



**VIRGINIA TECH MS4 Annual Report
(Includes Annual Report Submittal for Year 5)**

NPDES PHASE II: SMALL MS4 (Municipal Separate Storm Sewer System)

VPDES PERMIT NO. VAR 040049

EFFECTIVE DATE: JULY 1, 2013

EXPIRATION DATE: JUNE 30, 2018

**CERTIFICATION STATEMENT AND SIGNATORY REQUIREMENTS
FOR MS4 PERMIT APPLICATIONS AND REPORTS**

SUBMITTED TO:

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INTRODUCTORY NOTE

Virginia Tech has held an MS4 General Permit since 2003. At the end of each five-year term, the University must submit a new program plan to the Virginia Department of Environmental Quality (DEQ). With approval from DEQ, this plan establishes guidelines for the Virginia Tech Stormwater Management Program for the next permit cycle. The following document is Virginia Tech's Program Plan submission for the 2013-2018 permit cycle. **Appendix A** of this document has been updated to reflect the accomplishments of the Virginia Tech Stormwater Management Program and acts as the annual report submission for each reporting year of the 2013-2018 permit cycle.

Permit requirements mandate six minimum control measures for the program (*Public Education and Outreach, Public Involvement and Participation, Illicit Discharge Detection and Elimination, Construction Site Stormwater Runoff Control, Post-Construction Stormwater Management, and Pollution Prevention and Good Housekeeping*). The Facilities – Site & Infrastructure Development (SID) Department has developed best management practices in order to comply with the minimum control measure requirements and all other requirements outlined in the permit.

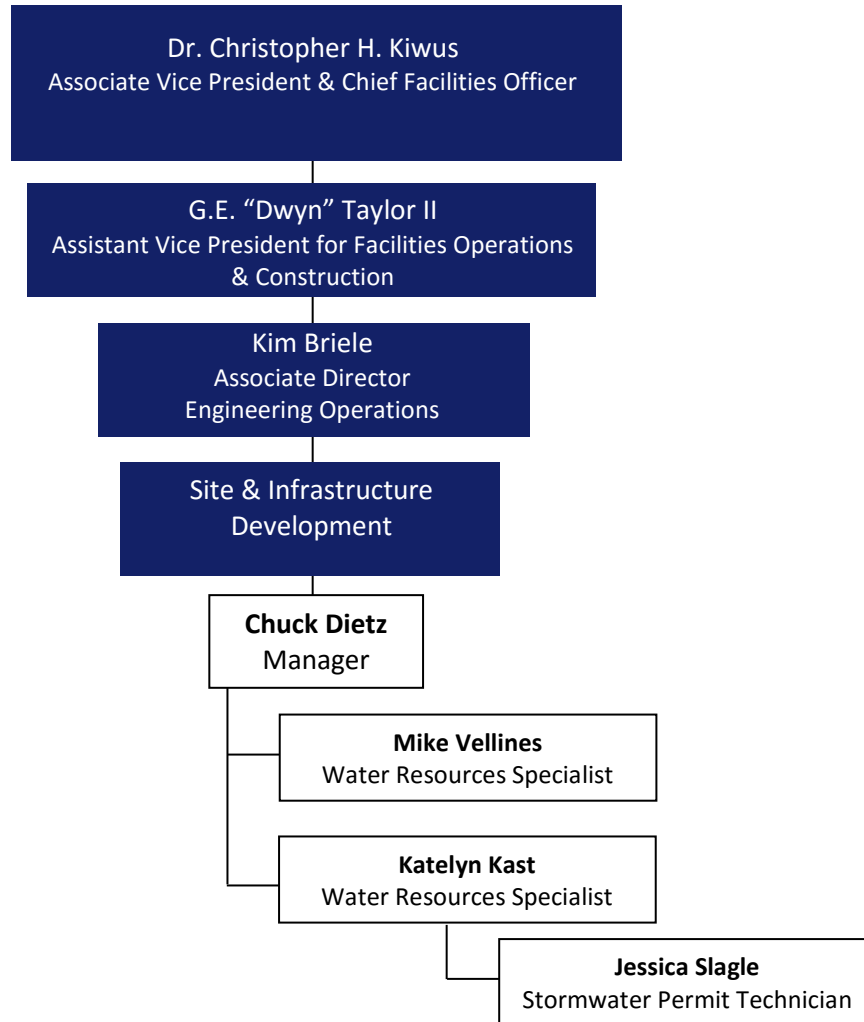
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SID ORGANIZATIONAL STRUCTURE

Site & Infrastructure Development Department



RESPONSIBLE PARTY CONTACT INFORMATION

During the 2013-2018 MS4 Permit Cycle, Virginia Tech will finalize its list of responsible parties and associated contact information. The updated responsible party and contact information list will be added to the MS4 Program Plan.

MS4 OVERVIEW

Introduction

This document serves as the Registration Statement for Virginia Tech per **9VAC25-890-40** General Permit for Discharges of Stormwater from Small MS4s. The Registration Statement serves as an overview of Virginia Tech's MS4 Program Plan for the duration of the 2013-2018 permit cycle. Any revisions to this plan will be justified in writing and submitted to DEQ for review. The document follows the sequencing established in the permit. Any italicized content refers to language taken directly from the permit. **Appendix A** of this document has been updated to reflect the accomplishments of the Virginia Tech Stormwater Management Program and acts as the annual report submission for each year of the 2013-2018 permit cycle.

General Registration Statement Information

Information pertaining to 9VAC25-890-30 B 1-6:

- **Name:** Virginia Polytechnic Institute and State University (Virginia Tech)
- **Type:** University
- **Address:** Virginia Tech – Sterrett Facilities Complex, 230 Sterrett Drive (0529), Blacksburg, VA 24061
- **HUCs currently receiving discharge:**
 - NE59 – New River Stroubles Creek
 - *IMPAIRED:* Stroubles Creek (Benthic) Pollutant – Sediment
- **Estimated Drainage Area discharging to any impaired surface waters:**
 - See Description of Drainage Area below for more information.
- **Physically Interconnected MS4s:**
 - Town of Blacksburg – VAR040019
 - Virginia Department of Transportation (VDOT) – VAR040016

9VAC25-890-30 B 9 *A list of all existing signed agreements between the operator and any applicable third parties where the operator has entered into an agreement in order to implement minimum control measures:*

- There are no signed agreements between the operator and any third parties in order to implement minimum control measures or portions of minimum control measures. Should this change, all necessary information will be added to the Virginia Tech MS4 Program Plan and future annual reports.

9VAC25-890-30 B 10 *The name, address, telephone number and email address of either the principal executive officer or ranking elected official as defined in 9VAC25-870-370:*

Principle Executive Officer:

Title: Associate Vice President and Chief Facilities Officer

Name: Dr. Christopher H. Kiwus
230 Sterrett Drive
Blacksburg, VA 24061
Phone: (540) 231-6291
Email: chkiwus@vt.edu

9VAC25890-30 B 11 *The name, position title, address, telephone number, and email address of any duly authorized representative as defined in 9VAC25-870-370:*

- At this time, Virginia Tech does not have a duly authorized representative. If one is ever appointed, it will be reflected in the Virginia Tech MS4 Program Plan and future annual reports.

Description of Drainage Area

Virginia Polytechnic Institute and State University (Virginia Tech) is located in Blacksburg, Virginia with approximately 31,000 full time students and 14,000 faculty/staff. The main campus includes approximately 135 buildings and 2,600 acres. Virginia Tech is part of a watershed that drains to Stroubles Creek. The overall watershed is approximately 3,500 acres, and the main campus of Virginia Tech is approximately 2,600 acres. Stroubles Creek is a tributary of the New River (VAW-N22R, HUC 05050001). The headwaters of the creek originate in the northeastern part of the Town of Blacksburg, flowing in a generally southwesterly direction. Upper Stroubles Creek is formed from two main tributaries – Central Branch and Webb Branch – and receives flow from a number of other unnamed perennial streams. The two named tributaries flow into the Duck Pond on the Virginia Tech campus, with the main Lower Stroubles Creek channel beginning at the pond’s outfall. The Upper Stroubles Creek watershed contains a significant urban area including the Town of Blacksburg and a majority of the main campus of Virginia Tech.

PROGRAM OVERVIEW

Total Maximum Daily Load

Virginia Tech currently has one stormwater-related Waste Load Allocation (WLA) and is accountable for specific pollutant reductions. The WLA assigned to Virginia Tech is:

- **Stroubles Creek:** 210.88 tons/year sediment

9VAC25-890-40 Section I B 1 *Maintain an updated MS4 Program Plan that includes a specific TMDL Action Plan for pollutants allocated to the MS4 in approved TMDLs*

- Virginia Tech will be teaming up with other Stroubles Creek TMDL Implementation Plan (IP) stakeholders in the development of a TMDL Action Plan for Stroubles Creek. A progress report for the TMDL Action Plan will be provided in the Year 1 Annual Report submission and updates will be provided in each additional annual report (See *TMDL Year 1 Response*).

9VAC25-890-40 Section I B 2 *Special conditions for approved TMDLs other than the Chesapeake Bay TMDL:*

- a) *Develop and maintain a list of legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements applicable to reducing the pollutant identified in each applicable WLA.*

- Virginia Tech has developed a preliminary list of legal authorities applicable to reducing the pollutant identified in the WLA for Stroubles Creek. The following list will be evaluated annually and updated as needed.
 - i. General Permit for Discharges of Stormwater from Municipal Separate Storm Sewer Systems (VAR04)
 - ii. Virginia Tech Annual Standards and Specifications for ESC and SWM
 - iii. General Permit for Discharges of Stormwater from Construction Activities (VAR10)
 - iv. Stormwater Management Policy (*under review*)
 - **Year 2 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required to be completed within 24 months of permit coverage. A copy of the completed TMDL Action will be submitted to DEQ with this Annual report and is available upon request.
 - **Year 3 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.
 - **Year 4 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.
 - **Year 5 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.
- b) Identify and maintain an updated list of all additional management practices, control techniques, and system design and engineering methods, beyond those identified in Section II B, that have been implemented as part of the MS4 Program Plan that are applicable to reducing the pollutant identified in the WLA.**
- Virginia will identify any additional practices, techniques, designs, and methods beyond those identified in Section II B that have been implemented and that are applicable to reducing the pollutant identified in the WLA for Stroubles Creek. Progress reports on this effort will be included in the appropriate annual reports.
 - **Year 2 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required to be completed within 24 months of permit coverage. A copy of the completed TMDL Action will be submitted to DEQ with this Annual report and is available upon request.
 - **Year 3 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.

- **Year 4 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.
 - **Year 5 Response:** Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.
- c) Enhance the public education and outreach and employee training programs to also promote methods to eliminate and reduce discharges of the pollutants identified in the WLA.**
- Virginia Tech has enhanced the public education and outreach and employee training programs to promote methods to eliminate and reduce discharges of the pollutant identified in the WLA. Each year, in conjunction with the annual reports, Virginia Tech will evaluate this effort and determine if any modifications are needed. Evaluations will be included with each annual report.
 - **Year 1 Response:** Sediment is a high priority water quality issue, as outlined in MCM1. Please see the MCM1 Evaluation in **Appendix G**.
 - **Year 2 Response:** Sediment is a high priority water quality issue, as outlined in MCM1. Please see the MCM1 Evaluation in **Appendix G**.
 - **Year 3 Response:** Sediment is a high priority water quality issue, as outlined in MCM1. Please see the MCM1 Evaluation in **Appendix G**.
 - **Year 4 Response:** Sediment is a high priority water quality issue, as outlined in MCM1. Please see the MCM1 Evaluation in **Appendix G**.
 - **Year 5 Response:** Sediment is a high priority water quality issue, as outlined in MCM1. Please see the MCM1 Evaluation in **Appendix F**.
- d) Assess all significant sources of pollutants from facilities owned or operated by the MS4 operator that are not covered under a separate VPDES permit and identify all municipal facilities that may be a significant source of the identified pollutant.**
- Facility pollutant identification will be incorporated into the high priority facility investigations that will be done in accordance with **9VAC25-890-40 Section II B 6 b**. Please see **Appendix A** for more information.
- e) Develop and implement methods to assess TMDL Action Plans for their effectiveness in reducing the pollutants identified in the WLA.**
- Methods to assess TMDL Action Plans will be considered during the development of any Action Plans that are required per **9VAC25-890-40 Section I B 1**. These methods will be addressed in the TMDL Action Plan and reported on in the appropriate annual reports.

9VAC25-890-40 Section I B 7 *Estimated end date for achieving the applicable WLA(s)*

- Any associated objectives and milestones for the WLA will be included in the TMDL Action Plan that will be developed within 24 months of permit coverage.

Annual Reporting Requirements

Per **9VAC25-890-40 Section I B 5**, each annual report shall include:

- Required TMDL Action Plan with appropriate annual report (Year 2).
- Report on the implementation of the TMDL Action Plans and associated evaluation including the results of any monitoring conducted as part of the evaluation.

Year 1 Response: A TMDL Implementation grant was awarded to Stroubles Creek stakeholders to aid in the advancement of goals and milestones in the current Stroubles Creek TMDL Implementation Plan. Throughout this process, the stakeholders have been assessing the progress of the goals and milestones specified in the current Stroubles Creek Implementation Plan. A scope of work and schedule have been developed to be implemented over the next 2 years. The assessment of progress will be utilized in the development of an action plan for Stroubles Creek.

Year 2 Response: Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required to be completed within 24 months of permit coverage. A copy of the completed TMDL Action will be submitted to DEQ with this Annual report and is available upon request.

Year 3 Response: Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.

Year 4 Response: Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.

Year 5 Response: Virginia Tech enlisted a consultant to help with the development of the TMDL Action Plan that is required by the MS4 Permit. A copy of the Action Plan was submitted with the Year 2 Annual Report and has since been approved by DEQ for implementation. Virginia Tech is currently in the data collection and evaluation stage of the Action Plan. Further information about the TMDL Action Plan is available upon request.

Minimum Control Measure 1 – Public Outreach and Education

For the 2013-2018 MS4 permit cycle, Virginia Tech has identified three initial target audiences and high priority water quality issues. These audiences and issues will be the focus of the Public Outreach and Education Program during the permit cycle. Please see Tables 1 and 2 for more information regarding Virginia Tech’s proposed target audiences and high priority water quality issues. Virginia Tech will strive to reach 20% of each target audience annually through a variety of mechanisms. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its public outreach and education efforts. Any observed weaknesses or shortcomings found during the evaluation will be appropriately addressed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

Table 1: Target Audiences

Target Audience	Population	Rationale
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On-Campus Students	~ 10,000	On-campus students are likely to impact stormwater in their everyday interaction with the campus community. Their greatest areas of impact are trash management, including the disposal of batteries, electronics, trash, cigarette butts, and food waste.
Off-Campus Students	~ 20,000	Off-campus Students frequent campus due to classes, sporting events, and activities. As a result, they have a great potential to impact stormwater. Some areas of concern are trash management and animal waste.
Faculty/Staff	~ 14,000	Faculty/Staff are most likely long-term members of the campus community and as such can be crucial advocates for stormwater management. Many employees deal with operations which use chemicals and equipment that have the potential to impact stormwater. Others are in a position to teach the student population about stormwater pollution prevention and facilitate research opportunities.

Table 2: High Priority Water Quality Issues

High Priority Water Quality Issue	Rationale
Sediment	Increased urbanization and runoff from impervious surfaces has high potential to damage the benthic ecosystem in Stroubles creek.
Animal Waste	Animal waste has high potential to cause bacterial pollutants in the creek.
Trash	Trash is the most common pollutant from the University community and has high potential to enter the creek.

9VAC25-890-40 Section II B 1 f *The MS4 Program Plan shall describe how the conditions of this permit shall be updated in accordance with Table 1.*

During Year 1, Virginia Tech will develop a Public Outreach and Education Plan for the 2013-2018 MS4 permit cycle. This plan will discuss how the aforementioned target audiences and high priority water quality issues will be addressed during the permit cycle. Virginia Tech will strive to complete the Public Outreach and Education Plan by the summer of 2014 and will give a progress update in the Year 1 annual report submission. The final copy of the Public Outreach and Education Plan will be available in the Virginia Tech Site & Infrastructure Development office.

Year 1 Response: Virginia Tech has developed a Public Outreach and Education Plan for the 2013-2018 permit cycle. The plan discusses the rationale for the target audiences and high priority water quality issues as well as how they will be addressed during the permit cycle. A copy of the Public Outreach and Education Plan is available by request in the Site & Infrastructure Development office.

Year 2 Response: During Year 2, Virginia Tech reviewed the Public Outreach and Education Plan and the rationale for target audiences and high priority water quality issues for consistency. A copy of the Public Outreach and Education Plan is available by request in the Site & Infrastructure Development office.

Year 3 Response: During Year 3, Virginia Tech reviewed the Public Outreach and Education Plan and the rationale for target audiences and high priority water quality issues for consistency. A copy of the Public Outreach and Education Plan is available by request in the Site & Infrastructure Development office.

Year 4 Response: During Year 4, Virginia Tech reviewed the Public Outreach and Education Plan and the rationale for target audiences and high priority water quality issues for consistency. A copy of the Public Outreach and Education Plan is available by request in the Site & Infrastructure Development office.

Year 5 Response: During Year 5, Virginia Tech reviewed the Public Outreach and Education Plan and the rationale for target audiences and high priority water quality issues for consistency. A copy of the Public Outreach and Education Plan is available by request in the Site & Infrastructure Development office.

Annual Reporting Requirements

Per **9VAC25-890-49 Section II B 1 g**, each annual report shall include:

- *List of education and outreach activities conducted during the reporting period for each high priority water quality issue, the estimated number of people reached, and an estimated percentage of the target audience or audiences reached.*
- *List of education and outreach activities that will be conducted during the next reporting period for each high priority water quality issue, the estimated number of people that will be reached, and an estimated percentage of the target audience or audiences that will be reached.*
- **Year 1 Response:** See BMP 1.1 and 1.2 in **Appendix A** for further information.
- **Year 2 Response:** See BMP 1.1 and 1.2 in **Appendix A** for further information.
- **Year 3 Response:** See BMP 1.1 and 1.2 in **Appendix A** for further information.
- **Year 4 Response:** See BMP 1.1 and 1.2 in **Appendix A** for further information
- **Year 5 Response:** See BMP 1.1 and 1.2 in **Appendix A** for further information

Minimum Control Measure 2 – Public Involvement/Participation

During the 2013-2018 permit cycle, Virginia Tech’s MS4 Program Plan will be updated at least once a year in conjunction with annual reports. An updated MS4 Program Plan will be maintained on Virginia Tech’s stormwater website. Copies of each annual report will be posted on Virginia Tech’s stormwater website within 30 days of submittal and will remain online for the duration of the permit cycle. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its public outreach and education efforts. Any observed weaknesses or shortcomings found during the evaluation will be addressed and solutions will be proposed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

9VAC25-890-40 Section II B 2 a (2) – Public Involvement:

- a)** *Maintain an updated MS4 Program Plan on the Virginia Tech stormwater website.*
- Virginia Tech will annually evaluate and update its MS4 Program Plan in conjunction with each annual report. The updated MS4 Program Plan will be maintained on Virginia Tech’s stormwater website.
- b)** *Post Copies of each annual report on the Virginia Tech stormwater website.*

- A copy of each MS4 Annual Report will be posted on the Virginia Tech stormwater website within 30 days of submittal and will remain online for the duration of the MS4 permit cycle.
- c) *Notify the public and provide for receipt of comment of the proposed MS4 Program Plan that will be submitted with the registration statement.*
- Virginia Tech will post a copy of the proposed MS4 Program Plan on the Virginia Tech stormwater website. A campus notice will be sent out to the University community to notify them that the proposed plan is available online and open to public comment. The public comment period will last 2 weeks. Any comments received during the public comment period will be reviewed by SID and addressed in the appropriate annual report.
 - **Year 1 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
 - **Year 2 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
 - **Year 3 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
 - **Year 4 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
 - **Year 5 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.

9VAC25-890-40 Section II B 2 b – Public Participation *Participate, through promotion, sponsorship, or other involvement, in a minimum of four local activities annually.*

- Virginia Tech will satisfy this requirement through a variety of activities on campus and in surrounding communities. These activities will be addressed in the Public Participation written procedures described in **9VAC25-890-40 Section II B 2 c** (below).
- **Year 1 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
- **Year 2 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
- **Year 3 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
- **Year 4 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.
- **Year 5 Response:** See BMP 2.1 and 2.2 in **Appendix A** for further information.

9VAC25-890-40 Section II B 2 c *The MS4 Program Plan shall include written procedures for implementing this program.*

- During Year 1, Virginia Tech will develop written procedures for the Public Involvement and Participation portion of the Virginia Tech MS4 Program. These will be created in conjunction with the development of the Public Education and Outreach Plan. A progress update will be given in the Year 1 Annual Report. The final copy of the Public Involvement/Participation written procedures will be added to the Virginia Tech MS4 Program Plan.

Year 1 Response: Virginia Tech has developed written procedures for the Public Involvement/Participation portion for the 2013-2018 Virginia Tech MS4 Program. A copy is available by request in the Site & Infrastructure Development office.

Year 2 Response: During Year 2, Virginia Tech reviewed the written procedures for the Public Involvement/Participation portion of the 2013-2018 Virginia Tech MS4 Program. A copy is available by request in the Site & Infrastructure Development office.

Year 3 Response: During Year 3, Virginia Tech reviewed the written procedures for the Public Involvement/Participation portion of the 2013-2018 Virginia Tech MS4 Program. A copy is available by request in the Site & Infrastructure Development office.

Year 4 Response: During Year 4, Virginia Tech reviewed the written procedures for the Public Involvement/Participation portion of the 2013-2018 Virginia Tech MS4 Program. A copy is available by request in the Site & Infrastructure Development office.

Year 5 Response: During Year 5, Virginia Tech reviewed the written procedures for the Public Involvement/Participation portion of the 2013-2018 Virginia Tech MS4 Program. A copy is available by request in the Site & Infrastructure Development office.

Annual Reporting Requirements

Per **9VAC25-890-40 Section II B 2 d**, each MS4 Annual Report shall include:

- *A web link to the MS4 Program Plan and annual report.*
- *Documentation of compliance with the public participation requirements of this section.*

Year 1 Response: See BMP 2.1 and 2.2 in **Appendix A** for further information.

Year 2 Response: See BMP 2.1 and 2.2 in **Appendix A** for further information.

Year 3 Response: See BMP 2.1 and 2.2 in **Appendix A** for further information.

Year 4 Response: See BMP 2.1 and 2.2 in **Appendix A** for further information.

Year 5 Response: See BMP 2.1 and 2.2 in **Appendix A** for further information.

Minimum Control Measure 3 – Illicit Discharge Detection and Elimination (IDDE)

During the 2013-2018 MS4 permit cycle, Virginia Tech will update its current IDDE Program in order to meet the requirements stated in **9VAC25-890-40 Section II B 3**. In the interim, Virginia Tech will continue to implement its current IDDE Program until the program is updated to meet the conditions of the 2013-2018 MS4 Permit. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its IDDE public education efforts and response procedures. Any observed weaknesses or shortcomings found during the evaluation will be appropriately addressed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

9VAC25-890-40 Section II B 3 a *Maintain an accurate storm sewer system map and information table and shall update it in accordance with Table 1.*

- Virginia Tech will update its storm sewer system map to meet the requirements set forth in the 2013-2018 MS4 permit. A progress report will be given in each annual report. Storm sewer system mapping is available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 1 Response:** Please see **Appendix A**, BMP 3.1.1 – Storm Sewer System Map (Inventory Outfall Locations) for a status update.
- **Year 2 Response:** Please see **Appendix A**, BMP 3.1.1 – Storm Sewer System Map (Inventory Outfall Locations) for a status update.
- **Year 3 Response:** Please see **Appendix A**, BMP 3.1.1 – Storm Sewer System Map (Inventory Outfall Locations) for a status update.
- **Year 4 Response:** Please see **Appendix A**, BMP 3.1.1 – Storm Sewer System Map (Inventory Outfall Locations) for a status update.
- **Year 5 Response:** Please see **Appendix A**, BMP 3.1.1 – Storm Sewer System Map (Inventory Outfall Locations) for a status update.

9VAC25-890-40 Section II B 3 b *Effectively prohibit, through ordinance or other legal mechanism, non-stormwater discharges into the storm sewer system to the extent allowable under federal, state, or local law or regulation.*

- During the 2013-2018 MS4 permit cycle, Virginia Tech will evaluate its methods for prohibiting non-stormwater discharges for effectiveness. Once this evaluation is complete, Virginia Tech will set goals for modification and implementation. Progress updates for the evaluation and any necessary modifications will be given in future MS4 Annual Reports.
- **Year 1 Response:** Please see BMP 3.2.2 Prohibiting Illicit Discharges in Appendix A for a status update and the MCM3 Evaluation in **Appendix G**.
- **Year 2 Response:** Please see BMP 3.2.2 Prohibiting Illicit Discharges in Appendix A for a status update and the MCM3 Evaluation in **Appendix G**.
- **Year 3 Response:** Please see BMP 3.2.2 Prohibiting Illicit Discharges in Appendix A for a status update and the MCM3 Evaluation in **Appendix G**.
- **Year 4 Response:** Please see BMP 3.2.2 Prohibiting Illicit Discharges in Appendix A for a status update and the MCM3 Evaluation in **Appendix G**.
- **Year 5 Response:** Please see BMP 3.2.2 Prohibiting Illicit Discharges in Appendix A for a status update and the MCM3 Evaluation in **Appendix F**.

9VAC25-890-40 Section II B 3 c *Develop and implement written procedures to detect, identify, and address non-stormwater discharges, including illegal dumping, to the small MS4.*

- During Year 1, Virginia Tech will develop IDDE written procedures to be used during IDDE and Outfall Reconnaissance Inventory (ORI) investigations. These written procedures will satisfy the requirements set forth in **9VAC25-890-40 Section II B 3 c**. Virginia Tech will strive to complete the written procedures by the summer of 2014 and will give a progress update in the Year 1 Annual Report submission. The final copy of the IDDE written procedures will be added to Virginia Tech's IDDE Program and will be available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 1 Response:** Virginia Tech has developed written procedures that are utilized during IDDE and ORI Investigations. These procedures have been added to the Virginia Tech IDDE Program and are available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 2 Response:** Virginia Tech has developed written procedures that are utilized during IDDE and ORI Investigations. These procedures are reviewed and maintained by the Site & Infrastructure Development office as a part of the Virginia Tech IDDE Program and are available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 3 Response:** Virginia Tech has developed written procedures that are utilized during IDDE and ORI Investigations. These procedures are reviewed and maintained by the Site & Infrastructure Development office as a part of the Virginia Tech IDDE Program and are available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 4 Response:** Virginia Tech has developed written procedures that are utilized during IDDE and ORI Investigations. These procedures are reviewed and maintained by the Site & Infrastructure Development office as a part of the Virginia Tech IDDE Program and are available upon request in the Virginia Tech Site & Infrastructure Development office.
- **Year 5 Response:** Virginia Tech has developed written procedures that are utilized during IDDE and ORI Investigations. These procedures are reviewed and maintained by the Site & Infrastructure Development office as a part of the Virginia Tech IDDE Program and are available upon request in the Virginia Tech Site & Infrastructure Development office.

9VAC25-890-40 Section II B 3 d *Promote, publicize, and facilitate public reporting of illicit discharges into or from MS4s.*

- Currently, Virginia Tech staff and students are able to report spills and illicit discharges on the Anonymous Safety Complaint interface of the Virginia Tech Environmental Health and Safety webpage: www.ehss.vt.edu/report_issue. During the 2013-2018 MS4 permit cycle, Virginia Tech will evaluate the process of reporting spills and illicit discharges to determine if any modifications are needed to satisfy the new IDDE Program requirements set forth in the 2013-2018 MS4 Permit. Progress updates for any necessary IDDE reporting modifications will be given in future MS4 Annual Reports.
- **Year 1 Response:** See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.
- **Year 2 Response:** See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.
- **Year 3 Response:** See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.
- **Year 4 Response:** See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.
- **Year 5 Response:** See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Annual Reporting Requirements

Per **9VAC25-890-40 Section II B 3 f**, each annual report shall include:

- *A list of any written notifications of physical interconnection given by the operator to other MS4s.*
- *The total number of outfalls screened during the reporting period, the screening results, and detail of any follow-up necessary based on screening results.*
- *Summary of each investigation conducted by the operator of any suspected illicit discharge. Each summary will include the following:*
 - *Date that the suspect discharge was observed or reported or both*
 - *How the investigation was resolved, including any follow-up*
 - *Resolution of the investigation and the date the investigation was closed*

Year 1 Response: See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Year 2 Response: See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Year 3 Response: See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Year 4 Response: See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Year 5 Response: See BMP 3.1, 3.2, and 3.3 in **Appendix A** for further information.

Minimum Control Measure 4 – Construction Site Runoff Control

The Virginia Tech Annual Standards and Specifications for Erosion and Sediment Control (ESC) and Stormwater Management (SWM) are integral components of Virginia Tech’s design, construction, and maintenance of the University’s facilities and campuses. The Virginia Tech Annual Standards and Specifications for ESC and SWM are administered by Virginia Tech Site & Infrastructure Development and apply to all design, construction, and maintenance activities on property owned by Virginia Tech, either by its internal workforce or contracted to external entities, where such activities are regulated by the Virginia ESC Law and Regulations or the Virginia SWM Act and VSMP Regulations. The Virginia Tech Annual Standards and Specifications for ESC and SWM are submitted to the Virginia Department of Environmental Quality (DEQ) for review and approval on an annual basis. Virginia Tech shall ensure that project-specific plans are developed and implemented in accordance with the Virginia Tech Annual Standards and Specifications for ESC and SWM. Please see **Appendix B** for a copy of the current Virginia Tech Annual Standards and Specifications for ESC and SWM. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its construction site runoff control efforts. Any observed weaknesses or shortcomings found during the evaluation will be appropriately addressed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

9VAC25-890-40 Section II B 4 c (4) *Promote to the public a mechanism for receipt of public complaints regarding regulated land-disturbing activities and shall follow-up on any complaints regarding potential water quality and compliance issues.* All public comments for the Virginia Tech MS4 program are directed to stormwater@vt.edu via a comment box on Virginia Tech’s stormwater website. All public complaints regarding regulated land-disturbing activities will also be directed to the comment box and its associated email address. Signs containing web address and email information for public complaints will be posted at construction sites.

Year 1 Response: See BMP 4.1 in **Appendix A** for a status update.

Year 2 Response: See BMP 4.1 in **Appendix A** for a status update.

Year 3 Response: See BMP 4.1 in **Appendix A** for a status update.

Year 4 Response: See BMP 4.1 in **Appendix A** for a status update.

Year 5 Response: See BMP 4.1 in **Appendix A** for a status update.

9VAC25-890-40 Section II B 4 e – MS4 Program Requirements for Construction Site Stormwater Runoff Control:

(1) *Description of the legal authorities utilized to ensure compliance with the minimum control measures in Section II related to construction site stormwater runoff control such as ordinances, permits, orders, specific contract language, and multijurisdictional agreements.*

- Virginia Tech currently utilizes the following to ensure compliance with Minimum Control Measure 4 – Construction Site Stormwater Runoff Control:
 - i. Virginia Tech Annual Standards and Specifications for ESC and SWM
 - ii. Virginia Tech MS4 Program
 - iii. General Permit for Discharges of Stormwater from Construction Activities (VAR10)
 - iv. Memorandums of Understanding (MOU): project-by-project basis
 - v. Memorandums of Agreement (MOA): project-by-project-basis

*This list will be updated on an as-needed basis. Projects outside of Virginia Tech’s main campus may be subject to local ordinances.

- (2) *Written plan review procedures and all associated documents utilized in plan review*
- During the 2013-2018 MS4 permit cycle, Virginia Tech will ensure that the established written plan review procedures are up-to-date. Progress updates on these procedures will be provided in future MS4 Annual Reports. Upon completion, the final plan review written procedures will be added to the MS4 Program Plan. Please see **Appendix B** for a copy of the current Virginia Tech Annual Standards and Specifications for ESC and SWM.
- (3) *Copy of current Virginia Tech Annual Standards and Specifications for ESC and SWM*
- Please see **Appendix B** for a copy of the current Virginia Tech Annual Standards and Specifications for ESC and SWM.
- (4) *Written inspection procedures and all associated documents utilized in inspections including the inspection schedule.*
- During the 2013-2018 MS4 permit cycle, Virginia Tech will evaluate its current written procedures for inspections in order to determine if any modifications are necessary. Progress updates will be given in future MS4 Annual Reports. The final version of the inspection written procedures and any necessary supporting documentation will be added to the Virginia Tech MS4 Program. Please see **Appendix B** for a copy of the current Virginia Tech Annual Standards and Specifications for ESC and SWM.
- (5) *Written procedures for compliance and enforcement, including a progressive compliance and enforcement strategy, where appropriate.*
- Virginia Tech does not have regulatory enforcement capabilities – DEQ has this responsibility – therefore no written procedures will be developed for enforcement. Compliance procedures can be found in the Virginia Tech Annual Standards and Specifications for ESC and SWM. Please see **Appendix B** for more information.
- (6) *Roles and Responsibilities of each of the operator's departments, divisions, or subdivisions in implementing Minimum Control Measure 4 – Construction Site Stormwater Runoff Control.*
- During the 2013-2018 MS4 permit cycle, Virginia Tech will compile a list of roles and responsibilities for Virginia Tech departments and divisions that are involved in the implementation of Minimum Control Measure 4 – Construction Site Stormwater Runoff Control. Progress updates for this effort will be given in future MS4 Annual Reports.

Year 1 Response: Virginia Tech Annual Standards and Specifications for ESC and SWM fulfill the roles and responsibilities requirement of the permit. Any changes to this document will be addressed in later annual reports. See BMP 4.1 in **Appendix A** for further information.

Year 2 Response: Virginia Tech Annual Standards and Specifications for ESC and SWM fulfill the roles and responsibilities requirement of the permit. Any changes to this document will be addressed in later annual reports. See BMP 4.1 in **Appendix A** for further information.

Year 3 Response: Virginia Tech Annual Standards and Specifications for ESC and SWM fulfill the roles and responsibilities requirement of the permit. Any changes to this document will be addressed in later annual reports. See BMP 4.1 in **Appendix A** for further information.

Year 4 Response: Virginia Tech Annual Standards and Specifications for ESC and SWM fulfill the roles and responsibilities requirement of the permit. Any changes to this document will be addressed in later annual reports. See BMP 4.1 in **Appendix A** for further information.

Year 5 Response: Virginia Tech Annual Standards and Specifications for ESC and SWM fulfill the roles and responsibilities requirement of the permit. Any changes to this document will be addressed in later annual reports. See BMP 4.1 in **Appendix A** for further information.

Annual Reporting Requirements

Per **9VAC25-890-40 Section II B 4 f**, each annual report shall include:

- Total number of regulated land-disturbing activities (**Appendix E**)
- Total disturbed acres (**Appendix E**)
- Total number of inspections performed (**Appendix E**)
- A summary of the enforcement actions taken (**Appendix E**)

Year 1 Response: See BMP 4.1 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 2 Response: See BMP 4.1 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 3 Response: See BMP 4.1 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 4 Response: See BMP 4.1 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 5 Response: See BMP 4.1 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Minimum Control Measure 5 – Post-Construction Stormwater Management

During the 2013-2018 MS4 permit cycle, Virginia Tech will update its current program for Post-Construction Stormwater Management in order to meet the requirements stated in **9VAC25-890-40 Section II B 5**. In the interim, Virginia Tech will continue to implement its current program until the program is updated to meet the conditions of the 2013-2018 MS4 Permit. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its public outreach and education efforts. Any observed weaknesses or shortcomings found during the evaluation will be appropriately addressed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

9VAC25-890-40 Section II B 5 d Update MS4 Program Plan, in accordance with Table 1, to include following for Stormwater Management Progressive Compliance Enforcement:

- (1) List of applicable legal authorities related to Post-Construction Stormwater Management in new development and development on prior developed lands
- (2) Written policies and procedures utilized to ensure that stormwater management facilities are designed and installed in accordance with **Section II B 5 b**
- (3) Written inspection policies and procedures utilized in conducting inspections
- (4) Written procedures for inspection and maintenance of operator-owned stormwater management facilities.
- (5) Roles and responsibilities of each of the operator's departments, divisions, or subdivisions in implementing Minimum Control Measure 5 – Post-Construction Stormwater Management.

During Year 1, Virginia Tech will update its MS4 Program Plan to include the items from **9VAC25-890-40 Section II B 5 d** outlined above. A progress update will be given in the Year 1 Annual Report submission. The final procedures will be added to the MS4 Program Plan upon completion.

Year 1 Response: During Year 1, Virginia Tech reviewed MS4 Program components, and it was determined that the items from 9VAC25-890-40 Section II B 5 d are covered under the current Virginia

Tech Annual Standards and Specifications for ESC and SWM as well as the current O&M Program for Virginia Tech Stormwater Management Facilities. These documents can be made available, upon request, at the Site & Infrastructure Development office.

Year 2 Response: Please see Year 1 response above, the referenced documents can be made available, upon request, at the Site & Infrastructure Development office.

Year 3 Response: Please see Year 1 response above, the referenced documents can be made available, upon request, at the Site & Infrastructure Development office.

Year 4 Response: Please see Year 1 response above, the referenced documents can be made available, upon request, at the Site & Infrastructure Development office.

Year 5 Response: Please see Year 1 response above, the referenced documents can be made available, upon request, at the Site & Infrastructure Development office.

9VAC25-890-40 Section II B 5 e *Maintain an updated electronic database of all known operator-owned stormwater management facilities that discharge into the MS4.*

- During Year 1, Virginia Tech will update its current stormwater management facilities electronic database to include all information required in **9VAC25-890-40 Section II B 5 e (1)-(9)**. An updated copy of this database will be provided with the Year 1 Annual Report submission. This electronic database will be updated annually and included in each Annual Report submission.
- **Year 1 Response:** See **Appendix D** for an updated list of all known operator-owned stormwater management facilities that discharge into the MS4.
- **Year 2 Response:** See **Appendix D** for an updated list of all known operator-owned stormwater management facilities that discharge into the MS4.
- **Year 3 Response:** See **Appendix D** for an updated list of all known operator-owned stormwater management facilities that discharge into the MS4.
- **Year 4 Response:** See **Appendix D** for an updated list of all known operator-owned stormwater management facilities that discharge into the MS4.
- **Year 5 Response:** See **Appendix D** for an updated list of all known operator-owned stormwater management facilities that discharge into the MS4.

Annual Reporting Requirements

Each Annual Report will include:

- *Current list of Stormwater Management Facilities (Appendix D)*
- *Number of inspections performed (Appendix A)*
- *Number of enforcement actions taken to ensure long-term maintenance (Appendix A)*

Minimum Control Measure 6 – Pollution Prevention/Good Housekeeping

During the 2013-2018 MS4 permit cycle, Virginia Tech will update its current program for Pollution Prevention/Good Housekeeping in order to meet the requirements stated in **9VAC25-890-40 Section II B 6**. In the interim, Virginia Tech will continue to implement its current program until the program is updated to meet the conditions of the 2013-2018 MS4 Permit. At the end of each reporting year, Virginia Tech will evaluate the effectiveness of its pollution prevention and good housekeeping efforts. Any observed weaknesses or shortcomings found during the evaluation will be addressed and solutions will be proposed. This evaluation will be included in each MS4 Annual Report. See **Appendix F**.

9VAC25-890-40 Section II B 6 a *Develop and implement daily operational procedures designed to minimize or prevent pollutant discharge from municipal operations.*

- During Years 1 and 2, Virginia Tech will develop written procedures designed to minimize or prevent pollutant discharge from daily operations, equipment maintenance, and the application, storage, transport, and disposal of pesticides, herbicides, and fertilizers. These written procedures will be utilized, as appropriate, as part of employee training. The status of written procedure development will be included in the Year 1 and Year 2 Annual Report submissions.
- **Year 1 Response:** Please see **Appendix A**, BMP 6.1.1 – Daily Good Housekeeping Procedures for a status update.
- **Year 2 Response:** Procedures have been developed and posted on the Virginia Tech website . Please see **Appendix A**, BMP 6.1.1 – Daily Good Housekeeping Procedures for more information.
- **Year 3 Response:** Procedures have been developed and posted on the Virginia Tech website . Please see **Appendix A**, BMP 6.1.1 – Daily Good Housekeeping Procedures for more information.
- **Year 4 Response:** Procedures have been developed and posted on the Virginia Tech website (Web address). Please see **Appendix A**, BMP 6.1.1 – Daily Good Housekeeping Procedures for more information.
- **Year 5 Response:** Procedures have been developed and posted on the Virginia Tech website. Please see **Appendix A**, BMP 6.1.1 – Daily Good Housekeeping Procedures for more information.

9VAC25-890-40 Section II B 6 b *Municipal facility pollution prevention and good housekeeping.*

(1) *Identify all municipal high priority facilities within 12 months of permit coverage.*

- During Year 1, Virginia Tech will develop selection criteria to use in the identification of municipal high priority facilities. Once the selection criteria are developed, Virginia Tech will perform site inspections of facilities that have the potential to be high priority facilities.
- **Year 1 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 2 Response:** Facilities have been identified. Virginia Tech is currently exploring the options and process of creating SWPPPs for the identified facilities. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update
- **Year 3 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update

- **Year 4 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update
- **Year 5 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update

(2) *Identify which of the municipal high priority facilities have a high potential of chemicals or other materials to be discharged in stormwater.*

- During Year 1, once the high priority facilities are identified, Virginia Tech will determine which high priority facilities have a high potential to discharge chemicals or other materials into the storm sewer system. All high priority/high potential facilities will be required to have a Stormwater Pollution Prevention Plan (SWPPP). A list of all the high priority/high potential facilities will be provided in the Year 1 Annual Report submission.
- **Year 1 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 2 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 3 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 4 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 5 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.

(3) *Develop and implement specific SWPPPs for all high priority facilities identified as having a high potential for the discharge of chemicals and other materials in stormwater.*

- During Year 2, Virginia Tech will begin the process of developing SWPPPs for all the high priority/high potential facilities identified in Year 1. The progress of SWPPP development and implementation will be reported in each MS4 Annual Report submission. Virginia Tech will strive to have all necessary SWPPPs developed and implemented by June 30, 2018. A copy of each SWPPP will be kept at each facility and will be appropriately updated and utilized as part of staff training required in **Section II B 6 d**.
- **Year 1 Response:** Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 2 Response:** Facilities have been identified. Virginia Tech is currently exploring the options and process of creating SWPPPs for the identified facilities. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 3 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 4 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.
- **Year 5 Response:** Facilities have been identified. Please see **Appendix A**, BMP 6.1.2 – High Priority Facilities for a status update.

Nutrient Management Plans

Currently, Virginia Tech has twenty-one Nutrient Management Plans (NMPs). For a list of Virginia Tech's current NMPs, please see Table 3 (below).

