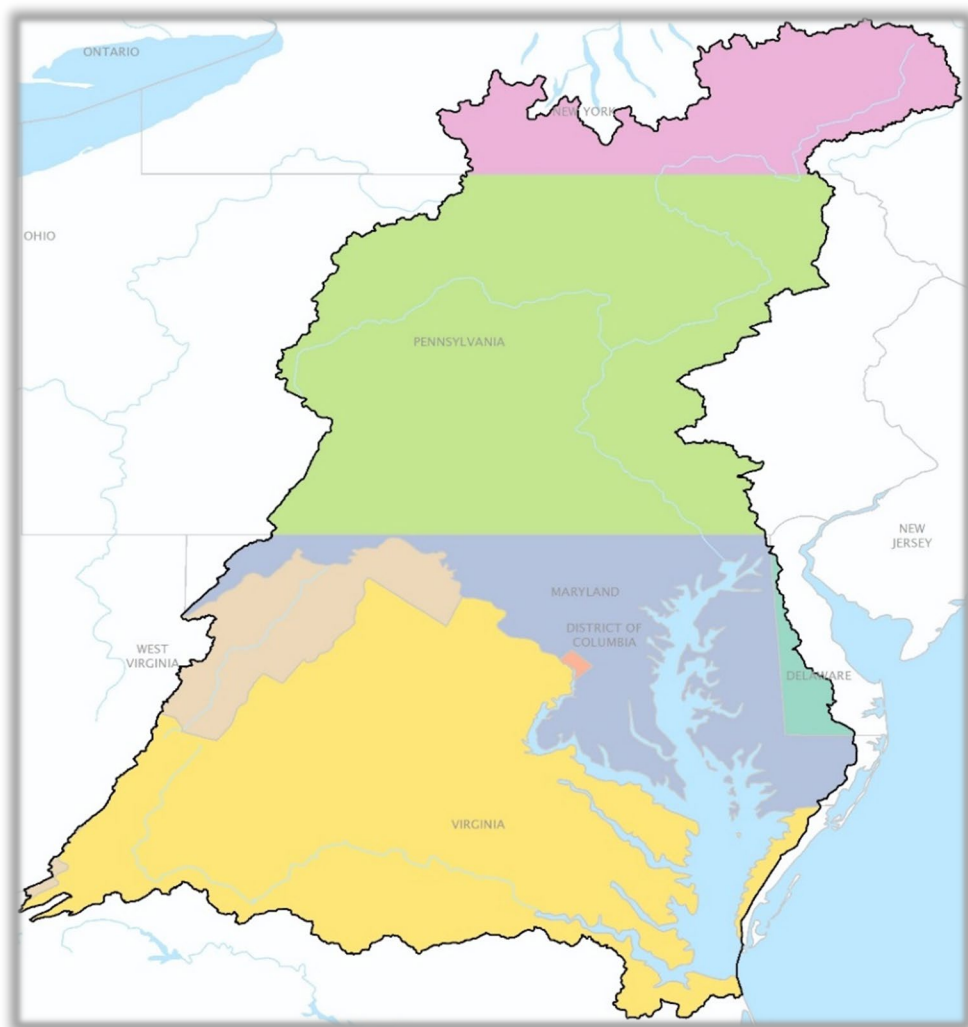


PHASE III CHESAPEAKE BAY TMDL ACTION PLAN

**A Plan for Achieving an Additional 60% Reduction
(100% Cumulative)
in Accordance with 9VAC25 890-40 Part II A**

**October 2024
Revised March 2025**



This plan satisfies the requirements of Part I of the 2023 – 2028 MS4 General Permit (9VAC25-890-40) and Part II A of the 2023 – 2028 MS4 General Permit for Special Conditions for the Chesapeake Bay TMDL. This plan is consistent with the Chesapeake Bay TMDL and the Virginia Phase I, II, and III WIPs to meet the Level 2 (L2) scoping run for existing developed lands as it represents an implementation of 5.0%, 35% and 60% of L2.

The data and analysis provided herein is based on the combined 2000 and 2010 census urbanized area. Additional revisions may be necessary once the 2020 census urban area is reconciled and information provided by the DEQ.

**Brightpoint
Community
College**



Chester Campus



Midlothian Campus

EXECUTIVE SUMMARY

Brightpoint Community College (Brightpoint) is authorized to discharge stormwater from its municipal separate storm sewer system (MS4) under the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Discharge of Stormwater from Small MS4s (MS4 General Permit). To maintain permit compliance, Brightpoint implements an MS4 Program Plan that includes best management practices (BMPs) to address six minimum control measures (MCMs) and special conditions for the Total Maximum Daily Load (TMDL) in which Brightpoint has been assigned a wasteload allocation (WLA). The Environmental Protection Agency (EPA) describes a TMDL as a “pollution diet” that identifies the maximum amount of a pollutant the waterway can receive and still meet water quality standards. A WLA determines the required reduction in pollutant of concern loadings from the MS4s to meet water quality standards. The MS4 General Permit serves as the regulatory mechanism for addressing the load reductions described in the TMDL, predominantly through the requirement of a TMDL Action Plan.

The Chesapeake Bay TMDL was established by the EPA on December 29, 2010, and initiated WLAs for phosphorus, nitrogen, and total suspended solids. In response, the Commonwealth of Virginia developed Watershed Implementation Plans (WIPs) that, in part, identify the MS4 General Permit as a mechanism for enforcing load reductions in urban areas. Subsequently, the Commonwealth included special conditions into the latest MS4 General Permit to address the reductions required by the TMDL for the pollutants of concern. The WIPs intended the reductions to be achieved over the course of three 5-year permit cycles. The first cycle (2013 – 2018) required 5%, the second cycle (2018 – 2023) an additional 35%, and the third permit cycle (2023 – 2028) required an additional 60% of the reductions to be achieved, respectively.

Brightpoint has developed Phase I, Phase II and Phase III Chesapeake Bay TMDL Action Plans consistent with Virginia Department of Environmental Quality (DEQ) Guidance Memos No. 15-2005 and 20-2003. The guidance documents were used to determine the required pollutant load reductions and identify the means and methods for achieving pollutant load reductions required by the previous and current MS4 General Permit as shown in Table 1. A review of Brightpoint’s existing stormwater management facilities identified applicable pollutant reduction credits. These existing BMPs, combined with the implementation of street sweeping and land use change as a new BMP served as the means and methods to achieve the required 40% reductions. The final 60% required reductions will be achieved through nutrient credit purchase. These means and methods, along with continued implementation of the Brightpoint MS4 Program Plan is consistent with the provisions of an iterative MS4 Program, which constitutes compliance with the MS4 General Permit standard of reducing pollutants to the maximum extent practicable.

Table 1: Summary of POC Load Reductions

POC	Phase I (2013 – 2018) 5% Load Reduction	Phase II (2018 – 2023) 35% Load Reduction	Phase III (2023 – 2028) 60% Load Reduction	Cumulative Total 100% Load Reduction
Nitrogen	2.73	19.09	32.71	54.53
Phosphorus	0.60	4.20	7.20	12.00
TSS	262.65	1,838.57	-	-

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Acronyms

BMP	Best Management Practice
CUA	Census Urbanized Area (2013 -2023) / Census Urban Area (2023 – 2028)
CWA	Clean Water Act
DEQ	Virginia Department of Environmental Quality
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
Brightpoint	Brightpoint Community College
LA	Load Allocation
L2	Level 2
MCM	Minimum Control Measure
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
POC	Pollutant of Concern
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
VAC	Virginia Administrative Code
VCCS	Virginia Community College System
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WIP	Watershed Implementation Plan
WLA	Wasteload Allocation

Definitions

Best Management Practices (BMPs) are schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, including both structural and nonstructural practices, to prevent or reduce the pollution of surface waters and groundwater systems.

Census Urbanized Area (CUA) are areas identified as urban by the United States Census Bureau. MS4 regulations only apply within CUAs.

Existing Sources are pervious and impervious urban land uses served by the MS4 as of June 30, 2009.

Impervious Cover is a surface composed of material that significantly impedes or prevents natural infiltration of water into soil.

L2 Scoping Run is a model run to determine required reductions from urban sources as of June 30, 2009. The L2 reductions are summarized in the following table:

Pollutant of Concern	Regulated Impervious (%)	Regulated Pervious (%)
Nitrogen	9	6
Phosphorus	16	7.25
Sediment	20	8.75

Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains that are:

- Owned or operated by a federal state, city, town, county, district, association, or other public body, created by or pursuant to state law that discharges to surface waters;
- Designed or used for collecting or conveying stormwater;
- Not a combined sewer; and
- Not part of a publicly owned treatment works.

New Sources are pervious and impervious urban land uses served by the MS4 developed or redeveloped on or after July 1, 2009.

Brightpoint MS4 Program Plan is the guiding document of the Brightpoint's MS4 Program and includes best management practices to address conditions of the MS4 General Permit.

Pollutants of Concern (POC) are total nitrogen ("TN"), total phosphorus ("TP"), and total suspended solids ("TSS").

Prior Developed Lands are lands that has been previously utilized for residential, commercial, industrial, institutional, recreation, transportation, or utility facilities or structures, and that will have the impervious areas associated with those uses altered during a land-disturbing activity.

Transitional Sources are regulated land disturbing activities that are temporary in nature and discharge through the MS4.

1.0 INTRODUCTION AND PURPOSE

Mandated by Congress under the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) storm water program includes the Municipal Separate Storm Sewer System (MS4), Construction, and Industrial General Permits. In Virginia the NPDES Program is administered by the Department of Environmental Quality (DEQ) through the Virginia Stormwater Management Program (VSMP) and the Virginia Pollutant Discharge Elimination System (VPDES). Brightpoint is authorized to discharge stormwater from its MS4 under the VPDES General Permit for Discharge of Stormwater from Small MS4s (MS4 General Permit). As part of the MS4 General Permit authorization, Brightpoint developed and implements a MS4 Program Plan (the Plan) with best management practices (BMPs) to address the six minimum control measures (MCMs) and the special conditions for applicable total maximum daily loads (TMDLs) outlined in the MS4 General Permit. Implementation of these BMPs is consistent with the provisions of an iterative MS4 Program, which constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable" or MEP.

"Brightpoint's MS4 program strives to improve environmental compliance, quality and stewardship."

Brightpoint's MS4 program strives to improve environmental compliance, quality and stewardship through effective management, implementation, and enforcement of sound technical guidelines, criteria and practices for stormwater management and erosion and sediment control. The plan presented herein demonstrates how Brightpoint's MS4 Program Plan addresses sediment and nutrients (nitrogen and phosphorus) in its MS4 regulated area consistent with the requirements of the Chesapeake Bay TMDL.

