Chesapeake Bay TMDL Action Plan

Prepared in compliance with General Permit No. VAR 040097

DRAFT

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Norfolk State University, Virginia

Chesapeake Bay TMDL Action Plan

CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate 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."

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1. Introduction

1.1 Purpose

This Chesapeake Bay TMDL Action Plan documents how NSU (Norfolk State University) intends to meet the "Special Condition for the Chesapeake Bay TMDL" in Section I, Part C of the University's General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s).

NSU's most recent permit (VAR040097) was issued by the Virginia Department of Environmental Quality (DEQ) effective July 1, 2013 and will expire June 30, 2018.

NSU's MS4 permit requires the development and implementation of action plans for impaired waters where a Total Maximum Daily Load (TMDL) as directed by Virginia Department of Environmental Quality to treat for Pollutants of Concern POC, which include Total Nitrogen, Total Phosphorus and Total Suspended Solids. A TMDL establishes the maximum amount of a pollutant that can enter a water body without violating water quality standards.

A TMDL for the Chesapeake Bay was established by the U.S. Environmental Protection Agency in 2010. Pollutants of concern (POCs) identified for the Chesapeake Bay include total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). Virginia subsequently developed and adopted a Watershed Implementation Plan (WIP) that establishes the framework for meeting the Chesapeake Bay TMDL. The Virginia WIP states that MS4 permit holders will implement a phased approach for meeting required reductions over three five-year permit cycles in accordance with the following: 5% of required reductions by the end of the first permit cycle (June 30, 2018); a total of 40% of required reductions by the end of the second permit cycle; and, 100% of required reductions by the end of the third permit cycle.

This Chesapeake Bay TMDL Action Plan establishes the 5% reduction target and the means and methods for achieving the reduction target in accordance with the MS4 permit and the Chesapeake Bay TMDL Special Condition Guidance developed by DEQ (Guidance Memo No 14-2012).[1]

1.2 Summary of Required Reductions and Means and Methods to Achieve Required Reductions

In accordance with the MS4 permit, NSU must calculate reductions required from existing sources as of June 30, 2009 (Section 4) and then calculate offsets to account for increases in pollutant loads due to new sources initiating construction between July 1, 2009 and June 30, 2014 (Section 6) and grandfathered projects beginning construction after July 1, 2014 (Section 7). NSU must then identify the means and methods to achieve the required POC reductions accordingly.

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NSU calculates that the following reductions must be achieved from existing sources as of June 30, 2009: 4.24 pounds for TN, 0.87 pounds for TP, and 519.55 pounds for TSS. NSU will achieve the reductions through a combination of means and methods as detailed in Section 5. Means and methods include:

- NSU's credit for implemented and planned stormwater management projects within its boundary;
- Redevelopment between July 1, 2009 and June 30, 2014 that resulted in a decrease in pollutant loads; and,
- Street sweeping.

These practices are anticipated to result in the following POC reductions: 24.00 pounds for TN, 7.83 pounds for TP, and 4,086.81 pounds for TSS. These practices exceed required reductions from existing sources.

NSU will also take credit for any additional redevelopment after June 30, 2014 that results in a decrease in pollutant loads, and additional means and methods that may be implemented during the current permit cycle in accordance with DEQ's Chesapeake Bay TMDL Special Conditions Guidance (Section 5.6). Any credits will be documented in NSU's annual report to DEQ.

During the period of July 1, 2009 through June 30, 2014, eleven projects with a land disturbance of one acre or greater resulted in an increase in pollutant loads. NSU has to account for required pollutant removal, however is able to take credit for reductions from existing and planned BMPs. The total credits from existing and planned sources are 24.47 pounds for TN, 7.25 pound for TP, and 3,650.75 pounds for TSS. NSU will apply excess credit from reductions required for existing sources to offset required reductions from new sources. No grandfathered projects requiring offsets have been identified by the NSU. As demonstrated in Table 1A, total existing and planned credits exceed total reduction requirements.

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Table 1A– Summary of Required Reductions and Means and Methods to Achieve Required Reductions

	Total Nitrogen (lbs)	Total phosphorus (lbs)	Total Suspended Solids (lbs)
Required reductions from existing sources	4.24	0.87	519.55
-Means and methods from section 5	28.67	8.93	4,190.75
=Excess credit from existing sources	24.43	8.06	3,671.20
Required new source offset	0.07	0.03	24.49
-Excess credit from existing sources	24.43	8.06	3,671.20
=Remaining excess credit after accounting for new source offsets	24.36	8.03	3,646.71
Required grandfathered assets	0	0	0
Remaining excess credit after accounting for grandfathered source offsets	24.36	8.03	3,646.71

1.3 Permit Compliance Crosswalk

Table 1B provides each of the requirements of NSU's MS4 permit and the specific section where the requirement is addressed in this Chesapeake Bay TMDL Action Plan.

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Table 1B – Action Plan and Permit Compliance Crosswalk

NSU Action Plan Section	Element from DEQ TMDL Special Condition Guidance	MS4 Permit	MS4 Permit Requirement
Section 2.1	Part VI.1 – Current Program and Existing Legal Authority	Section I.C.2.a(1)	A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition.
Section 2.2	Part VI.2 – New or Modified Legal Authority	Section I.C.2.a(2)	The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and inter-jurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition.
Section 3	Part VI.3 – Means and Methods to Address Discharges from New Sources	Section I.C.2.a(3)	The means and methods that will be utilized to address discharges into the MS4 from new sources.
Section 4	Part VI.4 – Estimated Existing Source Loads and Calculated Total Pollutants of Concern (POC) Required Reductions	Section I.C.2.a(4) and Section I.C.2.a(5)	An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable versions of Tables 2 a-d in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the
NSU Action Plan Section	**Element from DEQ TMDL Special Condition Guidance**	**MS4 Permit**	**MS4 Permit Requirement**
Section 4			MS4 on June 30, 2009 and the 2009 Edge of Stream (EOS) loading rate. A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable versions of Tables 3 a-d in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For the purpose of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.
Section 5	Part VI.5 – Means and Methods to Meet the Required Reductions and Schedule	Section I.C.2.a(6)	The means and methods, such as best management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2.a(5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.

Section 6	Part VI.6 – Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014	Section I.C.2.a(7)	The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014 that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post- development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.
Section 7	Part VI.7 – Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014	Section I.C.2.a(8)	The means and methods to offset the increased loads from projects as grandfathered in accordance with 4VAC50-60-48 that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.
Section 8	Part VI.8 – List of Future Projects, and Associated Acreage that Qualify as Grandfathered	Section I.C.2.a(10)	A list of future projects and associated acreage that qualify as grandfathered in accordance with 4VAC50-60-48.
NSU Action Plan Section	**Element from DEQ TMDL Special Condition Guidance**	**MS4 Permit**	**MS4 Permit Requirement**
Section 9	Part VI.9 – Estimated Expected Cost to Implement Necessary Reductions	Section I.C.2.a(10)	An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle.
Section 10	Part VI.10.a&b – Public Comments on Draft Action Plan	Section I.C.2.a(12)	An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan. A list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

2. Current Program and Legal Authority

2.1 Current Program and Existing Legal Authority

NSU has adopted an MS4 Program Plan that documents implementation of all MS4

permit requirements, including the programmatic and legal authorities required to meet the "Special Condition for the Chesapeake Bay TMDL." The full MS4 Annual Report can be found at https://www.nsu.edu/Assets/websites/facilities-management/forms/NSU%20-%20%20ANNUAL%20MS4%20REPORT%202014%20Complete%20-%20REVISED%202015-04-06.pdf Table 2A provides a summary of elements of the six minimum control measures (MCMs) implemented by NSU under the MS4 permit that relate to controlling total nitrogen, total phosphorus, and total suspended solids.