Table 3: VT Nutrient Management Plans

Department	Area (Acres)	Issue Date	Expiration Date	Category	Contact Information
CALS Livestock Plan for Campus and Montgomery County Lands	1427	3/1/2018	12/31/2018	Agriculture	Dwight Paulette kentland@vt.edu
Virginia Tech Athletic Department	28.8	05/01/2016	05/01/2019	Turf & Landscape	Casey Underwood caunderw@vt.edu Emerson Pulliam emerson@vt.edu
Golf Course	33.0	1/1/2016	1/1/2021	Turf & Landscape	Jason Ratcliff jratclif@vt.edu
Virginia Tech Campus Grounds	51.61	11/30/2015	11/30/2018	Turf & Landscape	Steve Perfater sperfate@vt.edu
Hahn Horticulture Garden	6.3	8/2/2015	8/1/2018	Turf & Landscape	Paul Chumbley vtgarden@vt.edu
Virginia Tech Recreational Sports	10.2	1/1/2016	1/1/2019	Turf & Landscape	Coty Skaggs coty36@vt.edu
Turfgrass Research Center	20	03/02/2016	03/1/2019	Turf & Landscape	Dr. Erik Ervin ervin@vt.edu
Northern Piedmont AREC	20.3	9/2/2015	9/1/2018	Turf & Landscape	Steve Gulick sgulick@vt.edu
Urban Horticulture Center	15	4/2/2016	4/1/2019	Turf & Landscape	John James jojames@vt.edu
Kentland Managed Lands	114	4/16/2016	4/15/2019	Turf & Landscape	Jon Wooge jwooge@vt.edu
Glade Road Research Center	6.3	4/21/2016	4/20/2019	Turf & Landscape	Dr. Shawn Askew saskew@vt.edu
Alson H. Smith, Jr AREC – Winchester	52	12/02/2015	12/01/2018	Turf & Landscape	Dr. Tony Wolf vitis@vt.edu
Eastern Shore AREC	117.9	3/16/2016	3/15/2019	Turf & Landscape	Steven Rideout srideout@vt.edu
Eastern Virginia AREC	154.5	9/11/2015	9/10/2018	Turf & Landscape	Robert Pitman rpitman@vt.edu
Hampton Roads AREC	40.25	7/1/2018	7/2/2021	Turf & Landscape	Dr. Pete Shultz schultzp@vt.edu
Middleburg AREC	264.2	9/15/2015	7/09/2018	Turf & Landscape	MAREC@vt.edu
Reynolds Homestead AREC	8.17	5/4/2016	12/01/2018	Turf & Landscape	Dr. Kyle Peer krpeer@vt.edu
Shenandoah Valley AREC	613.1	2/2/2016	2/01/2019	Agriculture	David Fiske dafiske@vt.edu
Southern Piedmont AREC	359	3/16/2016	3/15/2019	Agriculture	Dr. Carl Wilkinson wilki@vt.edu
Southwest AREC	98.1	1/15/2016	1/14/2019	Agriculture	Lee Wright lrite@vt.edu
Tidewater AREC	230	12/02/2015	12/01/2018	Agriculture	David Langston dblankston@vt.edu

9VAC25-890-40 Section II B 6 c (1) *Implement Nutrient Management plans that have been developed by a certified nutrient management planner on all lands owned or operated by Virginia Tech where nutrients are applied to a contiguous area greater than one acre.*

- a)** *Identify all applicable lands where nutrients are applied to a contiguous area of more than one acre within 12 months of permit coverage.*
- During Year 1, Virginia Tech will determine if any additional lands will require NMPs and/or if any of the current turf and landscape NMPs need to be updated. A final list of turf and landscape NMPs will be provided in the Year 1 annual report submission. A latitude and longitude for each piece of land will be included in the final list.
 - **Year 1 Response:** Virginia Tech determined that no additional lands require a nutrient management plan. Please see Table 3 (above) for a current list of Virginia Tech's nutrient management plans.
 - **Year 2 Response:** Please see year 1 Response above, copies of current Virginia Tech nutrient management plans are available upon request.
 - **Year 3 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.
 - **Year 4 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.
 - **Year 5 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.
- b)** *Implement turf and landscape NMPs on all lands where nutrients are applied to contiguous area of more than one acre, within 60 months of permit coverage.*
- If it is determined that additional turf and landscape NMPs need to be developed and/or any existing NMPs need to be modified, Virginia Tech will begin the process during Year 2. Progress updates regarding NMP modification and development will be given in each MS4 Annual Report submission. Virginia Tech will strive to have all necessary NMPs Developed and implemented by June 30, 2018.
 - **Year 1 Response:** Virginia Tech determined that no additional lands require a nutrient management plan. Please see Table 3 (above) for a current list of Virginia Tech's nutrient management plans.
 - **Year 2 Response:** Please see year 1 Response above, copies of current Virginia Tech nutrient management plans are available upon request.
 - **Year 3 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.
 - **Year 4 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.
 - **Year 5 Response:** Copies of current Virginia Tech Nutrient Management Plans are available upon request.

9VAC25-890-40 Section II B 6 d *Conduct training for employees and develop an annual written training plan including a schedule of training events that ensures implementation of the training requirements.*

- During Year 1, Virginia Tech will develop an Annual Training Plan which will outline training schedules and implementation of training requirements. The Annual Training Plan will be added to the MS4 Program and updated annually.

- **Year 1 Response:** An Annual Written Training Plan was completed during Year 1 and outlines the training components that will be accomplished each year. A copy of the training plan is available in the Site & Infrastructure Development office upon request. See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update.
- **Year 2 Response:** The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. A copy of the training plan is available in the Site & Infrastructure Development office upon request. See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update.
- **Year 3 Response:** The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. A copy of the training plan is available in the Site & Infrastructure Development office upon request. See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update.
- **Year 4 Response:** The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. A copy of the training plan is available in the Site & Infrastructure Development office upon request. See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update.
- **Year 5 Response:** The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. A copy of the training plan is available in the Site & Infrastructure Development office upon request. See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update.

Annual Reporting Requirements

Per **9VAC25-890-40 Section II B 6 g**, each annual report shall include the following:

- *A summary report on the development and implementation of the daily operational procedures*
- *A summary report on the development and implementation of the required SWPPPs*
- *A summary report on the development and implementation of the nutrient management plans that includes:*
 - *The total acreage of lands where nutrient management plans are required*
 - *The total acreage of lands upon which nutrient management plans have been implemented*
- *A summary report on the required training, including a list of training events, the training date, the number of employees attending training and the objective of the training.*

Year 1 Response: See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 2 Response: See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 3 Response: See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 4 Response: See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

Year 5 Response: See BMP 6.1, 6.2, and 6.3 in **Appendix A** for a status update of the aforementioned annual reporting requirements.

APPENDIXES

Appendix A – Summary of BMPs & Measurable Goals

MINIMUM CONTROL MEASURE 1 – PUBLIC OUTREACH & EDUCATION

Table 1: Public Education Outreach Plan

Program Update Requirement:	Permit Reference:	Update Completed By:
Public Education Outreach Plan	Section II B 1	12 months after permit coverage

*Updates will be submitted with the appropriate annual report.

1.1–Public Outreach Events for Target Audiences (Virginia Tech Students & Staff)

1.1.1 – Academic, Campus, and Community Events

Program Description: Educate the University about stormwater issues and pollution prevention techniques by participating in campus-sponsored events.

Measurable Goals: Participate in a total of 3 campus, community, or academic public outreach events each year. Track the number of outreach materials distributed at each event. Estimate the number of people from each target audience reached. TMDL- specific information will be incorporated into all public outreach events.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Public Outreach and Education Procedure

Year 1 Response: Site & Infrastructure Development (SID) staff assisted in coordinating and implementing the **Recycling Olympics** on March 19, 2014 to promote recycling, waste elimination, and proper waste disposal on the Virginia Tech campus. 42 on-campus students and 4 staff members participated in this event. The high priority water quality issue addressed through this outreach event was trash. SID promoted the Office of Energy and Sustainability’s **America Recycles Day Green Tailgate** on November 14, 2013 through advertisements on Facebook and Twitter. Over 50 (off-campus and on-campus) students and 3 faculty members participated in this event which paralleled with our tailgate signage efforts encouraging proper disposal of waste during football season. The high priority water quality issue addressed through this outreach event was also trash. SID also promoted the Virginia Tech Alternative Transportation **Cycle Chic** event on April 23, 2014. Over 30 off-campus commuter students and 6 staff members participated in the event, including members of the Virginia Tech Police Department. The event included bike tune-ups and

information on the benefits of alternative transportation. No stormwater-specific outreach material was distributed as a part of this event, but all events incorporated outreach components that included important pollution prevention practices. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Sustainability Week** on September 18, 2013. Representatives distributed pollution prevention information and were available for questions/concerns regarding local waterways. Approximately 10 off-campus students and 5 Virginia Tech employees visited the booth during the event. Children and their parents were able to enjoy Enviroscape demonstrations as well as the aquatic insect display (highlighting the core benthic impairment issue with the Stroubles Creek TMDL). More face-to-face interactions took place at this event than material distribution. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment. Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Steppin' Out 2013**. A 'kids table' included an aquatic insect display, a Virginia Tech weather station informational video, coloring activities, and goodie bags with activity books and bookmarks. The adult table included a watershed map, basic water quality testing equipment, and information about lawn maintenance and pet waste. A rain barrel was also on display. Again, representatives were available to address any questions/concerns from community members. Approximately 60% of all materials provided were distributed during the event. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment. For the first time, Site & Infrastructure Development took advantage of a program in Housing and Residence Life that allows printed materials to be distributed to each dormitory bed in order to provide pertinent information to new and returning students. An informational **residential dormitory packet** included a flier and a business card outlining illicit discharge indicators and information on how to report an illicit discharge. The materials were distributed to 9,026 beds for all on-campus students. This effort reached 100% of the on-campus student target audience. Next steps include developing innovative outreach material that is *not* paper-based to encourage continued use (magnets, dog leash poop bag holders, keychains, etc.). The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

A Virginia Tech Site & Infrastructure Development (SID) employee and two Town of Blacksburg employees presented in Travis Williams' **Environmental Justice course** March 20, 2014. Of the three total presentations, the local MS4 Programs, local flooding issues, and local water quality sampling were all addressed. Approximately 30 students were present in the classroom, along with one professor. The manager of SID participated in a field outing with Erich Hester's **Water Resources Engineering course** on March 26, 2014 which included a tour of an on-campus enhanced extended detention pond, an explanation of the project's plan sets and relevant stormwater design information. Approximately 30 students were present in the class, along with one professor. A Virginia Tech SID employee presented in Leigh Anne Krometis' **Land and Water Resources Engineering II course** on April 7, 2014 highlighting the campus storm sewer system and the Virginia Tech MS4 Program. Approximately 30 students and one professor were present in the class. Since all courses were upperclassmen level, all students most likely lived off-campus. New River Valley Watershed stickers and illicit discharge business cards were distributed to those interested,

but material distribution numbers were not collected. The high priority water quality issues addressed through all three of these academic outreach events were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Gobbler Fest** on September 5, 2014. Representatives distributed pollution prevention information and were available for questions/concerns regarding local waterways and stormwater control. Approximately 83 magnets and 103 stickers promoting awareness were distributed through the display. Items given out also included approximately 6 cigarette butt holders and 3 Illicit Discharge Detection business cards. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment. Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, also hosted a stormwater display at **Steppin' Out** on August 7-8, 2014. A 'kids table' included an aquatic insect display, coloring activities, and goodie bags with activity books and bookmarks. The table also included a watershed map, basic water quality testing equipment, and information about lawn maintenance and pet waste. A rain barrel was also on display. Again, representatives were available to address any questions/concerns from community members. Approximately 150 public outreach materials were distributed during the event. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment. Site & Infrastructure Development also took advantage of a program in Housing and Residence Life that allows materials to be distributed to each dormitory bed to provide pertinent information to new and returning students on campus. Magnets were distributed through these **residential dormitory packets** to 9,026 beds for all on-campus students. This effort reached 100% of the on-campus student target audience. Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Sustainability Week** on September 16, 2014. Representatives distributed pollution prevention information and were available for questions/concerns regarding local waterways. More face-to-face interactions took place at this event than material distribution. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment.

A Virginia Tech Site & Infrastructure Development (SID) employee presented in a **Hydraulics Structures** course on March 2, 2015. Approximately 13 students were present in the classroom, along with one professor. The presentation included the discussion of SWM facility design, and looked at the different parts of facilities and different hydrology methods that could be used. Another presentation was given in an **Introduction to Environmental Policy and Planning** course on April 15, 2015 by Chuck Dietz the Stormwater Compliance Manager. The presentation included information on stormwater control and aspects managed through Virginia Tech Site & Infrastructure Development (SID) and was given to approximately 24 undergraduate students. A third presentation was again delivered by Chuck Dietz in a **Non-Point Source Assessment and Control** Course course on May 4, 2015. This specific presentation focused on stormwater control and approximately 10 students were present in the classroom along with

On April 3, 2015 Facilities participated in a play at an event called **First Friday**. This play gave facilities the opportunity to educate the rest of the Administrative Services Division about the role of facilities in the University. The play targeted faculty and staff and informed them

of Facilities' role in campus projects and the stormwater management projects they take part in. Approximately 72 faculty and staff members were present for this play.

On March 18, 2015 Site & Infrastructure Development gave a presentation to faculty and staff at an event called **3rd Wednesday** that is put on every month by the Facilities department to update the university community on the latest events and projects. The presentation included information about Virginia Tech's Stormwater Management Program and pollution prevention practices. Approximately 75 faculty/staff members were in attendance

Year 3 Response:

Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, also hosted a stormwater display at **Steppin' Out** on August 7-8, 2015. A 'kids table' included an aquatic insect display, coloring activities, and goodie bags with activity books and bookmarks. The table also included a watershed map, basic water quality testing equipment, and information about lawn maintenance and pet waste. Representatives from the Town of Blacksburg and Virginia Tech were available to address any questions/concerns from community members. Approximately 184 public outreach materials were distributed during the event. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment.

Sustainability Week is held by Virginia Tech and the Town of Blacksburg to promote creating a more sustainable community. Virginia Tech Site & Infrastructure Development participated by distributing approximately 50 pamphlets and handouts promoting local stormwater issues. The high priority water quality issues addressed through this outreach event were trash, pet waste, and sediment.

Magnets designed by Virginia Tech Site & Infrastructure Development were also distributed at an **American Society of Agricultural and Biological Engineers (ASABE) Conference** held April 1st through the 3rd. Approximately 140 students received these informational magnets and learned about on-campus stormwater management programs and listened to a lecture about a stream lab monitored by the Virginia Tech Sustainability Office.

Site & Infrastructure Development also took advantage of a program in Housing and Residence Life that allows materials to be distributed to each dormitory bed to provide pertinent information to new and returning students on campus. Magnets promoting the protection of Stroubles Creek were distributed through these **residential dormitory packets** to all on-campus students. This effort reached 100% of the on-campus student target audience.

A Virginia Tech Site & Infrastructure Development (SID) employee presented in a **Hydraulics Structures** course on March, 1 2016. The individuals present for this class included 2 on-campus students, 22 off-campus students and 1 Virginia Tech Faculty/Staff member. The presentation included the discussion of stormwater management facilities, including their different parts and the hydrology methods that could be used for design. A second presentation was given to a **Non-Point Source Assessment and Control** Course on April 27, 2016. The students in attendance included 13 that live off campus and 2 that live on campus. This lecture covered the Municipal Storm Sewer System and how it works and operates on Virginia Tech's campus. A third presentation that included an on-campus tour was given to an Environmental Economics Course on April 29, 2016. The audience included

18 off-campus students, 1 on-campus student and 1 member of Virginia Tech's faculty/staff. The discussion and tour covered the cost of inspections and maintenance of several best management practices located on campus.

Handouts designed by Virginia Tech Site & Infrastructure Development were distributed at an on-campus picnic geared towards Virginia Tech Graduate students. The target audience for these handouts included off-campus students. The high priority water quality issues addressed through these handouts were trash and pet waste.

Twice during the reporting year Virginia Tech Site & Infrastructure was able to educate faculty and staff through the **Facilities Newsletter**. In August stormwater facts were presented to educate employees that work in the facilities department. A write-up about the Stormwater BMP Inspector Training was also featured in the Facilities Newsletter.

Virginia Tech Site & Infrastructure Development hosted a **Stormwater BMP Inspection training** on July 22, 2015. This training was meant to teach DEQ employees and stormwater related individuals how to perform inspections of different types of stormwater management facilities. Thirty-one individuals were involved, including some DEQ staff and some Virginia Tech faculty/staff. SID was given the opportunity to present an overview of the current BMP maintenance program, and then several field inspections around campus were conducted throughout the remainder of the day.

Year 4 Response:

Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Steppin' Out** on August 4-5, 2016. The tables at the booth included a multitude of handouts, watershed maps, and educational information about lawn maintenance and pet waste. Representatives were available to address any questions/concerns from community members. Based upon the numbers of items handed out, approximately 75 different individuals were reached during this event. The priority water quality issues addressed through this outreach event were trash, pet waste, and sediment.

Site & Infrastructure Development also took advantage of a program in Housing and Residence Life that allows materials to be distributed to each dormitory bed to provide pertinent information to new and returning students on campus. Magnets promoting the protection of Stroubles Creek were distributed through these **residential dormitory packets** to all on-campus students at the beginning of the 2016 school year. This effort reached 100% of the on-campus student target audience.

A Virginia Tech Site & Infrastructure Development (SID) employee presented in the BSE 4224 Course on September 1, 2016. The individuals present for this class included 18 off-campus students and 1 Virginia Tech Faculty/Staff Member. The presentation included site visits to various stormwater management facilities around campus.

Virginia Tech Site & Infrastructure Development hosted an **Illicit Discharge Detection and Elimination (IDDE) Workshop** on November 10, 2016. This training was meant to teach regional MS4 Representatives and local consultants about developing and implementing IDDE Programs for MS4s. SID was given the opportunity to present an overview of the Virginia Tech IDDE Program and then several field visits around campus were conducted throughout the remainder of the day.

A Virginia Tech Site & Infrastructure Development (SID) employee presented in a **Hydraulic Structures** course on February, 23 2017. The individuals present for this class included 29 off-campus students and 1 Virginia Tech Faculty/Staff member. The presentation included the discussion of stormwater management facilities, including their different parts and hydrology methods that could be used. On top of the presentation, this class specifically went out in the field and looked at the Alumni Pond BMP located on the Virginia Tech campus. A second presentation was given to a **Green Engineering** class on March 17, 2017. The students in attendance included 14 students that live on campus and 52 students that live off campus. This lecture covered the Municipal Storm Sewer System (MS4) and how it works and operates on Virginia Tech's campus. A third presentation that included an on campus tour was given to a **Non-Point Source Assessment and Control** class on April 3, 2017. The audience included 14 off-campus students and 1 member of Virginia Tech's faculty/staff. The discussion and tour covered the responsibilities and duties of VTSID, how the stormwater management program is implemented on the Virginia Tech campus, and an overview of inspections and maintenance of several stormwater management facilities located on campus.

Members of Virginia Tech SID staff participated in an educational booth at a **New River Valley Home Show** in Christiansburg Virginia on March 10-12, 2017. Through communicating with residents, providing education pamphlets and performing demonstrations for children, approximately 100 different individuals were reached. This event targeted pet waste, sediment and trash along with many other home related stormwater issues.

A Virginia Tech Site & Infrastructure Development (SID) employee taught a station at an event for sixth graders on April 12, 2017. The topic at the station included education on stormwater runoff and watershed conservation using a hands on Enviroscape model. The audience included 240 sixth grade students and 28 teachers and volunteers from local middle schools.

Virginia Tech hosted the **DEQ Continuing Education Course** entitled "Applied Soils for ESC and SW Professionals" on April 19, 2017. Forty individuals from local jurisdictions, including Virginia Tech staff, attended this training.

Virginia Tech hosted the **DEQ Continuing Education Course** entitled "Where the Water Goes" on April 20, 2017. Forty individuals from local jurisdictions, including Virginia Tech staff, attended this training.

A Virginia Tech Site & Infrastructure Development (SID) employee participated in the first annual **Girls Day** sponsored by the Virginia Tech Facilities Department on June 7, 2017. The topics covered in the presentation included water quality, watershed conservation and sustainability. The audience included approximately 80 eighth grade students, 10 teachers and 10 of Virginia Tech's faculty/staff members.

A Virginia Tech Site & Infrastructure Development (SID) employee led 10 **Master Gardener** members around the Virginia Tech campus on June 22, 2017. The topics covered included discussing Site and Infrastructure's role on campus while visiting several different types of green infrastructure. The audience included two members of Virginia Tech's faculty/staff and eight individuals from different regions of the state.

Year 5 Response:

Virginia Tech, in conjunction with the stormwater management employees at the Town of Blacksburg, hosted a stormwater display at **Steppin' Out** on August 4-5, 2017. The tables at the booth included a multitude of handouts, watershed maps, and educational information about lawn maintenance and pet waste. Representatives were available to address any questions/concerns from community members. Based upon the numbers of items handed out, approximately 100 different individuals were reached during this event. The priority water quality issues addressed through this outreach event were trash, pet waste, and sediment.

Site & Infrastructure Development also took advantage of a program in Housing and Residence Life that allows materials to be distributed to each dormitory bed to provide pertinent information to new and returning students on campus. Magnets promoting the protection of Stroubles Creek were distributed through these **residential dormitory packets** to all on-campus students at the beginning of the 2017 school year in August. This effort reached 100% of the on-campus student target audience.

Katelyn Kast and Mike Vellines, Virginia Tech Site & Infrastructure Development (SID) employees, spoke at the **ASCE meeting** on September 19th, 2017. The meeting had 162 attendees who included a mixture of on campus and off campus Virginia Tech students. The presentation included discussion of the priority stormwater pollutants on campus and SID's role in preventing stormwater pollution.

Chuck Dietz, a Virginia Tech Site & Infrastructure Development (SID) employee presented in the Sterrett Facility Classroom on September 27th, 2017. The presentation was called the **Site and Infrastructure Department Lunch and Learn**. There were 30 Virginia Tech faculty and staff members present. The presentation included a briefing on the responsibilities and roles of the Site and Infrastructure Department.

Katelyn Kast, a Virginia Tech Site & Infrastructure Development (SID) employee, taught a station at **Stormwater Day**, an event for sixth graders on November 3rd 2017. The topic at the station included education on stormwater runoff and watershed conservation using a hands-on Enviroscape model. The audience included 300 Blacksburg Middle School Students and approximately 20 teachers and chaperones. Volunteers at the event included Virginia Tech students who helped engage and teach the students about Stormwater. This same event was held in the spring on April 12th and 13th to reach Christiansburg Middle School Students, Auburn Middle School Students and Shawsville Middle School Students. Approximately 405 students were education during the second round Stormwater Day along with 44 adults. Virginia Tech students were also educated through this event as 16 different students were utilized as volunteers across the two days.

Katelyn Kast, a Virginia Tech Site & Infrastructure Development (SID) employee, taught a station at an event for **Virginia Tech's Preschool Program** on November 17th 2017. The topic at the station included education on stormwater runoff and watershed conservation using a hands on Enviroscape model. The audience included 18 preschool children and 2 Virginia Tech faculty and staff members.

Mike Vellines, a Virginia Tech Site & Infrastructure Development (SID) employee, presented **Virginia Tech's Annual Standards and Specifications** in the Sterrett Facility Classroom on January 7th, 8th, 11th, 16th, and 17th of 2018. The individuals present for this class on the 7th included 13 Virginia Tech faculty and staff members. The individuals present for this class on the 8th included 17 Virginia Tech Faculty/Staff members. The individuals present for this class on the 11th included 8 local contractors. The individuals present for this class on the 16th included 18 local engineers. Lastly, the individuals present on the 17th included 12 Virginia Tech faculty and staff and local engineers. The presentation included a discussion of the new annual standards and specifications dealing with erosion and sediment control and stormwater management for Virginia Tech projects.

Chuck Dietz, a Virginia Tech Site & Infrastructure Development (SID) employee presented **Stormwater Pollution Prevention Plan training at the Virginia Tech Quarry** on January 11th of 2018. The individuals present for this class included 19 Quarry employees who are considered Virginia Tech staff.

Katelyn Kast, Virginia Tech Site & Infrastructure Development (SID) employee, presented to a **Municipal Engineering class** at Virginia Tech on January 23rd, 2018. Katelyn taught 52 engineering students about the Site and Infrastructure Developments role on campus and future job opportunities that the students could have. The professor in the classroom was Randy Formica.

Members of Virginia Tech SID staff participated in an educational booth at a **New River Valley Home Show** in Christiansburg Virginia on March 9-11, 2018. This event targeted pet waste, sediment and trash along with many other home-related stormwater issues. Virginia Tech provided and gave out 100 children's activity books. The total attendance for the home show was calculated to be 1,576 across the entire weekend.

Site and Infrastructure Development taught 23 **Biological System Engineering** students from Dr. Krometis' class, in the classroom and in the field on March 26th. The presentation included a tour of stormwater facilities on Virginia Tech's campus and an overview of SID's overall goals and role on campus.

Katelyn Kast, Virginia Tech Site & Infrastructure Development (SID) employee, presented to 7th graders at **Christiansburg Middle School** on May 18th, 2018. Katelyn taught approximately 300 students about the Site and Infrastructure Development's role on campus, and aided the students on what to consider when thinking about future job opportunities within the field of Stormwater Management. Other presenters included operations faculty and staff at Virginia Tech.

Katelyn Kast, Virginia Tech Site & Infrastructure Development (SID) employee, presented to 7th graders at **Blacksburg Middle School** on May 18th, 2018. Katelyn taught approximately 300 students about the Site and Infrastructure Development's role on campus, and aided the students on what to consider when thinking about future job opportunities within the field of Stormwater Management. Other presenters included operations faculty and staff at Virginia Tech.

Katelyn Kast, Virginia Tech Site & Infrastructure Development (SID) employee, presented to 7th graders at **Auburn Middle School** on May 21st, 2018. Katelyn taught approximately 50 students about the Site and Infrastructure Department's role on campus, and aided the students on what to consider when thinking about future job opportunities within the field of Stormwater Management. Other presenters included operations faculty and staff at Virginia Tech.

Katelyn Kast, Virginia Tech Site & Infrastructure Development (SID) employee, presented to 7th graders at **Shawsville Middle School** on May 23th, 2018. Katelyn taught approximately 50 students about the Site and Infrastructure Department's role on campus, and aided the students on what to consider when thinking about future job opportunities within the field of Stormwater Management. Other presenters included operations faculty and staff at Virginia Tech.

On June 19th approximately 60 girls were educated through a hands on activity at an event called **Girls Day** hosted by Virginia Tech Operations department. The students were educated about stormwater pollution and completed exercises related to water quality at one of the stormwater facilities on campus. Approximately 15 members of Virginia Tech faculty and staff were also educated through this event. The faculty and staff members aided the attendees of Girls Day by acting as chaperones, several even took part in the hands on activity.

1.2 – Targeting Public Outreach Mediums for Target Audiences

1.2.1 – Electronic Outreach

Program Description: Provide the University community with electronic outreach mediums to access information regarding stormwater management and methods to improve local watershed health (i.e., Facebook, stormwater website, Twitter, Tumblr, blogs, etc.).

Measurable Goals: Post at least 5 stormwater-related facts each year via electronic outreach. Track the number of viewers and record the estimated number reached from each target audience. Track comments that SID receives from social media sources.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Public Outreach and Education Procedure

Year 1 Response: Virginia Tech Site & Infrastructure Development (SID) maintains a “Virginia Tech Stormwater” Facebook page (facebook.com/hokiestormwater), a Twitter feed (@VTstormwater), and a departmental website. On the Facebook page during this annual reporting year, two posts received over 140 organic views and the overall site had 142 “likes” (88 more than last year). The SID webpage received 9,865 page views this reporting year and the Twitter page has 101 followers. It was not feasible to determine the target audience reached from the 9,865 website views. No Twitter followers are students at Virginia Tech. Approximately 46 of the Facebook likes are off-campus students. Many ‘likes’ and ‘followers’ are student organizations or other Virginia Tech departments as well as other stormwater entities. The high priority water quality issues addressed through these

electronic outreach mediums were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Virginia Tech Site & Infrastructure Development (SID) maintains a “Virginia

Tech Stormwater” Facebook page (facebook.com/hokiestormwater), a Twitter feed (@VTstormwater), and a departmental website. On the Facebook page during this annual reporting year, posts received over 70 organic views and the overall site had 182 “likes” (40 more than last year). The SID webpage received 658 page views this reporting year and the Twitter page has 131 followers (30 more than last year). It was not feasible to determine the target audience reached from the 9,865 website views. No Twitter followers are students at Virginia Tech. Approximately 60 of the Facebook likes are off-campus students. Many ‘likes’ and ‘followers’ are student organizations or other Virginia Tech departments as well as other stormwater entities. The high priority water quality issues addressed through these electronic outreach mediums were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Virginia Tech Site & Infrastructure Development (SID) maintains a “Virginia Tech Stormwater” Facebook page (facebook.com/hokiestormwater), a Twitter feed (@VTstormwater), and a departmental website. The Facebook page currently has 208 “likes” and through the posts within the reporting year an average of 69 individuals were reached. The SID webpage was viewed by 353 users this reporting year, and the Twitter page has 141 followers. Approximately 60 of the Facebook likes are off-campus students. Many ‘likes’ and ‘followers’ are student organizations or other Virginia Tech departments as well as other stormwater entities. The high priority water quality issues addressed through these electronic outreach mediums were trash, pet waste, and sediment.

Year 4 Response: Virginia Tech Site & Infrastructure Development (SID) maintains a “Virginia Tech Stormwater” Facebook page (facebook.com/hokiestormwater), a Twitter feed (@VTstormwater), and a departmental website. The Facebook page currently has 217 followers and through the posts within the reporting year an average of 80 individuals were reached. The SID webpage received 552 page views this reporting year and the Twitter page has 141 followers. The high priority water quality issues addressed through these electronic outreach mediums were trash, pet waste, and sediment.

Year 5 Response: Virginia Tech Site & Infrastructure Development (SID) maintains a “Virginia Tech Stormwater” Facebook page (facebook.com/hokiestormwater) and a departmental website. The Facebook page currently has 253 followers and through the posts within the reporting year an average of 50 individuals were reached. One specific facebook post reached over 1,000 individuals on March 23rd 2018. The high priority water quality issues addressed through these electronic outreach mediums were trash, pet waste, and sediment.

1.2.2 – Other Outreach Materials

Program Description: Provide the University community with outreach materials to access information regarding local water pollution concerns (i.e., PSAs, pamphlets, table cards, signage, public advertisements).

Measurable Goals: Produce at least 2 printed outreach materials each year such as those listed in the *Program Description*. Record number of methods utilized each year. Record the estimated number reached for each target audience.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Public Outreach and Education Procedure

Year 1 Response: Approximately 2,538 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls in October. Each table card remained for a total of one week before it was removed. According to the average daily headcount in each dining hall, 3,901 students enter these dining halls each day and 20,026 on and off-campus students held dining plans last year. The high priority water quality issues addressed through this outreach medium were sediment and trash. **Tailgating signs** encouraging pollution prevention to protect local waterways were posted alongside both sides of the creek where cars gather for pre- and post-game tailgating. The signs were posted for five of the six home games. On average, 61,671 persons attended each of the six home games when the signage was posted. According to the following [source](#), on average, 25.67% of those in the stadium are students. For the sake of fairness, half are most likely on-campus students while half are off-campus. The high priority water quality issue addressed through this outreach medium was trash. The signage was a parallel effort alongside the Office of Energy and Sustainability's 'America Recycles Green Tailgating' event on November 14, 2013. Two advertisements are on rotation at **The Lyric Theatre** in downtown Blacksburg, VA. These two stormwater-specific advertisements are each aired three times during the 30-minute preview during all showings. There are approximately two movie showings per day. On average, 35-45,000 people go to The Lyric each year. The high priority water quality issues addressed through this outreach medium were trash and pet waste. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Approximately 2000 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls during Year 2. Each table card remained for a total of one week before it was removed. The average daily headcount in each dining hall ranges from approximately 1,000-6,600 customers each day. There were approximately 18,500 dining plan holders during the 2014-2105 academic year. The high priority water quality issues addressed through this outreach medium were sediment and trash. **Tailgating signs** encouraging pollution prevention to protect local waterways were posted alongside both sides of Stroubles Creek where cars gather for pre- and post-game tailgating. The signs were posted for five of the six home games. On average, 66,223 persons attended each of the home games when the signage was posted. According to the following [source](#), on average, 25% of those in the stadium are students. The high priority water quality issue addressed through this outreach medium was trash.

Year 3 Response: **Table cards** designed by Site & Infrastructure Development were placed throughout dining halls on campus during the 2015-2016 school year. Approximately 1,395 table cards were placed across 5 different dining halls which reach on and off campus students. These table cards provide educational information on ways to reduce pollution to

local waterways and spread the word on ways to get involved with the local stormwater programs. The high priority water quality issues addressed through this outreach medium were sediment and trash.

Year 4 Response: Table cards designed by Site & Infrastructure Development were placed throughout dining halls on campus during the 2016-2017 school year. Approximately 1,680 table cards were placed across 6 different dining halls which reach on and off campus students. These table cards provide educational information on ways to reduce pollution to local waterways and spread the word on ways to get involved with the local stormwater program.

Year 5 Response: Educational and informative Table Cards addressing pet waste were placed in three of the on-campus dining halls throughout the 2017-2018 school year. Approximately 500 table cards were put into circulation and could be accessed by on and off campus students along with Virginia Tech Faculty and Staff.

1.2.3 – TMDL-Specific Outreach Materials

Program Description: Provide the University community with outreach mediums to access information regarding local water pollution concerns (i.e., PSAs, pamphlets, table cards, signage, public advertisements, etc.).

Measureable Goals: Produce at least 2 TMDL- specific outreach materials each year such as those listed in the program description. Record the estimated number reached for each target audience.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Public Outreach and Education Program Procedure.

Year 1 Response: The Table Cards distributed to Virginia Tech dining halls have TMDL-specific information and illicit discharge contact information. The residential packet fliers also contain TMDL-specific information about the Stroubles Creek watershed and contain illicit discharge contact information. The aquatic insects on display with an informational poster at Steppin’ Out and Sustainability Week highlighted the core benthic impairment issue with Stroubles Creek as determined by the Stroubles Creek TMDL Implementation Plan. The high priority water quality issues addressed through TMDL-specific outreach materials were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: The Table Cards distributed to Virginia Tech dining halls have TMDL-specific Information and illicit discharge contact information. The residential packet fliers also contain TMDL-specific information about the Stroubles Creek watershed and contain illicit discharge contact information. The aquatic insects on display with an informational poster at Steppin’ Out highlighted the core benthic impairment issue with Stroubles Creek as determined by the Stroubles Creek TMDL Implementation Plan. The high priority water quality issues addressed through TMDL-specific outreach materials were trash, pet waste,

and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: The Table Cards distributed to Virginia Tech dining halls have TMDL-specific Information and illicit discharge contact information. The residential packet fliers also contain TMDL-specific information about the Stroubles Creek watershed and contain illicit discharge contact information. The aquatic insects on display with an informational poster at Steppin' Out highlighted the core benthic impairment issue with Stroubles Creek as determined by the Stroubles Creek TMDL Implementation Plan. The high priority water quality issues addressed through TMDL-specific outreach materials were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: The Table Cards distributed to Virginia Tech dining halls have TMDL-specific Information and illicit discharge contact information. The residential packet fliers also contain TMDL-specific information about the Stroubles Creek watershed and contain illicit discharge contact information. The aquatic insects on display with an informational poster at Steppin' Out highlighted the core benthic impairment issue with Stroubles Creek as determined by the Stroubles Creek TMDL Implementation Plan. The high priority water quality issues addressed through TMDL-specific outreach materials were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: The Table Cards distributed to Virginia Tech dining halls have TMDL-specific Information and illicit discharge contact information. The residential packet fliers also contain TMDL-specific information about the Stroubles Creek watershed and contain illicit discharge contact information. The aquatic insects on display with an informational poster at Steppin' Out highlighted the core benthic impairment issue with Stroubles Creek as determined by the Stroubles Creek TMDL Implementation Plan. The high priority water quality issues addressed through TMDL-specific outreach materials were trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

1.2.4 – Storm Drain Markers

Program Description: Provide stormwater outreach through the use of storm drain markers to remind the community about the vital role they play in watershed health and in the prevention and detection of illicit discharges.

Measureable Goals: Mark new storm structures within 6 months of project termination. Replace existing storm drain markers as needed. Record and map the number of storm drains marked each year.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Storm Drain Marking Standard Operating Procedure

Year 1 Response: Five Virginia Tech student volunteers marked 58 storm drains around the Town of Blacksburg on April 7, 2014 during **The Big Event**. Storm drain markers were placed on campus at the newly constructed inlets around Signature Engineering, Center for the Arts, Sigma Phi Epsilon, and Human & Agricultural Biosciences Building 1 soon after the projects' termination. 90% of the Virginia Tech main campus storm drains have been marked and are documented via ArcGIS mapping. The high priority water quality issues addressed through this outreach medium are trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: 4 Virginia Tech student volunteers marked 48 storm drains around the Town of Blacksburg on April 11, 2015 during the Big Event. Storm drain markers were placed on campus at newly constructed inlets soon after the projects' completion. Approximately 90% of the Virginia Tech campus storm drains have been marked and are documented via ArcGIS mapping. The high priority water quality issues addressed through this outreach medium are trash, pet waste, and sediment. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Big Event is an annual event that takes place on Virginia Tech's campus. This year's volunteer event was scheduled for April 9, 2016, and Virginia Tech Site & Infrastructure Development had plans for their volunteers to label approximately 50 storm drains with markers indicating "no dumping." The weather with temperatures in the 30's did not allow for the storm drains to be marked since the adhesive wouldn't work properly. The 50 storm drain markers are planned to be put out during the upcoming year's Big Event.

Year 4 Response: Virginia Tech SID participated in Big Event by providing storm drain markers and necessary tools for a group of volunteers to mark storm drains. The group marked approximately 60 new unmarked storm drains in the Town of Blacksburg. This outreach event targeted illicit discharge and water quality protection.

Year 5 Response: Big Event is an annual event that takes place on Virginia Tech's campus. This year's volunteer event was scheduled for April 7, 2018, and Virginia Tech Site & Infrastructure Development had plans for their volunteers to label approximately 30 storm drains with markers indicating "no dumping." The weather with temperatures in the 30's did not allow for the storm drains to be marked since the adhesive wouldn't work properly. The 30 storm drain markers are planned to be put out during the upcoming year's Big Event.

Projected Outreach Events for the 2014-2015 Annual Reporting Year:

Outreach events are subject to change in the upcoming annual reporting year. New events are likely to be added in order to better address high priority water quality issues and target audiences.

- Steppin' Out 2014
- Sustainability Week 2014
- Gobblerfest 2014
- Storm Drain Marking
- The Lyric Theatre – stormwater advertisement
- Residential Dormitory Packets 2014
- Table Cards
- Academic Presentations

- Stormwater Training for employees

Year 2 Response: Virginia Tech was able to participate in all the outreach events mentioned above except for placing an ad at the Lyric Theatre. Please see MCM evaluations in **Appendix F** for more information regarding target audience percentages.

Projected Outreach Events for the 2015-2016 Annual Reporting Year:

Outreach events are subject to change in the upcoming annual reporting year. New events are likely to be added in order to better address high priority water quality issues and target audiences.

- Steppin' Out 2015
- Sustainability Week 2015
- Gobblerfest 2015
- Graduate Student Fair 2015
- Storm Drain Marking
- The Lyric Theatre
- Residential Dormitory Packets
- Table Cards
- Academic Presentations
- Stormwater Training for employees

Year 3 Response: Virginia Tech was able to participate in all the outreach events mentioned above except for Gobblerfest 2015. Please see MCM evaluations in **Appendix F** for more information regarding target audience percentages.

Projected Outreach Events for the 2016-2017 Annual Reporting Year:

Outreach events are subject to change in the upcoming annual reporting year. New events are likely to be added in order to better address high priority water quality issues and target audiences.

- Steppin' Out 2016
- Sustainability Week 2016
- Gobblerfest 2016
- Graduate Student Fair 2016
- Storm Drain Marking
- Residential Dormitory Packets
- Table Cards
- Academic Presentations
- Stormwater Training for employees

Year 4 Response: Virginia Tech was able to participate in all the outreach events mentioned above except for Gobblerfest 2016, Sustainability Week 2016, and Graduate Student Fair 2016. Please see MCM evaluations in **Appendix G** for more information regarding target audience percentages.

Projected Outreach Events for the 2017-2018 Annual Reporting Year:

Outreach events are subject to change in the upcoming annual reporting year. New events are likely to be added in order to better address high priority water quality issues and target audiences.

- Steppin' Out 2017
- Storm Drain Marking
- Residential Dormitory Packets
- Table Cards
- Academic Presentations
- Stormwater Training for employees
- Stormwater Day – November 2017 and April 2018

- NRV Home Show 2018
- Touch A Truck 2018
- Training sessions for updated Virginia Tech Annual Standards and Specifications

Year 5 Response: Virginia Tech was able to participate in all the outreach events mentioned above except touch a truck 2018.

Projected Outreach Events for the 2018-2019 Annual Reporting Year:

Outreach events are subject to change in the upcoming annual reporting year. New events are likely to be added in order to better address high priority water quality issues and target audiences.

- Steppin' Out 2018
- Academic Presentations
- Stormwater Training for employees
- Stormwater Days for all of Montgomery County 6th graders
- Green Tailgating
- Table Cards
- Residential Dormitory Packets with new updated magnets
- Earth Week
- Girls Day

MINIMUM CONTROL MEASURE 2 – PUBLIC INVOLVEMENT/PARTICIPATION

2.1 – Promote Availability of the MS4 Program Plan & Annual Reports

2.1.1 – Promotion through Electronic Mediums

Program Description: Provide for public comment by maintaining an updated copy of the MS4 Program Plan and each annual report on the Virginia Tech stormwater website. To solicit immediate feedback, other electronic mediums such as email listservs, Facebook, Twitter, etc. will also be utilized.

Measurable Goals: Post copies of each annual report within 30 days of submittal to DEQ. Track the number of public comments received each year. Any required updates to the MS4 Program Plan will be completed at a minimum of once per year and in conjunction with annual reports. Ensure that the updated program plan is posted on the Virginia Tech stormwater website within 30 days of submittal of the annual report.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Virginia Tech MS4 Program Plan, Methods for Public Notice Program Procedure

Year 1 Response: Public comment forums are available to Virginia Tech students, staff, and faculty as well as concerned residents on the Virginia Tech Site & Infrastructure Development (SID) website: (http://www.facilities.vt.edu/sid/ms4/mcm2_submitCmnt.asp). An advertised general stormwater email (stormwater@vt.edu) is published on all outreach materials and is managed through the Site & Infrastructure Development office. In addition, Facebook, Twitter, and the

Environmental Health and Safety website's Anonymous Safety Complaints forum (http://www.ehss.vt.edu/report_issue/) are all means to contact appropriate personnel to address MS4 Program concerns or general stormwater comments. The stormwater@vt.edu email forum was utilized twice this reporting year regarding a Duck Pond potential illicit discharge/water quality concern as well as a request for additional Pet Waste Stations at the Veterinary Medicine school. A stormwater awareness survey was posted on the January 14, 2014 and February 10, 2014 Virginia Tech Daily News Email which gained 18 comprehensive responses from Virginia Tech faculty and staff members. Over 9,000 employees subscribe to the daily email and approximately 950,000 unique visitors come to the Virginia Tech News website each year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Public comment forums are available to Virginia Tech students, staff, and faculty as well as concerned residents on the Virginia Tech Site & Infrastructure Development (SID) website: (http://www.facilities.vt.edu/sid/ms4/mcm2_submitCmnt.asp). An advertised general stormwater email (stormwater@vt.edu) is published on all outreach materials and is managed through the Site & Infrastructure Development office. In addition, Facebook, Twitter, and the Environmental Health and Safety website's Anonymous Safety Complaints forum (http://www.ehss.vt.edu/report_issue/) are all means to contact appropriate personnel to address MS4 Program concerns or general stormwater comments. The stormwater@vt.edu email forum was utilized a couple times as a request for additional Pet Waste Bags when the public noticed that the stations were empty.

Year 3 Response: Public comment email forums (stormwater@vt.edu) are available to Virginia Tech Students, staff, and faculty as well as concerned residents on the Virginia Tech Site & Infrastructure Development (SID) website: <http://facilities.vt.edu/permits-inspections/stormwater-management/ms4-program/mcm-2.html>. This same email forum is published on all outreach materials and is managed through the Site & Infrastructure Development office. In addition, Facebook, Twitter, and the Environmental Health and safety website's Anonymous Safety Complaints forum (http://www.ehss.vt.edu/report_issue/) are all means to contact appropriate personnel to address MS4 Program concerns or general stormwater comments. The stormwater@vt.edu email forum was utilized a couple times as a request for additional Pet Waste Bags when the public noticed that the stations were empty. Reports were also received from the public, via the email forum, to report damaged pet waste stations on campus.

Year 4 Response: Public comment email forums (stormwater@vt.edu) are available to Virginia Tech Students, staff, and faculty as well as concerned residents on the Virginia Tech Site & Infrastructure Development (SID) website: <http://facilities.vt.edu/permits-inspections/stormwater-management/ms4-program/mcm-2.html>. This same email forum is published on all outreach materials and is managed through the Site & Infrastructure Development office. In addition, Facebook, Twitter, and the Environmental Health and safety website's Anonymous Safety Complaints forum (http://www.ehss.vt.edu/report_issue/) are all means to contact appropriate personnel to address MS4 Program concerns or general stormwater comments. The stormwater@vt.edu email forum was utilized a couple of times as a request for additional Pet Waste Bags when the public noticed that the stations were empty. Reports were also received from the public, via the email forum, to report damaged pet waste stations on campus.