1.1 Total Maximum Daily Loads

A TMDL is the total amount of a given pollutant that a waterbody can assimilate and still meet water quality standards. Typically, TMDLs are represented numerically in three main components: Waste Load Allocations (WLAs), a Load Allocation (LA), and a Margin of Safety. A WLA is the allocated amount of pollutant from areas discharging through a pipe or other conveyance considered a point source. Point sources include sewage treatment plants, industrial facilities, and storm sewer systems. In contrast, a LA is the amount of pollutant from existing non-point sources and natural background such as farm runoff and atmospheric deposition. As a point source discharge, MS4s are assigned a WLA representing the annual loading of the pollutant of concern (POC) that can be discharged from its regulated MS4 area.

1.2 MS4 General Permit Special Conditions

Brightpoint's MS4 General Permit includes a series of special conditions that must be addressed for permit compliance where Brightpoint has been assigned a WLA as part of an approved TMDL. The special conditions state that any TMDL approved by the State Water Control Board (SWCB) assigning a WLA to an MS4 must be addressed by the Permittee through the measurable goals of their MS4 Program Plan.

In 1998, large portions of Chesapeake Bay and its tidal tributaries within Virginia were identified as not meeting water quality standards and listed as impaired because of excess nitrogen, phosphorus, and sediment. Due to the Chesapeake Bay waters remaining on the impaired waters list, the Environmental Protection Agency (EPA) required that a TMDL be developed, which was subsequently approved on December 29, 2010.

1.3 Watershed Implementation Plan and Strategy for MS4s

The Chesapeake Bay Watershed Implementation Plans (WIPs) are plans that detail how and when the six Chesapeake Bay states and the District of Columbia will meet pollutant allocations. In the Phase I and Phase II WIPs for the Chesapeake Bay TMDL, Virginia committed to a phased approach to reducing nutrients and suspended solids discharging from MS4s. The issuance of the 2013 - 2018 MS4 General Permit set forth special conditions required by all MS4 General Permit holders within the Chesapeake Bay watershed. In part, the special conditions require the permittee to achieve 5% of the required reductions identified in the Level 2 Scoping Run from existing baseline loads by July 1, 2018, 40% by July 1, 2023, and 100% by July 1, 2028. Baseline loads are defined as those occurring on June 20, 2009, and are computed using loading rates provided in the MS4 General Permit. The issuance of the Phase III 2023 - 2028 MS4 General Permit removed the requirement for reducing suspended solids discharging from MS4s.

1.4 Brightpoint Chesapeake Bay Action Plan

Brightpoint's Action Plan presented herein provides a review of the current MS4 program, which demonstrates Brightpoint's ability to ensure compliance with the special conditions and includes the means and methods Brightpoint used to meet 5.0% of the Level 2 (L2) scoping run reduction by July 1, 2018, and 40% reductions by July 1, 2023. This Plan also describes how Brightpoint anticipates meeting the 100% reductions by July 1, 2028.

This Action Plan was developed to comply with the special conditions of the MS4 General Permit (9VAC25-890) and under the advisement of DEQ's Guidance Memo No. 15-2005 and Guidance Memo No. 20-2003, which provide background information and procedures to meet the Chesapeake Bay TMDL special condition requirements.

2.0 APPLICABLE OVERVIEW OF BRIGHTPOINT'S MS4 PROGRAM

Brightpoint's MS4 Permit regulates stormwater discharges from areas included within census urbanized areas (CUAs). Brightpoint campuses included in CUAs include the Chester and Midlothian campuses, as depicted in Appendix A. Brightpoint's collective efforts, as described in the Brightpoint MS4 Program Plan, result in significant reduction of pollutants that may be discharged from its regulated MS4. BMPs already included in the Brightpoint Program Plan that address nutrients impairing the Chesapeake are described in the following sections. Each subsection is provided to address the referenced special condition in the 2013 – 2018, 2018 – 2023, and 2023 – 2028 MS4 General Permits.

2.1 Legal Authorities

As a non-traditional MS4, Brightpoint does not have the ability to create legal authorities and has not identified any legal authorities necessary to meet the requirements of the special conditions. However, Brightpoint's MS4 Program includes Minimum Control Measures (MCMs) that include policies and procedures consistent with the goals of the Chesapeake Bay TMDL.

- *MCM 1 (Public Education and Outreach)* – Brightpoint's MS4 Program includes a Public Education and Outreach Program (PEOP) that identifies the Chesapeake Bay TMDL pollutants of concern (POCs) as a high priority water quality issue. The PEOP is described in BMP 1.2 of the Brightpoint MS4 Program Plan and includes the distribution of educational materials regarding methods to reduce introduction of the POCs into stormwater runoff.
- *MCM 3 (Illicit Discharge Detection and Elimination)* – Brightpoint's MS4 Program includes an Illicit Discharge Detection and Elimination (IDDE) Program that includes written procedures to detect, identify, and address non-stormwater discharges, including illegal dumping, to the small MS4 with policies and procedures for when and how to use legal authorities. IDDE BMPs are described in the Minimum Control Measure 3 BMPs in the Brightpoint MS4 Program Plan. The IDDE Program is effective at addressing the POCs through staff training, prohibition of illicit discharges, and annual outfall screening.
- *MCM 4 (Construction Site Runoff Control)* – Brightpoint's MS4 Program includes a Construction Site Runoff Control Program that includes mechanisms to ensure compliance and enforcement on regulated construction sites with implementation of the DEQ-approved "VCCS Standards and Specifications." The standards and specifications are consistent with the Virginia Erosion and Sediment Control and Stormwater Management Laws and Regulations and includes:
 - Required plan approval prior to commencement of a regulated land disturbance activity;
 - Construction site inspections and enforcement; and
 - Certification of post-construction stormwater management facilities.

The Construction Site Runoff Control Program is especially effective at reducing downstream conveyance of sediment from transitional sources. Minimum Control Measure 4 BMPs in the Brightpoint MS4 Program Plan describe construction site runoff control BMPs.

- *MCM 5 (Post-Construction Stormwater Management)* – Brightpoint’s MS4 Program includes a Post-Construction SWM Program that ensures water quality criteria in the Virginia Stormwater Management Regulations has been achieved on new developments and developments on prior developed land since July 1, 2009. Included among these requirements are written policies and procedures in the VCCS Standards and Specifications to ensure that stormwater management facilities are designed and installed in accordance with appropriate law and regulations. Post-construction, the Program includes schedules and written procedures to ensure long-term inspections and maintenance of stormwater management BMPs. Minimum Control Measure 5 BMPs in the Brightpoint MS4 Program Plan describe post-construction stormwater management BMPs.
- *MCM 6 (Good Housekeeping)* – Brightpoint’s MS4 Program includes a Pollution Prevention/Good Housekeeping Program that includes policies and procedures to ensure that day-to-day operations minimize the exposure of pollutants to rainfall on campus grounds to the maximum extent practicable. The program is supported with Brightpoint’s Pollution Prevention & Good Housekeeping Manual and biennial training for applicable staff. Minimum Control Measure 6 BMPs in the Brightpoint MS4 Program Plan describe pollution prevention and good housekeeping BMPs.

2.2 New or Modified Legal Authorities

Consistent with the 2013 – 2018, 2018 – 2023, and 2023 - 2028 MS4 General Permits, Brightpoint uses an iterative approach to ensure the College is minimizing the discharge of pollutants through its MS4 to the MEP. The iterative approach is implemented through the annual reporting process with the review of the effectiveness of each MS4 Program Plan BMP. BMPs are modified, as necessary, to increase effectiveness. If new or modified authorities are identified as part of the annual “measure of effectiveness” as described for each BMP in the Brightpoint MS4 Program Plan annual reporting, they will be reported through the annual report process.

As a non-traditional MS4, Brightpoint does not have the ability to create legal authorities. No new policies and procedures or modifications to existing policies and procedures were identified as necessary to meet the requirements of the special conditions. Means and methods to meet the special conditions are described in Section 4.

3.0 POLLUTANT OF CONCERN (POC) LOADINGS

The 2013 – 2018 MS4 General Permit required Brightpoint to estimate the annual loadings and the POC load reductions. To complete this requirement, Brightpoint determined the amount of pervious and impervious land cover for their regulated campus and input the data into the appropriate loading and reduction tables provided in the MS4 General Permit. The methodology to determine sediment and nutrient loadings and the required reductions are described in the following sub-sections.

3.1 Baseline Loading Characterization

Brightpoint's MS4 regulated area was calculated using the Brightpoint property boundaries as a conservative estimate of the areas the MS4 serves. Campus boundaries were obtained from the County of Chesterfield's GIS data. The determination of regulated area was based on the 2010 CUA. Aerial photography was obtained from the 2009 Virginia Base Map Program Orthophotography Program Aerials¹. The extent of pervious, impervious and forest areas as of June 30, 2009, were digitized based on the aerial imagery and best professional judgment, as depicted in Appendix A. For areas that were under construction or disturbed in the 2009 aerial imagery, current aerial images were used to determine whether the areas resulted in pervious or impervious surfaces after construction. Baseline land cover results are provided in Table 2.

Table 2: Classification of Campus Land Cover Area (Acres)

Land Cover	Chester Campus	Midlothian Campus
Impervious	19.1	15.8
Pervious	16.1	43.6
Forest*	20.7	57.6
Surface Water*	0.0	0.64

* Consistent with methodology described in the DEQ Guidance, these areas are not included in the loading computations described in Section 3.2.

3.2 Annual Loadings from Existing Sources

The data summarized in Table 2 was used to estimate pollutant loads from existing sources as of June 30, 2009, using the James River Basin calculation sheet for estimating existing source loads provided in the MS4 General Permit. The calculation sheet was completed for each regulated Brightpoint campus as provided in Tables 3 and 4.

¹ Virginia Base Map Program Orthophotography Program, 2009. <http://www.vita.virginia.gov/isp/default.aspx?id=8412>

Table 3: Loadings from the Chester Campus

Pollutant	Regulated Urban Land Cover	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs./acre)	Estimated Total POC Load Based on 2009 Progress Run (lbs.)	Total Load (lbs.)
Nitrogen	Impervious	19.1	9.39	179.35	291.89
	Pervious	16.1	6.99	112.54	
Phosphorus	Impervious	19.1	1.76	33.62	41.67
	Pervious	16.1	0.5	8.05	
TSS	Impervious	19.1	676.94	12,929.55	14,556.94
	Pervious	16.1	101.08	1,627.39	

Table 4: Loadings from the Midlothian Campus

Pollutant	Regulated Urban Land Cover	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs./acre)	Estimated Total POC Load Based on 2009 Progress Run (lbs.)	Total Load (lbs.)
Nitrogen	Impervious	15.8	9.39	148.36	453.13
	Pervious	43.6	6.99	304.76	
Phosphorus	Impervious	15.8	1.76	27.81	49.61
	Pervious	43.6	0.5	21.80	
TSS	Impervious	15.8	676.94	10,695.65	15,102.74
	Pervious	43.6	101.08	4,407.09	

3.3 5% Annual Loadings from New Sources and Grandfathered Projects

In addition to computing baseline loadings from existing conditions as of June 30, 2009, the special conditions require the determination of offsets for increased loads from development occurring on or after July 1, 2009, including grandfathered projects. No offsets are necessary for new sources since:

- Loadings from new sources are addressed with the water quality criteria in the stormwater management regulations. Water quality criteria for new sources from regulated development between July 1, 2009, and June 30, 2014, was based on an average land cover condition of 16% and therefore appropriate offsets were incorporated within the development project's stormwater management plan.
- No Brightpoint projects are grandfathered.

