July 1, 2014

General Permit Section I.C.2.a.(8)
The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.

Frederick County Public Schools does not have any grandfathered projects over one acre which began construction after July 1, 2014 within the regulated MS4 boundary.

8.0 A List of Future Projects, and Associated Acreage That Qualify as Grandfathered

General Permit Section I.C.2.a.(10)
A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48.

Frederick County Public Schools does not have any grandfathered projects within the regulated MS4 boundary.

9.0 An Estimate of the Expected Cost to Implement the Necessary Reductions

General Permit Section I.C.2.a.(11)
An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle.

Installing new manufactured BMP's in the existing storm drain system will require the following items:

- Selective demolition of sections of the existing storm drain system.
- Excavation and installation of the manufactured BMP's
- Replacement / restoration of grassed areas.

A budgetary cost estimate is included below.

PHASE II TMDL ACTION PLAN - MILLBROOK/REDBUD MS4

PROJECT DESCRIPTION:
Millbrook/Redbud TMDL
Commission Number:
2017-012

DATE:
9/21/2018

OWPR ARCHITECTS AND ENGINEERS

Item	Quantit	Unit	Cost/Unit	Item Cost	Comment
CONSTRUCTION OF SIX MANUFACTURED HYDRODYNAMIC BMPs					
General Conditions / Mobilization	1	LS	$6,000.00	$6,000.00	
Erosion Control	6	LS	$2,000.00	$12,000.00	*Safety fence, silt fence*
Excavation	1000	CY	$15.00	$15,000.00	
Demo SD Pipe	200	LF	$30.00	$6,000.00	
Manufactured BMP	6	EA	$10,000.00	$60,000.00	
Connect to SD Pipe	200	LF	$50.00	$10,000.00	
Backfill / Compaction	1000	CY	$15.00	$15,000.00	
Restoration / Seeding	6000	SF	$1.00	$6,000.00	
Subtotal 1				$130,000.00	
Contingency	20%			$26,000.00	
Subtotal 2				$156,000.00	

Design / Const Admin	25%			$39,000.00	

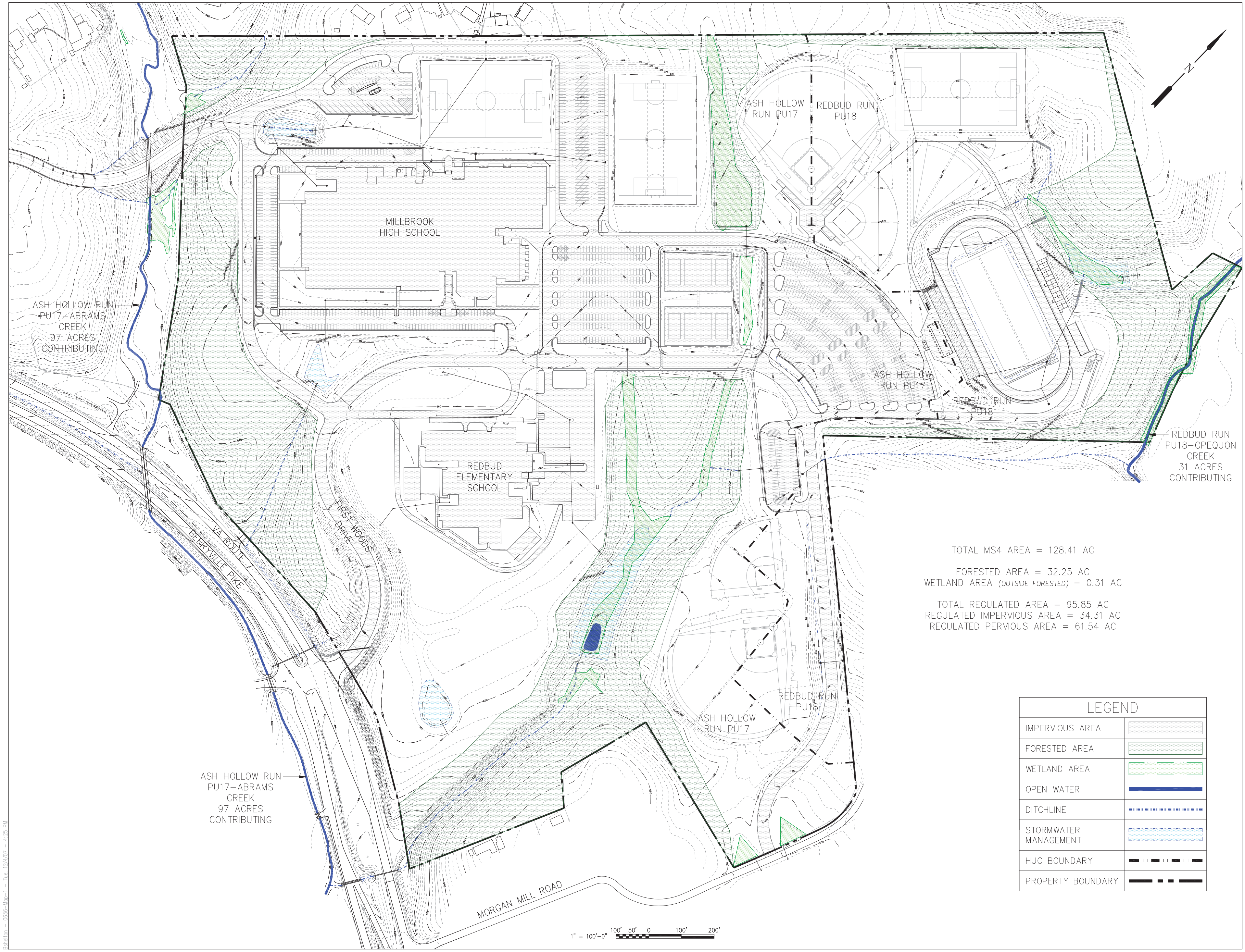
ESTIMATED PROJECT TOTAL	**$195,000**

10.0 Public Comments on Draft Action Plan

General Permit Section I.C.2.a.(12)
General Permit Requirements: An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.
Phase 1 Permit Requirements: An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan; and, a list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

Frederick County Public Schools will post the draft TMDL Action Plan to its website in October 2018 and will send an announcement via e-mail and on its Facebook page that it is available for public review and comment. The draft TMDL Action Plan will remain on the FCPS website until November 2018 at which time all public comments will be compiled, reviewed, and any changes to the TMDL Action Plan made.

11.0 Appendix



No.	Description	Date
	Revisions	

OWPR ARCHITECTS AND ENGINEERS

CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

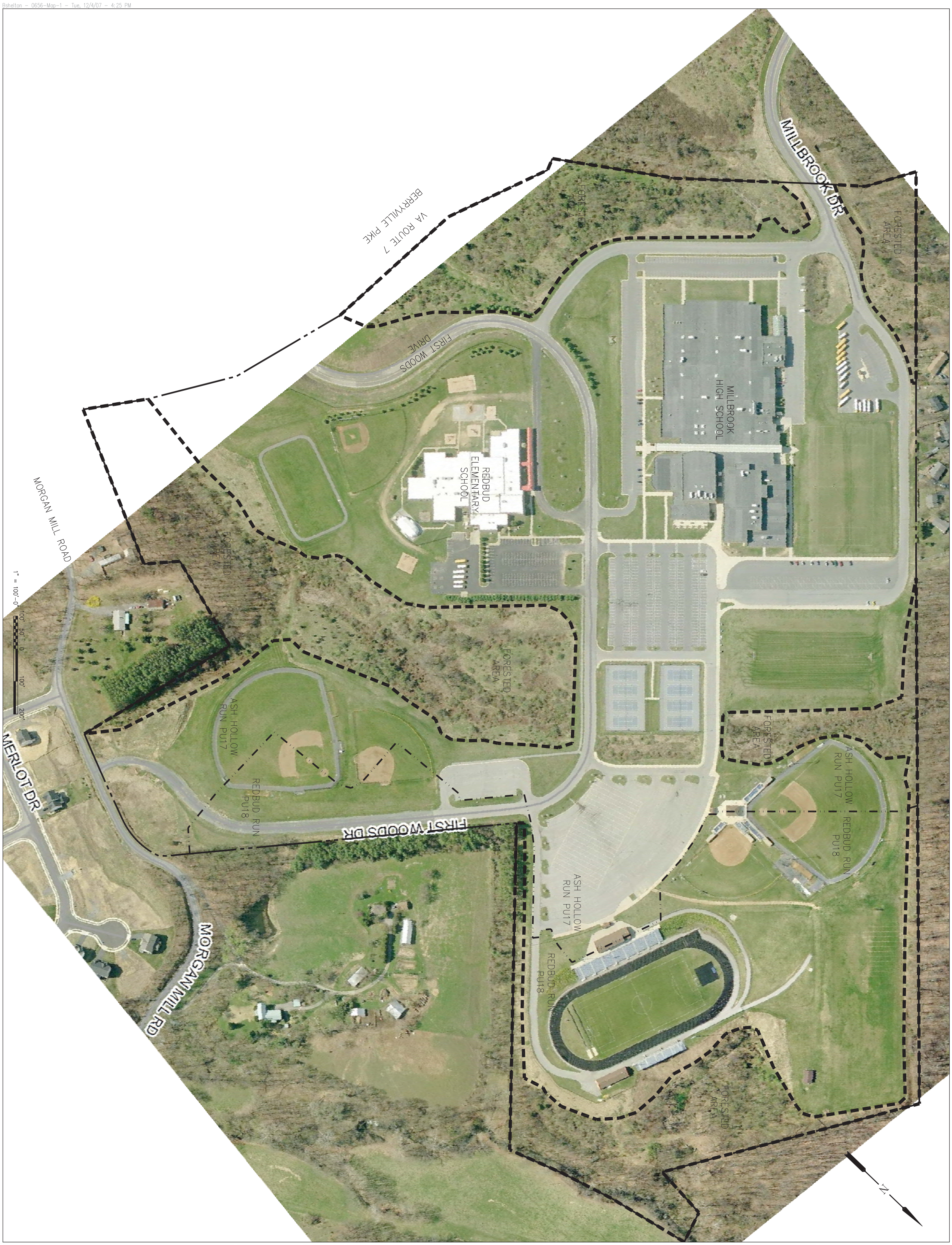
Comm. No. 2017–012
Date 21 SEP 18

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

TMDL AREA MAP

TMDL1

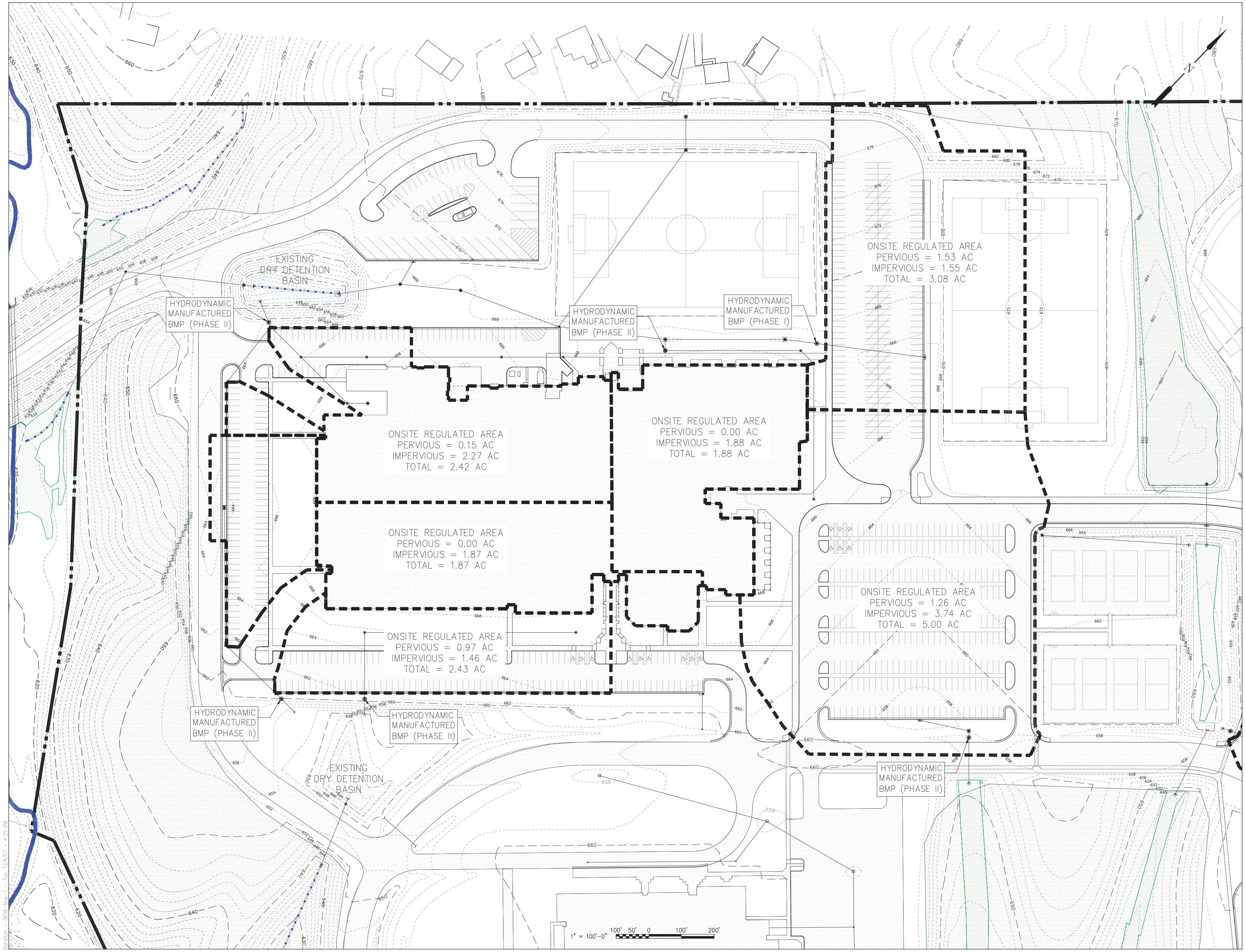
Bshelton - 0656-Map-1 - Tue, 12/4/07 - 4:25 PM



TMDL2	TMDL AERIAL MAP	Designed: WAS Drawn: WAS Checked: N/A Approved: N/A	Comm. No. 2017-012 Date 21 SEP 18	CHESAPEAKE BAY TMDL ACTION PLAN MILLBROOK H.S. / REDBUD RUN E.S. SMALL MS4 PERMIT FREDERICK COUNTY VIRGINIA	OWPR ARCHITECTS AND ENGINEERS

No.	Description	Date

Revisions



No.	Description	Date
	Revisions	

OWPR ARCHITECTS AND ENGINEERS

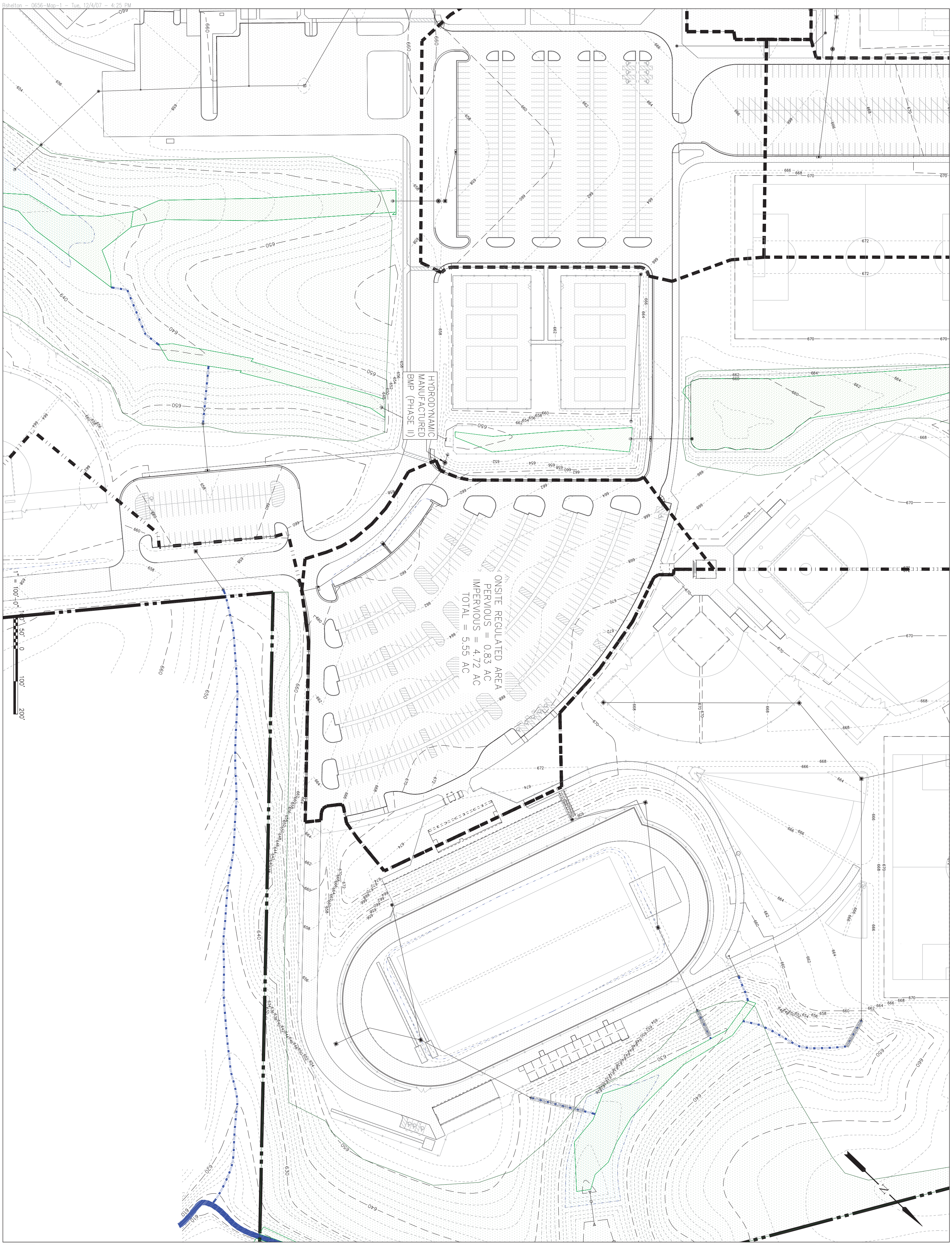
CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 2017-012
Date 21 SEP 18

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

SWM BMP AREA MAP 1

TMDL3



TMDL4	SWM BMP AREA MAP 2	Designed: WAS Drawn: WAS Checked: N/A Approved: N/A	Comm. No. 2017-012 Date 21 SEP 18	CHESAPEAKE BAY TMDL ACTION PLAN MILLBROOK H.S. / REDBUD RUN E.S. SMALL MS4 PERMIT FREDERICK COUNTY VIRGINIA	OWPR ARCHITECTS AND ENGINEERS

Revisions

No.	Description	Date

Rshelton - 0656-Map-1 - Tue, 12/4/07 - 4:25 PM

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

September 4, 2014

Ms. Lisa Lemont, CPSWQ
Hydro International
94 Hutchins Drive
Portland, Maine 04102

Re: Assignment of Removal Efficiencies for Total Phosphorus-Downstream Defender® and First Defense®

Dear Ms Lemont,

Thank you for your submittals of the Manufactured Treatment Devices (MTD) Registration Forms and supporting documentation for the Downstream Defender® and First Defense® treatment devices. The MTD information provided was reviewed for the purpose of assigning pollutant removal efficiencies for total phosphorus (TP) for each treatment device. This review was performed in accordance with the Guidance Memo Number 14-2009 titled "Interim Use of Stormwater Manufactured Treatment Devices (MTDs) to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria, Part IIB Water Quality Design Requirements". The review process included the analysis of the documents submitted and any other publically available reports.