Year 5 Response: Public comment email forums (stormwater@vt.edu) are available to Virginia Tech Students, staff, and faculty as well as concerned residents on the Virginia Tech Site & Infrastructure Development (SID) website: <http://facilities.vt.edu/permits-inspections/stormwater-management/ms4-program/mcm-2.html>. This same email forum is published on all outreach

materials and is managed through the Site & Infrastructure Development office. In addition, Facebook, Twitter, and the Environmental Health and Safety website's Anonymous Safety Complaints forum (http://www.ehss.vt.edu/report_issue/) are all means to contact appropriate personnel to address MS4 Program concerns or general stormwater comments. The stormwater@vt.edu email forum was utilized a couple of times as a request for additional Pet Waste Bags when the public noticed that the stations were empty.

2.2 – Public Involvement/Participation

2.2.1 – Stream Clean-ups/Adopt-A-Stream

Program Description: Participate in DCR's Adopt-A-Stream Program and conduct stream clean-up initiatives internally, through sponsorship, or through the use of student volunteers and student clubs/organizations.

Measurable Goals: Participate through promotion, sponsorship, or other involvement in a minimum of 4 stream clean-up and volunteer events each year. Report and track all necessary information associated with each volunteer event (number of volunteers, amount of trash collected, linear feet of stream cleaned up, number of storm drains marked, etc.)

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Adopt-A-Stream Documentation, Public Involvement and Participation Procedure Stream Clean-Up Standard Operating Procedure.

Year 1 Response: Students from the American Society of Agricultural and Biological Engineering, the Soil and Water Conservation Society, and the Environmental Student Organization, as well as a few independent students, cleaned up three stream sections in the Stroubles Creek watershed from 5:00-7:00pm on April 2, 2014 as a part of the 1.2 mile **Adopt-A-Stream Program**. Approximately 20 bags of trash were collected in this 2-hour period. Three clean-ups were conducted through the month of April on the Enhanced Extended Detention Pond through the internal efforts of **Site & Infrastructure Development**. Two truck bed loads of tree stakes were removed and approximately 3 bags of trash were collected. Approximately 10 students from **The Students for Clean Energy** organization conducted a stream clean-up around the Stroubles Creek interconnection between the Town of Blacksburg and Virginia Tech often referred to as "Triangle Park". Approximately 3 bags of trash and 1 bag of recycling were collected during this .25mile effort. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Students from the Environmental & Water Resources Institute and Coast Oceans Ports & Rivers Institute, cleaned up areas including Webb Branch, areas near the Virginia Tech Vet Med Detention Pond and areas around the Duck Pond on October 11, 2014 as a part of the 3 mile **Adopt-A-Stream Program**. Approximately 22 bags of trash were collected in this 3-hour period by 21 individuals. A clean-up was also conducted on October 18, 2014 by **the Virginia Tech Chapter of the American Water Resources Association** located at Alumni Pond, Duck Pond and stretches of Stroubles Creek starting at the StREAM lab. Nine individuals participated to remove 9 trash bags of trash and large debris within 2.5 hours.

Year 3 Response: Three separate stream cleanup events took place in the reporting year as a part of the Adopt-A-Stream Program that Virginia Tech Site & Infrastructure Development participates in.

The Virginia Tech Chapters of AWRA and ASABE met on October 10, 2015 with 15 volunteers to pick up trash and debris. Also on October 10, 2015, the Virginia Tech Chapters of ASCE, AWWA/VWEA, and EWRI/COPRI had 22 volunteers clean-up 8 bags of trash around the Duck Pond and Vet Med Retention Pond on campus. Virginia Tech Site & Infrastructure Development organized a third stream cleanup on April 24, 2016, and 11 individuals participated. Please see **Appendix G** for documentation of Public Participation Activities.

Year 4 Response: Two separate stream cleanup events organized and supported by Virginia Tech Site & Infrastructure Development (SID) took place on Virginia Tech's campus during the reporting year. The first stream cleanup on October 22, 2016 focused on cleaning up trash across a 2-mile stretch along Stroubles Creek and included 18 volunteers from the Virginia Tech chapters of **EWRI and COPRI**. The second clean up took place in April of 2017 and included 85 volunteers from the **College of Natural Resources** who helped remove invasive species along stream banks.

Year 5 Response: Several stream cleanup events were organized and supported by Virginia Tech Site & Infrastructure Development (SID) on Virginia Tech's campus during the reporting year. Eight bags of trash were removed from Stroubles Creek and the Vet Med Pond area on October 7, 2017 by twenty-four students from Virginia Tech's ASCE chapter. Ten local volunteers from the Blacksburg Womens Club helped remove 8 bags of trash from sections of Stroubles Creek on October, 29th 2017. Site and Infrastructure worked with the Student Government Association to sponsor two Duck Pond Clean ups during the permit cycle. The first event was held on December 3rd 2017 and included 65 student volunteers who targeted cleaning up trash floating in or around the Duck Pond. The second cleanup occurred on April 22nd and 33 student volunteers participated. Another group of approximately 10 Virginia Tech students from the American Water Resource Association worked to clean up a portion of Stroubles Creek on April 22nd. Fifteen local residents that were part of a Girl Scouts group helped clean up a stormwater facility and a portion of Stroubles Creek on May, 5th 2018. Please see **Appendix F** for documentation of Public Participation Activities.

2.2.2 – Volunteer Events

Program Description: Participate in volunteer events through the use of student volunteers and student clubs/organizations (i.e., Big Event, Greeks Giving Back, etc.).

Measurable Goals: Participate through promotion, sponsorship, or other involvement in a minimum of 4 stream clean-up and volunteer events each year. Report and track all necessary information associated with each volunteer event (number of volunteers, amount of trash collected, linear feet of stream cleaned up, number storm drains marked, etc.)

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Public Involvement and Participation Procedure

Year 1 Response: Virginia Tech student volunteers marked 58 storm drains around the Town of Blacksburg on April 7, 2014 during **The Big Event**. Students from the American Society of Agricultural and Biological Engineering, Soil and Water Conservation Society, and the Environmental Student Organization, as well as a few independent students, cleaned up three sections of the Stroubles Creek watershed from 5:00 - 7:00pm on April 2, 2014 as a part of the 1.2 mile **Adopt-A-**

Stream Program. Approximately 20 bags of trash were collected in this 2 hour period. Three clean-ups were conducted through the month of April on the Enhanced Extended Detention Pond through internal efforts of **Site & Infrastructure Development**. Approximately 10 students from **The Students for Clean Energy** organization conducted a stream clean-up around the Stroubles Creek interconnection between the Town of Blacksburg and Virginia Tech at the intersection of Stanger Street and Prices Fork Road often referred to as “Triangle Park.” Approximately 3 bags of trash and 1 bag of recycling were collected during this effort. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: 5 Virginia Tech student volunteers marked 48 storm drains around the Town of Blacksburg, specifically in the Smith’s Landing Area and the Oak Manor Area on April 11, 2015 during **The Big Event**. Students from the Environmental & Water Resources Institute and Coast Oceans Ports & Rivers Institute, cleaned up areas including Webb Branch, areas near Virginia Tech Vet Med Detention pond and areas around the Duck Pond on October 11, 2014 as a part of the 3 mile **Adopt-A-Stream Program**. Approximately 22 bags of trash were collected in this 3-hour period by 21 individuals. A clean-up was also conducted on October 18, 2014 by **the Virginia Tech Chapter of the American Water Resources Association** located at Alumni Pond, Duck Pond and stretches of Stroubles Creek starting at StREAM lab. Nine individuals participated to remove 9 trash bags of trash and large debris within 2.5 hours. Site & Infrastructure Development purchased 250 trees and sponsored a multiple tree plantings along Stroubles Creek. The trees were planted by 15 volunteers over the course of a few weeks in April 2015. Please see **Appendix G** for documentation of Public Participation Activities.

Year 3 Response: Big Event is an annual event that takes place on Virginia Tech’s campus. This year’s volunteer event was scheduled for April 9th 2016, and Virginia Tech Site & Infrastructure Development had plans for their volunteers to label approximately 50 storm drains with markers indicating “no dumping”. The weather with temperatures in the 30’s did not allow for the storm drains to be marked since the adhesive wouldn’t work properly. The 50 storm drain markers are planned to be put out during the upcoming year’s Big Event. Three separate stream cleanup events took place in the reporting year as a part of the Adopt-A-Stream Program that Virginia Tech Site & Infrastructure Development participates in. The Virginia Tech Chapters of AWRA and ASABE met on October 10, 2015 with 15 volunteers to pick up trash and debris. Also on October 10, 2015, the Virginia Tech Chapters of ASCE, AWWA/VWEA, and EWRI/COPRI had 22 volunteers clean-up 8 bags of trash around the Duck Pond and Vet Med Retention Pond on campus. Virginia Tech Site & Infrastructure Development organized a third stream cleanup on April 24, 2016, and 11 individuals participated. Virginia Tech Site and Infrastructure Development sponsored a tree planting on March 24, 2016 for a class in the Department of Natural Resources and the Environment. On March 26, 2016, Virginia Tech Site & Infrastructure Development sponsored a joint tree planting and stream clean-up event hosted by Saves Stroubles and the Office of Energy & Sustainability. The event included 118 volunteers who planted a total of 155 trees and cleaned approximately 2 miles of Stroubles Creek. The event actually made the local news for the great efforts that took place for this event. Please see **Appendix G** for documentation of Public Participation Activities.

Year 4 Response: Virginia Tech SID participated in the **Big Event** by providing storm drain markers and necessary tools for a group of volunteers to mark storm drains. The group marked approximately 60 new unmarked storm drains in the Town of Blacksburg. This outreach event targeted illicit discharge and water quality protection. Two separate stream cleanup events organized and supported by Virginia Tech Site & Infrastructure Development (SID) took place on Virginia Tech’s campus during the reporting year. The first stream cleanup on October 22, 2016 focused on cleaning up trash across a 2-mile stretch along Stroubles Creek and included 18 volunteers from the Virginia Tech chapters of

EWRI and COPRI. The second cleanup took place in April of 2017 and included 85 volunteers from the **College of Natural Resources** who helped remove invasive species along stream banks. A **tree-planting event** sponsored and funded by Virginia Tech Site & Infrastructure Development took place in April 2017 and included 85 student volunteers from the College of Natural Resources and Virginia Tech faculty/staff members. The volunteers planted 297 trees and shrubs to create a riparian buffer and support enhanced water quality along Holton Branch.

Year 5 Response: Site and Infrastructure implemented and sponsored several **Tree-Planting and Restoration events** as Volunteer events for Public Involvement Opportunities. Across 4 different dates from September to December approximately 100 student volunteers worked to remove non-native vegetation that was harming the riparian habitat, and removed old unused livestock fencing along the stream. These volunteers also planted 470 native trees to ensure restoration of the riparian buffer along Stroubles Creek. The spring portion of restoration was held on March 31st and consisted of 34 student volunteers who successfully planted 300 more native trees in the riparian buffer area along Stroubles creek by the Huckleberry Trail and Plantation Road. **Big Event** is an annual event that takes place on Virginia Tech’s campus. This year’s volunteer event was scheduled for April 7th 2018, and Virginia Tech Site & Infrastructure Development had plans for their volunteers to label approximately 30 storm drains with markers indicating “no dumping.” The weather with temperatures in the 30’s did not allow for the storm drains to be marked since the adhesive wouldn’t work properly. The 30 storm drain markers are planned to be put out during the upcoming year’s Big Event.

MINIMUM CONTROL MEASURE 3 – ILLICIT DISCHARGE DETECTION & ELIMINATION

3.1 – Illicit Discharge Detection Program

3.1.1 – Storm Sewer System Map (Inventory Outfall Locations)

Program Description: The storm sewer map will show the location of all MS4 outfalls. Each mapped outfall will be given a unique identifier. The name and location of all waters receiving discharges from the MS4 outfalls and associated HUCs will be mapped. The location of all known points of discharge including those physically interconnected to another MS4 will be mapped.

Measurable Goals: The storm sewer system map will be updated to meet the requirements set forth in **9VAC25-890-40 Section II B 3 a (3)** by 2017 (48 months after permit coverage).

Schedule of Activities: A comprehensive storm sewer system map will be completed by 2017 (48 months after permit coverage). Once the storm sewer system map is updated, it will be evaluated annually and updated as necessary.

Table 2: Outfall Map

Program Update Requirement:	Permit Reference:	Update Completed By:
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Outfall Map	Section II B 3 a (3)	48 months after permit coverage
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*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: IDDE/ORI Standard Operating Procedure

Year 1 Response: Virginia Tech maintains stormwater infrastructure information in the campus GIS database. This database is updated on an as-needed basis as campus projects are completed or new information is discovered through Outfall Reconnaissance Inventory, etc. The comprehensive storm sewer system map and all required components will be incorporated into the campus GIS database. Upon completion, the map will be evaluated annually and updated as needed.

Year 2 Response: During Year 2 Virginia Tech has worked on incorporating the comprehensive storm sewer system map into the campus GIS database. Upon completion, the map will be evaluated annually and updated as needed. Please see Year 1 Response above.

Year 3 Response: Virginia Tech maintains an extensive GIS database which contains the elements required for the storm sewer system map. The GIS database is maintained by the Facilities Department and is updated on an as-needed basis.

Year 4 Response: Virginia Tech maintains an extensive GIS database which contains the elements required for the storm sewer system map. The GIS database is maintained by the Facilities Department and is updated on an as-needed basis.

Year 5 Response: Virginia Tech maintains an extensive GIS database which contains the elements required for the storm sewer system map. The GIS database is maintained by the Facilities Department and is updated on an as-needed basis.

3.1.2 – Inspect Stormwater Outfalls for Dry Weather Discharge

Program Description: Dry weather screening methodologies will be used to detect and eliminate illicit discharges to the MS4 that include field observations and field screening monitoring.

Measurable Goals: A minimum of 50 outfalls will be screened each year.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: IDDE/ORI Standard Operating Procedure

Year 1 Response: Last annual reporting year, Site & Infrastructure Development ensured that all Virginia Tech main campus outfalls were inspected during the five year permit cycle. 16 outfalls were inspected during that time and 8 potential outfalls were passed on to the Virginia Tech GIS Manager. Since that time, Site & Infrastructure Development has been working to revisit the ORI Program. This includes developing revised mapping of outfalls (including the “new” outfalls) that

contribute to Stroubles Creek, a revised interconnection map, and a comprehensive ORI Log that includes inspections from 2009 and forward. Site & Infrastructure Development also worked in coordination with VT Biological Systems Engineering and the Town of Blacksburg to conduct a watershed-scale bacteria sampling and inventory as a part of the Research Experience for Undergraduates Program (REU). The inventory included outfall interconnections and crucial outfall points that would assist in indicating where bacteria might enter Stroubles Creek. Other inventory and field observation opportunities included storm drain marking and the Adopt-A-Stream clean-up on April 2, 2014. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: During Year 2, all 73 Virginia Tech main campus outfalls were inspected and no “new outfalls” were discovered. Further documentation of inspections is available by request and is not provided as part of the Annual Report.

Year 3 Response: During Year 3, all 73 Virginia Tech Main Campus outfalls were inspected. A couple outfalls were unable to be inspected due to construction and will be inspected as soon as they are accessible. One new outfall was discovered during the Outfall Reconnaissance Inventory. The new outfall has been added to the inventory and will be included in future inspection efforts.

Year 4 Response: During Year 4, all Virginia Tech Main Campus outfalls that could be accessed were inspected. A couple of outfalls were unable to be inspected due to construction and will be inspected as soon as they are accessible. Further documentation of inspections is available by request and is not provided as part of the Annual Report.

Year 5 Response: During Year 5, all Virginia Tech Main Campus outfalls that could be accessed were inspected. A total of 68 outfalls were inspected and reports were filed for each inspection. Further documentation of inspections is available by request and is not provided as part of the Annual Report.

3.1.3 – Identify/Inspect Priority Areas

Program Description: Investigations will be performed to locate and identify campus areas that have the potential for illicit discharges and need to be monitored on a regular basis. These areas will be mapped and regularly monitored.

Measurable Goals: Priority areas will be evaluated each year and modified when necessary. Each priority area will be inspected at a minimum of once per year. If an illicit discharge occurs outside of the identified priority areas, the associated area will be added to the Map of Priority Areas and incorporated into the inspection schedule.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: IDDE/ORI Standard Operating Procedure, Map of Priority Areas

Year 1 Response: A consulting firm assisted Virginia Tech in identifying high priority/high potential areas on Virginia Tech’s main campus utilizing a checklist and general inspection form. Sites were considered for SWPPP development if the report showed that they were both high priority and high

potential. Next steps include identifying all personnel and operations on each individual site to refine stormwater pollution mitigation efforts prior to SWPPP development. Those facilities that did not qualify as both high priority and high potential will be incorporated into the illicit discharge detection and elimination (IDDE) program as priority areas. All locations will be tracked using ArcGIS. Next steps for the IDDE Program include developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: The facilities that did not qualify as both high priority and high potential have been incorporated into the IDDE Program. All locations will be tracked using ArcGIS. Next steps for the IDDE Program include developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: The facilities that did not qualify as both high priority and high potential have been incorporated into the IDDE Program. All locations will be tracked using ArcGIS. Next steps for the IDDE Program include developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. This process is ongoing; further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: The facilities that did not qualify as both high priority and high potential have been incorporated into the IDDE Program. All locations will be tracked using ArcGIS. Next steps for the IDDE Program include developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. This process is ongoing; further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: The facilities that did not qualify as both high priority and high potential have been incorporated into the IDDE Program. All locations will be tracked using ArcGIS. Next steps for the IDDE Program include developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. This process is ongoing; further documentation of implementation is available by request and is not provided as a part of the Annual Report.

3.1.4 – Reporting by Staff and Students

Program Description: The Virginia Tech Environmental Health and Safety (EHS) Department has a webpage available to report Anonymous Safety Complaints. This reporting page and other necessary contact information will be publicized to university staff and students via outreach materials and the Virginia Tech stormwater website.

Measurable Goals: A minimum of 3 outreach methods will be used to promote illicit discharge reporting methods.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party Facilities Department – Site & Infrastructure Development and Environmental Health and Safety

Necessary Documents: IDDE/ORI Standard Operating Procedure, EHS reporting page

Year 1 Response: Individuals can report spills and illicit discharges on the **Environmental Health and Safety webpage:** www.ehss.vt.edu/report_issue. This website link and further information regarding illicit discharges are available on the **Site & Infrastructure Development website** (www.sid.vt.edu) and on **illicit discharge business cards and table cards**. The business cards have been distributed to all on-campus residents as well as all staff members that attend “MS4 Stormwater Training” sessions. The business card includes the aforementioned contact information as well as illicit discharge indicators. Approximately 2,538 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls for the second and third weeks in October. Each table card remained for a total of one week before it was removed. According to the average daily headcount in each dining hall, 3,901 students enter these dining halls each day and 20,026 on and off-campus students held dining plans last year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Individuals can report spills and illicit discharges on the **Environmental Health and Safety webpage:** www.ehss.vt.edu/report_issue. This website link and further information regarding illicit discharges are available on the **Site & Infrastructure Development website** (www.sid.vt.edu) and on **illicit discharge business cards and table cards**. Approximately 2000 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls during Year 2. Each table card remained for a total of one week before it was removed. The average daily headcount in each dining hall ranges from approximately 1,000-6,600 customers each day. There were approximately 18,500 dining plan holders during the 2014-2105 academic year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Individuals can report spills and illicit discharges on the **Environmental Health and Safety webpage:** www.ehss.vt.edu/report_issue. This website link and further information regarding illicit discharges are available on the **Site & Infrastructure Development website** (www.sid.vt.edu) and on **illicit discharge business cards and table cards**. Approximately 1,400 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls during Year 3. Each table card remained for a total of one week before it was removed. The average daily headcount in each dining hall ranges from approximately 1,000-6,600 customers each day. There were approximately 18,500 dining plan holders during the 2015-2016 academic year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Individuals can report spills and illicit discharges on the **Environmental Health and Safety webpage:** www.ehss.vt.edu/report_issue. This website link and further information regarding illicit discharges are available on the **Site & Infrastructure Development website** (www.sid.vt.edu) and on **illicit discharge business cards and table cards**. Approximately 1,600 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls during Year 4. Each table card remained for a total of one week before it was removed. Dining Services serves approximately 7.4 million meals per year and there are approximately 19,000 dining plan holders. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Individuals can report spills and illicit discharges on the **Environmental Health and Safety webpage:** www.ehss.vt.edu/report_issue. This website link and further information regarding illicit discharges are available on the **Site & Infrastructure Development website** (www.sid.vt.edu) and on **illicit discharge business cards and table cards**. Approximately 500 TMDL-focused **Table Cards** were distributed throughout the Virginia Tech campus dining halls during Year

5. Each table card remained for a total of one week before it was removed. Dining Services serves approximately 7.4 million meals per year and there are approximately 19,000 dining plan holders. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

3.2 – Illicit Discharge Elimination

3.2.1 – Trace and Remove Illicit Discharges

Program Description: Virginia Tech will promptly address and determine the source of illicit discharges. Methodologies to determine the source of an illicit discharge shall be conducted and documented as appropriate.

Measurable Goals: Track the number of illicit discharges and potential illicit discharges through a database. Map all illicit discharges to determine potential high priority areas. Document all actions taken to trace and eliminate the suspected illicit discharge.

Table 3: Illicit Discharge Procedures

Program Update Requirement:	Permit Reference:	Update Completed By:
Illicit Discharge Procedures	Section II B 3	12 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development and Environmental Health and Safety

Necessary Documents: IDDE/ORI Standard Operating Procedure, Storm Sewer System Map

Year 1 Response: All potential illicit discharges are documented in Autodesk VAULT. All illicit discharges are mapped in ArcGIS. All documentation and photographic evidence from each discharge is also stored in Autodesk VAULT. A summary of the annual reporting period’s illicit discharges can be found in **Appendix C**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: All potential illicit discharges are now documented in Laserfiche. All illicit discharges are mapped in ArcGIS. All documentation and photographic evidence from each discharge is also stored in Laserfiche. A summary of the annual reporting period’s illicit discharges can be found in **Appendix C**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: All potential illicit discharges are now documented in Laserfiche. All illicit discharges are mapped in ArcGIS. All documentation and photographic evidence from each discharge is also stored in Laserfiche. A summary of the annual reporting period’s illicit discharges can be found in **Appendix C**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: All potential illicit discharges are now documented in Laserfiche. All illicit discharges are mapped in ArcGIS. All documentation and photographic evidence from each discharge are also stored in Laserfiche. A summary of the annual reporting period's illicit discharges can be found in **Appendix C**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: All potential illicit discharges are now documented in Laserfiche. All illicit discharges are mapped in ArcGIS. All documentation and photographic evidence from each discharge are also stored in Laserfiche. A summary of the annual reporting period's illicit discharges can be found in **Appendix C**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

3.2.2 – Prohibiting Illicit Discharges

Program Description: Virginia Tech will develop a policy in order to effectively prohibit non-stormwater discharges from entering the storm sewer system. This policy will apply to all university staff and students as well as contracted personnel.

Measurable Goals: Virginia Tech will have a final policy implemented by summer of 2017.

Schedule of Activities: Virginia Tech will have a final draft of the policy by summer of 2015 with implementation to follow by the summer of 2017. Progress updates will be given in each annual report until the policy is completed and implemented. Once the policy is implemented, it will be evaluated annually and updated as necessary.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Virginia Tech Illicit Discharge Detection and Elimination (IDDE) Policy (once implemented)

Year 1 Response: The Illicit Discharge Detection and Elimination Policy has been reviewed and approved internally and is in its final stages of review and approval by upper management, including the Virginia Tech Board of Visitors. This Policy and a Stormwater Management policy will be pushed forward in the approval process in the coming months – this process may include multiple revisions. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: The Stormwater policy is still awaiting approval. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: The Stormwater policy is still awaiting approval. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: The Stormwater Policy is still awaiting approval. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: The draft Stormwater Policy is currently under review by the present administration.

3.3 – MS4 Interconnection

3.3.1 – Notification to Interconnected MS4s

Program Description: Virginia Tech will notify, in writing, neighboring MS4s of any known physical interconnections.

Measurable Goals: During Year 1 of the 2013-2018 permit cycle, Virginia Tech will notify neighboring MS4s of any known physical interconnections and track the number of neighboring MS4s notified.

Schedule of Activities: Initial notifications will be made during Year 1 of the 2013-2018 permit cycle. Updates will be sent out if any new interconnections are found.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Notification Letters

Year 1 Response: Notification letters were sent to the Town of Blacksburg and the Virginia Department of Transportation on October 30, 2013. It was requested that each entity contact Virginia Tech if there were any inconsistencies or questions regarding MS4 interconnected outfalls. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Please see Year 1 Response above, further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Please see Year 1 Response above, further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Please see Year 1 Response above, further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Please see Year 1 Response above, further documentation of implementation is available by request and is not provided as a part of the Annual Report.

MINIMUM CONTROL MEASURE 4 – CONSTRUCTION SITE STORMWATER RUNOFF

4.1 – Management of Construction Site Stormwater Runoff

4.1.1 – Virginia Tech Annual Standards for Erosion and Sediment Control and Stormwater Management

Program Description: The Virginia Tech (VT) Annual Standards and Specifications for Erosion and Sediment Control (ESC) and Stormwater Management (SWM) are submitted to the Virginia Department of Environmental Quality (DEQ) for review and approval on an annual basis.

Measurable Goals: Ensure that project-specific plans are developed and implemented in accordance with the VT Annual Standards and Specifications for ESC and SWM. Submit the VT Annual Standards and Specifications for ESC and SWM to DCR each year for approval.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Approval Letter for VT Annual Standards and Specifications for ESC and SWM, Approved VT Annual Standards and Specifications for ESC and SWM

Year 1 Response: The Virginia Tech Annual Standards (VTAS&S) for ESC and SWM are located on the stormwater management website for access by project managers and the public. A copy is also available on the Site & Infrastructure Development website (www.sid.vt.edu) and in Appendix B. Virginia Tech is still working under the 2012 VTAS&S for ESC and SWM, as authorized by DEQ. Site & Infrastructure Development has until December 31, 2014 to submit a revised version of the VTAS&S for ESC and SWM for approval by DEQ. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: The latest version of the VTAS&S for ESC and SWM are located on the Site & Infrastructure Website (www.sid.vt.edu) and in **Appendix B**. Virginia Tech is still working under the 2012 VTAS&S for ESC and SWM, as authorized by DEQ. Site & Infrastructure Development has until December 31, 2015 to submit a revised version of the VTAS&S for ESC and SWM for approval by DEQ. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: The latest version of the VTAS&S for ESC and SWM are located on the Site & Infrastructure Website (www.sid.vt.edu) and in **Appendix B**. Virginia Tech is still working under the 2012 VTAS&S for ESC and SWM, as authorized by DEQ. Site & Infrastructure Development has until December 31, 2016 to submit a revised version of the VTAS&S for ESC and SWM for approval by DEQ. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: The latest version of the VTAS&S for ESC and SWM is located on the Site & Infrastructure Development Website (www.sid.vt.edu) and in **Appendix B**. Virginia Tech is still working under the 2012 VTAS&S for ESC and SWM, as authorized by the DEQ. Site & Infrastructure Development will submit a revised version of the VTAS&S for ESC and SWM for approval by DEQ by September 30, 2017. Once approved by DEQ, the latest version of the VTAS&S will be posted on the Site & Infrastructure Development website. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Virginia Tech's 2017 Annual Standards and Specifications were approved by the DEQ. The latest version of the VTAS&S for ESC and SWM is located on the Site & Infrastructure Development Website (www.sid.vt.edu) and in **Appendix B**. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

4.1.2 Design Phase Meetings

Program Description: Meetings will be held in order for Virginia Tech Site & Infrastructure Development to review and provide feedback on University projects to ensure that ESC and SWM issues are addressed in an effective manner during the design phases and in accordance with the VT Annual Standards and Specifications for ESC and SWM.

Measurable Goals: Attend design phase meetings on a project-by-project basis.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: VT Annual Standards for ESC and SWM, Pre-Construction Meeting Attendance Sheets

Year 1 Response: Chuck Dietz, Stormwater Compliance Manager of Site & Infrastructure Development, attended 42 design phase meetings throughout the annual reporting year. Design phase project meetings included the Dairy Barn Relocation to Kentland Farm, Human and Agricultural Biosciences Building 1, Indoor Athletic Training Facility, Upper Quad Residential Facilities, and the 460 Southgate Interchange. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Site and Infrastructure Development attended approximately 16 design phase meetings throughout the annual reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Site and Infrastructure Development attended approximately 18 design phase meetings throughout the annual reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Site and Infrastructure Development attended approximately 80 design phase meetings throughout the annual reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Site and Infrastructure Development attended approximately 40 design phase meetings throughout the annual reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

4.1.3 – Requirement for ESC/SWM Plans and Review

Program Description: All ESC and SWM Plans, plan review documents, and plan review certifications must be submitted to the Virginia Tech Site & Infrastructure Development Department for review and approval.

Measurable Goals: Plan reviews will be performed to ensure compliance with the VT Annual Standards and Specifications for ESC and SWM. All plan reviews will be performed by a certified plan reviewer.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department Site & Infrastructure Development

Necessary Documents: VT Annual Standards and Specifications for ESC and SWM, list of active projects, list of certified plan reviewers

Year 1 Response: All plans for regulated land-disturbing projects have been reviewed and approved according to the VT Annual Standards and Specifications for ESC and SWM through the oversight of Site & Infrastructure Development. If projects are reviewed internally, they are conducted by certified plan reviewers in Site & Infrastructure Development. According to the complexity of the project and the workload at Site & Infrastructure Development, plan reviews may also be outsourced to engineering firms under a term contract. See **Appendix B** for more information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: All plans for regulated land-disturbing projects have been reviewed and approved according to the VT Annual Standards and Specifications for ESC and SWM through the oversight of Site & Infrastructure Development. Please see Year 1 Response above and **Appendix B** for more information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: All plans for regulated land-disturbing projects have been reviewed and approved according to the VT Annual Standards and Specifications for ESC and SWM through the oversight of Site & Infrastructure Development. Please see Year 1 Response above and **Appendix B** for more information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: All plans for regulated land-disturbing projects have been reviewed and approved according to the VT Annual Standards and Specifications for ESC and SWM through the oversight of Site & Infrastructure Development. Please see Year 1 Response above and **Appendix B** for more information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: All plans for regulated land-disturbing projects have been reviewed and approved according to the VT Annual Standards and Specifications for ESC and SWM through the oversight of Site & Infrastructure Development. Please see Year 1 Response above and **Appendix B** for more information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

4.1.4 – ESC and SWPPP Inspections on Project Sites

Program Description: University projects that are approved for land-disturbing activities will be inspected for compliance with the approved ESC/SWM Plans. All ESC and SWPPP inspections will be conducted by certified personnel as follows:

- **Initial Inspection:** Upon installation of initial ESC Measures
- **Routine ESC Inspections:**
 - Every 14 calendar days
 - Within 48-hours of a runoff producing rainfall event that accumulates 0.25” of rainfall or more during the storm event
- **Routine SWM Inspections:**
 - Every 5 business days

- Every 4 business days in the Stroubles Creek TMDL
- **Final Inspection:** Upon completion of the project, prior to termination of any VAR10 Permit

Measurable Goals: Record the total number of inspections performed each reporting year. Record the enforcement actions taken during each reporting year.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department —Site & Infrastructure Development

Necessary Documents: Summary of Total Number of Inspections performed during reporting year, Summary of enforcement action taken during reporting year

Year 1 Response: As a state entity, Virginia Tech does not have enforcement authority. Only the Department of Environmental Quality is able to issue official enforcement actions such as a Notice of Violation and a Stop Work Order. Site & Infrastructure Development may initiate informal correspondence, often through email notification, with operators, contractors, and project managers regarding non-compliance. This does not qualify as an enforcement action according to permit language. With that being said, Virginia Tech performed 244 inspections on VAR10 regulated projects and 82 inspections on regulated projects that disturbed less than 1 acre this reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Virginia Tech performed 209 inspections on VAR10 regulated projects and 14 inspections on regulated projects that disturbed less than 1 acre this reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Virginia Tech performed 392 inspections on 23 projects this reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Virginia Tech performed 233 inspections on 21 projects this reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Virginia Tech performed 420 inspections on 20 projects this reporting year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

4.1.5 – Tracking of Land-Disturbing Activities

Program Description: Virginia Tech land-disturbing projects must comply with the VT Annual Standards for ESC and SWM. Prior to commencement of a land-disturbing activity, the project must receive written approval for the plan from the Virginia Tech Site & Infrastructure Development Department.

Measurable Goals: Annually record the total number of regulated land-disturbing activities and associated acres disturbed.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department Site & Infrastructure Development

Necessary Documents: VT Annual Standards and Specifications for ESC and SWM, list of all regulated land-disturbing activities, and associated acres disturbed per project for each reporting year.

Year 1 Response: There are 18 projects on Virginia Tech’s main campus that were regulated under VAR10 permit coverage during the annual reporting cycle. Those projects that are current, and those that have since been terminated, are both included in **Appendix D**. Active land-disturbing projects disturbing less than 1 acre, which do not require VAR10 permit coverage but are regulated under the VT Annual Standards and Specifications for ESC, are also included in the **Appendix D** document. The acreage disturbed by the 18 regulated projects was 94.87 acres. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: There are 11 projects on Virginia Tech’s main campus that were regulated under VAR10 permit coverage during the annual reporting cycle. The acreage disturbed by the 11 regulated projects was 119 acres. Those projects that are current, and those that have since been terminated, are both included in **Appendix D**. Active land-disturbing projects disturbing less than 1 acre, which do not require VAR10 permit coverage but are regulated under the VT Annual Standards and Specifications for ESC, are also included in the **Appendix D** document. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: There are 10 projects on Virginia Tech’s main campus that were regulated under VAR10 permit coverage during the annual reporting cycle. The acreage disturbed by the 10 regulated projects was approximately 266 acres. Those projects that are current, and those that have since been terminated, are both included in **Appendix D**. Active land-disturbing projects disturbing less than 1 acre, which do not require VAR10 permit coverage but are regulated under the VT Annual Standards and Specifications for ESC, are also included in the **Appendix D** document. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: There are 11 projects on Virginia Tech’s main campus that were regulated under VAR10 permit coverage during the annual reporting cycle. The acreage disturbed by the 11 regulated projects was approximately 243 acres. Those projects that are current, and those that have since been terminated, are both included in **Appendix D**. Active land-disturbing projects disturbing less than 1 acre, which do not require VAR10 permit coverage but are regulated under the VT Annual Standards and Specifications for ESC, are also included in the **Appendix D** document. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: There are 10 projects on Virginia Tech’s main campus that were regulated under VAR10 permit coverage during the annual reporting cycle. The acreage disturbed by the 10 regulated projects was approximately 197 acres. Those projects that are current, and those that have since been terminated, are both included in **Appendix D**. Active land-disturbing projects

disturbing less than 1 acre, which do not require VAR10 permit coverage but are regulated under the VT Annual Standards and Specifications for ESC, are also included in the **Appendix D** document. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

MINIMUM CONTROL MEASURE 5 – POST-CONSTRUCTION STORMWATER MANAGEMENT

5.1 – Stormwater Management Facilities

5.1.1 – Tracking of Stormwater Management Facilities

Program Description: Virginia Tech will maintain an updated electronic database of all known operator-owned permanent Stormwater Management Facilities in accordance with the requirements set forth in **9VAC25-890-40Section II B 5 e**.

Measurable Goals: Update the electronic database on a project-by-project basis during each reporting year. Submit an updated permanent Stormwater Management Facility inventory list with each annual report.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Stormwater Management Facilities inventory list, Stormwater Management Facilities inventory map, Stormwater Management Facility Operation and Maintenance (O&M) Manual

Year 1 Response: Virginia Tech maintains an electronic database of all known operator-owned permanent Stormwater Management Facilities on campus. This database is updated on an as needed basis as projects are terminated. An updated permanent Stormwater Management Facility inventory list is included in **Appendix D**.

Year 2 Response: Virginia Tech maintains an electronic database of all known operator-owned permanent Stormwater Management Facilities on campus. This database is updated on an as needed basis as projects are terminated. An updated permanent Stormwater Management Facility inventory list is included in **Appendix D**.

Year 3 Response: Virginia Tech maintains an electronic database of all known operator-owned permanent Stormwater Management Facilities on campus. This database is updated on an as-needed basis as projects are terminated. An updated permanent Stormwater Management Facility inventory list is included in **Appendix D**.

Year 4 Response: Virginia Tech maintains an electronic database of all known operator-owned permanent Stormwater Management Facilities on campus. This database is updated on an as-

needed basis as projects are terminated. An updated permanent Stormwater Management Facility inventory list is included in **Appendix D**.

Year 5 Response: Virginia Tech maintains an electronic database of all known operator-owned permanent Stormwater Management Facilities on campus. This database is updated on an as-needed basis as projects are terminated. An updated permanent Stormwater Management Facility inventory list is included in **Appendix D**.

5.1.2 – Inspection of Stormwater Management Facilities

Program Description: Virginia Tech utilizes the University’s work order system (HokieServ) to ensure that known operator-owned permanent Stormwater Management Facilities are inspected in accordance with the comprehensive Virginia Tech Stormwater Management Facility O&M Manual.

Measurable Goals: Inspect each known permanent stormwater management facility in accordance with the Virginia Tech Stormwater Management Facilities O&M Manual. Annually track and report the total number of inspections completed each year.

Schedule of Activities:

Table 4: Operator-owned Stormwater Management Inspection Procedures

Program Update Requirement:	Permit Reference:	Update Completed By:
Operator-owned Stormwater Management Inspection Procedures	Section II B 5	12 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Stormwater Management Facility Inspection Written Procedures, Stormwater Management Facility O&M Manual

Year 1 Response: Periodic inspections for maintenance and proper functionality have been performed on all Virginia Tech Stormwater Management Facilities (SWMF). Virginia Tech has successfully incorporated the SWMF inspections into the current work order system. This system allows for improved communication between the Virginia Tech Grounds Department and Site & Infrastructure Development as well as improved tracking of inspections and maintenance activities. Work orders are automatically generated each month to ensure proper inspection frequency. Please the table below for the total number of inspections performed during Year 1 of the 2013-2018 Permit Cycle.

BMP Type	Quantity	Total Number of Inspections
Bioretention	15	190
Detention/Extended Detention/Retention *this includes Enhanced Extended Detention Basin and Detention Swale	13	119
Green Roof	2	20
Filtterra and Biofilter Units	4	27

Underground Detention	6	6
Underground Water Quality Units	7	16

Year 2 Response: Periodic inspections for maintenance and proper functionality have been performed on all Virginia Tech Stormwater Management Facilities (SWMF). All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come on line during Year 2. Please the table below for the total number of inspections performed during Year 2 of the 2013-2018 Permit Cycle.

BMP Type	Quantity	Total Number of Inspections
Bioretention	15	85
Detention/Extended Detention/Retention *this includes Enhanced Extended Detention Basin and Detention Swale	16	58
Green Roof	2	8
Filtrerra and Biofilter Units	6	24
Underground Detention	6	4
Underground Water Quality Units	7	10

Year 3 Response: Periodic inspections for maintenance and proper functionality have been performed on all Virginia Tech Stormwater Management Facilities (SWMFs). All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come on line during Year 3. Please the table below for the total number of inspections performed during Year 3 of the 2013-2018 Permit Cycle.

BMP Type	Quantity	Total Number of Inspections
Bioretention	16	86
Detention/Extended Detention/Retention *this includes Enhanced Extended Detention Basin and Detention Swale	16	67
Green Roof	2	12
Filtrerra and Biofilter Units	15	32
Underground Detention	6	6
Underground Water Quality Units	7	7

Year 4 Response: Periodic inspections for maintenance and proper functionality have been performed on all Virginia Tech Stormwater Management Facilities (SWMFs). All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come on line during Year 4. Please the table below for the total number of inspections performed during Year 4 of the 2013-2018 Permit Cycle.

BMP Type	Quantity	Total Number of Inspections
Bioretention	16	100
Detention/Extended Detention/Retention	17	96

*this includes Enhanced Extended Detention Basin and Detention Swale		
Green Roof	2	14
Filtterra and Biofilter Units	15	92
Underground Detention	6	6
Underground Water Quality Units	7	7

Year 5 Response: Periodic inspections for maintenance and proper functionality have been performed on all Virginia Tech Stormwater Management Facilities (SWMFs). All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come on line during Year 4. Please the table below for the total number of inspections performed during Year 5 of the 2013-2018 Permit Cycle.

BMP Type	Quantity	Total Number of Inspections
Bioretention	16	78
Detention/Extended Detention/Retention *this includes Enhanced Extended Detention Basin and Detention Swale	18	67
Green Roof	2	12
Filtterra and Biofilter Units	15	66
Underground Detention	6	6
Underground Water Quality Units	7	7

5.1.3 – Maintenance of Stormwater Management Facilities

Program Description: With the help of the Virginia Tech Facilities Operations Department, campus stormwater management facilities are maintained on an as-needed basis each year.

Measurable Goals: Maintenance of campus stormwater management facilities will be performed on an as-needed basis each year. Record the number of inspections and maintenance items completed each year.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Facilities Operations will be responsible for the maintenance of campus stormwater management facilities. Facilities Department – Site & Infrastructure Development will be responsible for recording the number of inspections and maintenance items.

Necessary Documents: Stormwater Management Facility O&M Manual, inspection forms, HokieServ Summary for each reporting year

Year 1 Response: All Virginia Tech stormwater management facilities (SWMFs) have been inspected periodically for maintenance and proper functionality. SWMFs have been successfully incorporated into the current Hokieserv work order system. This system allows for improved communication between the Virginia Tech Grounds Department and Site & Infrastructure Development as well as improved tracking of inspection and maintenance activities. Work orders are automatically generated to ensure proper inspection frequency. All inspection reports are available in the Site &

Infrastructure Development office upon request. Virginia Tech will evaluate its current inspection and maintenance program for effectiveness and make improvements as necessary. See the MCM5 Evaluation in **Appendix G** for further information.

Year 2 Response: All Virginia Tech stormwater management facilities (SWMFs) are maintained on an as-needed basis. All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come on line during Year 2. Virginia Tech will evaluate its current inspection and maintenance program for effectiveness and make improvements as necessary. See the MCM5 Evaluation in **Appendix G** for further information.

Year 3 Response: All Virginia Tech stormwater management facilities (SWMFs) are maintained on an as-needed basis. All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come online during Year 3. Virginia Tech will evaluate its current inspection and maintenance program for effectiveness and make improvements as necessary. See the MCM5 Evaluation in **Appendix G** for further information.

Year 4 Response: All Virginia Tech stormwater management facilities (SWMFs) are maintained on an as-needed basis. All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come online during Year 4. Virginia Tech will evaluate its current inspection and maintenance program for effectiveness and make improvements as necessary. See the MCM5 Evaluation in **Appendix G** for further information.

Year 5 Response: All Virginia Tech stormwater management facilities (SWMFs) are maintained on an as-needed basis. All inspection reports are available in the Site & Infrastructure Development office upon request. The work order system utilized during SWMF inspections has been updated to reflect any new SWMFs that have come online during Year 5. Virginia Tech will evaluate its current inspection and maintenance program for effectiveness and make improvements as necessary. See the MCM5 Evaluation in **Appendix D** for further information.

MINIMUM CONTROL MEASURE 6 – POLLUTION PREVENTION/GOOD HOUSEKEEPING

6.1 – Municipal Facility Pollution Prevention and Good Housekeeping

6.1.1 – Daily Good Housekeeping Procedures

Program Description: Virginia Tech will develop and implement written procedures designed to minimize or prevent pollutant discharge from daily municipal operations and activities.

Measurable Goals: Develop and implement written procedures designed to minimize or prevent pollutant discharge from certain municipal operations and activities 24 months after permit coverage. Incorporate written procedures into the training curriculum after completion. Post final written procedures on the Virginia Tech Environmental Health and Safety website. Update written procedures as needed.

