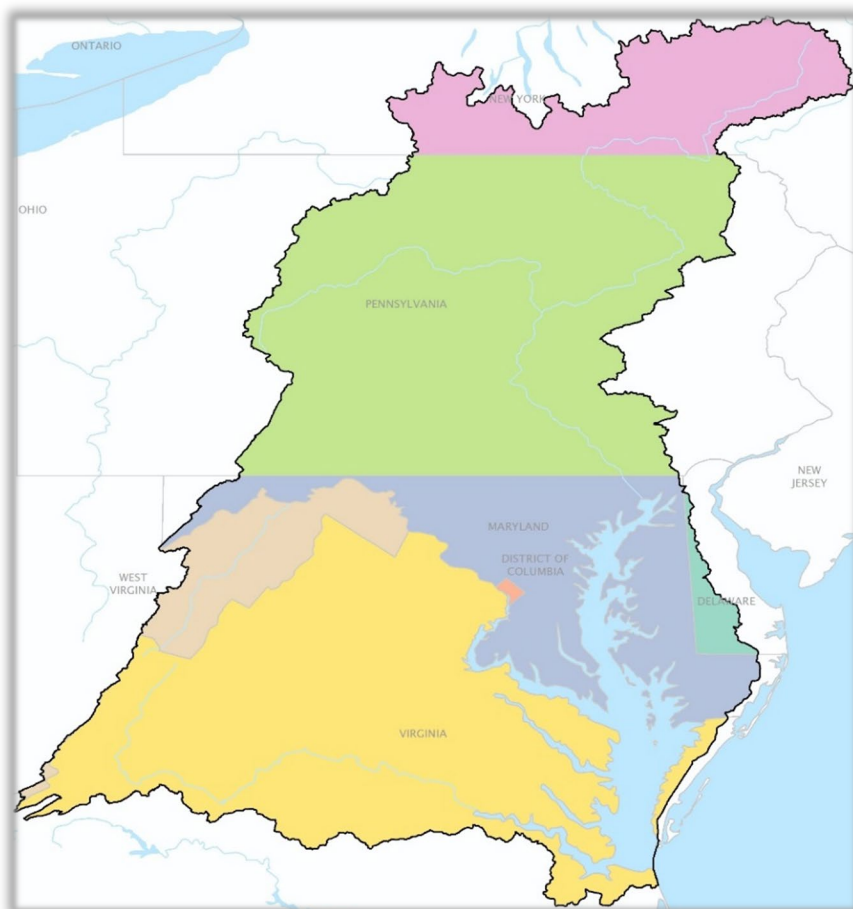


PHASE III CHESAPEAKE BAY TMDL ACTION PLAN

**A Plan for Achieving an Additional 60% Reduction
(100% Overall)**

in Accordance with 9VAC25-890-40 Part II A

October 2024



**Germanna
Community
College**



**Fredericksburg
Campus**

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.

EXECUTIVE SUMMARY

Germanna Community College (GCC) 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, GCC 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 GCC 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.

GCC has developed Phase I, Phase II, and Phase III Chesapeake Bay TMDL Action Plans consistent with the 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. GCC has used the land use change conversion BMP to achieve the required reductions to meet the 100% cumulative reductions. The BMP along with continued implementation of the GCC MS4 Program Plan, is consistent with the provisions of an iterative MS4 Program and constitutes compliance with the MS4 General Permit standard of reducing pollutants to the maximum extent practicable (MEP).

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	.57	3.99	6.84	11.40
Phosphorus	.12	.84	1.44	2.40

