



**OLD DOMINION**  
UNIVERSITY

IDEA FUSION

# CHESAPEAKE BAY TMDL ACTION PLAN

October 2024



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### Old Dominion University

Chad A. Reed – Vice President for Administration and Finance

Michal D. Holliday – Assistant Vice President for Facilities Management & Construction

Chris Pewterbaugh – Interim Director of Design & Capital Construction

Stephen Harrison – Deputy Director of Facilities Management

Brandon P. Armstrong – Project Manager, Design & Capital Construction

Doug Alexander – Director of Environmental Health and Safety

Jean Kennedy-Sleeman, AIA LEED AP AUA – University Architect

## Planning Team

Vanasse Hangen Brustlin, Inc.  
Two Columbus Center  
4500 Main Street, Suite 400  
Virginia Beach VA 23462  
[www.vhb.com](http://www.vhb.com)

John D. Hines, P.E. – Project Manager  
ODU Class of 2000

Ian Smith, P.E. Senior Water Resources Engineer

Karen Bagnell, E.I.T. – Site/Civil Designer,  
ODU Class of 2016

Sarah Bohn – Civil Designer,  
ODU Class of 2022

Katherine Smith – Lead Designer/Graphics



## List of Abbreviations

Title	Abbreviation
Best Management Practice.....	BMP
Chesapeake Bay Preservation Act.....	CBPA
Capital Improvement Project.....	CIP
Virginia Department of Conservation and Recreation .....	DCR
Division of Engineering & Buildings .....	DEB
Virginia Department of Environmental Quality .....	DEQ
Department of General Services.....	DGS
Edge of Stream.....	EOS
Environmental Protection Agency.....	EPA
Intensely Developed Area .....	IDA
Leadership in Energy and Environmental Design .....	LEED
Low Impact Design.....	LID
Minimum Control Measure .....	MCM
Minimum Standard.....	MS
Municipal Separate Storm Sewer Systems .....	MS4
National Pollution Discharge Elimination System.....	NPDES
Norfolk Stormwater Master Plan.....	NSWMP
Old Dominion University.....	ODU
Pollutant of Concern .....	POC
Resource Protection Area.....	RPA
Stormwater Improvement Project .....	SIP
Stormwater Management .....	SWM
Stormwater Management Masterplan.....	SWMP
Stormwater Pollution Prevention Plan .....	SWPPP
Total Maximum Daily Load.....	TMDL
Total Nitrogen .....	TN
Total Phosphorus.....	TP
Total Suspended Solids.....	TSS
Vanasse Hangen Brustlin.....	VHB
Virginia Erosion and Sediment Control Program .....	VESCP
Virginia Pollution Discharge Elimination System.....	VPDES
Virginia Stormwater Management Handbook .....	VSMH
Virginia Stormwater Management Program .....	VSMP
Watershed Implementation Plan.....	WIP

## 1. Introduction

### Purpose

This Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan was written to describe the means and methods by which Old Dominion University (ODU) intends to meet the Special Condition for the Chesapeake Bay TMDL. This Special Condition is located in the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems which was effective as of July 1, 2013, and states that Small Municipal Separate Storm Sewer Systems (MS4) must create a TMDL Action Plan and submit the plan to the Virginia Department of Environmental Quality (DEQ).

The University's MS4 permit (VAR040078) requires action plans to be implemented for the impaired bodies of water to which ODU discharges stormwater runoff. The ultimate discharge point for ODU is the Chesapeake Bay. Approximately half of the campus drains to the Elizabeth River, the other half drains to the Lafayette River. A TMDL is assigned to determine a waste load allocation to the University that establishes the maximum amount of pollutant that can enter an impaired water without violating water quality standards.

The TMDL for the Chesapeake Bay was established by the EPA in 2010 and targets specific Pollutants of Concern (POCs). POCs included in the TMDL are total nitrogen (TN), total phosphorous (TP), and total suspended solids (TSS). Virginia developed a Chesapeake Bay TMDL Watershed Implementation Plan (WIP) that implements an outline for meeting the Chesapeake Bay TMDL. The WIP requires a phased approach over three five-year permit cycles for meeting required POC reductions for the final TMDL target goal. The reductions include:

- 5% first permit cycle reduction, met at the end of the first permit cycle (June 30, 2018)
- 35% second permit cycle reduction, which will need to be accomplished by the end of the second permit cycle (June 30, 2023)
- 60% third permit cycle reduction which will need to be accomplished by the end of the third permit cycle (June 30, 2028). The total reduction thus is 100% of the TMDL requirement.

Reductions are applied to 2009 Edge of Stream (EOS) loading rates for each POC as defined by the Chesapeake Bay Program Watershed Model Phase 5.3.2 for the James River Basin. A target reduction percent in the 2009 EOS loading rates must be met in order meet the TMDL target goal at the end of the third permit cycle. The reduction target percent is defined for each POC by the Chesapeake Bay WIP. Target reduction percentages are further broken into two categories for impervious and pervious cover. Impervious areas must show a reduction of 9.0% for nitrogen loads, 16% for phosphorous loads, and 20% for total sediment loads. Pervious areas must show a reduction of 6.0% for nitrogen, 7.25% for phosphorous, and

8.75% for total sediment loads.

This plan establishes how ODU intends to meet the 35% and 60% reduction requirements by the end of the second and third permit cycles to stay in compliance with their MS4 Permit and the Chesapeake Bay TMDL Special Condition Guidance developed by DEQ. This report follows the order specified in Guidance Memo No. 15-2005 set forth by DEQ and dated May 18, 2015.

The following elements are included within this Action Plan:

1. Current Program and Existing Legal Authority
2. New or Modified Legal Authority
3. Means and Methods to Address Discharges from New Sources
4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions
5. Means and Methods to Meet the Required Reductions and Schedule
6. Means and Methods to Offset Increased Loads from New Sources Initiating Construction Between July 1, 2009 and June 30, 2014
7. Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction After July 1, 2014
8. List of Future Projects and Associated Acreage that Qualify as Grandfathered
9. An Estimate of the Expected Cost to Implement the Necessary Reductions
10. Public Comments on Draft Action Plan

## **MS4 Permit Compliance**

*Table 1* provides the requirements of ODU's MS4 permit and the specific section of this report where the requirement is met by ODU's MS4 Program Plan. Additionally, *Table 1* describes actions ODU has taken to meet the MS4 permit requirements.

**Table 1: MS4 Permit Compliance**

ODU TMDL Action Plan Section	Element from DEQ TMDL Special Condition Guidance	MS4 General Permit Section	MS4 Permit Requirement
2	Part VI.1 - Current Program and Existing Legal Authority	I.C.2.a(1)	A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator's ability to ensure compliance with this special condition
2	Part VI.2 - New or Modified Legal Authority	I.C.2.a(2)	The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and interjurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition

3	Part VI.3 - Means and Methods to Address Discharges from New Sources	I.C.2.a(3)	The means and methods that will be utilized to address discharges into the MS4 from new sources
4	Part VI.4 - Estimated Existing Source Loads and Calculated Total Pollutants of Concern (POC) Required Reductions	I.C.2.a(4) and I.C.2.a(5)	An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable versions of Tables 2 a-d in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009, and the 2009 Edge of Stream (EOS) loading rate.
			A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable versions of Tables 3 a-d in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the corresponding permit cycle required reduction in loading rate. For the purposes of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4
5	Part VI.5 - Means and Methods to Meet the Required Reductions and Schedule	I.C.2.a(6)	The means and methods, such as management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2 a (5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions
6	Part VI.6 - Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014	I.C.2.a(7)	The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize Table 4 to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.

7	Part VI.7 - Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014	I.C.2.a(8)	The means and methods to offset the increased loads from projects as grandfathered in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 to develop the equivalent pollutant load for nitrogen and total suspended solids
8	Part VI.8 - List of Future Projects and Associated Acreage that Qualify as Grandfathered	I.C.2.a(10)	A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48;
9	Part VI.9 - Estimated Expected Cost to Implement Necessary Reductions	I.C.2.a(11)	An estimate of the expected costs to implement the requirements of this special condition during the state permit cycle
10	Part VI.10.a&b - Public Comments on Draft Action Plan	I.C.2.a(12)	An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan.

## Summary

In accordance with the MS4 Permit, the University must calculate required permit cycle reductions and offsets for the following:

- Existing sources as of June 30, 2009
- Sources beginning construction between July 1, 2009 and June 30, 2014,
- Grandfathered sources beginning construction after July 1, 2014

The additional treatment provided by existing best management practices (BMPs) that were constructed to meet project development goals met the offset for the required first permit cycle reductions.

Total POC Load Reductions required by the permit cycles and associated offsets can be found in *Table 2*. A breakdown of total phosphorus removal provided by the existing BMPs and project requirements can be found in *Appendix B*.



## 2. Current Program and Legal Authority

### **Current Program and Existing Legal Authority**

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As an operator of an MS4, Old Dominion University must develop, implement, and enforce an MS4 Program Plan as stated in Phase II MS4 regulations. ODU has created an MS4 Program Plan that is continually updated and monitored to ensure ODU meets MS4 regulations. This MS4 Program Plan ensures the ODU is acting in the most effective manner to reduce pollutant discharge, protect water quality, and ensure compliance with water quality standards. Additionally, the MS4 Program Plan ensures that ODU is adhering to the Clean Water Act, the MS4 permit regulations, and other associated regulations.

The ODU MS4 Program Plan is managed by the Environmental Health and Safety Office and includes updating the MS4 Program Plan and the MS4 General Permit Annual Report. Six minimum control measures (MCMs) are outlined in the Phase II MS4 General Permit:

- Public Education and Outreach on Stormwater Impacts
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post Construction Stormwater Management
- Pollution Prevention and Good Housekeeping for Municipal Operations

Best Management Practices have been integrated into these six MCMs to assist in protecting the water quality within the regulated acreage that ultimately discharges into the Chesapeake Bay. The University's MS4 Program Plan lists each of the six MCMs and activities that ODU is pursuing to meet them.

Stormwater policies have been implemented by ODU within the MS4 Program Plan to administer the Program and comply with the MCMs. These policies can be found on the ODU's Stormwater Management Webpage.

- Stormwater Management Master Plan, September 2023
- Illicit Discharge Detection and Elimination Program, March 2017
- Nutrient Management Plan, June 2022
- Spill Prevention Control and Countermeasure Plan, March 2021
- Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management, April 2022

### **New or Modified Legal Authority**

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New or modified legal authorities are not required for compliance with the Special Condition for the Chesapeake Bay TMDL. ODU possesses the authorities necessary to meet pollution reduction goals. ODU and neighboring MS4 jurisdictions are responsible for the drainage within their boundaries. If an agreement is made with a neighboring MS4 operator (City of Norfolk) to meet pollution reduction goals, this TMDL Action Plan will be updated.

### 3. Means and Methods to Address Discharges from New Sources

The University must introduce and implement means and methods to offset pollutant loads from new sources. To offset pollutant loads, provisions of the Virginia Stormwater Management Handbook (VSMH), as of the 2014 revisions, require that if a redevelopment project site is less than 1 acre, phosphorus loadings from that site be reduced by 10% as compared to the existing developed conditions. Phosphorous loadings must be reduced by 20% when the project area is greater than 1 acre. Virginia Stormwater Management Program (VSMP) Regulations identify phosphorus loading as the “keystone” indicator of runoff water quality. As phosphorus is present in stormwater runoff in both particulate and soluble form, its concentration in stormwater runoff is considered indicative of the presence of other pollutants (nitrogen, TSS) that exist in either form. VSMP regulations require all new developments to remove 0.41 pounds of phosphorus per acre per year. The VSMH evaluates BMP pollutant removal performance in terms of percentage of Total Phosphorus (TP) removed. Total phosphorus removal loads are used to determine TN and TSS removal loads through use of pollutant loading ratios found in *Table 4* of the MS4 General Permit regulations.

For the plan approval and application process, refer to ODU Annual Standards and Specifications. Construction documents are developed by a design team hired by ODU which includes surveyors, engineers, and landscape architects. Plans are designed to comply with the Virginia Standards and to comply with the MS4 General Permit regulations.

Following plan approval, general contractors are responsible for obtaining the necessary land disturbance permits and attending preconstruction meetings with ODU officials. The purpose of the preconstruction meeting is to review all erosion and sediment controls once they are installed on site and to confirm they comply with the approved plans. The contractor is also responsible for maintaining the latest approved set of plans and the SWPPP on-site for each project during the extent of construction. A certified inspector is responsible for making sure each inspection is completed for the site.

A preconstruction meeting is also held prior to installation of any permanent water quality BMPs. Following construction, permanent stormwater facilities are inspected for conformance with plans, specifications, and standards. Annual inspection of stormwater facilities will be conducted with maintenance being performed as required by the contractor, or ODU Facilities Management staff.

In addition to measures discussed within this TMDL Action Plan, ODU has submitted a Stormwater Master Plan to the Virginia DEQ in 2023. This Master Plan outlines several Stormwater Improvement and Capital Improvement projects that can be implemented on campus to meet future Permit Cycle pollutant reduction goals. Campus wide Stormwater Pollution Prevention Plans are to be submitted as part of the University’s MS4 Program Plan to assist in facilitating the measures for maintaining current and future best management practices.

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

### MS4 Area Delineation

In order to estimate the existing source loads within ODU's regulated area, an MS4 boundary for the campus must be outlined. The MS4 area delineation as well as areas of pervious and impervious regulated land were determined based on data from the 2023 Stormwater Master Plan (SWMP) submitted to DEQ in September of 2023. Area delineation was calculated in the SWMP using GIS data and survey for the ODU campus that was generated from an aerial flown in 2021. GIS data was supplemented by various record drawings of completed projects on the ODU campus. If ODU expands or reduces its current campus area, the MS4 area delineation will need to be revised. A map of ODU's MS4 boundary can be found in *Appendix A*.

In accordance with DEQ's Chesapeake Bay TMDL Special Guidance, the University may exclude from its MS4 service area land regulated under any general VPDES permit that addresses industrial stormwater or forested land one half contiguous acre or more that meets specific criteria. The University has not identified any property with a VPDES industrial stormwater permit or forested area within its MS4 boundary. In the event that a property within the ODU campus obtains an industrial stormwater permit, further analysis would be necessary to determine if this property meets specific criteria to be excluded from the MS4 service area delineation.

### Existing Source Loads

Existing source loads for phosphorus, nitrogen, and total suspended solids were calculated using 2009 Edge of Stream (EOS) loading rates specified in the MS4 General Permit. Since the ODU campus is in the James River watershed, 2009 EOS rates were taken from *Table 3* of the MS4 General Permit. Loading rates were applied to impervious and pervious cover and summed in order to determine total existing source loads.

Refer to *Table 2: TMDL Reduction Requirements* for existing source load calculations.

### Total POC Reduction Requirements

Total pollutant of concern (POC) reduction requirements were calculated using 2009 EOS loading rates that were reduced to meet the final TMDL target goals as required by the Chesapeake Bay Watershed Implementation Plan (WIP). Loading rates for the James River watershed can be found in *Table 2* of the MS4 Permit. The loading rate reduction percentage is defined by the Chesapeake Bay WIP for each specific POC and land cover type. MS4 Impervious areas must show a reduction of 9.0% for nitrogen loads, 16% for

phosphorous loads, and 20% for total sediment loads. MS4 Pervious areas must show a reduction of 6.0% for nitrogen, 7.25% for phosphorous, and 8.75% for total sediment loads. Reduced loading rates were then used to determine reduced final POC loads required at the end of the third permit cycle.

After determining the total net reduction required to meet TMDL target goals, the percentage reduction for each POC for each permit cycle was calculated. Reduction required for pervious and impervious cover were summed to determine a total reduction required for each POC for each permit cycle. *Table 2* summarizes POC reduction requirements.

**Table 2: TMDL Reduction Requirements**

**Table 3a**  
**Calculation Sheet for Estimating Existing Source Loads and Reduction Requirements for the James River, Lynnhaven and Little Creek Basins**

		A	B	C	D	E	F	G	H	I	J
Pollutant	Subsource	Loading Rate (lbs/ac/ yr) <sup>1</sup>	Existing developed lands as of 6/30/09 served by the MS4 within the 2010 CUA (acres) <sup>2</sup>	Loads (lbs/yr) <sup>3</sup>	Percentage of MS4 required Chesapeake Bay Total L2 loading	Percentage of L2 Required by 6/30/2023 (lbs/yr)	40% Cumulative reduction required by 6/30/2023 (lbs/yr) <sup>4</sup>	Sum of 40% cumulative reduction (lbs/yr) <sup>5</sup>	Percentage of L2 Required by 6/30/2028 (lbs/yr)	100% Cumulative reduction required by 6/30/2028 (lbs/yr) <sup>6</sup>	Sum of 100% cumulative reduction (lbs/yr) <sup>7</sup>
Nitrogen	Regulated Urban	9.39	104.10	977.50	9%	40%	35.19	46.83	100%	87.97	117.08
	Impervious										
	Regulated Urban Pervious	6.99	69.40	485.11	6%	40%	11.64		100%	29.11	
Phosphorus	Regulated Urban	1.76	104.10	183.22	16%	40%	11.73	12.73	100%	29.31	31.83
	Impervious										
	Regulated Urban Pervious	0.5	69.40	34.70	7.25%	40%	1.01		100%	2.52	
Sediment	Regulated Urban	676.94	104.10	70,469.45	20%	40%	5637.56	5883.08	100%	14093.89	14707.70
	Impervious										
	Regulated Urban Pervious	101.08	69.40	7,014.95	8.75%	40%	245.52		100%	613.81	

1. Edge of stream loading rate based on the Chesapeake Bay Watershed Model Progress Run 5.3.2

2. To determine the existing developed acres required in column B, permittees should first determine the existing of their regulated service area based on the 2010 Census urbanized area (CUA). Next, permittees will need to delineate the lands within the 2010 CUA served by the MS4 as pervious and impervious as of the baseline date of June 30, 2009.

3. Column C= Column A x Column B

4. Column F= Column C x Column D x Column E

5. Column G= The sum of subsource cumulative reduction required by 6/30/23 (lbs/yr) as calculated in Column F

6. Column I= Column C x Column D x Column H

7. Column J= The sum of subsource cumulative reduction required by 6/30/28 (lbs/yr) as calculated in Column I

Note: From Old Dominion University- TMDL Action Plan dated June 30, 2018

**Table 3a**  
**Calculation Sheet for Estimating Existing Source Loads and Reduction Requirements for the James River, Lynnhaven and Little Creek Basins (REVISED BASED ON 2023 LAND CHANGE)**

		A	B	C	D	E	F	G	H	I	J
Pollutant	Subsource	Loading Rate (lbs/ac/ yr) <sup>1</sup>	Existing developed lands as of 6/30/09 served by the MS4 within the 2010 CUA (acres) <sup>2</sup>	Loads (lbs/yr) <sup>3</sup>	Percentage of MS4 required Chesapeake Bay Total L2 loading	Percentage of L2 Required by 6/30/2023 (lbs/yr)	40% Cumulative reduction required by 6/30/2023 (lbs/yr) <sup>4</sup>	Sum of 40% cumulative reduction (lbs/yr) <sup>5</sup>	Percentage of L2 Required by 6/30/2028 (lbs/yr)	100% Cumulative reduction required by 6/30/2028 (lbs/yr) <sup>6</sup>	Sum of 100% cumulative reduction (lbs/yr) <sup>7</sup>
Nitrogen	Regulated Urban	9.39	2.19	20.56	9%	40%	0.74	1.11	100%	1.85	2.78
	Impervious										
	Regulated Urban Pervious	6.99	2.21	15.45	6%	40%	0.37		100%	0.93	
Phosphorus	Regulated Urban	1.76	2.19	3.85	16%	40%	0.25	0.28	100%	0.62	0.70
	Impervious										
	Regulated Urban Pervious	0.5	2.21	1.11	7.25%	40.00%	0.03		100.00%	0.08	
Sediment	Regulated Urban	676.94	2.19	1,482.50	20%	40%	118.60	126.42	100%	296.50	316.05
	Impervious										
	Regulated Urban Pervious	101.08	2.21	223.39	8.75%	40.00%	7.82		100.00%	19.55	

Note: Health Sciences Building and Monarch Inn transfer from real estate foundation to campus property.



## 5. Means and Methods to Meet the Required Reductions and Schedules

### Best Management Practices

Best Management Practices (BMP) are used extensively by ODU to offset sources of pollutant loads. The University presently has a total of 36 BMPs. It is a common ODU practice to construct BMPs as part of Capital Improvement Projects located on the University campus. These BMPs are intended to provide water quality treatment and to offset increases in pollutant loads that are associated with new developments. Additionally, these BMPs provide surplus treatment that can be used to offset permit cycle reduction requirements. The sum offset provided by existing condition BMPs provides enough pollutant removal credit to meet the 5% first permit cycle reduction requirements. In addition, existing BMPs provide surplus pollutant removal credits that can be applied to the second and third permit cycles. BMPs that are planned to be constructed with future CIPs and SIPs will provide additional credit towards the second and third permit cycle reduction requirements. Since phosphorus is considered a “keystone” pollutant, reduction calculations were performed to target solely phosphorus. Pollutant loading ratios found in *Table 4* of the MS4 General Permit regulations were used to calculate required TN and TSS reductions. Refer to *Appendix B* for a summary of the BMPs and associated pollutant offsets.

### 2023 Old Dominion University Master Plan

The 2023 ODU Stormwater Master Plan (SWMP) will be submitted to DEQ in September 2023. One of the goals of the SWMP was to provide a “menu” of Stormwater Improvement Projects that could be implemented to meet TMDL reduction goals using a variety of BMPs. Of these projects, ODU is considering Constructed Wetlands located at Lot 42 near the Outfall to the Elizabeth River and Constructed Wetlands located at the Outfall to the Lafayette River. These projects, Synthetic Turf Permeable Pavement retrofits, and offsite nutrient credits purchase provide enough pollutant offset to meet the second and third permit cycle of the University TMDL goals. An agreement with the City of Norfolk (neighboring MS4 operator) would be required with the constructed wetlands as it would treat both City and State property.

Table 3 of this report summarizes the means and methods to meet the required reductions.

**Table 3: Means and Methods to Offset Increased Loads**

Permit Cycle	Removal	POC Removal		
		TP	TN	TSS
2023 Composite	Removal Required	12.73	46.83	5883.08
2023 Property Addition	Removal Required	0.28	1.11	126.42
<b>2023</b>	<b>Total Removal Required</b>	<b>13.01</b>	<b>47.94</b>	<b>6009.50</b>
	2023 Removal Achieved by Projects	1.22	7.98	-560.52
	Offsite Nutrient Credit Purchase	13.43	134.88	10295.24
<b>2023</b>	<b>Total Removal Achieved</b>	<b>14.65</b>	<b>142.86</b>	<b>9734.72</b>
<b>2028</b>	<b>Total Removal Required</b>	<b>19.52</b>	<b>71.92</b>	<b>9014.25</b>

\*Offsite Nutrient Credit Purchase meets 2023 Requirements (2028 Requirements to be met over the next permit cycle)

## 2028 Compliance Options

ODU is planning to purchase nutrient credits to meet the campus wide 2028 goals from the above Table 3. ODU may also choose to implement a few stormwater improvement projects from the 2023 SWMP, such as Constructed Wetlands at the Lafayette River outfall and Synthetic Turf Permeable Pavement retrofits as described in the 2023 Old Dominion University Master Plan section. These stormwater improvements projects will further the Campus's compliance and can be utilized towards future post-2028 TMDL goals.

## Offsite Nutrient Credit Purchases

In addition to using nutrient credits to aid CIPs in meeting their development goals the "General VPDES Permit for Discharges or Stormwater from Small Municipal Separate Storm Sewer Systems" effective November 1, 2018 allows the use of nutrient credits to meet TMDL requirements. Refer to the ODU MS4 permit (VAR040078) including nutrient credit requirements. If Stormwater Improvement Projects are not constructed to meet the requirements of the 2023 and 2028 permit cycles, the University will need to purchase nutrient credits. The approximate rate of nutrient trading for the James River watershed is \$24,000 per pound phosphorus. This is a one-time fee.

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

Between July 1, 2009 and June 30, 2018, a number of projects were constructed on the ODU campus. Projects constructed between July 1, 2009 and June 30, 2014 were subject to Technical Criteria IIC under the VSMP regulations and the technology-based criteria. Capital improvement projects typically offset increased pollutant loads on a project-by-project basis using BMPs. Projects during this time created a surplus of pollutant removal that was used for smaller projects and maintained to aid in campus requirements. To determine the surplus of pollutant credit, the campus CBPA (technology-based criteria) was used to define the BMP credits and impervious area change. If project areas were not available an area was assumed based on the design plans.

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

ODU does not have any projects that qualify for grandfathering under 9VAC25-870-48.

## **8. List of Future Projects Qualifying as Grandfathered**

ODU has not identified any projects that qualify to be grandfathered under 9VAC25-870-48.

## **9. Estimated Cost of Compliance**

Since existing BMPs provided first and second permit cycle pollutant offsets, estimated costs include only operation and maintenance that are required to keep existing BMPs functioning. These costs are summarized in *Table 4*.

**Table 4: Costs of Compliance (Operations and Maintenance)**

BMP Type	Typical Cycle (years)	Cycle Cost (\$)		Existing 2023	
				Qty	Total Cost (\$/year)
Hydrodynamic Structure	1	1000	per structure	4	\$ 4,000
Bioretention Basin	1	2000	per basin	19	\$ 38,000
Dry Detention Basins	1	1500	per basin	0	\$ -
Wet Pond	1	1500	per basin	2	\$ 3,000
Permeable Pavers	1	3000	per acre	3.08	\$ 9,240
Cistern	1	3000	per structure	2	\$ 6,000
Total BMP's				36	
Yearly Cost					\$ 60,240

\*Existing constructed facilities as per the date of this report.

## 10. Public Comment

Part of the University's MS4 program includes Public Education and Outreach to students, faculty and staff. As part of this program, this TMDL Action Plan will be available on the University's Stormwater Management webpage. A two-week public comment period will take place which will provide an opportunity for the ODU community to provide feedback. Public comments and feedback will be considered and incorporated into this Action Plan before final completion.





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# STORMWATER MANAGEMENT MASTER PLAN

APPENDICES





# Appendix A: Figures



*Lafayette  
River*

*Elizabeth  
River*

Campus Study Area =  
±177.90 AC

*W 49th St*

*Hampton Blvd*

*W 43rd St*

*Powhatan Ave*

*Elkhorn Ave*

KEY:

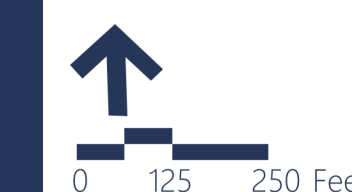
— Old Dominion University State Owned Property

## Stormwater Management Master Plan

Figure 1 Applicable Area



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# Appendix B: Pollutant Offsets

Notes	
(1) From Runoff Reduction Spreadsheet	Adjustments to Permit Cycle TMDL Requirements
(2) TP * Ratio of Phosphorous Loading Rate to Nitrogen and Total Suspended Solids Loading Rates for Chesapeake Bay Basins	From Virginia Runoff Reduction Spreadsheet (VRRM)
(3) From Guidance Memo 15-2005 Table V.C1- Chesapeake Bay Program BMPs, Established Efficiencies	Based on Established Efficiencies and Loading Rates
(4) BMP: Based on Loading Rates from Table 2a: Calculation Sheet for Estimating Existing Source Loads for the James River Basin Provided Removal= (Impervious * Loading Rate + Pervious * Loading Rate) * BMP Efficiency	Nitrogen Removal based on Cranston Mill Pond LLC bank ratio to P of 2:2
(4) Nutrient Credit: Based on Bank ratio of Phosphors to Nitrogen Removal (Cranston Mill Pond LLC bank ratio N= 2.2 *P)	Assumed TSS credit provided for purchasing Phosphorus Credits for permit cycles after 2018

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen		9.39	
Regulated Urban Pervious			6.99	
Regulated Urban Impervious	Phosphorus		1.76	
Regulated Urban Pervious			0.5	
Regulated Urban Impervious	Total Suspended Solids		676.94	
Regulated Urban Pervious			101.08	

Ratio of Phosphorous to Other POCs (Based on All Land Uses 2009 Progress Run)	Phosphorous Loading Rate (lbs/acre)	Nitrogen Loading Rate (lbs/acre)	Total Suspended Solids Loading Rate (lbs/acre)
James River Basin	1.0	5.2	420.9
Potomac River Basin	1.0	6.9	469.2
Rappahannock River Basin	1.0	6.7	320.9
York River Basin	1.0	9.5	531.6

Chesapeake Bay Program BMPs	TN	TP	TSS
Wet Ponds and Wetlands	20%	45%	60%
Dry Detention Ponds and Hydrodynamic Structures	5%	10%	10%
Dry Extended Detention Ponds	20%	20%	60%
Infiltration Practices w/o Sand, Veg.	80%	85%	95%
Infiltration Practices w/ Sand, Veg.	85%	85%	95%
Filtering Practices	40%	60%	80%
Bioretention C/D soils, underdrain	25%	45%	55%
Bioretention A/B soils, underdrain	70%	75%	80%
Bioretention A/B soils, no underdrain	80%	85%	90%
Vegetated Open Channels C/D soils, no underdrain	10%	10%	50%
Vegetated Open Channels A/B soils, no underdrain	45%	45%	70%
Bioswale	70%	75%	80%
Permeable Pavement w/o Sand, Veg. C/D soils, underdrain	10%	20%	55%
Permeable Pavement w/o Sand, Veg. A/B soils, underdrain	45%	50%	70%
Permeable Pavement w/o Sand, Veg. A/B soils, no underdrain	75%	80%	85%
Permeable Pavement w/Sand, Veg. C/D soils, underdrain	20%	20%	55%
Permeable Pavement w/Sand, Veg. A/B soils, underdrain	50%	50%	70%
Permeable Pavement w/Sand, Veg. A/B soils, no underdrain	80%	80%	85%

# Appendix C: References



# Existing Conditions Campus Map

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#### Existing BMP (Elizabeth River Discharge)

- E-1 - Lot 23 - Dry Detention Basin (Removed)
- E-2 - Engineering & Computational Sciences - Bioretention
- E-3 - Lot 42 - Hydrodynamic Separator
- E-4 - 43rd Street Parking Garage - Hydrodynamic Separator
- E-5 - Oceanography and Physical Sciences - Wet Retention Basin
- E-6 - Wrestling Addition - Infiltration Trench (Removed)
- E-7 - Indoor Tennis Center - Bioretention
- E-8 - Physical Sciences Building - Water Quality Inlet
- E-9 - Student Recreation Center - Bioretention (Removed)
- E-10 - Student Recreation Center - Water Quality Inlet (Removed)
- E-11 - Quad Student Housing - Cistern
- E-12 - Broderick Dining Commons - Bioretention
- E-13 - Broderick Dining Commons - Permeable Pavers
- E-14 - Chemistry Building - Permeable Pavers
- E-15 - Owens House - Bioretention
- E-17 - Ireland House - Permeable Pavers
- E-18 - Student Recreation Center Field - Bioretention

#### Existing BMP (Lafayette River Discharge)

- L-1 - Gornto Hall - Wet Retention Basin
- L-2 - Constant Hall - Hydrodynamic Separator
- L-3 - Batten Arts and Letters - Green Roof (Removed)
- L-4 - 49th Street Stadium Garage - Cistern
- L-5 - Student Success Center - Bioretention
- L-6 - Dragas Hall - Bioretention
- L-7 - Diehn Fine and Performing Arts Center - Bioretention
- L-8 - Barry Arts Building - Water Quality Inlet
- L-9 - Engineering Systems Building - Bioretention
- L-10 - Hixon Art Studio Building - Water Quality Inlet
- L-11 - Education Building - Bioretention
- L-12 - Education Building - Permeable Pavers
- L-13 - S.B. Ballard Stadium - Permeable Pavers
- L-14 - Children's Learning Center - Bioretention

#### Under Construction

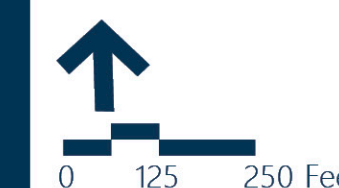
- E-16 - 48th Street - Permeable Pavers
- L-15 - Health Sciences Building - Bioretention
- L-16 - Health Sciences Building - Permeable Pavers

## Stormwater Management Master Plan

Figure 4 Existing Conditions



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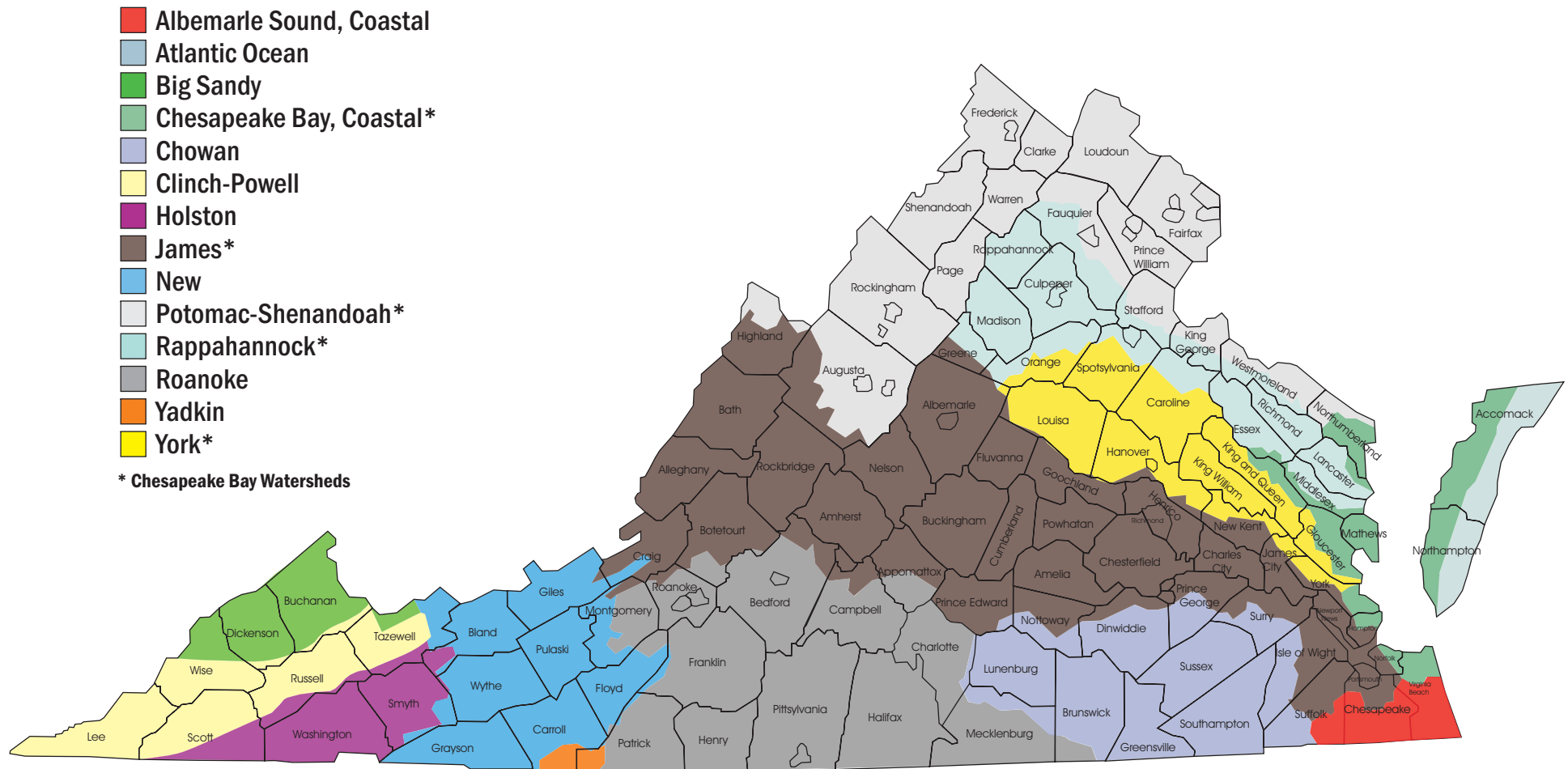
KEY:  
 Existing BMP



# Virginia's Major Watersheds

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# Virginia's Major Watersheds



Virginia Department of Conservation and Recreation



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