Schedule of Activities:

Table 5: Daily Good Housekeeping Procedures

Program Update Requirement:	Permit Reference:	Update Completed By:
Daily Good Housekeeping Procedures	Section II B 6 a	24 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development and Virginia Tech Environmental Health and Safety

Necessary Documents: Final Written Procedures (once completed)

Year 1 Response: User-friendly good housekeeping procedures were created for: the disposal of wastewater; road, street, and parking lot maintenance; equipment maintenance; application, storage and transport of pesticides, herbicides, and fertilizers; illicit discharge detection; waste material disposal; washwater disposal; wastewater disposal; dewatering operations; and bulk/salt storage. All procedures can be found on the Environmental Health and Safety Frequently Asked Questions website (http://www.ehss.vt.edu/detail_pages/faq_list.php?categories_document_catg1Page=6). Good housekeeping educational material is also incorporated into the stormwater management training presentations. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Please see Year 1 Response above, all procedures can be found on the Environmental Health and Safety Frequently Asked Questions website (http://www.ehss.vt.edu/detail_pages/faq_list.php?categories_document_catg1Page=6). Good housekeeping educational material is also incorporated into the stormwater management training presentations. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Please see Year 1 Response above, all procedures can be found on the Environmental Health and Safety Frequently Asked Questions website (http://www.ehss.vt.edu/detail_pages/faq_list.php?categories_document_catg1Page=6). Good housekeeping educational material is also incorporated into the stormwater management training presentations. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Please see Year 1 Response above, all procedures can be found on the Environmental Health and Safety Frequently Asked Questions website (http://www.ehss.vt.edu/detail_pages/faq_list.php?categories_document_catg1Page=6). Good housekeeping educational material is also incorporated into the stormwater management training presentations. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Please see Year 1 Response above, all procedures can be found on the Environmental Health and Safety Frequently Asked Questions website (http://www.ehss.vt.edu/detail_pages/faq_list.php?categories_document_catg1Page=6). Good housekeeping educational material is also incorporated into the stormwater management training

presentations. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.1.2 – High Priority Facilities

Program Description: Virginia Tech will develop a list of high priority facilities and identify which of those high priority facilities have a high potential of chemicals or other materials to be discharged into the storm sewer system.

Measurable Goals: Develop list of all high priority facilities on campus. Set up checklist and ranking system to better classify high priority areas and determine which facilities will require a SWPPP.

Schedule of Activities:

Table 6: SWPPP Locations & Implementation

Program Update Requirement:	Permit Reference:	Update Completed By:
Identification of Locations Requiring SWPPPs	Section II B 6 b	12 months after permit coverage
SWPPP Implementation	Section II B 6 b (3)	48 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development

Necessary Documents: Inspection Checklist, list of High Priority Facilities

Year 1 Response: Virginia Tech enlisted a consultant to aid in identifying high priority/high potential areas on Virginia Tech’s main campus utilizing a checklist and general inspection form. Sites were considered for SWPPP development if the report showed that they were both high priority and high potential. Next steps include identifying all personnel and operations on each individual site to refine stormwater pollution mitigation efforts prior to SWPPP development. Those facilities that did not qualify as both high priority and high potential will be incorporated into the illicit discharge detection and elimination (IDDE) program. All locations will be tracked using ArcGIS. All identified locations area available by request but were not included as part of the Annual Report. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

High Priority Areas Requiring a SWPPP
1. Sterrett Facilities Complex
2. Toms Creek Basin Facility
3. Agronomy Research Barns on Prices Fork Road
4. Large Equipment Storage at Old Mill Road
5. Glade Road Research Center
6. Virginia Tech Electric Service

Year 2 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Virginia Tech is currently in the process of assessing funding needs to develop SWPPPs for these High Priority/High Potential Areas.

Year 3 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Virginia Tech is currently in the process of assessing funding needs to develop SWPPPs for these High Priority/High Potential Areas.

Year 4 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1.

Year 5 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Two of the high priority/high potential areas (Sterrett Facilities Complex and Toms Creek Basin Facility) have completed SWPPPs that are kept on site and quarterly inspections are performed. The other four high priority/high potential areas are currently under review.

6.1.3 – Develop and Implement SWPPPs for High Priority-High Potential Facilities

Program Description: All high priority areas that are determined to have a high potential of chemicals or other materials to be discharged into the storm sewer system will need to be covered under a SWPPP.

Measurable Goals: Develop SWPPP for all high priority facilities that are determined to have a high potential of chemicals or other materials to be discharged into the storm sewer system, within 48 months of permit coverage.

Schedule of Activities:

Table 7: SWPPP Locations & Implementation

Program Update Requirement:	Permit Reference:	Update Completed By:
Identification of Locations Requiring SWPPPs	Section II B 6 b	12 months after permit coverage
SWPPP Implementation	Section II B 6 b (3)	48 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development (Responsible Party will change once it is determined which departments and facilities will need SWPPPs developed)

Necessary Documents: Inspection Checklist, List of High Priority Facilities, High Priority/High Potential Facility SWPPPs (once developed)

Year 1 Response: Virginia Tech enlisted a consultant to aid in identifying illicit discharge high priority/high potential areas on Virginia Tech’s main campus. The investigation included recommendations for those facilities that require a SWPPP. Virginia Tech has discussed and verified the list of high priority/high potential areas that need a SWPPP. SWPPP locations are tracked using ArcGIS. Next steps include developing and implementing a SWPPP, developing inspection forms, establishing a frequency of inspections, and confirming responsible parties. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

High Priority Areas Requiring a SWPPP
1. Sterrett Facilities Complex
2. Toms Creek Basin Facility

3. Agronomy Research Barns on Prices Fork Road
4. Large Equipment Storage at Old Mill Road
5. Glade Road Research Center
6. Virginia Tech Electric Service

Year 2 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Virginia Tech is currently in the process of assessing funding needs to develop SWPPPs for these High Priority/High Potential Areas.

Year 3 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Virginia Tech is currently in the process of assessing funding needs to develop SWPPPs for these High Priority/High Potential Areas.

Year 4 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Virginia Tech has developed SWPPPs for their current High Priority Areas. Implementation and inspections will begin during the next reporting year.

Year 5 Response: Please see Year 1 Response above, high priority/high potential areas on Virginia Tech’s Main campus were identified during Year 1. Implementation and inspections have begun at two of the High Priority Areas (Sterrett Facilities Complex and Toms Creek Basin Facility), while the other four high priority/high potential areas are currently under review.

6.2 – Landscaping Management and Pest Control

6.2.1 – Pesticide Application by Certified Pesticide Applicators

Program Description: Pesticide application will only be performed by certified pesticide applicators.

Measurable Goals: Annually track certified pesticide applicators and appropriate certification information in a database and update as necessary.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Athletic Department, Virginia Tech Golf Course, Virginia Tech Department of Horticulture, Virginia Tech Department of Recreational Sports, Virginia Tech Turfgrass Research Center, Virginia Tech Facilities Operations, Virginia Tech College of Agriculture and Life Sciences (CALS) College Farm, Facilities Department Site & Infrastructure Development

Necessary Documents: List of Certified Pesticide Applicators

Year 1 Response: There are six groups on campus that are responsible for applying pesticides and fertilizers as needed: Agricultural Operations, Virginia Tech Athletics, Virginia Tech Golf Course, Virginia Tech Grounds Department, Peggy Lee Hahn Garden Pavilion, and Virginia Tech Recreational Sports. Each department is responsible for maintaining Certification for Applicators and a list of products used. Copies of the current lists can be found in the Site & Infrastructure Development office. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Please see Year 1 Response above, there are six groups on campus that are responsible for applying pesticides and fertilizers as needed. Each department is responsible for maintaining Certification for Applicators and a list of products used. Copies of the current lists can be found in the Site & Infrastructure Development office. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Please see Year 1 Response above, there are six groups on campus that are responsible for applying pesticides and fertilizers as needed. Each department is responsible for maintaining Certification for Applicators and a list of products used. Copies of the current lists can be found in the Site & Infrastructure Development office. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Please see Year 1 Response above, there are six groups on campus that are responsible for applying pesticides and fertilizers as needed. Each department is responsible for maintaining Certification for Applicators and a list of products used. Copies of the current lists can be found in the Site & Infrastructure Development office. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Please see Year 1 Response above, there are six groups on campus that are responsible for applying pesticides and fertilizers as needed. Each department is responsible for maintaining Certification for Applicators and a list of products used. Copies of the current lists can be found in the Site & Infrastructure Development office. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.2.2 – Turf and Landscape Management

Program Description: Virginia Tech currently maintains 21 nutrient management plans that are managed by several different departments. These nutrient management plans cover all campus areas where nutrients are applied to a contiguous area greater than one acre and are developed by a certified nutrient management planner.

Measurable Goals: Annually track the total acreage of lands where turf and landscape NMPs are required. Annually track the acreage of lands upon which turf and landscape NMPs have been implemented.

Schedule of Activities: In accordance with the 2013-2018 MS4 Permit Requirements, Virginia Tech will determine if any additional NMPs will be needed. Virginia Tech will then develop and implement the additional NMPs, if necessary. Please see the table below for more information.

Table 8: NMP Locations & Implementation

Program Update Requirement:	Permit Reference:	Update Completed By:
NMP Locations	Section II B 6 c (1) (a)	12 months after permit coverage
NMP Implementation	Section II B 6 c (1) (b)	60 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Virginia Tech Athletic Department, Virginia Tech Golf Course, Virginia Tech Department of Horticulture, Virginia Tech Department of Recreational Sports, Virginia Tech

Turfgrass Research Center, Virginia Tech Facilities Operations, Virginia Tech College of Agriculture and Life Sciences (CALs) College Farm, Facilities Department —Site & Infrastructure Development

Necessary Documents: Nutrient Management Plans, list of applicable lands and associated acreage

Year 1 Response: Virginia Tech currently maintains 21 nutrient management plans that are managed by seven different departments. During Year 1, Virginia Tech assessed all properties where nutrients are applied to a contiguous area greater than an acre and determined that no additional nutrient management plans are needed. Please see Table 3 for a current list of all nutrient management plans. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Please see Table 3 for a current list of all nutrient management plans and associated contact information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Please see Table 3 for a current list of all nutrient management plans and associated contact information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Please see Table 3 for a current list of all nutrient management plans and associated contact information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Please see Table 3 for a current list of all nutrient management plans and associated contact information. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.3 – Personnel Training

6.3.1 – Annual Written Training Plan

Program Description: Virginia Tech will develop an annual written training plan that will outline training schedules and implementation of training requirements.

Measurable Goals: Once developed, the annual written training plan will be evaluated and modified each year. Each MS4 Annual Report will contain the annual written training plan for the upcoming year as well as a progress report from the previous year.

Schedule of Activities: During Year 1, Virginia Tech will develop an annual training plan which will outline training schedules and implementation of training requirements. The annual training plan will be added to the MS4 Program and updated annually.

Table 9: Training Schedule and Program

Program Update Requirement:	Permit Reference:	Update Completed By:
Training Schedule and Program	Section II B 6	12 months after permit coverage

*Updates will be submitted with the appropriate annual report.

Responsible Party: Facilities Department – Site & Infrastructure Development, Environmental Health and Safety

Necessary Documents: Annual Written Training Plan

Year 1 Response: The Annual Written Training Plan has been developed and incorporates Virginia Tech Dining Services stormwater management and awareness training as well as general stormwater management and awareness training for Virginia Tech Facilities Operations personnel. It also includes responsible parties and contact information as well as preliminary annual training schedules. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: The Annual Written Training Plan has been reviewed and updated to reflect training procedures for the upcoming year. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.3.2 – Stormwater Pollution Prevention Training for Virginia Tech Personnel

Program Description: A general stormwater pollution prevention course will be developed for applicable Virginia Tech personnel. The course will cover pollution prevention techniques that can be utilized when performing certain job tasks as well as when illicit discharges have been detected.

Measurable Goals: Applicable field crews for the Virginia Tech Facilities Operations Department will receive stormwater pollution prevention training every 2 years. Track the number of employees trained each year.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Environmental Health and Safety will be responsible for implementing the training. Facilities Department —Site & Infrastructure Development will be responsible for developing the training curriculum as well as any future modifications when necessary.

Necessary Documents: Annual Training Plan, Stormwater Pollution Prevention Training material, training session attendance logs

Year 1 Response: 1,436 Virginia Tech Dining Services employees have received stormwater management training, which includes job-specific pollution prevention techniques such as disposing of wastewater and used oil, and cleaning off floor mats. Employees were trained as a part of New Hire Orientation or, for returning staff members, as an annual training requirement for all levels of employees including student, wage, and salary employees. 1,092 of the 1,436 employees are students. It can be assumed that most, if not all, of the students are off-campus students. 279 of the 1,436 are wage staff members and 63 are salaried staff members. 139 Virginia Tech employees were trained through Environmental Health and Safety on MS4 awareness and pollution prevention, which includes disposal information and spill procedures for those working in areas and with equipment susceptible to generating stormwater pollution. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: During Year 2, 1602 Virginia Tech Dining Services employees have received stormwater management training, which includes job-specific pollution prevention techniques such as disposing of wastewater and used oil, and cleaning off floor mats. 223 Virginia Tech employees were trained through Environmental Health and Safety on MS4 awareness and pollution prevention, which includes disposal information and spill procedures for those working in areas and with equipment susceptible to generating stormwater pollution. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: During Year 3, 2002 Virginia Tech Dining Services employees have received stormwater management training, which includes job-specific pollution prevention techniques such as disposing of wastewater and used oil, and cleaning off floor mats. 104 Virginia Tech employees were trained through Environmental Health and Safety on MS4 awareness and pollution prevention, which includes disposal information and spill procedures for those working in areas and with equipment susceptible to generating stormwater pollution. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: During Year 4, 1735 Virginia Tech Dining Services employees have received stormwater management training, which includes job-specific pollution prevention techniques such as disposing of wastewater and used oil, and cleaning off floor mats. 125 Virginia Tech employees were trained through Environmental Health and Safety on MS4 awareness and pollution prevention, which includes disposal information and spill procedures for those working in areas and with equipment susceptible to generating stormwater pollution. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: During Year 5, 1763 Virginia Tech Dining Services employees have received stormwater management training, which includes job-specific pollution prevention techniques such as disposing of wastewater and used oil, and cleaning off floor mats. Twelve Virginia Tech employees were trained through Environmental Health and Safety on MS4 awareness and pollution prevention at the Virginia Tech Quarry.

6.4 - Management of Municipal Facilities

6.4.1 - Street Sweeping

Program Description: Virginia Tech owns and operates a street sweeper to pick up litter and debris from parking lots and roads on campus. All campus parking lots and roads will be swept regularly with additional measures taken during football seasons.

Measureable Goals: Parking lots and roads will be swept on an annual basis. Track mileage of roads and parking lots swept. Track amount of material collected during street sweeping operations.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Facilities Operations

Necessary Documents: Street Sweeper Log

Year 1 Response: Virginia Tech continues to maintain streets and parking lots by sweeping them as needed as well as before and after large sporting events. A log showing dates and locations of street sweeping is available upon request. A total of approximately 33,550 pounds was collected from September 9, 2013 through July 21, 2014. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Virginia Tech continues to maintain streets and parking lots by sweeping them as needed as well as before and after large sporting events. A log showing dates and locations of street sweeping is available upon request. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Virginia Tech continues to maintain streets and parking lots by sweeping them as needed as well as before and after large sporting events. A log showing dates and locations of street sweeping is available upon request. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Virginia Tech continues to maintain streets and parking lots by sweeping them as needed as well as before and after large sporting events. A log showing dates and locations of street sweeping is available upon request. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Virginia Tech continues to maintain streets and parking lots by sweeping them as needed as well as before and after large sporting events. A log showing dates and locations of street sweeping is available upon request. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.4.2 – Stormwater Structure Maintenance and Cleaning

Program Description: Storm structures around campus are routinely cleaned and repaired when necessary by Virginia Tech Facilities Operations. This prevents sediment and other pollutants from entering the storm sewer system and ensures that stormwater structures are free of obstructions.

Measureable Goals: Clean storm sewer inlets on an annual basis and maintain/repair when needed. Track and record when cleaning is completed and repairs are made.

Schedule of Activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Facilities Operations

Necessary Documents: Stormwater System Repair Log

Year 1 Response: Virginia Tech works to perform storm sewer system inlet cleaning and maintenance as much as possible. The Virginia Tech Mechanical Utilities Department routinely cleans the storm drains around campus. A university-owned vacuum truck is used to aid in this process. The maintenance and cleaning records are tracked and maintained in the work order system. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 2 Response: Virginia Tech continues to perform sewer system inlet cleaning and maintenance as much as possible. The maintenance and cleaning records are tracked and maintained in the work order system. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 3 Response: Virginia Tech continues to perform sewer system inlet cleaning and maintenance as much as possible. The maintenance and cleaning records are tracked and maintained in the work order system. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 4 Response: Virginia Tech continues to perform sewer system inlet cleaning and maintenance as much as possible. The maintenance and cleaning records are tracked and maintained in the work order system. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

Year 5 Response: Virginia Tech continues to perform sewer system inlet cleaning and maintenance as much as possible. The maintenance and cleaning records are tracked and maintained in the work order system. Further documentation of implementation is available by request and is not provided as a part of the Annual Report.

6.4.3 – Salt Storage and Application

Program Description: The Virginia Tech Facilities Operations Department applies pretreatment products to campus roads and parking lots in order to reduce the amount of salt applied. After salt or other materials are applied, regular street sweeping will occur to remove the materials from roads and parking lots, preventing it from entering the storm sewer system. Deicing agents containing urea or other forms of nitrogen or phosphorous will not be applied to parking lots, roadways, sidewalks, or other paved surfaces.

Measurable Goals: Annually track the amount of salt and other materials applied to aid in snow and ice removal.

Schedule of activities: Continue to implement the current program and evaluate annually.

Responsible Party: Virginia Tech Facilities Operations

Necessary Documents: Salt Application Log

Year 1 Response: The Virginia Tech Grounds Department uses a spreadsheet to track the application and location of salt and brine used during snow events each year. The current salt application log for November 16, 2013 to April 24, 2014 is available upon request.

Year 2 Response: The Virginia Tech Grounds Department uses a spreadsheet to track the application and location of salt and brine used during snow events each year. The current salt application log for is available upon request.

Year 3 Response: The Virginia Tech Grounds Department uses a spreadsheet to track the application and location of salt and brine used during snow events each year. The current salt application log for is available upon request.

Year 4 Response: The Virginia Tech Grounds Department uses a spreadsheet to track the application and location of salt and brine used during snow events each year. The current salt application log for is available upon request.

Year 5 Response: The Virginia Tech Grounds Department uses a spreadsheet to track the application and location of salt and brine used during snow events each year. The current salt application log is available upon request.

Appendix B – Virginia Tech Annual Standards and Specifications for ESC & SWM

The 2017 Virginia Tech Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management have been included in **Appendix B**. They remain in effect until November 1, 2018, as approved by the Virginia Department of Environmental Quality.



**ANNUAL STANDARDS AND SPECIFICATIONS
FOR
EROSION AND SEDIMENT CONTROL
AND
STORMWATER MANAGEMENT**



VIRGINIA TECH SITE AND INFRASTRUCTURE DEVELOPMENT

EFFECTIVE:

November 1, 2017

This document is submitted in accordance with 9VAC25-870-170, which requires submission to DEQ, on an annual basis, of standards and specifications consistent with the Virginia Stormwater Management Act, the General VPDES Permit for Discharges of Stormwater from Construction Activities, the VSMP Regulations and the Erosion and Sediment Control Laws and Regulations. This document describes how land-disturbing activities shall be conducted on lands owned by Virginia Tech.

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APPENDICES

- Appendix A Statewide Coverage Map of Virginia Tech Properties
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- Appendix D Erosion and Sediment Standard Notes
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- Appendix F Non-VESCH Specifications
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- Appendix H DEQ AS&S Entity Form (VTSID-05)
- Appendix I Preconstruction Meeting Form (VTSID-06)
- Appendix J Construction Site Inspection Forms (VTSID-07 & VTSID-08)
- Appendix K SWM Facility Record Report & Certification Form (VTSID-09)
- Appendix L Land Disturbance Termination Form (VTSID-10)

ACRONYMS

A	Drainage area, acres (stormwater hydrology)
Administrator	Program Administrator for VTSID or designee who administers and enforces the requirements of the approved Virginia Tech Annual Standards and Specifications
B	VDOT rainfall coefficient, no units (stormwater hydrology)
BMP	Best Management Practice
C	Runoff coefficient, no units (stormwater hydrology)
C_f	Saturation factor, no units (stormwater hydrology)
CGP	Construction General Permit
CMP	Corrugated Metal Pipe
CN	Curve Number (stormwater hydrology)
CWA	Clean Water Act
D	VDOT rainfall coefficient, no units (stormwater hydrology)
D_e	Critical storm duration, minutes (stormwater hydrology)
DEQ	Virginia Department of Environmental Quality
DPOR	Department of Professional and Occupational Regulation
E	VDOT rainfall coefficient, no units (stormwater hydrology)
ESC	Erosion and Sediment Control
g	Gravity coefficient, 32.2 feet/s ²
H	Height or depth of water, feet H_f , H_i , H_m ,
H_o , $H\Delta$	Head losses in piping and structures, feet (storm drain hydraulics)
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
HUC	Hydrologic Unit Code
I	Rainfall intensity, inches per hour (stormwater hydrology)
I_{post}	Post-development impervious cover, percentage (water quality Simple Method calculation)
$I_{existing}$	Existing impervious cover, percentage (water quality Simple Method calculation)
K, K_i , K_o	Head loss coefficients for piping, no units
L_{pre}	Pre-development pollutant loading, pounds per year (water quality Simple Method calculation)
L_{post}	Post-development pollutant loading, pounds per year (water quality Simple Method calculation)
NFIP	National Flood Insurance Program
Q	Stormwater flow, gallons per minute (gpm) or cubic feet per second (cfs)
R	Hydraulic radius, feet (open channel hydraulics)
r_c	Stream bend radius, center, feet (open channel hydraulics)
r_i	Stream bend radius, inside bank, feet (open channel hydraulics)

r_o	Stream bend radius, outside bank, feet (open channel hydraulics)
Responsible party	Individual(s) or department(s) responsible for maintaining stormwater management facilities, including but not limited to basins, other BMPs, storm drains, culverts, ditches and swales in accordance with a maintenance agreement.
S	Slope, feet per feet (open channel or pipe hydraulics)
SCS	Soil Conservation Service
VTSID	Virginia Tech Site and Infrastructure Development
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
t_c	Time of concentration, hours (stormwater hydrology)
T_p	Time to peak flow, hours (stormwater hydrology)
T_r	Time to recede, hours (stormwater hydrology)
T_t	Travel time, hours (stormwater hydrology)
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
V, V_i, V_o	Velocity, feet per second (open channel and pipe hydraulics)
VDOT	Virginia Department of Transportation
VDOT Drainage Manual	Virginia Department of Transportation, Drainage Manual, Current Edition
VDOT Specifications	Virginia Department of Transportation, Road and Bridge Specifications, Current Edition
VDOT Standards	Virginia Department of Transportation, Road and Bridge Standards, Current Edition
VESCH	Virginia Erosion and Sediment Control Handbook, Current Edition
VMRC	Virginia Marine Resources Commission
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program, as administered by DEQ
VSWMH	Virginia Stormwater Management Handbook, Current Edition
VT	Virginia Tech
VTAS&S	Virginia Tech Annual Standards and Specifications

DEFINITIONS

The words and terms used in these Standards & Specifications shall have the meanings defined in the regulations listed in Section 1.0 unless the context clearly indicates otherwise. The following definitions apply to these Standards & Specifications:

“Applicant” means person or persons providing submittals to VTSID to engage in a regulated land-disturbing activity (e.g., Operator, Permittee, Designer or designee).

“Licensed professional” means a professional registered in the Commonwealth of Virginia pursuant to Article 1 (§ 54.1-400 et seq.) of Chapter 4 of Title 54.1 of the Code of Virginia. For purposes of these Standards and Specifications a licensed professional is one that is certified by DPOR as an Architect, Professional Engineer, Land Surveyor, or Landscape Architects.

“Local technical criteria (for SWM)” means technical criteria in a DEQ approved local ordinance that is more stringent than the technical criteria described in Part II B of 9VAC25-870.

“Operator (for SWM)” means the contractor of a regulated activity. In the context of the Standards & Specifications, Operator means any person associated with a construction project that meets either of the following two criteria: (i) the person has direct operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications or (ii) the person has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a stormwater pollution prevention plan for the site.

“Permittee” means the Operator to whom the General Permit for Discharges of Stormwater from Construction Activities (Construction General Permit) is issued.

“Stormwater Management Facility” means a control measure that controls stormwater runoff and changes the characteristics of that runoff including, but not limited to, the quantity and quality, the period of release or the velocity of flow. For purposes of water quality, a stormwater management facility means approved practices as described on the Virginia Stormwater BMP Clearinghouse Website.

“VTAS&S for ESC” includes the information described in the standards and specifications regarding ESC.

“VTAS&S for SWM” includes the information described in the standards and specifications regarding SWM.

“VT Project Manager” means the individual managing the land disturbing activities.

INTRODUCTION

Virginia Tech Site and Infrastructure Development's (VTSID) stormwater management goals ensure compliance and minimize and mitigate adverse effects of land development by implementing effective stormwater management Best Management Practices (BMPs) as required by the Virginia Department of Environmental Quality.

As land is developed and woodlands and pastures are converted to more urban uses, the increase in impervious surfaces (pavements and buildings) increases adverse effects including:

- Flooding
- Erosion and deposition of sediment in streams
- Property damage due to flooding, erosion, or deposition
- Less base flow in streams due to less groundwater recharge
- Runoff of pollutants (nutrients, sediment, bacteria, oil)
- Decreased stream biodiversity

Virginia Polytechnic Institute and State University, commonly known as Virginia Tech (VT), is required per §62.1-44. 15:31 of the Virginia Stormwater Management Act to submit standards and specifications for approval by the Virginia Department of Environmental Quality (DEQ) to describe how land-disturbing activities shall be conducted on VT properties. In response, VT has adopted the Virginia Tech Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management (VTAS&S) that guide regulated land-disturbing activities on VT properties. The VTAS&S incorporate, by reference, the following laws and attendant regulations:

- Virginia Stormwater Management (SWM) Act (§62.1-44. 15:24 et seq.) and Virginia Stormwater Management Program (VSMP) Regulations (9VAC25-870);
- General VPDES Permit for Discharges of Stormwater from Construction Activities (9VAC25-880);
- Virginia Erosion and Sediment Control (ESC) Law (§62.1-44.15:51 et seq.) and Virginia Erosion and Sediment Control Regulations (9VAC25-840);
- Erosion and Sediment Control and Stormwater Management Certification Regulations (9VAC25-850); and where applicable,
- Chesapeake Bay Preservation Act (§62.1-44.15:67 et seq.) and Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-830).

The VTAS&S serves as a local supplement to, and not as a replacement for, existing State guidance manuals that address proper stormwater management design techniques. These manuals include:

- Virginia Department of Environmental Quality Stormwater Management Handbook, First Edition 1999 & Second Edition 2013
- Virginia Department of Transportation Drainage Manual
- Virginia Department of Environmental Quality Erosion and Sediment Control Handbook

The VTAS&S are submitted annually to DEQ for their review and approval based on consistency with the law and regulations listed above. The VTAS&S shall apply to all applicable land-disturbing activities,

as described in this chapter. The use of this document and generally accepted references should ensure that standard, acceptable design practices are used for stormwater management designs.

Administration and enforcement of the VTAS&S will be performed by Virginia Tech Site and Infrastructure Development (VTSID) as described herein. Virginia Tech shall ensure responsible staff and its representatives obtain the necessary certifications through DEQ in accordance with the Erosion and Sediment Control and Stormwater Management Certification Regulations (9VAC25-850). Certifications will be dependent on the individual's role in implementing the VTAS&S and may include Program Administrator, Plan Reviewer and/or Inspector. The VTSID Stormwater Compliance Manager shall have overall administrative responsibility for the VTAS&S.

DEQ is the regulatory authority for ESC and SWM on state agency projects. DEQ provides oversight of the Virginia Tech Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management and its implementation by Virginia Tech VTSID. Inspection reports conducted by VTSID as well as complaint logs and complaint responses may be required to be submitted to the DEQ. Virginia Tech may be required to provide weekly e-reporting to the Department's applicable regional office that include: inspection reports; pictures; complaint logs and complaint responses; and other compliance documents. VTSID will submit project information to the DEQ quarterly for all active ESC and SWM regulated land-disturbing activities. DEQ may perform random site inspections or inspections in response to a complaint to assure compliance with the associated laws/regulations and these annual standards and specifications. DEQ may take enforcement actions as required.

The Department shall assess an administrative change to cover the costs of services rendered associated with its responsibilities pursuant to §62.1-44.15:31. The Board shall have the authority to enforce approved specifications and change fees equal to the lower of (i) \$1,000 or (ii) an amount sufficient to cover the costs associated with standards and specification review approval, project inspections, and compliance.

1.1 Contents of the Standards & Specs

The VTAS&S have been framed to guide a land-disturbing activity through planning, plan approval and construction to ensure consistency with the regulatory requirements referenced in this Section. The VTAS&S include four distinct sections:

Chapter 1 – Introduction – presents the general background and purpose behind the VTAS&S. The chapter documents the goals of the program, the applicable requirements for land disturbance, and the administration of the program.

Chapter 2 – Plan Review and Approval – presents the process that the Applicant and VTSID follow to assure that the requirements of the VTAS&S are met. The chapter covers the conception, submittal, review, and approval of the Erosion and Sediment Control and Stormwater Management Plans as applicable.

Chapter 3 – Construction Process – presents the necessary procedures for VTSID, Operators, Contractors and Designers during construction through the termination of a project.

Chapter 4 – Maintenance of SWM Facilities – presents Virginia Tech responsibilities and procedures to ensure long-term care and maintenance of permanent stormwater management facilities.

1.2 Authority

The VTAS&S provide the policies and procedures that implement the state laws and regulations as they pertain to erosion and sediment control and stormwater management, including storm drainage. In the event that any part of this VTAS&S is held to be illegal or void, this shall not have the effect of making illegal or void the VTAS&S in its entirety, or any other section thereof, which shall remain effective.

1.3 Erosion and Sediment Control

The VTAS&S for ESC apply to VT properties where land-disturbing activities are equal to or greater than:

- 10,000 square feet;
- 5,000 square feet for projects located on VT Main Campus;
- Any more stringent threshold established in a locality’s DEQ-approved ESC Program ordinance (e.g., 5,000 square feet for the Town of Blacksburg); or
- 2,500 square feet if the project is within a Chesapeake Bay Preservation Area (CBPA).

Appendix A provides information for each VT property throughout the Commonwealth to assist in determining if a land-disturbing activity is subject to the more stringent local threshold or the CPBA threshold. For the purposes of applicability to the VTAS&S for ESC, a land-disturbing activity is defined as:

ESC Land-Disturbing Activity – means any man-made change to the land surface that may result in soil erosion from water or wind and the movement of sediments into state waters or onto lands in the Commonwealth, including, but not limited to, clearing, grading, excavating, transporting and filling of land.

Exceptions to the applicability of the VTAS&S for ESC that are potentially relevant to VT include:

- Installation, maintenance, or repair of underground public utility lines when such activity occurs on, and is confined within, an existing hard surfaced road, street or sidewalk;
- Septic tank lines or drainage fields unless included in an overall plan for land-disturbing activity relating to construction of the building to be served by the septic tank system;
- Tilling, planting, or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations, including engineering operations as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage and land irrigation;
- Installation of fence, sign posts, telephone and electric poles, and other posts or poles; and

- Emergency work to protect life, limb or property, and emergency repairs; however, the land area disturbed shall be shaped and stabilized in accordance with the requirements of the VTAS&S.

1.4 Stormwater Management

The VTAS&S for SWM are applicable where a land-disturbing activity is equal to or greater than:

- 1-acre; or
- 2,500 square feet if the project is within a CBPA.

SWM Land-Disturbing Activity - means a man-made change to the land surface that potentially changes its runoff characteristics, including clearing, grading, or excavation.

Exceptions to the applicability of the VTAS&S for SWM that are potentially relevant to VT include:

- Clearing of lands specifically for agricultural purposes and the management, tilling, planting, or harvesting of agricultural, horticultural, or forest crops, livestock feedlot operations including engineering operations as follows: construction of terraces, terrace outlets, check dams, desilting basins, dikes, ponds, ditches, strip cropping, lister furrowing, contour cultivating, contour furrowing, land drainage, and land irrigation;
- Discharges to a sanitary sewer or a combined sewer system;
- Routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original construction of the project. The paving of an existing road with a compacted or impervious surface and reestablishment of existing associated ditches and shoulders shall be deemed routine maintenance; and
- Land-disturbing activities in response to a public emergency where the related work requires immediate authorization to avoid imminent endangerment to human health or the environment. In such situations, VTSID and the DEQ shall be advised of the disturbance within seven days of commencing the land-disturbing activity, and compliance with the administrative requirements described in Section 2.4 are required to be submitted to VTSID within 30 days of commencing the land-disturbing activity.

1.5 Stormwater Management for Non-Regulated Projects

Development projects on VT properties may incorporate the construction of a SWM practice that is not required by the SWM laws and regulations. The incorporation of these practices may occur as part of a building project to assist in achieving credit towards environmental rating system certifications. Any stormwater management practice that does not otherwise qualify as subject to the VTAS&S for SWM shall require approval of a SWM Plan from VTSID, as described in Chapter 2. The practice shall be designed per the Virginia Stormwater Management Handbook and the standards and specifications in the Virginia Stormwater BMP Clearinghouse.

1.6 Administration

1.6.1 General

The policies and procedures contained within the VTAS&S shall be administered by the Program Administrator in Virginia Tech Site and Infrastructure Development.

1.6.2 Manual Amendments

This VTAS&S will be revised annually, as necessary to address:

- Changes in technology.
- Changes in accepted construction practices.
- Changes in Federal and/or State requirements.
- Items that require clarification to avoid confusion.
- Development issues that potentially impact public health, safety and welfare.

Amendments to the VTAS&S will be submitted to the DEQ for review and approval and posted on the VTSID website, <http://www.facilities.vt.edu/permits-inspections/stormwater-management.html>, and will become effective on the date listed on the website. It is the user's responsibility to check the website and verify that they have the latest requirements.

1.7 Approval and Permits

The Applicant is responsible for acquiring all required approvals and permits.

1.7.1 Local Approval and Permits

The review and approval of ESC and SWM Plans for projects meeting the requirements of sections 1.3, 1.4 and 1.5 is required before University Building Official permits will be issued.

1.7.2 VSMP Permit

The Department of Environmental Quality's role in the approval of land disturbing activities is to provide coverage under the Construction General Permit for Discharges of Stormwater from Construction Activities (CGP), for projects of 1 acre or more of disturbance. It is the sole responsibility of the Operator, serving as the Permittee, to submit for the DEQ approval under the Construction General Permit prior to beginning land disturbance. A copy of all forms and approvals submitted to and received by the DEQ by the Permittee shall be submitted to VTSID.

1.7.3 Joint Permit Application

Wetlands and streams are protected under several Federal and State programs. Whenever jurisdictional wetlands or streams are impacted by land disturbing activities, a Joint Permit Application must be completed and filed with the Virginia Marine Resources Commission (VMRC). All permits required by the reviewing agencies must be obtained prior to approval from VTSID for any regulated land-disturbing activity. VMRC will distribute the Joint Permit Application to the U.S. Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (DEQ) and Federal and State agencies in processing the permit application. Upon receipt of an acceptable application the following permits may be issued:

- USACE Federal Section 404 Permit
- DEQ Virginia Water Protection Permit
- VMRC Permit

1.8 Reference Sources

These annual standards and specifications serve as a supplement to existing state design manuals that address proper stormwater management design techniques, and not to replace them. In the case of a contradiction or conflict, the more stringent requirement shall apply. The requirements of the following state design manuals and standards are incorporated into this document by reference.

- Virginia Stormwater Management Handbook, Volumes I and II, prepared by the Virginia Department of Environmental Quality, first edition dated 1999 and second edition dated 2013, as amended. Hereafter throughout this document referred to as the VSWMH first edition or second edition.
- Virginia Department of Transportation Drainage Manual, prepared by the Hydraulics Section of the Virginia Department of Transportation, dated 2002 or latest version, as amended. Hereafter throughout this document referred to as the VDOT Drainage Manual.
- Virginia Department of Transportation Road and Bridge Standards, Volumes I and II, prepared by the Virginia Department of Transportation, dated 2001 or latest version, as amended. Hereafter throughout this document referred to as the VDOT Standards.
- Virginia Department of Transportation Road and Bridge Specifications, prepared by the Virginia Department of Transportation, dated 2002 or latest version, as amended. Hereafter throughout this document referred to as the VDOT Specifications.
- Virginia Erosion and Sediment Control Handbook, prepared by the Virginia Department of Environmental Quality, dated 1992 or latest version, as amended. Hereafter throughout this document referred to as the VESCH.
- Virginia Department of Environmental Quality Erosion and Sediment Control Technical Bulletin #4 – Nutrient Management for Development Sites.
- Virginia Stormwater BMP Clearinghouse Website, administered by the Virginia Department of Environmental Quality and the Virginia Water Resources Research Center, located at <http://www.vwrrc.vt.edu/swc/StandardsSpecs.html>
- Virginia Department of Conservation and Recreation (DCR) Native v. Invasive Plant Species for Erosion and Sediment Control Frequently Asked Questions. This DCR FAQ updated the VESCH Temporary and Permanent Seeding specifications.

PLAN REVIEW & APPROVAL

In order to maintain the character and integrity of Virginia Tech properties, to promote excellence of design and development and to prevent environmental hazards, plans must be submitted and reviewed for regulated land-disturbing activity as described in Chapter 1. To verify compliance with the VTAS&S, this chapter describes the development process once a land-disturbing activities has been identified to be subject to the VTAS&S. As described in Chapter 2, a regulated land-disturbing activity may be subject to:

- ESC submission requirements and technical criteria described in Section 2.3.1;
- ESC and SWM submission requirements and technical criteria described in Sections 2.3.1 and 2.4.2; or
- SWM Plan only, if a project includes a SWM facility as described in Section 1.5.

All submissions are to be provided by the Applicant to VTSID and require VTSID approval on the plans (in the form of an approval stamp signed by a certified Plan Reviewer). For a land-disturbing activity equal to or greater than one acre, a CGP, issued by the DEQ, is also required prior to the commencement of land disturbance.

2.1 Overview of the Review & Approval Process

Submittal of a concept plan prior to submittal of an ESC or SWM plan is strongly recommended by VTSID in certain situations and may be submitted for any project, as deemed appropriate by the Applicant.

The submittal, review, and approval of ESC and SWM Plans shall adhere to the general guidelines as follows:

- VTSID, upon receipt of a plan, shall have fifteen (15) days to review the site development plan for completeness and notify the Applicant. If the plan is rejected for incompleteness, VTSID shall provide written comments of the deficiencies to the Applicant.
- Upon acceptance of the completed plan, VTSID shall have forty-five (45) days from the date of completeness notification to review and either approve or disapprove the plan. Approval or disapproval of the plan will be in writing to the Applicant.
- The Applicant may correct and resubmit the plan following disapproval. When resubmitting, the resubmittal shall include a review comments response letter addressing how all review comments were addressed in the resubmitted plan. A new application is not required.
- VTSID, upon receipt of a resubmitted plan, shall have forty-five (45) days to review and approve or disapprove the resubmitted plan. Approval or disapproval of the plan will be in writing to the Applicant.
- Upon VTSID approval of a plan, should a land-disturbing activity associated with the approved plan not begin within a 180-day period following approval or cease for more than 180 days, VTSID may evaluate the plan to determine whether the plan still satisfies the VTAS&S and to

verify that all design factors are still valid. If VTSID finds the previously approved plan to be inadequate, a modified plan shall be submitted for approval.

2.2 Concept Plan Submittal

Prior to submitting any plans for review, the Applicant may submit a ESC/SWM concept plan to the Administrator for the proposed development. Applicants are recommended to consult with VTSID to discuss the conceptual stormwater management design and to determine if they are subject to additional stormwater design requirements, prior to submittal.

2.3 Erosion & Sediment Control Plan Submittal

Land-disturbing activities subject to the VTAS&S for ESC requires a VTSID-approved ESC Plan. The required submittals, as listed in Section 2.3.2, will be reviewed for consistency with the Minimum Standards described in Section 2.3.1 by an individual certified in accordance with the ESC and SWM Certification Regulations (9VAC25-850).

The review shall be in accordance with Section 2.1.

2.3.1 ESC Minimum Standards

The ESC Plan shall be consistent with the requirements of the Virginia ESC Regulations (9VAC25-840) and the latest edition of the Virginia Erosion and Sediment Control Handbook (VESCH) and shall specifically address each applicable minimum standard described in 9VAC25-840-40.

When applicable, the ESC Plan shall also address more stringent local requirements for erosion and sediment control. For planning purposes, localities known to have more stringent local criteria for ESC are identified in Appendix A. However, it is the responsibility of the ESC Plan preparer to review the locality's ESC ordinance for more stringent requirements and incorporate them into the ESC Plan.

2.3.2 ESC Plan Requirements

The following shall be submitted by the Applicant to VTSID for review when a land-disturbing activity is subject to the VTAS&S for ESC. One (1) hard-copy and an electronic pdf copy of each following item shall be provided to VTSID for review:

- Land Disturbance Application Form – A copy of the form is provided in Appendix B.
- Completed ESC Plan Checklist – The ESC Plan Checklist in Appendix E is provided to assist the ESC Plan preparer and reviewer with ensuring compliance with the minimum standards and the VTAS&S. Each applicable item on the checklist shall be addressed in the ESC Plan or ESC Narrative certified by the licensed professional. Written reference on the checklist to the location (Plans or Narrative) as to where an item has been addressed is recommended to assist with plan development and review.
- ESC Plan – The ESC Plan shall be signed and sealed by a licensed professional and demonstrate compliance with the technical criteria described in Section 2.3.1.
- ESC Plan Narrative – The ESC Plan Narrative shall be signed and sealed by a licensed professional and is considered part of the ESC Plan. The Narrative shall incorporate supporting

information necessary to demonstrate compliance with the minimum standards described in Section 2.3.1.

Resubmittals to address comments provided by VTSID as the result of a review shall include a cover letter from the licensed professional that explicitly responds to each comment from the review. Each response shall describe how the comment was addressed with reference to the locations of the changes in the Plan and/or Narrative. Any other changes not specifically addressed in the response to comments from the previous review shall also be described.

Submittals for approval shall include one (1) 11x17 copy of the plans in addition to the full size copy.

2.3.3 Narrative

The ESC Plan Narrative shall be signed and sealed by a licensed professional and is considered part of the ESC Plan. The Narrative shall incorporate supporting information necessary to demonstrate compliance with the minimum standards described in Section 2.3.1. The ESC Plan Narrative shall include:

- Project Description
- Existing Site Conditions
- Adjacent Areas
- Offsite Areas
- Soils
- Critical Areas
- Erosion and Sediment Control Measures
- Permanent Stabilization
- Stormwater Runoff Considerations
- Sequence and Timing of Land Disturbing Activities

2.3.4 ESC Plan Variances/Deviations

An Applicant may request a variance from the ESC minimum standards through VTSID. A variance request shall be provided in writing and may be considered prior to plan approval or during construction under the following conditions:

- The Applicant requests, in writing, a variance with explanation of the reasons for requesting the variance. Reasons must be specific to restrictive site conditions, and the variance shall be the minimum necessary to mitigate for the site restriction.
- The request shall include alternative measures to address potential downstream transport of sediment that could result from the granting of the variance.
- The request shall describe how the alternative measure(s) meets the intent of the minimum standard (9VAC25-840-40) for which the variance is sought.
- A variance will not be granted in any case where the granting of the variance could cause damage to downstream property. It is the responsibility of the Applicant to demonstrate in the

request that downstream properties will be protected from erosion, sedimentation and flooding.

- Specific variances which are allowed by VTSID shall be documented on the ESC Plan.

Requests for variances will be considered by VTSID, and if deemed appropriate, VTSID will submit the request to DEQ for approval.