In addition to the registration forms, performance studies were also submitted for review. These studies are in support of the approval letters from the State of New Jersey that certifies Downstream Defender® and First Defense® has a removal rate of 50% total suspended solids. Consistent with Guidance Memo Number 14-2009, Downstream Defender® and First Defense® are receiving an event mean concentration percent TP removal efficiency of 20%. As stated in the guidance memo, this information will be posted on the Virginia Stormwater Clearinghouse website. This MTD and the assigned removal efficiency can be manually added into Virginia Runoff Reduction spreadsheet to demonstrate compliance with Runoff Reduction Method.

If you have any questions regarding this information, please contact Robert E. Cooper, P.E. at (804) 698-4033 or e-mail at Robert.Cooper@deq.virginia.gov.

Sincerely;

Fred K. Cunningham
Director
Office of Water Permits

A15 Chesapeake Bay TMDL Action Plan – Phase 2 – Addendum 1

FREDERICK COUNTY PUBLIC SCHOOLS

CHESAPEAKE BAY
TMDL ACTION PLAN
PHASE II
ADDENDUM 1

For

Millbrook High School /
Redbud Elementary School Campus

Prepared For
Frederick County Public Schools
1415 Amherst Street
Winchester, VA 22604
540-662-3888

Prepared By
OWPR, Inc.
200 Country Club Drive
Plaza 1, Building E
Blacksburg, VA 24060
540-552-2151

July 27, 2020

OWPR ARCHITECTS AND ENGINEERS

Project Memo

To: Jeffrey Selengut	Date: 07/27/20
From: William A. Shelton, P.E.	Project: FCPS Millbrook HS / Redbud ES MS4
Subject: Chesapeake Bay TMDL Action Plan Phase II – Addendum	Commission #: 2019-073

After discussion with some other MS4 operators at the MS4 Forum last fall, it became apparent that there are more cost-effective solutions available to meet the Phase II requirements of the Chesapeake Bay TMDL. The following is a summary of the current plan and the alternative plan we are proposing:

<u>Current Plan</u>

The three pollutants that are regulated and require removal include: Nitrogen, Phosphorus, Total Suspended Solids (TSS).

Chesapeake Bay TMDL Phase I

Pollutant	Total Removal Required (40%) (lb/yr)	Phase I Removal Required (5%) (lb/yr)	Phase I Removal Achieved (lb/yr)	Carryover to Phase II (lb/yr)
Nitrogen	35.70	4.46	4.57	0.11
Phosphorus	4.29	0.54	0.63	0.09
TSS	3,593.69	449.21	1,042.26	593.05

The hydrodynamic BMP which was installed for Phase I achieved the required pollutant removal for nitrogen and phosphorus, and greatly surpassed the requirement for TSS. This is due to the nature of the BMP whose main function is to remove sediment (Total Suspended Solids).

Since the Phase I project was so successful, we decided to continue with the installation of hydrodynamic BMPs in order to meet the requirements. The current Phase II plan would be to install 6 new BMPs at an estimated cost of ***$195,000***.

Chesapeake Bay TMDL Phase II

Pollutant	Phase II Removal Required (35%) (lb/yr)	Carryover from Phase I (lb/yr)	Phase II Removal Remaining (lb/yr)	Phase II Removal Achieved (lb/yr)
Nitrogen	31.24	0.11	31.13	33.12
Phosphorus	3.75	0.09	3.66	5.43
TSS	3,144.48	593.05	2,551.43	9,617.58

Upon analysis, it became clear that sizing the hydrodynamic BMPs to achieve the nitrogen and phosphorus removals would again cause the TSS removal to far surpass the requirements, making the plan very inefficient.

Chesapeake Bay TMDL Total (Phase I and Phase II)

Pollutant	Total Removal Required (40%) (lb/yr)	Total Removal Achieved (lb/yr)	Excess Pollutant Removal (lb/yr)
Nitrogen	35.70	37.69	1.99
Phosphorus	4.29	6.06	1.77
TSS	3,593.69	10,659.84	7,066.15

Proposed Addendum

In order to improve the efficiency of the plan, we explored the possibility of sizing the hydrodynamic BMPs to achieve the TSS removal requirements and then buying nutrient credits to make up the difference in the nitrogen and phosphorus. This alternative would involve the installation of only one hydrodynamic BMP at the stadium parking lot and then purchasing nutrient credits for the remaining removal requirements.

Chesapeake Bay TMDL Phase II

Pollutant	Phase II Removal Required (35%) (lb/yr)	Carryover from Phase I (lb/yr)	Phase II Removal Remaining (lb/yr)	Phase II Removal Achieved (lb/yr)
Nitrogen	31.24	0.11	31.13	9.67
Phosphorus	3.75	0.09	3.66	1.60
TSS	3,144.48	593.05	2,551.43	2,837.27

Chesapeake Bay TMDL Total (Phase I and Phase II)

Pollutant	Total Removal Required (40%) (lb/yr)	Total Removal Achieved (lb/yr)	Nutrient Credits Provided (lb/yr)	Excess Pollutant Removal (lb/yr)
Nitrogen	35.70	14.24	21.46	0
Phosphorus	4.29	2.23	3.05	0.99
TSS	3,593.69	3,879.53	1,063.23	1,349.07

Credits are available and pricing was obtained from the Virginia Nutrient Bank. The total cost for nutrient credits would be approximately $67,100. The cost for design and construction administration would be approximately $18,000. The construction cost to install one BMP would be approximately $30,000 for a project total of ***$115,100***. Utilizing credits will also reduce the annual inspection, operating and maintenance costs from 6 BMPs to 1 BMP.

Conclusion

It is clear that the proposed alternative would significantly decrease the first cost as well as the life cycle cost of inspection, operation and maintenance. We would recommend approval of this addendum to the Phase II TMDL to change to this alternative.

Table 2 b: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	34.31	16.86	578.47
Regulated Urban Pervious		61.54	10.07	619.71
Regulated Urban Impervious	Phosphorus	34.31	1.62	55.58
Regulated Urban Pervious		61.54	0.41	25.23
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Table 3 b: Calculation Sheet for Determining Total POC Reductions Required During the Permit Cycle for the Potomac River Basin
(*Based on Chesapeake Bay Program Watershed Model Phase 5.3.2)

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
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Regulated Urban Impervious	Phosphorus	34.31	0.01296	0.44
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Regulated Urban Impervious	Total Suspended Solids	34.31	11.7132	401.88
Regulated Urban Pervious		61.54	0.769125	47.33

Total Pollutant Removal Required for First Permit Cycle

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)		Total Reduction Required First Permit Cycle (lbs/yr)
Total Regulated Area	Nitrogen	95.85		4.46
Total Regulated Area	Phosphorus	95.85		0.54
Total Regulated Area	Total Suspended Solids	95.85		449.21

PHASE I - Add Manufactured Hydrodynamic BMP

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	1.55	16.86	26.13
Regulated Urban Pervious		1.53	10.07	15.41
Regulated Urban Impervious	Phosphorus	1.55	1.62	2.51
Regulated Urban Pervious		1.53	0.41	0.63
Regulated Urban Impervious	Total Suspended Solids	1.55	1,171.32	1,815.55
Regulated Urban Pervious		1.53	175.80	268.97

Subsource	Pollutant	Total Existing Acres Served by BMP (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	3.08	11%	4.57
Total Regulated Area	Phosphorus	3.08	20%	0.63
Total Regulated Area	Total Suspended Solids	3.08	50%	1,042.26

Total Pollutant Removal Required 40% (lbs/yr)	Phase I Pollutant Removal Required 5% (lbs/yr)	Phase I Pollutant Removed Achieved (lbs/yr)	Phase II Pollutant Removal Required (lbs/yr)
35.70	4.46	4.57	31.13
4.29	0.54	0.63	3.66
3,593.69	449.21	1,042.26	2,551.43

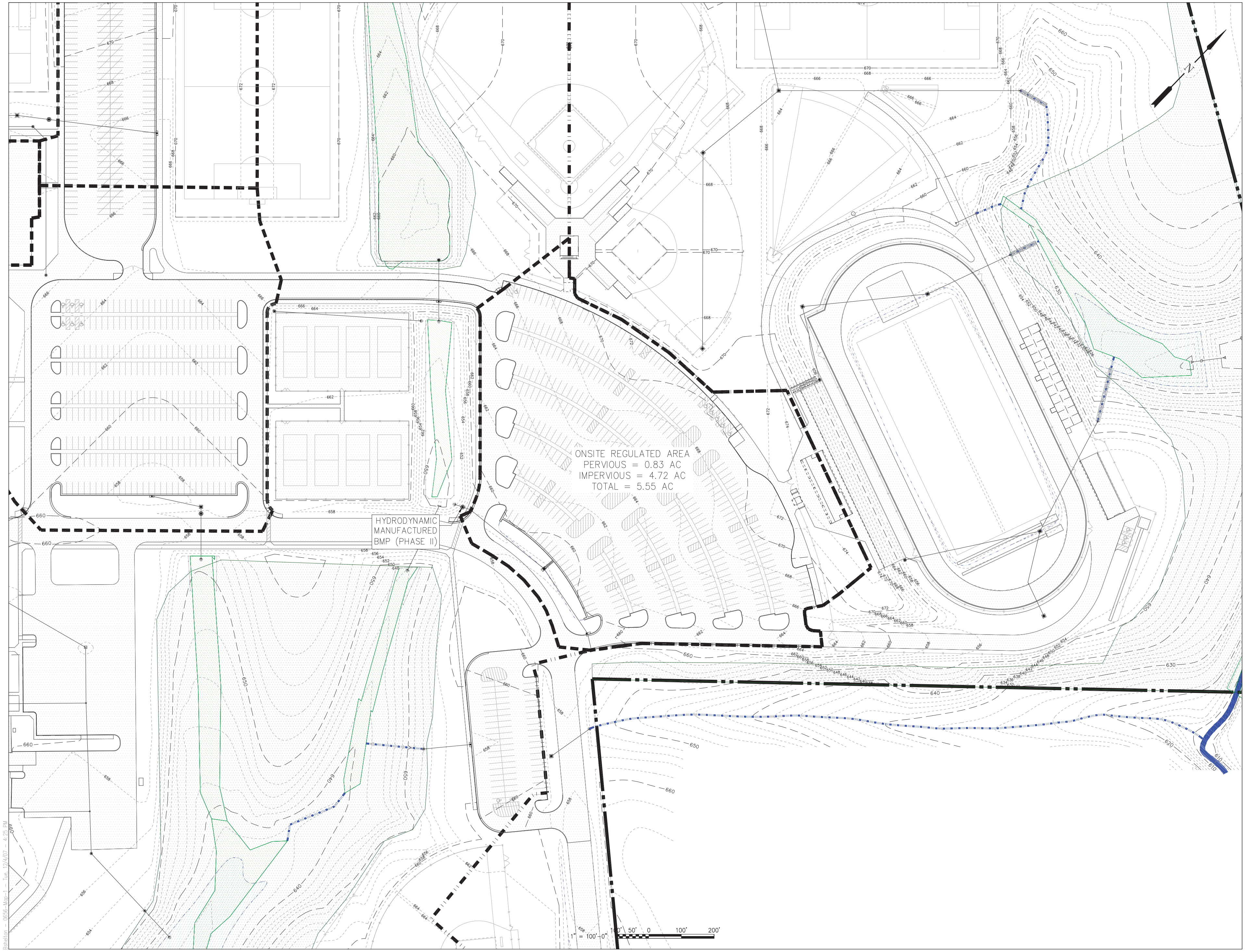
PHASE II - Add Manufactured Hydrodynamic BMP

Subsource	Pollutant	Total Regulated Acres Served by BMPs (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	4.72	16.86	79.58
Regulated Urban Pervious		0.83	10.07	8.36
Regulated Urban Impervious	Phosphorus	4.72	1.62	7.65
Regulated Urban Pervious		0.83	0.41	0.34
Regulated Urban Impervious	Total Suspended Solids	4.72	1,171.32	5,528.63
Regulated Urban Pervious		0.83	175.80	145.91

Subsource	Pollutant	Total Existing Acres Served by BMPs (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	5.55	11%	9.67
Total Regulated Area	Phosphorus	5.55	20%	1.60
Total Regulated Area	Total Suspended Solids	5.55	50%	2,837.27

Total Pollutant Removal Required 40% (lbs/yr)	Phase I Pollutant Removal Required 5% (lbs/yr)	Phase I Pollutant Removed Achieved (lbs/yr)	Phase II Pollutant Removal Required (lbs/yr)	Phase II Pollutant Removal Achieved (lbs/yr)
35.70	4.46	4.57	31.13	9.67
4.29	0.54	0.63	3.66	1.60
3,593.69	449.21	1,042.26	2,551.43	2,837.27

Total Pollutant Removal Achieved 40% (lbs/yr)
14.24
2.23
3,879.53



No.	Description	Date

Revisions

OWPR
ARCHITECTS AND ENGINEERS

CHESAPEAKE BAY TMDL ACTION PLAN
MILLBROOK H.S. / REDBUD RUN E.S.
SMALL MS4 PERMIT
FREDERICK COUNTY VIRGINIA

Comm. No. 2017-012
Date 21 SEP 18

Designed: WAS
Drawn: WAS
Checked: N/A
Approved: N/A

SWM BMP AREA MAP 2

TMDL4

From: Gordon Weirich
To: Bill Shelton
Cc: Nathan; Amber Aboagye
Subject: Re: 2019-110 FCPS MS4 - Chesapeake Bay TMDL Phase II
Date: Thursday, April 30, 2020 5:04:30 PM

Hi Bill,

Great to hear from you! Hope everything is going well.

When you purchase the phosphorus credits, you'll receive nitrogen and TSS along with it. It's all bundled together according to the following ratio:
1 pound of Phosphorus =
Nitrogen: 7.04 lb/yr
Suspended Solids: 348.6 lb/yr

So to achieve the Nitrogen loads you'll receive the following:
TP - 3.05 lbs
TN - 21.46 lbs
TSS - 1,063.23 lbs
Cost - $67,100.00

This will help lower the total pounds of TSS for the BMP to take care of while also eliminating the TN and TP.

Please let me know if you have any questions!

Thank you,

photo

Gordon D. Weirich
Conservation Marketing Director, Virginia Nutrient Bank
540-437-0470 (o) | 540-271-2192 (c)
gordon@virginianutrientbank.com
www.virginianutrientbank.com
P.O. Box 142 Penn Laird, VA 22846

"HELPING CLEAN THE WATERWAYS OF VIRGINIA ONE SITE AT A TIME"

On Thu, Apr 30, 2020 at 4:42 PM Bill Shelton <bshelton@owpr.com> wrote:

> Hey Gordon, back again.
>
> We are now looking at a combination option of installing a hydrodynamic BMP to take care of the TSS so we only have to purchase Phosphorus and Nitrogen.
>
> In this scenario, we would need 21.46 lb of nitrogen and 2.06 lb of phosphorus. All of the TSS is taken care of.
>
> Can you let me know what that would look like?

