Virginia Pollutant Discharge Elimination System (VPDES)

General Permit for Discharge of Stormwater from

Small Municipal Separate Storm Sewer Systems (MS4s)

VPDES General Permit Number: VAR040039

Third Phase Chesapeake Bay TMDL Action Plan

WILLIAM & MARY

CHARTERED 1693

November 1, 2024

TRC

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1.0 SIGNED CERTIFICATION (PART IV K-2):

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

DocuSigned by:
Sean Hughes
759C55F1AF9541A...

10/22/2024 | 08:53:48 EDT

Responsible Official Signature Date

Sean Hughes
Associate VP for Business Affairs

VAR040039 The College of William & Mary
Permit Number MS4 Name

2.0 INTRODUCTION

The College of William and Mary (CWM) was originally issued an MS4 permit in 2003 by the Commonwealth of Virginia. This permit outlines minimum requirements for the operation of the university's storm sewer system, including storm water treatment systems (BMPs), and it is reissued every five years. The College's current permit number is VAR040039, and the permit cycle duration is from November 1, 2023, to October 31, 2028.

As an MS4 community and as a condition of the permit, CWM is required to complete a third phase Chesapeake Bay TMDL action plan by November 1, 2024 demonstrating that CWM will be achieved a total reduction of nutrients (total nitrogen and total phosphorus) no later than October 31, 2028, of 100% of Level 2 (L2) scoping run from stormwater runoff based on existing developed land cover as of June 30, 2009, within the 2010 U.S. Census Urbanized Areas. CWM issued this plan for the previous two

permit cycles, achieving the required 5% reduction in the first cycle and the 35% reduction required in the second permit cycle for L2. A draft plan for the third permit cycle was issued in September 2023.

This third phase Chesapeake Bay TMDL Action Plan is a critical planning tool used to provide permit compliance in a fiscally responsible manner. This TMDL action plan is provided to meet reporting requirements per permit part II A 12 (b). The Chesapeake Bay TMDL Action Plan will outline CWM's compliance path for the third permit cycle (2023-2028) of the Chesapeake Bay TMDL. This document is a comprehensive revision of the draft 3rd permit cycle Action Plan that examines all of the previous calculations against the latest MS4 permit, DEQ guidance, and available record documents. This effort included:

- Compilation of all properties currently owned by CWM within the 2010 U.S. Census Urbanized Areas.
- Re-calculation of the regulated urban impervious and pervious areas as of June 30, 2009, using the land cover definitions in DEQ Guidance Memo 20-2003 *Chesapeake Bay TMDL Special Condition Guidance* (Guidance Memo). Forested areas are excluded from the urban pervious area.
- Identification of additional nutrient removal credits in accordance with the Guidance Memo.

3.0 MS4 REGULATED SERVICE AREA DELINEATION

The relation of the CWM to the 2010 U.S. Census Urbanized Areas is shown in Appendix A. As indicated, all of the University's properties are located within the 2010 U.S. Census Urbanized Area. However, the MS4 Permit and GM20-2003 direct permittees to define the MS4 Service Area as the portion of the 2010 U.S. Census Urbanized Area that drains to the storm sewer system operated by the permittee. The permittee should not include conveyances and drainage areas regulated by a separate MS4 permit within its service area. Permittees should also exclude the following areas from their regulated MS4 service areas:

- Lands regulated under any General or Individual VPDES permit for industrial stormwater discharges;

- Lands regulated under a General VPDES permit for Concrete Product Facilities;
- Forested lands, which are defined as undeveloped areas with a minimum tree density (based on tree caliper) and a contiguous area of at least 900 square meters (30m x 30m);
- Agricultural lands, wetlands, and open waters.

In the case of CWM, the MS4 regulated Service Area, as defined in the first phase of the TMDL Action Plan, includes all parcels owned by the University, minus the excluded lands mentioned above. Additionally, areas of the University that do not drain to the CWM-operated and maintained storm sewer system are excluded. Conversely, some areas not owned by the University but that drain into CWM's operated storm conveyance system are included in the MS4 Service Area. The university's MS4 service area has been coordinated with adjacent MS4 permit holders. This information is required for MS4 permit compliance. This regulated MS4 Service Area and interconnected MS4s are shown on the map at Appendix B. MS4 area land cover map is shown on Appendix C.

The shopping center to the east of the School of Education is privately owned but included in the university's service area. A portion of the shopping center drains by a piped system that crosses Mt. Vernon Road and discharges into the south-east BMP at the university's School of Education. This arrangement was the result of an arrangement made during the design of the Williamsburg Community Hospital and was formalized by a BMP agreement between the Hospital and the City. When the university purchased the former hospital, the BMP agreement conveyed with the property. The BMP agreement will be available upon request by DEQ.

The parcel at the northern end of the Law School precinct is owned by the university but is part of the City of Williamsburg's MS4 service area. The property is under long-term lease to State Courts. The storm sewer from this property drains through an underground detention system to a structure at the north-east corner of the property which drains to the Colonial Parkway. The underground detention structure is under a BMP agreement between State Courts and the City of Williamsburg. The BMP agreement will be available upon request by DEQ.

The One Tribe Place parcel has been excluded from the MS4 service area because it was not owned by the university in 2009 and the storm sewer traversing the parcel is within a City of Williamsburg easement.

William & Mary has approximately 9,654 students and employs around 2,000 faculty staff members. Facilities include buildings for dormitory housing, education, dining, administration, libraries, student services, and facility maintenance. The university's campus spans about 1,200 acres, including historical and academic buildings, as well as green spaces, forests, open waters, and Matoaka Lake. The parcel information was obtained from the City of Williamsburg property website and verified using GIS, see Appendix B. The majority of the parcel is preserved and protected wooded and open water areas including Matoaka Lake under resolution 7. The resolution is available upon request by DEQ. These preserved areas have been excluded from MS4 service area map. Properties adjacent to W&M include residential neighborhoods, commercial and historical properties. See figure 1 below for an arial photo of CWM campus.

The regulated urban pervious and impervious acres served by the MS4 as of June 30, 2009, were estimated using available GIS resources, previous studies, and historical aerial photography from Google Earth Pro. In some cases, record plans for projects were also available.

Based on the information above, the following are the estimated regulated urban impervious and regulated urban pervious areas as of June 30, 2009, within the MS4 Service Area:

Table 1. CWM MS4 Service Areas as of June 30, 2009 (existing sources)

College of William and Mary	Regulated Urban Impervious Acres	Regulated Urban Pervious Acres
	108.47	122.61

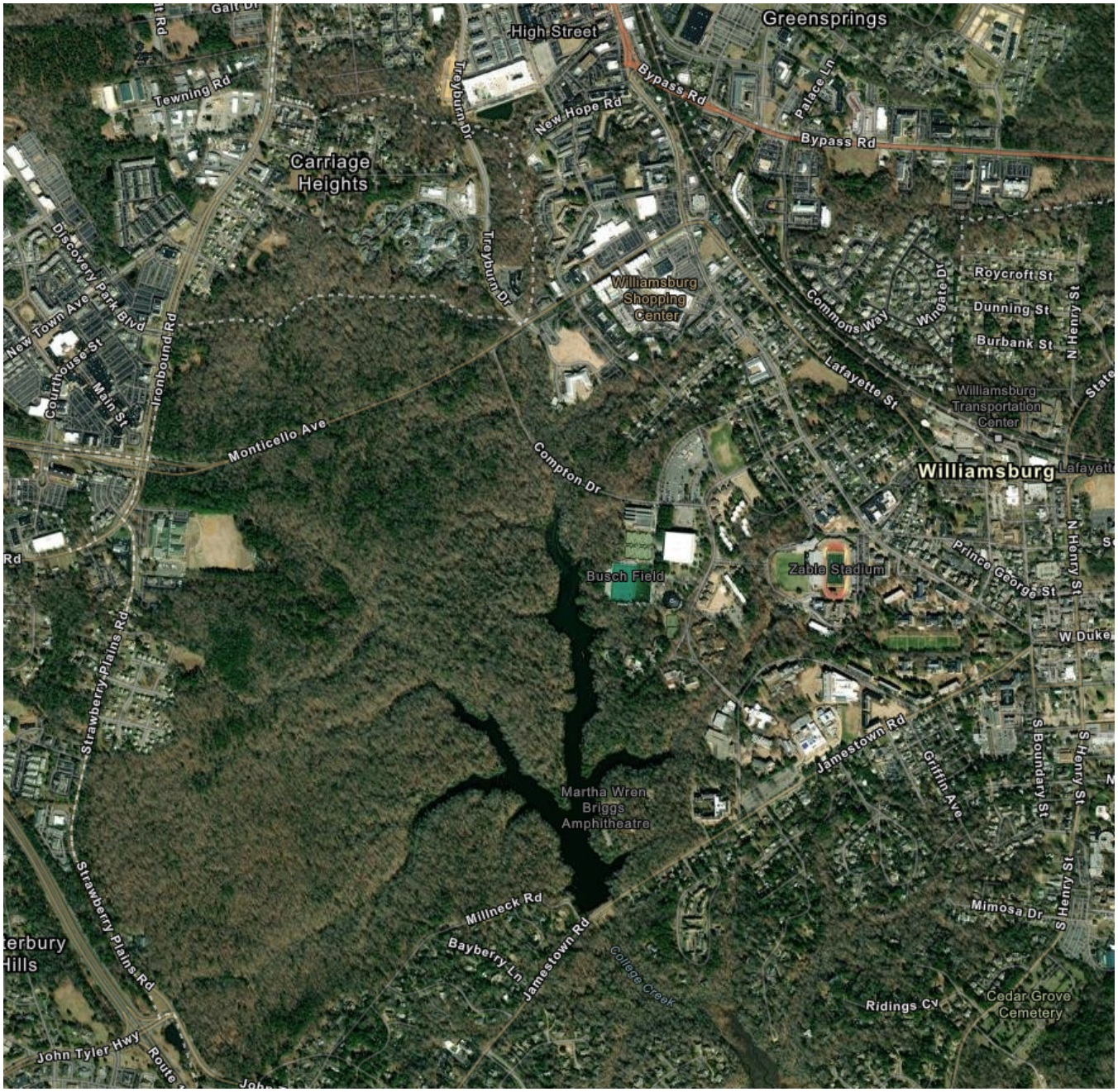


Figure 1 – Aerial Photo – College of William and Mary

4.0 STORM SEWER SYSTEM MAPPING

The MS4 permit requires the university to map the storm sewer system in order to provide a document to aid in system maintenance and the tracking of the source of illicit discharges. The mapping is also required to determine the MS4 service area. The university has maintained system mapping on paper,

transitioned to electronic drawings, and has developed a GIS based system. As part of this study, the GIS based mapping was reviewed for readily apparent gaps and supplemented by field investigation where required. For the purposes of the MS4, storm sewer lines below 8" in size, such as individual roof drains, were not considered to be part of the MS4 storm sewer system.

5.0 MS4 SYSTEM INTERCONNECTS

The university's MS4 system interconnects with the City of Williamsburg system at multiple points as shown at Appendix B. The university is in the process of evaluating the need for formalizing maintenance responsibilities for these portions of the storm sewer. The university and the City have maintained a close working relationship since the early 1700's and will continue to cooperate on shared issues.

Interconnect A - The drainage to a City curb inlet in Jamestown Road drains to the university's storm sewer.

Interconnect B1 – The City storm sewer draining a large area north of W. Francis Street ties into the university's storm sewer at a point on South Boundary Street near Grigsby Drive.

Interconnect B2 – The City storm sewer draining a small area north of Ireland Street ties into the university's storm sewer at a point on South Boundary Street near Ireland Street.

Interconnect B3 – The university's storm sewer under the Facilities Management area becomes the City's storm sewer as it leaves university property and discharges at Pollard Park.

Interconnect C – At the School of Education, the outlet of the bioretention BMP is connected to the City storm sewer in Monticello Ave.

Interconnect D – At the Dillard Complex, the outlet of the Plumeri BMP is connected to the City storm sewer in Ironbound Road.

6.0 MS4 LAND COVER DETERMINATION

The land cover within the MS4 service area is shown at Appendix C. The land cover condition as of June 30, 2009, was determined using GIS based mapping supplemented by record drawings and field observations.

7.0 BANKED CREDITS

The university has a system of banked credits created by upgrades to existing BMPs. As these upgrades were installed prior to January 1, 2006, these BMPs are considered to be part of the existing baseline condition, and these credits cannot be used for the Chesapeake Bay TMDL action plan.

8.0 PART II TMDL SPECIAL CONDITIONS

A. CHESAPEAKE BAY TMDL SPECIAL CONDITION.

In Part II A 12 of the MS4 general permit, the permit lists specific items to be addressed in the third phase Chesapeake Bay TMDL Action Plan. The following are the items listed in the permit in italic typeface followed by responses in bold typeface:

Part II A 12. Chesapeake Bay TMDL action plan requirements.

a. *Permittees applying for initial coverage under this general permit shall submit a draft first phase Chesapeake Bay TMDL action plan to the department no later than October 31, 2028, unless the department grants a later date. The required reduction shall be calculated using Tables 3a, 3b, 3c, and 3d as applicable. The first phase action plan shall achieve a minimum reduction of at least 40% of the L2 Scoping Run based on lands within the 2000 and 2010 expanded Census urbanized areas no later than October 31, 2033. The action plan shall include the following information:*

(1) The load and cumulative reduction calculations for each river basin calculated in accordance with Part II A 3, A 4, and A 5;

(2) The BMPs to be implemented by the permittee to achieve 40% of the reductions calculated in Part II A 13 a:

(a) Type of BMP;

(b) Project name;

(c) Location;

(d) Percent removal efficiency for each pollutant of concern; and

(e) Calculation of the reduction expected to be achieved by the BMP calculated and reported in accordance with the methodologies established in Part II A 9 for each pollutant of concern;

(3) A preliminary schedule for implementation of the BMPs included in the Chesapeake Bay TMDL action plan; and

(4) A summary of any comments received as a result of public participation required in Part II A 14, the permittee's response, identification of any public meetings to address public concerns, and any revisions made to Chesapeake Bay TMDL action plan as a result of public participation.

Response: Not applicable. CWM was previously covered under the General VPDES Permit (VAR040039) for the Discharge of Stormwater from MS4, effective November 1, 2018. CWM falls under Part II A 12 b below. CWM is submitting this final third-phase Chesapeake Bay TMDL Action Plan to address the reductions required in Part II A 3, A 4, and A 5.

b. *For permittees previously covered under the General VPDES Permit for the Discharge of Stormwater from MS4 effective November 1, 2018, no later than 12 months after the permit effective date, the permittee shall submit a third phase Chesapeake Bay TMDL action plan for the reductions required in Part II A 3, A 4, and A 5 that includes the following information:*

Response: As a permittee previously covered under the General VPDES Permit for the Discharge of Stormwater from MS4, effective November 1, 2018, CWM submits this third-phase Chesapeake Bay TMDL Action Plan in compliance with the required 12-month deadline from the current permit's effective date (November 1, 2023). This plan outlines the specific reductions required in Part II A 3, A 4, and A 5.

1) *Any new or modified legal authorities, such as ordinances, permits, policy, specific contract language, orders, and interjurisdictional agreements, implemented or needing to be implemented to meet the requirements of Part II A 3, A 4, and A 5.*

Response: The university's existing legal authorities are sufficient and no new or modified legal authorities—such as ordinances, permits, policies, specific contract language, orders, or interjurisdictional agreements—have been implemented or need to be implemented to meet the requirements of Part II A 3, A 4, and A 5. Additionally, no new legal authorities are required for permit compliance at this time. Existing legal authorities will be used to meet the Special Condition and CWM fully controls all the property it owns within the Chesapeake Bay TMDL watershed.

Existing Legal Authorities: As the sole landowner of the MS4 service area, the College of William & Mary has the legal authority to ensure compliance with the Chesapeake Bay TMDL. The university owns all of the BMPs on its property, conducts all BMP inspections, and performs all required BMP maintenance. The university issues all contracts for design and construction on its property, reviews all design documents, and issues all construction permits through the university's Code Review process. In addition, the university is a holder of the Standards & Specifications.

2) *The load and cumulative reduction calculations for each river basin calculated in accordance with Part II A 3, A 4, and A 5.*

Response: The VDEQ requires that previously MS4 permittees covered under the General VPDES Permit for Discharges of Stormwater from MS4 effective November 1, 2018 shall reduce the load of total nitrogen and total phosphorus from existing developed lands served by the MS4 as of June 30, 2009, within 2010 U.S. Census urbanized areas by at least 100% of the Level 2 (L2) Scoping Run Reductions during the current permit cycle (November 1, 2023-October 31, 2028). Chesapeake Bay TMDL existing source loads and cumulative required reduction calculations for James River basin calculated below using Table 3a from the General

Permit and in accordance with Part II A3, A4, and A5. Please note that CWM MS4 service area is located within the James River basin.

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

		A	B	C	D	E	F
Pollutant	**Subsource**	**Loading rate (lbs/ac/yr)[1]**	**Existing Developed Lands as of 6/30/09 served by the MS4 within the 2010 CUA (acres)[2]**	**Load (lbs/yr)[3]**	**Percentage of MS4 required Chesapeake Bay total L2 loading reduction**	**100% cumulative reduction required by 10/31/2028 (lbs/yr)[4] ***	**Sum of 100% cumulative reduction (lbs/yr)[5] ***
Nitrogen	Regulated Urban Impervious	9.39	108.47	1019	9%	92	**143**
	Regulated Urban Pervious	6.99	122.61	857	6%	51	
Phosphorus	Regulated Urban Impervious	1.76	108.47	191	16%	31	**35**
	Regulated Urban Pervious	0.5	122.61	61	7.25%	4.44	

[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 extent 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 or impervious as of the baseline date of June 30, 2009.

[3]Column C = Column A x Column B.

[4]Column E = Column C x Column D.

[5]Column F = The sum of the subsource cumulative reduction required by 10/31/2028 (lbs/yr) as calculated in Column E.

* In accordance with Parth II A. 9. of General Permit, loading and reduction values greater than or equal to 10 pounds have been calculated and reported to the nearest pound without regard to mathematical rules of precision. Loading and reduction values of less than 10 pounds have been calculated and reported to two significant digits.

3) *The total reductions achieved as of November 1, 2023, for each pollutant of concern in each river basin.*

4) *A list of BMPs implemented prior to November 1, 2023, to achieve reductions associated with the Chesapeake Bay TMDL, including:*

    a. *The date of implementation; and*

    b. *The reductions achieved.*

Response to 3 & 4: The Guidance Memo 20-2003 outlines several types of projects that can be credited towards compliance. Each appendix in the memo details the specific requirements for meeting the criteria of each project type. Table 1 below shows the compliance projects that were implemented between July 1, 2009, and November 1, 2023, by CWM, the applicable appendix from GM20-2003, and the total reductions achieved for each pollutant of concern (POC) in the James River basin as of November 1, 2023: Refer to Appendix D for detailed calculations.

Table 1. BMPs Implemented between 7/1/2009 – 11/1/2023.

BMP Type & Location	Year Implemented	Total Nitrogen Removal Reduction (lb/ac/yr)*	Total Phosphorus Removal Reduction (lb/ac/yr)*	Applicable Appendix from GM20-2003
School of Education - Bioretention	2010	8.03	1.89	Appendix V.C - Chesapeake Bay Program, Established Efficiencies
School of Business - Bioretention	2009	1.04	0.28	Appendix V.C
School of Business - Cistern	2009	2.63	0.49	Appendix V.A - Virginia BMP Clearinghouse
Law School – BMP - Retrofit	2014	18	2.68	Appendix V.C
South Sunken Garden - Bioretention	2016	5.56	0.78	Appendix V.A
Crim Dell – BMP - Retrofit	2018	89	6.18	Appendix V.B - Chesapeake Bay Program, Retrofit Curves/Equations
Heath Center – Manufactured	2017	52	3.59	Appendix V.A and Appendix V. B
Health Center BMP – Retrofit	2017	128	8.68	Appendix V. B
Wildflower Refuge – BMP - Retrofit	2017	174	10	Appendix V. B
	Total	**478**	**35**	

* In accordance with Parth II A. 9. of General Permit, loading and reduction values greater than or equal to 10 pounds have been calculated and reported to the nearest pound without regard to mathematical rules of precision. Loading and reduction values of less than 10 pounds have been calculated and reported to two significant digits.

5) *The BMPs to be implemented by the permittee within 60 months of the effective date of this permit to meet the cumulative reductions calculated in Part II A 3, A 4, and A 5, including as applicable:*

   a. *Type of BMP;*

   b. *Project name;*

   c. *Location;*

   d. *Percent removal efficiency for each pollutant of concern;*

   e. *Calculation of the reduction expected to be achieved by the BMP calculated and reported in accordance with the methodologies established in Part II A 9 for each pollutant of concern; and*

   f. *A preliminary schedule for implementation of the BMPs included in the Chesapeake Bay TMDL action plan.*

Response: CWM has already achieved compliance for the third permit cycle, and 100% of the Level 2 (L2) required reductions have been achieved during first and second permit cycles. As a result, no additional BMPs need to be implemented during third permit cycle. Table 2 below shows the comparison between the cumulative required and achieved reductions for total nitrogen and total phosphorus.

Table 2. Cumulative Required & Achieved Reductions

Pollutants	Required Reduction (lbs/ac/yr)	Achieved Reduction (lbs/ac/yr)	Excess Removal (lbs/ac/yr)
Total Nitrogen (TN)	143	478	335
Total Phosphorus (TP)	35	35	0

6) A summary of any comments received as a result of public participation required in Part II A 13, the permittee's response, identification of any public meetings to address public concerns, and any revisions made to Chesapeake Bay TMDL action plan as a result of public participation.

Response: This Chesapeake Bay TMDL action plan was posted on the following website from October 16-31, 2024, for public comments/concerns as required in Part II A 13 of General Permit. No public comments have been received.

Part II A 13.

13. Prior to submittal of the action plan required in Part II A 12 a and b, permittees shall provide an opportunity for public comment for no fewer than 15 days on the additional BMPs proposed in the third phase Chesapeake Bay TMDL action plan.

Response: Please see the response above.

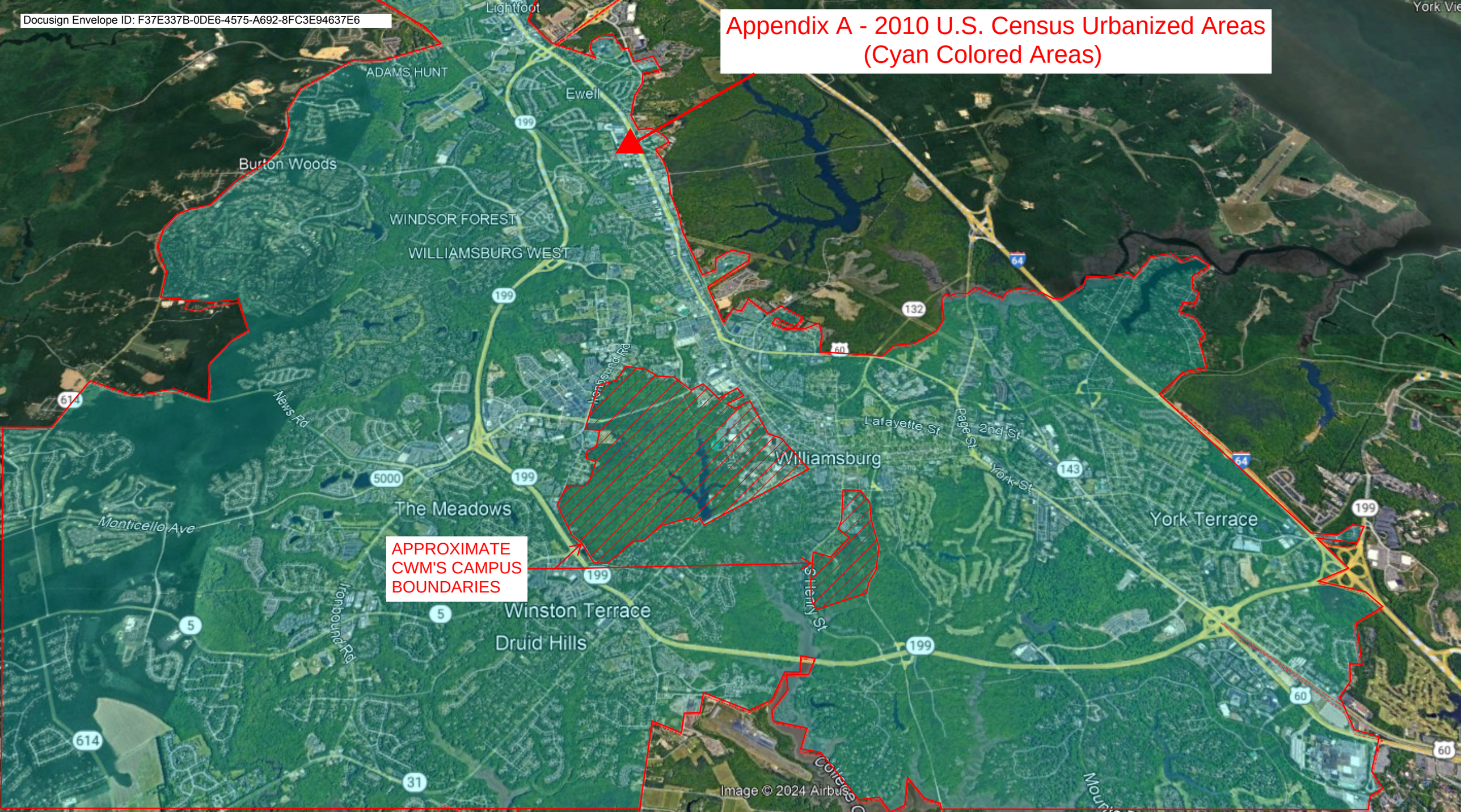
9.0 DISCHARGES FROM NEW SOURCES (PARTH II A 4)

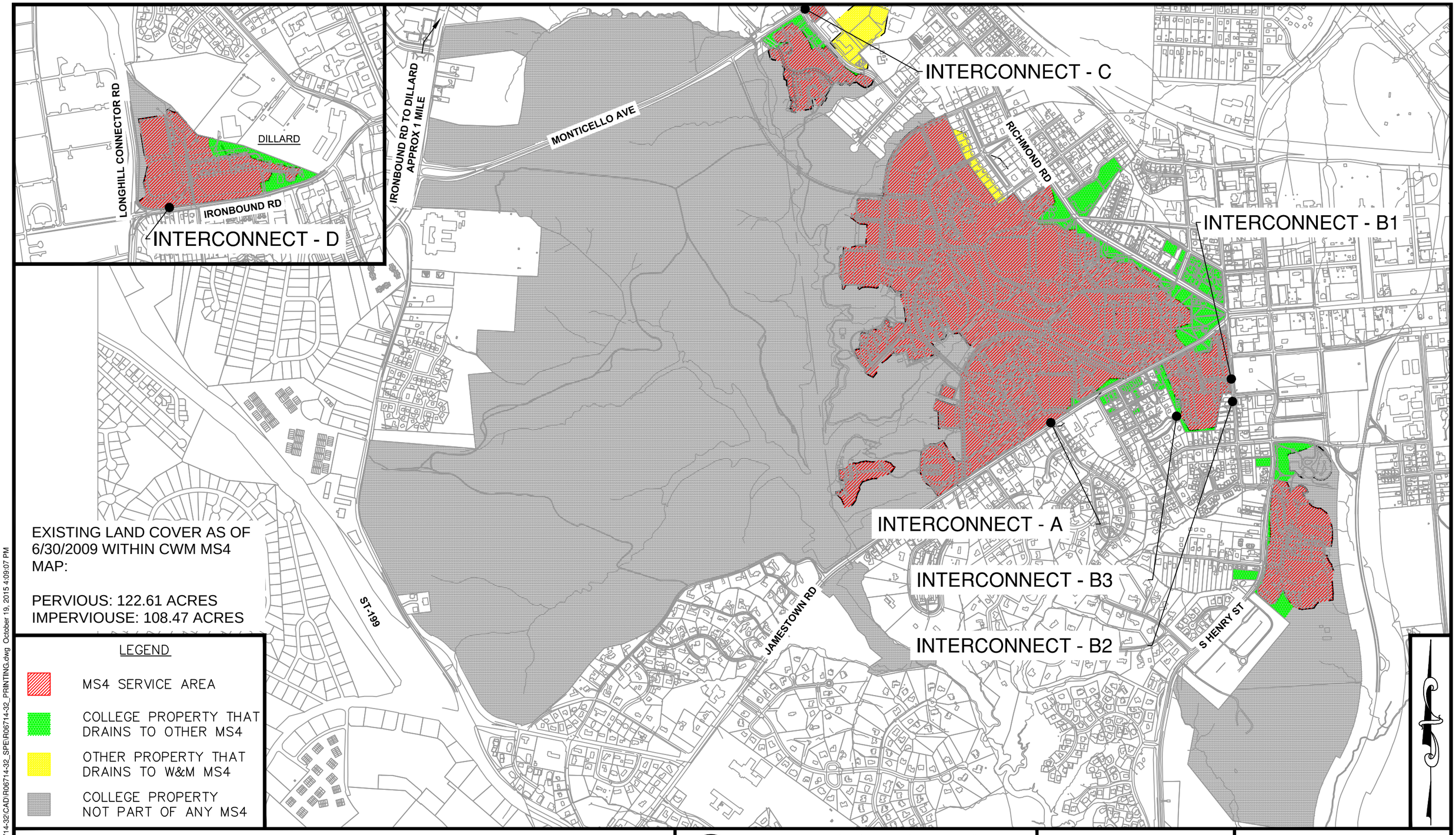
Discharges into CWM's MS4 from new sources that initiated construction between July 1, 2009, and October 31, 2023, and disturbed one acre or more, were addressed by adhering to the VSMP regulations for the implementation of post-development stormwater management facilities. An average impervious land cover condition of 16% was utilized for the design of these post-development stormwater management facilities in accordance with VSMP regulations technical criteria IIB and the Collage's standards and specifications; therefore, no offsets of increased load are required.

10.0 DISCHARGES FROM GRANDFATHERED PROJECTS (PARTH II A 5)

There were two grandfathered project that began construction after July 1, 2014: Integrated Science Center – Phase 3 and Zable Stadium Improvements. Both of these projects used a land cover condition of 16% impervious cover to calculate the required pollutant removal, therefore, no offsets of increased load are required.

Appendix A - 2010 U.S. Census Urbanized Areas (Cyan Colored Areas)





EXISTING LAND COVER AS OF 6/30/2009 WITHIN CWM MS4 MAP:

PERVIOUS: 122.61 ACRES
IMPERVIOUSE: 108.47 ACRES

LEGEND

- MS4 SERVICE AREA
- COLLEGE PROPERTY THAT DRAINS TO OTHER MS4
- OTHER PROPERTY THAT DRAINS TO W&M MS4
- COLLEGE PROPERTY NOT PART OF ANY MS4

MS4 SERVICE AREA MAP AND INTERCONNECTED MAS4

COLLEGE OF WILLIAM & MARY

MS4 PERMIT #VAR040039

APPENDIX B

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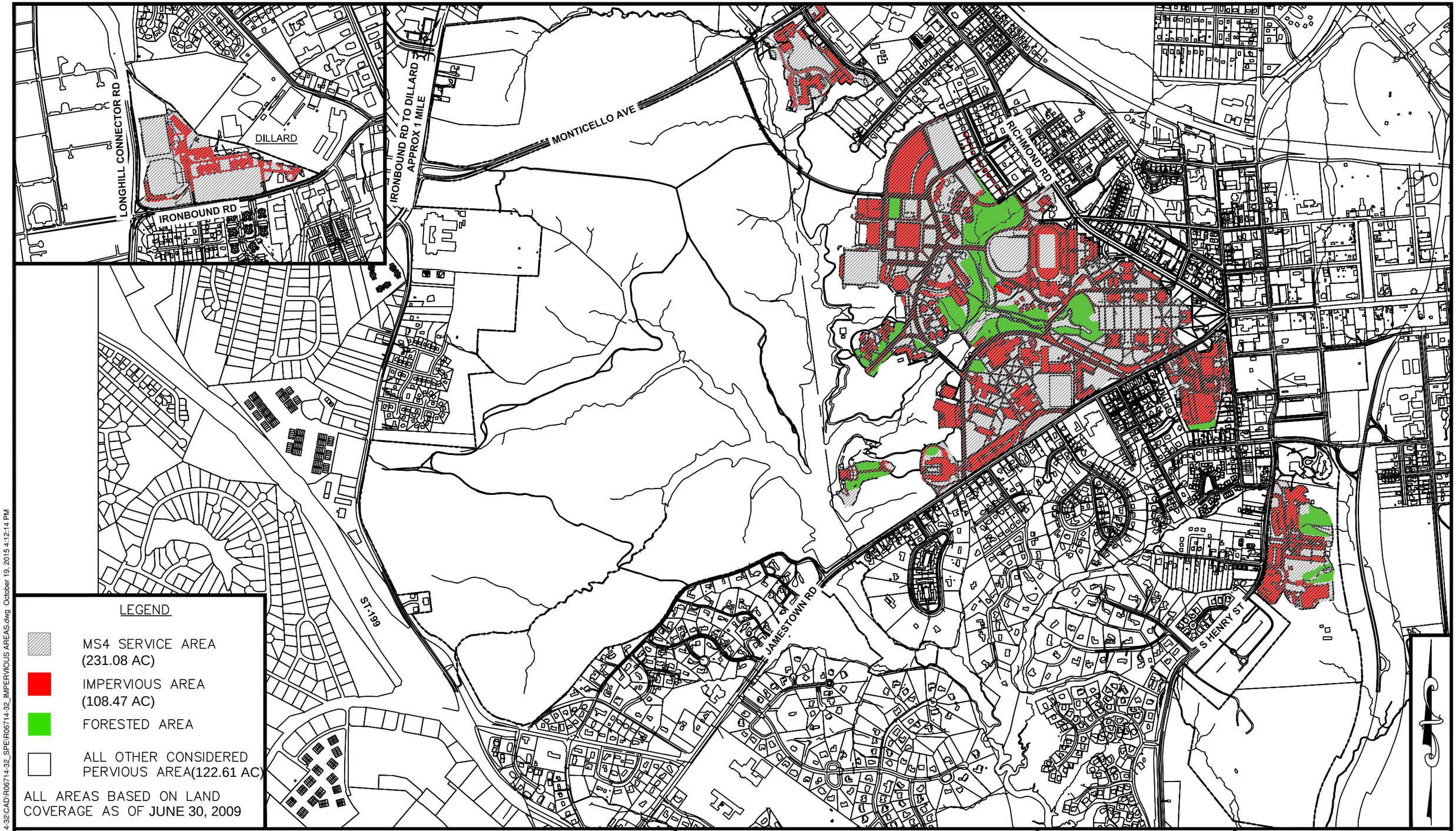
Richmond, VA 23228
804-264-2228 Fax: 804-264-8773
Blacksburg, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED	GHT
DRAWN	NRH
CHECKED	GHT
DATE	10/21/2015

SCALE: 1" = 1,000'

PROJECT: R06714-32



MS4 AREA LAND COVER MAP
COLLEGE OF WILLIAM & MARY
MS4 PERMIT

APPENDIX C

Draper Aden Associates
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DESIGNED	GHT
DRAWN	NRH
CHECKED	GHT
DATE	10/21/2015

SCALE: 1" = 1,000'

PROJECT: R06714-32

Appendix D - Required and Achieved Reductions Calculations

College of William & Mary
Third Phase Chesapeake Bay TMDL Action Plan
November 1, 2024

WLA & Compliance Calculations

Waste Load Allocation (WLA) (Reductions Required)

	Land Cover	
Land Cover Date	**Impervious**	**Pervious**
6/30/2009	108.47	122.61

Table 3 a: Calculation Sheet for Determing Total POC Reductions Required During the Permit Cycle for the James River, Lynnhaven, and Creek Basins

Pollutant	Subsource	Loading rate (lbs/ac/yr)	Existing Developed Lands as of 6/30/09 served by the MS4 within the 2010 CUA (acres)	Load (lbs/yr)	Percentage of MS4 required Chesapeake Bay total L2 loading reduction	100% cumulative reduction required by 10/31/2028	Sum of 100% cumulative reduction (lb/yr)
Nitrogen	Regulated Urban Impervious	9.39	108.47	1019	9%	92	143
	Regulated Urban Pervious	6.99	122.61	857	6%	51	
Phosphorus	Regulated Urban Impervious	1.76	108.47	191	16%	31	35
	Regulated Urban Pervious	0.50	122.61	61	7.25%	4.44	

College of William & Mary
Stormwater Infrastructure Improvements

Chesapeake Bay TMDL
Cumulative Reduction Achieved Calculations as of November 1, 2024

					Direct Drainage Area (not including upstream)			Pollutant Load from direct drainage area		Pollutant Load from Upstream		Total Pollutant Load				Removal Achieved				
Completed Projects	BMP Type	Total Area Treated (Ac)						TN	TP	TN	TP	TN	TP	Removal Efficiences		TN	TP	Calculation Methodology	Year Constructed	Remarks
		Imp.	Perv.	Forest	Imp.	Perv.	Forest	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)	(lbs/ac/yr)	N	P	(lbs/ac/yr)	(lbs/ac/yr)			
School of Education (SOE)	Bioretention	1.74	2.26	0	1.74	2.26	0	32.14	4.19	0.00	0.00	32.14	4.19	25%	45%	8.03	1.89	Ches Bay Program (Established Efficiencies)		Bioretention C/D soils, underdrain
School of Business	Bioretention	0.3	0.19	0	0.3	0.19	0	4.15	0.62	0.00	0.00	4.15	0.62	25%	45%	1.04	0.28	Ches Bay Program (Established Efficiencies)		Bioretention C/D soils, underdrain
School of Business	Cistern	0.56	0	0	0.56	0	0	5.26	0.99	0.00	0.00	5.26	0.99	50%	50%	2.63	0.49	BMP Clearinghouse		RS = 1,395 cf, IA = 0.56 Ac
Law School	Retrofit	6.48	3.53	1.86	6.48	3.53	1.86	89.91	13.41	0.00	0.00	89.91	13.41	20%	20%	18.00	2.68	10% per missing design element based on Ches Bay Program (Established Efficiences)		Credit for adding forebay & outlet pool to dry ED basin (20%, 20% & 60%)
South Sunken Garden	Bioretention	0.31	0.65	0.00	0.31	0.65	0.00	7.41	0.86	0.00	0.00	7.41	0.86	75%	90%	5.56	0.78	Type 2, BMP Clearinghouse for N&P	2016	N & P from BMP Clearinghouse, Ches Bay Program RR TSS Curves
Crim Dell	Retrofit	6.37	11.68	3.29	6.06	11.03	3.29	141.81	16.61	1.85	0.08	143.66	16.70	62%	37%	89.00	6.18	Ches Bay Program ST Curves	circa 1930	Conversion for non-BMP to wet pond
Health Center Crystal Stream	Manufactured	6.97	4.18	0.00	6.97	4.18	0.00	94.67	14.36	0.00	0.00	94.67	14.36	55%	25%	52.00	3.59	N: Bay Program ST curves, P: BMP Clearinghouse	2016	RD = 1"
Health Center BMP	Retrofit	9.96	20.06	8.83	9.96	20.06	8.83	254.58	28.71	42.67	10.77	297.25	39.47	43%	22%	128.00	8.68	Ches Bay Program ST Curves - dry detention missing two elements	2005	Conversion from non-compliant dry detention to wet pond
Wildflower Refuge BMP	Retrofit	33.58	52.17	19.35	23.62	32.11	10.52	471.07	58.99	223.91	41.31	694.98	100.31	25%	10%	174.00	10.00	Ches Bay Program ST Curves - dry detention missing two elements	2005 2016	Conversion from non-compliant dry detention to wet pond RD = 1"
TOTALS																478	35			