If the plan shows a deviation by the use of a non-VESCH control measures not listed in Appendix F as previously approved, the designer is required to submit all applicable practical information including definition, purpose, condition where the practice applies, planning consideration, design criteria, construction specification, design tables, plates and maintenance and inspections. VTSID reserves the right to approve or disapprove the non-VESCH control measure on a project-specific basis.

ESC measures shall be designed and constructed in accordance with the VESCH or the manufacturer's recommendations as applicable. VTSID and the DEQ have the discretion to disallow the use of any of the previously approved measures based on findings that demonstrate poor performance related to sedimentation control or maintenance. Sufficient detail shall be provided on the ESC Plan and in the Specifications for proprietary measures, including any necessary computations, installation instructions, and inspection and maintenance instructions. Installation and maintenance shall be per the manufacturer's recommendations. A list of approved, non-VESCH measures can be found in Appendix F. Should non-VESCH control measures fail to effectively control soil erosion, sediment deposition, and non-agricultural runoff, then VESCH control measures shall be utilized.

Deviations for consideration of ESC measures not listed in Appendix F will only be considered when requested by an Applicant as part of a proposed ESC Plan or on-going land disturbance with an approved ESC Plan.

2.4 Stormwater Management Plan Review & Approval

Land-disturbing activities subject to the VTAS&S for SWM require a VTSID-approved SWM Plan. The required submittals, as listed in Section 2.4.1, will be reviewed for consistency with the technical criteria described in Section 2.4.2 and 2.4.3 by an individual certified in accordance with the ESC and SWM Certification Regulations (9VAC25-850).

Within 45 days of the notification of completion VTSID will provide an approval or a letter providing the reasons the SWM Plan could not be approved.

2.4.1 Submittal of Stormwater Calculations

Calculations shall be submitted to VTSID supporting the stormwater management and storm drainage design. Calculations shall be well organized and coordinated with the design to allow for efficient review by VTSID. Calculations shall be bound together in a booklet with pages numbered. Submittals shall include calculation software files (i.e. HydroCAD, Hydraflow, etc.) in addition to electronic pdf versions and a bound copy. Calculations shall follow the following general format:

- Cover Sheet – The cover sheet shall contain the project name, design professional’s name, calculations date, and the seal and signature of the design professional.
- Table of Contents – A table of contents shall be provided to assist the reviewer in locating information in the calculations. All pages must be sequentially numbered.
- Project Description – A general description of the project providing information to assist the reviewer in understanding the nature and scope of the project and of the storm drainage and stormwater management facilities that are proposed.
- Criteria and Methodology – A listing of the basic design criteria and methodologies that the calculations will follow to demonstrate that the basic design criteria are met.
- References – A listing of the references that are used in the calculations.
- Assumptions – A listing of all assumptions, and justification of the assumptions that are used in the calculations.
- Analysis – The body of the calculations shall be clearly labeled as to which Stormwater management facility or storm drainage system the calculations pertain. The calculations shall be step-by-step to ensure that a reviewer that is not familiar with the project can follow the progression of the calculations. Provided input and output information shall be clearly identified, if highlighted only in yellow, to ensure that the input information is clearly supported in the calculations, and that the output is properly evaluated in the summary and conclusions. All calculation parameters must be fully supported and documented and include the design storm frequency, rainfall intensity/depth and duration, times of concentration, hydrologic soil groups, curve numbers or runoff coefficients; calculations identifying total runoff volumes for each watershed area, infiltration rates (where applicable), culvert, headwaters, storm drain, and open channel capacities, flow velocities, data on the increase in rate and volume of runoff for the specified design storms, pre- and post-development phosphorus loadings, downstream channel analysis and all other calculations needed to support the proposed design, as identified in the Virginia Stormwater Management Handbook, the Virginia Erosion and Sediment Control Handbook and the VTAS&S.
- Summary and Conclusions – A summary of the results, preferably in tabular or chart form for each storm drainage system and stormwater management facility to indicate that the land disturbing project meets the requirements of the VTAS&S, with conclusions.
- Appendices and Attachments – Any supporting information such as drainage area maps, soil survey maps, USGS quadrangle maps, design nomographs, and computer printouts.

Calculations that are not well organized and coordinated with the design shall be rejected, and the submittal shall not be reviewed until proper calculations are submitted.

2.4.2 SWM Technical Criteria

The SWM Plan shall be consistent with Part II A (9VAC25-870-55 parts A through C) and Part II B of the VSMP Regulations. Design standards and specifications shall be consistent with the Virginia Stormwater BMP Clearinghouse Website, the latest edition of the Virginia Stormwater Management Handbook, and the supplemental criteria in the VTAS&S.

When applicable and to the maximum extent practicable, the SWM Plan shall comply with any local VSMP authority's additional technical requirements for stormwater management adopted within a DEQ-approved local ordinance. Localities with additional technical requirements for SWM are identified in Appendix A. However, it is the responsibility of the SWM Plan preparer to:

- Review the locality's SWM ordinance for specific requirements and incorporate them into the SWM Plan to the maximum extent practicable.
- Where applicable, demonstrate to VTSID that the locality's additional technical requirements are not practicable and include information in the SWM Plan Narrative demonstrating the impracticability.

2.4.3 VT Supplemental Technical Criteria

For the purposes of the technical criteria for water quality described in Part II B of the VSMP Regulations, the planning area shall be defined as the limits of disturbance.

Proprietary BMPs that are approved on the BMP Clearinghouse website are the only proprietary BMPs allowed on Virginia Tech property. VTSID reserves the right to not approve certain BMPs based on site condition.

2.4.4 SWM Plan Requirements

The following shall be submitted by the Applicant to VTSID for review when a land-disturbing activity is subject to the VTAS&S for SWM. One (1) hard-copy and an electronic pdf copy of each following item shall be provided to VTSID for review:

- Land Disturbance Application Form – A copy of the form is provided in Appendix B.
- Completed SWM Plan Checklist – The SWM Plan Checklist in Appendix E is provided to assist the SWM Plan preparer and reviewer with ensuring compliance with the technical criteria and the VTAS&S. Each applicable item on the checklist shall be addressed in the SWM Plan or SWM Narrative. Written reference on the checklist to the location (Plans or Narrative) as to where an item has been addressed is recommended to assist with plan development and review.
- SWM Plan – The SWM Plan shall be signed and sealed by a licensed professional and provide all of the information described in 9VAC25-870-55 (Stormwater Management Plans) of the VSMP regulations. When applicable, the SWM Plan shall also address local technical requirements as described in Section 2.4.2.
- SWM Plan Narrative – The SWM Plan Narrative shall be signed and sealed by a licensed professional and is considered part of the SWM Plan, incorporating supporting information necessary to demonstrate compliance with the technical criteria described in Sections 2.4.2 and 2.4.3.
- Completed VSWMH BMP Checklist – As applicable, provide the applicable BMP Design Checklist from Appendix 8-A of the VSWMH, latest edition. A BMP-type specific checklist shall be provided for each BMP proposed in the SWM Plan.
- Exception Request – Where applicable, the Applicant shall provide a written request that addresses the conditions described in Section 2.4.5.

Resubmittals to address comments provided by VTSID as the result of a review shall include a cover letter from the licensed professional that explicitly responds to each comment from the review. Each response shall describe how the comment was addressed with reference to the locations of the changes in the Plan and/or Narrative. Any other changes not specifically addressed in the response to comments from the previous review shall also be described in the cover letter.

Submittals for approval shall include one (1) 11x17 copy of the plans in addition to the full size copy.

2.4.5 SWM Plan Exceptions

An Applicant may request in writing an exception to the SWM technical criteria and design standards and specifications through VTSID. An exception may be granted provided that:

- The exception is the minimum necessary to afford relief;
- Reasonable and appropriate conditions are imposed as necessary upon any exception granted so that the intent of the Virginia Stormwater Management Act and the technical criteria is preserved;
- Granting the exception will not confer any special privileges that are denied in other similar circumstances; and
- The request is not based upon conditions or circumstances that are self-imposed or self-created.

Economic hardship alone is not a sufficient reason to request an exception from the requirements of the technical criteria or design standards and specifications. The following exceptions will not be granted:

- The requirement that a land-disturbing activity obtain a CGP, when applicable.
- The use of a BMP not found on the BMP Clearinghouse.
- Requirements for phosphorus reductions.

Requests for exceptions will be considered by VTSID, and if deemed appropriate, VTSID will submit the request to DEQ for consideration of approval.

2.5 Stormwater Pollution Prevention Plans (SWPPP) Submittal

A land-disturbing activity that disturbs an acre or greater requires a General Permit for Discharges of Stormwater from Construction Activities (9VAC25-880), also known as the Construction General Permit. The Construction General Permit is issued by the Virginia DEQ and coverage is required throughout the duration of the land-disturbing activity. The Operator shall obtain permit coverage as the Permittee and provide VTSID with the completed Registration Statement and SWPPP at the preconstruction meeting described in Section 2.7. The Registration Statement is required prior to the commencement of the land-disturbing activity and shall be maintained in the project SWPPP described herein. The Permittee is responsible for compliance with the permit conditions. VTSID will provide oversight of permit compliance through site inspections as described in Section 3.3.

Prior to submission of a Registration Statement to DEQ for coverage under the Construction General Permit, the project is required to have a VTSID-approved ESC and SWM Plan included as part of the

site-specific SWPPP. The SWPPP shall be prepared and certified, in accordance with the permit, by the Permittee or duly authorized representative. The Permittee is responsible for implementation of the SWPPP and may delegate authority for certifications (e.g., SWPPP amendments, inspection reports, etc.) in writing.

The SWPPP shall be appropriately sealed and signed by a professional engineer. A SWPPP is comprised of the following:

- An Erosion and Sediment Control Plan;
- A Stormwater Management Plan;
- A Pollution Prevention Plan; and
- Any additional control measures necessary to address a TMDL.

2.5.1 Pollution Prevention Plan Requirements

The pollution prevention plan submittal shall address potential pollutant-generating activities that may reasonably be expected to affect the quality of stormwater discharges from the construction activity, including any support activity. The Pollution Prevention Plan shall:

- a. Identify the potential pollutant-generating activities and the pollutant that is expected to be exposed to stormwater;
- b. Describe the location where the potential pollutant-generating activities will occur, or if identifies on the site plan, reference the site plan;
- c. Identify all nonstormwater discharges, as authorized in Part I E of this general permit, that are or will be commingled with stormwater discharges from the construction activity, including any applicable support activity;
- d. Identify the person responsible for implementing the pollution prevention practice or practices for each pollutant generating activity (if other than the person listed as the qualified personnel);
- e. Describe the pollution prevention practices and procedures that will be implemented to:
 1. Prevent and respond to leaks, spills and other releases including (i) procedures for expeditiously stopping, containing and cleaning up spills, leaks and other releases; and (ii) procedure for reporting leaks, spills and other releases in accordance with Part III G;
 2. Prevent the discharge of spilled and leaked fuels and chemicals from vehicle fueling and maintenance activities (e.g., providing secondary containment such as spill berms, decks, spill containment pallets, providing cover where appropriate, and having spill kits readily available);
 3. Prevent the discharge of soaps, solvents, detergents, and wash water from construction material, including the clean-up of stucco, paint, form release oils, and curing compounds (e.g., providing (i) cover (e.g., plastic sheeting or temporary roofs) to prevent contact with stormwater (ii) collection and proper disposal in a manner to prevent contact with stormwater; and (iii) a similarly effective means designed to prevent discharge of these pollutants);
 4. Minimize the discharge of pollutants from vehicle and equipment washing, wheel wash water, and other types of washing (e.g., locating activities away from surface waters and

- stormwater inlets or conveyance and directing wash waters to sediment basins or traps, using filtration devices such as filter bags or sand filters, or using similarly effective controls);
5. Direct concrete wash water into a leak-proof container or leak-proof settling basin. The container or basin shall be designed so that no overflows can occur due to inadequate sizing or precipitation. Hardened concrete wastes shall be removed and disposed of in a manner consistent with the handling of other construction wash waters and shall not be discharged to surface waters;
 6. Minimize the discharge of pollutants from storage, handling, and disposal of construction products, materials and wastes including (i) building products such as asphalt sealants, copper flashing, roofing material, adhesives and concrete admixtures; (ii) pesticide, herbicides, insecticides, fertilizers, and landscape materials; and (iii) construction and domestic wastes such as packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, Styrofoam, concrete, and other trash or building materials;
 7. Prevent the discharge of fuels, oils, and other petroleum products, hazardous or toxic wastes, and sanitary wastes; and
 8. Address any other discharge from the potential pollutant-generating activities not addressed above; and
- f. Describe procedures for providing pollution prevention awareness of all applicable wastes, including any wash water, disposal practices, and applicable disposal locations of such wastes, to personnel in order to comply with the conditions of the general permit. The operator shall implement the procedures described in the SWPPP.

Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls.

2.5.2 Special Conditions for Total Maximum Daily Loads

Dependent on the location of a project, special conditions may be applicable if a wasteload allocation has been assigned to construction activities in a DEQ-approved Total Maximum Daily Load (TMDL). DEQ will indicate in the Construction General Permit coverage letter if the TMDL Special Conditions apply to the project. In the case that special conditions apply, the Permittee is responsible for incorporating the more stringent DEQ regulations in accordance with 9VAC25-880-70-Part I.B.4.

2.6 Off-Site Land-Disturbing Activities

Off-site support facilities are defined as those facilities such as staging areas, equipment and material storage areas, unsuitable and surplus material disposal areas, borrow areas, etc., which are located outside of the project limits shown on an approved ESC and/or SWM Plan. Off-site support facilities may be located within or outside of VT property. It is the responsibility of the Applicant to ensure plans are approved and permits are obtained for support facilities prior to the commencement of the main land-disturbing activity. The Applicant shall provide VTSID with copies of local land disturbing permits for LDAs not on VT property.

2.7 Changes and Amendments to an Approved Plan

Changes and amendments to an approved Erosion and Sediment Control or Stormwater Management Plan may only be made with the approval of VTSID and will be submitted to VTSID through the VT project manager. VTSID, upon receipt of a change or amendment to an approved plan, shall have up to ten (10) business days to review and approve or disapprove the resubmitted plan. Proposed changes may be submitted in PDF format via email. Changes which significantly impact function and design shall come from the design professional. Location and other minor changes may come from the Contractor. VTSID has sole discretion over how a change or amendment must be submitted. Approval or disapproval of the resubmitted plan shall be made in writing to the Applicant. All changes shall be submitted, reviewed, and approved BEFORE any action is taken on the change in the field.

The Operator is responsible for updating the Registration Statement with the DEQ if a plan change or amendment affects the information originally submitted.

2.8 Pre-Construction Meeting

A preconstruction meeting is required for all regulated land-disturbing activities subject to the VTAS&S, prior to the commencement of the land disturbance. The VT Project Manager or Operator is responsible for coordination of the meeting and shall notify VTSID at least five (5) business days prior to the proposed meeting date. The certified Responsible Land Disturber (RLD), as defined in 9VAC25-850-10, shall be identified on the plans at, or prior to, the preconstruction meeting. The VT Project Manager shall ensure the individuals identified in Section 1 of the Preconstruction Meeting Form (see Appendix I) attend the meeting and the checklist items in Section 2 of the form are available at the meeting.

IMPLEMENTATION THROUGH CONSTRUCTION

The Contractor/Operator and VTSID are responsible for ensuring implementation of the approved plan in accordance with the VTAS&S throughout the construction and until VTSID and DEQ acceptance of the site and any stormwater BMP's and termination of any permits.

3.1 Contractor/Operator Responsibilities

For land-disturbing activities subject to the VTAS&S, the Contractor/Operator's responsibilities prior to and during construction may include, but are not limited to:

- Obtaining necessary permit coverage and plan approvals for the site and for applicable off-site activities;
- Adhering to the approved plans;
- Maintaining the approved plans and an up-to-date SWPPP (e.g., plan modifications and inspection reports) on the project site at all times;
- Performing self-inspections per the Construction General Permit. The Permittee shall have inspections performed by a DEQ-certified ESC/SWM Inspector per 9VAC25-850;
- Responding to any corrective action(s) within specified time frames identified as the result of a VTSID or DEQ inspection;
- Providing certifications for applicable ESC measures as described in Section 3.2;
- Providing certified SWM BMP Report per Section 4;
- Contacting VTSID and VT project manager in the event of a cavern/sink hole discovery prior to any further excavation and any back fill; and
- Notify VTSID and VT project manager of any illicit discharges that occur on site during construction.

3.2 ESC Installation Certifications (applicable to all VT property in the Town of Blacksburg)

Section 10-207(b)(6&8) of the Town of Blacksburg ESC Ordinance requires ESC measures that require calculations to be identified on the plans with a tabular summary. These measures, including sediment basins, sediment traps, conveyance channels (including diversions), and detention basins serving as sediment basins, require certification that they were built according to the approved ESC Plan. Upon installation of these measures, the Operator is responsible for providing a written certification by a design professional as to completeness and correctness of the installation of the measure.

The certification letter shall be completed and provided to VTSID within 14 business days of the installation of the measure. If the measure was not installed according to the approved plan, VTSID may require corrective action. Failure to provide certification, or to properly install the measures in accordance with the approved plan, may result in enforcement actions, as described in Section 3.4.

3.3 Inspections

VTSID will perform inspections on all projects subject to the VTAS&S. The individual performing inspections on behalf of VTSID shall be a Certified Project Inspector for ESC and SWM, as applicable, in

accordance with the ESC and SWM Certification Regulations (9VAC25-850). Where a Construction General Permit is required, periodic VTSID SWPPP inspections are in addition to the required Permittee's self-inspections in accordance with the Construction General Permit. The applicable inspection report provided in Appendix J shall be completed by the inspector on each inspection and a copy provided to the appropriate individual identified on the Preconstruction Meeting Form (Appendix I) within 2 business days.

DEQ may perform random site inspections or inspections in response to a complaint to assure compliance with the associated laws/regulations and the VTAS&S. DEQ may take enforcement action at their discretion.

VTSID will conduct the following ESC inspections, at a minimum:

- After the installation of initial ESC measures per the approved ESC Plan;
- At least once in every two-week period;
- Within 48 hours following any runoff-producing (precipitation greater than 0.25") storm event;
- At the completion of the project; and
- Periodically as deemed necessary by VTSID.

The Operator shall not commence additional land-disturbing activities until after a VTSID inspection of the initial ESC measures per the approved ESC Plan. Inspection reports shall specify a required corrective action for each violation noted and a date by which the corrective action must be completed.

3.3.1 Structural Inspections

The Operator shall schedule a inspection with VTSID for all BMPs and critical components by 4 pm the day before the inspection, and prior to installation. The following are examples of, but not limited to, critical components:

- Stormwater pond embankment;
- Pond outlet structures;
- Setting of any concrete BMP structures – does not include precast drop inlets or manholes;
- Energy dissipation structures and any outfall structure discharging into a jurisdictional wetland;
- Infiltration or bioretention BMPs; or
- Any other key BMP component as determined by VTSID.

The Operator is responsible for performing inspections of the construction activities sufficient to confirm that the site is in compliance with the construction of storm drainage systems and stormwater management facilities and that BMPs are in conformance with the approved Stormwater Management Plan.

3.4 Violations

Instances of non-compliance with VTAS&S on regulated projects may be noted for the following circumstances:

- No approved ESC and/or SWM Plan;
- Failure to install stormwater BMPs or erosion and sediment controls;
- Stormwater BMPs or erosion and sediment controls improperly installed or maintained;
- Failure to conduct required inspections;
- Incomplete, improper, or missed inspections;
- Discharges not in compliance with the requirements of Section 9VAC25-880-70 of the general permit;
- No Construction General Permit registration;
- No SWPPP;
- Incomplete SWPPP; and
- SWPPP not available for review.

Notice of any violations shall be provided to the Operator in the form of an inspection report from VTSID. The notice shall specify the measures needed to comply with the plan and shall specify the time within which such measures shall be completed. If a time frame is not provided, the deadline will default to the next required inspection by VTSID.

3.5 Notice to Comply (NTC) and Stop Work Orders (SWO)

If VTSID notes a violation for the third consecutive inspection that has not been corrected within six (6) weeks of the initial notice, VTSID shall issue a written Notice to Comply, delivered in person or by registered or certified mail to the Operator. Should the Operator not address the violations noted on the Notice to Comply within the given timeframe, VTSID shall issue a Stop Work Order in accordance with §62.1-44.15:58.

If VTSID finds that a regulated land-disturbing activity has begun without an approved plan, has violations that are causing or are in imminent danger of causing harmful erosion of lands or sediment deposition in waters within a watershed of the Commonwealth, or is otherwise substantially impacting water quality, it may issue, without advance notice, a Stop Work Order.

The Notice to Comply and Stop Work Order shall include:

- The name and address of the responsible party.
- The address when available or a description of the building, structure or land upon which the violation is occurring.
- A statement specifying the nature of the violation.
- A description of the remedial measures necessary to correct the violation and a time schedule for the completion of such remedial action.
- A statement of the penalty or penalties that may be assessed against the person to whom the notice of violation is directed, should the remedial measures not be implemented.

If a project site is under construction and receives a Stop Work Order, all approved land-disturbing activities on the site shall cease until the specified corrective measures have been taken or, if land-disturbing activities have commenced without an approved plan, all land-disturbing activities shall be

stopped and immediately mitigated with the necessary ESC measures until an approved plan or any required permits are obtained.

The Stop Work Order will be in effect for seven days from the date of the order, at which time VTSID may issue a subsequent order until all violations have been addressed. Upon completion of the remedial measures, VTSID shall inspect the work and authorize the Operator in writing that the Stop Work Order has been removed and work may recommence.

Failure to comply with a Stop Work Order or a Notice to Comply may result in the revocation of the permit, as applicable, and any associated University Building Official permits.

3.6 Termination of Land Disturbance

The Operator shall submit the Termination of Land Disturbance Form (Appendix L) to VTSID upon:

- The approval of the Record Report submittal described in Section 4 and
- Verification that the area of disturbance has been stabilized to the satisfaction of VTSID.

Acceptance of the Record Report submittal does not release the Operator from any post-construction warranty, and the Permittee, as applicable, shall not terminate the Construction General Permit coverage until receipt of a VTSID-approved Termination of Land Disturbance Form. The Operator shall be responsible for any and all maintenance of BMPs and stormwater systems on the site up until the Termination of Land Disturbance.

Record Report for Stormwater Management Facilities

The Applicant shall submit as-built documentation to VTSID prior to final acceptance of the project, verifying that the stormwater management facilities and storm drainage systems have been constructed in accordance with the approved Erosion and Sediment Control Plan and Stormwater Management Plan. In addition, once the as-built documentation has been submitted, VTSID will conduct a final inspection to confirm the accuracy of the as-built documentation.

Specific requirements for as-built documentation and certification will be determined by VTSID and Applicant during the plan review and preconstruction meeting process. Documentation shall include the following:

- A completed and certified copy of the Stormwater Management Facility Record Report and Certification Form in Appendix K;
- A Record Report including a signed and sealed copy of the certifying professional's inspection log, including incremental surveys (drawings), photographs, construction logs, inspection reports, geotechnical testing reports, soil reports, certification of materials, and all other information necessary to certify that the SWM facility has been built in accordance with the approved Plan; and
- A Record Drawing (as-built) signed and sealed by the licensed professional that includes:
 - The long-term inspection and maintenance schedule for the SWM facility (extracted from the SWM Plan or SWM Narrative); and
 - An exhibit of the total drainage area being served by the stormwater practice with the total impervious and pervious areas within the drainage area.

Once VTSID approves the Record Report, the Operator shall schedule a final inspection of the project site prior to final acceptance of the project by VTSID.

In the case that a SWM facility has not been constructed in accordance with the approved SWM Plan, then the licensed professional responsible for certifying the as-built shall immediately notify VTSID. Generally, there are two potential options when a facility has not been constructed in accordance with the approved Plan:

Option 1: Re-construct the facility in accordance with the approved Plan and submit a new Record Report for review and approval by VTSID.

Option 2: Perform calculations and analysis, based on the licensed professional's surveys, data, inspections, and other applicable documentation necessary to verify the as-built conditions satisfy the BMP standards and specification and the applicable ESC minimum standards and SWM technical criteria and submit the final report as required in this section.

The following record retention is required both during a project and after state permit termination or project completion:

1. Project records, including approved stormwater management plans, shall be kept for three years after state permit termination or project completion.
2. Stormwater management facility inspection records shall be documented and retained for at least five year for the date of inspection.
3. Construction record drawings shall be maintained in perpetuity or until a stormwater management facility is removed.
4. All registration statements submitted in accordance with 9VAC25-870-59 shall be documented and retained for at least three years from the date of project completion or state permit termination.
5. The AS&S holder shall maintain, either on site or in AS&S files, a copy of the approved ESC plan and a record of inspections for each active land-disturbing activity.

APPENDIX A

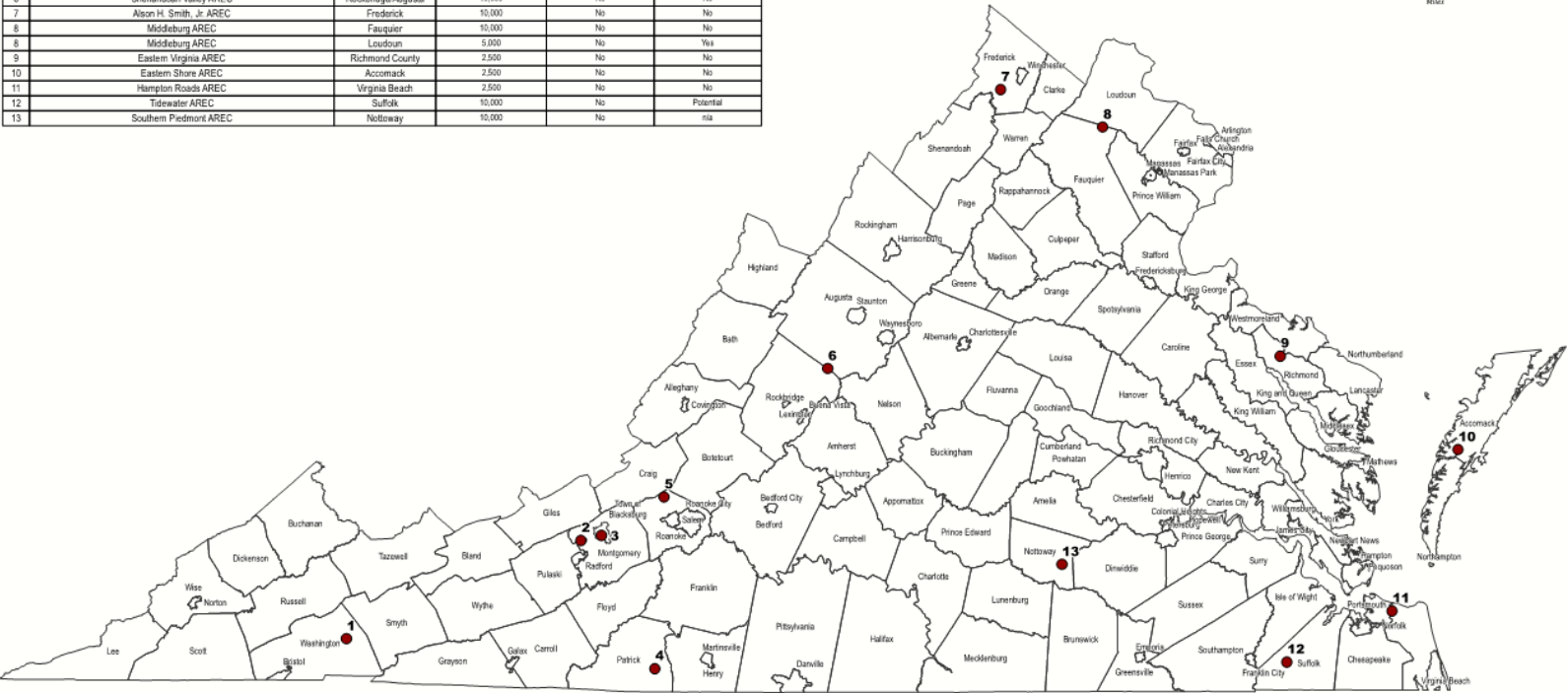
Statewide Coverage Map of Virginia Tech Properties

ID	Name	LOCALITY	ESC PLAN THRESHOLD (SF)	MORE STRINGENT LOCAL ESC REQUIREMENTS	ADDITIONAL LOCAL SWM TECHNICAL CRITERIA
1	Southwest Virginia AREC	Washington	10,000	No	No
2	Kentland / Whitehome	Montgomery	10,000	No	No
3	Main Campus (Parcel ID 70853)	Town of Blacksburg	5,000	No	Yes
3	Main Campus (Parcel ID 71111)	Town of Blacksburg	10,000	No	No
4	Reynolds Homestead FRRC	Patrick	10,000	No	No
5	Catawba Sustainability Center	Roanoke	2,500 if or 250 of	Potential	Potential
6	Shenandoah Valley AREC	Rockbridge/Augusta	10,000	No	No
7	Alton H. Smith, Jr. AREC	Frederick	10,000	No	No
8	Middleburg AREC	Fauquier	10,000	No	No
8	Middleburg AREC	Loudoun	5,000	No	Yes
9	Eastern Virginia AREC	Richmond County	2,500	No	No
10	Eastern Shore AREC	Accomack	2,500	No	No
11	Hampton Roads AREC	Virginia Beach	2,500	No	No
12	Tidewater AREC	Suffolk	10,000	No	Potential
13	Southern Piedmont AREC	Notloway	10,000	No	na

Legend

- Virginia Tech Properties
- Virginia Jurisdictions

0 40 80
Miles



APPENDIX B**Land Disturbance Application Form
(VTSID-01)**

LAND DISTURBANCE APPLICATION FORM

Instructions: This form shall be completed and submitted to VTSID for all projects involving land disturbances on VT-owned properties.

Project Name: _____

Date of submittal: _____

Project/Work Order Number: _____

Project Location (Address): _____

<u>APPLICANT</u>
Name: _____
Phone: _____
Email: _____

Project Location (Latitude, Longitude): _____

Estimated Area of Disturbance (sq. ft.): _____

Estimated Impervious Area (sq. ft.): Pre-Development: _____ **Post-Development:**

Estimated Dates: _____ to _____ **or Duration (months):**

Describe the land-disturbance(s) involved with the project, including any offsite activities:

SUBMISSION ITEM	INCLUDED	
	YES	NO
Land Disturbance Application Form		
Project Location Map		
Area of Disturbance Map		

Applicant (Print):

Applicant Signature:

INFORMATION BELOW TO BE COMPLETED BY SID

SID has verified receipt of the applicable submittal items identified above on _____.

Received by: _____.

Based on the Area of Disturbance, the project is: Regulated or Not Regulated for Erosion and Sediment Control

Based on the Area of Disturbance, the project is: Regulated or Not Regulated for Stormwater Management

APPENDIX C

Virginia Tech Stormwater Design Manual

1.0 STORMWATER HYDROLOGY

Stormwater hydrology defines the means and methods to calculate stormwater runoff from a designated area. This section documents the hydrologic practices used to establish design flows necessary to prepare the required stormwater peak flow and storage calculations.

1.1 References

Except where more stringent requirements are presented in this Design Manual, stormwater hydrology shall comply with state requirements. The primary design references are:

- VDOT Drainage Manual
- VA Stormwater Management Handbook
- VA Stormwater BMP Clearinghouse website specifications

1.2 Design Frequencies

1.2.1 General

Design frequencies shall be selected consistent with good engineering practice and regulatory requirements. The design frequency requirements in this Design Manual are minimum standards - specific conditions may dictate that less frequent design frequencies should be used.

1.2.2 Storm Drainage Systems

Storm drainage systems consist of open channels, culverts, and storm drains. Designs shall be based on the following minimum design storm frequencies:

Type of System	Frequency
Open Channels: Channel Capacity	10- year
Open Channels: Protective Lining	2- year
Culverts	10-year
Storm Drains	10-year

Additionally, all storm drainage designs for open channels, culverts, and storm drains shall be checked for the 100-year flow condition where there is the possibility of downstream flooding, overtopping primary roads, experiencing significant economic loss, or catastrophic failure. Where justified by the consequences of failure, the minimum design recurrence interval shall be increased.

1.3 Stormwater Management Facilities

Certain stormwater management facilities temporarily store a portion of stormwater runoff to mitigate increases to stormwater runoff peak flows and volumes due to the effects of land development.

Channel protection and flood protection shall be addressed in accordance with the criteria set forth in Section 9VAC25-870-66 of the Stormwater Management Regulations.

1.5 Time of Concentration (t_c) and Travel Time (T_t)

1.5.1 General

Travel Time (t_t) is the time it takes runoff to travel from one location to another in a watershed. Travel Time is a component of Time of Concentration (t_c), which is the time for runoff to travel from the most hydraulically distant point in the watershed to the outfall. The Time of Concentration is computed by summing all the travel times for consecutive components of the drainage conveyance system. Travel Time and Time of Concentration generally consist of three flow types – overland flow, shallow concentrated flow, and open channel flow. The following methods shall be used to determine the flow and velocity for the various conditions; however, the results shall be reviewed for reasonableness, and the results shall be revised if needed to provide a reasonable velocity and flow time that will best represent the study area.

When designing a drainage system, the Time of Concentration is not necessarily the same before and after land disturbing activities have been completed. Therefore, the travel time path shall be reflective of the actual conditions both before and after the land disturbing activities.

In some cases, runoff from a portion of the drainage area that is highly impervious may result in a greater peak discharge than would occur if the entire drainage area were considered. In this case, adjustments shall be made to the drainage area by disregarding those areas where the travel time is too long to add substantially to the peak discharge.

To prevent small drainage areas from skewing the time of concentration calculation results, when establishing subdrainage areas for analysis, the largest subdrainage area shall be no greater than 5 times the area of the smallest subdrainage area.

1.5.2 Overland (Sheet) Flow

Overland flow is flow that occurs at the upper end of a watershed, where flow is not concentrated and there are no channels. The length of overland flow shall be reflective of actual conditions and shall normally be no greater than 100 feet.

1.5.3 Shallow Concentrated Flow

Shallow concentrated flow is the flow that occurs when minor rivulets form just downstream from the overland flow. The maximum allowable length for shallow concentrated flow shall be 1000 feet.

1.5.4 Open Channel Flow

Open channel flow occurs where stormwater flow converges in gullies, ditches, and natural or man-made conveyances.

1.5.5 Pipe Flow

Pipe flow is the flow that occurs through culverts and storm drains. Use full-flow pipe velocities, unless it can be shown that the pipe will operate at partially full conditions. If it can be shown that the pipe will operate at a partially full condition, then the partially full pipe velocity may be used.

Design of culverts is presented in Chapter 3. Design of storm drain systems is presented in Chapter 4.

1.6 Hydrologic Methods

1.6.1 General

There are a variety of widely used hydrologic methodologies. Each has its strengths and weaknesses. In the interest of standardizing hydrologic calculations, the following methodologies will be used for all projects, unless a variance is granted. A variance will only be granted if it may be demonstrated that good engineering practice dictates the use of another method.

1.6.2 Peak Discharge Methods for Design of Storm Drainage Systems

The Rational Method may be used to design storm drainage systems for drainage areas up to 200 acres.

The SCS Method may be used for drainage areas up to 10 square miles.

For drainage areas greater than 10 square miles, calculations shall be performed using at least two separate methods as described in the VDOT Drainage Manual (SCS Method, regression equations, and/or stream gage data). The design peak flow shall be selected based on a professional evaluation of the results of the various methods.

1.6.3 Hydrograph Methods for Design of Stormwater Management Facilities

The SCS method must be used to design stormwater management facilities

1.7 Methodologies

Following is an abbreviated discussion of each method. Refer to the VDOT Drainage Manual for a more complete discussion of the Rational Method and the VA SWM Handbook for a more complete discussion of the SCS Method.

1.7.1 Rational Method

1.7.1.1 General

The Rational Method is expressed as:

$$Q = C_f CIA$$

Where:

Q = Peak flow rate of runoff, cubic feet per second (cfs)

C_f = Saturation factor

C =Runoff coefficient representing a ratio of runoff to rainfall (dimensionless)

(See VESCH Table 5-2 Below)

I =Average rainfall intensity for a duration equal to the time of concentration for a selected return period (in/hr)

A =Drainage area contributing to the design location, acres (ac)

**TABLE 5-2
VALUES OF RUNOFF COEFFICIENT (C) FOR RATIONAL FORMULA**

Land Use	C	Land Use	C
Business: Downtown areas Neighborhood areas	0.70-0.95 0.50-0.70	Lawns: Sandy soil, flat, 2% Sandy soil, average, 2-7% Sandy soil, steep, 7% Heavy soil, flat, 2% Heavy soil, average, 2-7% Heavy soil, steep, 7%	0.05-0.10 0.10-0.15 0.15-0.20 0.13-0.17 0.18-0.22 0.25-0.35
Residential: Single-family areas Multi units, detached Multi units, attached Suburban	0.30-0.50 0.40-0.60 0.60-0.75 0.25-0.40	Agricultural land: Bare packed soil * Smooth * Rough Cultivated rows * Heavy soil, no crop * Heavy soil, with crop * Sandy soil, no crop * Sandy soil, with crop Pasture * Heavy soil * Sandy soil Woodlands	0.30-0.60 0.20-0.50 0.30-0.60 0.20-0.50 0.20-0.40 0.10-0.25 0.15-0.45 0.05-0.25 0.05-0.25
Industrial: Light areas Heavy areas	0.50-0.80 0.60-0.90	Streets: Asphaltic Concrete Brick	0.70-0.95 0.80-0.95 0.70-0.85
Parks, cemeteries	0.10-0.25	Unimproved areas	0.10-0.30
Playgrounds	0.20-0.35	Drives and walks	0.75-0.85
Railroad yard areas	0.20-0.40	Roofs	0.75-0.95
<p>Note: The designer must use judgement to select the appropriate "C" value within the range. Generally, larger areas with permeable soils, flat slopes and dense vegetation should have the lowest C values. Smaller areas with dense soils, moderate to steep slopes, and sparse vegetation should be assigned the highest C values.</p>			

1.7.1.2 Saturation Factor

The saturation factor (C_f) is an adjustment factor for modifying the runoff coefficient (C) for storms that are less frequent than a 10-year recurrence interval. The product of C_f and C should not be greater than 1.0. Where the product of C_f and C is greater than 1.0, use 1.0.

Recurrence Interval (Years)	C_f
2, 5, and 10	1.0

25	1.1
50	1.2
100	1.25

1.7.1.3 Runoff Coefficient

The runoff coefficient (C) is a variable of the Rational Method that requires significant judgment and understanding for proper selection.

As the slope of the drainage basin increases, the selected C-value should also increase as follows:

- The lower range of C-values should be used where the majority of the slopes are less than 2 percent.
- The average range of C-values should be used where the majority of slopes are 2 to 5 percent.
- The higher range of C-values should be used where the majority of the slopes are greater than 5 percent.

The C-value selection should be based on the soil type as follows:

- The lower range C-values should be used in sandy and other more pervious soils
- The higher range of C-values should be used in clayey and other less pervious soils.

It is often necessary to develop composite C-values based on the different land uses and other factors in a drainage basin. The composite C-value must be representative of the drainage basin. As noted in 1.3.1, averaging the C-value for mixed pervious/impervious watersheds may underestimate the peak flow rate.

1.7.1.4 Average Rainfall Intensity

Rainfall intensity (I) shall be determined by utilizing NOAA or Atlas 14.

1.7.1.5 Drainage Area

Drainage area (A) is measured in acres and is determined from evaluating a topographic map of the area.

1.7.2 SCS Method

1.7.2.1 General

The SCS Method may be used for computing peak flow rates and generating hydrographs for storms of selected return frequencies. This approach takes into account the time distribution of the rainfall, the initial rainfall losses to interception and depression storage, and an infiltration rate that decreases during the course of a storm. 24-Hour Rainfall and Distribution

The 24-hour rainfall is determined by consulting NOAA Atlas 14.

1.7.2.2 Curve Number

The SCS method uses a combination of soil conditions and land use (ground cover) to assign a runoff factor to an area. These runoff factors, or runoff curve numbers (CN), indicate the runoff potential of an area. The CN requires significant judgment and understanding for proper selection.

When calculating existing rates of runoff (pre-construction), assume that all cover types are in good hydrologic condition.

Hydrologic Soils Groups include types A, B, C, and D, with type A being the most permeable and type D the least permeable. Soils maps for Virginia may be obtained by referring to <http://soils.usda.gov/>.

1.7.2.3 Drainage Area

Drainage areas for each sub-basin should be identified on an appropriate topographic map. The USGS quadrangle maps are often appropriate to delineate drainage areas that extend beyond the site development area.

1.7.2.4 Elevation – Storage Relationship

When runoff hydrographs are being routed through a stormwater management facility, the relationship between the elevation (or depth) of stored water in the facility and storage volume needs to be known and input into the calculation. Often this information is obtained by determining the pond area bounded by contour lines on a grading plan. Enough data pairs (elevation – storage) must be provided to properly model conditions.

1.7.2.5 Elevation – Discharge Relationship

When runoff hydrographs are being routed through a stormwater management facility, the relationship between the elevation (or depth) of stored water in the facility and the discharge rate from the facility needs to be known and input into the calculation. The development of this relationship requires an understanding of the design conditions and underlying hydraulic principles. The hydraulic principles and equations governing the discharge rate will often change several times at varying elevations, based on the flow control and conveyance structures. These include weir flow, orifice flow, culvert inlet control, culvert outlet control, open channel flow, and possible effects from downstream tailwater.

1.8 Pre-Development Conditions

1.8.1 Site Development

Pre-development hydrologic calculations for land disturbing activities shall consider the site conditions that exist at the time that plans for the land development are submitted to SID. Where phased development or plan approval occurs (preliminary grading, demolition, etc.), the existing conditions at the time prior to the first item being submitted shall establish the pre-development conditions.

For the purposes of computing pre-development runoff, all pervious lands on the site shall be assumed to be in good hydrologic condition, regardless of conditions existing at the time of computation.

1.9 Drainage Area Analysis

When determining the stormwater management requirements for quantity control, an analysis of the pre- and post-development site conditions must be conducted. The drainage area analysis shall reflect the ultimate development conditions of the property where the land disturbing activity is being conducted.

To prevent the undersizing of stormwater management components, upstream property conditions in the entire watershed shall be considered in the drainage area analysis. Improvements to stream channels and conveyance systems shall be analyzed based on the ultimate development conditions. Design of drainage infrastructure shall be based on proposed development and the associated density of impervious areas.

When a site contains or is divided by multiple drainage areas, the downstream receiving channel for each area must be analyzed in accordance with section 9VAC25-870-66 of the VSMP regulations.

When a site drains to more than one Hydrologic Unit Code (HUC), the pollutant load reduction requirements shall be applied independently within each HUC, unless reductions are achieved in accordance with a comprehensive stormwater management plan.

The downstream limits of analysis and channel adequacy shall be determined in accordance with section 9VAC25-870-66 of the VSMP regulations.

2.0 OPEN CHANNELS

Open channels are man-made ditches, channels, as well as natural channels, that are used to convey stormwater runoff. This section defines the criteria and restrictions to be used in designing open channels.

Grass Channels are a type of water quality BMP with design requirements beyond those of the typical open channel. The design specifications for Grass Channels can be found on the VA Stormwater BMP Clearinghouse website.

2.1References

Except where more stringent requirements are presented in this Design Manual, open channels shall comply with VDOT and DEQ requirements. The primary design references are the latest editions of the following:

- VDOT Drainage Manual
- VDOT Road and Bridge Standards
- VA Erosion and Sediment Control Handbook
- Hydraulic Engineering Circular Number 15 (HEC-15), Design of Roadside Channels with Flexible Linings

2.2Design Methodology and Criteria

2.2.1 Open Channels

Open channels are classified as either major channels or minor channels. The base design storm for storm drainage systems are the 2- and 10-year, 24-hour storm events, for velocity and capacity. However, the entire system must be capable of handling a 100-year, 24-hour design storm.

2.2.2 Design Flow

Design flow for open channels is contained in Chapter 1. Design flows for open channels must be contained within the channel with adequate freeboard from the top of the bank to the peak water surface elevation. See section 2.2.9 for adequate freeboard requirements for capacity calculations.

Capacity calculations shall be made at the flattest section of the channel.