Table 2A – MS4 Program Plan Components Related to Meeting the Chesapeake Bay TMDL

Minimum Control Measure	MS4 Program Plan Elements Related to Controlling Total Nitrogen, Total Phosphorus, and Total Suspended Solids
Public Education and Outreach on Stormwater Impacts.	This measure requires the University to educate the public about the potential impact of stormwater discharges from the University. The University will show the impact it has on surrounding bodies of water, emphasizing the precautions to be taken to reduce pollutants in stormwater runoff. The University considers the campus community as its public and a critical stakeholder in the University's Stormwater Management Plan. Staff receive work orders that directly address physical conditions that can be the source of stormwater pollutants. Multiple Best Management Practices (BMP)s are associated with this Minimum Control Measure. All BMPs defined under this measure were implemented during the first permitting year and continuously since that time.
Public Involvement and Participation	This measure requires the University to encourage the public to become involved in the protection of stormwater runoff and related sewer systems. As a State University and a campus open to the general public, NSU has provided program basics on its website, conferred with faculty, and made presentations to students. Multiple BMPs are associated with this Minimum Control Measure. All BMPs defined under this measure were
Minimum Control Measure	**MS4 Program Plan Elements Related to Controlling Total Nitrogen, Total Phosphorus, and Total Suspended Solids**
Public Involvement and Participation	implemented during the first permitting year and continuously since that time, unless specifically stated otherwise.
Illicit Discharge Detection and Elimination	This measure requires the University to detect and eliminate illicit discharges into the MS4. The University is aware of potential sources of illicit discharges and has made their elimination a high priority. The following discharges are exempt from discharge prohibitions established by this Minimum Control Measure: • Water line flushing or other potable water sources • Landscape irrigation or lawn watering • Diverted stream flows • Rising ground water • Ground water infiltration to storm drains • Uncontaminated pumped ground water • Foundation or footing drains (not including active groundwater dewatering systems) • Crawl space pumps • Air conditioning condensation • Springs • Natural riparian habitat or wetland flows • Swimming pools (if de-chlorinated - typically less than one PPM chlorine) • Firefighting activities • Any other water source not containing Pollutants. Materials used by the equipment maintenance staff, vegetative nutrients, housekeeping cleansers, chemicals used in academic and research laboratories have been identified as

	potential pollutants. Separate procedures have been established for each of these exposures. Multiple BMPs are associated with this Minimum Control Measure. All BMPs defined under this measure were implemented during the first permitting year and continuously since that time, unless specifically stated otherwise.
Construction Site Stormwater Runoff Control	The University has adopted state mandated procedures to reduce pollutants in stormwater runoff from entering the stormwater inlets on campus during construction projects. As of July 1, 2009, Virginia Stormwater Management Laws have changed. Public institutions of higher education will continue to have stormwater management plans reviewed by DCR; however, DCR will no longer review Erosion and Sediment Control Plans. The two options for Erosion and Sediment Control review are: implementation of an internal Erosion and Sediment Control review process, or review by the locality. NSU has reviewed both options and will submit Erosion and Sediment Control Plans to the City of Norfolk for review. It should be noted projects submitted to DCR prior to July 1, 2009, will continue to be inspected by the Department.
Post-Construction Stormwater Management	The University will develop, implement and enforce procedures to address stormwater runoff from completed construction sites. Multiple BMPs are associated with this Minimum Control Measure. All BMPs defined under this measure will be implemented beginning in the first permit year.
Pollution Prevention and Good Housekeeping for Municipal Operations	The University has been performing functions that contribute to the prevention of pollutants from entering stormwater inlets and adversely affecting the natural environment. Potential sources of stormwater pollution include oil/grease stains in parking lots, fuel spills, lawn & garden nutrients on pavement, exposed bulk storage piles and common floatable trash. It is recognized greater documentation, training and expansion in some areas will contribute to an increase in the efficiency of the overall program. Multiple BMPs are associated with this Minimum Control Measure. All BMPs defined under this measure will be implemented beginning in the first permit year.

2.2 New or Modified Legal Authority

After review of NSU's existing MS4 Program Plan and legal authorities, NSU finds that no additional legal authorities are required for compliance with the "Special Condition for the Chesapeake Bay TMDL."

3. Means and Methods to Address Discharges from New Sources

NSU must identify and implement the means and methods necessary to address discharges into the MS4 from new sources. Any new source that disturbs one acre or greater and utilizes an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities must be offset in accordance with Section I.C.2.a(3) of the permit. Between July 1, 2009 and June 30, 2014, NSU utilized an average land cover condition of 53.25%. The total offsets required to be addressed by this plan are established in Section 6.

NSU has adopted stringent new stormwater quality requirements (Norfolk City Code Chapter 41.1 "Stormwater Management") that meet or exceed the state's minimum requirements for discharges from new sources. NSU was approved as a Virginia Stormwater Management Program (VSMP) by DEQ on May, 2013. The new requirements, which became effective July 1, 2014, meet the requirements of the Virginia Stormwater Management Act (§62.1-44.15:24 et seq, Code of Virginia), the Erosion and Sediment Control Act (§62.1-44.15:51 et seq, Code of Virginia), the Chesapeake Bay Preservation Act (§62.1-44.15:67 et seq, Code of Virginia), and their attendant regulations.

NSU's ordinance applies to any land-disturbing activity 2,500 square feet and greater, regardless of land use type, which is more stringent than the one acre threshold required in the permit and the Virginia Stormwater Management Regulations (9VAC25-870). All new development must meet a standard of 0.41 pounds of phosphorus per acre per year. All redevelopment must reduce the phosphorus load by 20% if the land disturbance is one acre or greater or by 10% if the land disturbance is less than one acre (not to exceed the 0.41 standard for new development). The standard of 0.41 pounds of phosphorus per acre per year is mandated by the Virginia Stormwater Management Regulations, and according to DEQ's guidance meets the requirement for no-net-increase from new sources.

A full copy of the stormwater management ordinance NSU has adopted can be found at the following website:
https://www.municode.com/library/va/norfolk/codes/code_of_ordinances?nodeId=COCI_CH41.1STMA

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

The following sections describe the methodology used by NSU to estimate existing POC source loads. In accordance with the MS4 permit, NSU must estimate the annual POC loads discharged from existing sources as of June 30, 2009, based on the 2009 progress run. Completed calculation tables from the permit are included in Table 4A.