Table of Contents

1.0	Introduction and Purpose	1
1.1	Total Maximum Daily Loads	1
1.2	MS4 General Permit Special Conditions	2
1.3	Watershed Implementation Plan and Strategy for MS4s	2
1.4	GCC Chesapeake Bay Action Plan	2
2.0	Applicable Overview of GCC's MS4 Program	3
2.1	Legal Authorities	3
2.2	New or Modified Legal Authorities	4
3.0	Pollutant of Concern (POC) Loadings	5
3.1	Baseline Loading Characterization	5
3.2	Annual Loadings from Existing Sources	5
3.3	Annual Loadings from New Sources and Grandfathered Projects	6
3.4	Required 5% Load Reductions	6
3.5	Required 35% Load Reductions	7
3.6	Required 40% Overall Load Reductions	7
3.7	Required 60% Load Reductions	8
3.8	Required 100% Overall Load Reductions	8
4.0	Means to Achieve 5% Pollutant Reductions	9
4.1	5% Reductions Achieved with Street Sweeping	9
4.2	Implementation of 5% POC Reduction to the MEP	9
4.3	Supplemental Means and Methods for 5% POC Reductions	10
4.4	Public Comment Period for 5% POC Reductions	10
4.5	Annual Reporting for 5% POC Reductions	10
5.0	Means to Achieve 40% Overall POC Reductions	11
5.1	40% Overall POC Reductions to be Achieved with Street Sweeping	11
5.2	Revised Means to Achieve 40% POC Reductions	12
5.3	Implementation of 40% POC Reduction to the MEP	12
5.4	Supplemental Means and Methods for 40% POC Reductions	13
5.5	Public Comment Period for 40% POC Reductions	13
5.6	Annual Reporting for 40% POC Reductions	13
6.0	Means to Achieve 100% Cumulative POC Reductions	14
6.1	Implementation of 100% POC Reductions to the MEP	14
6.2	Supplemental Means and Methods for 100% POC Reductions	14
6.3	Public Comment Period for 100% POC Reductions	14
6.4	Annual Reporting for 100% POC Reductions	14

Tables

Table 1: Summary of POC Load Reductions	i
Table 2: Classification of Campus Land Cover Area (Acres)	5
Table 3: Loadings from the GCC Campus	6
Table 4: Estimated 5% POC Reductions from the GCC Campus	6
Table 5: Estimated 35% POC Reductions from the GCC Campus	7
Table 6: Estimated 40% Overall POC Reductions from the GCC Campus	7
Table 7: Estimated 60% POC Reductions from the GCC Campus	8
Table 8: Estimated 100% Overall POC Reductions from the GCC Campus	8

Table 9: Required 5% Street Sweeping Material Swept per the Mass Loading Approach.....	9
Table 10: 40% Overall POC Reductions to be Achieved with Street Sweeping.....	11
Table 11: Summary of BMPs Achieved for 40% POC Reductions.....	12
Table 12: Summary of 100% Cumulative POC Reductions	14

Appendices

Appendix A: 2009 Baseline Map for Characterization of GCC's Campus
Appendix B: Nutrient Reduction Calculations
Appendix C: Land Use Change Maps

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
GCC	Germanna Community College
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
LA	Load Allocation
L2	Level 2
MCM	Minimum Control Measure
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination 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. 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

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.

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

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

Prior Developed Lands are land 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 Virginia Department of Environmental Quality (DEQ) through the Virginia Stormwater Management Program (VSMP) and the Virginia Pollutant Discharge Elimination System (VPDES). Germanna Community College (GCC) 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, GCC 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.

"GCC's MS4 program strives to improve environmental compliance, quality and stewardship through effective management, implementation, and enforcement."

The GCC 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 GCC's MS4 Program Plan addresses 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

GCC's MS4 General Permit includes a series of special conditions that must be addressed for permit compliance where GCC 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 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 GCC Chesapeake Bay Action Plan

The GCC Action Plan presented herein provides a review of the current MS4 program which demonstrates GCC's ability to ensure compliance with the special conditions and includes the means and methods GCC used to meet 5.0% of the Level 2 (L2) scoping run reductions by July 1, 2018, and 40% reductions by July 1, 2023. This Plan also describes how GCC meets the 100% reductions required 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 provides background information and procedures to meet the Chesapeake Bay TMDL special condition requirements.

2.0 APPLICABLE OVERVIEW OF GCC'S MS4 PROGRAM

GCC's MS4 Permit regulates stormwater discharges from areas included within census urbanized areas (CUAs). GCC's main campus is included in a CUA, as depicted in Appendix A. GCC's collective efforts, as described in the GCC MS4 Program Plan, result in significant reduction of pollutants that could potentially be discharged from its regulated MS4. BMPs already included in the GCC Program Plan that address nutrients 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, GCC 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, GCC'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)* – GCC's MS4 Program includes a Public Education and Outreach Program (PEOP) that identifies the Chesapeake Bay TMDL POCs as a high priority water quality issue. The PEOP is described in BMP 1.1 of the GCC 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)* – GCC'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. GCC prohibits non-stormwater discharges into the storm sewer system through language provided within the Standards of Conduct for employees and the Student Handbook for students. IDDE BMPs are described in the Minimum Control Measure 3 BMPs in the GCC 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)* – GCC'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 include:
 - 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 GCC MS4 Program Plan describe construction site runoff control BMPs.