3.4 Required 5% Load Reductions

The 2013 – 2018 MS4 General Permit required Brightpoint to reduce 5.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for both campuses for the 2013 – 2018 permit cycle were calculated using the calculation sheet in the 2013 – 2018 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheets were modified with the corrected loading rates provided in DEQ's Guidance. The required load reductions for each campus are depicted in Tables 5 and 6. Since both

regulated campuses are in the James River Basin, reductions are not campus-specific and therefore are summarized in Table 7.

Table 5: Estimated 5% POC Reductions Required for the Chester Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	Reduction Required First Permit Cycle (lbs.)	Total Reduction (lbs.)
Nitrogen	Impervious	19.1	0.042255	0.81	1.14
	Pervious	16.1	0.02097	0.35	
Phosphorus	Impervious	19.1	0.01408	0.27	0.30
	Pervious	16.1	0.0018125	0.03	
TSS	Impervious	19.1	6.7694	129.30	136.42
	Pervious	16.1	0.442225	7.43	

Table 6: Estimated 5% POC Reductions Required for the Midlothian Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	Reduction Required First Permit Cycle (lbs.)	Total Reduction (lbs.)
Nitrogen	Impervious	15.8	0.042255	0.67	1.58
	Pervious	43.6	0.02097	0.91	
Phosphorus	Impervious	15.8	0.01408	0.22	0.30
	Pervious	43.6	0.0018125	0.08	
TSS	Impervious	15.8	6.7694	106.96	126.24
	Pervious	43.6	0.442225	19.28	

Table 7: Compiled 5% POC Reductions Required for Brightpoint's Regulated Campuses

Pollutant	Chester Reduction (lbs.)	Midlothian Reduction (lbs.)	5% Reduction Required (lbs.)
Nitrogen	1.14	1.58	2.73
Phosphorus	0.30	0.30	0.60
TSS	136.42	126.24	262.65

3.5 Required 35% Load Reductions

The 2018 – 2023 MS4 General Permit required Brightpoint to reduce 35.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the Brightpoint's campuses for the 2018 - 2023 permit cycle were calculated using the calculation sheet in the 2018 – 2023 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ's Guidance Memo No. 15-2005. The required load reductions for Brightpoint are depicted in Table 8.

Table 8: Estimated 35% POC Reductions Required for Brightpoint's Regulated Campuses

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	35% Reduction Required (lbs.)
Nitrogen	Impervious	34.9	0.042255	19.09
	Pervious	59.7	0.02097	
Phosphorus	Impervious	34.9	0.01408	4.20
	Pervious	59.7	0.0018125	
TSS	Impervious	34.9	6.7694	1,838.57
	Pervious	59.7	0.442225	

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 35% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

3.6 Required 40% Overall Load Reductions

The 2018 – 2023 MS4 General Permit required Brightpoint to reduce 40.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the Brightpoint's campuses for the 2018 - 2023 permit cycle were calculated using the calculation sheet in the 2018 – 2023 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ's Guidance Memo No. 15-2005. The required load reductions for Brightpoint are depicted in Table 9.

Table 9: Estimated 40% Overall POC Reductions Required for Brightpoint Regulated Campuses

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	40% Reduction Required (lbs.)
Nitrogen	Impervious	34.9	0.042255	21.81
	Pervious	59.7	0.02097	
Phosphorus	Impervious	34.9	0.01408	4.80
	Pervious	59.7	0.0018125	
TSS	Impervious	34.9	6.7694	2,101.22
	Pervious	59.7	0.442225	

3.7 Required 60% Load Reductions

The 2023 – 2028 MS4 General Permit required Brightpoint to reduce an additional 60.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the Brightpoint's campuses for the 2023 - 2028 permit cycle were calculated using the calculation sheet in the 2023 – 2028 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates

provided in DEQ's Guidance Memo No. 15-2005. The required load reductions for Brightpoint are depicted in Table 10.

Table 10: Additional 60% POC Reductions Required for Brightpoint Regulated Campuses

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	60% Reduction Required (lbs.)
Nitrogen	Impervious	34.9	0.042255	32.71
	Pervious	59.7	0.02097	
Phosphorus	Impervious	34.9	0.01408	7.20
	Pervious	59.7	0.0018125	

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 35% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

3.8 Required 100% Overall Load Reductions

The 2023 – 2028 MS4 General Permit required Brightpoint to reduce 100.0% overall of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the Brightpoint's campuses for the 2023 - 2028 permit cycle were calculated using the calculation sheet in the 2023 – 2028 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates which are consistent DEQ Guidance Memo No. 15-2005 and Guidance Memo No. 20-2003. The required load reductions for Brightpoint are depicted in Table 11.

Table 11: Estimated 100% POC Reductions Required for Brightpoint Regulated Campuses

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	100% Reduction Required (lbs.)
Nitrogen	Impervious	34.9	0.042255	54.53
	Pervious	59.7	0.02097	
Phosphorus	Impervious	34.9	0.01408	12.00
	Pervious	59.7	0.0018125	

4.0 MEANS TO ACHIEVE 5% POLLUTANT REDUCTIONS

DEQ's Guidance Memo No. 15-2005 was used to identify appropriate means and methods for achieving the required reductions computed in Sections 3.4. A review of Brightpoint's existing stormwater management facilities determined that the required reductions are achieved for the current MS4 General Permit cycle as described in the following sub-sections and were incorporated into the Brightpoint MS4 Program Plan for implementation.

POC load reductions described in this section demonstrate compliance with the reduction requirements for this 2013 - 2018 MS4 General Permit cycle with the understanding that any changes in established BMP efficiencies will not be retroactively applied to projects approved to meet reductions for the MS4 General Permit cycle.

4.1 5% Reductions Achieved with Existing BMPs

Consistent with DEQ Guidance No. 15-2005, certain credits from historic water quality BMPs can be credited towards pollutant load reductions requirements. Specifically, permittees can receive full credit from BMPs that were:

- Initially installed on or after January 1, 2006, and prior to July 1, 2009, and constructed to address water quality within the permittee's regulated service area; and
- Initially installed after June 30, 2009, if credit is only taken for reductions achieved in excess of the reductions required by the SWM regulations water quality criteria for the development.

A review of Brightpoint's BMPs did not identify water quality BMPs installed on or after January 1, 2006, and prior to July 1, 2009; but did identify two facilities that provide POC reductions in excess of those necessary for the associated developments:

- In October 2009, a retention II basin, as described in the Virginia Stormwater Management Handbook, was installed on the Midlothian campus as part of a stormwater master plan completed by Burgess and Niple entitled, "John Tyler Community College Midlothian Campus Stormwater Master Plan." Consistent with the stormwater regulations water quality criteria at the time, the retention II basin was designed to provide to achieve water quality criteria for the existing and future build-out of the Brightpoint Midlothian campus. Per the stormwater master plan, the existing retention II basin is designed to provide an additional pollutant removal of 1.5 pounds of phosphorus after future build-out of the Midlothian campus is complete.

To ensure that credit is taken based only on existing development actually treated by the BMP, calculations were completed to determine what portion of the additional 1.50 pounds of phosphorus may be applied to current reduction requirements. As described in Appendix B, based on a ratio of existing impervious area to ultimate impervious area (after all phases of the future build-out are completed), it was calculated that 1.32 of the

1.50 pounds remaining in the pond may be applied to meet reduction requirements. The remaining 0.18 pounds (1.50 - 1.32) of phosphorus will become applicable as future campus development occurs. Calculations to determine the proportional nitrogen and sediment credits available in the regional pond that may be applied towards the required reductions are included in Appendix B and relevant BMP design plan sheets are included in Appendix C. Required and provided nutrient reductions are summarized in Table 12.

Table 12: Summary of POC Reductions from the Retention II Basin BMP

Pollutant	Reductions Required by L2 Scoping Run (lbs./yr.)	Reductions Provided by Existing BMP (lbs./yr.)
Nitrogen	2.73	2.11
Phosphorus	0.60	1.32
TSS	262.65	512.61

- In the spring of 2015, an extended detention basin, as described in the Virginia Stormwater Management Handbook, was installed on the Midlothian campus as part of a plan completed by Timmons Group entitled, “John Tyler Community College Midlothian Campus Phase III.” The approved design plans show that the BMP provides an extra 0.1 pounds of phosphorus removal per year than what is required for its associated development. Calculations to determine the corresponding nitrogen and sediment reductions achieved are included in Appendix B and relevant BMP design plan sheets are included in Appendix C. Required and provided nutrient reductions are summarized in Table 13.

Table 13: Summary of 5% POC Reductions from the Extended Detention Basin BMP

Pollutant	Reductions Required by L2 Scoping Run (lbs./yr.)	Reductions Provided by Existing BMP (lbs./yr.)
Nitrogen	2.73	0.30
Phosphorus	0.60	0.10
TSS	262.65	71.97

The required reductions and those provided by the two existing basins are summarized in Table 14. It is noted from the Table that although the required reductions for phosphorus and TSS are achieved with the two existing BMPs, the full nitrogen reduction requirement is not achieved.

Table 14: Summary of 5% POC Reductions from Existing BMPs to Achieve Required Reductions

Pollutant	Reductions Required by L2 Scoping Run (lbs./yr.)	Reductions Provided by 2009 Retention II Basin (lbs./yr.)	Reductions Provided by 2015 Extended Detention Basin (lbs./yr.)	Total Reductions Provided by Existing BMPs (lbs./yr.)	Remaining Reductions Required by L2 Scoping Run (lbs./yr.)
Nitrogen	2.73	2.11	0.30	2.41	0.32
Phosphorus	0.60	1.32	0.10	1.42	-
TSS	262.65	512.61	71.97	584.58	-

4.2 5% Reductions Achieved with New BMPs

The applicable credit remaining in the existing BMPs did not fully satisfy the required nitrogen reductions. A new BMP was implemented to meet the remaining nitrogen reduction requirement. Brightpoint implemented street sweeping to supplement the existing BMPs to fully satisfy the required POC reductions identified in Section 3.4. The “mass loading approach,” as described in DEQ’s Guidance No. 15-2005 was used to determine the extent of street sweeping efforts to be implemented. Per the mass loading approach, the overall weight of material collected through street sweeping is multiplied by a dry weight factor and then a factor specific to each POC to quantify the pollutant reduction achieved. Given the target nitrogen reduction and the dry weight and POC factors, it was determined that Brightpoint must collect a minimum of **183** pounds of material per year to achieve the remainder of the required nitrogen reductions. Required reductions and sweeping efforts are summarized in Table 15.