A16 Chesapeake Bay TMDL Action Plan – Phase 3

GENERAL PERMIT FOR
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4)

PERMIT NO. VAR040113

PERMIT CYCLE: 2023-2028

Millbrook High School and Redbud Elementary School Campus

Chesapeake Bay TMDL Action Plan
Phase III
Draft

Revised October 25, 2024

Frederick County
Public Schools

Fredrick County Public Schools
1415 Amherst Street
Winchester, VA. 22604
540-662-3888

Date: September 26, 2023
Revised: October 25, 2024

Table of Contents

Plan Purpose and Objective

The Millbrook High School / Redbud Run Elementary School campus has been designated as a small Municipal Storm Sewer System (MS4), located in the Potomac River Basin portion of the Chesapeake Bay watershed. As such, it is included in the overall Chesapeake Bay TMDL. In accordance with the General VPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems, it is required to develop a Chesapeake Bay TMDL Action Plan in order to meet the requirements of the overall TMDL. The Action Plan is required to provide a review of the current MS4 program, which demonstrates its ability to ensure compliance with the Special Condition and include the means and methods the permittee will use to meet the (Phase III) 100% of the Level 2 (L2) scoping run reduction for existing development by the end of the third permit cycle. This TMDL Action Plan has been prepared in accordance with the requirements of Guidance Memo No. 20-2003 “Chesapeake Bay TMDL Special Condition Guidance” as amended and dated 02/06/2021. GM20-2003 Part V, requires the TMDL Action Plan to address to following items:

1. Any new or modified legal authorities, such as ordinances, permits, policy, specific contract language, orders, and inter-jurisdictional agreements, implemented or needing to be implemented to meet the requirements of Part II A 3, A 4, and A 5.
2. The load and cumulative reduction calculations for each river basin calculated in accordance with Part II A 3, A 4, and A 5.
3. The total reductions achieved as of July 1, 2018, for each pollutant of concern in each river basin.
4. A list of BMPs implemented prior to July 1, 2018, to achieve reductions associated with the Chesapeake Bay TMDL including:
   a) The date of implementation; and
   b) The reductions achieved.
5. The BMPs to be implemented by the permittee prior to the expiration of this permit to meet the cumulative reductions calculated in Part II A 3, A 4, and A 5, including as applicable:
   a) Type of BMP;
   b) Project name;
   c) Location;
   d) Percent removal efficiency for each pollutant of concern; and
   e) Calculation of the reduction expected to be achieved by the BMP calculated and reported in accordance with the methodologies established in Part II A 8 for each pollutant of concern; and
6. A summary of any comments received as a result of public participation required in Part II A 12, the permittee's response, identification of any public meetings to address public concerns, and any revisions made to Chesapeake Bay TMDL action plan as a result of public participation.
7. Prior to submittal of the action plan required in 9VAC25-890-40 Part II.A.11 , the permittee shall provide an opportunity for public comment on the additional BMPs proposed to meet the reductions not previously approved by the department in the first phase of the Chesapeake Bay TMDL Action Plan. This information on the proposed BMPs for this permit cycle that have not been previously approved must be public noticed for no less than 15 days.

Since the Millbrook HS / Redbud ES campus is a small MS4 which is currently developed in its existing condition, some of the elements which would apply to a municipal type MS4 will not apply. Each element is still included and discussed in the Action Plan to verify whether it isapplicable.

1.0 Existing, New, or Modified Legal Authority

(MS4 General Permit Part II.A.11.a)
Any new or modified legal authorities, such as ordinances, permits, policy, specific contract language, orders, and inter-jurisdictional agreements, implemented or needing to be implemented to meet the requirements of Part II A 3, A 4, and A 5.

Frederick County Public Schools currently administers an MS4 program plan for the Millbrook HS / Redbud Run ES Campus. Property regulated by this MS4 program plan is owned by the Frederick County School Board and therefore they have the authority to enforce and/or perform all requirements of the program plan. As the property owner, FCPS has the legal authority to make changes to site amenities, existing stormwater structures, and create new stormwater BMP's. FCPS owns and maintains all of the existing stormwater BMP's and will maintain ownership and maintenance responsibility of any proposed stormwater BMP's required by this Action Plan to ensure compliance with this special condition.

No new or modified legal authorities are required to meet the requirements of MS4 General Permit *Part II A 3, A 4, and A 5.*

2.0 The Load and Cumulative Reduction Calculations for each River Basin

(MS4 General Permit Part II.A.11.b)

The load and cumulative reduction calculations for each river basin calculated in accordance with Part II A 3, A 4, and A 5.

The Millbrook HS / Redbud Run ES Campus MS4 drains entirely to the Potomac River Basin.

Frederick County Public Schools has AutoCAD files of the existing conditions at the Millbrook HS / Redbud Run ES Campus property from which the existing impervious and pervious areas have been calcul ated. Additionally, recent aerial photographs, GIS information, and field observations were used to deter mine the areas which could be designated as "forested". These areas were reviewed and determined to be compliant with the criteria for "forested" areas set forth in Guidance Memo 20-2003. Several wetland areas are mapped on the school campus. Many wetland areas within "forested areas, while others are outside the "forested" areas.
Maps showing these designated areas are attached at the end of this report.

Unregulated Area(s) include:
1. Land regulated under any General VPDES permit that addresses industrial stormwater, including the General VPDES Permit for Stormwater Associated with Industrial Activity (VAR05), the General VPDES Permit for Concrete Products Facilities (VAG11), and the Nonmetallic Mineral Processing General Permit (VAR84);
2. Lands regulated under an individual VPDES permit for industrial stormwater discharges;
3. Forested Lands;
4. Agricultural Lands;
5. Wetlands; and,
6. Open Waters.

Below is a tabulation of existing land cover, regulated areas and unregulated areas.

Total MS4 Area = 128.41 acres
Forested Area = 32.25 acres (Unregulated Area)
Wetland Area = 0.31 acres (Unregulated Area)

Total Regulated Area = Total MS4 Area - Unregulated Area(s)
Total Regulated Area = 128.41 acres – (32.25 acres + 0.31 acres)
Total Regulated Area = 95.85 acres

Regulated Pervious Area = 61.54 acres
Regulated Impervious Area = 34.31 acres

An estimate of the annual POC Source Loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run is presented in the "MS4 EXISTING SOURCE LOAD COMPUTATIONS" table below.

Estimated POC Load Based on the 2009 Progress Run =
(Regulated MS4 Area on 6/30/2009) x (2009 EOS Loading Rate)

MS4 EXISTING SOURCE LOAD COMPUTATIONS						
REGULATED URBAN SUBSOURCE	POLLUTANT	REGULATED MS4 AREA (6/30/09)	X	2009 EOS LOADING RATE	=	ESTIMATED POC LOAD BASED ON 2009 PROGRESS RUN
		Acres		(lbs/ac/yr)		(lbs/yr)
IMPERVIOUS	*NITROGEN*	*34.31*	*x*	***16.86***	=	*578.47*
PERVIOUS	*NITROGEN*	*61.54*	*x*	***10.07***	=	*619.71*
				TOTAL NITROGEN LOAD	**=**	**1,198.17**
IMPERVIOUS	*PHOSPHORUS*	*34.31*	*x*	***1.62***	=	*55.58*
PERVIOUS	*PHOSPHORUS*	*61.54*	*x*	***0.41***	=	*25.23*
				TOTAL PHOSPHORUS LOAD	**=**	**80.81**
IMPERVIOUS	*TSS*	*34.31*	*x*	***1,171.32***	=	*40,187.99*
PERVIOUS	*TSS*	*61.54*	*x*	***175.80***	=	*10,818.73*
				TOTAL TSS LOAD	**=**	**51,006.72**
MS4 Permit Table 3b was used to determine the 2009 EOS Loading Rate(s) necessary to calculate existing source loads from pervious and impervious lands served by the MS4 as of June 30, 2009.						

An estimate of the total POC Load Reductions Required, based on the 2009 progress run is presented in the "POC REDUCTIONS REQUIRED (POTOMAC RIVER BASIN) SUM TOTAL POC REDUCTIONS REQUIRED OVER 3 PERMIT CYCLES" table below.

Total MS4 Required Chesapeake Bay L2 POC Load Reduction(s) =
(POC Load Based on the 2009 Progress Run) x (MS4 Required CB L2 POC Loading Reduction Rate)

MS4 REQUIRED CB L2 POC LOAD REDUCTIONS						
REGULATED URBAN SUBSOURCE	POLLUTANT	ESTIMATED POC LOAD BASED ON 2009 PROGRESS RUN	X	MS4 REQUIRED CHESAPEAKE BAY L2 LOADING REDUCTION RATE	=	MS4 REQUIRED CHESAPEAKE BAY L2 POC LOAD REDUCTION
		(lbs/yr)		(%)		(lbs/yr)
IMPERVIOUS	*NITROGEN*	*578.47*	*x*	***9.00%***	=	*52.06*
PERVIOUS	*NITROGEN*	*619.71*	*x*	***6.00%***	=	*37.18*
TOTAL REQUIRED NITROGEN LOAD REDUCTION					**=**	**89.24**
IMPERVIOUS	*PHOSPHORUS*	*55.58*	*x*	***16.00%***	=	*8.89*
PERVIOUS	*PHOSPHORUS*	*25.23*	*x*	***7.25%***	=	*1.83*
TOTAL REQUIRED PHOSPHORUS LOAD REDUCTION					**=**	**10.72**
IMPERVIOUS	*TSS*	*40,187.99*	*x*	***20.00%***	=	*8,037.60*
PERVIOUS	*TSS*	*10,818.73*	*x*	***8.75%***	=	*946.64*
TOTAL REQUIRED TSS LOAD REDUCTION					**=**	**8,984.24**
MS4 Permit Table 3b was used to determine the MS4 Required CB L2 Loading Reduction Rate(s) necessary to calculate MS4 Required CB L2 POC Load Reduction(s). The calculated POC Load Reductions represent the SUM TOTAL POC REDUCTIONS REQUIRED OVER 3 PERMIT CYCLES						

3.0 The Total Reductions Achieved as of July 1, 2023, For Each Pollutant of Concern in Each River Basin

(MS4 General Permit Part II.A.11.c) The total reductions achieved as of July 1, 2018, for each pollutant of concern in each river basin.

The First Permit Cycle spanned from 2013 – 2018. A 5% Load Reduction was required to be completed by June 30, 2018. See the "FIRST PERMIT CYCLE (2013 – 2018)" table below. A summary of Required POC Load Reductions and Achieved Load Reductions Required is presented.

First Permit Cycle MS4 Required Chesapeake Bay L2 POC Load Reduction(s) =
(Total MS4 Required Chesapeake Bay L2 POC Load Reduction(s)) x (0.05)

All POC Loads Achieved at least 5.0% Reductions.

POC REDUCTIONS REQUIRED FOR EACH PERMIT CYCLE

FIRST PERMIT CYCLE (2013 - 2018)

		REQUIRED LOAD REDUCTION		ACHIEVED LOAD REDUCTION COMPLETED FIRST PERMIT CYCLE			
REGULATED URBAN SUBSOURCE	POLLUTANT	THRU COMPLETED FIRST PERMIT CYCLE		FIRST PERMIT CYCLE ONLY	FIRST PERMIT CYCLE TOTAL	DIFFERENTIAL VS REQUIRED	PERCENTAGE OF TOTAL POC
		(%)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(%)
IMPERVIOUS	*NITROGEN*	*5.00%*	*2.60*				
PERVIOUS	*NITROGEN*	*5.00%*	*1.86*				
TOTAL REQUIRED NITROGEN LOAD REDUCTION =			**4.46**	**4.57**	**4.57**	**0.11**	**5.12%**
IMPERVIOUS	*PHOSPHORUS*	*5.00%*	*0.44*				
PERVIOUS	*PHOSPHORUS*	*5.00%*	*0.09*				
TOTAL REQUIRED PHOSPHORUS LOAD REDUCTION =			**0.54**	**0.63**	**0.63**	**0.09**	**5.88%**
IMPERVIOUS	*TSS*	*5.00%*	*401.88*				
PERVIOUS	*TSS*	*5.00%*	*47.33*				
TOTAL REQUIRED TSS LOAD REDUCTION =			**449.21**	**1,042.26**	**1,042.26**	**593.05**	**11.60%**

First Permit Cycle POC Loading Reductions
One Hydrodynamic Seperator Reductions:
N = 4.57 lbs/yr, P = 0.63 lbs/yr and TSS = 1,042.26 lbs/yr

TMDL Action Plan Tracking Notes:

Two TMDL Action Plans Prepared for the First Permit Cylce.

CB TMDL Action Plan Date: 7/1/2015 Rev: 12/10/2015

This Action Plan proposed conversion of existing Dry Pond (SWM Area C) to Extended Detention.

This Action Plan was not executed. Addendum 1 was prepared to revised the Action Plan.

CB TMDL Action Plan Addendum 1 Date: 1/24/2018

This Action Plan proposed one Hydrodynamic Seperator, in lieu of existing Dry Pond converion to Extended Detention.

This Action Plan was executed, satisfying the First Permit Cylce Required 5% POC Reductions.

The Second Permit Cycle spanned from 2018 – 2023. A Cumulative 40% Load Reduction was required to be completed by June 30, 2023. See the “SECOND PERMIT CYCLE (2018 – 23” table below. A summary of Required POC Load Reductions and Achieved Load Reductions Required is presented.

Second Permit Cycle MS4 Required Chesapeake Bay L2 POC Load Reduction(s) = (Total MS4 Required Chesapeake Bay L2 POC Load Reduction(s)) x (0.40)

All POC Loads Achieved at least 40% Cumulative Reductions.

POC REDUCTIONS REQUIRED FOR EACH PERMIT CYCLE										
SECOND PERMIT CYCLE (2018 - 2023)										
		REQ'D LOAD REDUCTION		ACHIEVED LOAD REDUCTION (ENTIRE SECOND PERMIT CYCLE)						
REGULATED URBAN SUBSOURCE	POLLUTANT	THRU COMPLETED SECOND PERMIT CYCLE		FIRST PERMIT CYCLE ONLY	+	SECOND PERMIT CYCLE TOTAL	=	FIRST & SECOND PERMIT CYCLE TOTAL	DIFFERENTIAL VS REQUIRED	PERCENTAGE OF TOTAL POC
		(%)	(lbs/yr)	(lbs/yr)		(lbs/yr)		(lbs/yr)	(lbs/yr)	(%)
IMPERVIOUS	*NITROGEN*	*40.00%*	*20.82*							
PERVIOUS	*NITROGEN*	*40.00%*	*14.87*							
TOTAL REQUIRED NITROGEN LOAD REDUCTION =			35.70	4.57	+	31.14	=	35.71	0.01	40.01%
IMPERVIOUS	*PHOSPHORUS*	*40.00%*	*3.56*							
PERVIOUS	*PHOSPHORUS*	*40.00%*	*0.73*							
TOTAL REQUIRED PHOSPHORUS LOAD REDUCTION =			4.29	0.63	+	4.65	=	5.28	0.99	49.24%
IMPERVIOUS	*TSS*	*40.00%*	*3,215.04*							
PERVIOUS	*TSS*	*40.00%*	*378.66*							
TOTAL REQUIRED TSS LOAD REDUCTION =			3,593.69	1,042.26	+	3,897.12	=	4,939.38	1,345.69	54.98%

Second Permit Cycle POC Loading Reductions
<u>One Hydrodynamic Seperator Reductions:</u>
N = 9.67 lbs/yr, P = 1.60 lbs/yr and TSS = 2,837.27 lbs/yr
<u>Nutrient Offset Credit Purchase Reductions:</u>
N = 21.47 lbs/yr, P = 3.05 lbs/yr and TSS = 1,059.85 lbs/yr

<u>TMDL Action Plan Tracking Notes:</u>

Two TMDL Action Plans Prepared for the Second Permit Cylce.

<u>CB TMDL Action Plan Phase II</u> Date: 5/18/2018 Rev: 9/21/2018

This Action Plan was <u>not</u> executed and is void. Addendum 1 was prepared to revise the Action Plan.

<u>CB TMDL Action Plan Phase II Addendum 1</u> Date: 7/27/2020

This Action Plan proposed one Hydrodynamic Seperator , in lieu of existing Dry Pond converion to Extended Detention.

This Action Plan was executed, satisfying the Second Permit Cylce Required Cumullative 40% POC Reductions.

4.0 A List Of BMPs Implemented Prior to July 1, 2023, To Achieve Reductions for The Chesapeake Bay

(MS4 General Permit Part II.A.11.d) A list of BMPs implemented prior to July 1, 2018, to achieve reductions associated with the Chesapeake Bay TMDL including: a) The date of implementation; and b) the reductions achieved.

One Hydrodynamic Separator was implemented prior to July 1, 2018.

This satisfied the First Permit Cycle Required POC Load Reductions.

PHASE I - Add Manufactured Hydrodynamic BMP

Subsource	Pollutant	Total Regulated Acres Served by BMP (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	1.55	16.86	26.13
Regulated Urban Pervious		1.53	10.07	15.41
Regulated Urban Impervious	Phosphorus	1.55	1.62	2.51
Regulated Urban Pervious		1.53	0.41	0.63
Regulated Urban Impervious	Total Suspended Solids	1.55	1,171.32	1,815.55
Regulated Urban Pervious		1.53	175.80	268.97

Subsource	Pollutant	Total Existing Acres Served by BMP (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	3.08	11%	4.57
Total Regulated Area	Phosphorus	3.08	20%	0.63
Total Regulated Area	Total Suspended Solids	3.08	50%	1,042.26

A second Hydrodynamic Separator was implemented prior to July 1, 2023.

It provided for a portion of the Second Permit Cycle POC Load Reductions. However, additional POC Load Reductions were necessary to achieve the minimum cumulative POC Load Reductions of 40% for the Second Permit Cycle.