- *MCM 5 (Post-Construction Stormwater Management)* – GCC’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 to maintain functionality. Minimum Control Measure 5 BMPs in the GCC MS4 Program Plan describe post-construction stormwater management BMPs.
- *MCM 6 (Good Housekeeping)* – GCC’s MS4 Program includes a Pollution Prevention/Good Housekeeping Program that incorporates 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 GCC’s Pollution Prevention & Good Housekeeping Manual and biennial training for applicable staff. GCC also utilizes contract language to ensure appropriate certifications for application of fertilizers per a Nutrient Management Plan approved by Virginia Department of Conservation and Recreation. Minimum Control Measure 6 BMPs in the GCC MS4 Program Plan describe pollution prevention and good housekeeping BMPs.

2.2 New or Modified Legal Authorities

Consistent with 2013 – 2018, 2018 – 2023, and 2023 - 2028 MS4 General Permits, GCC 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 GCC MS4 Program Plan annual reporting, they will be reported through the annual report process.

As a non-traditional MS4, GCC does not have the ability to create legal authorities. No new 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 GCC to estimate the annual loadings and the POC load reductions. To complete this requirement, GCC 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

Before estimating the loads and required reductions, GCC first evaluated the extent of their regulated MS4 area, including the regulated acres of urban pervious and impervious surface served by its MS4 as of June 30, 2009. These evaluations were conducted using Geographic Information System (GIS) digitization utilizing aerial photography, as depicted in Appendix A.

GCC's MS4 regulated area was calculated using the GCC property boundaries as a conservative estimate of the area the MS4 serves. Campus boundaries were obtained from Spotsylvania County's GIS data. Aerial photography was obtained from the 2009 Virginia Base Map Program Orthophotography Program Aerials¹. The extent of pervious, impervious and forest areas was digitized based on the aerial imagery and best professional judgment. 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. The determination of regulated area was based on the 2010 CUA.

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

Land Cover	GCC Campus
Impervious	9.66
Pervious	10.30
Forest*	54.33
Surface Water*	0.42

* Consistent with methodology described in the DEQ Chesapeake Bay 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 Rappahannock River Basin calculation sheet for estimating existing source loads provided in the MS4 General Permit. The calculation sheet was completed for the regulated GCC campus as provided in Table 3.

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

Table 3: Loadings from the GCC 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	9.66	9.38	90.61	145.61
	Pervious	10.30	5.34	55.00	
Phosphorus	Impervious	9.66	1.41	13.62	17.53
	Pervious	10.30	0.38	3.91	
TSS	Impervious	9.66	423.97	4095.55	4,672.45
	Pervious	10.30	56.01	576.90	

3.3 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 required 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 GCC projects are grandfathered.

3.4 Required 5% Load Reductions

The 2013 – 2018 MS4 General Permit required GCC to reduce 5.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the GCC campus for the permit cycle was calculated using the calculation sheet in the 2013 – 2018 MS4 General Permit for determining POC reductions for the Rappahannock 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 GCC are depicted in Table 4.

Table 4: Estimated 5% POC Reductions from the GCC 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	9.66	0.04221	0.41	0.57
	Pervious	10.30	0.01602	0.17	
Phosphorus	Impervious	9.66	0.01128	0.11	0.12
	Pervious	10.30	0.0013775	0.01	
TSS	Impervious	9.66	4.2397	40.96	43.48
	Pervious	10.30	0.24504375	2.52	

3.5 Required 35% Load Reductions

The 2018 – 2023 MS4 General Permit required GCC 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 GCC campus for the permit cycle were calculated using the calculation sheet in the 2018 – 2023 MS4 General Permit for determining POC reductions for the Rappahannock 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 GCC are depicted in Table 5.

Table 5: Estimated 35% POC Reductions from the GCC Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	35% Reduction (lbs.)
Nitrogen	Impervious	9.66	0.04221	3.99
	Pervious	10.30	0.01602	
Phosphorus	Impervious	9.66	0.01128	0.84
	Pervious	10.30	0.0013775	
TSS	Impervious	9.66	4.2397	304.36
	Pervious	10.30	0.24504375	

- No expanded sources identified in the 2000 and 2010 census urban 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 required 40% overall load reductions for GCC are depicted in Table 6.