4.1 MS4 Service Area Delineation Methodology

NSU's Campus property boundary and Stormwater Master Plan was utilized (including MS4 outfalls) were used to delineate NSU's MS4 boundary and create an MS4 boundary polygon layer. Artificial conveyances and natural drainage features were thoroughly reviewed by engineers and planners in order to accurately account for storm sewer drainage areas and determine break points between NSU's drainage system and the City of Norfolk.

NSU's stormwater system ties into the City of Norfolk's system at 12 outfall locations, where it is then conveyed via. an underground piped system that discharges into the Elizabeth River.

There is interconnections with the City of Norfolk MS4. NSU has notified the City of Norfolk of its interconnection.

4.2 Pervious and Impervious Surface Delineation Methodology

NSU's Campus ACAD Stormwater Master Plan was used to determine NSU's regulated urban impervious and regulated urban pervious acres. The Campus Stormwater Master Plan has been continually updated over the past 5 years as new development projects have taken place. The plan contains the entire campus and illustrates all the impervious cover surfaces including buildings, roads, parking lots, sidewalks, recreational surfaces, and other similar features.

To calculate the 2009 impervious regulated area, the ACAD stormwater master plan from 2009 was utilized to determine the impervious cover features by clipping all impervious surfaces within the MS4 boundary, with the resulting acres totaled. Regulated pervious acres were calculated by subtracting the regulated impervious acres from the total MS4 acres.

Map 4A – NSU Campus MS4 Service Area Delineation

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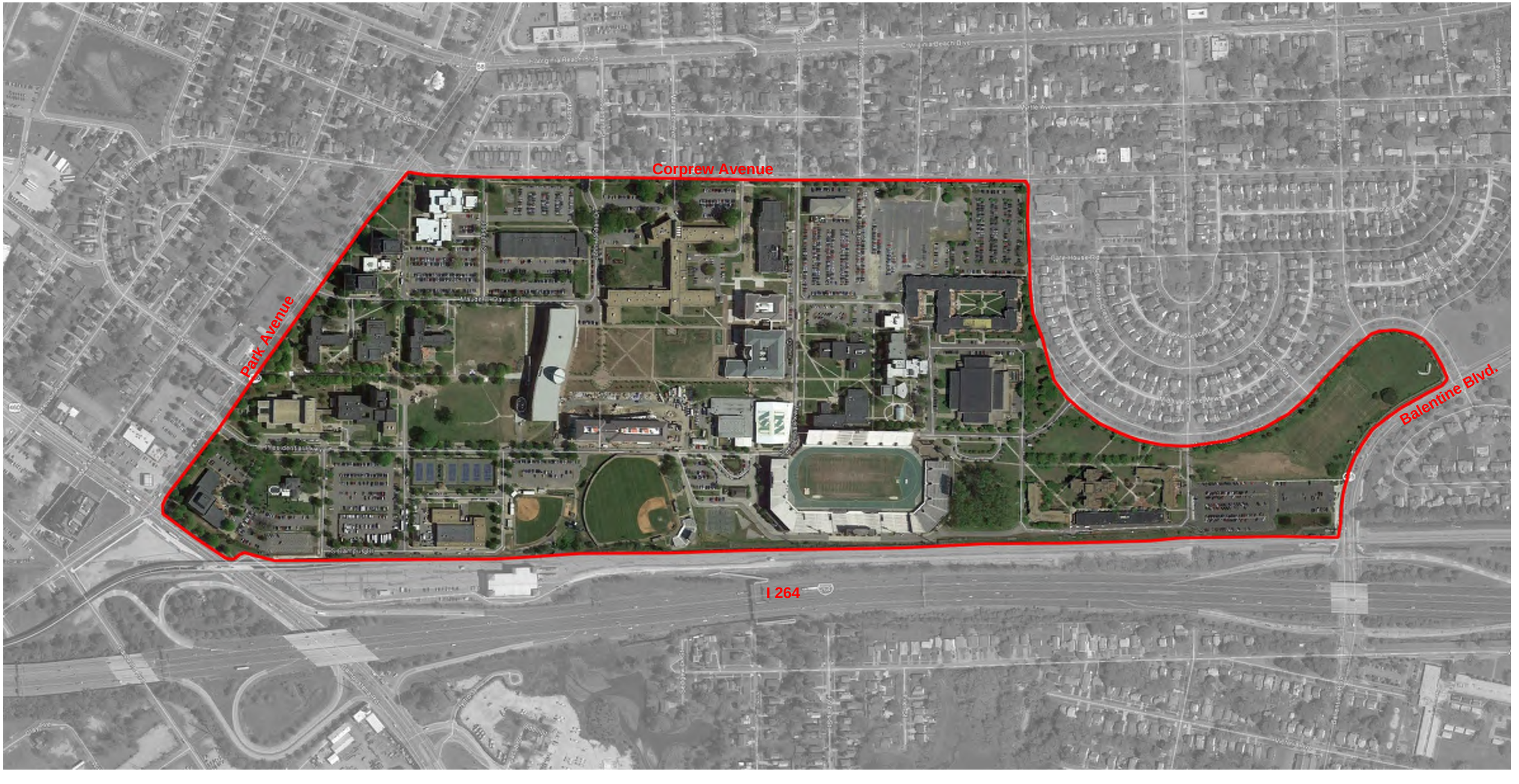
Map 4A – NSU Campus MS4 Service Area Delineation



4.3 Estimated Existing Source Loads

NSU must estimate the total existing source loads for total nitrogen, total phosphorus, and total suspended solids as of June 30, 2009 based on the 2009 Chesapeake Bay Model progress run and using 2009 Edge of Stream (EOS) loading rates. Since NSU is within the James River Basin watershed, the 2009 EOS loading rates from Table 2a of the MS4 permit must be utilized. NSU has a total of 138 acres served by the regulated MS4.

Table 4A presents the estimated existing source loads in accordance with the MS4 permit and the Chesapeake Bay TMDL Special Conditions Guidance.

Table 4A – Estimated Existing Source Loads

Source	Pollutant	Total Existing Acres Served by MS4 6/30/09	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC Load Based on 2009 Progress Run	
Regulated Urban Impervious	Nitrogen	73.63	9.39	691.39	1143.15
Regulated Urban Pervious		64.63	6.99	451.76	
Regulated Urban Impervious	Phosphorus	73.63	1.76	129.59	161.90
Regulated Urban Pervious		64.63	0.5	32.32	
Regulated Urban Impervious	Total Suspended Solids	73.63	676.94	49843.09	56,375.89
Regulated Urban Pervious		64.63	101.08	6532.80	

4.4 Required Reductions from Existing Source Loads

The reductions from the estimated existing source loads (loads in existence as of June 30, 2009) in Table 4A must be calculated using Table 3a of the MS4 permit. Table 4B shows the completed calculations from Table 3a (Calculation Sheet for Determining Total POC Reductions Required During this Permit Cycle for the James River Basin *Based on Chesapeake Bay Program Watershed Model Phase 5.3.2) of the permit.