PHASE II - Add Manufactured Hydrodynamic BMP

Subsource	Pollutant	Total Regulated Acres Served by BMPs (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	4.72	16.86	79.58
Regulated Urban Pervious		0.83	10.07	8.36
Regulated Urban Impervious	Phosphorus	4.72	1.62	7.65
Regulated Urban Pervious		0.83	0.41	0.34
Regulated Urban Impervious	Total Suspended Solids	4.72	1,171.32	5,528.63
Regulated Urban Pervious		0.83	175.80	145.91

Subsource	Pollutant	Total Existing Acres Served by BMPs (06/30/09)	BMP Removal Rate (lbs/acre/yr)	Pollutant Removed (lbs/yr)
Total Regulated Area	Nitrogen	5.55	11%	9.67
Total Regulated Area	Phosphorus	5.55	20%	1.60
Total Regulated Area	Total Suspended Solids	5.55	50%	2,837.27

NonPoint Nutrient Offset Credits were acquired by the MS4 to achieve the minimum cumulative POC Load Reductions of 40% for the Second Permit Cycle.

Acquired Nutrient Offset Credits include:
Phosphorous (P) = 3.05 lbs/yr
Nitrogen (N) = 21.47 lbs/yr
Sediment (TSS) = 1,059.85 lbs/yr

See the Program Plan Appendix for the "Agreement for Purchase and Sale of NonPoint Nutrient Offset Credits".

5.0 BMPs Implemented by the Permittee Prior to the Expiration of this Permit to Meet Cumulative Reductions

(MS4 General Permit Part II.A.11.e) The BMPs to be implemented by the permittee prior to the expiration of this permit to meet the cumulative reductions calculated in Part II A 3, A 4, and A 5, including as applicable: a) Type of BMP; b) Project Name; c) Location; d) Percent removal efficiency for each pollutant of concern; and e) calculation of the reduction expected to be achieved by the BMP calculated and reported in accordance with the methodologies established in Part II A 8 for each pollutant of concern.

Various options are available to the MS4 to meet the remaining Required POC Reductions by the end of the Third Permit Cycle, June 30, 2028. The MS4 is required to achieve 100% POC Load Reduction by the end of the Third Permit Cycle, June 30, 2028.

Frederick County Schools may elect to purchase nutrient credits to meet the Third Permit Cycle Loading Reduction Requirement. Alternative options may be implemented utilizing proprietary or non-proprietary BMP's should they be deemed more effective or less costly.
The quantity and location of any purchased nutrient credits or installed BMP's will be adequate to meet the required pollutant removal in this third permit cycle. The removal rates will be determined from the BMP clearinghouse and DEQ approved removal rates based on the BMP's selected. Phase III BMP's will be designed and bid so that construction can occur during the summer when school is not in session. All construction, or nutrient credit purchases, shall be completed before the end of the permit cycle. The table below details the remaining Loading Reduction Requirements for the third permit cycle.

POC REDUCTIONS REQUIRED FOR EACH PERMIT CYCLE

THIRD PERMIT CYCLE (2023 - 2028)

		REQ'D LOAD REDUCTION		ACHIEVED LOAD REDUCTION (THRU PERMIT CYCLE YEAR 1)								
REGULATED URBAN SUBSOURCE	POLLUTANT	THRU COMPLETED THIRD PERMIT CYCLE		FIRST PERMIT CYCLE ONLY	+	SECOND PERMIT CYCLE ONLY	+	THIRD PERMIT CYCLE-YEAR 1	=	CURRENT PERMIT TOTAL	DIFFERENTIAL VS REQUIRED	PERCENTAGE OF TOTAL POC
		(%)	(lbs/yr)	(lbs/yr)		(lbs/yr)		(lbs/yr)		(lbs/yr)	(lbs/yr)	(%)
IMPERVIOUS	*NITROGEN*	*100.00%*	*52.06*									
PERVIOUS	*NITROGEN*	*100.00%*	*37.18*									
TOTAL REQUIRED NITROGEN LOAD REDUCTION =			89.24	4.57	+	31.14	+	0.00	=	35.71	-53.53	40.01%
IMPERVIOUS	*PHOSPHORUS*	*100.00%*	*8.89*									
PERVIOUS	*PHOSPHORUS*	*100.00%*	*1.83*									
TOTAL REQUIRED PHOSPHORUS LOAD REDUCTION =			10.72	0.63	+	4.65	+	0.00	=	5.28	-5.44	49.24%

TSS LOAD REDUCTIONS ARE NO LONGER REQUIRED IN THE THIRD PERMIT CYLCE (2023 - 2028). TSS REDUCTIONS ARE NOW MOOT.

TMDL Action Plan Tracking Notes:	REQUIRED Third Permit Cycle POC Loading Reductions
A Single TMDL Action Plan has been prepared for the Third Permit Cylce.	
CB TMDL Action Plan Phase 3	N = 53.53 lbs/yr and P = 5.44 lbs/yr
This Action Plan proposes consideration of multiple options to satisfy the required POC Load Reductions.	
See CB TMDL Action Plan Phase 3 - Section "5.0 Means and Method to Meet the Required Reductions and Schedule".	

6.0 Public Comments on Draft Chesapeake Bay TMDL Action Plan (GENERAL PERMIT REQUIREMENTS MS4 General Permit Part II.A.11.f and Phase I PERMIT REQUIREMENTS)

A summary of any comments received as a result of public participation required in Part II A 12, the permittee's response, identification of any public meetings to address public concerns, and any revisions made to Chesapeake Bay TMDL action plan as a result of public participation.

Frederick County Public Schools will post the draft TMDL Action Plan to its website in the fall of 2024 and will send an announcement that it is available for public review and comment for a period of no less than 15 days. After which all public comments will be compiled, reviewed, and any changes to the TMDL Action Plan made.

The announcement may be made via the e-mail and on its Facebook page, publishment in a local newspaper, or other acceptable means of notification.

7.0 Opportunity for Public Comment on Additional BMPs, Not Previously Approved

(MS4 General Permit Part II.A.12). *As required by 9VAC25-890-40 Part II.A.12, prior to submittal of the action plan, the permittee shall provide an opportunity for receipt of public comment on the Chesapeake Bay TMDL action plan; and a list of all public comments on the additional BMPs proposed to meet the reductions not previously approved by the department in the first phase Chesapeake Bay TMDL action plan for no less than 15 days.*

Frederick County Public Schools will post the draft TMDL Action Plan to its website in the fall of 2024 and will send an announcement that it is available for public review and comment for a period of no less than 15 days. After which all public comments will be compiled, reviewed, and any changes to the TMDL Action Plan made.
The announcement may be made via the e-mail and on its Facebook page, publishment in a local newspaper, or other acceptable means of notification.

A17 Nutrient Credits Agreement 09/01/2020

AGREEMENT FOR PURCHASE AND SALE OF NONPOINT NUTRIENT OFFSET CREDITS

This agreement for the Purchase and Sale of Nonpoint Offset Credits (this "Agreement") is made this 12th day of August, 2020 (the "Effective Date"), between **Virginia Nutrient Bank, LLC**, a Virginia Limited Liability Company ("Seller") and **Frederick County Public Schools** ("Purchaser").

RECITALS

A. Seller is the broker and exclusive selling agent of an approved nonpoint nutrient offset generation bank entitled the Shenandoah Nutrient Bank (Potomac-045) (HUC:02070006) (the "Bank") consisting of 83.91 acres, more or less, located near New Market in Shenandoah County, Virginia. The Bank has been authorized by the Virginia Department of Environmental Quality ("VDEQ") to generate and transfer nonpoint source offsets in accordance with i) the Chesapeake Bay Watershed Nutrient Credit Exchange Program (VA Code 62.1-44.19:14 et seq), ii) (VA Code 62.1-44.15:35), and iii) the Virginia Soil and Water Conservation Board's Guidance Document on Stormwater Nonpoint Nutrient Offsets approved on July 23, 2009 to those regulated entities qualifying for nutrient offsets. The Bank was approved on May 28, 2020 to generate 619.28 pounds of nitrogen reduction, 88.06 pounds of phosphorous reduction, and 30,599.62 pounds of sediment reduction within the North Fork of the Shenandoah River (HUC: 02070006) and thence the Potomac River Watershed. Operation, management and maintenance of the Bank are subject to the requirements of the Nonpoint Nutrient Offset Generation Certification approved by the VDEQ on May 13, 2020 and to the statutes, regulations and policies cited therein.

B. Purchaser has applied for and obtained site plan approval from Frederick County for Frederick County Public Schools MS4. The MS4 requires the reduction of 3.05 pounds of phosphorous to obtain the additional 21.47 pounds of nitrogen and 1,059.85 pounds of sediment each year to be applied to the MS4 requirements. Purchaser proposes to offset the annual nutrient control requirement by purchasing 3.05 pounds of phosphorus with the associated 21.47 pounds of nitrogen and 1,059.85 pounds of sediment (the "Nutrient Credits") from Seller.

AGREEMENT

NOW, THEREFORE, for and in consideration of the mutual promises and agreements contained herein and for the good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Seller and Purchaser agree as follows:

1. Recitals. The foregoing Recitals are hereby incorporated into this Purchase Agreement as a matter of contract and not mere recital.

2. Sale and Purchase. Seller agrees to sell, and Purchaser agrees to purchase 3.05 Nutrient Credits from the Bank for the purchase price of **$67,100.00**, which includes the 6% State DEQ Fee ($3,798.11), and in accordance with the terms and conditions set forth in this Agreement.

3. Deposit.

4. Payment of Purchase Price. Purchaser shall pay the Purchase Price, Net of the Deposit, to Seller on or before the date of Closing (as hereinafter defined) in cash, a check made out to **Virginia Nutrient Bank, LLC** or by making a wire transfer of immediately available federal funds to an account at a financial institution designated in writing by Seller.

5. Seller's Representation and Warranties. Seller hereby makes the following representations and warranties:

a. Authorization, Execution and Delivery. This Agreement has been duly authorized, executed and delivered by all necessary action on the part of Seller, constitutes the binding agreement of Seller and is enforceable in accordance with its terms.

b. Compliance with Laws. Seller will comply with all applicable State of Virginia laws and regulations with regard to Chesapeake Bay Watershed Nutrient Credit Exchange Program and the Virginia Stormwater Offset Program. The intent is for the Seller to legally transfer the Nutrient Credits to the Purchaser.

6. Purchaser's Representations and Warranties. Purchaser hereby makes the following representations and warranties:

a. Authorization, Execution and Delivery. This Agreement has been duly authorized, executed and delivered by all necessary action on the part of Purchaser, constitutes the valid and binding agreement of Purchaser and is enforceable in accordance with its terms.

b. As Is Where Is Sale. Purchaser acknowledges and agrees that Purchaser is purchasing the Nutrient Credits "AS IS, WHERE IS," at Closing. The Seller has not made and does not make any representations or warranties, either expressed or implied, with respect to the Nutrient Credits, other than as expressly set forth in Paragraph 5, and in entering into this Agreement, Purchaser has not been induced by, and has not relied upon, any representations, warranties or statements, whether expressed or implied, made by the Seller or any agent, employee or other representative of the Seller, which are not expressly set forth herein. This Paragraph shall survive Closing and delivery of the Nutrient Credits.

7. Closing. Closing on the purchase and sale of the Nutrient Credits pursuant to this Agreement ("Closing") shall be held at a location mutually agreeable to Purchaser and Seller, at a time and date to be agreed upon by the Parties, but not later than 4:00 p.m. on ___________, 2020, unless Seller consents in writing to a later date.

8. Seller's Deliveries.

a. At Closing, Seller shall deliver to Purchaser a signed Bill of Sale (Exhibit A), Affidavit of Nutrient Offset Sale (Exhibit B), and DEQ Water Quality Enhancement Fee Form (Exhibit C) substantially in the form of Exhibits A, B, and C attached hereto and incorporated herein by, this reference, evidencing the sale to Purchaser of the Nutrient Credits from the Bank. (Note: Seller is responsible for all fees associated with the DEQ Water Quality Enhancement Fee Form)

b. Not more than thirty (30) calendar days following the Closing, Seller shall deliver, or cause to be delivered, to Purchaser a copy of Seller's Ledger entry, or other documentation, recording the sale of the Nutrient Credits to Purchaser as provided herein and debiting the Nutrient Credits sold to Purchaser against the outstanding Nutrient Credits in the Bank in accordance with the Nonpoint Nutrient Offset Generation Certification.

9. Closing Costs. Seller shall pay the cost of preparing the Bill of Sale, Affidavit, and DEQ Water Quality Enhancement Fee Form, any taxes and costs customarily paid by Sellers including the DEQ Enhancement Fee, and Seller's attorney's fees. Purchaser shall pay any taxes customarily paid by Purchaser, Purchaser's attorney's fees and all other costs of Closing, if any.

10. Default.

a. By Purchaser. If Purchaser defaults in performing any of Purchaser's obligations under this Agreement, and if such default continues for a period of ten (10) days after Seller has provided written notice to Purchaser of such default, Seller may terminate this Agreement by providing written notice to Purchaser whereupon this Agreement shall terminate and Purchaser and Seller shall have no further obligations hereunder. Seller agrees that it waives any and all other rights and remedies against Purchaser and all other claims for damages against Purchaser arising from Purchaser's default under the terms of this Agreement.

b. By Seller. If Seller defaults in performing any of Seller's obligations under this Agreement, and if such default continues for a period of ten (10) days after Purchaser has provided written notice to Seller of such default, Purchaser's sole and exclusive remedy shall be to terminate this Agreement by providing written notice thereof to Seller and receive a refund of any amounts paid to Seller including the Deposit, in which event neither party shall have any further rights or obligations hereunder, except as expressly provided herein.

11. Effect of Condemnation, Regulatory Action or Force Majeure.

a. Condemnation. If the Bank property or any part thereof is taken prior to Closing pursuant to eminent domain proceedings, or if such proceedings are commenced prior to Closing, and as a result Seller determines that it will be unable to transfer the Nutrient Credits to Purchaser at Closing as specified in this Agreement, then Seller may terminate this Agreement by providing written notice to Purchaser at any time prior to Closing and the Deposit will be returned to Purchaser within 5 days of notification, and neither party shall have any further rights or obligations hereunder, except as expressly provided herein.

b. Regulatory Action.

i. If Seller is unable to transfer the Nutrient Credits to Purchaser as provided in this Agreement because of the action or order of any municipality or regulatory agency, regardless of whether or not Seller has contested or challenged such action or order, Seller may terminate this Agreement by providing written notice to Purchaser at any time prior to Closing and the Deposit will be returned to Purchaser within 5 days of notification and neither party shall have any further rights or obligations hereunder, except as expressly provided herein.

ii. If Purchaser is prevented by any municipality or regulatory agency from acquiring the Nutrient Credits from Seller as provided in this Agreement, or if Purchaser's nonpoint nutrient offset plan or site plan is not approved by any municipality or regulatory agency, Purchaser may terminate this Agreement by providing written notice to Seller at any time prior to Closing and the Deposit will be returned to Purchaser within 5 days of notification, and neither party shall have any further rights or obligations hereunder, except as expressly provided herein.

c. Force Majeure. If Seller is unable to transfer the Nutrient Credits to Purchaser as provided in this Agreement because of damage to or loss of the Bank property resulting from fire, flood, storm, drought or other natural disaster, or from any other cause that is not the fault of Seller and is beyond Seller's reasonable ability to prevent or control, Seller may terminate this Agreement by providing written notice to Purchaser at any time prior to Closing and the Deposit will be returned to Purchaser within 5 days of notification, and neither party shall have any further rights or obligations hereunder, except as expressly provided herein.

12. Indemnification.

   a. Seller's Indemnification. Seller shall be solely responsible for compliance with the Nonpoint Nutrient Offset Generation Certification and with all statutes, regulations and requirements applicable to the operation, management and maintenance of the Bank, and for ensuring the payment of all taxes owed by the Bank or assessed against the Bank property ("Bank Regulatory Requirements"). Seller shall indemnify, defend and hold harmless Purchaser and Purchaser's authorized successors and assigns from and against any action, order, investigation or proceeding initiated by any government agency and arising from or based upon Seller's failure to comply with any Bank Regulatory Requirement. Seller's duty to indemnify Purchaser under this Paragraph 12 shall survive Closing.

13. Credit Not Real Estate. The sale and conveyance of the Nutrient Credits to Purchaser in accordance with this Agreement shall not constitute the conveyance or transfer of any right, interest or ownership in real property or in the Bank, nor shall such sale and conveyance impose upon Purchaser any obligation, duty or liability arising from or incident to ownership of or interest in real property. Purchaser shall have no right of access to Bank property.