Table 15: Required Street Sweeping Material to be Collected for 5% POC Reduction

Pollutant	Remaining Reductions Required by L2 Scoping Run (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	0.32	0.7	.0025	182.86
Phosphorus	0.00	0.7	.001	-
TSS	0.00	0.7	0.3	-

5.0 IMPLEMENTATION OF 5% POC REDUCTION TO THE MEP

Implementation of the Action Plan is dependent on continued execution of the Brightpoint MS4 Program Plan. MS4 Program Plan BMPs will continue to be implemented per the schedules outlined in the Brightpoint MS4 Program Plan.

The cost associated with the implementation of street sweeping is estimated to be approximately \$1,390 per year per pound of nitrogen reduction. This estimate is based on the document titled “Cost-Effectiveness Study of Urban Stormwater BMPs in the James River Basin” by the Center for Watershed Protection. The study detailed costs associated with street sweeping based on a ten-year life cycle and capital costs of the equipment.

During the 2013 - 2018 permit cycle, Brightpoint evaluated the most cost-effective way for implementing a street sweeping program which included contracting a street sweeping company. Brightpoint’s actual costs for the 2013 – 2018 permit cycle were \$5,950.

5.1 Implementation Actions for 5% POC Reductions

Brightpoint developed a street sweeping program. Street sweeping efforts included the following Action Steps:

1. Begin street sweeper contractor identification and begin sweeping to determine the scale of street sweeping needed to meet the target reductions. These preliminary sweepings are not intended to meet any regulatory requirement.
2. Based on the results from Step 1, develop documentation for tracking areas swept, type of sweeper used, man hours, and other information determined as relevant for characterization of collected materials.
3. Develop and conduct annual training for staff performing street-sweeping.
4. Conduct sampling of collected street sweeping materials to correlate dry weight and sediment fraction to verify computational methods for determining POC reductions from collected street sweeping material. Alternative computational methods may result from a study of the sampled materials. Sampling and analysis will be based on technically defensible analytical methods.
5. Conduct an assessment to identify target areas based on areas swept that produce the largest yield of sediment collected per acre. The assessment considered the time span between sweeping and weather conditions at the time of sweeping.
6. Assessment of College’s current street sweeping to determine their sediment and nutrient removal efficiencies and cost effectiveness.

The Action Steps identified are intended to serve as a defined method that inherently serves as an adaptive iterative approach.

5.2 Implementation Schedule for 5% POC Reductions

Brightpoint began implementing Step 1 of the implementation strategy described in Section 5.1 during the 2015 - 2016 MS4 General Permit reporting year. Implementation was documented and improved with the implementation of the remaining steps with the schedule and measurable goals described in Table 14. The Implementation Actions described in Section 5.1 and the Implementation Schedule in Table 16.

5.3 Supplemental Means and Methods for 5% POC Reductions

In addition, the remaining Minimum Control Measure BMPs described in Section 2.1 continued to be implemented by Brightpoint as part of the Brightpoint's MS4 Program Plan. Continued implementation of these BMPs demonstrated implementation of the Brightpoint's Chesapeake Bay Action Plan to the maximum extent practicable and demonstrates adequate progress.

5.4 Public Comment Period for 5% POC Reductions

Brightpoint solicited public comments on the Phase I Chesapeake Bay TMDL Plan during the 2013 – 2018 MS4 General Permit cycle and considered all comments that were provided. Public comment was provided through the following means:

- A draft of the Phase I Chesapeake Bay TMDL Action plan was posted on Brightpoint's website for a minimum of 14 total days.
- An email was sent to the target audience audiences identified in Minimum Control Measure 1 of the Brightpoint MS4 Program Plan with a link where the public may comment on the Action Plan.

The Brightpoint Phase I Chesapeake Bay TMDL Action Plan was posted for public comment from 9/28/2015 – 10/19/2015. One comment was received that was complimentary of the Brightpoint Chesapeake Bay TMDL Action Plan. Therefore, no additional considerations or responses were needed.

5.5 Annual Reporting for 5% POC Reductions

The effectiveness of the Phase I Chesapeake Bay TMDL Action Plan was measured through the MS4 General Permit annual reporting requirement. Brightpoint reported annually on the implementation of the BMPs described in Section 4.1 of this Plan.

6.0 MEANS TO ACHIEVE 40% OVERALL POC REDUCTIONS

Prior to July 1, 2022, DEQ's Guidance Memo No. 15-2005 was used to identify appropriate means and methods for achieving the required reductions computed in Section 3.6 for the Phase II Chesapeake Bay TMDL Action Plan. The means and methods are described in the following sub-sections and were incorporated into the Brightpoint MS4 Program Plan for implementation.

POC load reductions described in the following sub-sections demonstrate compliance with the reduction requirements for the 2018 - 2023 MS4 General Permit cycle with the understanding that any changes in established BMP efficiencies will not be retroactively applied to projects approved to meet reductions for this 2018 – 2023 MS4 General Permit cycle.

6.1 40% Overall POC Reductions to be Achieved with Street Sweeping

Brightpoint implemented street sweeping to satisfy the required POC reductions identified in Section 3.6. The “mass loading approach,” as described in DEQ's Guidance Memo No. 15-2005, was used to determine the extent of street sweeping efforts to be implemented. Per the mass loading approach, the overall weight of material collected through street sweeping is multiplied by a dry weight factor and then a factor specific to each POC to quantify the pollutant reductions achieved. Given the target pollutant reductions and the dry weight and POC factors, it was determined that Brightpoint must collect a minimum of **12,465** pounds of material per year to meet the POC reduction requirements. Required reductions and sweeping efforts are summarized in Table 16.

Table 16: Required Street Sweeping Material to be Collected for 40% POC Reduction

Pollutant of Concern (POC)	40% Annual Reductions Required of L2 (lbs./yr.)	Existing BMP Reduction Credit (Section 6.1)	Revised 40% Annual Reductions Required (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	21.81	2.41	19.39	0.7	.0025	12,464.5
Phosphorus	4.80	1.42	3.38	0.7	.001	6,852.55
TSS	2,101.22	584.58	1,516.64	0.7	0.3	7,222.10

6.2 Revised Means to Achieve 40% POC Reductions

For the 2022 - 2023 reporting year, Brightpoint continued to implement street sweeping to partially satisfy the required POC reductions identified in Section 3.6 in accordance with DEQ's Guidance Memo No. 20-2003. The “revised street cleaning module,” as described in the Guidance Memo was used to determine the extent of street sweeping efforts to be implemented. Table 1 within Appendix V.G – Street Cleaning Section of the Guidance Memo reflects the module's preferences to use regenerative air sweepers and sweeping frequency to increase nutrient sediment reduction rates. Nutrient and sediment reductions are provided for various street sweeping practices (SCP).

Using the standard street cleaning unit of one mile of curb miles swept on one-side and one acre equivalent for parking lots to one curb lane mile swept, Brightpoint has determined the number of total “curb lane miles” on their property. It was calculated that Brightpoint has a total of 30.36 curb lane miles on their properties. Using the nutrient and sediment loading rates for urban impervious cover for the James River provided in the 2018 – 2023 MS4 General Permit (9VAC25-890-40), the required nutrient reductions were calculated. Brightpoint selected SCP-4: 1 Pass Every 4 Weeks to implement to partially meet the required nutrient and sediment reductions. See Appendix C for calculations. By July 1, 2023, Brightpoint swept 1 pass every 4 weeks to satisfy the reductions achieved by street sweeping.

In addition to street sweeping, Brightpoint implemented land use changes to achieve the remaining nutrient reduction credits towards the 40% reduction requirements. By July 1, 2023, Brightpoint converted .93 acres of impervious to turf at the Chester campus. By July 1, 2023, Brightpoint converted 2.87 acres of turf to mixed open space at BCC’s Midlothian campus. Table 17 depicts the 40% POC reductions achieved by Brightpoint based on the selected best management practices.

Table 17: Summary of BMPs Achieved for 40% POC Reductions

POC	Existing BMPs Prior to 7/1/2009 (lbs./yr.)	Reductions Planned by Street Sweeping* (lbs./yr.)	Reductions Achieved by Land Use Change (lbs./yr.)	Total 40% Reductions Achieved (lbs./yr.)	Required 40% Reductions (lbs./yr.)
TN	2.41	2.85	21.99	27.25	21.81
TP	1.42	1.60	3.21	6.24	4.80
TSS	584.58	1,233.11	801.66	2,619.35	2,101.22

* Street Sweeping reductions were not fully satisfied in the 2022 – 2023 reporting year due to a mechanical broom sweeper being used by the contractor.

- No expanded sources identified in the 2000 or 2010 census urbanized area.
- No additional 60% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

6.3 Implementation of 40% POC Reduction to the MEP

Implementation of the Action Plan was dependent on continued execution of the Brightpoint MS4 Program Plan. MS4 Program Plan BMPs was implemented per the schedules outlined in the Brightpoint 2018 – 2023 MS4 Program Plan.

For the 2022 - 2023 permit year, the issuance of DEQ’s Guidance Memo No. 20-2003 forced Brightpoint to re-evaluate using street sweeping as the primary BMP in meeting the required reductions. Brightpoint determined that the Land Use Conversion BMP was an effective BMP to achieve the required reductions.

6.4 Supplemental Means and Methods for 40% POC Reductions

In addition, the remaining Minimum Control Measure BMPs described in Section 2.1 were implemented by Brightpoint as part of the Brightpoint MS4 Program Plan. Continued implementation of these BMPs demonstrated implementation of the Brightpoint Chesapeake Bay Action Plan to the maximum extent practicable and demonstrates adequate progress.

6.5 Public Comment Period for 40% POC Reductions

Brightpoint solicited public comment on Phase II Chesapeake Bay TMDL Plan during the 2018 – 2023 MS4 General Permit cycle and considered all comments that were provided. Public comment was provided through the following means:

- A draft of the Chesapeake Bay TMDL Action plan was sent via email to the target audience identified in Minimum Control Measure 1 of the Brightpoint MS4 Program Plan with a link where comments could be provided on the 2018 – 2023 Phase II Chesapeake Bay TMDL Action Plan through survey software. The survey remained open for 15 days.

6.6 Annual Reporting for 40% POC Reductions

The effectiveness of the Phase II Chesapeake Bay TMDL Action Plan was measured through the MS4 General Permit annual reporting. Brightpoint reported annually on the implementation of the means and methods described in Sections 5.1 and 5.2 of this Plan.

7.0 MEANS TO ACHIEVE 100% CUMULATIVE POC REDUCTIONS

During the 2023 – 2024 permit year, Brightpoint evaluated additional potential BMPs to meet the required reductions. Several existing structural stormwater management facilities were evaluated for redevelopment reductions. Redevelopment reductions were calculated for the dry swale (BCC-SMF-CH-1) installed associated with the Nicholas Center Renovation Project. The spreadsheet with the calculations is available upon request. Brightpoint calculated the remaining 60% additional POC reductions required. Brightpoint solicited bids for the purchase of the remaining nutrient reductions required. During the 2024 – 2025 permit year, the bids were awarded, and the purchase of the remaining required credits was finalized. Table 18 summarizes the POC reductions achieved to date and Table 19 summarizes the 100% cumulative POC reductions to be achieved for this permit cycle.