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Table 4B – Required Reductions from Estimated Existing Source Loads

Source	Pollutant	Total Existing Acres Served by MS4	First Permit Cycle required Reduction in Loading rate (lbs/acre)	Total Reduction Required First Permit Cycle (lbs)	
Regulated Urban Impervious	Nitrogen	73.63	0.04	2.95	4.24
Regulated Urban Pervious		64.63	0.02	1.29	
Regulated Urban Impervious	Phosphorus	73.63	0.01	0.74	0.87
Regulated Urban Pervious		64.63	0.002	0.13	
Regulated Urban Impervious	Total Suspended Solids	73.63	6.67	491.11	519.55
Regulated Urban Pervious		64.63	0.44	28.44	

5. Means and Methods to Meet Required Reductions and Schedule

This section describes the means and methods by which NSU will achieve the 5% reductions required for source loads in existence as of June 30, 2009 as calculated in Section 4. NSU's reductions will be achieved through a combination of credit for projects with existing BMPs, redevelopment projects (Section 5.1), and street sweeping (Section 5.2). Finally, NSU reserves the right to take credit for additional means and methods that may be implemented during the current permit cycle in accordance with DEQ's Chesapeake Bay TMDL Special Conditions Guidance (Section 5.3).

5.1 Redevelopment Credit Projects

NSU will take credit for projects implemented after July 1, 2009 that are located within the Campus's jurisdictional boundary. NSU will also take credit for projects planned to be completed prior to the end of this permit cycle. This plan includes three such projects, three dry extended detention pond conversions to Bio-Retention. Information on implemented and planned projects is included in Appendix B in accordance with the Chesapeake Bay TMDL Special Condition Guidance.

In accordance with the Chesapeake Bay TMDL Special Condition Guidance NSU

may receive credit for pollutant reductions from redevelopment regardless of the initial land cover condition of the site. This applies to any redevelopment project initiated after July 1, 2009. Eleven qualifying projects have been identified by NSU, which are included in Appendix B. For projects completed prior to July 1, 2014, NSU used the simple method to determine the amount of TP credit and used Table 4 from the MS4 permit to determine the equivalent credit for TN and TSS.

Table 5A – Summary of Reductions from Redevelopment

	Total Nitrogen Reduction (lbs)	Total Phosphorus Reduction (lbs)	Total Suspended Solids Reduction (lbs)
Implemented Reductions	19.09	5.59	2890.21
Planned Reductions	5.38	1.66	760.54
Total Reductions	24.47	7.25	3650.75

5.2 Street Sweeping

NSU will take credit for its street sweeping program to meet required POC reductions. In its MS4 Fiscal Year 2014 Annual Report, NSU reported that it collected approximately 2,400 pounds of debris. In future years, NSU will maintain this level of effort and refine documentation of the amount of debris collected. DEQ's Chesapeake Bay TMDL Special Conditions Guidance provides the specific steps required for determining credit for street sweeping programs as well as efficiencies for reducing TN, TP, and TSS.2 Table 5B summarizes reductions achieved through NSU's street sweeping program.

Table 5B – Summary of Reductions from Street Sweeping

Pollutant	Pounds of Debris Collected	Dry Weight Factor)	Dry Pounds Collected	Removal Efficiency	Pollutant Reduction (lbs)
Total Nitrogen	2400	0.7	1680	0.0025	4.2
Total Phosphorus	2400	0.7	1680	0.001	1.68
Total Suspended Solids	2400	0.7	1680	0.3	540

5.3 Additional Means and Methods

NSU reserves the right to implement and take credit for additional creditable facilities or practices as provided for in the Chesapeake Bay TMDL Special Condition Guidance. The guidance document specifically references the work of the Chesapeake Bay Urban Stormwater Workgroup, which includes credits for urban nutrient management practices such as rainwater harvesting, downspout disconnection, permeable hard-scape, tree planting, and impervious cover removal. Reductions achieved will be documented to DEQ in NSU's annual report.

5.4 Compliance Demonstration

Tables 5D through 5F demonstrate how NSU will meet the required reductions from Section 4 for each POC with the means and methods described in Sections 5.1 through 5.5.

Table 5D – Compliance Demonstration for Total Nitrogen

Total Required Reductions (Table 4B)	Total Reductions Achieved (Table 5A and Table 5B)	Total Excess Credit Remaining (lbs.)	Percentage Target Achieved
4.24	24.47+4.2= 28.67	24.43	676%

Table 5E – Compliance Demonstration for Total Phosphorus

Total Required Reductions (Table 4B)	Total Reductions Achieved (Table 5A and Table 5B)	Total Excess Credit Remaining (lbs.)	Percentage Target Achieved
0.87	7.25+1.68=8.93	8.06	1026%

Table 5E – Compliance Demonstration for Total Suspended Solids

Total Required Reductions (Table 4B)	Total Reductions Achieved (Table 5A and Table 5B)	Total Excess Credit Remaining (lbs.)	Percentage Target Achieved
519.55	3650.75+540 = 4190.75	3,646.71	807%

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6. Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014

NSU must calculate any new POC loads between July 1, 2009 and June 30, 2014 that were due to water quality requirements less stringent than 16% impervious cover. NSU must then achieve a 5% reduction in the new loads during this permit cycle. In accordance with the DEQ guidance, NSU used the simple method to determine the excess TP that needs to be offset. Table 4 from the MS4 permit was used to determine the equivalent reduction required for TN and TSS. NSU has not identified any new projects that meet this criteria and therefore no offset is required.

6.1 Estimated New Source Loads

NSU must estimate the total new source loads for total nitrogen, total phosphorus, and total suspended solids between July 1, 2009 and June 30, 2014. NSU had Four (4) projects that resulted in a 3.61 acre increase in impervious area to the Campus (2.62% increase from 2009 to 53.25%). These projects accounted for required Virginia Stormwater management; however are also required to provide an additional 5% pollutant removal The increase in pollutant loads are based on the 2009 Chesapeake Bay Model progress run and using 2009 Edge of Stream (EOS) loading rates. Since NSU is within the James River Basin watershed, the 2009 EOS loading rates from Table 2a of the MS4 permit must be utilized.

Table 6A –Incremental Impervious Acreage and Percentage Increase.

Total Acres Served by MS4 7/1/09-6/30/14	Total Impervious Acres within MS4 as of 6/30/09	Percentage of Total Existing Impervious Area	Increased Impervious Acres from New Sources	Total Impervious Acres with New Sources	Percentage of Total Impervious Area with New Sources
138.26	73.63	53,25 %	3.61	77.24	55.87%

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Table 6B represents the estimated additional source loads in accordance with the MS4 permit and the Chesapeake Bay TMDL Special Conditions Guidance.