2.2.3 Hydrology

See Chapter 1 for the methodology used to determine peak flows for a given design frequency.

2.2.4 Channel Hydraulics

Open channel design will be based on Manning's Equation for open channel flow:

$$Q = A \times 1.49/n \times R^{2/3} \times S^{1/2}$$

Where:

- Q =Flow rate in the open channel (cfs)
- A =Cross-sectional area of the flow in the channel (ft²)
- R =Hydraulic radius, A/wetted perimeter (ft)
- S =Channel slope (ft/ft)
- n =Channel roughness coefficient (See VDOT Table: Appendix 7D-1 below)

Appendix 7D-1 Values of Roughness Coefficient n (Uniform Flow)

Type of Channel and Description	Minimum	Normal	Maximum
LINED CHANNELS (Selected linings)			
a. Concrete			
1. Trowel finish	0.011	0.013	0.015
2. Float finish	0.013	0.015	0.016
3. Gunite, good section	0.016	0.019	0.023
b. Asphalt			
1. Smooth	0.013	0.013	-
2. Rough	0.016	0.016	-
c. Riprap (st'd VDOT sizes)			
1. Class 1A	0.033	0.038	-
2. Class 1	0.035	0.040	-
3. Class 2	0.037	0.042	-
4. Class 3	0.039	0.045	-
5. Type I	0.041	0.047	-
6. Type II	0.044	0.050	-
EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.025	0.030	0.035
5. Stony bottom and weedy sides	0.025	0.035	0.045
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
NATURAL STREAMS			
1. Minor streams (top width at flood stage <100 ft)			
a. Streams on Plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones/weeds	0.030	0.035	0.040
3. Clean, winding, some pools/shoals	0.033	0.040	0.045
4. Same as above, but some weeds/stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080

* Rev 7/09

**Appendix 7D-1 Values of Roughness
Coefficient n (Uniform Flow)**

Type of Channel and Description	Minimum	Normal	Maximum
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
2. Floodplains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated area			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense Willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
3. Major Streams (top width at flood stage > 100 ft)			
The n-value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	-	0.060
b. Irregular and rough section	0.035	-	0.100

Source: Chow, V.T., FHWA's HDS-6 publication*

* For bare earth linings when the soil classifications in accordance with either AASHTO or USCS designations are known, use the Manning's "n" values recommended in the appropriate table from Appendix 7D-2

2.2.5 Channel Velocity

The lining of open channels with drainage areas of five acres or less shall be designed to withstand the erosive effects of a 2-year storm.. The final design shall be consistent with velocity limitations for the selected channel lining, as presented in Table 2-1.

Open channels associated with dam embankment spillways or other structures where catastrophic failure could result from a lining failure may be required to be designed to withstand a more severe storm event.

Where open channels receive flow from storm drains, culverts, or other open channels, or in other areas where channel velocity may cause scouring or erosion, outlet protection or energy dissipation

may be necessary to reduce the potential for severe erosion. For the design of energy dissipation devices, see Chapter 6.

Velocity calculations shall be made at the steepest section the channel.

**TABLE 2-1
Maximum Velocity Based on Channel Lining**

Channel Lining	Maximum Velocity (Design Storm)	
	Erosion Resistant Soils ¹	Easily Erodible Soils ²
Vegetative Lined Channels		
Tall Fescue Grass Mixtures	5 fps	3 fps
Kentucky Bluegrass	5 fps	3 fps
Annual and Perennial Rye	4 fps	3 fps
Sod	4 fps	3 fps
Geosynthetic Lined Channels		
VDOT EC-2	4 fps	
VDOT EC-3, Type A	7 fps	
VDOT EC-3, Type B	10 fps	
Other	Per Mfr Recommendations	
Riprap	Dependent on stone size and thickness, see VDOT Drainage Manual for design of riprap	
Concrete	None	

¹ Erosion resistant soils include those with a high clay content and high plasticity, silty clay, sandy clay, and clay.

² Easily erodible soils include those with a high content of fine sand or silty, lower plasticity or non-plasticity, sand, silt, sandy loam, and silty loam with an erodibility factor (K) greater than 0.35.

2.2.6 Channel Slope

Generally the slope of an open channel shall be established by the site topography. Open channels must be graded to drain with no standing water following a rain event. The minimum allowable grade shall be 2 percent for vegetative lined and riprap-lined open channels and 1 percent for a concrete open channel.

The maximum allowable grade for a stormwater channel shall be dependent on the channel lining materials and its ability to withstand erosion during the design storm.

2.2.7 Cross Sectional Area

Open channel cross-sectional area shall be designed based on site restrictions and channel capacity requirements. Acceptable cross-sectional area options include:

- Vee
- Parabolic
- Trapezoidal
- Rectangular

2.2.7.1 Vee

For design aids, see the VDOT Drainage Manual and the VA ESC Handbook.

The maximum side slope of a vee-shape open channel is 3 horizontal to 1 vertical for natural or vegetated channels and is 2 horizontal to 1 vertical for riprap, concrete or as approved by SID.

2.2.7.2 Parabolic

For design aids, see the VDOT Drainage Manual and the VA ESC Handbook.

2.2.7.3 Trapezoidal

For design aids, see the VDOT Drainage Manual and the VA ESC Handbook.

The maximum side slope of a trapezoidal-shape open channel is 3 horizontal to 1 vertical for natural or vegetated channels and is 2 horizontal to 1 vertical for all other linings engineered to be stable at this slope.

2.2.7.4 Rectangular

Rectangular channels shall only be allowed where site restrictions prevent the installation of a vee, parabolic, or trapezoidal channel.

The requirements for rectangular channels apply to any open channel with side slopes greater than 2 horizontal to 1 vertical and include the following:

- Rectangular channels must either be constructed of concrete or gabions.
- An approved safety barrier must be placed on both sides for the length of the rectangular channel, where the channel is more than 3 feet deep.
- Care must be taken to ensure that energy dissipation is placed at the outfall of the rectangular channel to prevent erosion at the discharge point.

2.2.8 Channel Lining

An open channel lining shall be designed based on the cross-section, slope, and channel velocity requirements. The design may be based on a consideration of either permissive velocity or tractive force as described in the VDOT Drainage Manual.

The preferred method for analyzing channel linings is to compare the maximum permissible velocity for the channel lining, listed in Table 2.1 in this chapter of the Design Manual, to the design velocity computed using Manning's equation to verify the selected lining is adequate. As an alternative, the selected lining may be analyzed using the Tractive Force Method in the VDOT Drainage Manual. This method analyzes critical shear loading on the open channel bottom and side slopes. The permissible tractive force for various soils is located in the Appendix of the VDOT Drainage Manual.

Open channels may have different lining materials in different channel reaches based on velocity and potential erosion conditions. Care must be exercised to avoid erosion at open channel transition points.

The open channel lining will have an impact on the design capacity in the form of the roughness coefficient. Allowable open channel linings include the following:

2.2.8.1 Natural

To the extent possible, natural channels shall be preserved.

To determine the permissible velocities in natural channels, based on soil conditions, use permissible velocities based on soil conditions published in the VDOT Drainage Manual. If the design storm velocity exceeds the permissible velocity, a natural channel cannot convey the stormwater runoff without modifying the discharge flow conditions or improving the natural channel.

2.2.8.2 Vegetative-Lined

Vegetated or grass-lined channels include man-made channels lined with established vegetation. These channels usually include a geosynthetic mat for channel stabilization for design flow velocities.

The type of grass allowable for vegetative-lined open channels is dependent on the slope of the channel and the peak calculated velocity. Table 2-1 details the maximum permissible velocities for various channel linings.

A permanent channel stabilization geosynthetic mat should be considered for all vegetated channels. There is a wide variety of geosynthetic stabilization mat options from various manufacturers. The geosynthetic mat selected should be adequate for the slope and design flow velocities calculated for the channel. Where appropriate, VDOT Road and Bridge Standard EC-2 or EC-3 may be used.

Where a permanent geosynthetic mat is used to provide channel stabilization, information on the proposed mat, in the form of the manufacturer's catalog information, shall be submitted as a part of

the stormwater management plan. The catalog information shall include the manufacturer's recommendations for maximum allowable velocity. Design drawings must state that the geosynthetic stabilization mat shall be installed in strict accordance with the manufacturer's recommendations.

Where a permanent channel stabilization geosynthetic is not used, a temporary geosynthetic lining designed to provide a measure of the bed/bottom and bank stability until such time as a reasonably stable and mature stand of vegetation is established shall be provided.

2.2.8.3 Riprap-Lined

The use of vegetated and geosynthetic-lined open channels for mild-sloped open channels and concrete for steep-sloped open channels is encouraged. Riprap-lined channels will not be acceptable where vegetated or geosynthetic-lined open channels are feasible. However, where design flow velocities exceed the erosive capability of a natural or vegetative-lined channel, riprap may be used as a channel lining in areas where erosion is a concern. For an extended length of high velocity channel, consideration should be given to using a concrete channel rather than riprap.

Use of riprap-lined channels requires pre-approval from SID.

Where riprap is approved by SID, it shall meet VESCH Specification 3.19, VDOT Standards, and VDOT Specifications.

2.2.8.4 Concrete-Lined

Concrete shall be considered where design velocities dictate or where there is a need to provide the maximum level of erosion protection.

2.2.9 Freeboard Requirements

Open channels shall have a minimum of 6" of freeboard above the calculated water surface elevation for the design peak flow, unless the flow is supercritical. Where the flow is supercritical, a minimum of 12" of freeboard is required. Flow is supercritical when:

$$V / (32.2 \times H)^{0.5} > 1$$

Where:

V =Velocity (fps)

H =Depth of flow (feet)

At channel bends and curves, the freeboard shall be measured from the calculated water surface elevation, including the increased depth due to the superelevation of the water surface.

2.2.10 Calculation of Depth of Flow at Bends and Curves

Increases in the depth of flow occur at bends and curves due to the superelevation of the water surface. Superelevation of the water surface at bends and curves is calculated, using the VDOT Drainage Manual, by:

$$\Delta Z = V^2 / (32.2 \times r_c) \times (r_o - r_i)$$

Where:

ΔZ =Difference in water surface elevation between the concave and convex banks (ft)

V =Average velocity (ft/s)

r_c =Radius of the center of the stream at the bend (ft)

r_o =Radius of the outside bank of the stream at the bend (ft)

r_i =Radius of the inside bank of the stream at the bend (ft)

The increase in the normal stream flow depth at the outer bank of an open channel bend is one half of ΔZ .

2.2.11 Environmental Considerations and Aquatic Organism Protection

Construction or modifications to open channels shall comply with all applicable laws and regulations. The applicant is responsible for procuring all necessary permits, such as USACE and DEQ Wetland Permits, DEQ VPDES Permits, etc., prior to obtaining SID approval.

2.2.12 Maintenance Requirements

The Operator is responsible for maintenance of open channels until the termination of land disturbance as described in the Annual Standards and Specifications. Maintenance includes periodically pruning or mowing vegetation and removing debris.

No one shall fill, modify, or construct structural modifications that impair or restrict flow in open channels.

3.0 CULVERTS

A culvert is a single run of storm drain pipe that conveys water or stormwater under a road, railway, embankment, sidewalk, or other open channel obstruction. A culvert typically connects two open channels, but it may connect an open channel to a storm drain.

Proper culvert design must consider many factors including:

- Design Flow
- Inlet conditions (flow approach conditions, allowable headwater, culvert inlet configuration)
- Culvert conditions (pipe roughness, pipe slope, diameter and length)
- Tailwater depth
- Buoyancy potential
- Environmental considerations and effects on aquatic life
- Design loads and service life of the pipe material

Refer to the VDOT Drainage Manual for a more thorough discussion of these items. For the design of stormwater inlets and storm drains, see Chapter 4.

3.1 References

Except where more stringent requirements are presented in this Design Manual, culverts shall comply with VDOT requirements. The primary design reference is the VDOT Drainage Manual. Other appropriate references include the latest editions of the following:

- VDOT Road and Bridge Standards
- VDOT Road and Bridge Specifications
- VA ESC Handbook
- VDOT Instructional and Informational Memorandum IIM-LD-121.15, Allowable Pipe Criteria for Culverts and Storm Sewers
- FHWA Hydraulic Design of Highway Culverts HDS No. 5, Pub. No. FHWA-HIF-12-026
- FHWA Debris Control Structures Evaluation and Countermeasures HEC No. 9, Pub. No. FHWA-IF-04-016
- FHWA Culvert Design for Aquatic Organism Passage HEC No. 2, Pub. No. FHWA-HIF-11-008

3.2 Design Methodology and Criteria

3.2.1 Computational Methods

Computations may be manual or by computer program.

Manual computations use design equations and nomographs. Results are documented on VDOT's Design Form LD-269.

There are a number of computer programs available to design culverts. Any of these computer programs will be acceptable if their methodologies are based on the same equations and

nomographs accepted by VDOT, and if they provide the same documentation of inputs, assumptions, and output as are contained on VDOT's Design Form LD-269.

3.2.2 Hydrology

3.2.2.1 Design Flow Methodology

See Chapter 1 for methodology used to determine design flows. Generally culverts shall be designed based on the peak flow (steady state), ignoring the effects of temporary upstream storage.

3.2.3 Culvert Hydraulics

3.2.3.1 Design Flow

Culverts shall be designed in accordance with the VDOT Drainage Manual, latest edition.

Compliance with the National Flood Insurance Program (NFIP) is necessary for all locations where construction will encroach on a 100-year floodplain. The Town of Blacksburg administers the NFIP on the Virginia Tech main campus, in accordance with Executive Memorandum 2-97.

In addition, the 100-year peak flow (without the addition of the obstruction allowance) shall be routed through all culverts, determining the headwater depth behind the culvert with road overtopping, to ensure that buildings and other structures are not flooded and that adjacent roadways and adjacent properties do not suffer significantly increased damage during the 100-year storm event. Storage impacts of water behind the culvert may be considered in the calculation but is not required.

3.2.3.2 Allowable Headwater

The allowable headwater is the depth of water that can be ponded at the upstream end of the culvert during the design condition, as measured from the culvert inlet invert.

The allowable headwater depth shall be limited by the following conditions:

- Headwater does not cause upstream property damage;
- Headwater does not increase the 100-year flood elevation, as mapped by NFIP;
- During a design storm event, the water surface shall be a minimum of 18 inches below the shoulder of the road at the point where the culvert crosses, or the low point of the road grade where the water would overtop the road;
- Headwater depth shall not exceed 1.5 times the diameter or height of the culvert barrel;
- Headwater depth shall not be such that stormwater flows to other ditches or terrain, which permit the flow to divert around the culvert.
- In most instances, the roadway overtopping may be treated as a broad crested weir.
- The maximum overtopping depths during a 100-year storm event for various street classifications are as follows:

<u>Classification</u>	<u>Max. Depth at Crown</u>	<u>Max. Velocity</u>
Local/Collector	1 ft*	6 fps
Arterial/Highway	No Overflow	No Overflow

3.2.3.3 Tailwater Conditions

Tailwater is the water into which a culvert outfall discharges. Culvert design shall be based on tailwater conditions that could reasonably be anticipated during the design condition.

- If an upstream culvert outlet is located near a downstream culvert inlet, the headwater elevation of the downstream culvert may establish the design tailwater depth at the upstream culvert.
- If the culvert discharges into a lake, pond, stream, or other body of water, the maximum water elevation of the body of water during the design storm may establish the design tailwater elevation at the upstream culvert.

3.2.3.4 Inlet and Outlet Control

Culvert hydraulic design shall consider both inlet and outlet control conditions. For a culvert operating under inlet control, the headwater elevation is governed by the inlet geometry. For an outlet control culvert, the inlet geometry, barrel characteristics and tailwater elevation all impact the headwater elevation.

Minimum culvert performance is determined by analyzing both inlet and outlet control for a given flow and using the highest resulting headwater.

Inlet Control

The following factors are considered when calculating inlet control headwater:

- Inlet Area – cross sectional area of the culvert entrance face
- Inlet Edge – projecting, mitered, headwall, or beveled edges are common
- Inlet Shape – rectangular, circular, elliptical, or arch are common

Nomographs for calculating headwater and flow capacity are found in the VDOT Drainage Manual.

Outlet Control

The following factors are considered when calculating outlet control headwater:

- Manning’s Roughness (n) – based on barrel material
- Barrel Area – cross section perpendicular to the flow
- Barrel Length
- Barrel Slope

- Tailwater Elevation

Outlet control affects the hydraulic grade line of the flow through the culvert. To calculate the hydraulic grade line, reference the equations for velocity, velocity head, entrance losses, friction losses, and exit losses contained in the VDOT Drainage Manual.

For nomographs, cross sections, and pipe materials, see the VDOT Drainage Manual.

3.2.3.5 Culvert Velocity

Outlet velocity must be checked to assure that excessive erosion and scour problems will not occur.

Culvert outlet protection shall be provided in accordance with the standards and specifications for Outlet Protection and Riprap in the VA ESC Handbook.

Culverts under roadways shall be provided with end sections or endwalls in accordance with the outlet protection requirements of the VDOT Drainage Manual.

Where a special design is needed to reduce outlet velocity, it shall be designed in accordance with VDOT standards.

The minimum velocity in a culvert barrel must be adequate to prevent siltation at low flow rates. At a minimum this velocity shall be 3 feet per second for a 2-year storm event.

3.2.4 Structural Design

All culverts shall be designed to withstand a HS-20 highway loading, unless it crosses under a railroad, in which case the culvert shall be designed for railroad loads. The structural design shall consider the depth of cover, trench width and condition, bedding type, backfill material, and compaction.

3.2.5 Materials

Culverts in public easements or rights-of-way shall be constructed of materials based on the following:

- Culverts under a roadway in the right-of-way shall be VDOT approved materials.
- Culverts under sidewalks, trails, etc. shall be reinforced concrete pipe (RCP) or HDPE.

3.2.6 Culvert Sizes

The minimum culvert size shall be 18-inch diameter.

Culverts shall meet all cover conditions required. Where the site conditions preclude the use of a single culvert barrel to meet the design flow conditions, multiple barrel culverts are acceptable.

The maximum length of a culvert shall be 300 feet. A culvert longer than 300 feet shall have manholes or junction boxes and shall fall under the requirements of Chapter 4.

3.2.7 End Conditions

Headwalls and end sections shall normally be required on inlets and outlets, as described below.

3.2.7.1 Prefabricated End Sections

Prefabricated end sections, or flared end sections, provide for a better flow path, improving the design flow and headwater conditions.

Prefabricated end sections shall be provided for culverts 18-inch to 36-inch diameter, except:

- Where culvert alignment exceeds 20 feet in vertical elevation change or culvert slope exceeds a 2:1 slope, a standard concrete headwall shall be provided instead of a prefabricated end section.
- Where a concrete headwall is provided.

3.2.7.2 Concrete Headwalls and Structures

Precast concrete headwalls shall be provided at all culvert inlets and outlets, unless other end conditions are allowed, as stated above. Precast concrete headwalls shall meet the requirements of the VDOT Road and Bridge Standards and VDOT Road and Bridge Specifications.

Wingwalls may be required in conjunction with headwalls. Culvert pipes 48" or larger in diameter shall have concrete wingwalls. Wingwalls are generally used where the culvert is skewed to the normal channel flow or where the side slopes of the channel or roadway are unstable. Wingwalls shall meet the requirements of the VDOT Standards and VDOT Specifications. Wingwalls shall be set at an angle between 30 degrees and 60 degrees from the headwall.

Concrete aprons may be used at the entrance or the exit of a culvert. Aprons are typically used where high velocities or headwater conditions may cause erosion upstream or downstream of the culvert. An apron shall not protrude above the normal stream bed elevation.

Special design concrete slab end treatment, per VDOT Standards, may be used as a concrete end section.

3.2.8 Multiple Barrel Culverts

Multiple barrel culverts shall be allowed where single culverts cannot handle the design flow while meeting the required cover or headwater condition requirements. The design of multiple barrels should avoid the need for excessive widening of the upstream or downstream receiving channels.

The minimum spacing between culverts in a multiple barrel culvert design shall be that required to provide adequate lateral support and allow proper compaction of bedding material under the pipe haunches.

3.2.9 Culvert Skew

Where possible, culverts shall be installed parallel to the flow path. The maximum allowable skew shall be 45 degrees as measured from the line perpendicular to the roadway centerline.

3.2.10 Buoyancy

Verify that the culvert pipe, end sections, and concrete endwall structures will not fail under hydrostatic uplift conditions.

The buoyancy force consists of the weight of water displaced by the pipe and the fill material that is over the pipe (below the headwater depth). The force resisting buoyancy includes the weight of the pipe, weight of the water within the pipe, and the weight of fill material over the pipe.

Buoyancy is more likely to be a problem where:

- Lightweight pipe is used
- The pipe is on a steep slope (usually inlet control with the pipe flowing partially full)
- There is little weight on the end of the pipe (flat embankment slopes, minimum cover, and/or no endwalls)
- High headwater depths ($HW/D > 1.0$)

Suitable cover, footings, or anchor blocks may be required to ensure the culvert's integrity during design conditions.

3.2.11 Debris and Trash Racks

In general, trash racks or debris deflectors shall not be used where other site modifications may be made to prevent excessive trash or debris from entering the culvert. However, they may be required at specific locations by SID where large amounts of storm debris may be anticipated.

3.3 Installation

All culvert pipe, headwalls, end sections, outlets, and other peripheral structures shall be installed in accordance with VDOT requirements and the manufacturer's recommendations. The characteristics of the trench, bedding, and pipe material all impact the structural strength of the pipe system. The installed culvert conditions shall comply with the design assumptions and calculations.

3.3.1 Bedding Material

Bedding material and installation shall comply with the requirements of the VDOT Specifications.

3.3.2 Backfill

Backfill shall be suitable material and shall be placed and compacted in accordance with VDOT Specifications.

A minimum of 12" of backfill shall be placed over the top of a HDPE or CMP culvert prior to placing pavement or other surface treatment.

3.4 Environmental Considerations and Aquatic Organism Protection

Where compatible with good hydraulic engineering, a culvert shall be located in “dry” conditions. Where this is not possible, the culvert shall be located to minimize impacts to streams or wetlands.

When a culvert is set in a perennial stream, the invert of the culvert shall be set below the normal flow line of the stream as required in the VDOT Drainage Manual. The grade of the culvert shall not exceed the grade of the natural stream in that section.

Where construction requires environmental permits, the applicant shall be responsible for obtaining all necessary environmental permits and complying with their requirements.

3.5 Maintenance Requirements

The Operator is responsible for maintenance of culverts until the termination of land disturbance as described in the Annual Standards and Specifications.

A storm drainage system consists of two or more interconnected pipes and one or more structures designed to intercept and convey stormwater runoff from specific storm event without surcharge. Storm drains collect and transport stormwater from a site primarily through the use of a closed pipe network. For the stormwater to be efficiently handled in a storm drain, the site must also have an efficient way to collect stormwater runoff and have it enter into the piped network. Once in the storm drain, the stormwater is routed to a discharge outfall.

Storm drainage systems include:

- Inlets
- Storm drain piping and structures that convey stormwater runoff to the outfall

This section defines criteria and restrictions that shall be used in designing and constructing storm drains. See the VDOT Drainage Manual for more in-depth information.

Profiles for all storm drains 12 inches in diameter and greater shall be provided on the site plans.

4.1 References

Except where more stringent requirements are presented in this Manual, storm drainage systems shall comply with VDOT and DEQ requirements. The primary design reference is the VDOT Drainage Manual. Other appropriate references include:

- VDOT Standards
- VDOT Road and Bridge Specifications
- VA ESC Handbook

4.2 Design Methodology and Criteria

4.2.1 Computational Methods

Computations may be manual or by computer program.

Manual computations use design equations and nomographs. Results may be documented on VDOT work sheets.

- Form LD-204 Stormwater Inlet Computations
- Form LD-229 Storm Drain Design Computations
- Form LD-347 Hydraulic Grade Line Computations

There are a number of computer programs available to design storm drainage systems. Any of these computer programs will be acceptable if their methodologies are based on the same equations and nomographs accepted by VDOT, and if they provide the same documentation of inputs, assumptions, and output as are contained on VDOT's work sheets.

Computational methods are explained in detail, including comprehensive design examples, in the VDOT Drainage Manual.

4.2.2 Hydrology

See Chapter 1 for the methodology used to determine design flows. Calculations establishing the design flow shall be submitted with the Stormwater Management Plan. Design flows shall be based on the ultimate build-out of the project, or of the campus precinct in accordance with the Virginia Tech Stormwater Management Master Plan.

4.2.3 Design Flows

Inlets shall be designed for 10-yr storm frequencies and intensities consistent with the VDOT Drainage Manual.

Storm drains shall be designed in accordance with Chapter 1 of this manual.

4.2.4 Measures to Convey Stormwater Runoff to Inlets

4.2.4.1 Curb and Gutter

Curb and gutter at the edge of pavements may be used to collect stormwater runoff from roadways. Curbing captures stormwater runoff and directs it to stormwater collection inlets while protecting adjacent properties from flooding and erosion due to sheet flow runoff from the impervious roadways.

A curb and gutter forms a triangular conveyance channel. When a storm occurs, the runoff from the road creates a spread of water from the curb. The curb and gutter must be designed to convey this flow and with associated drainage structures prevent the spread onto the roadway from impacting traffic. The spread width of flow is determined by using nomographs. For curb and gutter flow, a Manning's n value of 0.015 is used in the computational analysis.

Curb and gutter dimensions and design shall meet VDOT Standards.

4.2.4.2 Open Channels

Open channels may be used to collect site drainage and convey it to a storm drain inlet. Design requirements for open channels are covered in Chapter 2.

4.2.5 Storm Drain Inlets

4.2.5.1 General

Storm drain inlets are used to collect stormwater runoff from roads, sidewalks, or low elevations during storm events and provide a method for conveying the stormwater into the storm drain system. This is usually accomplished by placing storm drain inlets at regular intervals or at key locations to intercept flows and control the stormwater spread width. The design criteria for limiting the spread of water on travel lanes is found in the VDOT Drainage Manual.

There are several different types of storm drain inlets that can be used to meet this purpose, and the designer shall choose the proper inlet structure based upon site conditions and design conditions to maximize the drainage efficiencies.

- Curb
- Grate
- Slotted Drain/Trench
- Combination

Stormwater management plans shall include a contour plan with sufficient contours shown to ensure positive drainage to an inlet. Inlet Volume Capacity Calculations are required with the Stormwater Management Plan submittal.

4.2.6 Storm Drain Inlets

4.2.6.1 Curb Inlets

Curb inlets are vertical openings in the curb covered by a top slab. These inlets can convey large quantities of water, but also allow for large amounts of debris to enter the storm drain system.

Curb inlets shall be used to the maximum extent possible for pavement drainage.

4.2.6.2 Grate Inlets

Grate inlets are horizontal grates that are usually used in depressed medians or in other areas of low elevations. Grate inlets are often referred to as drop inlets or DIs. Grate inlets shall be pedestrian rated when installed in paved areas. Where they are used in pavement, inlet grates shall be bicycle safe.

4.2.6.3 Combination Inlets

Combination inlets combine both the vertical opening used by curb inlets and the horizontal grate used by grate inlets. These inlets are often used when the inlet chamber is required to be under the gutter or street pavement away from the sidewalk or other utilities. Combination inlets shall be avoided where possible. Where they are used, they must have bicycle-safe grates.

4.2.6.4 Trench Drain Inlets

Trench drain inlets are cast-in-place or precast concrete trenches covered by a grate that are used to intercept sheet flow.

4.2.6.5 Inlet Locations

Inlets shall be located to meet the design requirements of the VDOT Drainage Manual for maximum spread width. In addition, inlets shall be provided, regardless of contributing drainage area, as follows:

- At sag points in the gutter grade.
- Either side of sag point inlet (flanking inlets).

- Upstream of median breaks, crosswalks, and street intersections.
- Immediately upstream and downstream of bridges.
- On side streets at intersections, where flow is approaching the main line.
- Behind curbs, shoulders, or sidewalks to drain low areas or intercept concentrated flow.
- At 1% cross slope upstream of cross slope reversals.
- At any low elevation in the grade.

Inlets installed in pathways likely to be used by pedestrians or bicyclists shall be a pedestrian rated grate.

4.2.6.6 Access

All inlets shall have a removable grate or manhole cover to allow access for clean out.

4.2.6.7 Inlet Capacities

The capacities of each inlet type are contained in the VDOT Drainage Manual. Capacities are determined from equations or nomographs that are contained within the VDOT Drainage Manual. Documentation of inlet capacity shall be made on VDOT Form LD-204, Stormwater Inlet Computations or computer modeling output.

4.2.6.8 Separation of Pipes

Where two or more storm drains enter a concrete structure at or near the same elevation, a 6" minimum horizontal clearance must be maintained between the pipes. Additional clearance between pipes shall be provided if required to protect the structural integrity of the structure.

4.2.7 Storm Drain Pipes

4.2.7.1 Flow Capacity

Based on the size and slope of the storm drain, the design capacity for a pipe flowing full can be determined using Manning's equation.

$$Q = A \times 1.49/n \times R^{2/3} \times S^{1/2}$$

Where:

Q =Flow in the pipe (cfs)

A =Cross-sectional Area of the pipe (ft²)

R =Hydraulic radius; for circular pipe flowing full, R=Diameter/4 (ft)

S =Storm drain slope (ft/ft)

n =Pipe roughness coefficient

The design flow capacity of a storm drain shall comply with the design frequencies set forth in the VDOT Drainage Manual. In a roadway underpass, or depressed section, where ponded water can only

be removed through the storm drain system, a 100-year frequency storm event shall be used to design the storm drain at the sag point.

4.2.7.2 Storm Drain Slope

To deter the settling of debris and sediment in the storm drain pipe, the pipe shall be designed to ensure positive slope and maintain a minimum velocity of 3 feet per second during a 2-year frequency storm.

The maximum pipe velocity in any storm drain shall be 20 feet per second during a 10-year frequency storm to prevent excessive abrasion of the pipe and erosion at the discharge. If the pipe velocity exceeds 15 feet per second during a 10-year frequency storm, a reinforced concrete storm drain pipe is required.

Storm drains shall be sloped to meet the velocity requirement set in this chapter. Slopes greater than 16 percent shall be avoided if possible. If unavoidable, drop structures shall be utilized in steeper terrain. In addition, storm drains with slopes steeper than 16% must have anchor blocks for support.

4.2.7.3 Pipe Size

The minimum recommended conduit size for storm drainage pipe is 15-inch diameter or its equivalent for non-circular shapes. Where necessary, it will be permissible to use a 12-inch diameter pipe for laterals or initial pipe runs of 50 feet or less. Pipe size shall not be reduced along the direction of the flow, except as required for proper operation of stormwater management facilities.

4.2.7.4 Access

Regardless of pipe size, a cleanout access point, either an inlet, manhole, or junction box shall be provided at a maximum of every 300 feet of pipe.

4.2.7.5 Water-Tight Joints

The use of water-tight joints is encouraged to prevent infiltration of groundwater, and potential pollutants carried by contaminated groundwater, and to prevent settlement problems from occurring due to soil materials washing into storm drains.

SID reserves the right to require the use of water-tight joints in the following locations:

- Culverts and storm drains under pavement, sidewalks, or concrete structures
- Through stormwater “hotspots”
- In areas where groundwater may be contaminated by pollutants
- On steep slopes
- Culverts

The following land uses and activities are designated as stormwater hotspots:

- 1) Vehicle salvage yards and recycling facilities
- 2) Vehicle fueling stations
- 3) Vehicle service and maintenance facilities
- 4) Vehicle and equipment cleaning facilities
- 5) Fleet storage areas (bus, truck, etc.)
- 6) Industrial sites (for SIC codes contact VA DEQ)
- 7) Marinas (service and maintenance areas)
- 8) Outdoor liquid container storage
- 9) Outdoor loading and unloading facilities
- 10) Public works storage areas
- 11) Facilities that generate or store hazardous materials
- 12) Commercial container nursery
- 13) Golf courses
- 14) Chemical storage
- 15) Dry cleaning operations

4.2.8 Determination of Hydraulic Grade Line

4.2.8.1 General

The hydraulic grade line represents the free water surface elevation of water in a pipe system. Where the hydraulic grade line is above the top of a pipe, the pipe is flowing under pressure. The hydraulic grade line in a manhole or other structure is the elevation to which water will rise.

Hydraulic grade lines shall be calculated and evaluated for all storm drains. The hydraulic grade line shall be calculated using VDOT methods and equations that are fully described in the VDOT Drainage Manual. Calculations shall be documented on VDOT Form LD-347, Hydraulic Grade Line Computations, or computer modelling output. The output shall be in the form of profiles showing the HGL in relation to the pipe and structures.

The hydraulic grade line shall not exceed any critical elevation during the design storm. Critical elevations include rising above the ground elevation at inlets or other structures, or reaching an elevation where storm flow could back up to cause flooding damage.

The calculation of the hydraulic grade line begins at the system outfall and proceeds upstream to each structure in the system. The calculation is based on the principle of conservation of energy as shown below and includes major and minor energy losses:

$$HGL_{us} = HGL_{ds} + H_f + H_m$$

Where:

HGL_{us} = Elevation of hydraulic grade line at the upstream structure

HGL_{ds} = Elevation of hydraulic grade line at the downstream structure

H_f = Pipe friction loss

H_m = Summation of minor head losses (junctions, bends, etc.)

Major head losses are attributable to friction losses within the pipe. Minor head losses include losses from:

- Junctions
- Exits
- Entrances
- Bends in Pipes
- Access holes
- Conflict pipes
- Plunging flow
- Expansions and contractions
- Appurtenances such as weirs, diverters, valves and meters
 - **Outfall Conditions**

The hydraulic grade line starts at the system outfall. At this point the hydraulic grade line shall be the actual tailwater elevation or the elevation of 0.8 times the diameter of the outlet pipe, whichever is higher. If the system discharges into a detention or retention pond, the hydraulic grade shall start at the 10-year water surface elevation.

- **Pipe Friction Losses**

The friction slope is the energy slope for that run of pipe. The friction slope is determined by inserting pipe information and design flow into Manning's equation and solving for S (slope). The total friction head loss in the run of pipe is the friction slope multiplied by the length of the run.

Where the hydraulic grade line falls below the crown of the pipe, the elevation of normal flow is the hydraulic grade line.

- **Junction Losses**

General

Junction head losses are the summation of entrance (H_i), exit (H_o), and bend losses (H_Δ). When calculating junction losses it is important to use actual flow velocities. If pipes are flowing partially full, then partially full velocities are used.

Entrance (Expansion) Losses

Entrance loss at a junction is given by:

$$H_i = K_e (V_i^2 / 2g)$$

Where:

H_i = Entrance head loss

K_e = Entrance loss coefficient. $K_e = 0.35$

v_i = Velocity in the inlet pipe. Where more than one inlet pipe is present, use the velocity from the pipe that has the greatest momentum ($Q \cdot V$)

g = Gravitational acceleration constant, 32.2 ft/s^2

Exit (Contraction) Losses

Exit loss at a junction is given by:

$$H_o = K_o(V_o^2 / 2g)$$

Where:

H_o = Exit head loss

K_o = Exit loss coefficient. $K_o = 0.25$, except that $K_o = 0.3$ when computing the loss leaving the initial inlet

V_o = Velocity in the outlet pipe

g = Gravitational acceleration constant, 32.2 ft/s^2

Bend Losses

Bend losses at a junction are dependent on the angle between the inlet and outlet pipes. If the inlet and outlet pipe are in line with one another (no bend), the angle is 0 degrees and there is no bend loss. As the angle increases towards 90 degrees, the bend loss increases. Storm drain systems should not be designed with bend angles greater than 90 degrees. Where more than one pipe enters a junction at an angle, the H_Δ should be figured on all bends and the largest one used as the bend loss. The bend loss is given by:

$$H_\Delta = K (V_i^2 / 2g)$$

Where:

H_Δ = Head loss at bend

K = Bend loss coefficient. K is determined by consulting Figure 9-9 in the VDOT Drainage Manual.

V_i = Velocity in the inlet pipe.

g = Gravitational acceleration constant, 32.2 ft/s^2

Plunging Losses

Where surface inlet inflow is 20 percent or more of the total flow through a junction, or when a lateral pipe enters a junction with its invert elevation above the crown of the outgoing pipe and the flow in

the lateral pipe is 20 percent or more of the total flow through the junction, the total head loss from the structure ($H_i + H_o + H_{\Delta}$) shall be multiplied by 1.3 (increased by 30 percent). This adjustment is cumulative with the adjustment for plunging losses.

Inlet Shaping

Inlet shaping refers to how the invert is shaped to provide smooth flow through the structure and is required in all manholes and inlets. When VDOT Standard IS-1, inlet shaping, is used in a structure, the total head loss from the structure ($H_i + H_o + H_{\Delta}$) shall be multiplied by 0.5 (decreased by 50 percent). This adjustment is cumulative with the adjustment for inlet shaping.

4.2.9 100-Year Conditions

Where there is the possibility of building structures flooding, conditions during the 100-year storm shall be analyzed to verify that all existing and proposed structures do not flood. Flow from the 100-year storm may be carried overland as well as by the storm drain system.

4.2.10 Materials

4.2.10.1 Structures

All stormwater structures (inlets, manholes, and junction boxes) located in public easements or rights-of-way shall be precast or cast-in-place concrete. All structures, frames, grates, and covers shall be in accordance with VDOT Standards and VDOT Specifications.

4.2.10.2 Storm Drain Pipe

Storm drain pipe in roadways shall be constructed of Reinforced Concrete Pipe (RCP). Storm drain pipe in sidewalks, trails, etc shall be constructed of Reinforced Concrete Pipe (RCP) or High Density Polyethylene (HDPE). Corrugated Metal Pipe (CMP) shall not be allowed.

4.2.11 Structural Design

All inlet structures, frames and grates; and pipes shall be designed to withstand a HS-20 loading, unless a pipe crosses a railroad, in which case the pipe shall be designed for railroad loads. The structural design shall consider the depth of cover, trench width and condition, bedding type, backfill material, and compaction.

4.3 Installation

All inlets, pipes, and associated structures shall be installed in accordance with VDOT Specifications and the manufacturer's recommendations. The characteristics of the trench, bedding, and pipe material all impact the structural strength of the pipe system. The installed pipe conditions shall comply with the design assumptions and calculations.

4.3.1 Bedding Material

Bedding material and installation shall comply with the requirements of the VDOT Specifications.

4.3.2 Backfill

Backfill shall be suitable material and shall be placed and compacted in accordance with the VDOT Specifications.

Before passage of equipment, a minimum of 12" cover shall be placed over the top of a storm drain pipe prior to placement of pavement or other surface treatment. Additional depth of cover shall be provided if recommended by the manufacturer.

4.3.3 Separation of Utilities

Where storm drains cross other utilities, at least 1 foot of vertical separation shall be provided. Where 1 foot of vertical separation cannot be provided, special provisions shall be made in the bedding and backfill to avoid settlement that could cause point loadings on the storm drain or other utility.

Waterlines and sewer lines shall not pass through a storm drain inlet or manhole.

4.4 Environmental Impacts

Construction or modifications to storm drains shall comply with all applicable laws and regulations. The applicant is responsible for procuring all necessary permits.

4.5 Erosion Protection at Outfalls

Erosion protection at storm drain outlets shall be provided in accordance with the outlet protection standards contained in the VA ESC Handbook and the VDOT Drainage Manual.

4.6 Maintenance Requirements

The Operator is responsible for maintenance of storm drains until the termination of land disturbance as described in the Annual Standards and Specifications.

5.0 STORMWATER DETENTION

Stormwater detention facilities are a means of attenuating increases in peak flow rates caused by land development. In addition to providing flood control, stormwater detention facilities can protect downstream channels from increases in erosion and may provide a measure of water quality treatment. This chapter addresses general requirements for detention facilities as they relate to attenuating peak flow rates.

When a storm event occurs, stormwater runoff enters the detention facility. The outlet structure allows a portion of the stormwater runoff to discharge from the facility, while the remainder of the stormwater runoff is temporarily stored. After the end of the storm, water continues to discharge from the facility until it is empty or the permanent pool elevation is reached.

Stormwater detention facilities, as listed in VA Stormwater BMP Clearinghouse and DEQ Stormwater Regulations, include:

- Part IIB
 - Bioretention (Including Urban Bioretention)
 - Constructed Wetlands
 - Wet Ponds
 - Extended Detention Ponds
 - Underground Detention Facilities
- State Existing Facilities (Under Part IIC)
 - Detention Pond
 - Enhanced Extended Detention Pond

An underground detention facility consists of pipes or manufactured underground chambers used to temporarily store stormwater runoff following a storm event, discharging it at a controlled rate through a hydraulic outlet structure to a downstream conveyance system. An underground detention facility is dry during non-rainfall periods.

In addition to detention, the design requirements specified by this chapter shall apply to ponds created as amenities, research ponds, and farm ponds.

5.1 References

Except where more stringent requirements are presented in this Manual, the design and construction of stormwater detention facilities shall comply with VDOT and DEQ requirements. The primary design references are:

- VA SWM Handbook
- VDOT Drainage Manual
- VA ESC Handbook
- VDOT Standards

- VA Stormwater BMP Clearinghouse

5.2 Design Methodology and Criteria

5.2.1 Hydrology

See [Chapter 1](#) for methodology used to determine design flows.

5.2.2 Design Flows and Storage Volumes

To properly design stormwater detention facilities, a flow routing program shall be used with an appropriate elevation-storage-discharge relationship for the design storm events.

5.2.3 Detention Facility Locations

Stormwater detention facilities should not be constructed within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain. If this is unavoidable, the facility shall comply with all applicable regulations under the National Flood Insurance Program, 44 CFR Part 59.

The following factors shall be addressed when siting a stormwater detention facility:

- Geotechnical conditions, including soil conditions
- Karst topography
- Groundwater levels
- Existing and proposed utilities
- Aesthetic impacts on surrounding properties
- Environmental impacts, including wetlands

Stormwater basins shall be located to minimize the aesthetic impacts to adjacent properties. Basins shall be set back from property lines a distance equal to the minimum width of the applicable required Source.

Locate stormwater detention facilities to avoid collecting significant amounts of drainage from offsite areas.

All stormwater management basins shall be lined with either a clay liner or an impermeable High Density Polyethylene (HDPE) liner.

Stormwater basins shall be set back in accordance with VA Stormwater BMP Clearinghouse Specification No. 15.

5.2.4 Detention Basin Grading

Stormwater basins shall be graded to blend into the surrounding topography with the following conditions:

- Basin side slopes shall be no steeper than 3H:1V.

- Provisions shall be made for the long-term maintenance of basin slopes and periodic access for maintenance of the outlet structure and emergency spillway and removal of accumulated sediment and debris.
- The maximum allowable depth of a stormwater detention basin shall be 15 feet, as measured from the top of the embankment to the lowest point in the basin.
- The bottom of the basin shall be designed so that the entire bottom of the Extended Detention Basin is sloped at 1% to facilitate positive drainage to the outlet structure.

In addition to the above requirements, the following standards of practice should be used when designing a stormwater basin, to the extent possible:

- In order to prevent short-circuiting of a stormwater basin's storage areas, the length-to-width ratio of the basin should be a minimum of 2:1, with the flow entering the basin as far from the outlet structure as possible. A 3:1 ratio is desired where possible.
- To minimize cut and fill, the long dimension of a stormwater basin should run parallel to the contours.

5.2.5 Embankments and Emergency Spillways

Embankments and emergency spillways shall be designed in accordance with the Earthen Embankment and Vegetated Emergency Spillway specifications on the VA Stormwater BMP Clearinghouse website. A geotechnical study for the embankment and basin is required.

5.2.6 Outlet Structures and Release Rates

5.2.6.1 Stormwater Release Rates

Stormwater detention facilities shall be designed with an outlet structure to control the release rate of stormwater being held in the facility. Design release rates shall meet the requirements set forth in Chapter 5.

Research ponds, farm ponds and ponds created as amenities shall be exempt from release rate requirements.

5.2.6.2 Outlet Structure Criteria

Outlet structures generally include a principal spillway and an emergency spillway. An outlet structure may take the form of combinations of risers, pipes, weirs, or orifices. The principal spillway is intended to release flow from the design storm events at the necessary controlled rate, without allowing flow to enter the emergency spillway. The sizing of the outlet structure shall be based on the results of the hydrologic routing calculations or model. Due to the tendency of clogging, the minimum orifice diameter shall be 3 inches. A basin drain shall be installed to allow for dewatering.

