Commonwealth of Virginia

Chesapeake Bay TMDL Phase III Watershed Implementation Plan

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Contents

ACRONYM INDEX

ACEP – Agricultural Conservation Easement Program

Ag BMP TAC – Agricultural Best Management Practice Technical Advisory Committee

ALF – August Low Flow

AOSS – alternative onsite sewage systems

BACT – Best Available Control Technology

BART – Best Available Retrofit Technology

BMI – Benthic Macroinvertebrates

BMPs – Best Management Practices

CAA – Clean Air Act

CAST – Chesapeake Assessment Scenario Tool

CBIC – Chesapeake Bay Impact Crater

CBPA – Chesapeake Bay Preservation Act

CBP – Chesapeake Bay Program

CBRAP – Chesapeake Bay Regulatory and Accountability Program

CBSAG – Chesapeake Bay Stakeholder Advisory Group

CIP – Conservation Incentive Program

CFA – Certified Fertilizer Applicator

CPBMI – Coastal Plains Benthic Macroinvertebrates

CPMI – Coastal Plains Macroinvertebrate index

COSS – conventional onsite sewage system

CREP – Conservation Reserve Enhancement Program

CRP – Conservation Reserve Program

CWA – Clean Water Act

CWS – Community Water System

CZM – Coastal Zone Management

DCR – Virginia Department of Conservation and Recreation

DEQ – Virginia Department of Environmental Quality

DGIF – Virginia Department of Game and Inland Fisheries

DGS – Virginia Department of General Services

DHR – Virginia Department of Historic Resources

DMPI – Division of Data Management and Process Improvement

DMTF – Virginia Drought Monitoring Task Force

DoD – Department of Defense

ET – Evapotranspiration

EPA – U.S. Environmental Protection Agency

EQIP – Environmental Quality Incentives Program

EV – electric vehicle

FERC – Federal Energy Regulatory Commission

FSA – Farm Service Agency (part of the United States Department of Agriculture)