Table 6B – Estimated total additional POC from New Source Loads

Source	Pollutant	Total Additional Acres Served by MS4 7/1/09-6/30/14	2009 EOS Loading Rate (lbs/acre)	Estimated Total POC New Source Load Based on 2009 Progress Run	
Regulated Urban Impervious	Nitrogen	3.61	9.39	33.90	8.67
Regulated Urban Pervious		-3.61	6.99	-25.23	
Regulated Urban Impervious	Phosphorus	3.61	1.76	6.35	4.54
Regulated Urban Pervious		-3.61	0.5	-1.81	
Regulated Urban Impervious	Total Suspended Solids	3.61	676.94	2,443.75	2,078.86
Regulated Urban Pervious		-3.61	101.08	-364.89	

Table 6A – Estimated Additional New Source Loads

6.2 Required Reductions from New Source Load

The reductions from the estimated existing source loads (loads in existence as of June 30, 2009) in Table 6A must be calculated using Table 3a of the MS4 permit. Table 6B shows the completed calculations from Table 3a (Calculation Sheet for Determining Total POC Reductions Required During this Permit Cycle for the James River Basin *Based on Chesapeake Bay Program Watershed Model Phase 5.3.2) of the permit.

Table 6C – Reduction Required from Additional New Source Loads

Estimated POC Load from New Sources (Table 6B)		5% Required Reduction of Pollutant from New Source
Nitrogen	8.67	0.43
Phosphorus	4.54	0.23
Total Suspended Solids	2078.86	103.94

6.3 Compliance Demonstration

Tables 6D through 6F demonstrate how NSU will meet the required reductions from Section 4 for each POC with excess credit from means and methods described in Sections 5.1 through 5.5.

Table 6D – Compliance Demonstration for Total Nitrogen

Required Reductions (Table 6C)	**Total Excess Credits Remaining (lbs.) from Table 5D**	**Final Excess Credits Remaining (lbs.)**
0.43	24.43	24.43 – 0.43 = 24.00

Table 6E – Compliance Demonstration for Total Phosphorus

Required Reductions (Table 6C)	Total Excess Credits Remaining (lbs.) from Table 5D	Final Excess Credits Remaining (lbs.)
0.23	8.06	8.06 – 0.23 = 7.83

Table 6F– Compliance Demonstration for Total Suspended Solids

Required Reductions (Table 6C)	Total Excess Credits Remaining (lbs.) from Table 5D	Final Excess Credits Remaining (lbs.)
103.94	4190.75	4,190.75 – 103.94= 4,086.81

7. Means and Methods to Offset Increased Loads from Grandfathered Projects Beginning Construction after July 1, 2014

NSU must calculate new POC loads from grandfathered projects initiating construction after July 1, 2014 and disturbing one acre or greater. Unlike POCs from sources in Section 5 and Section 6, loads from grandfathered projects must be 100% offset prior to the completion of the project. NSU has not identified any existing projects that meet this criteria and therefore no offset is required.

8. List of Future Projects Qualifying as Grandfathered

NSU must list projects in addition to those in Section 7 that qualify as grandfathered in accordance with 9VAC25-870-48. No such projects have been identified for NSU.

9. Estimated Cost of Compliance

Table 9A provides a summary of the estimated maintenance cost for projects listed in Section 5. These projects exceed the POC reduction requirements of this permit cycle. The cost for each implemented BMP is listed within Appendix B.

Table 9A – Estimated Cost of Compliance

Strategy	Cost Explanation	Estimated Cost
Street Sweeping	Annual budgeted cost of street sweeping based on adopted capital budget.	$12,500year
Existing BMPs Project	BMP maintenance	$25,000/year

Ensuring an adequate funding source for meeting the Chesapeake Bay TMDL is a key component. The University capital maintenance fund allows for stormwater management, including Chesapeake Bay TMDL compliance. The University is seeking grants to allow for additional rehabilitation/conversion of existing BMPs for higher pollutant efficiency removal to meet future permit cycle pollutant removal goals.

10. Public Comment Plan

The time frame for the public comment process for NSU's Chesapeake Bay TMDL Action Plan is being determined. It will include a work session. The opportunity for public comment will be announced on NSU's web page and through NSU's social media outlets. The draft plan will be posted on NSU's web site.

Public comments will be summarized in the table below and will be taken into consideration in developing the final plan.

Table 10A – Public Comments

Appendix A

Table Appendix A1

Reduction Credit From Existing BMPs Summary Chart

BMPs		TN	
		Efficiency	**Existing Credit**
BMP 1	Bioretention	25	3.46
BMP 2	Vortechnics	5	0.46
BMP 3	Grass Swale	10	0.44
BMP 4	Dry Extended Detention	20	1.75
BMP 5	BioRetention	25	2.70
BMP 6	Bio Retention	25	0.31
BMP 7	Wet Retention	20	3.47
BMP 8	BioRetention	25	1.08
BMP 9	Bioretention	25	3.25
BMP 10	Cistern/Bioretention	25	1.71
BMP 11	Bioretention	25	0.47
	Total		**19.09**

BMPs		TP	
		Efficiency	**Existing Credit**
BMP 1	Bioretention	45	0.80
BMP 2	Vortechnics	10	0.17
BMP 3	Grass Swale	10	0.08
BMP 4	Dry Extended Detention	20	0.33
BMP 5	Bioretention	45	0.82
BMP 6	Bio retention	45	0.10
BMP 7	Wet Retention	45	1.24
BMP 8	Bioretention	45	0.36
BMP 9	Bioretention	45	0.93
BMP 10	Cistern/Bioretention	45	0.58
BMP 11	Bioretention	45	0.16
	Total		**5.59**

BMPs		TS	
		Efficiency	Existing Credit
BMP 1	Bioretention	55	326.31
BMP 2	Vortechnics	10	66.34
BMP 3	Grass Swale	50	159.08
BMP 4	Dry Extended Detention	60	377.73
BMP 5	Bioretention	55	373.86
BMP 6	Bio retention	55	48.40
BMP 7	Wet retention	60	605.02
BMP 8	Bioretention	55	171.27
BMP 9	Bioretention	55	415.95
BMP 10	Cistern/Bioretention	55	271.79
BMP 11	Bioretention	55	74.46
	Total		**2,890.21**

Table Appendix A2

Reduction Credit From Proposed BMPs Summary Chart

BMPs		TN		TP		TS	
		Efficiency	Credit	Efficiency	Existing Credit	Efficiency	Credit
BMP 12	Bioretention	25	3.03	45	0.87	55	388.22
BMP 13	Bioretention	25	2.35	45	0.79	55	372.32
	Total		**5.38**		**1.66**		**760.54**

Table Appendix A3

Total Reduction from Implemented and Planned Projects

	TN Removed	TP Removed	TSS Removed
Subtotal POCs Removed	24.47	7.25	3,650.75

Appendix B

Detailed Project List

Table Appendix B1 – Reductions from Projects Located in NSU Implemented on or After July 01, 2009

Project Name: BMP 1 - Student Center/Godwin Hall Bioretention 1						
Project Description:						
						