14. Miscellaneous.

   a. No Joint Venture. This Agreement is made solely for the purposes set forth herein and no joint venture, partnership or other relationship between Purchaser and Seller is created hereby.

   b. No Third-Party Beneficiary. This Agreement shall bind and inure to the benefit of the Parties hereto and their respective successors and authorized assigns. This Agreement does not create or convey any rights, benefits or interests on behalf of any other person.

   c. Assignment. This Agreement may be assigned prior to Closing only by written agreement of both parties, and any assignee shall assume the rights and obligations of its assignor.

   d. Entire Agreement. This Agreement sets forth the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior negotiations and agreements, written or oral. Each provision contained in this Agreement shall be severable from all other provisions hereof and the invalidity of any such provision shall not affect the enforceability of the other provisions of this Agreement. This Agreement may be modified only by a written instrument duly executed by both Seller and Purchaser.

   e. Choice of Laws. This Agreement shall be construed, performed and enforced under the laws of the Commonwealth of Virginia.

   f. Counterparts. This Agreement may be executed in one or more counterparts by the Parties. All counterparts shall collectively constitute a single agreement.

   g. Notices. All notices shall be in writing and sent by hand, facsimile transmission, overnight delivery service or certified mail, return-receipt requested, to the following addresses:

If to Seller: Virginia Nutrient Bank, LLC
Attn: Nathan W. Blackwell
PO Box 142
Penn Laird, VA 22846
Telephone: 540-908-1679
Electronic Mail: Nathan@virginianutrientbank.com

SEND DOCUMENTS TO:
566 East Market St
Harrisonburg, VA 22801

If to Purchaser: Frederick County Public Schools
Attn:
1415 Amherst Street
Winchester, VA 22601
Telephone: 540-662-3888
Electronic Mail:

Notices shall be deemed received (i) if hand delivered, when received, (ii) if given by electronic mail, when transmitted to the electronic mail address specified above during normal business hours and confirmation of complete receipt is received during normal business hours (provided a copy of the same is sent by overnight delivery service on the same day), (iii) if given by overnight delivery service, the first business day after being sent prepaid by such overnight delivery service, or (iv) if given by certified mail, return receipt requested, postage prepaid, two(2) days after posting with the United States Postal Service. Either party may change its address by notifying the other party in a manner described above.

15. Automatic Termination. This Agreement shall automatically terminate and become null and void in the event it has not been executed on behalf of Purchaser and returned to the Seller, no later than 4:00 p.m. local Harrisonburg, Virginia time on ______________________.

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK;
SIGNATURES APPEAR ON THE FOLLOWING PAGE]

Signatures:

Date 9/1/2020

Seller- Nathan W. Blackwell
Virginia Nutrient Bank, LLC

Patty Camery Date 8/12/2020

Purchaser
Print Name: Patty Camery
Frederick County Public Schools

A18 Construction Site Stormwater Runoff Control

Record of Corrective Actions

Location	Describe Corrective Action Performed	Date Performed	Additional Notes

Record of Land Disturbance & Stabilization Practices

Location	Dates		Describe Stabilization Measures Implemented
	Land Disturbance Began	Land Disturbance Ended	

Record of Site Inspections

Location	Control Measure			Incident of Non-Compliance (Y/N)[1]	Note Corrective Actions Taken and Provide any Additional Necessary Comments
	Type	Maintenance Required (Y/N)	Additional BMP Required (Y/N)		

Name:________________________________ Title:________________ Date:____________________

Signature: _________________________________

Record of Site Maintenance

Location	Describe Maintenance Performed	Date Performed	Additional Notes

A19 SWM Improvements – As-Built Plans & Photos

RECORD DRAWINGS

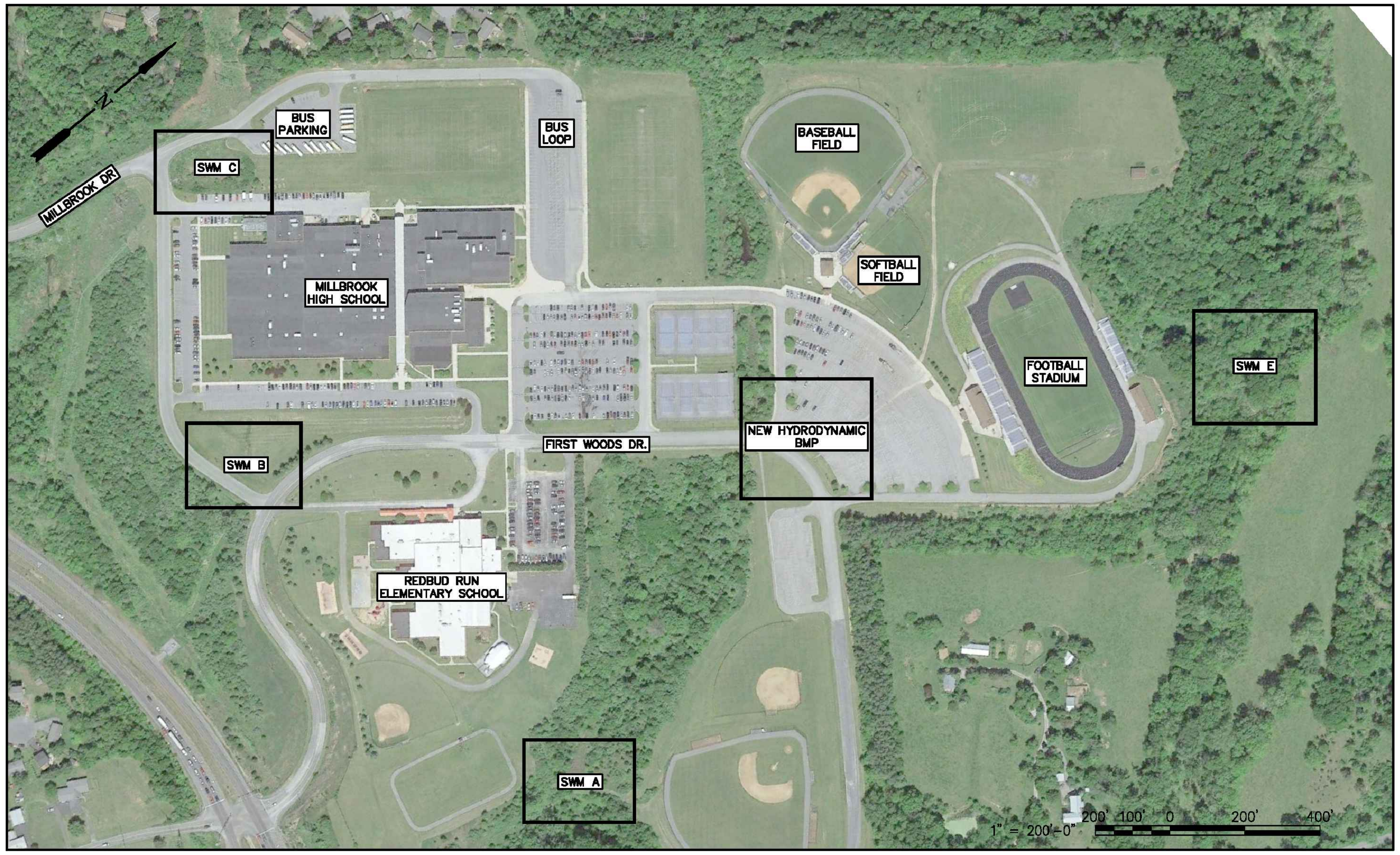
FREDERICK COUNTY PUBLIC SCHOOLS

MILLBROOK H.S./ REDBUD RUN E.S. CAMPUS STORMWATER MANAGEMENT IMPROVEMENTS

FREDERICK COUNTY, VIRGINIA

IFB 21002

JEFF WARNER LAND SURVEYING, INC.
9442 CENTER POINT LANE
MANASSAS, VIRGINIA 20110
(703) 369-5249 FAX (703) 369-5783



LEGEND

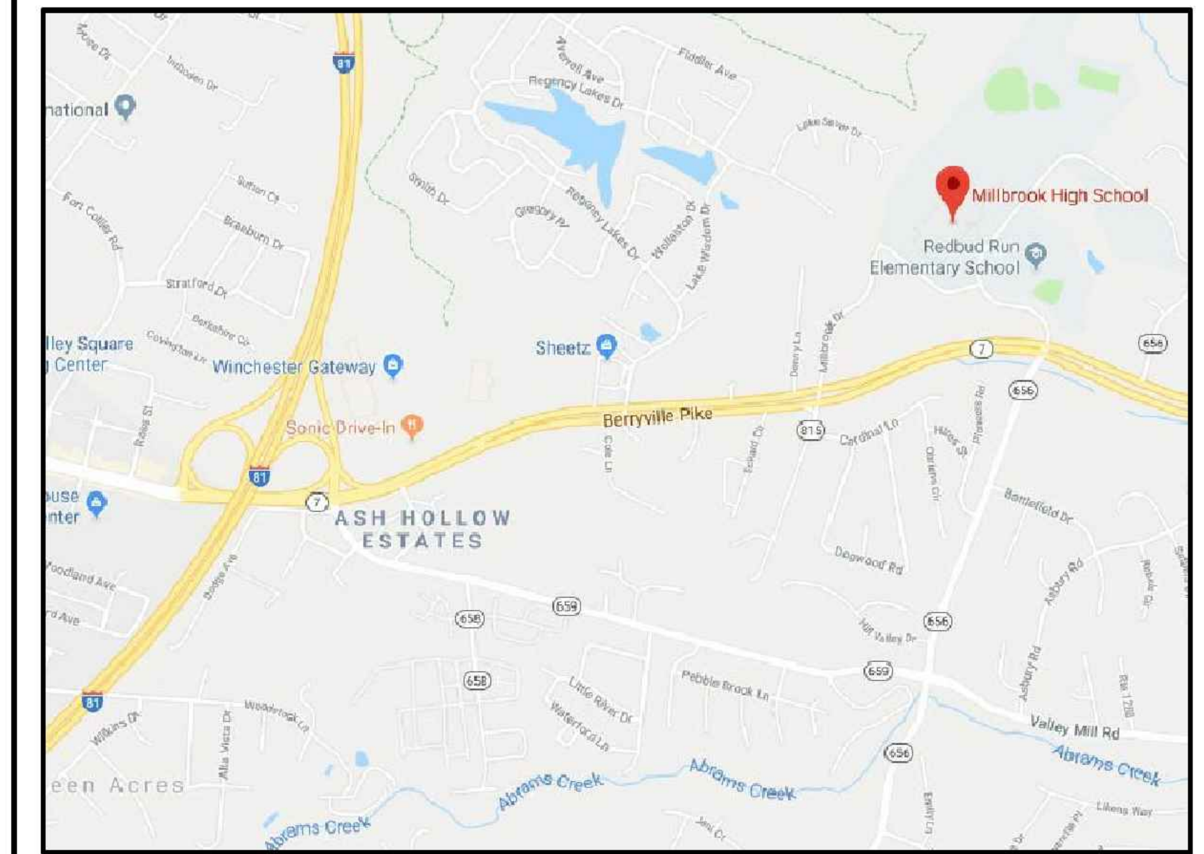
EXISTING	DEMO	NEW	DESCRIPTION
2050		2050	CONTOURS
			CONCRETE CURB
			CONCRETE CURB & GUTTER
			CONCRETE PAD/WALK
			PAVEMENT
			BUILDING
			SITE FEATURES
X X	X X	X X	FENCING
			PROPERTY LINE
			CENTERLINE OR BASELINE
			BENCHMARK
SD	SD	SD	STORM SEWER LINE
			CURB INLET
			DROP INLET
			END SECTION / END WALL
			MANHOLE
OHE	OHE	OHE	ELECTRIC – OVERHEAD
UGE	UGE	UGE	ELECTRIC – UNDERGROUND
UGT	UGT	UGT	TELEPHONE – UNDERGROUND
FO	FO	FO	FIBER OPTIC – UNDERGROUND
G	G	G	GAS LINE
M	M	M	GAS METER
SS	SS	SS	SANITARY SEWER
CO	CO	CO	CLEANOUT
W	W	W	WATER LINE
			GATE VALVE
			WATER METER
			FIRE HYDRANT
			TREE LINE
			SIGNS

PROJECT DESCRIPTION

THIS PROJECTS' PURPOSE IS TWOFOLD; THE FIRST IS TO INSTALL A HYDRODYNAMIC MANUFACTURED BMP IN AN EXISTING STORM DRAIN AT MILLBROOK HIGH SCHOOL TO SATISFY THE APPROVED TMDL ACTION PLAN FOR THE FREDERICK COUNTY PUBLIC SCHOOL MS4 PROGRAM.

THE SECOND IS TO PROVIDE MAINTENANCE AND IMPROVEMENTS TO SEVERAL EXISTING STORMWATER BMP'S TO IMPROVE THEIR PERFORMANCE AND MAINTAIN THEIR EFFECTIVENESS.

VICINITY MAP



PROJECT NOTES

1. OWNER:
   FREDERICK COUNTY SCHOOL BOARD
   SUPERINTENDENT OF SCHOOLS
   1415 AMHERST STREET
   WINCHESTER, VA 22601
   (540) 622-3888
2. ARCHITECT/ENGINEER:
   OWPR, INC.
   200 COUNTRY CLUB DRIVE
   PLAZA ONE, BUILDING "E"
   BLACKSBURG, VA 24060
   (540) 552-2151
   CONTACT: WILLIAM A. SHELTON, P.E.
3. PROJECT LOCATION:
   251 FIRST WOODS DRIVE
   WINCHESTER, VA 22603
4. SITE AREAS:
   TOTAL SITE AREA: 128.48 ACRES
   TOTAL DISTURBED AREA: 0.20 ACRES
5. ZONING: RURAL AREAS (RA)
6. MAGISTERIAL DISTRICT: RED BUD
7. PROPERTY INFORMATION:
   TAX PARCEL: 55-A-22
   CURRENT USE: EDUCATIONAL
   PROPOSED USE: EDUCATIONAL
8. CONTRACTOR REQUIREMENTS:
   8.1. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING JOB SITE IN ACCORDANCE WITH ALL OSHA REQUIREMENTS.
   8.2. CONTRACTOR CREW MUST MEET THE BACKGROUND CHECK REQUIREMENTS REQUIRED TO WORK ON A VIRGINIA SCHOOL CAMPUS.
9. CONTRACTOR SHALL HAVE A LICENSED LAND SURVEYOR RESET ANY BENCHMARKS DISTURBED DURING CONSTRUCTION AND SHALL NOTE THE NEW LOCATION AND ELEVATION ON THE AS-BUILT DRAWINGS.
10. A PRE-CONSTRUCTION MEETING WILL BE HELD PRIOR TO BEGINNING CONSTRUCTION. THE CONTRACTOR, AND MAJOR SUBCONTRACTORS, OWNER, ARCHITECT/ENGINEER, AND FREDERICK COUNTY REPRESENTATIVES SHALL ATTEND THE MEETING.