GEMS – Geospatial and Educational Mapping System

GPD – gallons per day

GSA – General Services Administration

GWMA – Groundwater Management Area

GWPP – Groundwater Withdrawal Permitting Program

GMP – Guidance, Memorandum and Policy

HAPs – Hazardous Air Pollutants

HUC – Hydrologic Unit Code

ICPRB – Interstate Commission on the Potomac River Basin

INRMP – Installation Natural Resource Management Plans

JRA – James River Association

LAPG – Local area planning goals

LaRC – Langley Research Center

LDAR – Leak Detection and Repair

LGAC – Local Government Advisory Committee

MACT – Maximum Achievable Control Technology

MGD – Million Gallons per Day

NGO – Non-government organization

MGY – Million Gallons per Year

MMBtu – Million British thermal units

MS4 – Municipal Separate Storm Sewer Systems

NASA – National Aeronautics and Space Administration

NDZ – No Discharge Zone

NFWF – National Fish and Wildlife Foundation

NM – Nutrient Management

NNBF – natural or nature-based features

NOAA – National Oceanic and Atmospheric Administration

NOx – nitrogen oxide

NPS – National Park Service

NPS pollution – Nonpoint Source pollution

NRCS – Natural Resources Conservation Service

NSPS – New Source Performance Standard

NWS – National Weather Service

ORSANCO – Ohio River Valley Water Sanitation Commission

OSNR – Office of the Secretary of Natural Resources

P2 – Pollution Prevention

PDC – Planning District Commissions

PEC – Piedmont Environmental Council

POTW – Publicly Owned Treatment Works

PSC – Principals' Staff Committee

PSD – Prevention of Significant Deterioration

PTE – Potential to Emit

RAP – regulatory advisory panel

RBC – River Basin Commission

RCPP – Regional Conservation Partnership Program

RFP – Request for Proposal

RMP – Resource Management Plan

RRBBC – Roanoke River Bi-State Commission

RTP – Rural Transportation Planning

SAP – scientific advisory panel

SAV – submerged aquatic vegetation

SDWA – Safe Drinking Water Act

SFI – Sustainable Forestry Initiative

SHARP – Sustainable Harvesting and Resource Professional

SL-6 – Stream Exclusion with Grazing Land Management

SLAF – Stormwater Local Assistance Fund

SSU – Self-Supplied Users

STAC – Scientific and Technical Advisory Committee

SWCD – Soil and Water Conservation Districts

SWMA – Surface Water Management Area

SWPPP – Stormwater Pollution Prevention Plan

TAC – Technical Advisory Committee

TCI – Transportation and Climate Initiative

TMDL – Total Maximum Daily Load

TN – total nitrogen

TP – total phosphorous

TPY, **tpy**, **tons/yr** – tons per year

U&CF – Urban and Community Forestry

USACE – United States Army Corp of Engineers

USDA – United States Department of Agriculture

USEPA – United States Environmental Protection Agency

USFWS – United States Fish and Wildlife Service

USFS – United States Forest Service

USGS – United States Geological Survey

VACS – Virginia Agricultural Cost Share

VAMSA – Virginia Association of Municipal Stormwater Agencies

VASWCD – Virginia Association of Soil and Water Conservation Districts

VCAP – Virginia Conservation Assistance Program

VCE – Virginia Cooperative Extension

VDACS – Virginia Department of Agriculture and Consumer Services

VDOF – Virginia Department of Forestry

VDH – Virginia Department of Health

VDMV – Virginia Department of Motor Vehicles

VDOT – Virginia Department of Transportation

VDH – Virginia Department of Health

VDH-ODW – Virginia Department of Health Office of Drinking Water

VECI – Virginia Enhanced Conservation Initiative

VEE – Virginia Environmental Endowment

VENIS – Virginia Environmental Information System

VESCP – Virginia Erosion and Sediment Control Program

VGRS – Vent Gas Reduction System

VIMS – Virginia Institute of Marine Science

VMRC – Virginia Marine Resources Commission

VNRCF – Virginia Natural Resources Commitment Fund

VPA – Virginia Pollution Abatement Program

VPDES – Virginia Pollutant Discharge Elimination System

VOC – Volatile organic compounds

VSCI – Virginia Stream Condition Index

VSMP – Virginia Stormwater Management Program

VTC – Virginia Tourism Corporation

VTCW – Virginia Trees for Clean Water

VWPP – Virginia Water Protection Permit

VWUDS – Virginia Water Use Database System

VWWR – Virginia Water Withdrawal Reporting

WIP – Water Implementation Program

WLA – Wasteload Allocation

WQIF – Water Quality Improvement Fund

WQMP – Water Quality Management Planning

WQS – Water Quality Standards

WSP – Water Supply Plan

WWTP – Wastewater Treatment Plant

EXECUTIVE SUMMARY

This document represents Virginia's Phase III Watershed Implementation Plan (WIP) to achieve nutrient and sediment reductions needed to restore the Chesapeake Bay and its tidal tributaries. Over the past several decades, multiple efforts by local governments, state and federal programs and the private sector including conservation groups and other non-governmental organizations (NGOs), farmers, landowners, consultants, and many others have resulted in significant improvements to Virginia's water quality. The Commonwealth's successes are the result of the collective effort of the public and private sector and to further the success of the past, this Phase III WIP relies on the continued support and engagement of all these stakeholders in Virginia. Chapter 2 of the Phase III WIPs describes many of the significant advancements resulting from implementation of the Phase I and Phase II WIPs.

In July 2018, the Environmental Protection Agency (EPA) issued State-Basin Planning Targets for nitrogen and phosphorus in Virginia's five river basins draining to the Chesapeake Bay. These targets for the Potomac River, Eastern Shore, Rappahannock River, York River, and James River basins cumulatively represent the assimilative capacity of the Chesapeake Bay to meet the dissolved oxygen water quality criteria. These target loads represent caps that need to be achieved and maintained through time. In addition to the planning targets, EPA also specified expectations described in Chapter 3 for the Phase III WIP and Virginia has addressed these expectations as follows:

- Account for changes due to climate change (Chapter 4) and growth (Chapter 5).
- Engage local partners in local planning goal development and implementation (Chapters 5 and 8).
- Develop comprehensive local, regional and federal engagement strategies and commitments (Chapter 6).
- Specify the programmatic and numeric commitments needed to achieve the Phase III WIP planning targets by 2025 (Chapters 7 and 8).
- Consider adjustments of state-basin targets and Phase II WIP source sector goals (Chapter 8).
- Target implementation at the Chesapeake Bay segment-shed scale (Chapter 10).

To account for climate change (Chapter 4), the Chesapeake Bay Program modeling estimates an additional nine million pounds of nitrogen and 0.5 million pounds of phosphorus reductions are needed to offset the effects of climate change by 2025. Virginia's share of that additional load reduction is 1.722 million pounds of nitrogen and 0.193 million pounds of phosphorus. Virginia's Phase III WIP includes sufficient practices and policies that when fully implemented will account for these additional load reductions.

Virginia focused its local engagement (Chapters 5 and 6) on addressing the local area planning goals (LAPGs), which are comprised of the load allocations for agricultural, urban/developed, septic and forest lands. Virginia utilized a comprehensive local engagement process involving collaboration among localities, Planning District/Regional Commissions (PDCs), Soil and Water Conservation Districts (SWCDs), stakeholders from the agriculture and conservation communities, citizens and numerous state agencies involved with nutrient and sediment reductions. SWCDs and the PDCs responded to the challenge of identifying best management practices (BMPs) and programmatic actions that are necessary to restore the Chesapeake Bay. From over 500 ideas and suggestions, the common themes among the programmatic actions for the urban/developed sector include:

- Increase DEQ's Stormwater Local Assistance Fund (SLAF);
- Expand use of the Virginia Conservation Assistance Program (VCAP);

- Conduct more urban nutrient management planning;
- Enhance promotion of living shoreline techniques to address shoreline erosion;
- Expand septic pump out and other maintenance programs statewide; and
- Improve coordination of local reporting of BMPs by DEQ.