Table 18: Summary of 60% POC Reductions Achieved per BMP

POC	Reductions Achieved by Existing BMPs Prior to 7/1/2009 (lbs./yr.)	Reductions Achieved by Land Use Change (lbs./yr.)	Reductions Achieved by Redevelopment (lbs./yr.)	Reductions Achieved by Nutrient Credit Purchase (lbs./yr.)*
TN	2.41	21.99	1.34	36.23
TP	1.42	3.21	0.28	7.09

* 7.09 TP and 36.23 TN nutrients credits were purchased under contract number VCCS-BCC-24-35307-ECO Nutrient Credits for BCC-TMDL-JAMES 4.

Table 19: Summary of 100% Cumulative POC Reductions

POC	100% Reductions Achieved (lbs./yr.)	Cumulative 100% Required Reduction (lbs./yr.)
TN	61.97	54.53
TP	12.00	12.00

- No expanded sources identified in the 2000 or 2010 census urbanized area.
- No additional 60% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

7.1 Implementation of 100% POC Reductions to the MEP

Implementation of the 2023 – 2028 Phase III Chesapeake Bay TMDL Action Plan will be dependent on continued execution of the Brightpoint's MS4 Program Plan and implementation of new BMP(s) to meet the required reductions.

7.2 Supplemental Means and Methods for 100% POC Reductions

In addition, the remaining Minimum Control Measure BMPs described in Section 2.1 will continue to be implemented by Brightpoint as part of the Brightpoint MS4 Program Plan. Continued implementation of these BMPs demonstrates implementation of the Brightpoint Chesapeake Bay Action Plan to the maximum extent practicable and demonstrates adequate progress.

7.3 Public Comment Period for 100% POC Reductions

Brightpoint solicited public comments on the draft Phase III Action Plan and considered all comments that were provided. Public comment was provided through the following means:

- A draft of the Chesapeake Bay TMDL Action plan was sent via email to the target audience identified in Minimum Control Measure 1 of the Brightpoint MS4 Program Plan with a link where comments could be provided on the Action Plan.




The Brightpoint Phase III Chesapeake Bay TMDL Action Plan was posted for public comment from 10/4/2024 – 10/18/2024. Three comments were received, all of which were complimentary of the Brightpoint Chesapeake Bay TMDL Action Plan. Therefore, no additional considerations or responses were required.

7.4 Annual Reporting for 100% POC Reductions

The effectiveness of the Action Plan will be measured through the Chesapeake Bay annual reporting. Brightpoint will report annually as required by the 2023 – 2028 MS4 General Permit.

Appendix A: 2009 Baseline Maps for Characterization of Brightpoint's Campuses



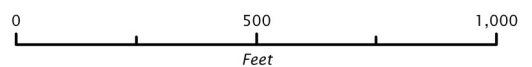
-  Campus Boundary
-  Impervious
-  Pervious



EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

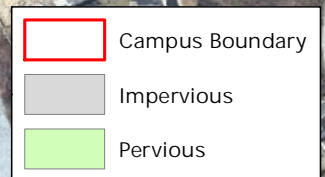


CHESTER CAMPUS
IMPERVIOUS AND PERVIOUS LAND COVER
JOHN TYLER COMMUNITY COLLEGE

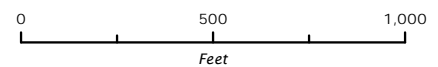


Chesterfield, Virginia

Prepared by J. Bradley, 10/10/2019
Sources: 2009 VGIN Imagery
Projection: NAD 1983 StatePlane Virginia South FIPS 4502 Feet



**MIDLOTHIAN CAMPUS
IMPERVIOUS AND PERVIOUS LAND COVER**
JOHN TYLER COMMUNITY COLLEGE



Chesterfield, Virginia
Sources: 2009 VGIN Imagery
Prepared by Brian Brown, May 14, 2015

Appendix B: Supporting BMP Design Plans

Calculations for BCC Midlothian Campus Retention II Basin TP, TN and TSS Reductions

Per Part III.3 of DEQ's Guidance Memo No. 15-2005, BCC may receive POC reduction credits for SWM BMPs initially installed after June 30, 2009, provided that credit is only taken for reductions in excess of the reductions required by the SWM regulation water quality criteria for the development. As described in Section 4.1 of the BCC Action Plan, a retention II basin was installed on the Midlothian campus in October 2009 as part of a stormwater master plan titled "John Tyler Community College Midlothian Campus Stormwater Master Plan" by EYP Architecture & Engineering, P.C. Relevant plan sheets are included in Appendix C for reference. The aforementioned plan utilized the retention II basin and a combination of other existing and future SWM facilities to comply with water quality requirements for ultimate development. Specifically, the retention II basin was designed to provide for water quality reductions for portions of the existing and future build-out of the Midlothian campus.

As described in Section 4.1 of the BCC Action Plan, the retention II basin has a reduction credit of 1.5 pounds of phosphorus per year remaining after treatment requirements for the future campus build-out are satisfied. To ensure that credit is taken based only on existing development draining to the pond, calculations were completed to determine what portion of the remaining 1.5 pounds of phosphorus may be applied to current reduction requirements. Based on the ratio of existing impervious area to ultimate impervious area (after all phases of the future build-out are completed), it is determined that 1.32 of the 1.5 pounds remaining in the pond may be applied to meet reduction requirements. The remaining 0.18 pounds of phosphorus will become applicable as future campus development occurs. The applicable 1.32 pounds of phosphorus per year was determined as follows:

BMP's available credit (after future build-out) = 1.5 lbs TP/yr

Impervious area (after future build-out) on JTCC Midlothian campus = 15.41 acres

Existing impervious area on JTCC Midlothian campus = 13.53 acres

BMP's available credit (current) = $1.5 \text{ lbs TP/yr} * (13.53 \text{ acres} / 15.41 \text{ acres}) = 1.32 \text{ lbs TP/yr}$

Steps 1 – 4 below are based on DEQ's Guidance Memo No. 15-2005 Example V.E.1 for determining reductions from oversized BMPs.

Step 1: Determine the proportion of the retention II basin's total TP reductions that may be applied towards the TMDL reduction requirements.

The total TP reduction provided by the BMP (23.39 lbs) was determined by multiplying the post-development phosphorous load in the water quality worksheet calculations by the 65% removal efficiency.

Proportion of BMP's available credit = $1.32 \text{ lbs TP/yr} / 23.39 \text{ lbs TP/yr} = \underline{0.0564}$

Step 2: Determine the total post-development TN and TSS loads going to the retention II basin.

Loading rates in this step to determine the total associated post-development TN and TSS loads to the BMP are from Table 4 in the MS4 GP (James River basin). The post-development pollutant load for the basin was calculated to be 35.99 lbs TP/yr, as shown in water quality calculations included in Appendix B.

$$\text{TN} = 35.99 \text{ lbs TP/yr} * 5.2 \text{ lbs TN/lb TP} = \underline{187.15 \text{ lbs TN/yr}}$$

$$\text{TSS} = 35.99 \text{ lbs TP/yr} * 420.9 \text{ lbs TSS/lb TP} = \underline{15,148.19 \text{ lbs TSS/yr}}$$

Step 3: Determine the total retention II basin reductions for TN and TSS:

The JTCC facility was designed as a retention II basin; therefore, per the Bay Program Established Efficiencies, a 20% efficiency for TN and a 60% efficiency for TSS were used to calculate total removals.

$$\text{TN} = 187.15 \text{ lbs TN/yr} * 0.20 = \underline{37.43 \text{ lbs TN/yr}}$$

$$\text{TSS} = 15,148.19 \text{ lbs TSS/yr} * 0.60 = \underline{9,088.91 \text{ lbs TSS/yr}}$$

Step 4: Determine the credit that may be applied towards the TMDL reduction requirements for TN and TSS:

$$\text{TN} = 37.43 \text{ lbs TN/yr} * 0.0564 = \underline{2.11 \text{ lbs TN/yr}}$$

$$\text{TSS} = 9,088.91 \text{ lbs TSS/yr} * 0.0564 = \underline{512.61 \text{ lbs TN/yr}}$$

Calculations for BCC Midlothian Campus Retention II Basin

Worksheet 2 : Situation 2

Page 1 of 4

Summary of Situation 2 criteria: from calculation procedure **STEP 1** thru **STEP 3**, Worksheet 1:

$$\text{Applicable area (A)*} = \underline{38.5} \text{ acres}$$

$$I_{\text{post}} = (\text{total post-development impervious cover} \div A) \times 100 = \underline{35.14\%}$$

$$I_{\text{watershed}} = \underline{\hspace{2cm}}\% \text{ or } I_{\text{watershed}} = 16\%$$

$$I_{\text{existing}} = (\text{total existing impervious cover} \div A^*) \times 100 = \underline{\hspace{2cm}}\%$$

$$I_{\text{existing}} \underline{\hspace{2cm}}\% \bullet I_{\text{watershed}} \underline{\hspace{2cm}}\%; \text{ and}$$

$$I_{\text{post}} \underline{35.14\%} > I_{\text{watershed}} \underline{16\%}$$

STEP 4 Determine the relative pre-development pollutant load (L_{pre}).

$$L_{\text{pre(watershed)}} = [0.05 + (0.009 \times I_{\text{watershed}})] \times A \times 2.28 \quad \text{(Equation 5-16)}$$

where: $L_{\text{pre(watershed)}}$ = relative pre-development total phosphorous load (pounds per year)
 $I_{\text{watershed}}$ = average land cover condition for specific watershed or locality **or** the Chesapeake Bay default value of 16% (percent expressed in whole numbers)
 A = applicable area (acres)

$$\begin{aligned} L_{\text{pre(watershed)}} &= [0.05 + (0.009 \times \underline{16\%})] \times \underline{38.5} \times 2.28 \\ &= \underline{17.03} \text{ pounds per year} \end{aligned}$$

Worksheet 2 : Situation 2

Page 2 of 4

STEP 5 Determine the relative post-development pollutant load (L_{post}).

$$L_{\text{post}} = [0.05 + (0.009 \times I_{\text{post}})] \times A \times 2.28 \quad (\text{Equation 5-21})$$

where: L_{post} = relative post-development total phosphorous load (pounds per year)

I_{post} = post-development percent impervious cover (percent expressed in whole numbers)

A = applicable area (acres)

$$\begin{aligned} L_{\text{post}} &= [0.05 + (0.009 \times \underline{40.0\%})] \times \underline{38.50} \times 2.28 \\ &= \underline{35.99} \text{ pounds per year} \end{aligned}$$

STEP 6 Determine the relative pollutant removal requirement (RR).

$$RR = L_{\text{post}} \bullet L_{\text{pre(watershed)}}$$

$$\begin{aligned} RR &= \underline{35.99} \bullet \underline{17.03} \\ &= \underline{18.96} \text{ pounds per year} \end{aligned}$$

STEP 7 Identify best management practice (BMP) for the site.

1. Determine the required pollutant removal efficiency for the site:

$$EFF = (RR \div L_{\text{post}}) \times 100 \quad (\text{Equation 5-22})$$

where: EFF = required pollutant removal efficiency (percent expressed in whole numbers)

RR = pollutant removal requirement (pounds per year)

L_{post} = relative post-development total phosphorous load (pounds per year)

$$\begin{aligned} EFF &= (\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}) \times 100 \\ &= \underline{\hspace{2cm}} \% \end{aligned}$$

Calculations for BCC Midlothian Campus Extended Detention Basin TN and TSS Reductions

In the spring of 2015, an extended detention basin, as described in the Virginia Stormwater Management Handbook, was installed on the Midlothian campus as part of a plan completed by Timmons Group titled “John Tyler Community College Midlothian Campus Phase III.” The extended detention basin is designed to meet and exceed water quality requirements for the phase III development. Sheet CA302 of the JTCC Midlothian Campus Phase III design plan indicates that the BMP provides an extra 0.1 pounds of phosphorus removal per year than what is required by its associated development. Sheet CA302 is included in Appendix C for reference. Calculations to determine the proportional nitrogen and sediment reductions achieved are shown below.

Steps 1 – 4 below are based on DEQ’s Guidance Memo No. 15-2005 Example V.E.1 for determining reductions from oversized BMPs.

Step 1: Determine the proportion of the extended detention basin’s total TP reductions that may be applied towards the TMDL reduction requirements.

$$\text{Proportion of BMP's available credit} = 0.10 \text{ lbs TP/yr} / 3.2 \text{ lbs TP/yr} = \underline{0.03125}$$

Step 2: Determine the total post-development TN and TSS loads going to the retention II basin.

Loading rates in this step to determine the total associated post-development TN and TSS loads to the BMP are from Table 4 in the MS4 GP (James River basin). The post-development pollutant load for the basin was calculated to be 9.12 lbs TP/yr, as shown in water quality calculations included in Appendix B.

$$\begin{aligned}\text{TN} &= 9.12 \text{ lbs TP/yr} * 5.2 \text{ lbs TN/lb TP} = \underline{47.42 \text{ lbs TN/yr}} \\ \text{TSS} &= 9.12 \text{ lbs TP/yr} * 420.9 \text{ lbs TSS/lb TP} = \underline{3,838.61 \text{ lbs TSS/yr}}\end{aligned}$$

Step 3: Determine the total extended detention basin reductions for TN and TSS:

Since this facility was designed as an extended detention pond, a 20% efficiency for TN and a 60% efficiency for TSS per the Bay Program Established Efficiencies were used to calculate total removals.

$$\begin{aligned}\text{TN} &= 47.42 \text{ lbs TN/yr} * 0.20 = \underline{9.48 \text{ lbs TN/yr}} \\ \text{TSS} &= 3,838.61 \text{ lbs TSS/yr} * 0.60 = \underline{2,303.17 \text{ lbs TSS/yr}}\end{aligned}$$

Step 4: Determine the credit that may be applied towards the TMDL reduction requirements for TN and TSS:

$$\begin{aligned}\text{TN} &= 9.48 \text{ lbs TN/yr} * 0.03125 = \underline{0.30 \text{ lbs TN/yr}} \\ \text{TSS} &= 2,303.17 \text{ lbs TSS/yr} * 0.03125 = \underline{71.97 \text{ lbs TN/yr}}\end{aligned}$$

Calculations for BCC Midlothian Campus Extended Detention Basin

Worksheet 2 : Situation 2

Page 2 of 4

STEP 5 Determine the relative post-development pollutant load (L_{post}).

$$L_{\text{post}} = [0.05 + (0.009 \times I_{\text{post}})] \times A \times 2.28 \quad (\text{Equation 5-21})$$

where: L_{post} = relative post-development total phosphorous load (pounds per year)

I_{post} = post-development percent impervious cover (percent expressed in whole numbers)

A = applicable area (acres)

$$L_{\text{post}} = [0.05 + (0.009 \times \underline{23.6\%})] \times \underline{15.24} \times 2.28$$

$$= \underline{9.12} \text{ pounds per year}$$

STEP 6 Determine the relative pollutant removal requirement (RR).

$$RR = L_{\text{post}} \bullet L_{\text{pre(watershed)}}$$

$$RR = \underline{\hspace{2cm}} \bullet \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}} \text{ pounds per year}$$

STEP 7 Identify best management practice (BMP) for the site.

1. Determine the required pollutant removal efficiency for the site:

$$EFF = (RR \div L_{\text{post}}) \times 100 \quad (\text{Equation 5-22})$$

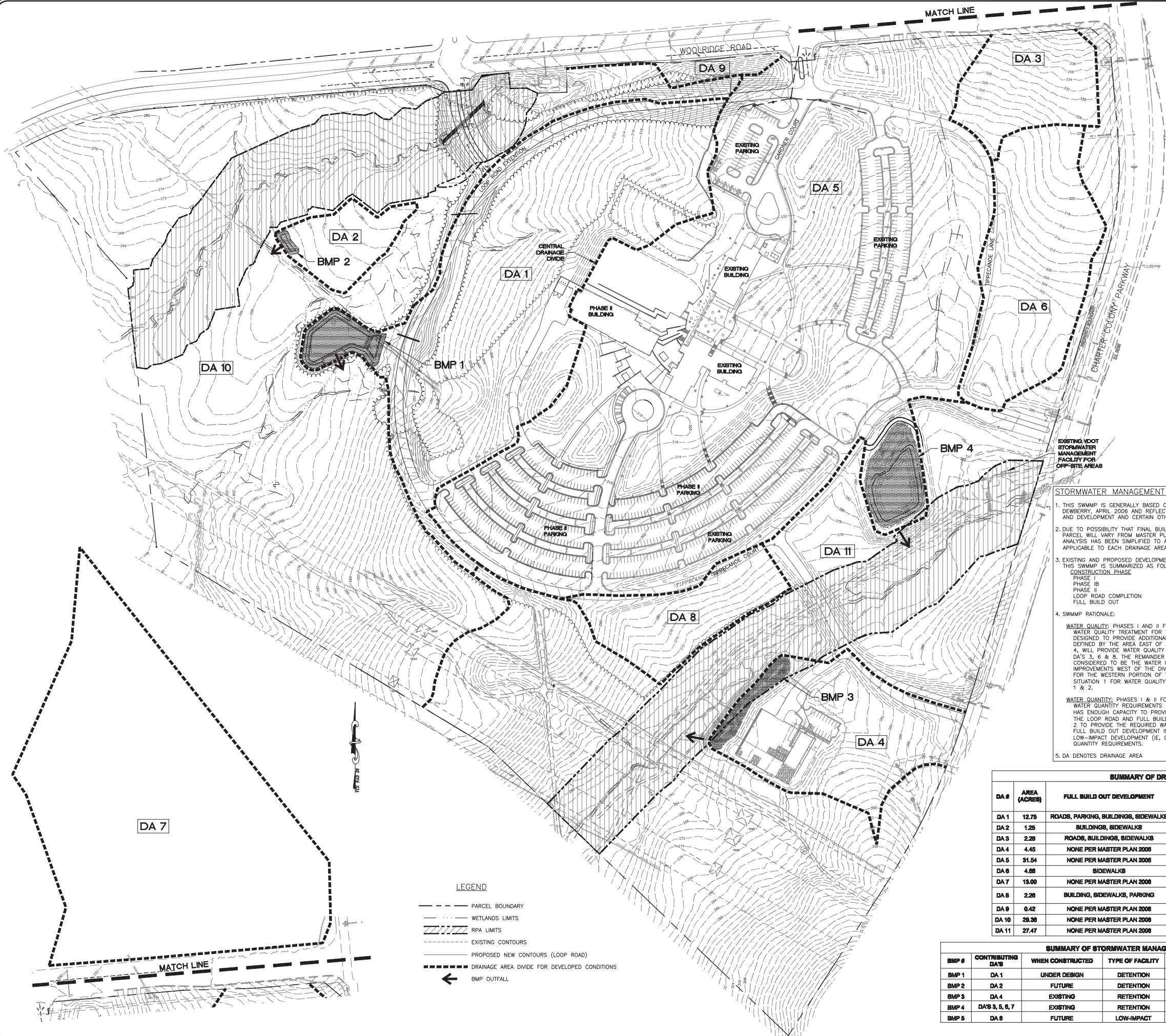
where: EFF = required pollutant removal efficiency (percent expressed in whole numbers)

RR = pollutant removal requirement (pounds per year)

L_{post} = relative post-development total phosphorous load (pounds per year)

$$EFF = (\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}) \times 100$$

$$= \underline{\hspace{2cm}} \%$$



- LEGEND**
- PARCEL BOUNDARY
 - WETLANDS LIMITS
 - RPA LIMITS
 - EXISTING CONTOURS
 - PROPOSED NEW CONTOURS (LOOP ROAD)
 - DRAINAGE AREA DIVIDE FOR DEVELOPED CONDITIONS
 - BMP OUTFALL

- STORMWATER MANAGEMENT MASTER PLAN (SWMMP) NOTES**
- THIS SWMMP IS GENERALLY BASED ON JOHN TYLER COLLEGE MASTER PLANNING BY PSA DENVER, APRIL 2006 AND REFLECTS KNOWN AND EXPECTED VARIATIONS PER CURRENT DESIGN AND DEVELOPMENT AND CERTAIN OTHER ASSUMPTIONS FOR FULL BUILD OUT CONDITIONS.
 - DUE TO POSSIBILITY THAT FINAL BUILD OUT FOR PARKING, BUILDINGS AND ROADS FOR THIS PARCEL WILL VARY FROM MASTER PLAN, THE MASTER PLAN IS NOT SHOWN AND THE SWMMP ANALYSIS HAS BEEN SIMPLIFIED TO ASSUME FULL BUILD OUT IMPERVIOUS PERCENTAGES APPLICABLE TO EACH DRAINAGE AREA, AS SHOWN IN TABLE, "SUMMARY OF DRAINAGE AREAS".
 - EXISTING AND PROPOSED DEVELOPMENT FOR THIS PARCEL AT THE TIME OF PREPARATION OF THIS SWMMP IS SUMMARIZED AS FOLLOWS:

CONSTRUCTION PHASE	CURRENT STATE
PHASE I	EXISTING
PHASE II	EXISTING
LOOP ROAD COMPLETION	UNDER DESIGN
FULL BUILD OUT	FUTURE
 - SWMMP RATIONALE:

WATER QUALITY: PHASES I AND II FOR THE DEVELOPMENT OF THIS SITE PROVIDE REQUIRED WATER QUALITY TREATMENT FOR THOSE IMPROVEMENTS. THE PHASE II RETENTION BASIN WAS DESIGNED TO PROVIDE ADDITIONAL POLLUTANT REMOVAL FOR THE APPLICABLE AREA THAT IS DEFINED BY THE AREA EAST OF A CENTRAL DRAINAGE DIVIDE. THIS RETENTION BASIN, BMP 4, WILL PROVIDE WATER QUALITY REMOVAL REQUIREMENTS FOR FUTURE DEVELOPMENT IN DA'S 3, 6 & 8. THE REMAINDER OF THE SITE, WEST OF THE CENTRAL DIVIDE, IS CONSIDERED TO BE THE WATER QUALITY APPLICABLE AREA FOR FULL BUILD OUT IMPROVEMENTS WEST OF THE DIVIDE. THE FULL BUILD OUT IMPERVIOUS AREA PERCENTAGE FOR THE WESTERN PORTION OF THE SITE WAS FOUND TO BE 15.5%, RESULTING IN SITUATION 1 FOR WATER QUALITY, REQUIRING NO ADDITIONAL POLLUTANT REMOVAL FOR DA'S 1 & 2.