Outlets from stormwater detention facilities shall be designed to function without manual, electrical, or mechanical controls.

Where necessary, energy dissipaters shall be placed at the outfall to provide a non-erosive velocity from the facility to a channel. See Chapter 6 for the design of outfall protection.

Where a stormwater basin with an earthen embankment does not have an emergency spillway, the principal spillway shall be sized to safely pass the flow from the 100-year storm without overtopping the embankment. In addition, the minimum size of the primary spillway shall be 24 inches.

Freeboard for detention basin facilities are as follows:

- 1 foot of freeboard for basins that have an emergency spillway that is measured from the calculated design water surface elevation to the top of the embankment; or
- 2 foot of freeboard for basins that do not have an emergency spillway that is measured from the calculated design water surface elevation to the top of the embankment.

Where a stormwater basin has an outfall with an emergency spillway, the outfall shall be sized to safely pass the flow from the 10-yr storm and the emergency spillway shall be sized to safely pass the 100-yr storm. For a stormwater basin that does not have an emergency spillway, the outfall shall be sized to safely pass the flow from the 100-yr storm.

For examples of design calculations of outlet structure orifices and weirs, see the VDOT Drainage Manual.

All riser structures shall be cast-in-place, precast concrete, or PVC unless a substitute material has been approved by SID. Standards for riser structures may be found in the VDOT Standards. Riser buoyancy calculations are required.

Outlet pipes shall be reinforced concrete pipe with rubber gasket watertight joints, shall have appropriate seepage control, and shall be installed on a concrete cradle from the toe of the pipe to the riser for the entire length of the outfall pipe. Concrete cradle shall be in accordance with the requirements of the VDOT Standards.

5.2.7 Landscaping

Stormwater basin embankments shall be stabilized. Plant selection and installation shall be in accordance with the standards of the VA Stormwater BMP Clearinghouse website specifications. Trees and shrubs shall not be planted within a stormwater detention basin, nor on a stormwater basin berm, dam, or emergency spillway.

Native plants will be used to the maximum extent possible.

5.2.8 Underground Detention

5.2.8.1 Materials

All materials used in underground detention facilities shall be corrosion-resistant, consisting of reinforced concrete, corrugated high density polyethylene pipe, or similar approved material.

5.2.8.2 Slope

Underground detention facilities shall be sloped to drain at a minimum floor slope of 1 percent.

5.2.8.3 Capacity

Underground detention facilities and other storm drainage system and facility components shall be sized such that the 100-year design storm may be routed through the drainage system and facilities with no damage to the surface property.

5.2.8.4 Accessibility and Maintainability

All underground detention facilities shall be designed to be readily accessible for periodic inspection and maintenance from the surface without the need to perform confined space entry.

Providing pre-treatment to remove sediments before or at the entrance of the underground detention facility to improve water quality and/or improve maintainability shall be included to the maximum extent practicable in the design.

5.2.9 Trash Racks

Outlet structures shall be equipped with an appropriate trash rack. The trash rack shall be in accordance with the VA SWM Handbook.

5.3 Environmental Impacts

Environmental impacts shall be carefully considered when designing stormwater detention facilities. Stormwater detention facilities shall be designed in accordance with MS-14. Proposing basins in low-lying areas with potentially environmentally sensitive areas requires careful consideration, coordination, approval, and permitting with SID and state and federal agencies to evaluate the suitability of constructing in these areas. Environmentally sensitive areas include, but are not limited to wetlands, shallow marshes, jurisdictional waters, natural watercourses, wildlife habitat, etc. and may be protected by state and/or federal laws. With careful planning, it may be possible to incorporate wetland mitigation into the basin design.

Construction of stormwater basins or modifications to existing basins shall comply with all applicable laws and regulations. The applicant is responsible for procuring all necessary permits, such as US Army Corps of Engineers and Virginia DEQ Wetland Permits, Virginia DEQ VPDES Permits, etc., and providing SID with the permit documentation prior to beginning construction.

Detention facilities may be coordinated with a Virginia Tech regional stormwater management facility or the Virginia Tech Stormwater Management Master Plan.

6.0 ENERGY DISSIPATION

Outlet protection for culverts, storm drains, BMP outlets, and steep open channels is essential to prevent high velocity flows from eroding downstream channels and damaging drainage structures. Erosion problems at culverts or at the outlets of detention basins are a common occurrence. Determination of the flow conditions, scour potential, and channel erosion resistance shall be standard procedure for all designs.

Outlet protection can be a channel lining, structure, or flow barrier designed to lower excessive flow velocities and prevent erosion and scour.

Outlet protection shall be employed whenever the velocity of flow at a pipe or open channel outlet exceeds the erosive velocity of the immediate downstream reach.

Energy dissipation may take the form of the following:

- Erosion control stone outlet protection.
- Erosion control stone-lined channels
- Riprap outlet basins
- Concrete baffled outlets

6.1 References

Except where more stringent requirements are presented in this Design Manual, energy dissipators shall comply with VDOT and other state requirements. The primary design references are the VDOT Drainage Manual and the VA ESC Handbook. Other appropriate references include:

- VDOT Road and Bridge Standards
- VDOT Road and Bridge Specifications
- VA Stormwater Management Handbook
- FHWA Design of Riprap Revetment HEC No. 11 (Pub. No. FHWA-IP-89-016 1989/2000)
- FHWA Hydraulic Design of Energy Dissipators for Culverts and Channels HEC No. 14 (Pub. No. FHWA-EPD-86-110 Sept. 1983 & FHWA-IF-00-02 2000)
- U.S. Dept. of the Interior – Bureau of Reclamation: Hydraulic Design of Stilling Basins and Energy Dissipators (Engineering Monograph No. 25)
- U.S. Dept. of the Interior – Bureau of Reclamation: Design of Small Canal Structures

6.2 Design Methodology and Criteria

6.2.1 Outlet Velocity

Where the outlet velocity from culverts, storm drain outfalls, or open channels is high, and channel or pipe modifications cannot adequately reduce the velocity, energy dissipation may be necessary. See the VDOT Drainage Manual and/or the VA ESC Handbook for methodologies to determine design outlet velocities from open channels, culverts, and storm drains.

6.2.2 Erosion Control Stone

The most common form of energy dissipation is the use of erosion control stone at the outlet. Protection is provided primarily by having sufficient length and flare to dissipate energy by expanding the flow. The outlet velocities are computed for the 10-year discharge.

Where a pipe discharges into a channel, the apron shall extend across the channel bottom and shall extend up the bank to a depth of one foot above the maximum tailwater depth from the design storm event. The dimensional requirements of the erosion control stone apron shall be determined using the graphical curves in the VA ESC Handbook.

Generally, the use of erosion control stone for energy dissipation is limited to a maximum velocity of 19 feet per second. Alternative means of energy dissipation shall be required where the discharge velocity is greater than 19 feet per second. Alternative means include riprap stilling basins or concrete baffled outlets. The use of alternative means of energy dissipation requires the approval of VDOT when located in a VDOT right-of-way.

6.2.3 Riprap Basins

A riprap outlet basin is a depressed area of riprap placed at the outlet of a high velocity culvert, storm drain or open channel. The riprap reduces the exit velocity by expanding the flow over the riprap length and width and forming a hydraulic jump.

For the design of riprap basins, refer to the VDOT Drainage Manual. Dissipator geometry may also be computed using the “Energy Dissipator” module that is available in the computer program FHWA HY8, Culvert Analysis.

6.2.4 Baffled Outlets

A baffled outlet usually consists of a concrete box structure with a vertical hanging concrete baffle and an end sill. Several variations of concrete baffled outlets have been published by VDOT and other state and local transportation and stormwater management agencies. Baffled outlets are usually used when very high exit velocities exist at piped or channel transitions. Baffled outlets function by dissipating energy through impact of the water hitting the baffle and through the resulting turbulence. A tailwater depth is not required for adequate energy dissipation, but will help smooth the outlet flow.

This type of outlet protection may be used with outlet velocities up to 50 feet per second.

Baffled outlets are not included in the state guidance handbooks. Hydraulic design procedures for baffled outlets may be found in the U.S. Department of Interior, Bureau of Reclamation, Design of Small Canal Structures, 1978.

6.2.5 Additional Energy Dissipators

For additional energy dissipators, refer to FHWA HEC No 14, Hydraulic Design of Energy Dissipators for Culverts and Channels.

6.3 Installation Requirements

Energy dissipators shall be installed and constructed according to all applicable FHWA, VDOT, and state requirements and recommendations.

6.4 Environmental Impacts

Construction or modifications to energy dissipation structures shall comply with all applicable laws and regulations. The applicant is responsible for procuring all necessary permits, such as US Army Corps of Engineers and VA DEQ Wetland Permits, etc.

6.5 Maintenance Requirements

The Operator is responsible for maintenance of energy dissipation structures in accordance with VESCH standards until the termination of land disturbance as described in the Annual Standards and Specifications.

7.0 STORMWATER POLLUTANT REMOVAL PRACTICES

A wide variety of Best Management Practices (BMPs) and general development strategies may be utilized to remove environmentally harmful pollutants from stormwater runoff. Allowable BMPs are listed on the VA Stormwater BMP Clearinghouse website.

7.1 References

Except where more stringent requirements are presented in this Design Manual, stormwater quality best management practices shall comply with DEQ requirements. The primary design reference is the VA Stormwater BMP Clearinghouse website.

7.2 Stormwater Quality Requirements

Stormwater runoff generated from land disturbing activities shall be treated through best management practices designed to remove pollutants from the stormwater. The required pollutant removal shall be dependent on the land cover conditions.

For most projects, the BMPs will be designed to remove phosphorus from the stormwater runoff. Generally, when a BMP is efficient in removing phosphorus from the stormwater runoff, it is assumed that easier to remove pollutants such as heavy metals and total suspended solids have also been adequately removed.

Where appropriate, additional pollutants may be required to be removed from the stormwater runoff based on the presence of stormwater hotspots (land use activities that generate highly contaminated runoff, as determined by SID). These pollutants may include the following:

- Total Suspended Solids, in areas with highly erodible soils.
- Total Petroleum Hydrocarbons (TPH), fueling stations or areas with fuel- contaminated soil.
- Heavy Metals, in areas with contaminated soils.
- High temperature runoff.

Land disturbing activities shall also comply with all additional water quality requirements as indicated in the Virginia Tech Annual Standards and Specifications, current version.

Proposed Common Plan developments shall apply stormwater quality management criteria to the land development project as a whole. Individual projects in Common Plan developments shall not be considered separate land development projects in regards to water quality. Hydrologic parameters shall reflect the ultimate land development and shall be used in all engineering calculations.

Where stormwater quality requirements must be implemented, stormwater runoff must flow through appropriate BMPs before the water is discharged from the site.

7.3 Stormwater Quality Calculations

To meet the requirements of section 9VAC25-870-65 of the VSMP regulations, the Virginia Runoff Reduction Method (VRRM) will be utilized to verify compliance. The VRRM water quality compliance

worksheet is available on the DEQ website. This worksheet must be submitted in the SWM Plan. The average one-year rainfall depth shall be 43 in.

7.4 Manufactured BMP Systems

A manufactured BMP system is a structural measure that is specifically designed and sized by a manufacturer to intercept stormwater runoff and prevent the transfer of pollutants downstream. Use of Manufactured BMPs will only be allowed if the device is approved and listed on the VA Stormwater BMP Clearinghouse website.

APPENDIX D

Erosion and Sediment Standard Notes

VIRGINIA TECH STANDARD GENERAL EROSION AND SEDIMENT CONTROL NOTES

ES-1 – Unless otherwise indicated, all vegetative and structural Erosion and Sediment Control practices shall be constructed and maintained in accordance with the Virginia Tech Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management and the Virginia Erosion and Sediment Control Handbook (VESCH), Latest Editions. The Contractor can use manufactured Erosion and Sediment Control measures with prior approval from VTSID.

ES-2 – Virginia Tech Site and Infrastructure Development shall be notified one week prior to the pre-construction conference, one week prior to the commencement of land disturbing activity, and one week prior to the final inspection.

ES-3 – All Erosion and Sediment Control measures are to be placed prior to or as the first step in clearing.

ES-4 – The narrative prepared for the plan is part of the plans and shall be used in conjunction with the plans. A copy of the approved Erosion and Sediment Control plan and narrative and the relevant VESCH sections, shall be maintained on the site at all times.

ES-5 – Prior to commencing land disturbing activities in the areas other than indicated on the these plans (including, but not limited to, off-site borrow or waste areas), the contractor shall submit a supplementary Erosion and Sediment Control plan to Virginia Tech Site and Infrastructure Development for review and approval.

ES-6 – Install additional Erosion and Sediment Control measures as required to prevent sediment-laden runoff from leaving the site, and as determined by Virginia Tech Site and Infrastructure Development.

ES-7 – All disturbed areas are to drain to approved sediment control measures at all times during land disturbing activities and during site development until final stabilization is achieved.

ES-8 – During dewatering operations, water will be pumped into an approved filtering device.

ES-9 – For the purposes of plan approval, the engineer of record for the Erosion and Sediment Control plan and narrative will be the certified Responsible Land Disturber for this project up to the award of the contract. Upon award of the contract, the contractor shall have a certified Responsible Land Disturber for this project.

ES-10 – The Responsible Land Disturber shall be added to the plan at the pre-construction conference.

ES-11 – The Responsible Land Disturber shall inspect Erosion and Sediment Control measures and practices for proper installation and deficiencies immediately after each runoff-producing rainfall event, at least daily during prolonged rainfall, and bi-weekly when no rainfall events occur. Any necessary repairs or cleanup to maintain the effectiveness of the Erosion and Sediment Control measures shall be made immediately.

ES-12 – As the Erosion and Sediment Control plan approving authority, Virginia Tech Site and Infrastructure Development may revise the approved plan if inspection reveals that the approved plan is inadequate to satisfy applicable standards.

ES-13 – Store excavated topsoil in topsoil stockpiles within the limits of construction with silt fence on the downslope side in accordance with the VESCH, latest edition.

ES-14 – All disturbed areas not otherwise hardscaped and stabilized are to be seeded in accordance with the seeding specifications in the VESCH, latest edition.

ES-15 – Seed and mulch all soil stockpiles and materials left undisturbed in accordance with the VESCH, latest edition.

ES-16 – All culvert inlet protection and storm drain inlet protection must remain in place until final upslope stabilization is achieved.

ES-17 – The following Erosion and Sediment Control measures require certification by the design professional upon installation and prior to commencing general site construction. If these measures are not utilized then the plan shall state that fact.

- A. Sediment Basin
- B. Conveyance Channels
- C. Detention Basins serving as Sediment Basins

APPENDIX E

Plan Preparer/Reviewer Checklists (VTSID-02 & VTSID-03)

ESC PLAN PREPARER/REVIEWER CHECKLIST

Instruction: The checklist shall be completed if an ESC Plan and Narrative is required per the VT Annual Standards and Specifications for ESC and SWM. The completed checklist shall be provided with the ESC Plan submittal. The Plan and Narrative submitted for review shall be signed and sealed by a licensed professional. This checklist is not inclusive. The licensed professional is responsible for ensuring plans address all applicable ESC laws and regulations.

Project Name: _____

Project Location: _____

Submittal Date: _____

Date on Plans: _____

Design Engineer (Printed): _____

Email: _____

Yes	N/A	General
		CHECKLIST – Completed ESC checklist provided in the ESC Narrative.
		VTAS&S – Note the applicable Virginia Tech Annual Standards and Specifications version on both covers.
		PROFESSIONAL SEAL – The designer’s original seal, signature, and date are required on the cover sheet of each Narrative and each sheet in a set of Plan sheets for approval.
		NUMBER OF PLAN SETS – One (1) complete full size set of plans must be submitted for review. One (1) 11x17 size set of plans must be submitted with the final submittal for approval, digital signatures on seals are acceptable for the 11x17 size plan set.
		ELECTRONIC PLAN SUBMITTAL – PDF versions of all submitted documentation shall be submitted for review. Electronic versions can have digital signatures on seals.
		REVIEW COMMENT RESPONSE LETTER – Submit a review comment response letter with each subsequent plan submittal that addresses all comments in the previous review’s comment letter from VTSID.
		VARIANCE – All required documentation submitted for SID review and submittal to DEQ for approval.
		ADDITIONAL PERMITS - If the project impacts any wetlands or surface waters, are all correspondence and permits concerning any proposed impacts to jurisdictional wetlands, stream and channels included?
Yes	N/A	ESC Narrative Requirements
		PAGE NUMBERS/TABLE OF CONTENTS – Provide a clearly organized narrative with pages numbers.
		PROJECT DESCRIPTION – Description of the purpose and nature of land disturbing activity and the area to be disturbed. Include the pre- and post- development impervious areas.
		EXISTING SITE CONDITION – Description of existing topography, ground cover, and drainage.
		ADJACENT AREAS - Description of neighboring areas such as agricultural areas, streams, lakes, roads, floodplains, etc., that might be impacted by the land disturbance.
		OFF-SITE AREAS - Description of any off-site land disturbing activities that may occur (disposal areas, etc.)
		SOILS - Description of conditions, including hydrologic soil groups, mapping unit, erodibility, permeability, surface runoff, and a brief description of depth, texture and soil structure. Mapping of soil variations should be provided in the narrative.
		CRITICAL AREAS - Description of areas that have potentially serious erosion problems or that are sensitive to

		sediment impacts (e.g., steep slopes, channels, wetlands, springs, etc.).
		EROSION AND SEDIMENT CONTROL MEASURES - Description of the measures that will be used for ESC on the site and their installation, inspection, and maintenance standards and specifications.
		PERMANENT STABILIZATION - Description, including specifications, of how the site will be stabilized after construction is completed.
		STORMWATER RUNOFF DESCRIPTION - Description of any increase in peak runoff rates and the effects on downstream erosion and flooding. The description shall include the strategy to control stormwater runoff as well as tables for quick reference to pertinent information.
		SWM FACILITY MAINTENANCE – Provide a table with a recommended schedule of inspection and maintenance along with the responsible party’s name and contact information.
		STREAM CHANNEL EROSION – Verify adherence to 9VAC25-870-66B.
		FLOODING – Verify adherence to 9VAC25-870-66C.
		CALCS FOR TEMP. ESC MEASURES – Provide the calculations required by the standards and specifications.
		STORMWATER MANAGEMENT CALCULATIONS – Provide exhibits showing the drainage areas, direction of flow, and acreage of each of the site drainage areas that discharge runoff off-site, for pre- and post-development. Provide supporting calculations from the drainage areas and verify that MS-19 is satisfied.
		SPECIFICATIONS – Include for all site work and stormwater management structures.
Yes	N/A	ESC <i>Plan</i> Requirements
		LOCATION AND VICINITY MAP - Locate the site in relation to the surrounding area. Include any landmarks and road information that might assist in locating the site.
		RESPONSIBLE LAND DISTURBER - Provide a location on the Plan cover sheet for identification of the RLD.
		NORTH ARROW – The direction of north in relation to the site.
		LEGEND - List all ESC measures used, the VESCH uniform code symbol, and the standard and spec number.
		EROSION AND SEDIMENT CONTROL GENERAL NOTES - Include (ES-1 through ES-17) found in the Appendix of the Virginia Tech Annual Standards and Specifications.
		EXISTING/PROPOSED CONDITIONS - Including existing contours (2’ interval min.), surface waters and other surface features, existing tree lines, buildings, parking lots, access roads, utility construction and features. Show all physical items that could affect or be affected by erosion, sediment, and drainage.
		EXISTING CONDITIONS GRAYED OUT - All existing conditions are to be shown as grayed out on all proposed plan sheets (i.e. site plan, grading plan, etc.).
		PROPERTY/EASEMENT LINES - For each adjacent, non-Virginia Tech property, list the deed book and page number and the property owner's name and address.
		DEMOLITION PLAN - Identify features to be demolished and ESC measures required for the demolition
		LIMITS OF DISTURBANCE – Clear delineation of the limits of disturbance, with total disturbed area called out including utilities, laydown areas, staging areas, unpaved access roads, etc. Area to be staked at 100’ intervals for permitted projects.
		PROTECTION AREAS - Show fencing or other measures to protect areas that are not to be disturbed.
		CRITICAL AREAS – Clearly identify critical areas and their appropriate protections.
		ESC PRACTICE LOCATIONS – Note each location used on the site with a unique identification number for multiple practices (i.e., SF1, SF2, etc.).
		OFF-SITE AREAS – Documentation of land disturbing approvals and identification of any off-site land disturbing activities and their appropriate ESC controls.
		FINISHED FLOOR ELEVATION - All buildings and pads on site, including basements.
		STORM DRAINS – Provide profiles of all proposed storm drains and the plan shall include the pipe size, pipe material, and flow direction arrows for all proposed and existing storm drains, excluding roof drains.

		DETAILS - Site-specific details for all ESC measures included within the project. Proprietary measures shall include any information for construction, maintenance, and inspection per the manufacturer's specifications.
Yes	N/A	Minimum Standard Requirement (9VAC25-840-40)
		Permanent or temporary soil stabilization shown where required on plans using standard symbols and abbreviations in Chapter 3 of the VESCH. (MS-1, MS-3, and MS-5)
		Stabilization and/or protection measures for soil stockpiles and borrow areas. (MS-2)
		Detailed sequence of construction shown on the plan ESC plan sheet that includes the phasing of installation of ESC measures with sediment trapping measures as a first step prior to upslope land disturbance. (MS-4)
		Drainage area maps for sediment traps and sediment basins included in the narrative. (MS-6)
		Stabilization measures provided for slopes steeper than 3:1. (MS-7)
		Measures to prevent concentrated flow from flowing down cut or fill slopes (e.g. slope drains). (MS-8)
		Measures to address water seeping from a slope face. (MS-9)
		Inlet protection provided for all operational storm drain and culvert inlets. (MS-10)
		Outlet protection and/or channel linings provided for all stormwater conveyance channels and receiving channels prior to being made operational (see sequence of construction). (MS-11)
		Measures to minimize encroachment and sediment transport for work in a live watercourse (MS-12)
		Temporary stream crossings of non-erodible material where a live watercourse must be crossed by construction vehicles more than twice in any six-month period. (MS-13)
		Applicable federal, state and local regulations pertaining to working in or crossing live watercourses are addressed and summarized on the plan. (MS-14)
		Stabilization measures for bed and banks of live watercourse subject to disturbance. (MS-15)
		Unique requirements for underground utility line installations have been addressed. (MS-16)
		Measures are shown on plan to minimize sediment transport onto public and/or paved roads. (MS-17)
		Adequacy of each receiving channel and pipe verified with calculations. (MS-19)

SWM PLAN PREPARER/REVIEWER CHECKLIST

Instruction: The checklist shall be completed if a SWM Plan and Narrative is required per the VT Annual Standards and Specifications for ESC and SWM. The completed checklist shall be provided with the SWM Plan submittal. The Plan and Narrative submitted for review shall be signed and sealed by a licensed professional. This checklist is not inclusive. The licensed professional is responsible for ensuring plans address all applicable SMW laws and regulations.

Project Name: _____ **Project Location:** _____

Submittal Date: _____ **Date on Plans:** _____

Design Engineer (Printed): _____ **Email:** _____

Yes	N/A	General
		ESC GENERAL – All items are included from the required ESC “General” checklist category.
		CHECKLIST – Completed SWM checklist provided in the SWM Narrative
		EXCEPTION – All required documentation submitted for SID review and submittal to DEQ for approval.
Yes	N/A	SWM <i>Plan</i> Requirements
		ESC PLAN – All items are included from the required “ESC <i>Plan</i> Requirements” checklist category.
		BORINGS – Locations of test borings.
		COMPACTION – Compaction requirements specified.
		SWM FACILITY CERTIFICATION – Plans shall list all SWM facilities and critical construction inspection time frames (e.g., liner, underdrain and outlet pipe installation) for which SWM BMP certification is required per Section 4.1.2 of the VT Annual Standards and Specifications for ESC and SWM.
		GENERAL NOTE – The following note is on the plan: "A certified construction record drawing for permanent SWM facilities shall be submitted to Virginia Tech SID for approval per section 4.1.2 of the VT Annual Standards and Specifications for ESC and SWM. Construction inspections, photographs and surveys, performed by a licensed professional, shall be required at each stage of installation (construction) as necessary to certify that the SWM facility has been built in accordance with the approved plan and design specifications. The Contractor shall provide a minimum of 2 business days’ notice to the certifying professional to allow for critical inspections."
		BMP MAINTENANCE – Include an inspection and maintenance plan for each permanent SWM facility. For manufactured permanent BMPs, the construction drawings shall include manufacturer’s recommendations on maintenance and inspection.
		BMP IDENTIFICATION – Identification of BMP IDs as assigned by the VTSID Department in a table format that provides: BMP ID (provided by SID), BMP Description, and Name, Title, Department, Phone Number, and Email of responsible party for the maintenance of each BMP.
Yes	N/A	SWM <i>Narrative</i> Requirements
		ESC NARRATIVE – All items are included from the required “ESC <i>Narrative</i> Requirements” checklist category.

		LAND COVER – Summary table and map with pre- and post-development land cover conditions (i.e., forest, managed turf, and impervious areas).
		QUANTITY & QUALITY NARRATIVE – Discussion of the stormwater management strategy to address water quantity and quality criteria.
		STORMWATER DISCHARGE DESCRIPTIONS – Information on the type and location of stormwater discharges, including information on the features to which stormwater is being discharged, including surface waters or karst features if present.
		PROPOSED SWM – Information on the proposed stormwater management facilities, including (i) the type of facility; (ii) location, (iii) impervious and pervious acres treated; and (iv) the surface waters or karst features into which the facility will discharge.
		SWM FACILITY OPERATION AND MAINTENANCE - A general description of the proposed stormwater management facilities and the mechanism through which the facilities will be operated and maintained after construction is complete.
		GEOTECHNICAL REPORT – Include when required for BMPs or other site specific needs. Include infiltration rates when required for a BMP.
		BORING LOCATIONS AND LOGS – Provide information on boring locations in the area of borrow areas, basin areas, and embankments (centerline principal spillway, emergency spillway, abutments). Include Unified Soil Classifications, soil descriptions, seasonal high groundwater table depths, etc.
		KARST REGIONS – Provide any additional geophysical investigation, consideration, and recommendations for any projects within Karst environments.
		LOCALITY REQUIREMENTS – Description of the locality’s additional technical requirements, if any, and how they were addressed to the maximum extent practicable.
Yes	N/A	Hydrologic Computations (<i>Narrative</i>)
		DRAINAGE AREAS – Pre- and Post-development mapping that includes all contributing drainage areas, CN labels, and time of concentration flow paths, slopes, and lengths used for runoff hydrographs.
		RAINFALL – Precipitation frequency data recommended by the U.S. National Oceanic and Atmospheric Administration (NOAA) Atlas 14. Partial duration time series shall be used for the precipitation data.
		CURVE NUMBERS – Summary table for determination of runoff curve numbers.
		TIME OF CONCENTRATION – Time of concentration calculations.
		HYDROGRAPHS – Pre- and post-development runoff hydrographs.
Yes	N/A	Hydraulic Computations (<i>Narrative</i>)
		ROUTING – Routing computations for each proposed stormwater management facility for each applicable design storm provided in the narrative.
		PEAK RUNOFF SUMMARY – Summary table of pre- and post-development peak runoff rates for each point of discharge from the site provided in narrative.
		STORM ELEVATIONS – Maximum water surface elevations for design storms shown in sections or profiles for each stormwater management facility.
		FREEBOARD – Adequate freeboard is provided for impoundments as shown on the plans based on computations in the narrative.
		HYDRAULIC GRADE LINE – Computations in the narrative with indication of locations of surcharge or inadequacy.
		STORM DRAIN CALCULATIONS – Storm drain design, culvert, drop inlet backwater, and gutter spread calculations.
		PIPE PROFILES – Provide profiles of all storm conveyances (except roof drains) on plans. Profiles should include existing and proposed grade, structure types, pipe materials and sizes, slopes, inverts, etc. HGL

		information shall be shown in profile format in the narrative in addition to tabular format.
Yes	N/A	Water Quality Computations (<i>Narrative</i>)
		VRRM SPREADSHEET – Provide Runoff Reduction Method spreadsheet output including: <ul style="list-style-type: none"> • Site loadings • Required reductions • Input for each BMP employed and reductions achieved by each BMP • Compliance worksheet • Adjusted CN worksheet, when applicable.
		TREATMENT VOLUME – Stage-storage information indicating the treatment volume required and volume provided as well as all subsequent calculations.
		BMP SPECS – Include the Virginia BMP Clearinghouse design specifications for all proposed SWM BMPs.
		BMP CHECKLIST – A BMP-type specific checklist from Appendix 8-A of the Virginia Stormwater Management Handbook, latest edition, is completed and provided in the narrative for each proposed BMP.

APPENDIX F

Non-VESCH Specifications

NON-VESCH SPECIFICATION

Table D-1

Proprietary ESC measures previously approved for use on properties subject to the VT Annual Standards and Specifications for ESC and SWM.*

(VESCH Standard and Specification 3.05)

- ACF Environmental Silt Fence
- Super Silt Fence

Inlet Protection (VESCH Standard and Specification 3.07)

- ACF Environmental Gutterbuddy Curb Inlet Drain Filters
- ACF Environmental GutterEEL Curb Inlet Drain Filters
- ACF Environmental SiltSack Sediment Capture Device
- Dandy Bag Inlet Protection System
- Dandy Curb Grateless Curb Inlet and Median Barrier Inlet Protection System
- Dandy Curb Bag Curb and Gutter Inlet/Grate Protection System
- Dandy Curb Sack Curb and Gutter Protection System
- Dandy Pop (Pop-up Dandy Bag) Inlet Protection System
- Dandy Sack Inlet Protection System
- Rapid Flow Drain Filter – Polystyrene Aggregate

Dewatering (VESCH Standard and Specification 3.26)

- Dandy Dewatering Bag
- Dirtbag Dewatering Bag

* VTSID does not promote the ESC measures listed and takes no responsibility for their performance.

APPENDIX G

DEQ Two-Week E-Notification Form

(VTSID-04)

**VIRGINIA TECH REGULATED LAND DISTURBING ACTIVITIES
TWO-WEEK E-NOTIFICATION TO DEQ**

Section 1– General Information:

Project Name:	Project Location:	
Acres Disturbed:	Project Start Date:	Project Finish Date:
Project Description:		
CGP Permit Number if applicable:		

Section 2– Plan Approval Verification:

Project Manager:	Project Manager Phone:	Project Manager Email:
Responsible Land Disturber:	Certification Number:	
RLD Phone:	RLD Email:	

Section 2– Variances:

List any variances, waiver or exemptions associated with this project:

Signature: _____

Date: _____

APPENDIX H

DEQ AS&S Entity Form

(VTSID-05)

**ANNUAL STANDARDS & SPECIFICATION (AS&S) ENTITY INFORMATION GENERAL VDPES
PERMIT FOR DISCHARGES OF STORMWATER FROM CONSTRUCTION ACTIVITIES (VAR10)**

Section 1– General Information:

AS&S Entity:	Project Name ² :
Acres Disturbed:	Operator ¹ :
Project Description:	

Section 2– Plan Approval Verification:

DEQ Certified ESC Plan Reviewer Name:	Certification Number:
DEQ Certified SWM Plan Reviewer Name:	Certification Number:

Printed Name: _____

Title: _____

Signature: _____

Date: _____

¹Operator of project that Entity is allowing to operate under their AS&S.

²Project name as it appears on the Registration Statement, which the Entity is allowing to be covered under their AS&S

APPENDIX I

Preconstruction Meeting Form

(VTSID-06)

PRECONSTRUCTION MEETING FORM

Instruction: This form shall be completed prior to the commencement of land disturbance. The purpose of this form is to have SID and the Contractor acknowledge responsibilities in accordance with the VT Annual Standards and Specifications for the ESC and SWM. A copy of this completed form shall be maintained by SID and the Contractor and be readily available upon request.

Section 1 – Project Information

Project Name: _____ Date: _____

Project Location/Description:

SID Representative:

Primary Contractor/ Construction General Permit Operator:

Responsible Land Disturber:

Section 2 – Checklist

The conditions of this section shall be met and this form shall be signed by the Contractor Operator prior to the commencement of land disturbance (check those that apply):

- Approved ESC Plan
- Approved SWM Plan
- Approved, site-specific SWPPP (projects \geq 1 acre)
- Identification of the Responsible Land Disturber
- Coverage Letter for the General Permit for Discharges of Stormwater from Construction Activities
- Any off-site areas associated with this project have been identified and approval documentation provided
- Conditions of Termination of Land Disturbance form discussed
- Discussion of responsibilities and standards for the SWM Record Report

Section 3 – Acknowledgement of the VT Annual Standards and Specifications for ESC and SWM

(To be completed by the Contractor/Operator)

I acknowledge my responsibilities to conduct the land disturbance activity in accordance with the approved Plans throughout the duration of the project, to seek approval from VTSID for any significant changes to the plan, to adhere to the conditions of the Construction General Permit (when applicable),

to oversee the maintenance of the Stormwater Pollution Prevention Plan (when applicable), and to notify the SID Project Inspector immediately after the initial installation of ESC measures and in the event of a significant discharge of sediment or other pollutants from the site.

Name: _____

Signature: _____

Date: _____

APPENDIX J

Construction Site Inspection Forms (VTSID-07 & VTSID-08)

VIRGINIA TECH ESC INSPECTION REPORT

Project Name: _____ Project Authority: VTSID _____

RLD Name: _____ RLD No. _____

Project Location: _____ Project No: _____

Inspector Name: _____

Inspection Date: _____

Time: _____

STAGE OF CONSTRUCTION

- | | | |
|--|--|--------------------------------|
| Pre-Construction Conference <input type="checkbox"/> | Rough Grading <input type="checkbox"/> | Final Stabilization |
| Initial ESC Inspection <input type="checkbox"/> | Building Construction <input type="checkbox"/> | Construction of SWM Facilities |
| Clearing & Grubbing <input type="checkbox"/> | Finish Grading <input type="checkbox"/> | Other _____ |

Item#	State/Local Regulation ⁽¹⁾	Violation		Description and Location of Problem/Violation ⁽²⁾ , Required or Recommended Corrective Actions, and Other Comments/Notes
		Initial	Repeat	

(1) Refers to applicable regulation found in the most recent publication of the *Virginia Erosion and Sediment Control Regulations* (9VAC25-840), *Virginia Stormwater Management Regulations* (9VAC25-870), or Virginia Tech Annual Standards & Specifications.

(2) Note whether or not off-site damage resulting from the problem/violation was evident during the inspection.

REQUIRED CORRECTIVE ACTION DEADLINE DATE: _____ **Re-inspection Date:** _____

(DD/MM/YY)

(DD/MM/YY)

The required corrective action deadline date applies to all violations noted on this report. If listed violation(s) currently constitute non-compliance and/or required corrective actions are not completed by the deadline, a **NOTICE TO COMPLY, STOP WORK ORDER**, and/or other enforcement actions may be issued to the entity responsible for ensuring compliance on the above project.

Inspector: _____
Signature Date

<i>Acknowledgement of on site report receipt:</i> _____		
_____	(print)	(signature)
(date)	<i>This report will be provided to the following parties via mail, fax, or e-mail within 24 hours of inspection:</i>	

SWPPP Stormwater Construction Site Inspection Report

General Information	
Project Name:	Date of Inspection:
Location: Blacksburg, VA	VSMP Permit #:
Inspector:	<i>*Inspector must be authorized by the Permit Operator to perform inspections. Check here if a Delegation of Authority Form has been included in the SWPPP</i> <input type="checkbox"/>
Title:	Inspector's Contact #:
Inspector's Qualifications <input type="checkbox"/> DEQ Certification Type _____ DEQ Certification # _____ Exp. _____ <input type="checkbox"/> RLD # _____ Exp. _____ <input type="checkbox"/> Other _____	Inspection Frequency (select one) <input type="checkbox"/> Once every four business days <input type="checkbox"/> Once every five business days and within 48 hours following a storm event of 0.25" or greater in 24 hours <input type="checkbox"/> Monthly where areas have been temporarily stabilized or activities are suspended due to continuous frozen conditions.
Describe present phase of construction:	
Weather Information	
Has there been a measurable storm event (0.25" or greater in 24 hours) since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No Storm Start Date & Time: _____ Approximate Amount of Precipitation (in): _____ Storm Duration (hrs): _____	
Weather at time of this inspection? Temperature: _____ <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: _____	
Are there any [stormwater] discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____	
Have any land-disturbing activities occurred outside of the approved ESC plan? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: _____	

	BMP / Control Measure	BMP Installed?	Maintenance Required?	Corrective Action Needed and Locations
	<i>*List all that appear on the approved ESC plan</i>			<i>*Initial and date when necessary Corrective Action has been taken</i>
1	Construction Entrance (3.02)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Silt Fence (3.05)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Culvert Inlet Protection (3.08)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Outlet Protection (3.18)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP / Control Measure <i>*List all that appear on the approved ESC plan</i>	BMP Installed?	Maintenance Required?	Corrective Action Needed and Locations <i>*Initial and date when necessary Corrective Action has been taken</i>
5	Temporary Rock Check Dams (3.20)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Continued on page 2

#	BMP / Control Measure	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Locations <i>*Initial and date when Corrective Action has been taken</i>
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Are there any control measures that failed to operate as designed or proved inadequate or inappropriate for a particular location?

#	BMP / Control Measure	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Locations <i>*Initial and date when Corrective Action has been taken</i>
Describe any additional corrective actions required (including any changes to the SWPPP that are necessary) as a result of the inspection or to maintain permit compliance:				
Describe any corrective actions required from a previous inspection that have not been implemented:				
<i>Continued on Page 3</i>				

	BMP/activity <i>Evaluate in accordance with the approved ESC plan.</i>	Implemented?	Maintenance Required?	Corrective Action Needed and Locations <i>*Initial and date when Corrective Action has been taken</i>
1	Are all slopes and disturbed areas that are at final grade or will remain dormant for 14 days or more stabilized within 7 days?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are completed earthen structures, such as embankments, dikes and diversions stabilized immediately?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are soil stockpiles and/or borrow areas adequately controlled with perimeter control measures and stabilization?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are perimeter controls installed where needed and properly maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Is there sediment deposition on any property outside of the construction activity?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP/activity <i>Evaluate in accordance with the approved ESC plan.</i>	Implemented?	Maintenance Required?	Corrective Action Needed and Locations <i>*Initial and date when Corrective Action has been taken</i>
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Check here if there are NO incidents of noncompliance; the facility is in compliance with the SWPPP and the General Permit.

CERTIFICATION STATEMENT

"I certify under penalty of law that I have read and understand this document and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Inspector Name (Print): _____ **Title:** _____

Signature: _____ **Date:** _____

Operator Name (Print): _____ **Title:** _____

***Signature:** _____ **Date:** _____

The Operator must sign inspection reports unless a Delegation of Authority has been included in the SWPPP.

APPENDIX K

SWM Facility Record Drawing & Certifications Form

(VTSID-09)

Stormwater Record Report Checklist – Bioretention

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes, indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Bioretention has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each Bioretention installed. The Stormwater Record Report for the installation of a Bioretention shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist - Bioretention
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Bioretention
- Original design documents including:
 - Drainage area maps
- Bioretention details showing:
 - Underdrain/Outlet storm drain inverts
 - Riser top elevations
 - Top of berm/seat wall elevations
 - Final Planting Plan
 - Sizing calculations
- Material specifications for each layer of material used including stone, soil, liner, geotextile, filter fabric, etc.

- Record survey information including:
 - Elevations of each layer of the bioretention in multiple locations
 - Outlet storm drain invert
 - Underdrain inverts
 - Pictures of all surveyed elements and all layers being installed
 - Pictures of the underdrain and outlet storm drain connections to cleanouts and to the riser structure
 - Pictures of liner key-in installation
 - Survey information for the top of the berm/seat wall
 - Survey information for the top of the riser structure
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Bioretention, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Vegetated Roof

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes, indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Vegetated Roof has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each Vegetated Roof installed. The Stormwater Record Report for the installation of a Vegetated Roof shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Vegetated Roof
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Vegetated Roof
- Original design documents including:
 - Drainage area maps
 - Vegetated Roof details showing:
 - Depth of Media
 - Final Planting Plan
 - Setbacks
 - Roof Access
 - Sizing calculations

- Structural Capacity calculations conforming to ASTM E 2397 05 for the roof
- Material specifications for each layer of material used including waterproof membrane, root barrier, drainage layer, filter fabric and growth media
- Record survey information including:
 - Pictures of all surveyed elements
 - Pictures of each layer installation
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Vegetated Roof, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist – Dry Swale

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes, indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Dry Swale has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each installation of a Dry Swale. The Stormwater Record Report for installing a Dry Swale shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Dry Swale
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Dry Swale
- Original design documents including:
 - Drainage area maps
 - Dry Swale details showing:
 - Underdrain/Outlet storm drain inverts
 - Riser top elevation
 - Top of berm/seat wall elevations
 - Final Planting Plan
 - Sizing calculations
- Material specifications for each layer of material used including stone, soil, liner, geotextile, filter fabric, etc.

- Record survey information including:
 - Outlet storm drain invert
 - Underdrain inverts
 - Pictures of all surveyed elements and all layers being installed
 - Pictures of the underdrain and outlet storm drain connections to cleanouts and to the riser structure
 - Pictures of liner key-in installation
 - Survey information for the top of the berm/seat wall
 - Survey information for the top of the riser structure
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Dry Swale, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Wet Swale

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Wet Swale has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each installation of a Wet Swale. The Stormwater Record Report for installing a Wet Swale shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- ___ Completed Stormwater Record Report Checklist – Wet Swale
- ___ Professional Engineer seal and signature
- ___ Project description
- ___ Location map showing the location of the Wet Swale
- ___ Original design documents including:
- ___ Drainage area maps
- ___ Wet Swale details showing:
 - ___ Underdrain/Outlet storm drain inverts
 - ___ Riser top elevations
 - ___ Top of berm/seat wall elevations
- ___ Sizing calculations
- ___ Material specifications for each layer of material used including stone, soil, liner, geotextile, filter fabric, etc.
- ___ Record survey information including:

- ___ Outlet storm drain invert
- ___ Underdrain inverts
- ___ Pictures of all surveyed elements and all layers being installed
- ___ Pictures of the underdrain and outlet storm drain connections to cleanouts and to the riser structure
- ___ Pictures of liner key-in installation
- ___ Survey information for the top of the berm/seat wall
- ___ Survey information for the top of the riser structure
- ___ Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Wet Swale, if applicable

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist – Rainwater Harvesting

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Rainwater Harvesting system has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each type of Rainwater Harvesting system installed. The Stormwater Record Report for the installation of Rainwater Harvesting systems shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Rainwater Harvesting
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Rainwater Harvesting system components
- Original design documents including:
 - Drainage area maps
- Rainwater Harvesting details showing:
 - Size of Storage Tank
 - Schematics of tank and piping system configuration
 - Material type and size of gutter, downspouts and conveyance piping to cistern inlet
 - Location and type of debris excluder

- Sizing calculations
- Discussion of use of harvested rainwater (irrigation, toilet flushing, etc.)
- Indicate how overflow water will be directed to minimize stormwater-runoff
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Rainwater Harvesting system, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist – Grass Channel

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Grass Channel has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each Grass Channel installed. The Stormwater Record Report for the installation of a Grass Channel shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Grass Channel
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Grass Channel
- Original design documents including:
 - Sizing calculations compared to As-Builts
 - Outfall volume and flow calculations
 - Final Planting Plan
- Provide the following information regarding Grass Channels:
 - Contributing drainage area boundaries, acreage, and land cover
 - Topography of site including the Grass Channel

- Locations of all conveyance system outfalls into the Grass Channel must be shown
- Provide a plan view showing:
 - Overall Grass Channel Grading
 - Layout and dimensions of the Grass Channel, including check dams
- Provide profiles, section views, and details that show the following:
 - Cross-section
 - Side slopes
 - Channel bottom width
 - Longitudinal slope
 - Check dam details
 - 10-year storm elevation
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Wet Pond

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Wet Pond has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each installation of a Wet Pond. The Stormwater Record Report for installing a Wet Pond shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Wet Pond
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Wet Pond
- Original design documents including:
 - Drainage area maps
- Wet Pond details showing:
 - Underdrain/Outlet storm drain invert
 - Riser Top Elevation
 - Top of berm/seat wall elevations
 - Final Planting Plan
 - Pretreatment Details
 - Sizing calculations

- Material specifications for each layer of material used including stone, soil, liner, geotextile, filter fabric, etc.
- Record survey information including:
 - Outlet storm drain invert
 - Underdrain inverts
 - Pictures of all surveyed elements and all layers being installed
 - Pictures of the underdrain and outlet storm drain connections to cleanouts and to the riser structure
 - Pictures of liner key-in installation
 - Survey information for the top of the berm/seat wall
 - Survey information for the top of the riser structure
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Wet Pond, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Extended Detention

Section 1 – SWM Facility General Information

Project Name:		Project Location:	
BMP Location (Latitude/Longitude in decimal degrees):			
BMP ID:		Total Drainage Area To BMP (Acres):	
Impervious Drainage Area to BMP (Acres):		Pervious Drainage Area to BMP (Acres):	
6 th Order HUC:		Date Facility Brought Online:	
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):			
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO		If yes indicate type of pretreatment:	

Section 2

Instruction: This checklist shall be completed if a Dry Swale has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each installation of a Dry Swale. The Stormwater Record Report for installing a Dry Swale shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Extended Detention
- Professional Engineer seal and signature
- Project description
- Location map showing the location of the Extended Detention
- Original design documents including:
 - Drainage area maps
 - Extended Detention details showing:
 - Underdrain/Outlet storm drain inverts
 - Riser top elevation
 - Final Planting Plan
 - Forebay Details if Applicable
 - Sizing calculations
- Material specifications for each layer of material used including stone, soil, liner, geotextile, filter fabric, etc.