From over 220 suggestions submitted by the SWCDs, the following themes emerged for programmatic actions in the agricultural sector:

- Create additional incentives for a variety of buffer widths and lifespans;
- Create new incentives for extended BMP lifespans;
- Establish an equine workgroup to address the implementation of BMPs on equine operations including horse pasture management;
- Remove or increase annual participant caps for cost share;
- Bundle BMPs into single cost share contracts to increase reporting of BMPs;
- Increase maximum tax credits for BMPs and conservation equipment;
- Modify practice specifications for cover crops, animal waste, stream protection, forest buffers and nutrient management; and
- Move towards regional agricultural BMP priorities.

Based on the BMP implementation levels and experiences over the last several years, it is clear that Virginia's nutrient reduction goals for 2025 are ambitious and will require significant effort, sustained funding and increased technical capacity in all sectors. In addition, while initial BMP and programmatic actions identified for agricultural, natural and non-MS4 developed lands provided by PDCs and SWCDs serve as a strong foundation for the Phase III WIP, additional state policy initiatives will be necessary to meet the Commonwealth's reduction targets for 2025. Multiple state initiatives described in Chapter 7 have been identified to support these efforts, and also address many of the resource and capacity gaps identified by the SWCDs, PDCs and their stakeholders through their local engagement process.

Chapter 9 describes the Commonwealth's tools for determining the cost of implementation of the Phase III WIP for the agricultural, urban/developed and wastewater sectors. The Department of Conservation and Recreation (DCR) and DEQ engage stakeholders annually to quantify anticipated funding needs. This analysis is communicated to the Governor and to the Virginia General Assembly to inform annual budget deliberations. Chapter 11 of the Phase III WIP acknowledges that all Virginians can play a role in restoration of the Chesapeake Bay and describes multiple opportunities to have a positive impact on their local communities and the Bay.

Virginia commits to have all practices and controls in place by 2025 to achieve the final Phase III WIP nutrient and sediment planning targets in accordance with the timelines and goals developed by the Bay Program Partnership and included in the 2014 Watershed Agreement. Virginia along with its Chesapeake Bay Program partners will utilize an adaptive management approach as described in Chapter 10. Anchored in two-year milestones and annual progress reporting, this approach will assess implementation progress, and adjust programs and priorities to ensure the load reductions called for in the Phase III WIP are achieved by 2025.

CHAPTER 1. INTRODUCTION

This document represents Virginia's Phase III Watershed Implementation Plan (WIP) to achieve nutrient and sediment reductions needed to restore the Chesapeake Bay and its tidal tributaries. The Final Phase III WIP details the best management practices (BMPs) along with programmatic actions necessary to achieve state basin planning targets for nitrogen and phosphorus. This planning effort benefited from significant achievements resulting from the Phase I and Phase II WIPs. Local input from Soil and Water Conservation Districts (SWCDs) and Planning District/Regional Commissions (PDCs) also forged a strong foundation for the Phase III WIP while guiding development of new state initiatives.

Governor Ralph Northam's goals for restoring the Chesapeake Bay and its tidal tributaries through this Phase III WIP include:

- Achieving the state basin planning targets while accounting for future population and economic growth and the impacts of climate change and to do so no later than December 31, 2025.
- Engaging and seeking guidance from partners, including local governments, PDCs and SWCDs through a local area planning effort.
- Developing a plan that is resilient, practical, cost-effective and provides for multiple benefits.
- Adhering to expectations established by the Environmental Protection Agency (EPA) and our Chesapeake Bay Program partners, particularly those regarding reasonable assurance.

As our current progress in reducing nutrient and sediment pollution reflects, cleaner water enhances our economy and quality of life. Implementation of the Phase III WIP will result in a healthier, more diverse economy, including but not limited to recreation, tourism, water-based industries, increased property values, more sustainable land uses and a Chesapeake Bay that future generations of Virginians will have the opportunity to enjoy.

CHAPTER 2. SIGNIFICANT ADVANCEMENTS RESULTING FROM PHASE I AND II WIPs

2.1 Programmatic Successes

This chapter focuses on state programs even though many efforts and improvements have come from local governments, federal programs and the private sector – including, non-government organizations (NGOs), farmers, landowners and consultants, among others. The Commonwealth's successes are the result of the collective effort of the public and private sector over the past three decades. The programs described below will remain key features of the Commonwealth's future progress.

Figure 1: Rainbow Over the York by Robert Hunter (Courtesy of Scenic Virginia)

Agriculture

Virginia Agricultural Cost Share Program – The program provides cost share and technical assistance to landowners and agricultural operators that voluntarily install select BMPs. The Virginia Agricultural Cost Share (VACS) Program originated in 1984 with a small number of eligible BMPs that have been continually expanded and revised in response to changing nonpoint source pollution and agricultural issues. Many of these changes have been influenced by relevant research as well as nutrient and sediment reduction priorities of the Chesapeake Bay Program and local TMDL implementation plans. The VACS Program emphasizes implementation of BMPs that provide cost-efficient reductions of nutrients and sediment. The primary source of funding is from deposits made to the Water Quality Improvement Fund (WQIF) or directly to the Virginia Natural Resources Commitment Fund (VNRCF). All 47 SWCDs, including 32 that are either wholly or partially within the Chesapeake Bay watershed, are funded by VACS contracts with individual farmers to implement agricultural BMPs.

Livestock Stream Exclusion – In December 2012, DCR introduced the Virginia Enhanced Conservation Initiative (VECI) to boost state agricultural cost-sharing programs. VECI included financial and technical assistance for farmers to implement stream exclusion and pastureland conservation practices. Stream exclusion systems prevent livestock from entering nearby waterways and provide a clean water source for

grazing animals. The systems include both stream and/or interior fencing, water troughs, vegetative buffers, wells and pumps. Through June 2015, DCR offered up to 100% reimbursement of the costs for the SL-6 (Stream Exclusion with Grazing Land Management) practice to cost-share applicants. As of December 2018, approximately $95 million had been paid or obligated by SWCDs as part of SL-6's reimbursement efforts. All participant enrollments received since January 2013 (a two and half year period) will be honored as cost-share funds become available. It is anticipated that focus on livestock exclusion from surface waters will result in dramatic reductions in nutrient and bacteriologic contamination. As a result of the funding, over 1,858 stream miles and approximately 119,000 animal units will be excluded statewide.

Resource Management Plan Program – In 2011, the Virginia General Assembly passed House Bill 1830 (Chapter 781 of the 2011 Virginia Acts of Assembly), which allowed for the creation of the Resource Management Plan (RMP) Program. DCR and the Soil and Water Conservation Board worked with representatives from SWCDs, agricultural commodity groups, conservation organizations, and state and federal agencies to develop RMP regulations. The board approved the regulations in 2013 and they became effective July 1, 2014. Information on the regulatory process is available on the DCR website.

The RMP program is a voluntary participation program that promotes the use of conservation practices to increase water quality protection. Each plan is written to include, at a minimum, BMPs that have proved most effective at reducing runoff pollution to local waters, while encouraging farmers to take conservation to the next level. In return for full implementation, the plan holder can be assured that they comply with any new state nutrient, sediment and water quality requirements – in particular, regulations related to the Chesapeake Bay and all local stream segment TMDLs. The certificate of safe harbor is valid for nine years, provided the farmer continues to implement the RMP. Funding for the RMP program comes from state and federal sources. VACS Program funding is available to pay for the development of RMPs. Cost-share funding also is available for most of the BMPs needed to meet RMP requirements and for implementation assistance. In addition to state funds, many plans were developed through U.S. EPA grants.

DCR continues to utilize federal grant monies from the EPA to directly contract with RMP developers in the Chesapeake Bay watershed. These contracts have led to the development of most of the RMPs across the state, amounting to just over $700,000. An additional $120,000 of federal funds has been allocated for the current contracts in the Chesapeake Bay watershed through May 2019. While plan development is still included in the current contract, emphasis has shifted to certifying implementation of plans. This year's contracts are anticipated to result in more than 32,000 acres certified and 3,544 acres included in new RMP plans. It is anticipated that another $120,000 will be available in program year 2020 for additional certification and plan development projects.

DCR provides operational support payments to SWCDs for duties associated with RMP review; however, there is also an impact to district workloads related to RMP inspections. In recognition of this impact, DCR has provided supplemental operational support payments to SWCDs for RMP certification inspections. As of August 31, 2018, more than $71,000 in additional operational support has been provided for work performed in the Chesapeake Bay watershed.

Forestry

The Virginia Department of Forestry (VDOF) is tasked under VAC10.1-1105 with the "...prevention of erosion and sedimentation, and maintenance of buffers for water quality…" The Department's water quality/buffer responsibilities, experience and initiatives include promoting and enforcing the Virginia

Silvicultural water quality law; developing forestry BMPs that are the standard for forest harvesting operations; and providing forestry technical assistance to USDA conservation agencies, SWCDs and private landowners on the design, installation and management of forest buffers.

Timber Harvest Inspection Program – The backbone for VDOF's water quality effort is the harvest inspection program, which began in the mid-1980s. The program has provided one-on-one contact between VDOF and the harvest operators, and has proven a welcomed opportunity to educate the operators on BMPs and the latest in water quality protection techniques. Since WIP II, VDOF field personnel have inspected 14,443 timber harvest sites across 581,806 acres of the Virginia Chesapeake Bay watershed. Of these harvested acres, 93%, or 538,775 acres, were under forestry BMPs. Over the past two years, the BMP implementation rate within the Bay watershed was 94.7% and 96.6%, respectively. The WIP II goal of 90% BMP implementation by 2017 and 95% implementation by 2025 have already been met and the goal for the future is to maintain a 95% BMP implementation rate.

Logger Education – Another focus of the VDOF water quality program is logger education. Since the development of the first Forestry BMP Manual for Virginia, VDOF has been involved in the training of harvesting contractors in water quality protection techniques, ranging from harvest planning, map reading and the use of GPS units to BMP implementation. This occurred through training that the agency sponsored and, more recently, through VDOF participation in the SFI® (Sustainable Forestry Initiative) SHARP (Sustainable Harvesting and Resource Professional) Logger Training Program. Since 1997, this program has enabled VDOF to assist in training 9,272 harvesting professionals in 304 programs relating to water quality protection. Since 2012, there have been 89 logger training programs offered with 2,465 participants.

Silviculture Water Quality BMP Program – This program already exceeds the WIP II goal of 90% BMP implementation by 2017 and 95% implementation by 2025. In 2018, Virginia reached 95% compliance statewide and 96.8%compliance Bay wide. One hundred percent of the 240 sites surveyed had no active sedimentation. The goal is to maintain a 95% BMP implementation rate in future years.

Silvicultural Water Quality Enforcement – In July 1993, the General Assembly of Virginia – with the support of the forest industry – enacted the Virginia Silvicultural Water Quality Law, §10-1-1181.1 through §10.1-1181.7. The law grants the authority to the State Forester to assess civil penalties to those owners and operators who fail to protect water quality on their forestry operations. This law allows the VDOF inspector to require corrective measures to prevent sediment from entering the waters of the Commonwealth as the result of improper forestry practices. It works though the Administrative Processes Act and allows the State Forester to assess civil penalties of up to $5,000 per day of violation and to issue Stop Work Orders if necessary to prevent pollution. Virginia continues to be the only state in the southeastern U.S. that grants enforcement authority to the state's forestry agency. Since 2012, the VDOF was involved with 928 water quality actions initiated under the Silvicultural Law within the Chesapeake Bay watershed. Of these actions, less than 1% resulted in Special Orders being issued for violations of the law; all other issues were corrected through informal conference or civil action. Cooperative enforcement of laws impacting the Chesapeake Bay watershed is shared between localities and VDOF.

Riparian Forest Buffer and Afforestation Programs – Working with our partners at Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), DCR and the SWCDs, VDOF provides technical assistance and forest tree seedlings for all riparian forest buffer installation projects as well as overseeing installation of forest trees for all afforestation projects. The agency also follows-up after establishment to ensure that the young seedlings are growing well, free of competition and thriving.

Specific focus areas include riparian forest buffer establishment along streams and associated lands, tree planting on urban/suburban land associated with riparian lands, and BMPs to mitigate concentrated flow to streams. Expanded private/public collaborative efforts funded by grants from the Virginia Environmental Endowment (VEE) and the National Fish and Wildlife Foundation (NFWF) are now underway in the James River and the Potomac/Shenandoah watersheds to establish riparian forest buffers and forests on suitable lands with owners that have been difficult to reach through existing programs. The initiatives will use traditional and new methods for implementing conservation projects. Examples include more emphasis on natural regeneration, higher dependence trees that grow quickly, utilization of forestry BMPs to address concentrated flow issues, and deployment of multi-use riparian buffers that meet both state water quality and landowner economic objectives.

VDOF also operates a tax credit program for landowners that actively manage their timber and retain riparian buffers. The Riparian Buffer Tax Credit program offers a tax credit 25% of the value of the timber that is retained as a buffer during a timber harvest. The buffer must remain in place for 15 years by the landowner or be required to pay back the credit to the Commonwealth.

Urban and Community Forestry Program – Community forests provide multiple benefits to Virginia's cities and towns. The Urban and Community Forestry Program helps Virginia communities maintain and enhance their community forests, and raise citizen awareness of the multiple benefits these forests provide: clean air, clean water, storm water management, community revitalization, community health and wellbeing, business district enhancement, aesthetics and contact with nature. The Program provides project coordination and networking, technical assistance, educational opportunities, professional development, academic program support and grants for specific projects. To date, VDOF has collaborated with 112 non-profit organizations and educational institutions, PDCs and SWCDs in 129 cities and towns, 57 counties and 10 military bases to support projects. The program is supported by funds from the USDA Forest Service, the Virginia Trees for Clean Water (VTCW) grant program, the USFS Chesapeake Watershed Forestry Program, and DCR's Water Quality Improvement Funds.

VDOF has also developed the Virginia Trees for Clean Water program that is designed to improve water quality across the Commonwealth through on-the-ground efforts to plant trees where they are needed most. Projects include tree planting activities of all types: riparian buffer tree planting, community and neighborhood tree plantings, etc. The goal is to encourage local government and citizen involvement in creating and supporting long-term and sustained canopy cover. 146 projects have been funded to-date, resulting in 49,657 trees being planted, and over 17,837 volunteer hours logged across the Commonwealth.

Forest Land Conservation – The VDOF Conservation Easement Program enables forest landowners to make certain their lands are available for forest management in perpetuity, with a focus on forests that provide the greatest range of natural functions and values. Since larger blocks of working forest provide the greatest range of benefits, VDOF conservation easements emphasize keeping the forest land base intact and undivided, enabling landowners to manage their forestland for timber products and environmental values. In fiscal year 2018, VDOF permanently protected 8,395 acres of open space and nearly 49 miles of water courses through 24 conservation easements. The agency now holds 170 easements in 57 counties and the City of Suffolk, covering 52,180 acres. These conserve more than 47,000 acres of the working forest land base while helping maintain viewsheds from state designated scenic rivers, thoroughfares and rural communities, and preserve habitat for rare species and natural communities. Many are also directly adjacent to and provide effective buffers for federal and state public lands and other conserved lands.

Working Forests – Forests are considered to be dynamic ecosystems that contribute significant value in the lives of Virginians. Forests contribute to clean water, air, renewable energy, forest products, wildlife habitat, soil retention and our local economies. Manipulation of the forest through harvesting or other types of silvicultural practice mimics natural processes enhancing forest benefits and contributing forest products options for landowners. The VDOF believes in the value of working healthy forests across landscapes and assists forestland owners of all sizes to ensure their success. This only occurs through proper planning and an active management regime. In an effort to assist landowners with active management, the VDOF offers a multitude of plans and services. Forest Stewardship plans, stand plans, pre-harvest plans and land use plans can all assist landowners with achieving their goals and improving water quality.

Residential

Golf Course Management – Nutrient management is a practice that entails the optimized application of commercial and organic fertilizers to support healthy plant growth while also protecting water quality. When fertilizers or other nutrient sources are applied to the land properly, there is a reduced risk for pollution of surface and ground waters.

DCR's Urban Nutrient Management Program certifies qualified individuals to write Turf and Landscape Nutrient Management Plans for a variety of clients, including golf courses. These plans contain recommendations to manage the amount, timing, placement and rate of application of nutrients as prescribed by soil testing and the type of plants being grown. Each planned acre will count towards meeting Virginia's water quality goals.

Pursuant to§ 10.1-104.5 of the Code of Virginia, by July 1, 2017, all golf courses were required to have a DCR-approved nutrient management plan if they are applying fertilizer. At least 99% of the 326 golf courses in the Commonwealth either have obtained a nutrient management plan, or are currently contracted with a nutrient management planner to finalize their plan. As of July 2018, there are more than 28,000 acres of golf course land under nutrient management. Many golf courses were able to obtain their plans at a reduced cost through a DCR grant program.

DCR would like to acknowledge the initiative taken by members of the golf turf industry to meet the highest environmental protection standards. In addition to the certified planners, superintendents and golf course managers, DCR also recognizes the supporting efforts of Virginia Tech, Virginia Cooperative Extension, the Virginia Golf Course Superintendents Association, the Virginia Turfgrass Council, Virginia Agribusiness Council and the national Golf Course Superintendents Association of America. Success was made possible by all parties involved demonstrating their commitment to protect the environment through sound nutrient management practices.

Lawn Fertilizer Legislation – The Virginia General Assembly adopted legislation in 2011 (Code of Virginia § 3.2-3602, § 3.2-3607, and § 3.2-3611) to prohibit the sale, distribution, and use of lawn maintenance fertilizer containing phosphorus beginning December 31, 2013. It also prohibited the sale of any deicing agent containing urea, nitrogen, or phosphorus intended for application on parking lots, roadways, sidewalks, or other paved surfaces. The legislation required the Board of Agriculture and Consumer Services to establish reporting requirements for contractor-applicators and licensees who apply lawn fertilizer to more than 100 acres of nonagricultural lands annually. The reporting requirements include the total acreage or square footage and the location of where the fertilizer is applied. The legislation also required VDACS to produce a report concerning the use of slowly available nitrogen in lawn fertilizer and lawn maintenance fertilizer. A nitrogen report led to the passage of House Bill 1210

during the 2012 session of the General Assembly. The legislation included an amendment requiring that any lawn maintenance fertilizer offered for sale, distribution, or use after July 1, 2014, would result in the application of nitrogen at rates consistent with the nitrogen application rates recommended for turfgrass in the Virginia Nutrient Management Standards and Criteria (when applied in accordance with the product's directions for use).

Certified Fertilizer Applicator Program – Regulations for the Application of Fertilizer to Nonagricultural Lands (2 VAC 5-405) became effective in 2011 and resulted in VDACS's establishment of the Certified Fertilizer Applicator (CFA) program. An estimated 2,700 individuals who apply fertilizer to non-agricultural lands in Virginia are certified by VDACS as CFAs. Individuals can become certified through in-person participation in fertilizer application courses or the online course developed by Virginia Cooperative Extension. The Fertilizer Applicator Certification Training is a cooperative effort of Virginia Cooperative Extension, VDACS and DCR. Courses must provide training on proper nutrient management practices in accordance with Va. Code § 10.1-104.2, including soil analysis techniques, equipment calibration, and timing of applications. The list of current CFAs can be found on the VDACS website. In addition, fertilizer applicators are required to report annually, by zip code, the acreage or square footage of nonagricultural lands receiving fertilizer. VDACS maintains this report for the previous three years on the agency's website. The general trend of acreage/square footage reported to have received fertilizer has increased. This is likely not an indication of increased fertilizer applications but rather an improvement in awareness and participation by those applying fertilizer to nonagricultural lands.

Annual Survey of Deicing Agent Use – VDACS conducts annual surveys to ensure compliance with the legislative changes relative to the use of deicing agents. VDACS has prevented the use of approximately 768 tons of deicing products containing urea, other forms of nitrogen, or phosphorus through the issuance of stop sale notices for 218 tons of deicing products and the diversion of another 550 tons scheduled for shipment to Virginia. The annual surveys have shown a significant reduction in the use of urea or phosphorus in deicing agents in Virginia. The survey conducted in the winter of 2017-18 resulted in stop sale of approximately seven tons.

Septic

VDH regulates the design and construction of onsite sewage systems and private wells in the Commonwealth. The program aims to improve population health by enabling adequate sewage disposal systems for Virginians. The program also strives to improve the health of Virginia's waterways and the Chesapeake Bay by reducing the nitrogen input from these systems. To achieve the TMDL, VDH has driven legislative, regulatory and policy changes aimed at reducing nitrogen loading to the watershed.

Onsite Sewage Systems – In December 2013, changes to VDH regulations (12VAC5-613-90.D) affected all new installations of small and large alternative onsite sewage systems (AOSS) in the Chesapeake Bay Watershed. The regulations now require that small AOSS with an average daily flow of less than 1,000 gallons meet 50% nitrogen reduction, as compared to a conventional onsite sewage system (COSS). This equates to delivering, at most, a total nitrogen (TN) load of 4.5 pounds per person per year at the edge of the property. Large AOSS between 1,000-10,000 gallons per day (GPD) average daily flow have to reduce their load to at least the same amount as the small AOSS. Additionally, large AOSS with more than 10,000 GPD average daily flow must reduce nitrogen loading by about 90% relative to a COSS.

In 2017, VDH addressed an issue involving repairs of onsite sewage systems that resulted in direct dispersal of effluent to ground water. Homeowners were often unable to meet the stringent effluent quality (including TN concentration of less than 3 mg/l) and sampling requirements due to excessive

financial burden. To avoid these costs, owners requested treatment waivers that allowed them to discharge septic tank effluent into ground water. More than 30 owners sought and received variances to install advanced treatment systems that exceeded septic effluent standards but did not meet the stringent performance and operation requirements for direct dispersal.

In response, VDH fast-tracked regulatory changes (12VAC5-613-90.E) to allow for repairs of these systems to meet 10 mg/l five-day biological oxygen demand and total suspended solid concentration, 50% total nitrogen reduction as compared to a conventional onsite system, ultra-violet disinfection, and pressure dispersal. Although the requirements are less stringent, they allow homeowners to install systems with some level of nitrogen reduction instead of requesting treatment waivers and installing systems without any TN reduction.

In 2018, VDH approved Guidance, Memorandum and Policy (GMP) 2018-01 for the enforcement of AOSS regulations. The GMP provides support for how local health districts enforce the AOSS regulations through civil and criminal penalty avenues. The AOSS regulations state that most AOSS homeowners will need to have their system inspected by a licensed operator each year and submit an accompanying report. Owners who fail to do so are in violation of the AOSS regulations. The inspection and report are used to ensure that the system is in proper working order and to verify the BMP in accordance with Virginia's BMP Verification Plan.

VDH continues to seek sources of funding for Virginians to upgrade and repair failing septic systems. In 2012, VDH received a $750,000 grant from NFWF to help upgrade onsite systems, repair failing systems, and connect homes to sewers. The grant, administered as a cost share program, resulted in 44 new AOSS and four new sewer connections. In October 2018, VDH received a $300,000 award from a Virginia Environmental Endowment grant, with an additional $200,000 match from the Smithfield Foundation. This grant will be administered over two years to help with onsite repairs and upgrades in certain localities in the lower James River watershed.

Although the nitrogen load from the onsite sector continues to rise with new construction in unsewered areas, VDH remains committed to minimizing the impact of these systems to protect public health and water quality.

To address local bacteria impairments, DEQ works regularly with VDH, organizations and localities across Virginia to fund projects that correct failing septic systems or straight-pipes. For example, during FY2017, DEQ provided funding to pump out septic systems, repair or replace failing septic systems, or remove straight pipes from at least 651 homes using $833,144 from grant funding sources and landowner contributions. Continuing implementation of septic BMPs to address local impairments within the Chesapeake Bay watershed will contribute to improvements not only of local water quality but also of the Bay itself.