Date Installed	**Type**	**Imp. Acres Treated**	**Total Acres Treated**	**Runoff Captured**	**Unit**	**Amount Applied**
2009	Bioretention	0.73	1.73			1.73
Latitude	**Longitude**	**HUC**	**TN Efficiency**	**TP Efficiency**	**TSS Efficiency**	**Efficiency Unit**
36.848623	-76.262582	JL54	25	45	55	%
TN Removed	**TP Removed**	**TSS Removed**	**Calculation Method / Efficiency Source**		**Cost of BMP Construction**	
3.46	0.80	326.31	Chesapeake Bay program		-	

BMP 1	**Student Center/Godwin Hall Bioretention 1**			
Pervious	1.00	ac.		
Impervious	0.73	ac.		
Nitrogen Reduction				
For Impervious	0.73	9.39 lb TN/ac/yr	6.82	lbs TN/yr
For Pervious	1.00	6.99 lb TN/ac/yr	7.01	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	1.71	lbs TN/yr		
For Pervious	1.75	lbs TN/yr		
Total Nitrogen reduction	**3.46**	**lbs TN/yr**		
Phosphorous Reduction				
For Impervious	0.73	1.76 lb TP/ac/yr	1.28	lbs TP/yr
For Pervious	1.00	0.5 lb TP/ac/yr	0.50	lbs TP/yr
Multiply by efficiency	0.45			
For Impervious	0.58	lbs TP/yr		
For Pervious	0.23	lbs TP/yr		
Total Phosphorous reduction	**0.80**	**lbs TP/yr**		
Total Suspended Solid Reduction				
For Impervious	0.73	676.94 lb TSS/ac/yr	491.86	lbs TSS/yr
For Pervious	1.00	101.08 lb TSS/ac/yr	101.42	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	270.53	lbs TSS/yr		
For Pervious	55.78	lbs TSS/yr		
Total TSS reduction	**326.31**	**lbs TSS/yr**		

Project Name: BMP 2 - Nursing Classroom Vortechnics

Project Description:

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2009	Vortechincs	0.98	0.98			0.98
Latitude	**Longitude**	**HUC**	**TN Efficiency**	**TP Efficiency**	**TSS Efficiency**	**Efficiency Unit**
36.847599	-76.262777	JL54	5	10	10	%
TN Removed	**TP Removed**	**TSS Removed**	**Calculation Method / Efficiency Source**		**Cost of BMP Construction**	
0.46	0.17	66.34	Chesapeake Bay Program		-	

BMP 2	**Nursing Classroom Vortechnics**			
Pervious	0.00	ac.		
Impervious	0.98	ac.		
Nitrogen Reduction	Area			
For Impervious	0.98	9.39 lb TN/ac/yr	9.20	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.05			
For Impervious	0.46	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**0.46**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.98	1.76 lb TP/ac/yr	1.72	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.10			
For Impervious	0.17	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.17**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.98	676.94 lb TSS/ac/yr	663.40	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.10			
For Impervious	66.34	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**66.34**	**lbs TSS/yr**		

Project Name: BMP 3 - Field House Grass Swale

Project Description: Field House Grass Swale

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2010	Grass Swale	0.47	0.47			0.47
Latitude	**Longitude**	**HUC**	**TN Efficiency**	**TP Efficiency**	**TSS Efficiency**	**Efficiency Unit**
36.846491	-76.261669	JL54	10	10	50	%
TN Removed	**TP Removed**	**TSS Removed**	**Calculation Method / Efficiency Source**		**Cost of BMP Construction**	
0.44	0.08	159.08	Chesapeake Bay Program		-	

BMP 3	**Field House Grass Swale**			
Pervious	0.00	ac.		
Impervious	0.47	ac.		
Nitrogen Reduction	Area			
For Impervious	0.47	9.39 lb TN/ac/yr	4.41	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.10			
For Impervious	0.44	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**0.44**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.47	1.76 lb TP/ac/yr	0.83	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.10			
For Impervious	0.08	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.08**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.47	676.94 lb TSS/ac/yr	318.16	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.50			
For Impervious	159.08	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**159.08**	**lbs TSS/yr**		

Project Name: BMP 4 - Hamm Fine Arts Retention/Detention

Project Description: Hamm Fine Arts Retention/Detention Basin

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2010	Retention/Detention	0.93	0.93			0.93

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.847799	-76.266346	JL54	20	20	60	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
1.75	0.33	377.73	Chesapeake Bay Program	-

BMP 4	**Hamm Fine Arts Retention/Detention Basin**			
Pervious	0.00			
Impervious	0.93			
Nitrogen Reduction	Area			
For Impervious	0.93	9.39 lb TN/ac/yr	8.73	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.20			
For Impervious	1.75	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**1.75**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.93	1.76 lb TP/ac/yr	1.64	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.20			
For Impervious	0.33	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.33**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.93	676.94 lb TSS/ac/yr	629.55	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.60			
For Impervious	377.73	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**377.73**	**lbs TSS/yr**		

Project Name: BMP 5 - Residence Hall 2 Bioretention

Project Description: Residence Hall 2 Bioretention

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2010	Bioretention	0.968	1.21			1.21

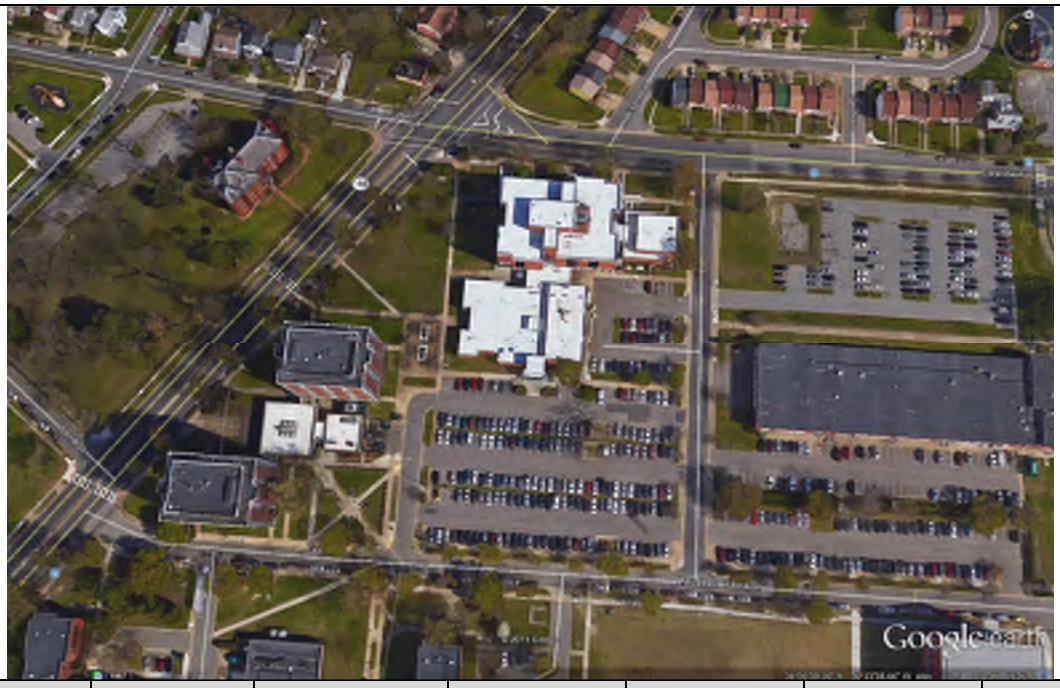
Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.849395	-76.259423	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
2.70	0.82	373.86	Chesapeake Bay Program	-