- Record survey information including:
 - Outlet storm drain invert
 - Underdrain inverts
 - Pictures of all surveyed elements and all layers being installed
 - Pictures of the underdrain and outlet storm drain connections to cleanouts and to the riser structure
 - Pictures of liner key-in installation
 - Survey information for the top of the berm/seat wall
 - Survey information for the top of the riser structure
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Extended Detention, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Nutrient Credits

Section 1 – SWM Facility General Information

Project Name:	Project Location:
Total Drainage Area To BMP (Acres):	
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Credits Purchased:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	

Section 2

Instruction: This checklist shall be completed if a construction site has been designed to use Nutrient Credits. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each use of Nutrient Credits. The Stormwater Record Report for the use of Nutrient Credits shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Nutrient Credits
- Professional Engineer seal and signature
- Project description
- Location map showing the location where the Nutrient Credits are being used
- Official Bill of Sale for Nutrient Credits being purchased
- Original design documents including:
 - Drainage area maps
- Nutrient Credit details showing:
 - Stormwater calculations
 - Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the site using Nutrient Credits, if applicable

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____ Date: _____

Stormwater Record Report Checklist –Manufactured

Section 1 – SWM Facility General Information

Project Name:	Project Location:
BMP Location (Latitude/Longitude in decimal degrees):	
BMP ID:	Total Drainage Area To BMP (Acres):
Impervious Drainage Area to BMP (Acres):	Pervious Drainage Area to BMP (Acres):
6 th Order HUC:	Date Facility Brought Online:
Name of any impaired waters the BMP discharges to (2012 305(b)/303(d)):	
Pretreatment: <input type="checkbox"/> YES <input type="checkbox"/> NO	If yes indicate type of pretreatment:

Section 2

Instruction: This checklist shall be completed if a Manufactured Unit has been designed and installed on a construction site. The completed checklist shall be provided as a part of the Stormwater Record Report submittal for each Manufactured Unit installed. The Stormwater Record Report for the installation of a Manufactured Unit shall contain the following information for submittal to Virginia Tech Site and Infrastructure Development:

- Completed Stormwater Record Report Checklist – Manufactured Unit
- Professional Engineer seal and signature
- Project description
- Location map showing the location of Manufactured Unit
- Original design documents including:
 - Drainage area maps
- Manufactured Unit details showing:
 - Stormwater calculations
 - Manufactures Specifications
- Updated drainage area maps to reflect any grading amendments affecting the overall drainage area to the Manufactured Unit, if applicable
- Include Maintenance and Inspection Schedule/Requirements

Virginia Tech Site and Infrastructure Development reserves the right to not approve the Stormwater Record Report if it does not contain the items listed above.

Professional Engineer: _____

Date: _____

SWM Facility Record Report & Certification Form

Instruction: The purpose of the stormwater management (SWM) facility record report certification process is to verify that all stormwater management facilities and associated conveyance systems have been built in accordance with the approved plan and the design specifications. All required information shall be submitted to SID for approval in accordance with Section 4.1.2 of the VT Annual Standards and Specifications for ESC and SWM. VTSID approval is required prior to receiving the VT Termination of Land Disturbance that is necessary for the permittee’s termination of a Construction General Permit. The following shall be submitted for each permanent post-construction stormwater management facility:

(1) A completed copy of this form

- A copy of this form shall be submitted for each permanent stormwater management facility that has been constructed. The applicant shall ensure that this form is completed in its entirety and all applicable documentation is included with the submittal.

(2) Certified Professional Inspection Log

- A copy of the applicant’s inspection log and photos shall be submitted with this form. This log should document all critical aspects of SWM facility construction to demonstrate compliance with the approved plan and specifications. For example, a bioretention facility requires a liner. Without an inspection log and photos, there would be no assurance post-construction that it was installed to specification because it is not visible from the surface.

(3) Certified Record Drawing (As-built)

- A record drawing of the plans is required to be submitted with this form. The plans should indicate any changes that differ from the approved plans, along with any applicable computations.
- A clear means, such as a checkmark, shall be used to demonstrate that the applicant agrees with the constructed values.
- For any revisions to the plans, including numeric changes, a red line shall be used to cross out the original item, and the actual revision shall be entered beside the crossed out value.
- Elevations shall be to the nearest 0.1 foot.
- The storage volume of the facility, including all dimensioned structures, shall be verified with the certification.
- Survey information for each layer of the SWM facility, if applicable.
- All submitted plan sheets shall be labeled as “Record Drawing.”

(4) Long Term Maintenance Responsibility

Responsible Department:	Contact Person:
Title:	Contact Information:

Section 1– Contractor Information:

Company:	Contact Person:
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Title:	Phone Number:
Plan Name:	Plan Date:

Section 2– Record Drawing Certifications Statement

A Licensed Professional shall provide the following certification of the SWM Record Report, including inspections, monitoring and other efforts used for the certification of Stormwater Management facilities during construction.

Record Drawing Certification

I certify that I am a Licensed Professional in the Commonwealth of Virginia and that to best of my knowledge, having completed site-specific inspection(s), the stormwater management facility referenced on this form is constructed in accordance with the approved plans and specifications and all of the information provided with this certification is complete and accurate.

Design Firm Name: _____

Mailing Address: _____

Business Phone: _____

Name of certifying individual: _____

PLACE SEAL HERE

Signature: _____ Date: _____

Section 3 – Record Report Approval

(To be completed by SID staff only)

VTSID Representative
(print): _____

Signature: _____

Date: _____

APPENDIX L**Land Disturbance Termination Form**
(VTSID-10)

TERMINATION OF LAND DISTURBANCE

Instruction: This form is to be used as a request for termination of land disturbance between the Contractor/Operator and SID. Approval of this request will **NOT** result in termination of VAR10 General Permit coverage from the DEQ. The Contractor/Operator **SHALL NOT** terminate VAR10 General Permit coverage with DEQ, when applicable, until Termination of Land Disturbance Approval from SID is granted.

Project Name: _____ VAR10 Permit # (when applicable):

Section 1 – Conditions for Termination of Land Disturbance

The conditions of this section shall be met and this form shall be signed by both the Operator and the VTSID Stormwater Compliance Manager prior to termination of land disturbance (check those that apply):

- No further land disturbance activities are planned
- The project area has been stabilized in accordance with the approved plans
- All temporary erosion and sediment control measures have been removed and resulting disturbances stabilized
- All pollution prevention measures have been removed from the site and disposed of in a legal manner
- All permanent, post-construction stormwater management facilities have approved Record Report
- All trash and debris have been removed from the site

Section 2 – Operator Certification

"I certify under penalty of law that I have read and understand this document and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. "

Operator/Contractor: _____

Company: _____

Signature: _____

Date: _____

Section 3 – Termination of Land Disturbance Approval

(To be completed by the Virginia Tech SID Stormwater Compliance Manager only)

SID recognizes this request to be accurate based on the certification above and terminates the Operator/Contractor's land disturbance activity as it applies to the VT Annual Standards and Specifications for ESC and SWM.

Stormwater Compliance Manager:

Signature: _____

Date: _____

Appendix C – Illicit Discharge Annual Report Summary

Illicit Discharge:					
Date	Illicit Discharge Type:	Location	Reported By:	Assessed By:	Actions Taken:
1/8/2018	Oil Sheen	Beamer Way	Erich Roscher	VT SID	Contacted Rob Lowe, no details on source.
2/7/2018	Sediment runoff from construction site	Southgate	Cully Hession	Mike Vellines SID	Emailed contractor to address problem.
2/7/2018	Sediment runoff from construction site	Sandy Hall	Cully Hession	Mike Vellines SID	Emailed contractor to address problem.
4/26/2018	Illicit Discharge 9:30 am phone call received via EHS notifying of a large fish kill in the Webb branch leading into the duck pond	Stroubles Creek Webb Branch		DEQ and VT SID	Rob Lowe of EHS notified DEQ immediately and SID began to track the discharge. Water pH levels were reading 10-11 pH at outfalls near Surge building. Through several days of investigation involving camera work, dye testing and tracking it was determined that the Virginia Tech Power House had a waste water tank that was compromised and leaking into several broken systems. Temporary tanks were brought in on 4/28 and continued work to repair the lines is taking place.
6/19/2018	Sediments entering Duck Pond from Stroubles Creek	Duck Pond	Bill Ross	VT SID	Tracked to a water main break on south Main Street in the town of Blacksburg.
6/19/2018	Manure Spill	Kentland Farm	Pat Hilt	VT SID	Cleaned up by employees and SID visited on 6/20 to assess and take photos. DEQ was notified and made a site visit.
6/28/2018	Water chill line hole	ICTAS Parking Lot	Jason	VT SID	Contained at site, water pumped out and line repaired.

Appendix D – Stormwater Management Facilities

BMP Number	BMP Name	BMP Status	BMP Type	BMP Location	Latitude	Longitude	Pervious Drainage Area (Acres)	Impervious Drainage Areas (Acres)	Total Acres	Date Added	Sixth Order HUC	Impaired Water
BMP_0001	Lane Stadium - Extended Detention Basin	Existing	Extended Detention	Virginia Tech Lane Stadium 285 Spring Road Blacksburg, VA 24061	37-13-8 N	80-25-1 W	1.06	0.05	1.11	06/2010	NE59	Stroubles Creek
BMP_0002	Chicken Hill Underground Detention Basin	Existing	Underground Stormwater Detention Facility	Corner of Southgate Road and Tech Center Drive (adjacent to Chicken Hill Parking Lot) Blacksburg, VA 24061	37-13-1.9 N	80-25-5.65 W	3.35	7.15	10.5	01/2012	NE59	Stroubles Creek
BMP_0004	Vet Med - Retention Pond	Existing	Retention Pond	Virginia Tech Campus Corner of Duckpond Road and Southgate Drive Blacksburg, VA 24061	37-12-59 N	80-25-32 W	312.2	119.5	431.7	06/2005	NE59	Stroubles Creek
BMP_0005	Vet Med - Detention Pond	Existing	Detention Pond	Virginia Tech Campus Corner of Southgate Drive and Route 460 Blacksburg, VA 24061	37-12-57 N	80-25-50 W	457.5	148.3	605.8	06/2005	NE59	Stroubles Creek
BMP_0006	Vet Med-IDRF Extended Detention Basin	Existing	Extended Detention	Virginia Tech Campus Behind VA-MD Vet Med Building Blacksburg, VA 24062			5.98	8.49	14.47		NE60	Stroubles Creek
BMP_0007	Smithfield Lot Bioretention Pretreatment	Existing	Bioretention Pretreatment	Virginia Tech Campus Smithfield Road (Smithfield Parking Lot) Blacksburg, VA 24061	37-13-22 N	80-25-46 W	0.36	1.03	1.39	06/2010	NE59	Stroubles Creek
BMP_0008	Smithfield Lot Bioretention	Existing	Bioretention	Virginia Tech Campus Smithfield Road (Smithfield Parking Lot) Blacksburg, VA 24061	37-13-22 N	80-25-46 W	0.49	1.04	1.53	07/2007	NE59	Stroubles Creek
BMP_0009	Smithfield Lot Extended Detention 1	Existing	Extended Detention	Virginia Tech Campus Smithfield Road (Smithfield Parking Lot) Blacksburg, VA 24061	37-13-24 N	80-25-46 W	0.09	0.16	0.25	07/2007	NE59	Stroubles Creek

BMP_0010	Smithfield Lot Extended Detention 2	Existing	Extended Detention	Virginia Tech Campus Smithfield Road (Smithfield Parking Lot) Blacksburg, VA 24061	37-13-25 N	80-25-45 W	0.22	0.27	0.49	07/2007	NE59	Strouble Creek
BMP_0011	Duck Pond Overflow Lot - Extended Detention	Existing	Extended Detention	Virginia Tech Campus Oak Lane (adjacent to Duck Pond Overflow Lot) Blacksburg, VA 24061	37-13-22 N	80-25-50 W	0.43	1.83	2.26	06/2005	NE59	Strouble Creek
BMP_0013	Oak Lane (SPH) - Extended Detention Basin	Existing	Extended Detention	Virginia Tech Campus Oak Lane (Center of Oak Lane Community) Blacksburg, VA 24061	37-13-29 N	80-26-17 W	6.89	4.31	11.2	06/2005	NE59	Strouble Creek
BMP_0014	Alumni Pond	Existing	Enhanced Extended Detention	Virginia Tech Campus Corner of Duck Pond Drive and West Campus Drive Blacksburg, VA 24061	37-13-42 N	80-25-41 W	15.8	28.0	43.8	01/2012	NE59	Strouble Creek
BMP_0015	Grove Lane Extended Detention	Existing	Extended Detention	Virginia Tech Campus Duck Pond Drive Blacksburg, VA 20461	37-13-22 N	80-25-39 W	33.5	28.2	61.7	06/2005	NE59	Strouble Creek
BMP_0016	Life Sciences - Green Roof Extension 1	Existing	Green Roof	Virginia Tech Life Sciences I Facility 970 Washington Street SW Blacksburg, VA 24061	37-13-16 N	80-25-28 W	0.11	0.22	0.33	06/2010	NE59	Strouble Creek
BMP_0017	Life Sciences - Green Roof Extension 2	Existing	Green Roof	Virginia Tech Life Sciences I Facility 970 Washington Street SW Blacksburg, VA 24061	37-13-14 N	80-25-28 W	0.06	0.19	0.25	06/2010	NE59	Strouble Creek
BMP_0018	Payne (NR) - Underground Detention Basin	Existing	Underground Detention	Virginia Tech Campus Between Slusher Wing and Dietrick Dining Hall Blacksburg, VA 24062	37-13-31 N	80-25-16 W	3.16	2.13	5.29	06/2005	NE59	Strouble Creek
BMP_0019	Henderson Hall Bioretention Filter	Existing	Bioretention Filter	Virginia Tech Henderson Hall 195 Alumni Mall Blacksburg, VA 24061	37-13-49 N	80-25-00 W	0.84	0.42	1.26	07/2011	NE59	Strouble Creek

BMP_0020	New Hall West 1	Existing	Bioretention Filter	Virginia Tech Campus New Hall West 190 West Campus Drive Blacksburg, VA 24061	37-13-19.173 N	80-25-21.899 W	0.05	0.11	0.16	01/2012	NE59	Strouble Creek
BMP_0021	New Hall West 2	Existing	Bioretention Filter	Virginia Tech Campus New Hall West 190 West Campus Drive Blacksburg, VA 24061	37-13-20.632 N	80-25-19.96 W	0.1	0.16	0.26	01/2012	NE59	Strouble Creek
BMP_0022	Horse Exhibit - Livestock Arena	Existing	Extended Detention	Virginia Tech Campus Alphin Stuart Livestock Teaching Arena 500 Plantation Road Blacksburg, VA	37-13-13 N	80-26-26 W	4.93	0.87	5.8	06/2005	NE59	Strouble Creek
BMP_0023	VTES - Extended Detention	Existing	Extended Detention	Virginia Tech Montgomery Executive Airport 1601 Research Center Drive Blacksburg, Va 24060	37-12-40 N	80-24-46 W	28.32	8.58	36.9	06/2005	NE59	Strouble Creek
BMP_0024	Library Storage - Extended Detention	Existing	Extended Detention	University Storage Facility 600 Energy Drive Blacksburg, VA 24061	37-12-46 N	80-24-40 W	10.97	2.73	13.7	06/2005	NE59	Strouble Creek
BMP_0027	ICTAS II- Bioretention	Existing	Bioretention Filter	Virginia Tech Institute for Critical Technology and Applied Science (ICTAS II) 1075 Life Science Circle Blacksburg, VA 24061	37-13-20 N	80-25-32 W	0.05	0.28	0.33	07/2011	NE59	Strouble Creek
BMP_0029	SWCP	Existing	Extended Detention	Virginia Tech Campus Southwest Chiller Plant 2295 Smithfield Road Blacksburg, VA 24061	37-13-16 N	80-25-50 W	3.25	1.31	4.56	11/2013	NE59	Strouble Creek
BMP_0030	Vet Med - IDRF Retention Basin	Existing	Retention Basin	Virginia Tech Campus 295 Duck Pond Drive Blacksburg, VA 24061	37-13-1 N	80-25-46 W	6.61	8.17	14.78	05/2012	NE59	Strouble Creek

BMP_0034	Lower Chicken Hill WQU	Existing	Underground WQU	Corner of Southgate Road and Tech Center Drive (adjacent to Chicken Hill Parking Lot) Blacksburg, VA 24061	37-13-2.4 N	80-25-6.2 W	3.35	7.15	10.5	01/2012	NE59	Strouble Creek
BMP_0035	New Hall West 3	Existing	Bioretention Filter	Virginia Tech Campus New Hall West 190 West Campus Drive Blacksburg, VA 24061	37-13-20.766 N	80-25-21.099 W	0.05	0.19	0.24	01/2012	NE59	Strouble Creek
BMP_0036	New Hall West 4	Existing	Bioretention Filter	Virginia Tech Campus New Hall West 190 West Campus Drive Blacksburg, VA 24061	37-13-19.945 N	80-25-22.273 W	0.02	0.12	0.14	01/2012	NE59	Strouble Creek
BMP_0037	McComas Filterra Unit	Existing	Filterra Unit	Virginia Tech campus McComas Hall 895 Washington Street SW Blacksburg, VA 24061	37-13-11 N	80-25-23 W	0.26	0.4	0.66	07/2011	NE59	Strouble Creek
BMP_0038	Football Locker Room WQU	Existing	Underground WQU	Virginia Tech Campus Merryman Athletic Facility 165 Spring Road Blacksburg, VA 24061	37-13-20 N	80-25-21 W	0.47	2.6	3.07	01/2012	NE59	Strouble Creek
BMP_0039	ICTAS II - Rain Garden	Existing	Bioretention Filter	Virginia Tech Institute for Critical Technology and Applied Science (ICTAS II) 1075 Life Science Circle Blacksburg, VA 24061	37-13-20 N	80-25-32 W	0	0.15	0.15	07/2011	NE59	Strouble Creek
BMP_0041	MMF Bioretention Filter	Existing	Bioretention Filter	Virginia Tech Health and Safety Building 675 Research Center Drive Blacksburg, VA 24061	37-12-52 N	80-25-28 W	0.53	0.87	1.4	09/2011	NE59	Strouble Creek
BMP_0042	West End Bioretention Filter	Existing	Bioretention Filter	Virginia Tech West End Market at Cochrane Hall 770 Washington Street SW Blacksburg, VA 24061	37-13-19.945 N	80-25-22.73 W	0.34	0.19	0.53	01/2012	NE59	Strouble Creek

BMP_0043	West End Filterra	Existing	Filterra Unit	Virginia Tech West End Market at Cochrane Hall 770 Washington Street SW Blacksburg, VA 24061	37-13-23.684 N	80-25-24.707 W	0.06	0.59	0.65	01/2012	NE59	Strouble Creek
BMP_0044	Roller Hockey Rink WQU	Existing	Stormceptor Underground WQU	Washington Street (southeast of Basketball Practice Facility) Blacksburg, VA 24061	37-19-1 N	79-58-27 W	3.22	4.2	7.42	01/2012	NE59	Strouble Creek
BMP_0045	Visitor's Center - Bioretention Filter 1	Existing	Bioretention Filter	Virginia Tech Visitor and Undergraduate Admissions Center 925 Prices Fork Road Blacksburg, VA 24061	37-13-50 N	80-26-6 W	0.9	0.47	1.37	07/2012	NE59	Strouble Creek
BMP_0046	Visitor's Center - Bioretention Filter 2	Existing	Bioretention Filter	Virginia Tech Visitor and Undergraduate Admissions Center 925 Prices Fork Road Blacksburg, VA 24061	37-13-51 N	80-26-4 W	0.34	0.14	0.42	07/2012	NE59	Strouble Creek
BMP_0047	Visitor's Center - Bioretention Filter 3	Existing	Bioretention Filter	Virginia Tech Visitor and Undergraduate Admissions Center 925 Prices Fork Road Blacksburg, VA 24061	37-13-48 N	80-26-5 W	0.47	0.16	0.4	07/2012	NE59	Strouble Creek
BMP_0048	Visitor's Center - Bioretention Filter 5	Existing	Bioretention Filter	Virginia Tech Visitor and Undergraduate Admissions Center 925 Prices Fork Road Blacksburg, VA 24061	37-13-48 N	80-25-59 W	1.53	0	2.99	07/2012	NE59	Strouble Creek
BMP_0049	ASA - Underground Storage Tank 1	Existing	Underground Detention Center	Virginia Tech Lavery Hall 430 Old Turner Street Blacksburg, VA 24061	37-13-52 N	80-25-22 W	0.08	1.15	1.23	01/2012	NE59	Strouble Creek
BMP_0050	ASA - Underground WQU 1	Existing	Underground WQU, Contech Stormfilter	Virginia Tech Lavery Hall 430 Old Turner Street Blacksburg, VA 24061	37-13-52 N	80-25-22 W	0.08	1.15	1.23	01/2012	NE59	Strouble Creek

BMP_0051	ASA - Underground Storage Tank 2	Existing	Underground Detention Center	Virginia Tech Lavery Hall 430 Old Turner Street Blacksburg, VA 24061	37-13-52 N	80-25-22 W	0.01	0.86	0.87	01/2012	NE59	Strouble Creek
BMP_0052	ASA - Underground WQU 2	Existing	Underground WQU, Contech Stormfilter	Virginia Tech Lavery Hall 430 Old Turner Street Blacksburg, VA 24061	37-13-52 N	80-25-22 W	0.01	0.86	0.87	01/2012	NE59	Strouble Creek
BMP_0053	ASA - Biofilter	Existing	WQU - Contech Urbangreen Biofilter	Virginia Tech Lavery Hall 430 Old Turner Street Blacksburg, VA 24061	37-13-52 N	80-25-22 W	0.1	0.18	0.28	01/2012	NE59	Strouble Creek
BMP_0054	SPE Filterra Unit 1	Existing	Filterra Unit	Virginia Tech Oak Lane Community Blacksburg, VA 24061	37-13-30 N	80-26-08 W	0.11	0.42	0.53	08/2013	NE59	Strouble Creek
BMP_0055	SPE Filterra Unit 2	Existing	Filterra Unit	Virginia Tech Oak Lane Community Blacksburg, VA 24061	37-13-30 N	80-26-08 W	0.15	0.52	0.67	08/2013	NE59	Strouble Creek
BMP_0056	SPE Underground Detention Piping	Existing	Underground Detention Pipe	Virginia Tech Oak Lane Community Blacksburg, VA 24061	37-13-30 N	80-26-08 W	0.51	0.35	0.86	05/2013	NE59	Strouble Creek
BMP_0057	VMIA - Detention Swale	Existing	Detention Swale	Virginia Tech 215 Duck Pond Drive Blacksburg, VA 24061	37-13-07 N	80-25-41 W	0.09	0.25	0.34	11/2012	NE59	Strouble Creek
BMP_0058	VMIA - Filterra Unit	Existing	Filterra Unit	Virginia Tech 215 Duck Pond Drive Blacksburg, VA 24061	37-13-07 N	80-25-41 W	0.01	0.23	0.24	11/2012	NE59	Strouble Creek
BMP_0060	CFTA Water Quality Unit 1	Existing	Stormceptor Underground WQU	Virginia Tech 190 Alumni Mall Blacksburg, VA 24061	37-13-52 N	80-25-02 W	2.01	4.43	6.44	07/2013	NE59	Strouble Creek
BMP_0061	CFTA Water Quality Unit 2	Existing	Stormceptor Underground WQU	Virginia Tech 190 Alumni Mall Blacksburg, VA 24061	37-13-53 N	80-25-00 W	1.06	1.82	2.88	07/2013	NE59	Strouble Creek
BMP_0062	CFTA Underground Detention	Existing	Underground Detention Facility	Virginia Tech 190 Alumni Mall Blacksburg, VA 24061	37-13-54 N	80-25-01 W	1.94	1.82	3.76	07/2013	NE59	Strouble Creek
BMP_0065	VT Airport Extended Detention Basin	Existing	Extended Detention	Virginia Tech Montgomery Executive Airport 1601 Research Center Drive Blacksburg, Va 24060	37-12-20 N	80-24-41 W	5.69	2.44	8.13	06/2005	NE59	Strouble Creek

BMP_0071	Drillfield Road Improvements Filterra Unit	Existing	MTD Filterra Unit	Virginia Tech Campus Drillfield Drive Blacksburg, Va 24061	37-13-46 N	80-25-17 W	0.06	0.24	0.3	4/4/2016	NE59	Strouble Creek
BMP_0072	Drillfield Road Improvements Filterra Unit	Existing	MTD Filterra Unit	Virginia Tech Campus Drillfield Drive Blacksburg, Va 24061	37-13-40 N	80-25-1 W	0.22	0.19	0.41	4/4/2016	NE59	Strouble Creek
BMP_0073	IATF Filterra Unit 1	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-16 N	80-25-2 W	0	0.24	0.24	9/17/2015	NE59	Strouble Creek
BMP_0074	IATF Filterra Unit 2	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-16 N	80-25-2W	0	0.19	0.19	9/17/2015	NE59	Strouble Creek
BMP_0075	IATF Filterra Unit 3	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-18	80-25-0 W	0	0.19	0.19	9/17/2015	NE59	Strouble Creek
BMP_0076	IATF Filterra Unit 4	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-18 N	80-25-0.7 W	0	0.24	0.24	9/17/2015	NE59	Strouble Creek
BMP_0077	IATF Filterra Unit 5	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-19 N	80-25-1 W	0	0.24	0.24	9/17/2015	NE59	Strouble Creek
BMP_0078	IATF Filterra Unit 6	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-20 N	80-25-2 W	0	0.24	0.24	9/17/2015	NE59	Strouble Creek
BMP_0079	IATF Filterra Unit 7	Existing	MTD Filterra Unit	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-20 N	80-25-3 W	0	0.19	0.19	9/17/2015	NE59	Strouble Creek
BMP_0080	IATF Underground Detention	Existing	MTD Underground Detention Pipe	Virginia Tech 530 Stadium Road Blacksburg, Va 24061	37-13-17 N	80-25-2 W	0	1.29	1.29	9/17/2015	NE59	Strouble Creek

Appendix E – Annual Report Active Project List

Virginia Tech 2018 MS4 Annual Report

MCM 4 - BMP 4.2: Number of Inspections (per project for FY 2018)

Project Name	Total Inspections Per Year
Moss Arts Center Amphitheater	28
Upper Quad Residential Facilities	27
New Classroom Building	11
Underground Storage Tank Demolition	10
Baseball Stadium Improvements	33
Rector Field House Addition	35
O'Shaughnessy Hall	33
VBI Data Center	3
Tom's Creek Landfill	16
APR Building	0
Runway 12-30 Extension Phase 1 & Phase 2 & Phase 3	65

ESAREC Equipment Storage Building	4
Catawba Sustainability Center Wetland Restoration Project	1
Hanger Site Development	29
VTES Lane Substation Expansion	16
Athletics Stockpile Area at Vet Med	21
Unmanned Aerial Vehicle Park	30
RRAB	33
Hahn Pedestrian Tunnel Repairs	23
University Club Demo	2
Total Inspections	420

Appendix F – Program Evaluations

Program Evaluation MCM 1

Appropriateness of the high-priority stormwater issues

Sediment

Stroubles Creek remains impaired due to sediment load and poor aquatic diversity. The potential remains for Stroubles Creek to receive sediment loads from eroded areas on campus, active construction sites, and unpaved sections of Plantation Road. As a result, sediment is an appropriate high-priority water quality issue and will remain a focus of pollution prevention efforts.

Animal Waste

High levels of fecal indicator bacteria (FIB) are the leading cause of surface water quality impairments in the United States (USEPA, 2012). Stroubles Creek is currently included on the Commonwealth of Virginia's 303(d) impairments list due to elevated E. coli concentrations. The StREAM Lab and faculty from the Biological Systems Engineering department regularly sample FIB concentrations. Waterfowl at campus stormwater management facilities and the Duck Pond, as well as domestic and agricultural animal waste are the most likely contributors to higher levels of FIB in Stroubles Creek. Animal waste remains as an appropriate high-priority stormwater issue.

Trash

In assessing the volume of trash gathered from Stroubles Creek during every stream clean-up, it is clear that trash is still a high-priority issue on the Virginia Tech Campus. We are hopeful that certain campus initiatives will mitigate some of the trash- but still anticipate trash as a high-priority stormwater issue due to constant foot traffic and the influx of campus visitors during football season.

Appropriateness of selected target audiences for high-priority stormwater issues

On-Campus Students

On-Campus Students remain a prominent and important part of the Virginia Tech Campus community and therefore are still very relevant in Virginia Tech Stormwater pollution prevention.

Sediment: All target audience are liable to contribute to pathway erosion around Virginia Tech's main campus whether on bike or on foot.

Animal Waste: On-Campus students often have family visits that include the family pet and/or feeding the ducks at the Duck Pond.

Trash: All campus community members have the potential to litter. On-Campus students are the most frequent target audiences to use dining halls and therefore are more likely to litter and/or disregard proper disposal procedures for the plastics and food containers used in the dining halls. On-Campus students also attend sporting events and participate in a multitude of campus activities that make them susceptible to accidentally (or purposely) littering.

Off-Campus Students

Off-Campus students remain as a prominent and important part of the Virginia tech campus community and therefore are still very relevant in stormwater pollution prevention.

Sediment: All target audiences are liable to contribute to pathway erosion around Virginia Tech's main campus whether on bike or on foot.

Animal Waste: Off-Campus students often bring their pets to campus to take walks and may feed the ducks at the Duck Pond.

Trash: All campus community members have the potential to litter. Off-campus students also frequent dining halls, attend sporting events, and participate in campus activities that make them susceptible to accidentally (or purposely) littering.

Faculty/ Staff

Faculty/Staff members remain as a prominent and important part of the Virginia tech campus community and therefore are still very relevant in stormwater pollution prevention.

Sediment: All target audiences are liable to contribute to pathway erosion around Virginia Tech's main campus whether on bike or on foot.

Animal Waste: Community members (including faculty and staff) will visit the Duck Pond to feed the ducks, which contribute to the ducks' continued residency at the pond. Some faculty and staff members also live close enough to campus to walk their pets as well.

Trash: All campus community members have the potential to litter. Faculty/Staff attend sporting events and participate in a multitude of campus activities, including job responsibilities, which make them susceptible to accidentally (or purposely) littering.

Effectiveness of the message or messages being delivered: During year 4, Virginia Tech was able to reach 100% of the on-campus student target audience through the move-in packets initiative. It is harder to quantify the off-campus student and faculty/staff target audience but it is estimated that at least 20% of each was reached this year as well. Documentation of target audience percentages is available upon request. As stated in the Year 1 Annual Report Program Evaluation for MCM 1, the messages that were utilized were more direct and focused on the target audiences and high priority water quality issue. The focused messages assisted in encouraging more innovative approaches such as the football tailgating signage, pet waste station public advertisements, and stormwater management training. The off-campus student outreach is still more difficult to quantify and as a result Virginia tech will be working to improve this in remaining years of this permit.

Effectiveness of the mechanisms of delivery employed in reaching the target audiences: The mechanisms used in the Virginia Tech outreach program utilize electronic mediums, hardcopy publications, and high traffic settings such as Steppin' Out, Facebook and Twitter. Techniques may need to be further refined to address each target audience. The Housing and Residence Life Packets were successful in specifically reaching on-campus students, but other event and mechanisms were not as clearly defined in regards to their intended target audience. During Year 4, Site and Infrastructure Development has been looking at different methods to better reach the off-campus and Faculty/ Staff target audiences. This effort will be explored and improved in the remaining years of the permit. As stated above, it was determined that the off-campus student and Faculty/ Staff reach was more difficult to quantify and as a result Virginia tech will be working to improve this in the remaining years of this permit.

Appropriateness of the BMP's outlines in the Program Plan:

1.1 Targeting Public Outreach Events for Target Audiences (VT Students and Staff)

Site and Infrastructure Development determined that the sections under BMP 1.1 did directly overlap with each other and as a result were combined into one BMP. This was done in an effort to more clearly define the descriptions and goals of BMP 1.1 so that all associated target audiences could be reached more successfully and efficiently. Please see the modification section below for more information.

1.2 Targeting Public Outreach Materials for Target Audiences

BMP 1.2 and its associated sections provide a forum for Virginia tech Site and Infrastructure Development to highlight their varied approaches to public outreach and education. Although target audiences may need to be more clearly addressed in these efforts, the structure of the BMP is sufficient and remains appropriate in the Program Plan.

Modification of roles and responsibilities for this MCM:

As stated previously, Site and Infrastructure Development (SID) intends to partners and sponsor more events that have stormwater relevant impact. This means the role of SID as the event planner will be less prominent as will be their role in the sponsorship and involvement with other departments such as the Office of Energy and Sustainability, Sustainable Dining, Alternative Transportation, as well as student organizations.

Any changes to identified BMPs or measurable goals:

Site and Infrastructure Development determined that the sections under BMP 1.1 did directly overlap with each other and as result were combined into one BMP. This was done in an effort to more clearly define the descriptions and goals of BMP 1.1 so that all associated target audience could be reached more successfully and efficiently.

Steps to be taken to address deficiencies:

Techniques may need to be further refined to address each target audience. The Housing and Residence Life Packets were successful in specifically addressing on-campus students, but other events and mechanisms were not as clearly defines in regards to their intended target audience.

Plans for the next reporting cycle:

Site and Infrastructure Development will be focusing more on the off-campus target audience as well as refining the methods of quantifying the percentage reached. In conjunction with the Town of Blacksburg, Virginia Tech would like to send out stormwater information mailings to apartment complexes around town to reach more of the off-campus student population.

Program Evaluation MCM 2

Appropriateness of the BMPs outlined in the Program Plan

2.1 Promote Availability of the MS4 Program Plan and Annual Reports

As a permit requirement, this BMP remains an appropriate part of the Program Plan. In the past, Virginia Tech has had limited review and/or comment of the Program Plan and Annual reports. This BMP will encourage innovative means to solicit feedback.

2.1.1 Promotion through Electronic Mediums

Virginia tech utilizes electronic mediums as a means to connect with a younger audience. Each year electronic interactions with campus community members increase in regards to the MS4 program Plan as well as general stormwater pollution prevention. Therefore, this remains as an appropriate BMP in the Program Plan.

2.2 Public Involvement/ Participation

As a permit requirement, this BMP remains as an appropriate part of the Annual report.

2.2.1 Stream Clean-up/ Adopt-A-Stream

Stream clean-ups provide a direct opportunity for interaction within the Stroubles Creek Watershed. Virginia Tech Site and Infrastructure Development is required to sponsor clean-ups as a part of the Adopt-A-Stream program and has slowly built partnerships and more regular volunteer efforts., Therefore, this remains as an appropriate BMP in the Program Plan.

2.2.2 Volunteer Events

Volunteer events are the core of the Public Involvement BMP- with that being said, it does directly overlap with the Stream Clean-up BMP and also with the Storm Drain Marking BMP MCM1. Unless Site and Infrastructure Development addresses this overlap and/or participates in additional volunteer events, this BMP may not appropriate in the Program Plan.

Modification of roles and responsibilities for this MCM: Student organizations that participated in this year’s stream clean-ups will, with regular communication, become the core volunteer groups for future clean-ups. Therefore, Site and Infrastructure Development might become the coordinating entity while the volunteer effort and promotion of the event will be accomplished through the student organization themselves.

Changes to identified BMPs and/or measurable goals: There does not seem to be an appropriate location in the BMPs to discuss the recently installed pet waste stations. Sit and Infrastructure Development may consider adding and/or altering a BMP to address situations like this one. Also, as stated above, BMP 2.2.2 may need to be reevaluated in the Program Plan.

Steps to be taken to address deficiencies: Site and Infrastructure Development will address any BMP deficiencies in the Program Plan and take into account campus pet waste stations and additional volunteer events.

Plans for the next reporting cycle: Site and Infrastructure Development will continue to find new volunteer events while continuing the established partnership that has been developed with the Town of Blacksburg for events like The Big Event. Stream Clean-ups may become more regular with increased interest from student groups. Site and Infrastructure Development will be focusing on reaching out to more student organizations in order to increase the number and type of volunteer events that occur each year.

Program Evaluation MCM 3

3.1 Illicit Discharge Detection Program

BMP 3.1 and its associated BMPs cover the basic components of the IDDE Program as outlined in the permit. It particularly pieces out the “detection” components, which include regularly updated storm sewer map, a regular outfall reconnaissance inventory, an identification or priority areas, and a reporting mechanism for staff and students. All of these pieces give Virginia Tech the tools to detect potential illicit discharges and mitigate the issues as soon as possible. All BMPs are still relevant and appropriate in the Program Plan.

3.2 Illicit Discharge Elimination

BMP 3.2 and its associated BMPs cover the basic components of the IDDE Program as outlined in the permit. It particularly pieces out the “elimination” and response components which include policymaking activities to prohibit illicit discharges altogether as well as a tracking mechanism to trace, remove, and document illicit discharges. All BMPs are still relevant and appropriate in the Program Plan.

3.3 MS4 Interconnections

Interaction with MS4 interconnections regarding illicit discharges and priority areas is crucial to a successful IDDE Program. This BMP is still relevant and appropriate in the Program Plan.

Modification of roles and responsibilities for this MCM: The LEWAS lab that is overseen by the Engineering Education Department has set up stream monitoring equipment on the Webb Branch portion of Stroubles Creek. A feature of the monitoring station is that it is able to send alerts out to applicable VT and Town of Blacksburg personnel when certain water quality parameters are out of range. These alerts have helped Virginia Tech respond to illicit discharges more quickly and effectively.

Changes to identified BMPs and/or measureable goals: No BMPs need to be changed at this time.

Steps to be taken to address deficiencies: Site and Infrastructure Development will continue to bolster public outreach and awareness, which will hopefully lessen the number of illicit discharges in the next annual reporting cycle.

Plans for the next reporting cycle: Site and Infrastructure Development hopes to continue building upon pre-existing procedures in the Virginia Tech Police Department to maintain regular communication regarding environmental spills, etc. With the addition of the LEWAS Lab alerts, Site and Infrastructure Development will also be working on the Stormwater Management Policy department and approval during the next reporting cycle.

Program Evaluation MCM 4

Appropriateness of the BMPs outlined in the Program Plan

4.1 Management of Construction Site Stormwater Runoff

The BMPs listed within section 4.1 are, for the most part, permit requirements. Therefore, they remain appropriate in the Program Plan. Additional tracking requirements in the new permit will encourage enhanced document management and a comprehensive filing system from the beginning to the end of a project cycle.

Modification of roles and responsibilities for this MCM: Site and Infrastructure Development has been working with a consultant to update Virginia Tech’s Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management. The updated Annual Standards and Specifications will be submitted to DEQ for approval by September 30, 2017.

Changes to identified BMPs and/or measurable goals: Pre-construction meetings have been added to BMP 4.1.2 Design Phase Meetings. Although design phase meetings and pre-construction meetings serve separate functions, they both are a means to ensure the project is designed and constructed according to stormwater regulations.

Steps to be taken to address deficiencies: Virginia Tech Site and Infrastructure Development will submit a revised version of the Annual Standards and Specifications for ESC and SWM to the DEQ by September 30, 2017.

Plans for the next reporting cycle: Once implementation begins for the new and approved Virginia Tech Annual Standards and Specifications, VT Site and Infrastructure Development will hold training sessions for project managers and designers. Documentation of all training sessions will be included in future MS4 Annual Reports, as appropriate.

Program Evaluation MCM 5

Appropriateness of the BMPs outlined in the Program Plan

5.1 Stormwater Management Facilities

This BMP includes corresponding tracking, inspection, and maintenance sections. These three parts make up a comprehensive post-construction stormwater management facility program. Therefore, these BMPs remain appropriate as part of the Program Plan.

Modification of roles and responsibilities for this MCM: Due to the increasing number of manufactured BMPs and the technical expertise needed for their maintenance, Site and Infrastructure Development is currently looking into different means and methods to improve the current maintenance program for manufacturing BMPs.

Changes to identified BMPs and/or measurable goals: Since the three components of the MCM 5 program include tracking, inspection, and maintenance, Site and Infrastructure Development has altered the title of BMP 5.1 to encompass all three components of the program.

Steps to be taken to address deficiencies: A responsible party database is an ongoing effort and is being created for all current BMPs on campus. The database also includes maintenance requirements and frequency of maintenance needs for manufactures BMPs, etc. This database will assist in the management of the MCM 5 program for Site and Infrastructure Development.

Plans for the next reporting cycle: Site and Infrastructure Development will continue developing the responsible party database for all current BMPs on campus. Due to the increasing number of manufacture BMPs and the technical expertise needed for the maintenance, Site and Infrastructure Development will look into different means and methods to improve the current maintenance program for manufactures BMPs.

Program Evaluation MCM 6

Appropriateness of the BMPs outlines in the Program Plan

6.1 Municipal Facility Pollution Prevention and Good Housekeeping

As permit requirements, components in BMP 6.1 remain appropriate in the Program Plan.

6.2 Landscaping Management and Pest Control

Landscaping and pest control are two activities that occur frequently and have potential to cause stormwater pollution. They remain relevant as part of the Program Plan.

6.3 Personnel Training

As a permit requirement, personnel training and Annual Written Training Plan remain an appropriate BMP in the Program Plan. The new permit requirements will encourage continued and enhanced training programs regarding stormwater specific pollution prevention practices.

6.4 Management of Municipal Facilities

The three corresponding BMPs include street sweeping, salt application and stormwater structure cleaning. These are three crucial components of pollution prevention and MCM 6. They remain appropriate and relevant in the Program Plan.

Modification of roles and responsibilities for this MCM: With high priority areas properly addressed, it is now important to establish responsible parties and appropriate procedures to ensure that each area is properly transitions into SWPPP implementation.

Changes to identified BMPs and/or measurable goals: BMP 6.1.2 and BMP 6.1.3 will be reassessed and possibly modified to reflect SWPPP implementation. They are organized as such in the Program Plan due to the new permit requirements. BMP 6.3.1 may be incorporated into BMP 6.3.2 if it shows there are limited training plan updates in the upcoming annual reporting cycles.

Steps to be taken to address deficiencies: N/A

Plans for the next reporting cycle: Next steps include working with all personnel and operation on each high priority site to begin SWPPP Implementation. Those facilities that did not qualify as both high priority and high potential will be incorporated into the illicit discharge detection and elimination (IDDE) Program. All locations will be tracked using ArcGIS.

Appendix G – Documentation of Public Participation Activities

Volunteers can be seen below planting trees and removing invasive species along Stroubles creek, these events occurred in November and December of 2017:







Volunteers can be seen below planting trees on March 31st in a riparian buffer along Stroubles Creek:

