Chesapeake Bay TMDL
Action Plan

Prepared for

Department of Environmental Services

York County, Virginia

June 30, 2015

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List of Abbreviations

ac	acre(s)
ac-ft.	acre-foot/feet
BMP	best management practice
CIP	Capital Improvement Plan
County	County of York, Virginia
DEQ	(Virginia) Department of Environmental Quality
EOS	edge of stream
GIS	geographic information system
Guidance Document	*Virginia DEQ Chesapeake Bay TMDL Action Plan Guidance Document*
HUC8	Hydrologic Unit Code 8
lb.	pound(s)
lf	linear foot/feet
MS4	municipal separate storm sewer system
NED	National Elevation Dataset
NHD	National Hydrography Dataset
NWI	National Wetlands Inventory
Phase II MS4 Permit	General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems
Plan	Chesapeake Bay TMDL Action Plan
POC	pollutant of concern
ROW	right-of-way
SLAF	Stormwater Local Assistance Fund
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
USGS	U.S. Geological Survey
VAG11	General VPDES Permit for Concrete Products Facilities
VAG84	Nonmetallic Mineral Processing General Permit
VAR05	General VPDES Permit for Stormwater Associated with an Industrial Activity
VDOT	Virginia Department of Transportation
VPDES	Virginia Pollutant Discharge Elimination System
WBD	Watershed Boundary Dataset
WIP	Watershed Improvement Plan
yr.	year(s)

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Executive Summary

York County, Virginia (County) has developed this first-phase Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan (Plan) as required in the 2013–2018 General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (Phase II MS4 Permit) and in accordance with the Virginia Department of Environmental Quality (DEQ) *Chesapeake Bay TMDL Action Plan Guidance Document* (Guidance Document) dated May 18, 2015. This Plan requires an evaluation of the 2009 MS4 boundary, calculation of the pollutant loading and first-phase required reductions, projects to meet the first-phase required reductions, the County's legal authority review to meet the requirements of the Plan, and a summary of the public comment process. Table ES-1 provides an overview of the Phase II MS4 Permit requirements and the corresponding section where the requirement is addressed.

Table ES-1. Overview of the Chesapeake Bay TMDL Action Plan Document Requirements

General Permit Section	Description of Requirement	Corresponding Section/Appendix of this TMDL Action Plan
I.C.2.a.(1)	Current program and existing legal authority	Section 4
I.C.2.a.(2)	New or modified legal authority	Section 4
I.C.2.a.(3)	Means and methods to address discharges from new sources	Section 4
I.C.2.a.(4)	Estimated existing source loads	Section 2.2
I.C.2.a.(5)	Calculated total pollutant of concern required reductions	Section 2.3
I.C.2.a.(6)	Means and methods to meet the required reductions and schedule	Sections 3.3 and 3.4
I.C.2.a.(7)	Means and methods to offset increased loads from new sources initiating construction between July 1, 2009, and June 30, 2014	Section 2.4.1
I.C.2.a.(8)	Means and methods to offset increased loads from grandfathered projects that begin construction after July 1, 2014	Section 2.4.2
I.C.2.a.(9)	Modifications to the TMDL or watershed implementation plan	Appendix C
I.C.2.a.(10)	A list of future projects and associated acreage that qualify as grandfathered	Section 3.5
I.C.2.a.(11)	An estimate of the expected cost to implement the necessary reductions	Section 3.4
I.C.2.a.(12)	Public comments on the Draft Action Plan	Section 5

The 2009 MS4 service area was developed with geographic information system (GIS) data provided by the County, as well as datasets sourced from the U.S. Census Bureau and U.S. Geological Survey (USGS) National Elevation Dataset (NED). The service area is the intersection of the 2000 U.S. census urban area and the county boundary, excluding Virginia Pollutant Discharge Elimination System (VPDES) permittees and other MS4s, forested areas greater than one-half acre, open water, and surface flows out of the service area. After the service area and exclusions were developed, the surface flow into the MS4 was evaluated and added to the final service area. Table ES-2 includes each exclusion type and the incremental change in the MS4 service area.

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Table ES-2. Areas of Inclusion and Exclusion from the MS4 Service Area	
	Area (ac)
York County Boundary	68,355
2000 Census Urbanized Areas within County	23,601
Exclusion Areas	
VPDES Permits and Other MS4s (Excluding VDOT)	1,395
VDOT Roads	2,172
Forested Areas	8,483
Agricultural Areas	N/A
Open Water	595
Surface Flow	1,637
Total Exclusion Area (Non-Overlapping)[a]	12,436
Inclusion Areas	
Surface Inflow	346
Total Inclusion Area	346
Total MS4 Service Area for Pollutant Load Calculations	11,511

a. *The total exclusion area is less than the sum of the individual exclusion areas because some of the individual exclusion areas overlap.*

Once the service area was established, the 2009 land cover, provided by the County in GIS files, was evaluated within the James and York River basins. The impervious and pervious land areas within each river basin were multiplied by the loading rates provided in the Phase II MS4 permit Tables 2a and 2d and the total existing source loads were calculated for the MS4 service area, as shown in Table ES-3.

Table ES-3. Total Existing Source Loads for the York County MS4 Service Area			
Basin	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
James River	3,433	335	93,906
York River	83,674	8,113	1,751,054
Total	87,107	8,448	1,844,960

After the existing source loads were calculated, the first-phase reduction of 5 percent was calculated for each river basin. The 5 percent reduction rates were provided in the Phase II MS4 Permit Tables 3a and 3d. The total first-phase required reductions are summarized in Table ES-4.

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Table ES-4. Total First-Phase Required Reductions for the York County MS4 Service Area			
Basin	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
James River	11.45	1.84	723.58
York River	278.19	45.77	14,045.33
Total	289.64	47.61	14,768.91

In order to achieve the 5 percent required reduction, the County has six structural best management practice (BMP) and stream restoration projects either constructed or in planning, design, or construction. Several of these projects include multiple BMPs and restoration sites. Each project segment and calculated pollutant reduction is identified in Table ES-5. Additionally, the County is conducting a septic-to-sewer conversion program. The final calculation methods have not yet been provided by DEQ; however, the County intends to include the credit for this program in its first phase Plan after the final calculation methods have been released. The proposed projects exceed the 5 percent required reduction. At a minimum, the County will ensure that projects that meet the 5 percent requirement will have funding approved as a part of an adopted CIP. Credits that exceed the 5 percent first phase requirement will be applied to the second-phase Plan.

Table ES-5. First-Phase Pollutant Reduction Credits			
Project	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
H-1 Regional BMP	170.2	49.9	15,769
Cook-Falcon Road Drainage Improvements: Phase I	56.4	10.5	3,442
Cook-Falcon Road Drainage Improvements: Phase II	82.6	59.0	13,704
Greensprings Stream Restoration	105.0	95.2	21,182
Dare Elementary School Constructed Wetland and Stream Restoration	191.6	93.4	17,397
Edgehill South Stream Restoration	150.0	136.0	30,260
Septic to Sewer Conversion Program	TBD	TBD	TBD
Total	755.8	444.0	101,754

The projects included in the Plan are a part of a program under which the County selects and implements projects to meet the requirements of the TMDL. Alternative projects may be substituted during implementation of this Plan to achieve the 5 percent required reduction.

Table ES-6 provides the current project status, implementation schedule, and cost estimate for each project. The H-1 Regional BMP at the Sports Complex and Edgehill South Stream Restoration projects have been completed. The first phase of Cook-Falcon Road Drainage Improvements and the Dare Elementary School Constructed Wetland and Stream Restoration are currently under construction. The final projects, the Greensprings Stream Restoration and the second phase of the Cook-Falcon Road Drainage Improvements, are anticipated to begin construction in fiscal year 2017, pending approval of public easements. The total cost of implementation is approximately $4 million.

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Table ES-6. First-Phase Implementation Schedule and Estimated Construction Cost

Project	Project Status	Estimated Construction Start Date	Construction Cost
H-1 Regional BMP	Complete	2009	$704,640
Cook-Falcon Road Drainage Improvements: Phase I	Under construction	2014	$1,050,000
Cook-Falcon Road Drainage Improvements: Phase II	In design	FY2017	$650,000
Greensprings Stream Restoration	In planning	FY2017	$600,000
Dare Elementary School Constructed Wetland and Stream Restoration	Under construction	2014	$880,000
Edgehill South Stream Restoration	Complete	2010	$110,000
Septic to Sewer Conversion Program	Ongoing	TBD	TBD
Total estimated construction cost			$3,994,640

In addition to the development of the MS4 service area and projects to meet the 5 percent required reduction, the County has provided a review of the legal authority it has to implement the Chesapeake Bay TMDL.

The County is required to complete the second-phase Plan prior to the end the current Phase II MS4 Permit term in 2018. In the second-phase Plan, the County will incorporate the 2010 U.S. Census Urban Area into the MS4 service area, which will increase the required pollutant reductions. The current Guidance Document requires that the County achieve a 40 percent reduction in the expanded MS4 service area by the end of the next permit cycle, which is equivalent to the 5 percent first-phase progress and second-phase 35 percent progress. Concurrently, DEQ will produce the statewide Phase III Watershed Improvement Plan (WIP) and the Chesapeake Bay Model will be updated, with both efforts anticipated in 2017. The second-phase Plan requirements may be modified as a result of these activities.

This first-phase TMDL Action Plan will become effective within 90 days of submittal to DEQ, unless the County is otherwise notified. It represents the County's plan for meeting the Phase II MS4 Permit requirements for the Chesapeake Bay TMDL Special Condition through 2018.

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Section 1

Introduction

York County (County) has developed this first-phase Total Maximum Daily Load (TMDL) Action Plan (Plan) for the Chesapeake Bay nutrient and sediment TMDL, as required in the 2013–2018 General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (Phase II MS4 Permit). This Plan was developed following the Virginia Department of Environmental Quality (DEQ) *Chesapeake Bay TMDL Action Plan Guidance Document* (Guidance Document) dated May 18, 2015.

The county is located on the James-York Peninsula in coastal Virginia, and has a total land area of 68,352 acres (ac). It is bordered by James City County; the cities of Williamsburg, Newport News, Poquoson, and Hampton; and the York River. Much of the county is suburban or occupied by federal installations, and portions of the county are within the 2000 census urbanized area named "Virginia Beach, Virginia."

This Plan describes the 2009 County MS4 boundary, the associated pollutant of concern (POC) loads within each river basin, the first-phase pollutant reduction requirements, and the projects that the County plans to implement to meet the reductions. In addition, this Plan includes an evaluation of the current and future legal authority to implement the Plan, the estimated costs for Plan implementation, and a description of the public comment process. Mapping of the MS4 service area and a list of the spatial datasets used for this evaluation are provided in Appendices A and B, respectively.

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Section 2

Pollutant Loads and Required Reductions

The calculation of pollutant loads and first-phase required reductions was based upon the MS4 service area as of June 30, 2009. The service area was defined in a manner that is consistent with the Guidance Document. Figures 1, 2, and 3 in Appendix A identify the final 2009 MS4 service area and exclusion areas.

After the MS4 service area was defined, the areas draining to the York and James rivers were delineated, and the 2009 pollutant loads were calculated based upon the basin-specific loading rates. The required pollutant reductions were then calculated for each basin within the MS4 area. Each of these steps is described in subsections below.

2.1 Definition of the MS4 Service Area

The MS4 service area was delineated in the geographic information system (GIS) using files provided by the County and other sources, as documented in Appendix B. The initial MS4 service area was defined using the 2000 Census urban area and the county boundary. Individual exclusion area files were created for Virginia Pollutant Discharge Elimination System (VPDES) and other MS4 permittees, forested areas, agricultural lands, wetlands, and open waters. The exclusion area files were developed separately within the county boundary to identify locations that met the specific exclusion requirement. As such, there may be overlapping areas between exclusion files. In order to create the MS4 service area, the initial service area was clipped in GIS using each of the exclusion area files to create an interim boundary.

After the interim MS4 service area was created, land areas outside of the service area that drain by surface flow directly onto lands currently served by the County MS4 were delineated, because they contribute to the County's pollutant removal requirement. Similarly, areas that drain by surface flow out of the County's MS4 were excluded from calculations of the County's pollutant removal requirement. These surface flows into and out of the MS4 were added or subtracted from the interim service area to create the final MS4 service area for the first-phase Plan. The process used for developing each dataset and the final MS4 service area are described further in the following sections. A list of the data types and sources is provided in Appendix B.

2.1.1 York County Boundary

The current county boundary was provided in a GIS file by the County in January 2015. The file contained county lands in a single polygon. The total land area of the county is 68,352 ac. It is bordered by the cities of Williamsburg and Newport News to the west, James City County to the north, the York River to the east, and the cities of Hampton and Poquoson to the south.

2.1.2 2000 U.S. Census Urban Areas

The U.S. Census Bureau defined urban areas during the 2000 Census as a core of census blocks with a minimum population density of 1,000 people per square mile and surrounding census blocks with a minimum population density of 500 people per square mile.

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The 2000 Census urban areas GIS file, as revised in 2011, was downloaded from the U.S. Census website in January 2015. The file contains all major urban areas in the United States. Portions of the county are included in the "Virginia Beach, Virginia" urbanized area.

2.1.3 VPDES Permittees

Per the Guidance Document, lands regulated under an individual VPDES permit for industrial stormwater discharges or a General VPDES Permit that includes stormwater discharges may be excluded from the regulated urban impervious and pervious cover calculations. The individual and general VPDES permittees within the county were identified from DEQ statewide permittee Excel spreadsheets. Only active permits within the county were selected from the databases, dated January 6, 2015, and accessed from the website on January 30, 2015.

The individual and general permittees were located by property address in GIS using the County parcel data. The parcel data were provided by the County in January 2015 and include parcel addresses and ownership. The permittee parcels were reviewed with current aerial imagery and the parcel ownership data to determine whether surrounding parcels appear to be contiguous permittee lands of the same land use. Figures 1, 2, and 3 in Appendix A provide the locations of the land areas associated with the permits. Permittees within the county were identified, including permittees that are outside of the 2000 census urban areas.

Seven individual VPDES permittees are located within the county, as shown in Table 2-1. The table includes permit numbers, facility names and addresses, permit types, and permit owners.

Table 2-1. Individual VPDES Permittees

Permit No.	Facility	Address	Location	Type	Facility Type	Owner Name
VA0004103	Dominion: Yorktown Power Station	1600 Waterview Road	Yorktown	Major	Industrial	Virginia Electric and Power Company
VA0081311	HRSD: York River Sewage Treatment Plant	515 Back Creek Road	Seaford	Major	Municipal	Hampton Roads Sanitation District
VA0005975	Newport News City: Harwoods Mill Water Treatment	3629 George Washington Mem Highway	Yorktown	Minor	Industrial	Newport News City: Dept. of Public Utilities
VA0003018	Plains Marketing LP Yorktown	2201 Goodwin Neck Road	Yorktown	Major	Industrial	Plains Marketing LP
VA0089826	Water Country USA	176 Water Country Parkway	Williamsburg	Minor	Industrial	SeaWorld Parks LLC
VA0056537	Williamsburg Water Filtration Plant	618 Waller Mill Road	Williamsburg	Minor	Industrial	Williamsburg Dept. of Public Works and Utilities
VA0089681	Newport News-Williamsburg International Airport	900 Bland Blvd, Ste. G	Newport News	Minor	Industrial	Peninsula Airport Commission

Three types of General VPDES permits may be excluded from the MS4 service area: the General VPDES Permit for Stormwater Associated with an Industrial Activity (VAR05), General VPDES Permit for Concrete Products Facilities (VAG11), and Nonmetallic Mineral Processing General Permit (VAG84). There are 11 stormwater general permittees within the county, as shown in Table 2-2. The county does not contain any concrete or mining permittees.

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Table 2-2. General VPDES Permittees				
Permit No.	Facility	Address	Location	Permit Type
VAR050242	Republic Services of Yorktown	124 Greene Drive	Yorktown	Stormwater General
VAR050304	English Motors LTD	2312 George Washington Highway	Yorktown	Stormwater General
VAR050326	Wormley Creek Marina	1221 Waterview Road	Yorktown	Stormwater General
VAR050742	SIMS Metal Management: Tabb	2116 George Washington Memorial Highway	Tabb	Stormwater General
VAR050773	M and J Motors	2024 Route 17	Yorktown	Stormwater General
VAR051313	Blackies	2208 George Washington Memorial Highway	Tabb	Stormwater General
VAR051321	U.S. Navy: Defense Fuel Support Point (DFSP) Yorktown	Washington Road	Yorktown	Stormwater General
VAR051508	U.S. Naval Weapons Station Yorktown: Cheatham Annex	Cheatham Annex	Yorktown	Stormwater General
VAR051742	Insurance Auto Auctions: Tidewater Branch	211 Production Drive	Yorktown	Stormwater General
VAR051957	VPPSA: Compost Facility	145 Goodwin Neck Road	Yorktown	Stormwater General
VAR052105	U.S. Navy: Naval Weapons Station Yorktown	State Routes 143 and 238	Yorktown	Stormwater General

2.1.4 Other MS4 Permittees

In addition to removing the VPDES permittees from the MS4 service area, other MS4 permittees were identified within the county boundary. The MS4 permittees Excel spreadsheet information was obtained from the DEQ website on January 21, 2015. Three other Phase II General MS4 permittees are also located within the county. These permits are noted in Table 2-3 and Figures 1, 2, and 3 in Appendix A. Two of the permittees, the U.S. Coast Guard Training Center and Camp Peary, were identified using the same process as the VPDES permittees, as discussed in Section 2.1.2.

Table 2-3. Other Municipal Separate Storm Sewer Systems				
Permit No.	Owner/Operator	System Name	Designation	Type
VAR040133	Virginia Department of Transportation	Virginia Department of Transportation	Phase II	State
VAR040125	U.S. Coast Guard Training Center: Yorktown	U.S. Coast Guard Training Center: Yorktown	Phase II	Federal
VAR040130	U.S. Navy: Consolidated MS4s	Camp Peary	Phase II	Federal

The roadways owned by the Virginia Department of Transportation (VDOT), which holds a Phase II MS4 Permit, were identified in two stages. First, the parcel data and boundary provided by the County were evaluated in GIS to isolate the void (i.e., undelineated) areas in the parcel file, which consist primarily of roadway rights-of-way (ROWs), including VDOT maintained roads. A copy of the county boundary GIS file was clipped with the parcel GIS file, so only the void areas remained.

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In order to determine which entity maintains each road, a roadway centerline GIS file was obtained from the VDOT website in February 2015. This file did not specify the maintainer of each roadway; however, the roadway centerline GIS file included an attribute field for the state route number, which contained route numbers for some of the roads within the county. It was assumed that roads identified with a route number in the VDOT GIS file corresponded to roadways maintained by VDOT. Thus, the roads that did not include a route number were assumed to be either County or privately maintained roads and these ROWs were removed from the VDOT ROW GIS file. It was assumed that VDOT maintains the stormwater runoff within its ROWs, so no additional modifications were made to the GIS file. Figure 2-1 is an example of the VDOT ROW delineation. Figures 1, 2, and 3 in Appendix A include the location of VDOT ROWs.

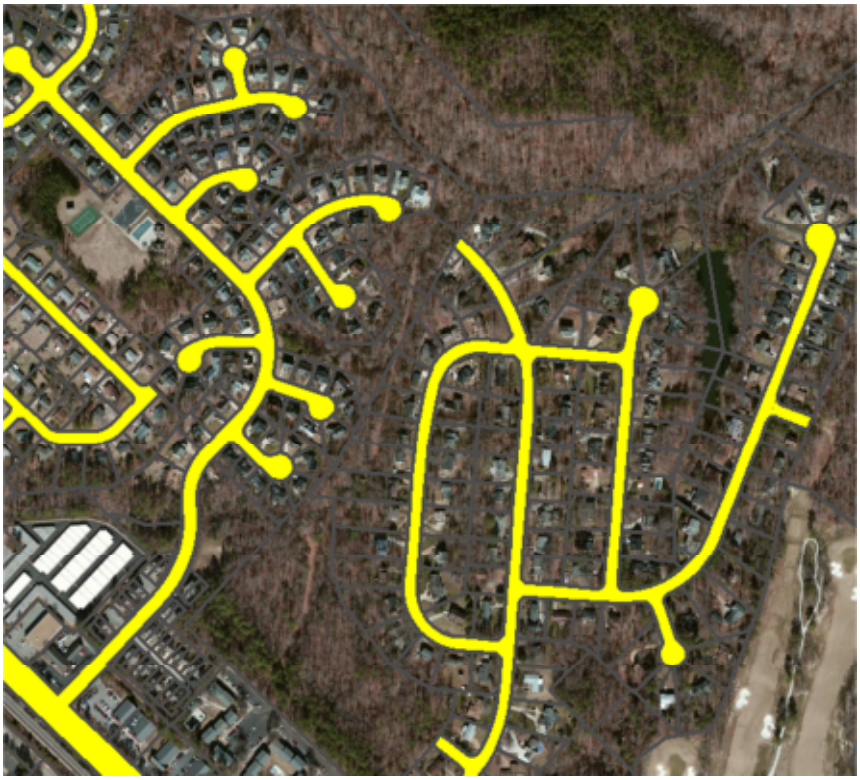

Figure 2-1. VDOT ROW delineation

2.1.5 Forested Lands and Wetlands

According to the Guidance Document, forested areas greater than 900 square meters (0.22 acres) can be excluded from the regulated urban impervious and pervious cover calculations. The GIS data provided by the County in January 2015 included a historical forest cover file delineated from aerial imagery in 2009. The polygons include moderate to dense tree cover greater than one-quarter acre in size, digitized at the edge of tree lines. This file was reviewed for accuracy and the areas labeled as unknown land cover were removed from the file. A comparison of the National Wetlands Inventory (NWI) indicates that forested wetlands have been included in this file from the County. Figures 1, 2, and 3 in Appendix A display the forested areas.

2.1.6 Agricultural Lands

DEQ added agricultural lands as a category of allowable MS4 service area exclusions during the April 2015 revision to the Guidance Document.

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A review of the current aerial imagery as well as the 2011 National Land Cover Dataset within the MS4 service area indicated that there were no significant agricultural lands. As such, a Countywide GIS file of agricultural lands was not created for this first-phase Action Plan. It is recommended that agricultural lands be reevaluated during the development of the second-phase Plan if the MS4 service area is modified.

2.1.7 Open Water

According to the Guidance Document, open waters can be excluded from the regulated MS4 service area. The GIS data provided by the County in January 2015 included a lake file delineated from aerial imagery in 2009. This file includes polygons of open water bodies throughout the county. The file was reviewed for accuracy and no modifications were required. Figures 1, 2, and 3 in Appendix A display the open waters.

2.1.8 Stormwater Runoff between Jurisdictions

Although the drainage basin delineation for each outfall is an ongoing effort by the County, an initial assessment of surface runoff into and out of the MS4 service area was completed for the first-phase planning effort. Some areas identified in the initial MS4 service area surface runoff away from the stormwater conveyance system and out of the service area, and are thus not served by the County MS4. These areas are excluded from the regulated urban impervious and pervious cover calculations. Conversely, the County is responsible for any area served by the MS4, including those areas outside of the designated urban areas that reach the stormwater conveyance system within the urban area by surface runoff.

Surface runoff areas were delineated in GIS with current aerial imagery from the stormwater conveyance system GIS files, County contour lines and U.S. Geological Survey (USGS) National Elevation Dataset (NED) topography. The stormwater conveyance system GIS files were provided by the County in January 2015 and represent the best available data for the current system.

The contour lines were also provided by the County in January 2015 and represent the topography in 2-foot intervals within the county boundary. The USGS NED files were accessed in February 2015 from the USGS NED website. The NED GIS file is a regional raster image containing elevation data on a 10-meter grid. This file allowed for the review of locations outside of the county boundary. Generally, the surface flow areas out of the system are located along the coast and drain directly into the York River, while several additional areas in the southwest flow out of the service area into other MS4s or unregulated land. Additionally, several locations have been identified as surface flow into the MS4 service area from other portions of the county. Figure 2-2 is an example of stormwater surface flows out of the county boundary.

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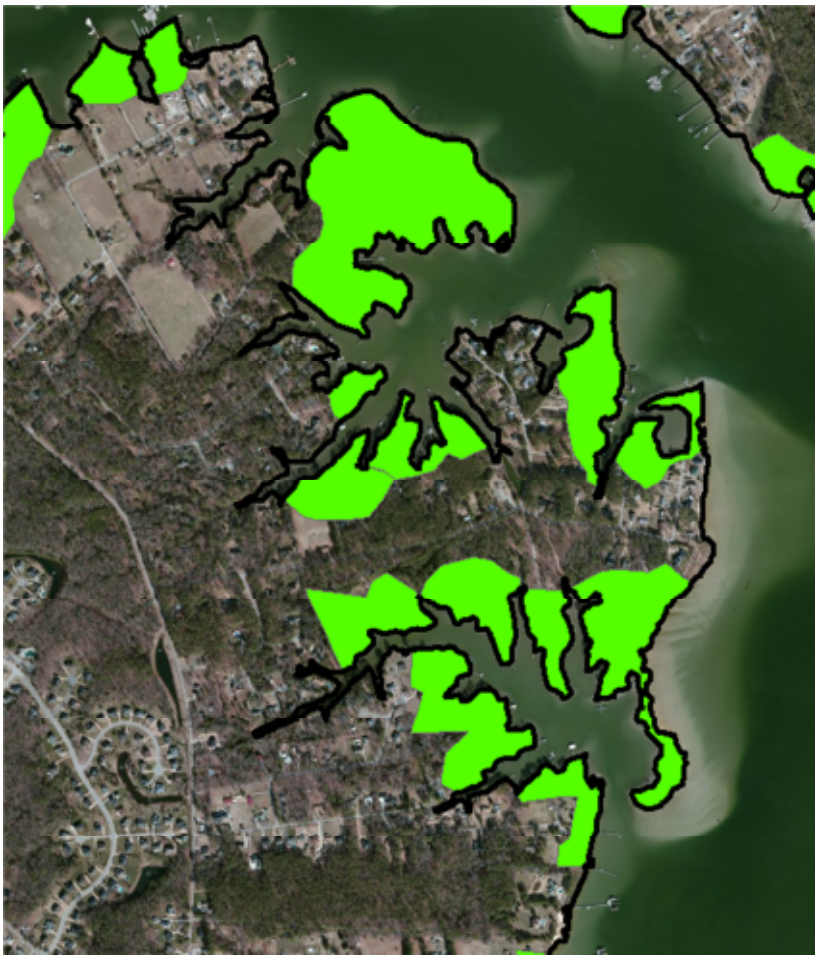

Figure 2-2. Surface flow out of MS4

Surface flow areas into the service area were evaluated with the forested lands GIS file to remove forested areas from the surface flow inclusion area, so only urban pervious and impervious areas remain. Figure 2-3 is an example of surface flow into the MS4. The surface flow areas are shown on Figures 1, 2, and 3 in Appendix A.

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Figure 2-3. Surface flow into MS4

The surface flow areas incorporated into this first-phase Plan are an initial assessment of the MS4 service area and drainage areas. It is recommended that the surface flow GIS files be reevaluated once the outfall drainage basin delineation is complete and the revised surface flows are included in the second-phase Plan.

2.1.9 Delineation of the 2009 MS4 Service Area

Table 2-4 displays the land areas that were calculated for the 2009 MS4 service area. The calculations were completed in GIS using the datasets developed as described in Sections 2.2.1 through 2.2.8. The first step was to calculate the initial MS4 service area. The 2000 Census urban areas were clipped to the County boundary in GIS to set the initial area, resulting in 23,601 ac of land, which is approximately 35% of the County. The initial MS4 service area is primarily in the southern portion of the county near the City of Newport News, City of Hampton, and City of Poquoson. A smaller service area is located in the northeastern portion of the county, near the City of Williamsburg.

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Table 2-4. Areas of Inclusion and Exclusion from the MS4 Service Area

	Area (ac)
York County Boundary	68,355
2000 Census Urbanized Areas within County	23,601
Exclusion Areas	
VPDES Permits and Other MS4s (Excluding VDOT)	1,395
VDOT Roads	2,172
Forested Areas	8,483
Agricultural Areas	N/A
Open Water	595
Surface Flow	1,637
Total Exclusion Area (Non-Overlapping)[a]	12,436
Inclusion Areas	
Surface Inflow	346
Total Inclusion Area	346
Total MS4 Service Area for Pollutant Load Calculations	11,511

a. *The total exclusion area is less than the sum of the individual exclusion areas because some of the individual exclusion areas overlap.*

The second step was to remove the exclusion areas from the initial MS4 service area. Many of the exclusion areas overlap, so the sum of the individual exclusion areas is greater than the total of the exclusions noted in Table 2-4. In the order presented in Table 2-4, each exclusion area was removed by clipping the MS4 service area using the GIS editor tools. The clip tool was set to remove the intersection between the exclusion file and the service area.

The final step to produce the MS4 service area was to add the surface flow inclusion area, also shown in Table 2-4. The surface inflow GIS file was merged with the MS4 service area file. The dissolve tool was used to create a single polygon. The final County MS4 service area to be used in the regulated urban impervious and urban pervious cover calculations is noted at the bottom of the table. The final first-phase MS4 service area is 11,511 ac, which is approximately 17 percent of the area within the total county boundary.

2.2 Baseline Annual Pollutant Loads

The baseline (2009) annual pollutant loading rates, as documented in the Phase II MS4 Permit and the Guidance Document, were estimated by the Chesapeake Bay Program using the Watershed Model Phase 5.3.2. The annual pollutant loads were calculated using the 2009 pervious and impervious lands cover conditions within the MS4 service area. Because the County discharges into multiple river basins (James and York), the basin areas within the MS4 service area were also delineated. After the urban impervious and pervious areas were identified within each basin, the annual pollutant loads were calculated. These values were summed to calculate the total annual pollutant loads for York County.

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2.2.1 Pervious and Impervious Land Cover

The annual pollutant loads were calculated based upon the 2009 land cover conditions within the MS4 service area. The County provided a GIS layer of the 2009 impervious cover within the county boundary delineated from aerial imagery. The GIS file was provided in January 2015 from the County archives. The GIS file was reviewed for accuracy and used to determine the urban impervious cover within the MS4 service area. The total impervious area within the service area was 2,560 ac, which is approximately 22 percent of the MS4. All other lands within the service area were assumed to be urban pervious cover. The urban pervious cover is 8,951 ac, which is approximately 78 percent of the MS4 service area.

2.2.2 Watershed Delineation

The annual pollutant loading rates are different for each major river basin. The county has areas in two major river basins: the York River and the James River. The USGS National Hydrography Dataset (NHD) Watershed Boundary Dataset (WBD) Hydrologic Unit Code 8 (HUC8) watershed boundaries were used to delineate the river basin boundaries. The NHD GIS files were accessed from the USGS website in January 2015. The County's MS4 service area is located within three HUC8 watersheds, the Lower James, York, and Lynnhaven-Poquoson watersheds. The Lynnhaven-Poquoson HUC8 watershed includes portions of the county that drain to the Poquoson River near the confluence of the York River and the Chesapeake Bay. Because of the Lynnhaven-Poquoson watershed's location downstream of the York HUC8, the York River basin loading rates were applied to this watershed. The County MS4 service area is located primarily in the York River basin, with a total area of 11,484 ac draining to that water body. The portion of the MS4 service area that lies within the James River basin is 463 ac. The HUC8 watershed boundaries are shown on Figure 4 in Appendix A.

The watershed delineation performed for this first-phase Plan did not incorporate results of the County's ongoing efforts to delineate drainage areas of individual MS4 outfalls. It is recommended that the watershed delineations be reevaluated after the completion of the outfall drainage basin delineation and any modifications to the drainage areas be incorporated into the second-phase Plan.

2.2.3 Annual Pollutant Load Calculations

The final MS4 service area defined in Table 2-4, land cover estimates described in Section 2.2.1, and watershed delineation described in Section 2.2.2 were used to calculate the annual pollutant loads. The following tables were copied from the Phase II MS4 Permit. Pollutant loading rates have been defined for pervious and impervious urban lands for total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). Once the individual river basin loads were calculated, the combined annual pollutant loads for each nutrient were totaled.

Table 2-5 presents the existing source loads for the James River basin, as calculated from loading rates in Table 2a of the Phase II MS4 Permit. This portion of the county's MS4 service area includes 82 ac of impervious area and 381 ac of pervious lands.

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Table 2-5. Existing Source Loads for the James River Basin				
Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/2009)	2009 EOS Loading Rate (lb./ac/yr.)	Estimated Total POC Load Based on 2009 Progress Run (lb./yr.)
Regulated urban impervious	Total nitrogen	82	9.39	768
Regulated urban pervious		381	6.99	2,665
Regulated urban impervious	Total phosphorus	82	1.76	144
Regulated urban pervious		381	0.5	191
Regulated urban impervious	Total suspended solids	82	676.94	55,374
Regulated urban pervious		381	101.08	38,532

Table 2-6 presents the annual pollutant loads for the York River basin, as calculated from loading rates in Table 2d of the Phase II MS4 Permit. The County MS4 service area discharges primarily into this river basin. This portion of the service area accounts for 2,478 ac of impervious area and 8,570 ac of pervious lands.

Table 2-6. Existing Source Loads for the York River Basin				
Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/2009)	2009 EOS Loading Rate (lb./ac/yr.)	Estimated Total POC Load Based on 2009 Progress Run (lb./yr.)
Regulated urban impervious	Total nitrogen	2,478	7.31	18,113
Regulated urban pervious		8,570	7.65	65,561
Regulated urban impervious	Total phosphorus	2,478	1.51	3,742
Regulated urban pervious		8,570	0.51	4,371
Regulated urban impervious	Total suspended solids	2,478	456.68	1,131,607
Regulated urban pervious		8,570	72.28	619,447

Table 2-7 presents the sum of the existing source loads for both major basins within the MS4 service area. The existing loads are 87,107 pounds (lb.) per year (yr.) of TN, 8,448 lb./yr. of TP, and 1,844,960 lb./yr. of TSS.

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Table 2-7. Total Existing Source Loads for the York County MS4 Service Area			
Basin	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
James River	3,433	335	93,906
York River	83,674	8,113	1,751,054
Total	87,107	8,448	1,844,960

2.3 Pollutant of Concern Required Reductions

The pollutant load reductions in the Phase II MS4 Permit are consistent with the Chesapeake Bay TMDL and the Virginia Phase I and II Watershed Improvement Plans to meet the Chesapeake Bay Model Phase 5.3.2 L2 scoping run for existing developed lands. The total required reductions from the annual pollutant loading rates vary for each pollutant and land cover. As specified in the Virginia Phase I Watershed Improvement Plan, the required first-phase pollutant reductions are 5 percent of the total required reductions specified in the L2 scoping run. The County has developed projects to achieve the required pollution reductions for the first permit phase as detailed in Section 3 of this Plan. The total required reductions and first-phase reductions for the James River basin are identified in Table 2-8.

Table 2-8. Total Required Reductions for the James River Basin (from the Chesapeake Bay Model 5.3.2 L2 Scoping Run)				
Subsource	Pollutant	Total Percent Required Reduction	Total Required Reduction (lb./ac/yr.)	First-Phase Required Reduction (lb./ac/yr.)
Regulated urban impervious	Total nitrogen	9%	0.8451	0.042255
Regulated urban pervious		6%	0.4194	0.02097
Regulated urban impervious	Total phosphorus	16%	0.2816	0.01408
Regulated urban pervious		7.25%	0.03625	0.0018125
Regulated urban impervious	Total suspended solids	20%	135.388	6.7694
Regulated urban pervious		8.75%	8.8445	0.442225

The total required reductions and first-phase required reductions for the York River basin are identified in Table 2-9.

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Table 2-9. Total Required Reductions for the York River Basin (from the Chesapeake Bay Model 5.3.2 L2 Scoping Run)

Subsource	Pollutant	Total Percent Required Reduction	Total Required Reduction (lb./ac/yr.)	First-Phase Required Reduction (lb./ac/yr.)
Regulated urban impervious	Total nitrogen	9%	0.6579	0.032895
Regulated urban pervious		6%	0.459	0.02295
Regulated urban impervious	Total phosphorus	16%	0.2416	0.01208
Regulated urban pervious		7.25%	0.036975	0.00184875
Regulated urban impervious	Total suspended solids	20%	91.336	4.5668
Regulated urban pervious		8.75%	6.36825	0.3184125

Table 2-10 presents the first-phase required reductions for the James River basin, as calculated from reduction rates in Table 3a of the Phase II MS4 Permit.

Table 2-10. First-Phase Required Reductions for the James River Basin

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/2009)	First Permit Cycle Required Reduction in Loading Rate (lb./ac/yr.)	Total Reduction Required First Permit Cycle (lb./yr.)
Regulated urban impervious	Total nitrogen	82	0.042255	3.46
Regulated urban pervious		381	0.02097	7.99
Regulated urban impervious	Total phosphorus	82	0.01408	1.15
Regulated urban pervious		381	0.0018125	0.69
Regulated urban impervious	Total suspended solids	82	6.7694	555.09
Regulated urban pervious		381	0.442225	168.49

Table 2-11 presents the first-phase required reductions for the York River basin, as calculated from reduction rates in Table 3d of the Phase II MS4 Permit.

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Table 2-11. First-Phase Required Reductions for the York River Basin				
Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/2009)	First Permit Cycle Required Reduction in Loading Rate (lb./ac/yr.)	Total Reduction Required First Permit Cycle (lb./yr.)
Regulated urban impervious	Total nitrogen	2,478	0.032895	81.51
Regulated urban pervious		8,570	0.02295	196.68
Regulated urban impervious	Total phosphorus	2,478	0.01208	29.93
Regulated urban pervious		8,570	0.00184875	15.84
Regulated urban impervious	Total suspended solids	2,478	4.5668	11,316.53
Regulated urban pervious		8,570	0.3184125	2,728.80

Table 2-12 presents the total required pollutant reductions for the first phase of the permit cycle. The first-phase required reductions are 289.64 lb. TN, 47.61 lb. TP, and 14, 768.91 lb. TSS annually.

Table 2-12. Total First-Phase Required Reductions for the York County MS4 Service Area			
Basin	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
James River	11.45	1.84	723.58
York River	278.19	45.77	14,045.33
Total	289.64	47.61	14,768.91

2.4 Additional Source Loads and Required Reductions

In addition to the required pollution reductions for existing development, the County must account for any increased pollutant loads from new sources and grandfathered projects. New sources are defined as Phase II MS4 Permit Special Condition 7 and grandfathered projects are defined as Phase II MS4 Permit Special Condition 8. For the first-phase Plan, the County is required to provide additional treatment to remove 5 percent of the net increase in pollutant loads for Special Condition 7. The County must provide treatment for the net increase in pollutant loads for any project that meets the requirements of Special Condition 8.

2.4.1 Increased Loads from New Sources (Special Condition 7)

Special Condition 7 is a Phase II MS4 Permit requirement that applies to all projects with construction initiated between July 1, 2009, and June 30, 2014, and meeting the following requirements:

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- Greater than 1 acre land disturbance
- Increase in the pollutant loads from existing condition
- An impervious land cover condition greater than 16 percent for the design of post-development stormwater management facilities

The County is required to provide additional pollutant load reductions for any project that meets the Special Condition 7 requirements. The total additional treatment is required for the incremental difference between the post-development land cover and the 16 percent design of post-development stormwater management facilities. The pollutant load reductions for the first-phase Plan are equal to 5 percent of the incremental increase.

The County has required that all new projects meet the 16 percent land cover requirements since 2003, as indicated in the Legal Authority Review in Section 4. Thus, no projects require additional pollutant load reductions under Special Condition 7 as defined in the Phase II MS4 Permit.

2.4.2 Increased Loads from Grandfathered Projects (Special Condition 8)

Special Condition 8 is a Phase II MS4 Permit requirement that applies to all projects with construction initiated after June 30, 2014, and meeting the following requirements:

- Greater than 1 acre land disturbance
- Increase in the pollutant loads from existing condition
- An impervious land cover condition greater than 16 percent for the design of post-development stormwater management facilities

The County is required to provide additional pollutant load reductions for any project that meets the Special Condition 8 requirements above prior to project construction completion. The additional treatment is required for the incremental difference between the post-development land cover and the 16 percent design of post-development stormwater management facilities.

The County has required that all new projects meet the 16 percent impervious land cover requirements for the design of post-development stormwater management facilities since 2003, as indicated in the Legal Authority Review in Section 4. Thus, no projects require additional pollutant load reductions under Special Condition 8 as defined in the Phase II MS4 Permit.

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Section 3

Means and Methods to Meet Required Reductions

The Phase II MS4 Permit requires that the Plan identify the means and methods to meet the required reductions. The means and methods used by the County to meet the first-phase required reductions include the construction of structural best management practices (BMPs) and stream restoration projects. All methods discussed in this Plan are included in either the Virginia Stormwater BMP Clearinghouse or expert panels approved by the Chesapeake Bay Program. The following sections discuss BMPs constructed prior to July 1, 2009, and projects in planning, design, or construction to meet the first-phase pollutant reduction requirement.

3.1 Historical Data

The County previously provided DEQ with information on BMPs installed prior to July 1, 2009. No additional historical projects are provided as a part of this Plan.

3.2 Pollutant Reduction Project Types

Seven project types have been identified in the Guidance Document as approved methods for achieving the required pollutant reductions: structural BMPs, street sweeping, land use changes, forest buffers, urban stream restoration, urban nutrient management, and redevelopment. Pollutant reduction efficiencies for these methods have been defined by the Virginia Stormwater BMP Clearinghouse or expert panels approved by the Chesapeake Bay Program. The County has planned primarily for the use of two project types—structural BMPs and stream restoration—to meet the first-phase required reductions.

The pollutant reduction efficiencies cited below are minimum project efficiencies. Any effective increases to pollutant reduction efficiencies will be included in future plans.

3.2.1 Structural BMPs

The method for calculating the pollutant load reduction achieved by structural stormwater BMPs depends on the pollutant and BMP type. If the BMP meets the Virginia Stormwater BMP Clearinghouse design criteria (http://www.vwrrc.vt.edu/swc/StandardsSpecs.html), the Clearinghouse's established efficiencies for TN and TP removal are used to calculate reductions. TSS removal is determined using the Bay Program retrofit equations, as described in the *Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects* (Bahr et al., January 2012). The retrofit equations relate the runoff depth treated per impervious acre to the pollutant removal percentage based on the BMP Practice Characterization, either Runoff Reduction or Stormwater Treatment Practice. If the BMP does not meet the Clearinghouse criteria, the Bay Program retrofit equations are used to determine the removal efficiencies for all three pollutants.

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3.2.2 Urban Stream Restoration

Pollutant removal credits are assigned to stream restoration projects using the Bay Program. Urban stream restoration interim approved removal rates are on a per-linear-foot (lf) basis as presented in *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (September 2014). The interim rates for pollutant removal at the edge of stream (EOS) are 0.075 lb./lf of TN, 0.068 lb./lf of TP, and 15.13 lb./lf of TSS. The calculated pollutant removal credits are then adjusted based on the ratio of contributing drainage area that is regulated land (lands within an MS4 boundary) versus unregulated land (land outside of an MS4 boundary). Full credit is given to regulated lands, whereas pollutant removal from unregulated lands is adjusted to remove the baseline reductions that were assumed for unregulated lands in the Chesapeake Bay TMDL. Full credit is also given to all forested land because forested lands do not have any baseline reduction requirements.

3.2.3 Septic to Sewer Conversion

The septic-to-sewer conversion credits are calculated from the number of households that have been connected to the County's sewer system. DEQ has determined that the TN reduction will be credited at a rate of 3.6 lb./yr./per capita. Other details of the calculation method—such as the number of residents per household and the conversion timeframe eligible for credit—have not yet been provided by DEQ. This plan will be updated when those calculation methods become available.

3.3 Projects for Pollutant Removal Credit

Six projects have been identified by the County for this Plan:

- York County H-1 Regional BMP at the Sports Complex
- Cook-Falcon Road Drainage Improvements: Phase I
- Cook-Falcon Road Drainage Improvements: Phase II
- Greensprings Stream Restoration
- Dare Elementary School Constructed Wetland and Stream Restoration
- Edgehill South Stream Restoration

Several of these projects include multiple BMPs or a combination of BMPs and stream restoration. One project, Cook-Falcon Road Drainage Improvements, has two project phases. The projects were constructed after June 30, 2009, or are currently in planning, design, or construction. In total, these projects exceed the first-phase reduction requirement. At a minimum, the County will complete projects to achieve the 5 percent first-phase required reduction and projects will have funds approved as a part of an adopted Capital Improvement Plan (CIP) by the end of the current Phase II MS4 Permit term in 2018. Each project location has been identified on Figure 5 in Appendix A.

The projects included in the Plan are a part of a program under which the County selects and implements projects to meet the requirements of the TMDL. Alternative projects may be substituted during implementation of this Plan to achieve the 5 percent required reduction.

3.3.1 York County H-1 Regional BMP at the Sports Complex

The York County H-1 Regional BMP at the Sports Complex is a series of three interconnected wet detention ponds, located adjacent to the Harwoods Mill Reservoir, that were completed in 2011. The drainage area to this new BMP is 82.87 ac, of which 38.12 ac (15.2 percent) are impervious, and 7 ac (8.4 percent) are forested. The area is composed of hydrologic soil groups C and D.

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According to the *York County H-1 Regional BMP Impact Study Report* (Vanasse Hangen Brustlin, Inc., 2006), this practice meets the Virginia Stormwater Management Handbook minimum standard 3.06 for retention basins; thus, it is classified as a BMP Clearinghouse Wet Pond 2, Stormwater Treatment Practice. The Impact Study Report also states that the ponds have a combined treatment volume of 91,687 cubic feet, or 6.7 acre-feet (ac-ft.). Because this facility meets the Clearinghouse design requirements, the Clearinghouse established efficiencies have been used for TN and TP removal: 30 percent and 65 percent, respectively. The TSS removal efficiency of 81 percent was derived from the Chesapeake Bay Program retrofit curves. Table 3-1 summarizes the pollutant load reductions attributed to the H-1 Regional BMP at the Sports Complex.

Table 3-1. Pollutant Removal Calculations for H-1 Regional BMP at the Sports Complex

Parameter	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious
Acres served by BMP	38.12	37.75	38.12	37.75	38.12	37.75
Pollutant	Total nitrogen		Total phosphorus		Total suspended solids	
Loading rate (lb./ac)	7.31	7.65	1.51	0.51	456.68	72.28
Load to BMP (lb.)	278.7	288.8	57.6	19.3	17,409	2,729
Removal rate (%)	30		65		78	
Pollutant removal (lb.)	83.6	86.6	37.4	12.5	13,633	2,137
Total removal (lb.)	170.2		49.9		15,769	

The entire drainage area to the H-1 Regional BMP at the Sports Complex, which is regulated land, was divided into impervious and pervious cover areas, as shown in Table 3-1. The EOS loading rates listed in the Guidance Document are applied to the drainage area to determine the total pollutant loads to the BMP. The removal rates are then applied to these pollutant loads to calculate the pollutant removal attributed to the BMP.

3.3.2 Cook-Falcon Road Drainage Improvements: Phase I

Phase I of the Cook-Falcon Road Drainage Improvements includes a constructed wetland BMP along Cook Road, across from Old York Hampton Highway. The total drainage area to this BMP is 46.15 ac, including 5.85 ac (12 percent) impervious and 16.4 ac (36 percent) forested. The area is composed of hydrologic soil groups C and D. This project is classified as a BMP Clearinghouse Practice Constructed Wetland 1, Stormwater Treatment Practice. According to the Stormwater Local Assistance Fund (SLAF) Grant Application Virginia Runoff Reduction Method Worksheet, the constructed wetland has a post-development treatment volume of 1.00 ac-ft. Table 3-2 summarizes the pollutant load reductions attributed to the Cook-Falcon Road Phase I Constructed Wetland.

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Table 3-2. Pollutant Removal Calculations for Cook-Falcon Road Phase I Constructed Wetland						
Parameter	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious
Acres served by BMP	5.85	23.9	5.85	23.9	5.85	23.9
Pollutant	Total nitrogen		Total phosphorus		Total suspended solids	
Loading rate (lb./ac)	7.31	7.65	1.51	0.51	456.68	72.28
Load to BMP (lb.)	42.8	182.8	8.8	12.2	2,672	1,727
Removal rate (%)	25		50		78	
Total estimated removal (lb.)	10.7	45.7	4.4	6.1	2,090	1,352
Total removal (lb.)	56.4		10.5		3,442	

A drainage improvement study, environmental study, soil testing, and construction plans and specifications have been completed for this phase, and construction began in 2014. A permit has been issued by the U.S. Army Corps of Engineers and public meetings and comment periods have been carried out. The County acquired 2 ac of land from the school division for construction of the wetland.

The entire drainage area to the constructed wetland, which is regulated land, was divided into impervious and pervious cover areas, as shown in Table 3-2. The EOS loading rates listed in the Guidance Document are applied to the drainage area to determine the total pollutant loads to the BMP. The removal rates are then applied to these pollutant loads to calculate the pollutant removal attributed to the BMP.

3.3.3 Cook-Falcon Road Drainage Improvements: Phase II

Phase II of the Cook-Falcon Road drainage improvements includes a constructed wetland and stream restoration along the headwaters of Wormley Creek. This phase is in design, so detailed drainage studies have not been completed and public easements are pending; however, the project is included in the York County CIP and Stormwater Management Plan.

The constructed wetland stormwater BMP will be constructed along Cook Road, adjacent to York High School and National Park Service property. This BMP will capture drainage from 25.45 ac, composed of 3.12 ac (12 percent) impervious cover and 13.5 ac (53 percent) forested ac. It is classified as a BMP Clearinghouse Practice Constructed Wetland 1, which is a Stormwater Treatment practice. The runoff storage was determined to be 0.46 ac-ft. Table 3-3 summarizes the pollutant load reductions attributed to the Cook-Falcon Road Phase II Constructed Wetland.

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Table 3-3. Pollutant Removal Calculations for Cook-Falcon Road Phase II Constructed Wetland						
Parameter	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious
Total existing acres served by MS4 (6/30/2009)	3.12	8.84	3.12	8.84	3.12	8.84
Pollutant	Total nitrogen		Total phosphorus		Total suspended solids	
2009 EOS loading rate (lb./ac)	7.31	7.65	1.51	0.51	456.68	72.28
Estimated total 2009 POC load (lb.)	22.8	67.6	4.7	4.5	1,425	639
Removal rate (%)	25		50		78	
Total estimated removal (lb.)	5.7	16.9	2.4	2.3	1,105	495
Total removal (lb.)	22.6		4.6		1,600	

The stream restoration will be along approximately 800 lf of perennial headwaters that discharge into Wormley Creek. This channel flows north from George Washington Memorial Highway, under Cook Road and Old York Hampton Highway, down to Wormley Creek. Significant erosion and bank failures are present, with actively eroding banks over 15 feet high.

The drainage area to this stream channel is 274 ac, located entirely on regulated lands so no adjustments were made to account for baseline loads on unregulated lands. Approximately 40 ac are on VDOT regulated lands.

The entire drainage area to the constructed wetland, which is regulated land, was divided into impervious and pervious cover areas, as shown in Table 3-4. The EOS loading rates listed in the Guidance Document are applied to the drainage area to determine the total pollutant loads to the BMP. The removal rates are then applied to these pollutant loads to calculate the pollutant removal attributed to the BMP. Pollutant removal for stream restoration projects is calculated on a per-linear-foot basis, as described in Section 3.2.2. Because the entire drainage area for this project is on regulated lands, no adjustments were necessary to account for baseline loads on unregulated lands. Table 3-5 summarizes the pollutant load reductions attributed to the Wormley Creek headwaters stream restoration.

Table 3-4. Values for Wormley Creek Headwaters (Cook-Falcon Phase II) Stream Restoration Calculations	
Total length of restoration (ft.)	800
Total drainage area (ac)	273.5
Total regulated area (ac)	273.5
Total unregulated area (ac)	0
Regulated area ratio	1.00
Unregulated land ratio	0.00

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Table 3-5. Pollutant Removal Calculations for Wormley Creek Headwaters (Cook-Falcon Phase II)			
Pollutant	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Approved removal rates (lb./lf)	0.075	0.068	15.13
Stream length (lf)	800	800	800
Pollutant removal (lb.)	60.0	54.4	12,104
Ratio of regulated acres to total acres draining to project	1.00	1.00	1.00
Ratio of unregulated acres to total acres draining to project	0.00	0.00	0.00
Adjusted pollutant removal (lb.)	60.0	54.4	12,104

3.3.4 Greensprings Stream Restoration

The Greensprings Stream Restoration project involves restoring 1,400 lf of highly eroded stream in the Greensprings subdivision that runs from Caran Road to Carrs Hill Road. The drainage area to this stream is 79 ac, of which 38 ac (48 percent) is impervious. The entire drainage area is considered MS4 regulated land, so no adjustments were made to account for baseline loads on unregulated lands, as shown in Table 3-6. Pollutant removal for stream restoration projects is calculated on a per-linear-foot basis, as described in Section 3.2.2. The pollutant removals are then adjusted based on the ratios of regulated land and unregulated land. Table 3-7 summarizes the pollutant load reductions attributed to the Greensprings Stream Restoration project.

Table 3-6. Values for Greensprings Stream Restoration Calculations	
Total length of restoration (ft.)	1,400
Total drainage area (ac)	78.98
Total regulated area (ac)	78.98
Total unregulated area (ac)	0
Regulated area ratio	1.00
Unregulated land ratio	0

Table 3-7. Pollutant Removal Calculations for Greensprings Stream Restoration			
Pollutant	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Approved removal rates (lb./lf)	0.075	0.068	15.13
Stream length (lf)	1,400	1,400	1,400
Pollutant removal (lb.)	105.0	95.2	21,182
Ratio of regulated acres to total acres draining to project	1.0	1.0	1.0
Adjusted pollutant removal (lb.)	105.0	95.2	21,182

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3.3.5 Dare Elementary School Constructed Wetland and Stream Restoration

The Dare Elementary project includes three stormwater treatment devices and stream restoration along the headwaters of Chisman Creek. These projects are in construction, which began in 2014.

The stormwater treatment devices are two grass channels and one constructed wetland to treat a large commercial area that was developed in the 1960s and does not currently have any stormwater treatment. Both grass channels provide pretreatment for the constructed wetland, and the constructed wetland provides the majority of the stormwater treatment. Thus, only the pollutant removal associated with the constructed wetland was included in the Plan.

This project is located adjacent to Dare Elementary School, near the intermittent headwaters of Chisman Creek. The project description states that this BMP treats a 64-acre commercial area, and the drainage area was estimated to be approximately 39 percent impervious. This BMP is classified as a BMP Clearinghouse Constructed Wetland I, a Stormwater Treatment device, and is expected to meet the Clearinghouse requirements.

The entire drainage area to the constructed wetland, which is regulated land, was divided into impervious and pervious cover areas, as shown in Table 3-8. The EOS loading rates listed in the Guidance Document are applied to the drainage area to determine the total pollutant loads to the BMP. The removal rates are then applied to these pollutant loads to calculate the pollutant removal attributed to the BMP.

Table 3-8. Pollutant Removal Calculations for Dare Elementary School Constructed Wetland

Parameter	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious	Regulated Urban Impervious	Regulated Urban Pervious
Total existing acres served by MS4 (6/30/2009)	24.96	39.04	24.96	39.04	24.96	39.04
Pollutant	Total nitrogen		Total phosphorus		Total suspended solids	
2009 EOS loading rate (lb./ac)	7.31	7.65	1.51	0.51	456.68	72.28
Estimated total 2009 POC load (lb.)	182.5	298.7	37.7	19.9	11,399	2,822
Removal rate (%)	25		50		21	
Total estimated removal (lb.)	45.6	74.7	18.8	10.0	2,424	600
Total removal (lb.)	120.3		28.8		3,024	

The stream restoration is along 950 lf of the headwaters of Chisman Creek, which is a tributary to the Lower Chesapeake Bay. The entire drainage area to this reach is regulated land, so no adjustments were made to account for baseline loads on unregulated lands, as shown in Table 3-9. Pollutant removal for stream restoration projects is calculated on a per-linear-foot basis, as described in Section 3.2.2. Table 3-10 summarizes the pollutant load reductions attributed to the Dare Elementary constructed wetland and stream restoration.

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Table 3-9. Values for Chisman Creek (Dare Elementary School) Stream Restoration Calculations	
Total length of restoration (ft.)	950
Total drainage area (ac)	97.53
Total regulated area (ac)	97.53
Total unregulated area (ac)	0
Regulated area ratio	1.00
Unregulated land ratio	0.00

Table 3-10. Pollutant Removal Calculations for Chisman Creek (Dare Elementary School) Stream Restoration			
Pollutant	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Approved removal rates (lb./lf)	0.075	0.068	15.13
Stream length (lf)	950	950	950
Pollutant removal (lb.)	71.3	64.6	14,374
Ratio of regulated acres to total acres draining to project	1.00	1.00	1.00
Ratio of unregulated acres to total acres draining to project	0.00	0.00	0.00
Adjusted pollutant removal (lb.)	71.3	64.6	14,374

3.3.6 Edgehill South Stream Restoration

The Edgehill South Stream Restoration project included the restoration of 2,000 lf of the Poquoson River and an unnamed tributary. This project addressed the Poquoson River from where it takes a 90-degree turn east near Aspen Boulevard down to Fort Eustis Boulevard. A tributary that flows from Brokenbridge Road down to the confluence with the Poquoson River near Bridge Lane was also addressed. The entire drainage area to this reach is regulated land, so no adjustments were made to account for baseline loads on unregulated lands, as shown in Table 3-11. Pollutant removal for stream restoration projects is calculated on a per-linear-foot basis, as described in the letter report. Table 3-12 summarizes the pollutant load reductions attributed to the Edgehill South Stream Restoration project. Construction of this project was completed in 2010.

Table 3-11. Values for Edgehill South Stream Restoration Calculations	
Total length of restoration (ft.)	2,000
Total drainage area (ac)	295
Total regulated area (ac)	295
Total unregulated area (ac)	0
Regulated area ratio	1.00
Unregulated land ratio	0.00

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Table 3-12. Pollutant Removal Calculations for Edgehill South Stream Restoration			
Pollutant	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Approved removal rates (lb./lf)	0.075	0.068	15.13
Stream length (lf)	2,000	2,000	2,000
Pollutant removal (lb.)	150.0	136.0	30,260
Ratio of regulated acres to total acres draining to project	1.00	1.00	1.00
Ratio of unregulated acres to total acres draining to project	0.00	0.00	0.00
Adjusted pollutant removal (lb.)	150.0	136.0	30,260

3.3.7 Septic to Sewer Conversion Program

As included in Section 3.2.3, the County will generate TN reduction credits for septic-to-sewer conversions . From July 1, 2009 to June 18, 2015, 773 homes were connected to the County's sewer program. At a minimum, the County expects to receive credit for these projects as a part of the first phase Plan. The timeframe of the program eligible for credit and the number of residents within a household have not yet been released by DEQ. The TN credit and additional project information will be included in Appendix C after the final credit methodology has been released by DEQ.

3.3.8 First-Phase Pollutant Reduction Credit

A comparison of the required reductions from Table 2-12 to the calculated pollutant removal credits displayed in Table 3-13 shows that the pollutant removals achieved by the six projects exceed the 5 percent progress removal requirements of the first phase of the Plan. Credits achieved that exceed the first-phase Plan required reductions will be applied toward the second-phase Plan requirements.

Table 3-13. First-Phase Pollutant Reduction Credits			
Project	Total Nitrogen (lb./yr.)	Total Phosphorus (lb./yr.)	Total Suspended Solids (lb./yr.)
H-1 Regional BMP at the Sports Complex	170.2	49.9	15,769
Cook-Falcon Road Drainage Improvements: Phase I	56.4	10.5	3,442
Cook-Falcon Road Drainage Improvements: Phase II	82.6	59.0	13,704
Greensprings Stream Restoration	105.0	95.2	21,182
Dare Elementary School Constructed Wetland and Stream Restoration	191.6	93.4	17,397
Edgehill South Stream Restoration	150.0	136.0	30,260
Septic to Sewer Conversion Program	TBD	TBD	TBD
Total	755.8	444.0	101,754
Total first-phase required reduction (from Table 2-12)	289.64	47.61	14,768.91

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3.4 Implementation Schedule and Estimated Cost to Complete

Table 3-14 provides the current project status, implementation schedule, and cost estimate for each project. The H-1 Regional BMP and Edgehill South Stream Restoration projects have been completed. The first phase of Cook-Falcon Road Drainage Improvements and the Dare Elementary School Constructed Wetland and Stream Restoration are currently under construction. The final projects, the Greensprings Stream Restoration and the second phase of the Cook-Falcon Road Drainage Improvements, are anticipated to begin construction in fiscal year 2017 pending the approval of public easements. The total cost of implementation is approximately $4 million.

Table 3-14. First-Phase Implementation Schedule and Estimated Cost to Complete

Project	Project Status	Estimated Construction Start Date	Estimated Construction Cost
H-1 Regional BMP at the Sports Complex	Complete	2009	$704,640
Cook-Falcon Road Drainage Improvements: Phase I	Under construction	2014	$1,050,000
Cook-Falcon Road Drainage Improvements: Phase II	In design	FY2017	$650,000
Greensprings Stream Restoration	In planning	FY2017	$600,000
Dare Elementary School Constructed Wetland and Stream Restoration	Under construction	2014	$880,000
Edgehill South Stream Restoration	Complete	2010	$110,000
Septic to Sewer Conversion Program	Ongoing	TBD	TBD
Total estimated construction cost			$3,994,640

3.5 Future Grandfathered Projects

As discussed in Section 2.4.2, no future grandfathered projects are anticipated within the county.

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Section 4

Legal Authority for TMDL Implementation

The Phase II MS4 Permit requires that the Plan document the current program and legal authority, new or modified legal authority, and the means and methods to address discharges from new sources.

4.1 Current Program and Existing Legal Authority

The County revised its ordinances in 2003 to be in compliance with the Virginia Stormwater Management Program (VSMP) requirements. In addition, the County maintains a Phase II MS4 Permit and an inter-jurisdictional agreement with the City of Newport News. The following components of the County's MS4 program will be utilized to meet the Special Condition:

- Code of the County of York, Virginia
  - Chapter 10: Erosion and Sediment Control Ordinance
  - Chapter 23.1: Wetlands
  - Chapter 23.2: Chesapeake Bay Preservation Area
  - Chapter 23.3: Stormwater Management Ordinance
  - Chapter 24.1: Zoning
- Permits
  - DEQ Permit Number VAR040028 - General VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems
- Inter-jurisdictional Agreements
  - Leasing Agreement with City of Newport News for Lease of the H-1 Regional BMP at Sports Complex
- Other Enforceable Mechanisms
  - Eminent Domain

4.2 New or Modified Legal Authority

No new legal authority is planned during this permit term to achieve compliance with the Phase II MS4 Permit.

4.3 Means and Methods to Address Discharges from New Sources

The County's Stormwater Ordinance was developed from the model ordinance provided by DEQ and was reviewed and approved by DEQ. New sources within the County are required to utilize an average land cover of 16 percent or less for the design of post-development stormwater management facilities. Subdivision and site plans submitted to the County are reviewed by Stormwater personnel to insure compliance with all applicable ordinances.

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BMP maintenance agreements are required for each development or single family homes that require BMPs. BMPs are inspected by County personal at least once a year.

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Section 5

Public Comment Process

The draft Plan was released for public comment on the County website from May 15, 2015 to June 19, 2015. A press release was issued to by the County to announce the release of the draft Plan and a link was added to the main page of the County website. One public comment was received and the comment has been addressed in the final Plan. Additionally, a presentation was made to the Board of Supervisors during a regular meeting on June 2, 2015 that was open to the public.

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Section 6

Conclusion

York County developed this first-phase Plan as required in the 2013–2018 Phase II MS4 Permit and in accordance with the *DEQ TMDL Action Plan Guidance Document* dated May 18, 2015. This Plan concludes that the first-phase pollutant reduction requirements are exceeded by the six BMP and stream projects identified in Section 3 of the Plan. Modifications to this Plan will be documented in Appendix C.

The County is required to complete the second-phase Plan prior to the end the current Phase II MS4 Permit term in 2018. In the second-phase Plan, the County will incorporate the 2010 U.S. Census Urban Area into the MS4 service area, which will increase the required pollutant reductions. The current Guidance Document requires that the County achieve a 40 percent reduction in the expanded MS4 service area by the end of the next permit cycle, which is equivalent to the 5 percent first-phase progress and second-phase 35 percent progress. Concurrently, DEQ will produce the statewide Phase III Watershed Improvement Plan (WIP) and the Chesapeake Bay Model will be updated, with both efforts anticipated in 2017. The second-phase Plan requirements may be modified as a result of these activities. The County will continue to implement projects and programs for compliance and this Plan will be updated accordingly.

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Section 7

Limitations

This document was prepared solely for York County in accordance with professional standards at the time the services were performed and in accordance with the contract between York County and Brown and Caldwell dated January 9, 2015. This document is governed by the specific scope of work authorized by York County; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by York County and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 8

References

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Appendix A: Maps

Figure 1. MS4 boundary delineation
Figure 2. MS4 boundary delineation: southern county
Figure 3. MS4 boundary delineation: northern county
Figure 4. USGS NHD HUC8 watersheds
Figure 5. First-phase Plan projects

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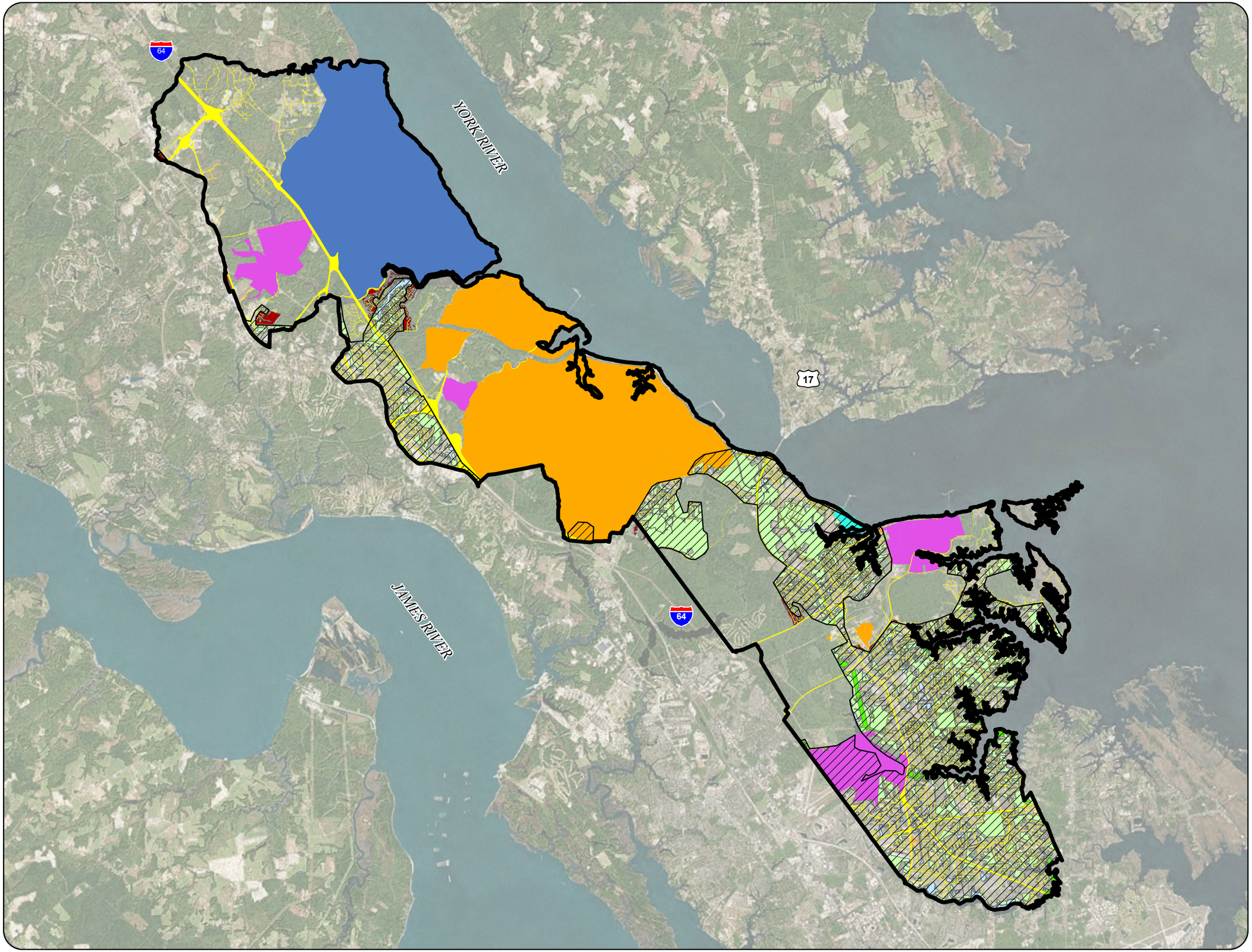


York County

Figure 1: MS4 Boundary Delineation

June 2015

0 2 4
Miles

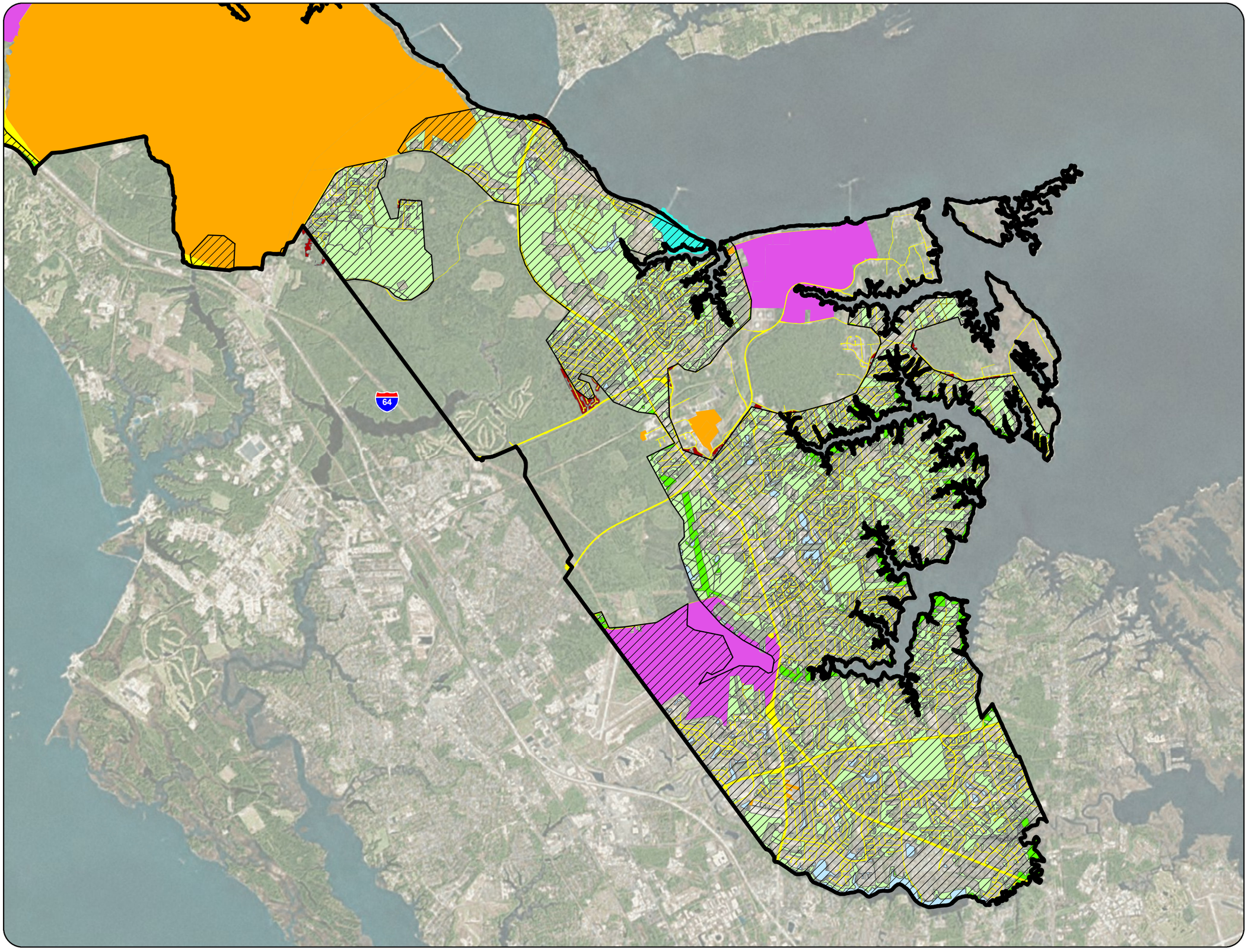
Legend

- York County Boundary
- Urban Areas 2000 Census Areas

MS4 and Other Permittees

- Coast Guard Training Center MS4
- Individual VPDES Permittee
- Stormwater General VPDES Permittee
- Camp Peary
- VDOT ROWs
- Open Water
- Forested Areas (Over Half Acre)
- Surface Inflows
- Surface Outflows

Brown AND Caldwell



York County

Figure 2: MS4 Boundary Delineation- Southern County

June 2015

0 1 2
Miles

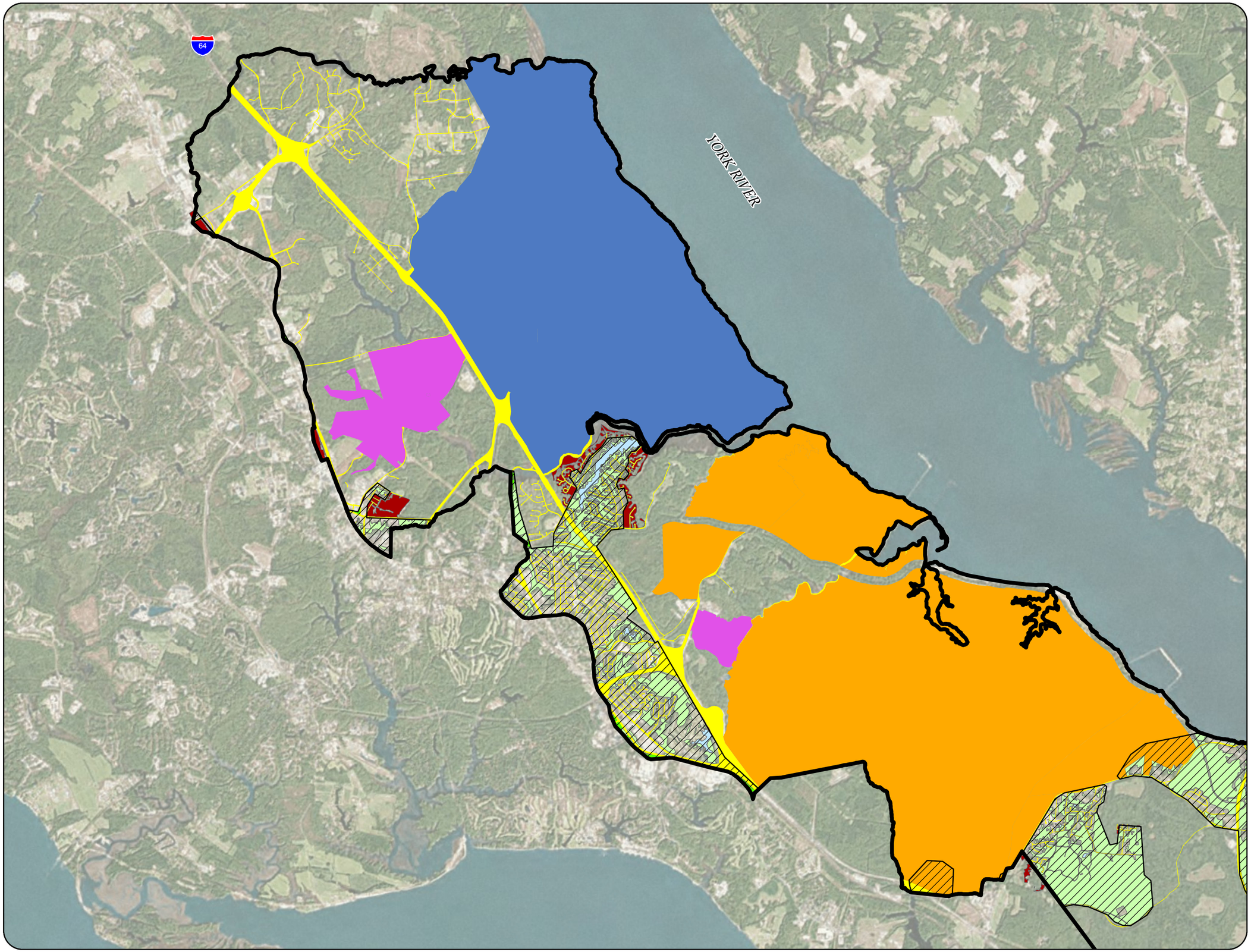
Legend

- York County Boundary
- Urban Areas 2000 Census Areas

MS4 and Other Permittees

- Coast Guard Training Center MS4
- Individual VPDES Permittee
- Stormwater General VPDES Permittee
- Camp Peary
- VDOT ROWs
- Open Water
- Forested Areas (Over Half Acre)
- Surface Inflows
- Surface Outflows

Brown AND Caldwell



York County

Figure 3: MS4 Boundary Delineation- Northern County

June 2015

0 1 2
Miles

Legend

- York County Boundary
- Urban Areas 2000 Census Areas

MS4 and Other Permittees

- Coast Guard Training Center MS4
- Individual VPDES Permittee
- Stormwater General VPDES Permittee
- Camp Peary
- VDOT ROWs
- Open Water
- Forested Areas (Over Half Acre)
- Surface Inflows
- Surface Outflows

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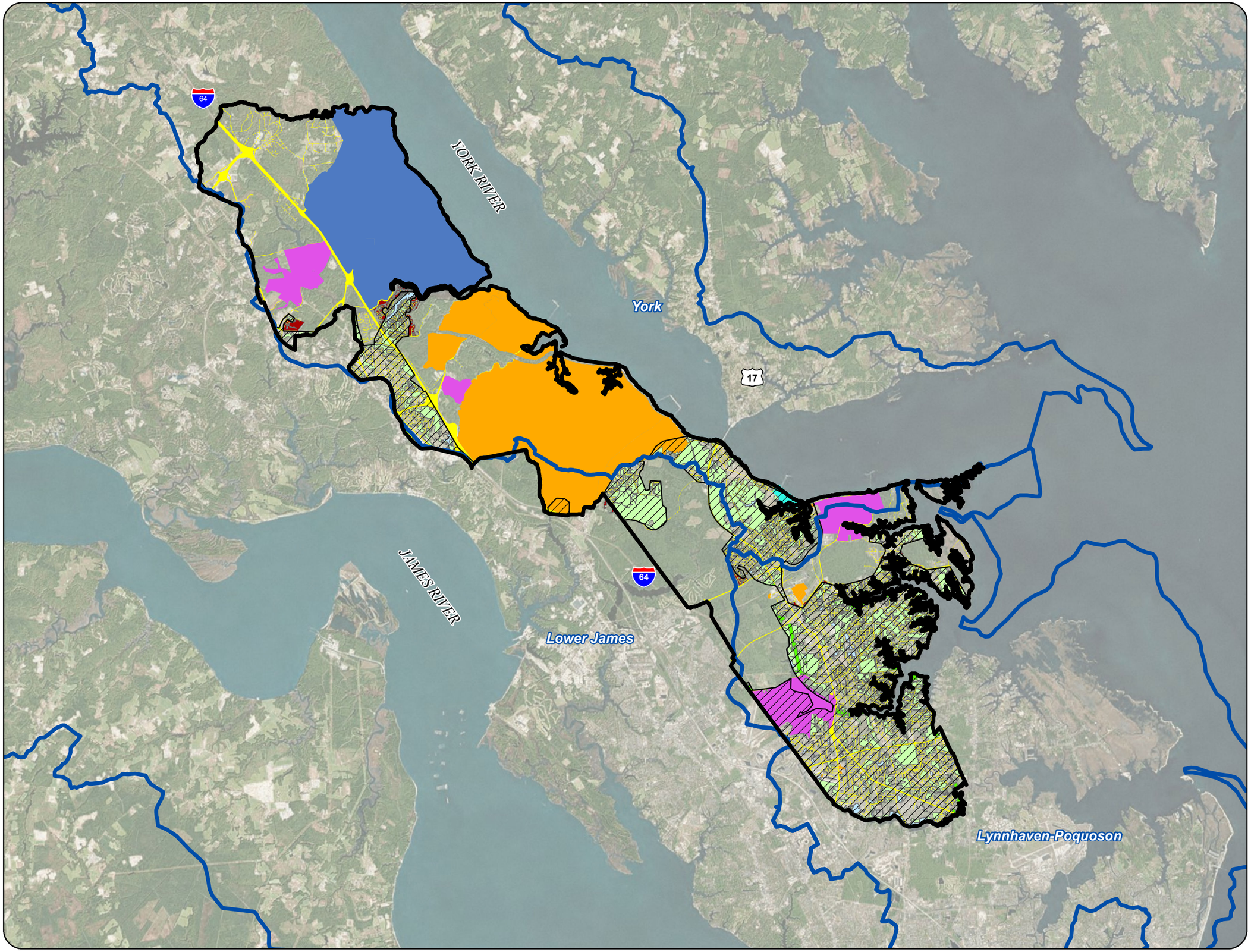

York County

Figure 4: HUC8 Watersheds

June 2015

0 2 4
Miles

Legend

- York County Boundary
- HUC8 Boundary
- Urban Areas 2000 Census Areas

MS4 and Other Permittees

- Coast Guard Training Center MS4
- Individual VPDES Permittee
- Stormwater General VPDES Permittee
- Camp Peary
- VDOT ROWs
- Open Water
- Forested Areas (Over Half Acre)
- Surface Inflows
- Surface Outflows

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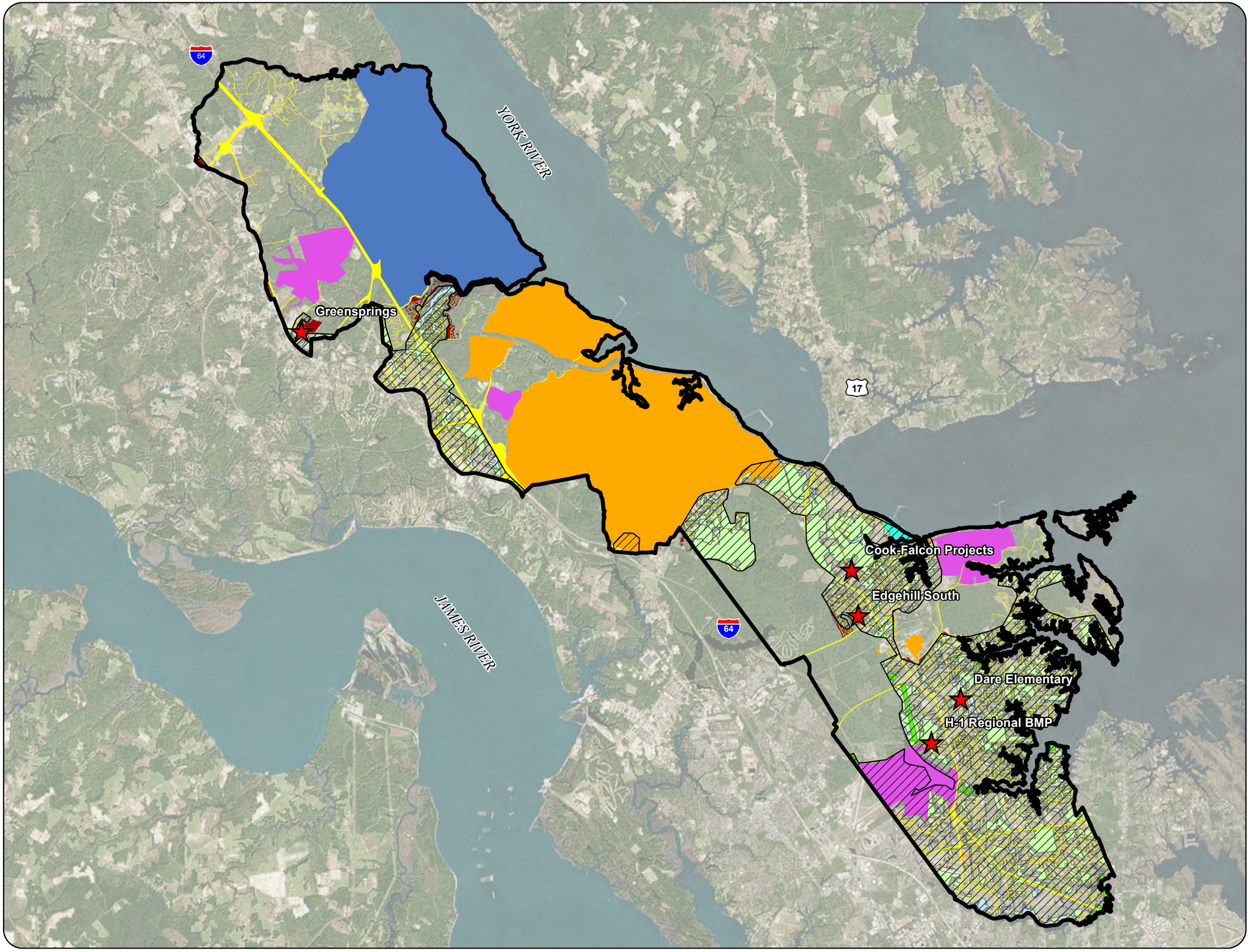

York County

Figure 5: First Phase Plan Projects

June 2015

0 2 4
Miles

Legend

- First Phase Projects
- York County Boundary
- Urban Areas 2000 Census Areas

MS4 and Other Permittees

- Coast Guard Training Center MS4
- Individual VPDES Permittee
- Stormwater General VPDES Permittee
- Camp Peary
- VDOT ROWs
- Open Water
- Forested Areas (Over Half Acre)
- Surface Inflows
- Surface Outflows

Brown AND Caldwell

Appendix B: Source Data

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Appendix B

Source Data

The following is a list of the GIS datasets, dates, and sources of GIS data that were used to develop the TMDL Action Plan.

Data Collected from the County

Lidar: Received January 2015

- GRID 5FT 2007
- GRID 5FT FIRSTRETURN 2007

Current York County Geodatabase: Received January 2015

January 2015 Boundary and Government

- Boundary

January 2015 Environmental

- Aquatic Vegetation
- Basins
- BMP Basins
- Contours
  - 2' contours
- Contours Navy 2006
  - 2' contours
- Lakes
- Land Cover
- Streams
- Tributaries
- Wetlands ACoE

January 2015 Land Records

- Address Annotation
- Address Points
- Lot number annotation
- Parcels
- Road annotation

January 2015 Planimetrics

- Buildings
- Centerline Annotation
- Centerlines

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- Docks
- Driveways
- Parking lots and paved areas
- Pools
- Railroads
- Road Edge
- Road Shields
- Sidewalks

January 2015 Utilities

- Drainage Ditch
- Storm Drain Medallions
- Storm Mains
- Storm Nodes

Miscellaneous

- Impervious Surface 2015 Merged

Historical York County Geodatabase: Received January 2015

Boundary and Government 2009

- Boundary

Environmental 2009

- Basins
- BMP Basins
- Contour
- Elevation Annotation
- HUC Boundary
- Lakes 2009
- Land Cover 2009
- Wetlands ACoE
- Wetlands NWI

Land Records 2009

- Address annotation
- Lot annotation
- Parcel arcs
- Parcels
- Road

Planimetrics 2010

- Buildings
- Centerline Annotation
- Centerlines

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- Docks
- Driveways
- Pads
- Pools
- Railroads
- Road Edge
- Road Shields
- Sidewalks
- Sidewalks Buffer

Utilities 2009

- Drainage Ditch

Misc.

- Impervious Surface March 2010
- Impervious Surface March 2010 Merged
- Urban Areas Hampton Roads Census 2000
- Urban Areas Hampton Roads Census 2010

York County Septic to Sewer Conversion Program: Received June 2015

Septic to Sewer Conversion Program

- Houses converted to sewer between July 1, 2009 and June 18, 2015

Data Collected from Tiger Census

2000 Census: Downloaded January 2015

- Census Urban Area

2010 Census: Downloaded January 2015

- Census Urban Area

Data Collected from DEQ

VPDES Permittees: Downloaded January 2015

- Individual Permittees Spreadsheet
- Stormwater General Permittees Spreadsheet

Individual MS4s: Downloaded January 2015

- Phase I and Phase II MS4s Spreadsheet

Data Collected from USGS NED

National Elevation Dataset: Downloaded January 2015

Regional DEM at a 10-meter resolution

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Appendix C: Modifications to the Plan

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