BMP 5	**Residence Hall 2 Bioretention**			
Pervious	0.24			
Impervious	0.97			
Nitrogen Reduction	Area			
For Impervious	0.97	9.39 lb TN/ac/yr	9.09	lbs TN/yr
For Pervious	0.24	6.99 lb TN/ac/yr	1.69	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	2.27	lbs TN/yr		
For Pervious	0.42	lbs TN/yr		
Total Nitrogen reduction	**2.70**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.97	1.76 lb TP/ac/yr	1.70	lbs TN/yr
For Pervious	0.24	0.5 lb TP/ac/yr	0.12	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.77	lbs TP/yr		
For Pervious	0.05	lbs TP/yr		
Total Phosphorous reduction	**0.82**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.97	676.94 lb TSS/ac/yr	655.28	lbs TSS/yr
For Pervious	0.24	101.08 lb TSS/ac/yr	24.46	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	360.40	lbs TSS/yr		
For Pervious	13.45	lbs TSS/yr		
Total TSS reduction	**373.86**	**lbs TSS/yr**		

Project Name: BMP 6 - West Living Center Block 1 Bioretention

Project Description: West Living Center Block 1 Bioretention



Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2011	Bioretention	0.13	0.13			0.13

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.849826	-76.266860	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
0.31	0.10	48.40	Chesapeake Bay Program	-

BMP 6	**West Living Center Block 1 Bioretention**			
Pervious	0.00			
Impervious	0.13			
Nitrogen Reduction	Area			
For Impervious	0.13	9.39 lb TN/ac/yr	1.22	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	0.31	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**0.31**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.13	1.76 lb TP/ac/yr	0.23	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.10	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.10**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.13	676.94 lb TSS/ac/yr	88.00	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	48.40	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**48.40**	**lbs TSS/yr**		

Project Name: BMP 7 - Wilson Renovation Wet Retention

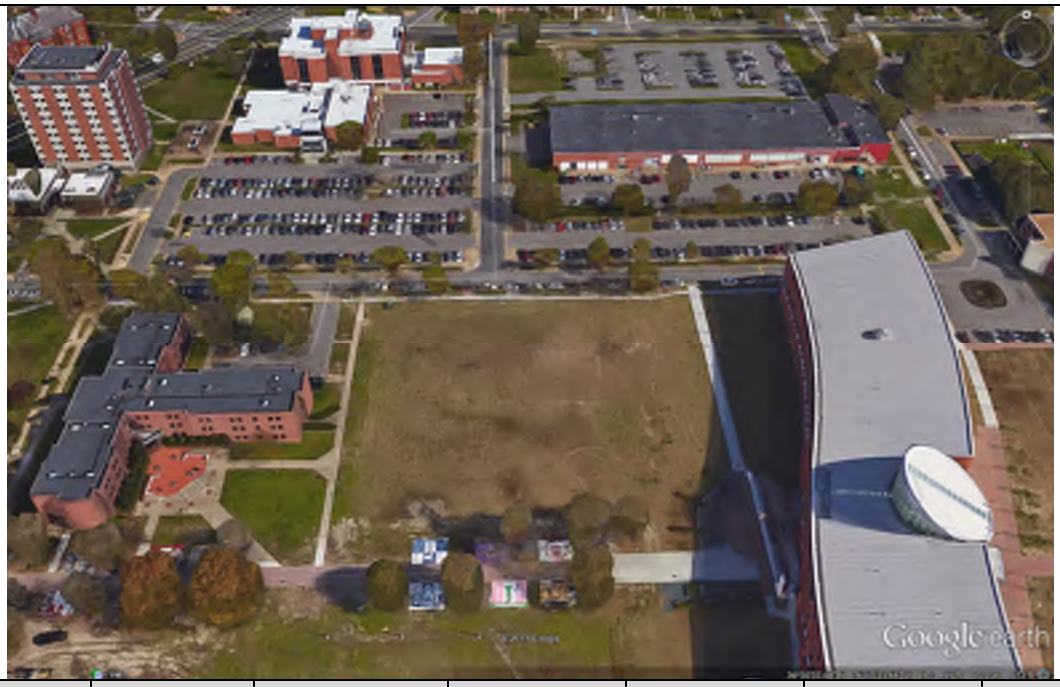
Project Description: Wilson Renovation upgrade Existing BMP

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2011	Upgrade Existing BMP	1.4	2.0			2.0
Latitude	**Longitude**	**HUC**	**TN Efficiency**	**TP Efficiency**	**TSS Efficiency**	**Efficiency Unit**
36.846259	-76.268326	JL54	20	45	60	%
TN Removed	**TP Removed**	**TSS Removed**	**Calculation Method / Efficiency Source**		**Cost of BMP Construction**	
3.47	1.24	605.02	Chesapeake Bay Program		-	

BMP 7	**Wilson Existing Dry Extended Detention**			
Pervious	0.60			
Impervious	1.40			
Nitrogen Reduction	Area			
For Impervious	1.40	9.39 lb TN/ac/yr	13.15	lbs TN/yr
For Pervious	0.60	6.99 lb TN/ac/yr	4.19	lbs TN/yr
Multiply by efficiency	0.20			
For Impervious	2.63	lbs TN/yr		
For Pervious	0.84	lbs TN/yr		
Total Nitrogen reduction	**3.47**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	1.40	1.76 lb TP/ac/yr	2.46	lbs TN/yr
For Pervious	0.60	0.5 lb TP/ac/yr	0.30	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	1.11	lbs TP/yr		
For Pervious	0.13	lbs TP/yr		
Total Phosphorous reduction	**1.24**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	1.40	676.94 lb TSS/ac/yr	947.72	lbs TSS/yr
For Pervious	0.60	101.08 lb TSS/ac/yr	60.65	lbs TSS/yr
Multiply by efficiency	0.60			
For Impervious	568.63	lbs TSS/yr		
For Pervious	36.39	lbs TSS/yr		
Total TSS reduction	**605.02**	**lbs TSS/yr**		

Project Name: BMP 8 - New Science Building Bioretention

Project Description: New Science Building Bioretention



Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2012	Bioretention	0.46	0.46			0.46

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.848846	-76.265665	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
1.08	0.36	171.27	Chesapeake Bay Program	-

BMP 8	**New Science Building Bioretention**			
Pervious	0.00			
Impervious	0.46			
Nitrogen Reduction	Area			
For Impervious	0.46	9.39 lb TN/ac/yr	4.32	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	1.08	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**1.08**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.46	1.76 lb TP/ac/yr	0.81	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.36	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.36**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.46	676.94 lb TSS/ac/yr	311.39	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	171.27	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**171.27**	**lbs TSS/yr**		

Project Name: BMP 9 - West Living Center Block #2 Bioretention

Project Description: West Living Center Block #2 Bioretention

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2012	Bioretention	1.05	1.5			1.5

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.848532	-76.268283	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
3.25	0.93	415.95	Chesapeake Bay Program	-

BMP 9	**West Living Center Block #2 Bioretention**			
Pervious	0.45			
Impervious	1.05			
Nitrogen Reduction	Area			
For Impervious	1.05	9.39 lb TN/ac/yr	9.86	lbs TN/yr
For Pervious	0.45	6.99 lb TN/ac/yr	3.15	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	2.46	lbs TN/yr		
For Pervious	0.79	lbs TN/yr		
Total Nitrogen reduction	**3.25**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	1.05	1.76 lb TP/ac/yr	1.85	lbs TN/yr
For Pervious	0.45	0.5 lb TP/ac/yr	0.23	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.83	lbs TP/yr		
For Pervious	0.10	lbs TP/yr		
Total Phosphorous reduction	**0.93**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	1.05	676.94 lb TSSac/yr	710.79	lbs TSS/yr
For Pervious	0.45	101.08 lb TSS/ac/yr	45.49	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	390.93	lbs TSS/yr		
For Pervious	25.02	lbs TSS/yr		
Total TSS reduction	**415.95**	**lbs TSS/yr**		

Project Name: BMP 10 - Echols Gymnasium Cistern and Bioretention

Project Description: Echols Gymnasium Cistern and Bioretention

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2014	Cistern / Bioretention	0.73	0.73			0.73

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.847997	-76.258634	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
1.71	0.58	271.79	Chesapeake Bay Program	-

BMP 10	**Echols Gymnasium Cistern/Bioretention**			
Pervious	0.00			
Impervious	0.73			
Nitrogen Reduction	Area			
For Impervious	0.73	9.39 lb TN/ac/yr	6.85	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	1.71	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**1.71**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.73	1.76 lb TP/ac/yr	1.28	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.58	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.58**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.73	676.94 lb TSS/ac/yr	494.17	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	271.79	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**271.79**	**lbs TSS/yr**		

Project Name: BMP 11 - Brown Memorial Hall Bioretention

Project Description: Brown Memorial Hall Bioretention

Date Installed	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2015	Bioretention	0.20	0.20			0.20

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.849656	-76.262894	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
0.47	0.16	74.46	Chesapeake Bay Program	-

BMP 11	**Brown Memorial Hall Bioretention**			
Pervious	0.00			
Impervious	0.20			
Nitrogen Reduction	Area			
For Impervious	0.20	9.39 lb TN/ac/yr	1.88	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	0.47	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**0.47**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.20	1.76 lb TP/ac/yr	0.35	lbs TN/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.45			
For Impervious	0.16	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.16**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.20	676.94 lb TSS/ac/yr	135.39	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	74.46	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**74.46**	**lbs TSS/yr**		

Table Appendix B2 – Reductions from Projects Planned to be Implemented During Current Permit Cycle

Project Name: BMP 12 - Robinson Technology Bioretention						
Project Description: Robinson Technology Bioretention						
						
Date Planned	**Type**	**Imp. Acres Treated**	**Total Acres Treated**	**Runoff Captured**	**Unit**	**Amount Applied**
2015	Bioretention	0.98	1.40			1.40
Latitude	**Longitude**	**HUC**	**TN Efficiency**	**TP Efficiency**	**TSS Efficiency**	**Efficiency Unit**
36.849599	-76.266306	JL54	25	45	55	%
TN Removed	**TP Removed**	**TSS Removed**	**Calculation Method / Efficiency Source**		**Cost of BMP Construction**	
3.03	0.87	388.22	Chesapeake Bay Program		-	

BMP 12	**Robinson Technology-Bioretention**			
Pervious	0.42			
Impervious	0.98			
Nitrogen Reduction	Area			
For Impervious	0.98	9.39 lb TN/ac/yr	9.20	lbs TN/yr
For Pervious	0.42	6.99 lb TN/ac/yr	2.94	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	2.30	lbs TN/yr		
For Pervious	0.73	lbs TN/yr		
Total Nitrogen reduction	**3.03**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	0.98	1.76 lb TP/ac/yr	1.72	lbs TP/yr
For Pervious	0.42	0.5 lb TP/ac/yr	0.21	lbs TP/yr
Multiply by efficiency	0.45			
For Impervious	0.78	lbs TP/yr		
For Pervious	0.09	lbs TP/yr		
Total Phosphorous reduction	**0.87**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	0.98	676.94 lb TSS/ac/yr	663.40	lbs TSS/yr
For Pervious	0.42	101.08 lb TSS/ac/yr	42.45	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	364.87	lbs TSS/yr		
For Pervious	23.35	lbs TSS/yr		
Total TSS reduction	**388.22**	**lbs TSS/yr**		

Project Name: BMP 13 - Additional Parking Bioretention

Project Description: Additional Parking Bioretention

Date Planned	Type	Imp. Acres Treated	Total Acres Treated	Runoff Captured	Unit	Amount Applied
2017	Bioretention	1.00	1.00			1.00

Latitude	Longitude	HUC	TN Efficiency	TP Efficiency	TSS Efficiency	Efficiency Unit
36.846987	-76.253376	JL54	25	45	55	%

TN Removed	TP Removed	TSS Removed	Calculation Method / Efficiency Source	Cost of BMP Construction
2.35	0.79	372.32	Chesapeake Bay Program	-

BMP 13	**Additional Parking Bioretention**			
Pervious	0.00			
Impervious	1.00			
Nitrogen Reduction	Area			
For Impervious	1.00	9.39 lb TN/ac/yr	9.39	lbs TN/yr
For Pervious	0.00	6.99 lb TN/ac/yr	0.00	lbs TN/yr
Multiply by efficiency	0.25			
For Impervious	2.35	lbs TN/yr		
For Pervious	0.00	lbs TN/yr		
Total Nitrogen reduction	**2.35**	**lbs TN/yr**		
Phosphorous Reduction	Area			
For Impervious	1.00	1.76 lb TP/ac/yr	1.76	lbs TP/yr
For Pervious	0.00	0.5 lb TP/ac/yr	0.00	lbs TP/yr
Multiply by efficiency	0.45			
For Impervious	0.79	lbs TP/yr		
For Pervious	0.00	lbs TP/yr		
Total Phosphorous reduction	**0.79**	**lbs TP/yr**		
Total Suspended Solid Reduction	Area			
For Impervious	1.00	676.94 lb TSS/ac/yr	676.94	lbs TSS/yr
For Pervious	0.00	101.08 lb TSS/ac/yr	0.00	lbs TSS/yr
Multiply by efficiency	0.55			
For Impervious	372.32	lbs TSS/yr		
For Pervious	0.00	lbs TSS/yr		
Total TSS reduction	**372.32**	**lbs TSS/yr**		