WATER QUANTITY: PHASES I & II FOR THE DEVELOPMENT OF THIS SITE PROVIDE REQUIRED WATER QUANTITY REQUIREMENTS FOR THOSE IMPROVEMENTS. THE PHASE II RETENTION BASIN HAS ENOUGH CAPACITY TO PROVIDE STORAGE FOR FUTURE DEVELOPMENT FOR DA'S 3 & 6. THE LOOP ROAD AND FULL BUILD OUT DETENTION FACILITIES ARE PROPOSED FOR DA'S 1 & 2 TO PROVIDE THE REQUIRED WATER QUANTITY REQUIREMENTS AS SHOWN ON THIS PLAN. FULL BUILD OUT DEVELOPMENT IN DA 8 WILL NEED TO BE CONSTRUCTED USING LOW-IMPACT DEVELOPMENT (IE, GREEN ROOFS OR OTHER TECHNIQUES) TO ACCOUNT FOR QUANTITY REQUIREMENTS.
 - DA DENOTES DRAINAGE AREA

SUMMARY OF DRAINAGE AREAS			
DA #	AREA (ACRES)	FULL BUILD OUT DEVELOPMENT	STORMWATER MANAGEMENT FACILITY/METHOD
DA 1	12.75	ROADS, PARKING, BUILDINGS, SIDEWALKS	BMP 1 (QUANTITY)
DA 2	1.25	BUILDINGS, SIDEWALKS	BMP 2 (QUANTITY)
DA 3	2.28	ROADS, BUILDINGS, SIDEWALKS	BMP 4 (QUANTITY & QUALITY)
DA 4	4.45	NONE PER MASTER PLAN 2006	BMP 3 (QUANTITY & QUALITY)
DA 5	31.54	NONE PER MASTER PLAN 2006	BMP 4 (QUANTITY & QUALITY)
DA 6	4.88	SIDEWALKS	BMP 4 (QUANTITY & QUALITY)
DA 7	13.00	NONE PER MASTER PLAN 2006	BMP 4 (QUANTITY & QUALITY)
DA 8	2.28	BUILDING, SIDEWALKS, PARKING	BMP 4 (QUANTITY) & LOW IMPACT DEVELOPMENT (QUANTITY)
DA 9	0.42	NONE PER MASTER PLAN 2006	N/A
DA 10	28.38	NONE PER MASTER PLAN 2006	N/A
DA 11	27.47	NONE PER MASTER PLAN 2006	N/A

SUMMARY OF STORMWATER MANAGEMENT FACILITIES				
BMP #	CONTRIBUTING DA'S	WHEN CONSTRUCTED	TYPE OF FACILITY	OUTFALL
BMP 1	DA 1	UNDER DESIGN	DETENTION	UNNAMED TRIBUTARY, 0.35 MI FROM TOMAHAWK CREEK
BMP 2	DA 2	FUTURE	DETENTION	UNNAMED TRIBUTARY, 0.36 MI FROM TOMAHAWK CREEK
BMP 3	DA 4	EXISTING	RETENTION	UNNAMED TRIBUTARY, 0.55 MI FROM TOMAHAWK CREEK
BMP 4	DA'S 3, 5, 6, 7	EXISTING	RETENTION	UNNAMED TRIBUTARY, 0.71 MI FROM TOMAHAWK CREEK
BMP 5	DA 8	FUTURE	LOW-IMPACT	UNNAMED TRIBUTARY, 0.55 MI FROM TOMAHAWK CREEK

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REVISIONS		DATE

STORM WATER MANAGEMENT MASTER PLAN

John Tyler Community College

Midlothian Campus

Charlottesville County
Midlothian, Virginia

DATE: OCTOBER, 2009
SCALE: 1"=100'
DESIGN: KLS DRAWN: KLS
CHECK: KSH CHECK: KSH
B&N PN: PR44117
SHEET: 1 OF 1
JRA FN:
B&N FN:

DRAINAGE AREA TO BMP



Virginia Stormwater Management Handbook
PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D
Worksheet 1

STEP 1 Determine the applicable area (A) and the post-developed impervious cover (post).

Applicable area (A)* = 38.56 acres

Post-development impervious cover:

buildings =	1.18 acres
parking lot and roadway =	10.35 acres
Sidewalk =	1.35 acres
Other 2 =	0.65 acres
Total =	13.53 acres

Imperv = (total post-development impervious cover / A) x 100 = 35.14%

* The area subject to the criteria may vary from locality to locality. Therefore, consult the locality for proper determination of this value.

STEP 2 Determine the average land cover condition (watershed) or the existing impervious cover (existing).

Average land cover condition (watershed):
If the locality has determined land cover conditions for individual watersheds within its jurisdiction, use the watershed's specific value determined by the locality as Impervished.

Impervished = 15.00%

Otherwise, use the Chesapeake Bay default value:
Impervished = 15.00%

Existing impervious cover (existing):
Determine the existing impervious cover of the development site if present.

Existing impervious cover:

structures =	0.00 acres
parking lot and roadway =	0.00 acres
Sidewalk =	0.00 acres
Total =	0.00 acres

Imperv = (total existing impervious cover / A) x 100 = 0.00%

* This area should be the same as used in STEP 1.

STEP 3 Determine the appropriate development situation.

The site information determined in STEP 1 and STEP 2 provide enough information to determine the appropriate development situation under which the performance criteria will apply. Check the appropriate development situation as follows:

Situation 1: This consists of land development where the existing percent impervious cover (Imperv) is less than or equal to the average and cover condition (Impervished) and the proposed improvements will create a total percent impervious cover (post) which is less than or equal to the average land cover condition (Impervished).

Imperv ≤ Impervished

X Situation 2: This consists of land development where the existing percent impervious cover (Imperv) is less than or equal to the average and cover condition (Impervished) and the proposed improvements will create a total percent impervious cover (post) which is greater than the average land cover condition (Impervished).

Imperv	2%	≤	Impervished	15%	and
post	2%	>	Impervished	24%	and

Situation 3: This consists of land development where the existing percent impervious cover (Imperv) is greater than the average and cover condition (Impervished).

Imperv	2%	>	Impervished	15%	and
--------	----	---	-------------	-----	-----

Situation 4: This consists of land development where the existing percent impervious cover (Imperv) is served by an existing stormwater management BMP(s) that addresses water quality.

If the proposed development meets the criteria for development Situation 1, then the low density development is considered to be the BMP and no pollutant removal is required. The calculation procedure for Situation 1 stops here. If the proposed development meets the criteria for development Situation 2, 3, or 4, then proceed to STEP 4 on the appropriate worksheet.

STORMWATER MANAGEMENT NARRATIVE

PROJECT DESCRIPTION:

This plan proposes general site plan design for an expansion to John Tyler Community College, Midlothian campus near Richmond, Virginia. The plan incorporates a 60,000 gsf building with an additional parking lot, utility access drive, and an approximate 550' extension to Tippecanoe court. Approximately 11 acres will be disturbed during construction.

EXISTING SITE CONDITIONS:

The campus property is occupied by three buildings connected by access roads, parking lots, and lawn. The other areas are currently undeveloped and heavily wooded. The southwestern edge of the site is bounded by a wide power line right-of-way. The northern and the eastern property boundaries are woolridge road and charter colony parkway, respectively. An unnamed stream runs through the southeastern region of the site, while another is running through the northwestern corner of the site. Both streams flow in a southeasterly direction. An abandoned road bed is located in the western portion of the wooded section of the site. In general, the topography of the site is hilly with a broad, northeasterly-southwesterly running ridge in the central part of the property. The two main buildings are located here. Grades of the ridge are varying from approximate elevations +340 to +310 feet, sloping down to elevations of approximately +250 feet in the west and east. The third building is located in the wooded southeastern section of the campus.

ADJACENT AREAS:

The site is bordered to the north by Woolridge Road, to the east by charter colony parkway, and to the southwest by vacant land and the Midlothian Turnpike. On the eastern portion of the site is the existing phase I portion of the campus master plan.

Soils: (see soils and drainage sheet or the geotechnical report)

The predominant soils on the site are Creedmoor fine sandy loam, Mayodon gravelly sandy loam, and Edgehill very gravelly fine sandy loam.

HYDROLOGY AND HYDRAULICS

Hydrologic calculations for the pre development and post development areas are done using the rational method. The pre-development calculations assume that the site is in pristine conditions, where as the developed conditions take into account both the current developed conditions and proposed conditions with the phase II project.

The drainage areas are delineated to a point of analysis which in this case is where the stormwater BMP that will serve the site is located. There are three major areas, two are onsite areas of 26.7 acres and 11.8 acres respectively and the third is an offsite area of 13 acres.

Once the hydrologic parameters are determined for the pre and post drainage areas, the information is applied to PondPak to route the flow and reduce the stormwater for the 2-yr and 10-yr flows to pre-developed conditions. The pre developed flows for 2, 10 and 100 yr are 36.52, 50.08 and 82.79 cfs respectively. The post developed flows for 2,10 and 100 yr are 63.21, 85.91 and 141.37 cfs respectively and the routed flows are 3.49,16and 82.65 cfs. For this project the stormwater management bmp is designed to fully contain the 100-yr flow and release it to the outfall channel through the principal spillway.

It is worth noting that the 13 and 11.8 acres come to a point of analysis just before entering the BMP and split their flow in halved through double 24" RCP pipes. Therefore half of the total areas are used in the storm quantity and quality calculations for the BMP.

Storm Sewer System: The project includes the design of storm sewer system that will tie into an existing system. Because we found that the existing system will not handle the added flow we have analyzed the system with 30" storage pipes for the proposed section of pipes. This process has allowed us to increase the inlet time and reduce the flow that is put into the existing system at the tie in points by constricting flow with smaller pipes.

WATER QUALITY

Assuming the site was in pristine condition and then adding to it all the onsite impervious areas, the total site impervious is calculated to be 35.14%. Based on the impervious area a water quality volume (WQV) of 24,557 cu.ft is required. The selected water quality BMP is Retention Basin II, which requires 4x WQV and with aquatic bench. This BMP will provide a 65% removal efficiency.