COMMONWEALTH OF VIRGINIA
JEFFERY D. WARNER
Lic. No. 1667
04-13-2021
LAND SURVEYOR

FOR AS-BUILT INFORMATION ONLY

INDEX OF DRAWINGS

OWPR
ARCHITECTS AND ENGINEERS

200 Country Club Dr. SW
Plaza One - Building E
Blacksburg, Virginia 24060
P: 540-552-2151
F: 540-951-0219
www.owpr.com

5550 Winchester Avenue
Berkeley Business Park - Suite 5
Martinsburg, WV 25401
P: 304-381-8541

COMMONWEALTH OF VIRGINIA
WILLIAM A. SHELTON
PROFESSIONAL ENGINEER

REVISIONS

NO.	DATE	DESCRIPTION

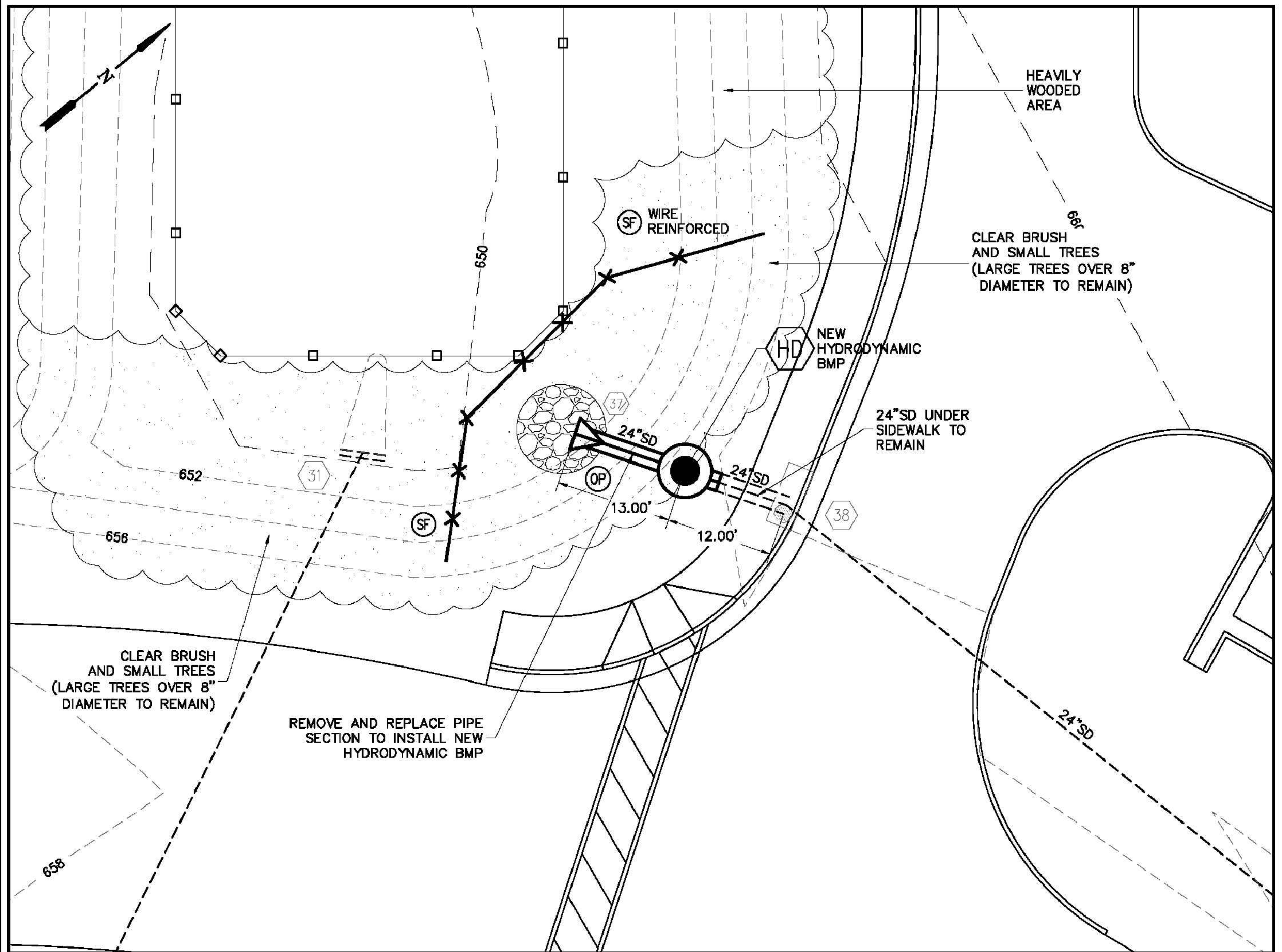
DATE
18 AUG 20

COMM NO.
2019-073

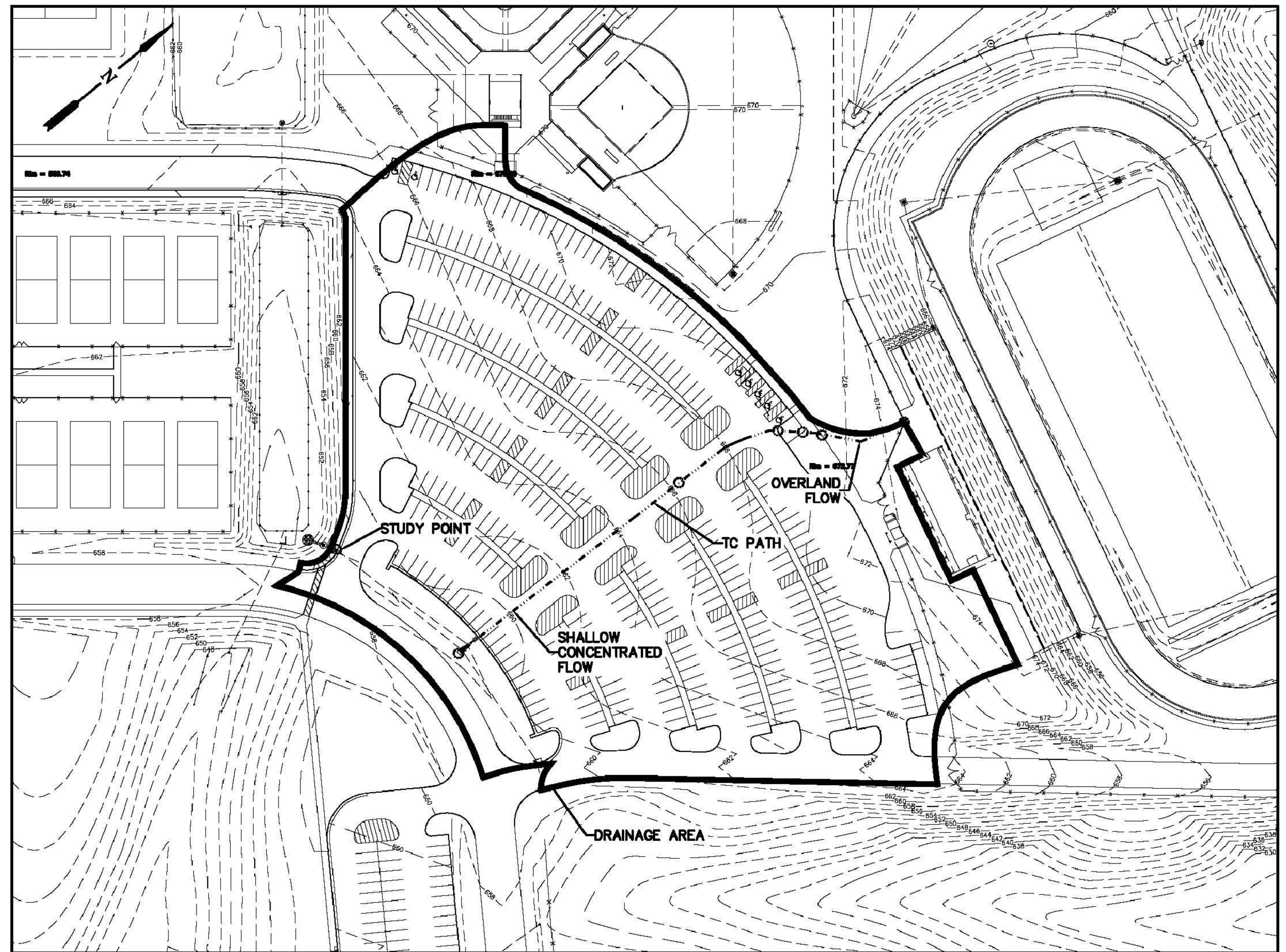
SET NO.

SHEET NO.
T001

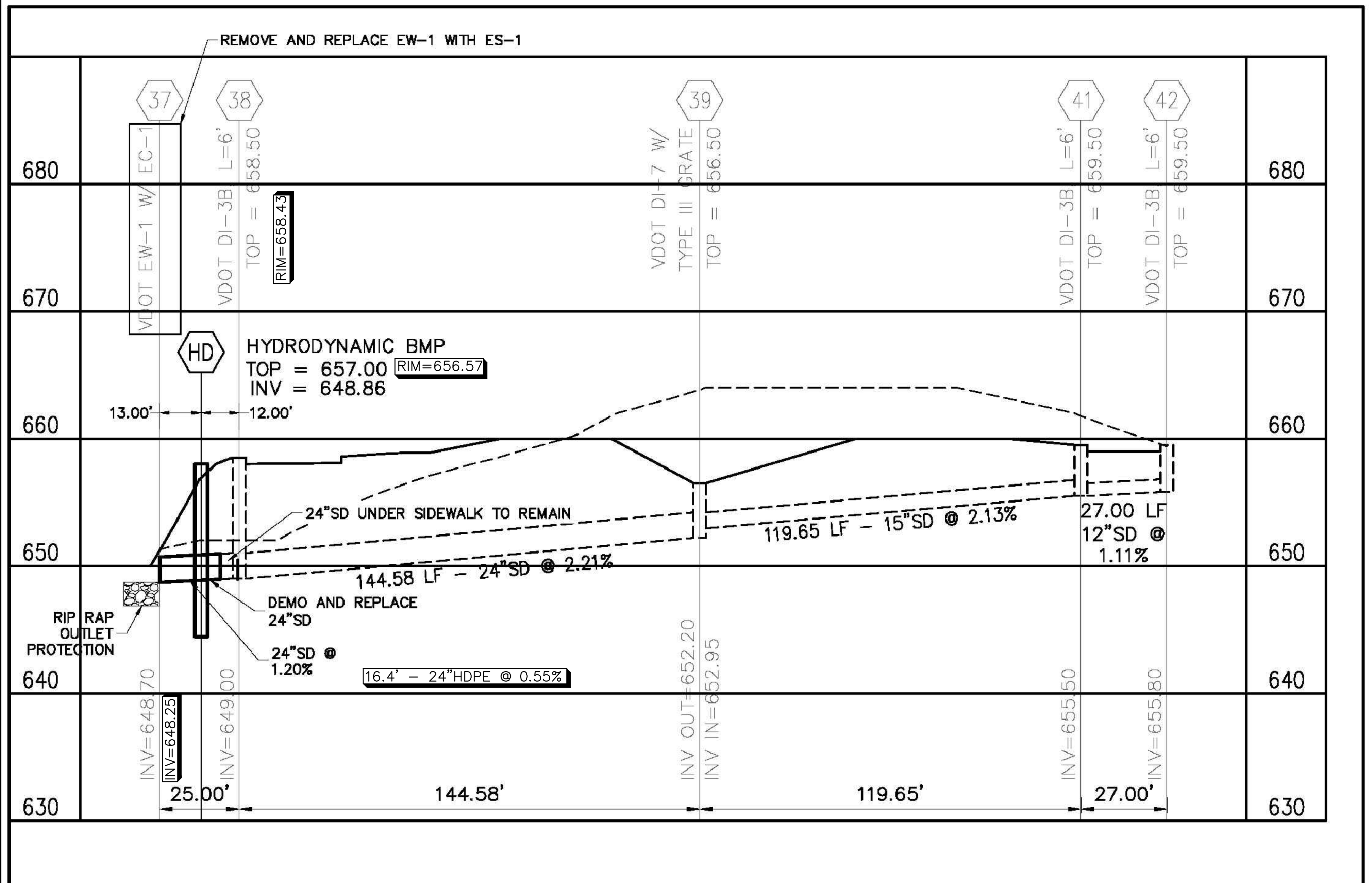
SHEET 1 OF 6



PLAN VIEW 1" = 10'-0" 10' 5' 0 10' 20'



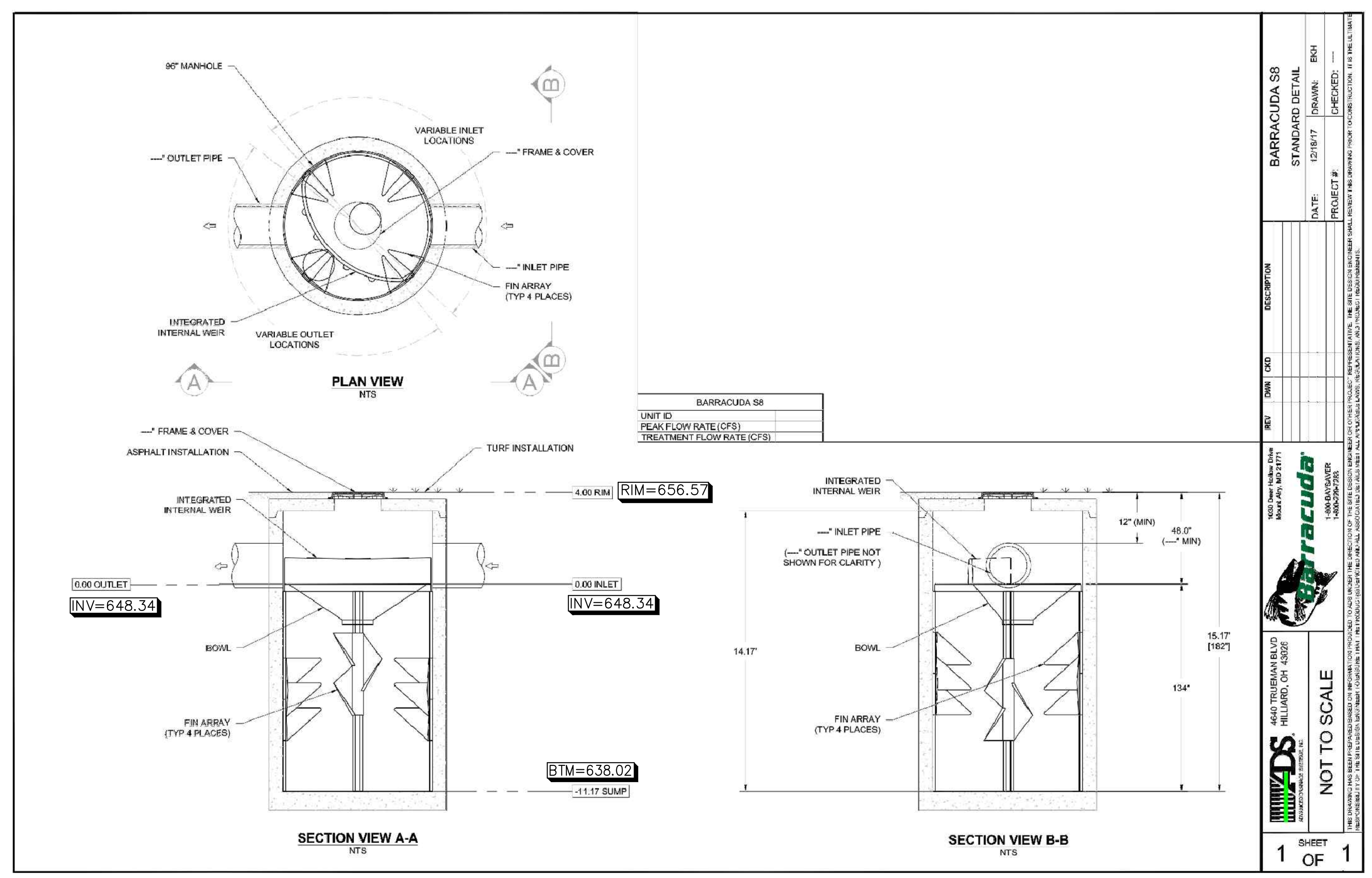
DRAINAGE AREA 1" = 80'-0" 40' 0 80' 160'



PROFILE VIEW

HORIZONTAL SCALE: 1" = 30'-0" 30' 20' 10' 0 30' 60'

VERTICAL SCALE: 1" = 3'-0" 3' 2' 1' 0 3' 6'



ASBUILT SURVEY APRIL 13, 2021

DENOTES AS-BUILT INFORMATION

JEFF WARNER LAND SURVEYING, INC.
9442 CENTER POINT LANE
MANASSAS, VIRGINIA 20110
(703) 369-5249 FAX (703) 369-5783

COMMONWEALTH OF VIRGINIA
JEFFERY D. WARNER
Lic. No. 1667
04-13-2021
LAND SURVEYOR

FOR AS-BUILT INFORMATION ONLY

OWPR ARCHITECTS AND ENGINEERS

FREDERICK COUNTY PUBLIC SCHOOLS
MILLBROOK H.S./ REDBUD RUN E.S. CAMPUS
STORMWATER MANAGEMENT IMPROVEMENTS
IFB 21002
FREDERICK COUNTY VIRGINIA

Comm. No. 2019-073
Date 18 AUG 20

Designed: WAS
Drawn: LCK
Checked: BTL
Approved: WAS

NEW HYDRODYNAMIC BMP
SITE PLAN AND PROFILE

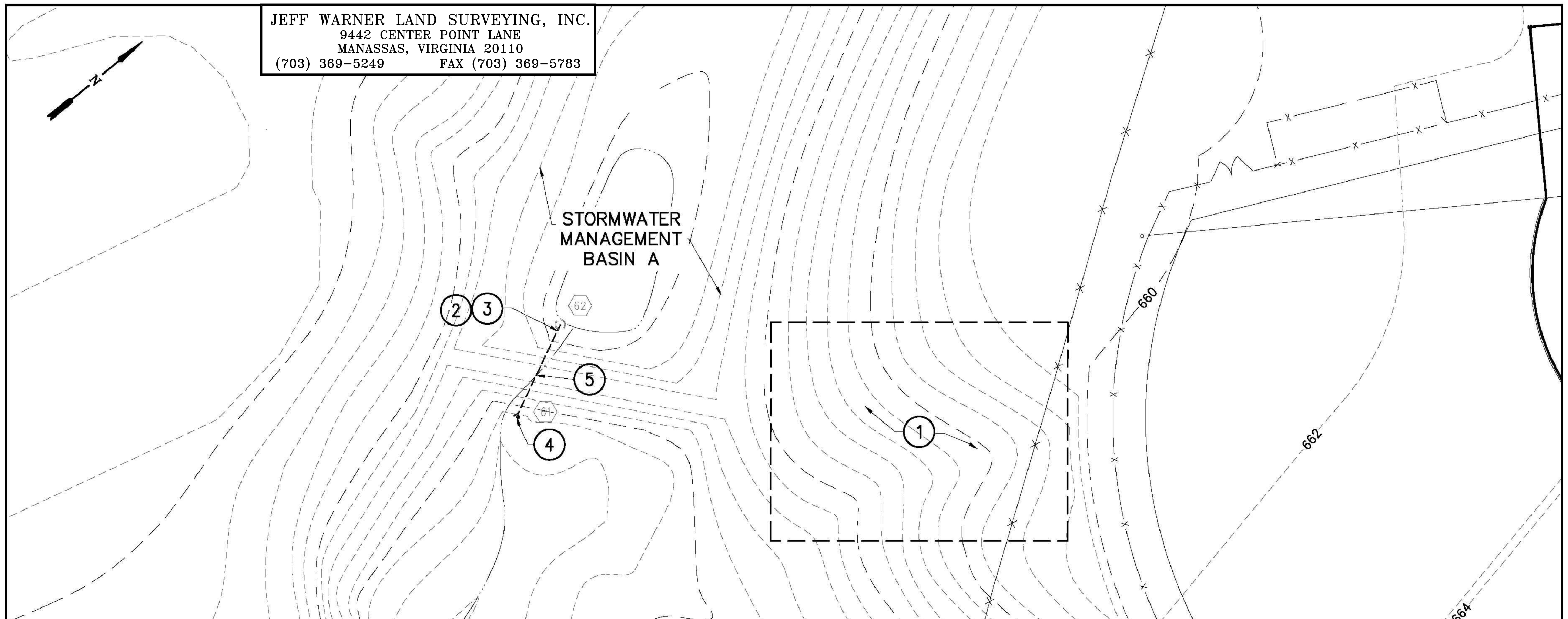
No.	Description	Date

Revisions

SHEET 2 OF 6

Bill Shelton – J:\2019 Projects\2019-073\Civil\2019-073 Civil Base.dwg – Thu, 13 Aug, 2020 – 3:54

JEFF WARNER LAND SURVEYING, INC.
9442 CENTER POINT LANE
MANASSAS, VIRGINIA 20110
(703) 369-5249 FAX (703) 369-5783



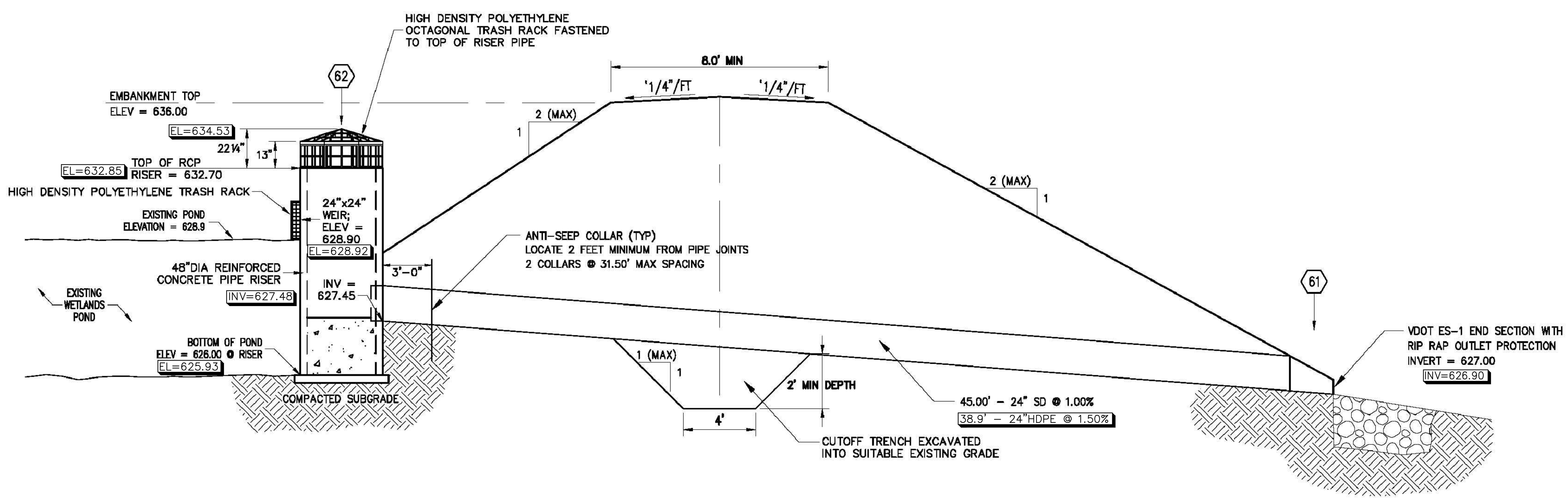
PLAN VIEW

1" = 30'-0" 30' 20' 10' 0 30' 60'

MAINTENANCE PLAN KEY NOTES

1. REGRADE AND SEED ERODING SLOPE EAST OF THE POND AND WEST OF THE BALL FIELD.
2. SEED DENUDED AREA IN THE VICINITY OF THE POND FLOW CONTROL STRUCTURE.
3. FILL IN HOLES THAT HAVE DEVELOPED AROUND THE BASE OF THE FLOW CONTROL STRUCTURE.
4. PROVIDE OUTLET PROTECTION AT THE FLARED END DISCHARGE SECTION.
5. VERIFY ASBUILT OUTLET STRUCTURES AND POND ELEVATIONS.

5



STORMWATER MANAGEMENT BASIN "A" OUTLET STRUCTURE DETAIL

NO SCALE

1

2

3

4

ASBUILT SURVEY APRIL 13, 2021

▭ DENOTES AS-BUILT INFORMATION

COMMONWEALTH OF VIRGINIA
JEFFERY D. WARNER
Lic. No. 1667
04-13-2021
LAND SURVEYOR

FOR AS-BUILT INFORMATION ONLY

COMMONWEALTH OF VIRGINIA
WILLIAM A. SHELTON
Lic. No. 051651
PROFESSIONAL ENGINEER

OWPR
ARCHITECTS AND ENGINEERS

FREDERICK COUNTY PUBLIC SCHOOLS
MILLBROOK H.S./ REDBUD RUN E.S. CAMPUS
STORMWATER MANAGEMENT IMPROVEMENTS
IFB 21002
FREDERICK COUNTY VIRGINIA

Comm. No. 2019-073
Date 18 AUG 20

Designed:	WAS
Drawn:	LCK
Checked:	BTL
Approved:	WAS

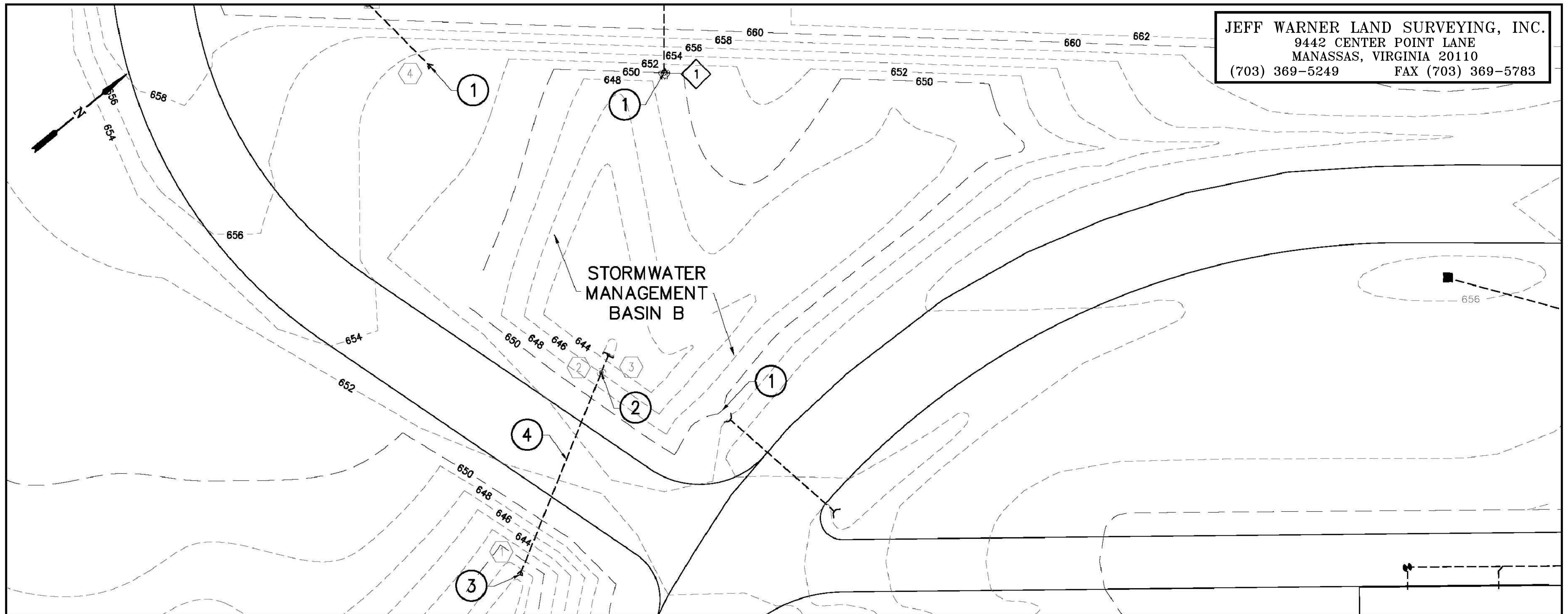
BMP MAINTENANCE PLAN – SWM A

No.	Description	Date
△		
△		
△		

Revisions

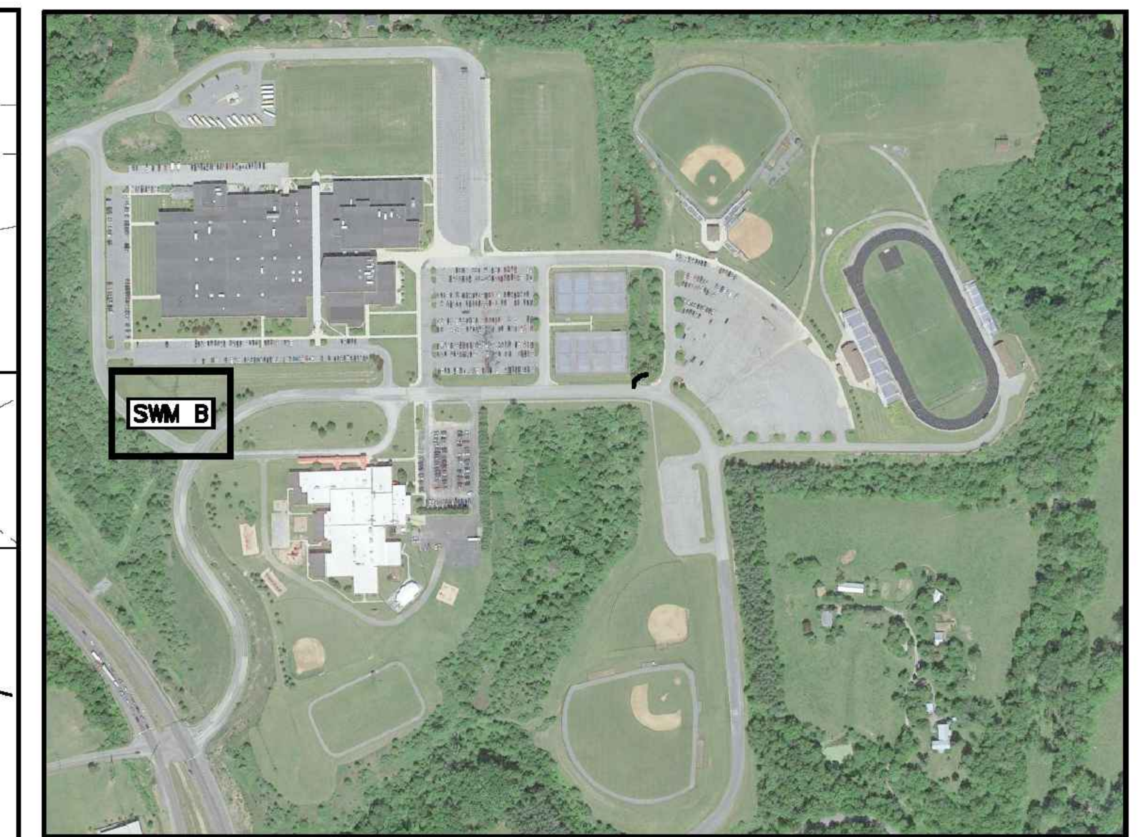
Bill Shelton – J:\2019 Projects\2019-073\Civ\2019-073 Civil Base.dwg – Thu, 13 Aug , 2020 – 4:01

JEFF WARNER LAND SURVEYING, INC.
9442 CENTER POINT LANE
MANASSAS, VIRGINIA 20110
(703) 369-5249 FAX (703) 369-5783



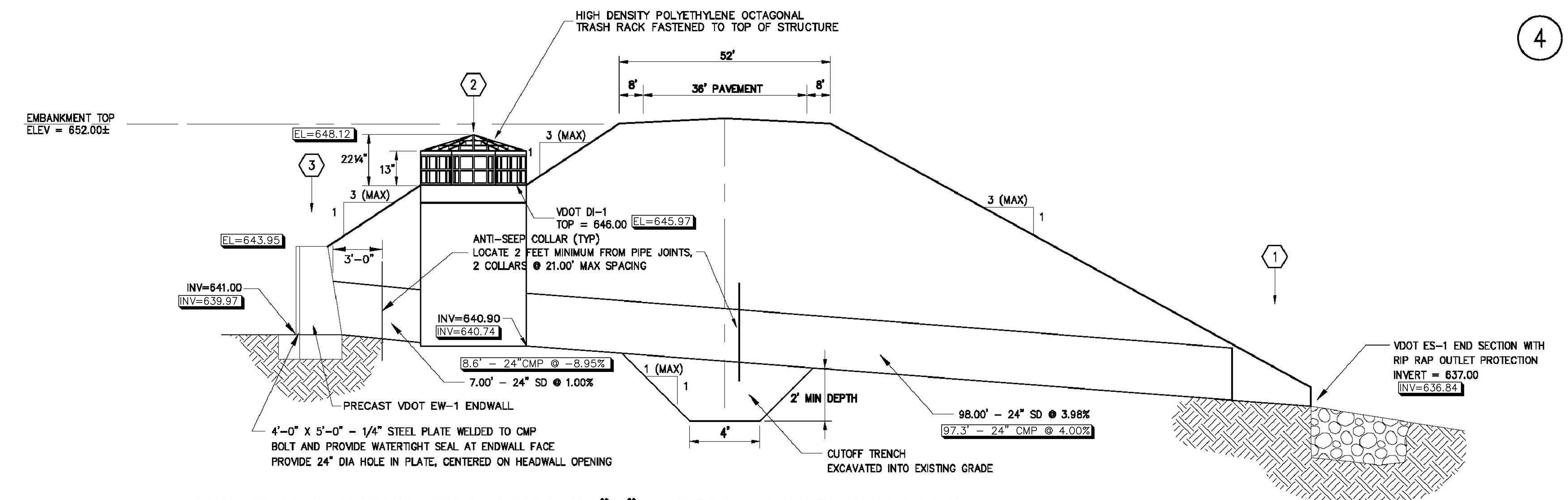
PLAN VIEW

1" = 30'-0"



MAINTENANCE PLAN KEY NOTES

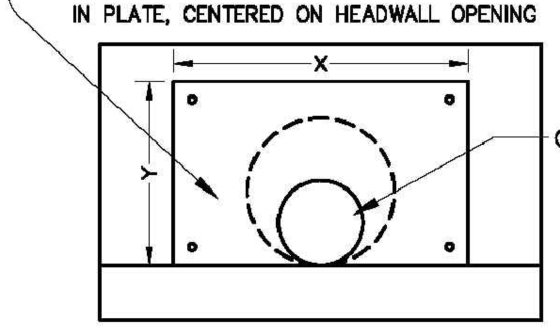
1. REGRADE AND SEED AROUND ERODED AREAS AT INLETS. PROVIDE ADDITIONAL RIP RAP
2. SECURE TRASH RACK TO FLOW CONTROL STRUCTURE.
3. REMOVE WOODY DEBRIS, VEGETATION, AND PROVIDE ADDITIONAL OUTLET PROTECTION AT POUND OUTFALL.
4. VERIFY ASBUILT OUTLET STRUCTURES AND POND ELEVATIONS.



STORMWATER MANAGEMENT BASIN "B" OUTLET STRUCTURE DETAIL

NO SCALE

1/4" STEEL PLATE - BOLT AND PROVIDE WATERTIGHT SEAL AT ENDWALL FACE. PROVIDE A CIRCULAR ORIFICE IN PLATE, CENTERED ON HEADWALL OPENING



ENDWALL NUMBER	ORIFICE DIA.	X	Y
3	10"	5'	3'
14	15"	5'	3'

NOTE: IN SEDIMENT BASINS, UPON COMPLETION OF CONSTRUCTION AND STABILIZATION OF SITE, REMOVE RISER, 5' OF CMP AND STEEL PLATE ON FACE ON HEADWALL AND GRADE TO DRAIN IN ACCORDANCE WITH SITE GRADING PLAN. THEN BOLT AND SEAL STEEL RESTRICTOR PLATE TO FACE OF HEADWALL.

ENDWALL RESTRICTOR PLATE DETAIL

NO SCALE

ASBUILT SURVEY APRIL 13, 2021

DENOTES AS-BUILT INFORMATION

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COMMONWEALTH OF VIRGINIA
JEFFERY D. WARNER
Lic. No. 1667
04-13-2021
LAND SURVEYOR
FOR AS-BUILT INFORMATION ONLY

COMMONWEALTH OF VIRGINIA
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OWPR ARCHITECTS AND ENGINEERS

FREDERICK COUNTY PUBLIC SCHOOLS
MILLBROOK H.S./ REDBUD RUN E.S. CAMPUS
STORMWATER MANAGEMENT IMPROVEMENTS
IFB 21002
FREDERICK COUNTY
VIRGINIA

Comm. No. 2019-073
Date 18 AUG 20

Designed: WAS
Drawn: LCK
Checked: BTL
Approved: WAS

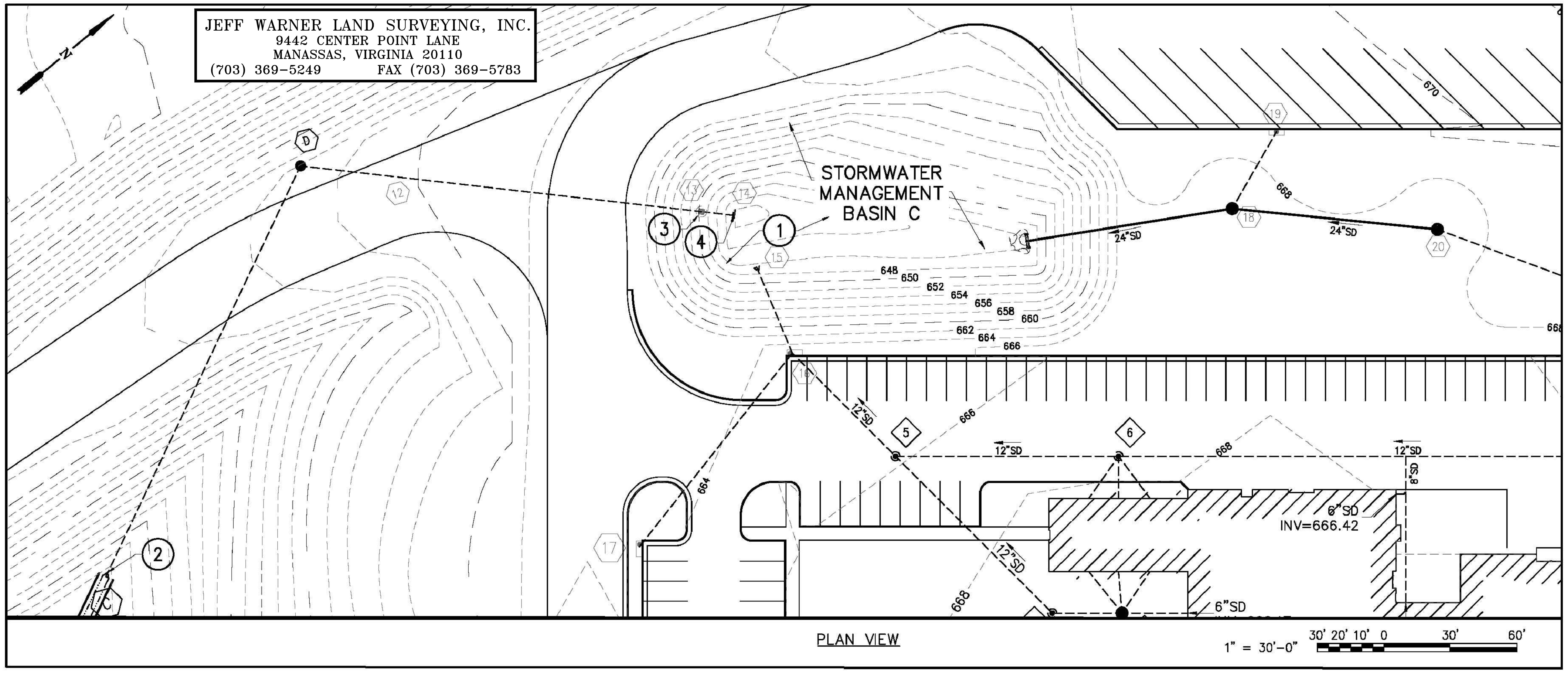
BMP MAINTENANCE PLAN - SWM B

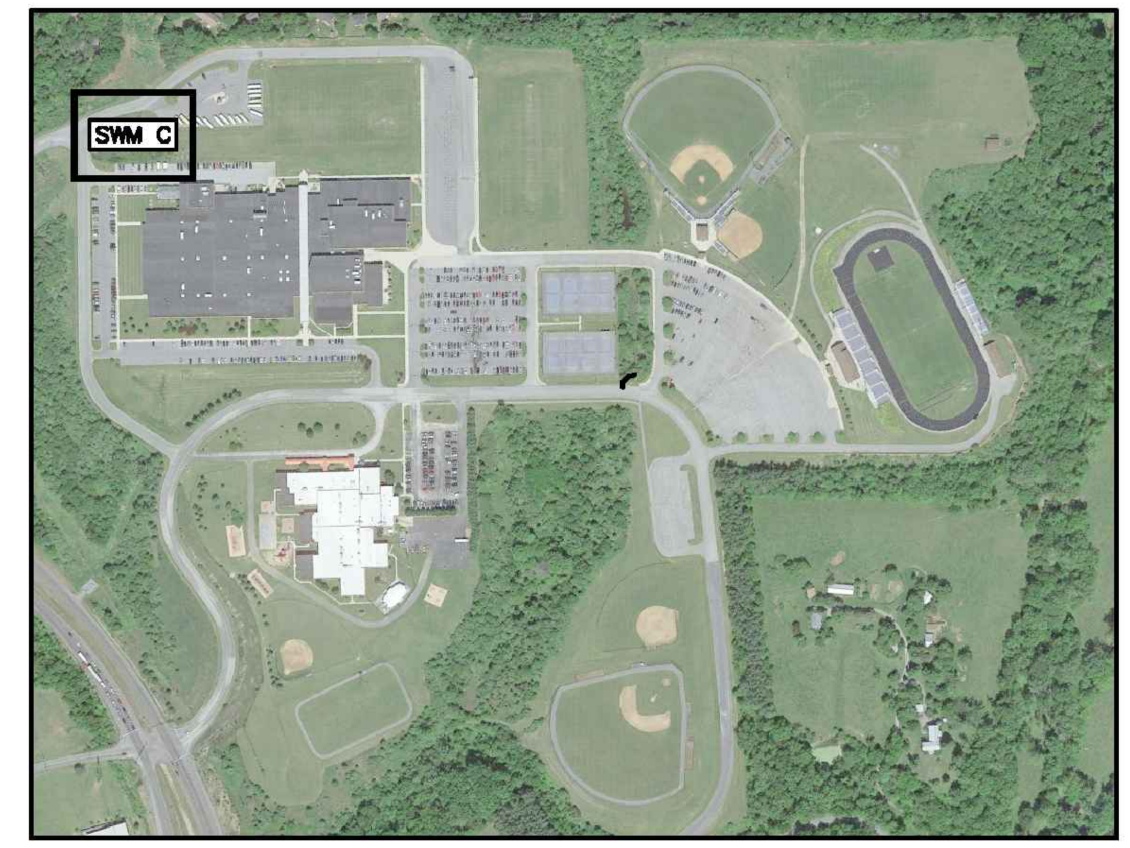
No.	Description	Date

Revisions

SHEET 4 OF 6

Bill Shelton - J:\2019 Projects\2019-073\Civ\2019-073 Civil Base.dwg - Thu, 13 Aug, 2020 - 4:10

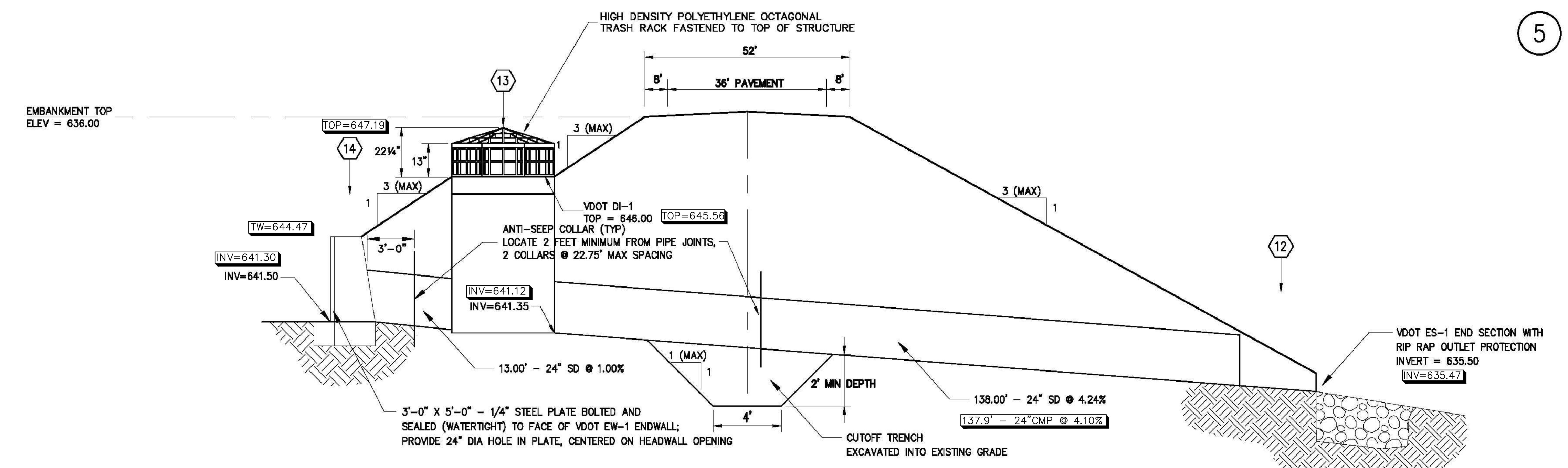




MAINTENANCE PLAN KEY NOTES

1. CLEAR WOODY DEBRIS AND VEGETATION FROM WITHIN POND.
2. CLEAR WOODY DEBRIS AND VEGETATION FROM WITHIN POND OUTFALL.
3. UNCOVER EXISTING RISER STRUCTURE, ENSURE TRASH RACK IS SECURED TO RISER STRUCTURE.
4. INSTALL A RODENT SCREEN ON POND SIDE OF OUTLET PIPE.
5. VERIFY ASBUILT OUTLET STRUCTURES AND POND ELEVATIONS.

5

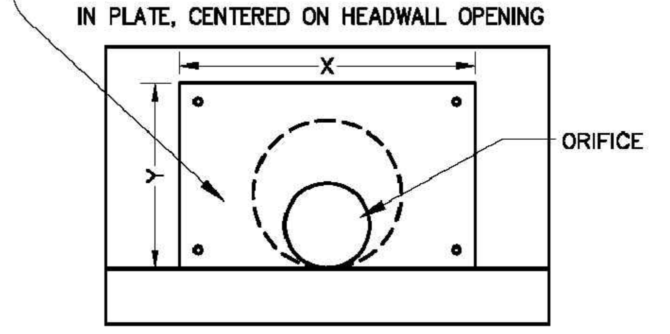


STORMWATER MANAGEMENT BASIN "C" OUTLET STRUCTURE DETAIL

NO SCALE

1/4" STEEL PLATE – BOLT AND PROVIDE WATERTIGHT SEAL AT ENDWALL FACE. PROVIDE A CIRCULAR ORIFICE IN PLATE, CENTERED ON HEADWALL OPENING

5



ENDWALL NUMBER	ORIFICE DIA.	X	Y
3	10"	5'	3'
14	15"	5'	3'

NOTE: IN SEDIMENT BASINS, UPON COMPLETION OF CONSTRUCTION AND STABILIZATION OF SITE, REMOVE RISER, 5' OF CMP AND STEEL PLATE ON FACE ON HEADWALL AND GRADE TO DRAIN IN ACCORDANCE WITH SITE GRADING PLAN. THEN BOLT AND SEAL STEEL RESTRICTOR PLATE TO FACE OF HEADWALL.

ENDWALL RESTRICTOR PLATE DETAIL

NO SCALE

ASBUILT SURVEY APRIL 13, 2021

DENOTES AS-BUILT INFORMATION

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No.	Description	Date

Revisions

COMMONWEALTH OF VIRGINIA
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BMP MAINTENANCE PLAN – SWM C

SHEET 5 OF 6

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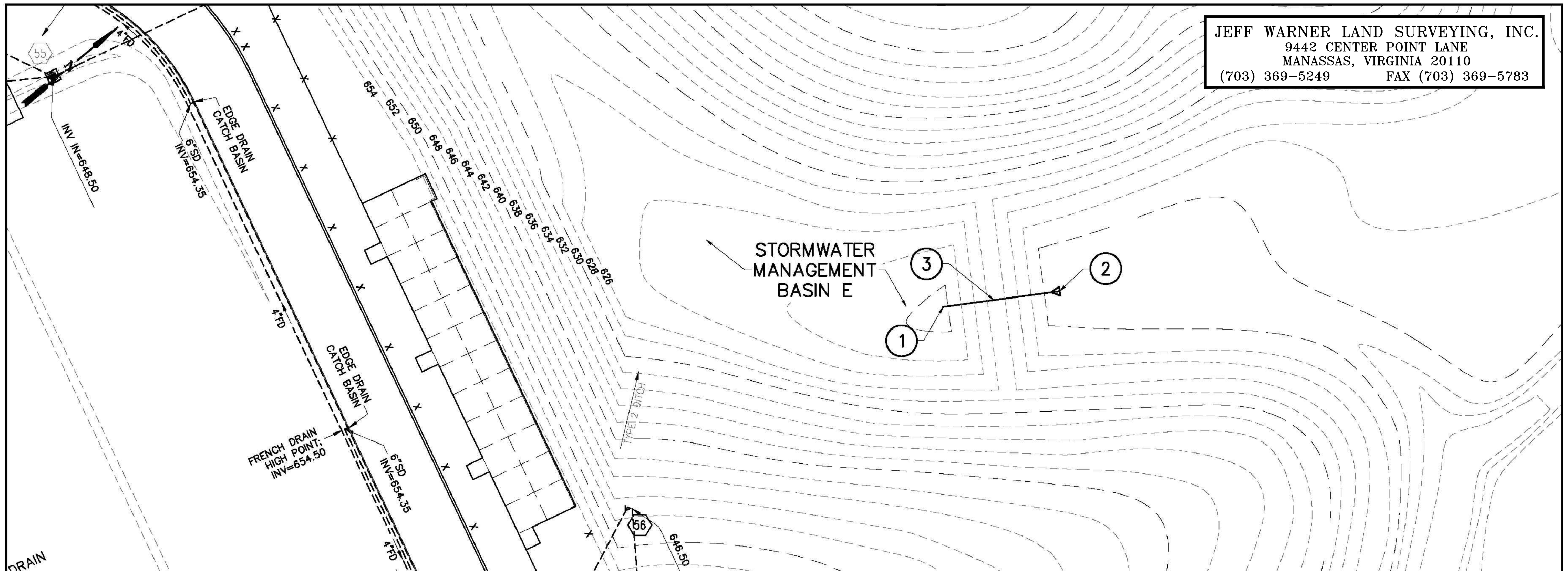
JEFF WARNER LAND SURVEYING, INC.
9442 CENTER POINT LANE
MANASSAS, VIRGINIA 20110
(703) 369-5249 FAX (703) 369-5783



PLAN VIEW

1" = 30'-0"

MAINTENANCE PLAN KEY NOTES

1. PROVIDE RIP RAP FOR ENERGY DISSIPATION ON POND SIDE OF OUTLET PIPE.
2. PROVIDE ADDITIONAL OUTLET PROTECTION AT THE PIPE DISCHARGE LOCATION.
3. VERIFY ASBUILT OUTLET STRUCTURES AND POND ELEVATIONS.

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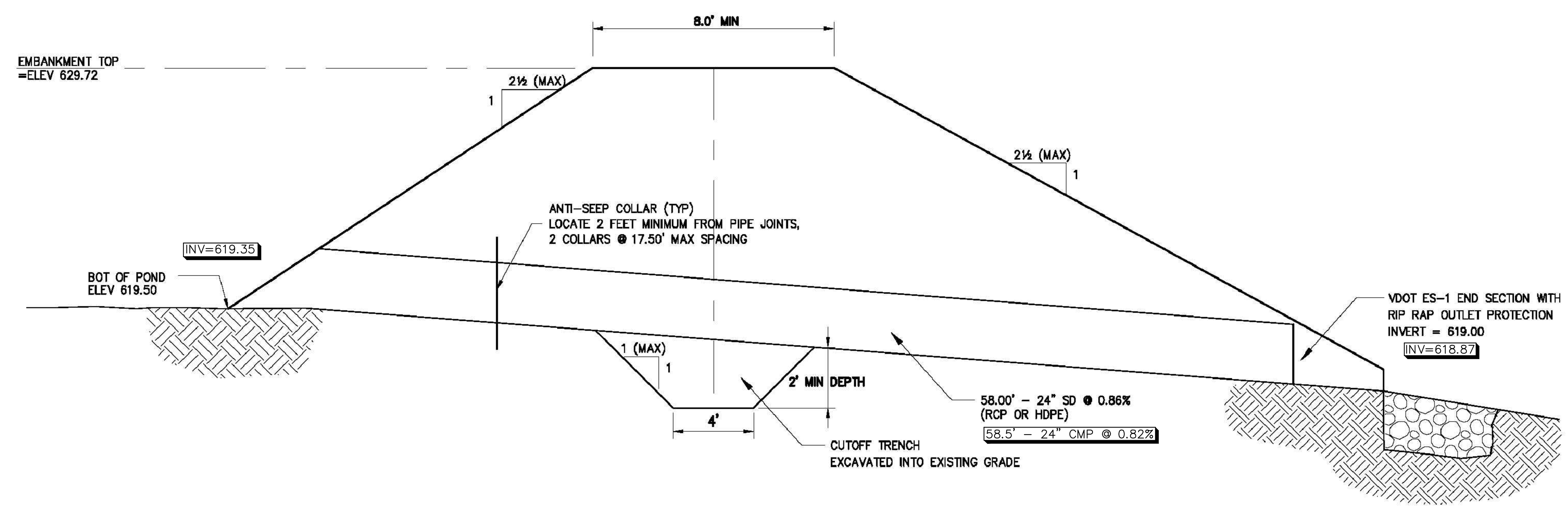

STORMWATER MANAGEMENT BASIN "E" OUTLET STRUCTURE DETAIL

NO SCALE

ASBUILT SURVEY APRIL 13, 2021

▭ DENOTES AS–BUILT INFORMATION

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BMP MAINTENANCE PLAN – SWM E

C201

SHEET 6 OF 6

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SWM AREA A - MAINTENANCE ITEM #1

SWM AREA A - MAINTENANCE ITEM #1


SWM AREA A - MAINTENANCE ITEM #2


SWM AREA A - MAINTENANCE ITEM #3

SWM AREA A - MAINTENANCE ITEM #4

NEW HYDRODYNAMIC BMP

NEW HYDRODYNAMIC BMP

SWM AREA B - MAINTENANCE ITEM #1

SWM AREA B - MAINTENANCE ITEM #1

SWM AREA B - MAINTENANCE ITEM #1

SWM AREA B - MAINTENANCE ITEM #2

SWM AREA B - MAINTENANCE ITEM #3

SWM AREA C - MAINTENANCE ITEM #1

SWM AREA C - MAINTENANCE ITEM #1

SWM AREA C - MAINTENANCE ITEM #2

SWM AREA C - MAINTENANCE ITEM #2 AND #4

SWM AREA C - MAINTENANCE ITEM #2

SWM AREA C - MAINTENANCE ITEM #2

SWM AREA E - MAINTENANCE ITEM #1

SWM AREA E - MAINTENANCE ITEM #2