Table 6: Estimated 40% Overall POC Reductions from the GCC Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	40% Reduction (lbs.)
Nitrogen	Impervious	9.66	0.04221	4.56
	Pervious	10.30	0.01602	
Phosphorus	Impervious	9.66	0.01128	.96
	Pervious	10.30	0.0013775	
TSS	Impervious	9.66	4.2397	347.84
	Pervious	10.30	0.24504375	

3.7 Required 60% Load Reductions

The 2023 – 2028 MS4 General Permit required GCC to reduce 60.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the GCC campus for the permit cycle were calculated using the calculation sheet in the 2023 – 2028 MS4 General Permit for determining POC reductions for the Rappahannock River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ’s Guidance Memo No. 20-2003. The required 60% load reductions for GCC are depicted in Table 7.

Table 7: Estimated 60% POC Reductions from the GCC Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	60% Reduction (lbs.)
Nitrogen	Impervious	9.66	0.04221	6.84
	Pervious	10.30	0.01602	
Phosphorus	Impervious	9.66	0.01128	1.44
	Pervious	10.30	0.0013775	

- No expanded sources identified in the 2000 and 2010 census urban 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 required 100% overall load reductions for GCC are depicted in Table 8.

Table 8: Estimated 100% Overall POC Reductions from the GCC Campus

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	100% Reduction (lbs.)
Nitrogen	Impervious	9.66	0.04221	11.40
	Pervious	10.30	0.01602	
Phosphorus	Impervious	9.66	0.01128	2.40
	Pervious	10.30	0.0013775	

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 Section 3.4. The means and methods are described in the following sub-sections and were incorporated into the GCC MS4 Program Plan for implementation.

POC load reductions described in the following sub-sections demonstrated compliance with the reduction requirements for the 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 2013 - 2018 MS4 General Permit cycle.

4.1 5% Reductions Achieved with Street Sweeping

GCC implemented street sweeping to satisfy the required POC reductions identified in Section 3.4. 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 GCC must collect a minimum of 326 pounds of material per year to meet the POC reduction requirements. Required reductions are summarized in Table 9.

Table 9: Required 5% Street Sweeping Material Swept per the Mass Loading Approach

Pollutant	Annual Reductions Required by L2 Scoping Run (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	0.57	0.7	0.0025	325.71
Phosphorus	0.12	0.7	0.001	171.43
TSS	43.48	0.7	0.3	207.05

GCC documented 1,926 lbs. of material swept exceeding the required 326 lbs. required.

4.2 Implementation of 5% POC Reduction to the MEP

Implementation of the Action Plan was dependent on continued execution of the GCC MS4 Program Plan. MS4 Program Plan BMPs was implemented per the schedules outlined in the GCC 2013 – 2018 MS4 Program Plan.

The cost associated with the implementation of street sweeping was estimated to be approximately \$3,475 per year per pound of phosphorous removed. 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 the capital cost of a mechanical sweeper.

During the 2013 - 2018 permit cycle, GCC evaluated the most cost-effective way for implementing a street sweeping program which included the purchase of a sweeper and a set of vehicle scales. GCC estimated the actual annual costs to be \$27,666 for a total of \$138,330 for the 2013 – 2018 permit cycle.

4.3 Supplemental Means and Methods for 5% POC Reductions

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

4.4 Public Comment Period for 5% POC Reductions

GCC 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 GCC’s website for a minimum of 14 total days.
- An email was sent to the target audience identified in Minimum Control Measure 1 of the GCC MS4 Program Plan with a link where comments may be provided on the Action Plan.

4.5 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. GCC reported annually on the implementation of the means and methods described in Section 4.1 of this Plan.

5.0 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 GCC 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 were not retroactively applied to projects approved to meet reductions for the 2018 – 2023 MS4 General Permit cycle.

5.1 40% Overall POC Reductions to be Achieved with Street Sweeping

GCC implemented street sweeping to satisfy the required POC reductions identified in Section 3.4. 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 GCC must collect a minimum of 2,280 pounds of material per year to meet the POC reduction requirements. Required reductions and sweeping efforts are summarized in Table 10.

Table 10: 40% Overall POC Reductions to be Achieved with Street Sweeping

Pollutant	Annual Reductions Required by L2 Scoping Run (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	0.57	0.7	0.0025	2,279.97
Phosphorus	0.12	0.7	0.001	1,200.01
TSS	43.48	0.7	0.3	1,449.35

5.2 Revised Means to Achieve 40% POC Reductions

For the 2022 - 2023 reporting year, GCC 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, GCC has determined the number of total “curb lane miles” on their property. It was calculated that GCC has 11.29 curb lane miles on the property. Using the nutrient and sediment loading rates for urban impervious cover for the Rappahannock River provided in the 2018 – 2023 MS4 General Permit (9VAC25-890-40), the required nutrient reductions were calculated. GCC selected SCP-4: 1 Pass Every 4 Weeks to implement to partially meet the required nutrient and sediment reductions. See Appendix B for the calculations.

In addition to street sweeping, GCC implemented land use changes to achieve the remaining nutrient reduction credits towards the 40% reduction requirements. By July 1, 2023, GCC converted 1.41 acres of mixed open space to forest at the Fredericksburg campus, GCC’s MS4 campus. By July 1, 2023, GCC also converted 1.85 acres of turf to mixed open space at GCC’s Culpeper campus by mowing the designated area only twice annually. GCC’s Culpeper campus is an unregulated property; therefore, the L2 Baseline Loadings were taken into account. See Appendix B for calculations and Appendix C for mapping of the land use changes.

Table 11 depicts the 40% POC reductions achieved by GCC based on the selected best management practices.

Table 11: Summary of BMPs Achieved for 40% POC Reductions

POC	Reductions Achieved by Street Sweeping (lbs./yr.)	Reductions Achieved by Land Use Change (lbs./yr.)	Total 40% Reduction Achieved (lbs./yr.)	40% Required Reduction (lbs./yr.)
Nitrogen	1.06	11.89	12.95	4.56
Phosphorous	.48	2.48	2.96	.96
TSS	287.20	968.67	1,255.87	347.84

5.3 Implementation of 40% POC Reduction to the MEP

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

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

5.4 Supplemental Means and Methods for 40% POC Reductions

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

5.5 Public Comment Period for 40% POC Reductions

GCC solicited public comments on the 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 GCC 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.

5.6 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. GCC reported annually on the implementation of the means and methods described in Sections 5.1 and 5.2 of this Plan.

6.0 MEANS TO ACHIEVE 100% CUMULATIVE POC REDUCTIONS

During the 2022 permit year, GCC evaluated its regulated and unregulated properties to identify areas that had already been converted and areas to convert from turf to mixed open or forest through landscape maintenance practices. The identified land use change conversions exceeded the additional 60% and cumulative 100% reductions required as summarized in Table 12.

Table 12: Summary of 100% Cumulative POC Reductions

POC	Reductions Achieved by Land Use Change (lbs./yr.)	100% Required Reduction (lbs./yr.)
Nitrogen	11.89	11.40
Phosphorous	2.48	2.40

- No expanded sources identified in the 2000 and 2010 census urban 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.

6.1 Implementation of 100% POC Reductions to the MEP

Implementation of the 2023 – 2028 Action Plan will be dependent on continued execution of the GCC MS4 Program Plan. MS4 Program Plan BMPs will continue to be implemented per the schedule outlined in the GCC MS4 Program Plan.

6.2 Supplemental Means and Methods for 100% POC Reductions

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

6.3 Public Comment Period for 100% POC Reductions

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

- A draft of the Phase III Chesapeake Bay TMDL Action plan was sent via email to the target audience identified in Minimum Control Measure 1 of the GCC MS4 Program Plan with a link where comments could be provided on the Action Plan through an online survey program for 15 days.

6.4 Annual Reporting for 100% POC Reductions

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

Appendix A: 2009 Baseline Map for Characterization of GCC's Campus



EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions



**FREDERICKSBURG CAMPUS
IMPERVIOUS AND PERVIOUS LAND COVER
GERMANNA COMMUNITY COLLEGE**

0 400 800
Feet

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

Appendix B: Nutrient Reduction Calculations

Street Sweeping Calculations

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

$$TN: (11.29 \times 9.38).01 = 1.06 \text{ lbs./yr.}$$

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

$$TP: (11.29 \times 1.41).03 = .48 \text{ lbs./yr.}$$

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

$$TSS: (11.29 \times 423.97).06 = 287.20 \text{ lbs./yr.}$$

Land Use Change Calculations

Areas converted from Mixed Open to Forest on Fredericksburg (regulated) Campus: 1.41 acres

Table V.H.1 Rappahannock Land Use Change Conversion Efficiency Table

From	Conversion	TN (lb./ac/yr.)	TP (lb./ac/yr.)	TSS (lb./ac/yr.)
Impervious	Forest	11.39	0.77	1477
Impervious	Mixed Open	10.92	0.49	790
Impervious	Turf	4.73	0	1021
Turf	Forest	6.66	1.42	457
Turf	Mixed Open	6.2	1.14	0
Mixed Open	Forest	0.47	0.28	687

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

$$TN: 1.41 \times 0.47 = 0.66 \text{ lbs./yr.}$$

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

$$TP: 1.41 \times 0.28 = 0.39 \text{ lbs./yr.}$$

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

$$TSS: 1.41 \times 687 = 968.67 \text{ lbs./yr.}$$

Area converted from Turf to Forest on the Culpeper (unregulated) Campus: 1.85 acres

Rappahannock Unregulated Land L2 Baseline Information								
POC	Subsource	(a) Loading Rate (lbs./ac./yr.)	(b) Exist. Dev. Lands as of 6/30/09 w/in 2010 CUA (ac.)	(c) Load (lbs./yr.)	(d) % of MS4 req'd CB total L2 loading reduction	(e) % of L2 req'd by 6/30/23	(f) 40% reduction req'd by 6/30/23 (lbs./yr.)	Sum of 40% reduction (lbs./yr.)
TN	Urb. Imp.	9.38	0	0	0.09	0.40	0	0.21
	Urb. Perv.	5.34	1.85	9.879	0.06	0.40	0.21	
TP	Urb. Imp.	1.41	0	0	0.16	0.40	0	0.02
	Urb. Perv.	0.38	1.85	0.703	0.07	0.40	0.02	
TSS	Urb. Imp.	423.97	0	0	0.20	0.40	0	3.17
	Urb. Perv.	56.01	1.85	103.6185	0.09	0.40	3.63	

TN, TP & TSS: $a \times b = c$; and $c \times d \times e = f$; and $f \text{ (Urban Impervious)} + f \text{ (Urban Pervious)} = g$

TN (Urban Impervious): $9.38 \times 0 = 0$; and $0 \times 0.09 \times 0.40 = 0$

TN (Urban Pervious): $5.34 \times 1.85 = 9.88$; and $9.88 \times 0.06 \times 0.40 = 0.24$

Total TN: $0 + 0.24 = 0.24$

TP (Urban Impervious): $1.41 \times 0 = 0$; and $0 \times 0.16 \times 0.40 = 0$

TP (Urban Pervious): $0.38 \times 1.85 = 0.70$; and $0.70 \times 0.07 \times 0.40 = 0.02$

Total TP: $0 + 0.02 = 0.02$

TSS (Urban Impervious): $423.97 \times 0 = 0$; and $0 \times 0.20 \times 0.40 = 0$

TSS (Urban Pervious): $56.01 \times 1.85 = 103.62$; and $103.62 \times 0.09 \times 0.40 = 3.73$

Total TSS: $0 + 3.73 = 3.73$

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

TN: $(1.85 \times 6.2) - 0.24 = 11.23 \text{ lbs./yr.}$

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

TP: $(1.85 \times 1.14) - 0.02 = 2.09 \text{ lbs./yr.}$

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

TSS: $(1.85 \times 0) - 3.73 = 0 \text{ lbs./yr.}$

Add Regulated and Unregulated Land Use Change Reductions

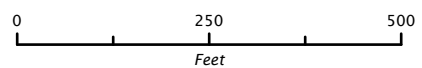
TN: $.66 + 11.23 = \underline{11.89}$ and TP: $0.39 + 2.09 = \underline{2.48}$ and TSS: $968.67 + 0 = \underline{968.67}$

Appendix C: Land Use Change Maps

- Areas converted from Mixed Open to Forest
- Previous Landcover - 2009
- Campus Boundary



APPENDIX C LANDCOVER CONVERSION GCC - FREDERICKSBURG CAMPUS



Fredericksburg, VA

Prepared by J. Bradley, 11/11/2022 11:46 AM
Sources: VGIN, VBMP 2009
Projection: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

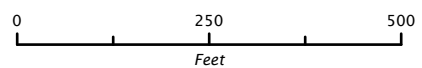
- Areas converted from Turf to Mixed Open
- Campus Boundary



Prepared by J. Bradley, 11/11/2022 3:10 PM
Sources: VGIN, VBMP
Projection: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



APPENDIX C LANDCOVER CONVERSION GCC - CULPEPER CAMPUS



Culpeper, VA