The water quality computations applying the use of the Retention BMP efficiency show that the removal requirement for the proposed project is met and also and extra 3.4 lb/s per year is removed. The water quality volume in the pond is at 281.5 to a accommodate 4x WQV which is 98228 cu.ft. (excluding the volume in the forebay). The actual water quality normal water surface elevation is set at 282 for the BMP to accommodate future development within the drainage area.

CHANNEL ADEQUACY

The 2-yr and 10-yr flows that leave the outfall channel are 3.49 cfs and 16 cfs respectively. A channel adequacy calculation using open channel flow for the outfall channel is performed and the result indicates that the channel is able to contain the 10-yr flow and passes the 2-yr flow with a velocity less than 2 ft/s complying with MS-19 requirements.

RECORD DOCUMENTS:
THESE RECORD DOCUMENTS HAVE BEEN SUBMITTED IN PART BY OTHERS WHILE THIS PROJECT WAS BEING DESIGNED TO BE NOT RESPONSIBLE FOR ANY OF THE INFORMATION CONTAINED HEREIN OR INCORPORATED INTO THE DOCUMENT AS A RESULT.



BURT, HILL

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RECORD DOCUMENTS 04/01/10
REVISIONS

Drawn By	KLS
Checked By	JB
Date Revised	04/01/10
Date Printed	04/01/10

RECORD DRAWING

JOHN TYLER COMMUNITY COLLEGE
800 CHARTER COLONY PKWY, MIDLOTHIAN, VA 23114

SWM/BMP DRAINAGE INFORMATION

VA Project # 280-17008

C802

SH Project # 00000000



POST-DEVELOPED TO BASIN	POST-DEVELOPED TO BASIN OUTFALL
A = 15.24 Acres	Q ₂ = 17.36 cfs
C = 0.56	Q ₁₀ = 21.17 cfs
T _c = 0.42 Hrs	Q ₁₀₀ = 23.34 cfs
POST-DEVELOPED INTO BASIN	
Q ₂ = 23.12 cfs	
Q ₁₀ = 32.29 cfs	
Q ₁₀₀ = 42.44 cfs	
POST-DEV TO WEST SECTION DD	POST-DEV TO SOUTH SECTION CC
A = 0.95 Acres	A = 18.88 Acres
C = 0.30	C = 0.51
T _c = 0.29 Hrs	Q ₂ = 19.93 cfs
Q ₂ = 1.1 cfs	Q ₁₀ = 24.74 cfs
Q ₁₀₀ = 1.4 cfs	

LEGEND

- DRAINAGE AREA BOUNDARY
- IMPERVIOUS AREA

MS-19 SUMMARY

AN EXTENDED DETENTION BASIN HAS BEEN PROVIDED WHICH DETAINS THE 2, 10, & 100 YEAR POST-DEVELOPED FLOWS TO FLOWS MEETING ADEQUATE CHANNEL ANALYSIS. SEE SHEET CA402 FOR ADEQUATE CHANNEL ANALYSIS.

WATER QUALITY SUMMARY

SITE AREA = 16.05 AC.
PRE-DEVELOPMENT IMPERVIOUS AREA = 0.77 AC. (4.8%)
POST-DEVELOPMENT IMPERVIOUS AREA = 4.09 AC. (25.4%)
REMOVAL REQUIREMENT = 3.1 LBS/YR
ON-SITE TREATMENT REMOVAL = 3.2 LBS/YR
WATER QUALITY REMOVAL REQUIREMENTS ARE MET THROUGH ON-SITE TREATMENT USING AN EXTENDED DETENTION BASIN.

Appendix C: Supporting POC Reduction Calculations

Street Sweeping Calculations

TN: (Lane Miles X James River TN Load) X SCP-4 TN Removal Rate = lbs./yr. Reduction

$$TN: (30.36 \times 9.39).01 = 2.85 \text{ lbs./yr.}$$

TP: (Lane Miles X James River TP Load) X SCP-4 TP Removal Rate = lbs./yr. Reduction

$$TP: (30.36 \times 1.76).03 = 1.60 \text{ lbs./yr.}$$

TSS: (Lane Miles X James River TSS Load) X SCP-4 TSS Removal Rate = lbs./yr. Reduction

$$TSS: (30.36 \times 676.94).06 = 1,233.11 \text{ lbs./yr.}$$

Land Use Change Calculations

Table V.H.1 James Land Use Change Conversion Efficiency Table				
From	Conversion	TN (lb./ac/yr.)	TP (lb./ac/yr.)	TSS (lb./ac/yr.)
Impervious	Forest	11.84	0.78	1327
Impervious	Mixed Open	11.36	0.50	389
Impervious	Turf	5.47	0	862
Turf	Forest	6.37	1.39	465
Turf	Mixed Open	5.89	1.12	0
Mixed Open	Forest	0.48	0.27	937

Areas converted from Impervious to Turf on Chester (regulated) Campus: .93 acres

TN: Acres converted X Impervious to Turf TN = lbs./yr. Reduction

$$TN: 0.93 \times 5.47 = 5.09 \text{ lbs./yr.}$$

TP: Acres converted X Impervious to Turf TP = lbs./yr. Reduction

$$TP: 0.93 \times 0 = 0.00 \text{ lbs./yr.}$$

TSS: Acres converted X Impervious to Turf TSS = lbs./yr. Reduction

$$TSS: 0.93 \times 862 = 801.66 \text{ lbs./yr.}$$

Areas converted from Turf to Mixed Open on Midlothian (regulated) Campus: 2.87 acres

TN: Acres converted X Turf to Mixed Open TN = lbs./yr. Reduction

$$TN: 2.87 \times 5.89 = 16.90 \text{ lbs./yr.}$$

TP: Acres converted X Turf to Mixed Open TP = lbs./yr. Reduction

$$TP: 2.87 \times 1.12 = 3.21 \text{ lbs./yr.}$$

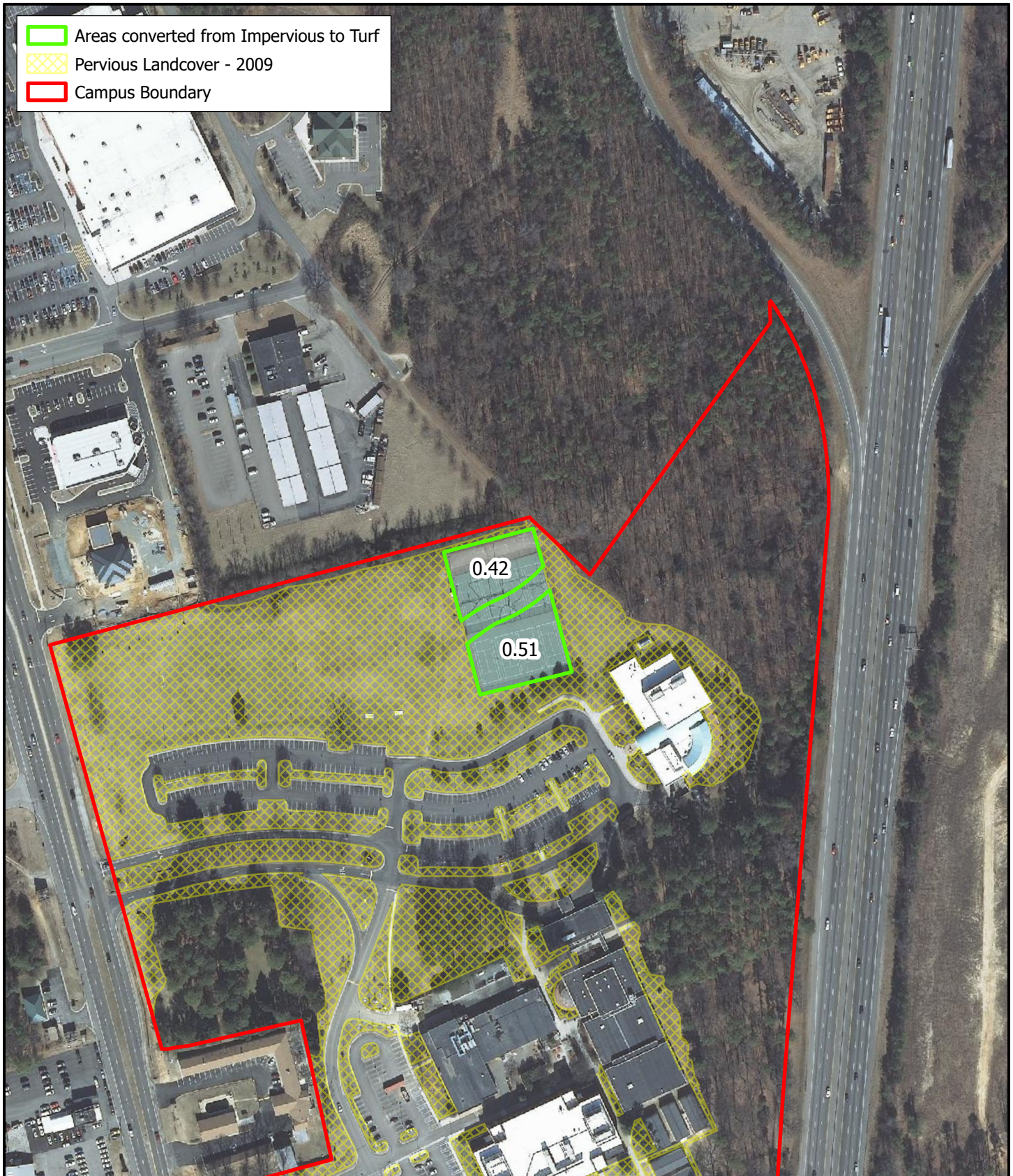
TSS: Acres converted X Turf to Mixed Open TSS = lbs./yr. Reduction

$$TSS: 2.87 \times 0.00 = 0.00 \text{ lbs./yr.}$$

Add Chester and Midlothian Land Use Change Reductions

$$TN: 5.09 + 16.90 = \underline{21.99} \text{ and } TP: 0.00 + 3.21 = \underline{3.21} \text{ and } TSS: 801.66 + 0.00 = \underline{801.66}$$

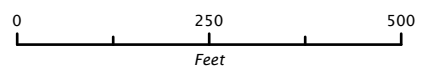
Appendix D: Land Use Change Plans






Prepared by J. Bradley, 11/14/2022 2:04 PM
Sources: VGIN, VBMP 2009
Projection: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



APPENDIX D LANDCOVER CONVERSION BCC - CHESTER CAMPUS



Chesterfield, VA

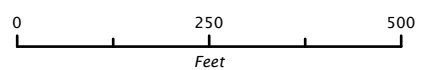
-  Areas converted from Turf to Mixed Open
-  Pervious Landcover - 2009
-  Campus Boundary



Prepared by J. Bradley, 11/14/2022 2:06 PM
 Sources: VGIN, VBMP 2009
 Projection: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



APPENDIX D **LANDCOVER CONVERSION** BCC - MIDLOTHIAN CAMPUS



Midlothian, VA