Stormwater

As rainwater and/or snow melt run off our streets, roofs and parking lots, it can cause erosion and pick up pollution and trash, flushing it into our local waters and, eventually, into the Chesapeake Bay. In fact, polluted stormwater runoff is the main source of impairment to local streams in many urbanized areas. Stormwater can also contribute to local flooding concerns.

Virginia Stormwater Management Program (VSMP, Va. Code § 62.1-44.15:24 et seq.) – Virginia has implemented a number of programs and regulations that help reduce the impacts of new development and

help track stormwater impacts as part of its commitment to restore the Bay. Prior to 2005, post-development stormwater controls were required for development in urbanized areas, development in Chesapeake Bay Preservation Act (Va. Code § 62.1-44.15:67 et seq.) areas and state projects. Since 2005, all regulated land-disturbing activities, regardless of location within the state, have been required to comply with the Commonwealth's post-development stormwater management requirements. In May 2011, the VSMP regulation (9VAC25-870-10 et seq.) was revised to adopt new scientifically-based requirements to protect local receiving streams with an implementation date of July 1, 2014. Through the 2011 regulation revisions, Virginia dedicated itself to achieving no net increase in nutrients from new development, a feat made more remarkable by Virginia's growing population and developed areas. The VSMP now requires greater reductions of runoff pollutant loadings (where phosphorus is the keystone pollutant) from new development and redevelopment than previously established.

The VSMP regulation requires the use of the Virginia Runoff Reduction Method (VRRM) for compliance with the Commonwealth's post-development water quality criteria. The VRRM accounts for runoff from various land covers and provides built-in incentives to preserve or restore forest cover and hydrologically functional open space. The VRRM also incentivizes the minimization of disturbed soils and the reduction of post-development impervious cover. Implementation of these measures results in decreased post-development runoff pollutant loadings thereby reducing the overall number of structural best management practices that may be required for development or redevelopment projects.

The VSMP regulation prescribes the use of the one-year, two-year, and 10-year 24-hour storms using site-specific rainfall precipitation estimates provided by the U.S. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for compliance with the Commonwealth's post-development water quantity criteria. At this time, NOAA continues to investigate the added value of rainfall precipitation estimates developed using approaches capable of accounting for future climate projections. NOAA has developed a modeling framework that allows climate effects to be integrated into their Atlas 14 process and is currently testing the feasibility of incorporating future climate projections into their rainfall precipitation estimates. Once fully integrated into the Atlas 14 process, the VSMP will be even better positioned to account for future climate projections when designing and constructing stormwater BMPs.

Virginia Erosion and Sediment Control Program (VESCP, Va. Code § 62.1-44.15:51 et seq.) – Virginia continues to successfully implement its long standing erosion and sediment control program to minimize sediment laden stormwater runoff during construction (i.e., during active land disturbance). Prior to commencing land-disturbing activities, the project owner or their designee must prepare an erosion and sediment control plan that complies with regulations 9VAC25-840-10 et seq. The owner must then implement the erosion and sediment control plan until such time that final stabilization is achieved for the project.

Virginia Pollutant Discharge Elimination System (VPDES) Construction General Permit – Virginia successfully reissued the General VPDES Permit for Discharges of Stormwater from Construction Activities (9VAC25-880-70) with an effective date of July 1, 2019. The permit requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must include an erosion and sediment control plan that complies with the ESC regulations, a post-development stormwater management plan that complies with the VSMP regulation, and a pollution prevention plan that complies with the VSMP regulations. The permit also includes additional control measures to be implemented during construction for projects located within the Bay watershed.

Municipal Separate Storm Sewer System (MS4) Permits –Virginia successfully cleared the 2011 backlog of expired Phase I MS4 permits (medium and large cities or certain counties with populations of 100,000

or more) and will only have one administratively continued Phase I MS4 permit (Arlington County) as of August 2019. The Phase II MS4 general permit was also reissued with an effective date of November 1, 2018. A list of current MS4 permittees is available on DEQ's website.

Virginia has committed to achieving nutrient and sediment reductions from the MS4 sector equivalent to the Level 2 (L2) scoping run performed in support of the TMDL[1]. These reductions will be achieved over three permit cycles – 5% of L2 in the first permit cycle, 35% of L2 in the second permit cycle and 60% of L2 in the third permit cycle. Tracking nutrient and sediment reduction progress among the MS4 permittees is an ongoing effort. Information submitted to date for the Phase II general permits in the watershed has established that the aggregate progress is significantly ahead of 5% of L2 required by the first permit term. In aggregate, the Phase II MS4s reviewed have achieved 40% of L2 TN reductions, 88% of L2 total phosphorus (TP) reductions and 69% of L2 sediment reductions.

The third cycle for the Phase II MS4 general permit should be completed as of November 2028. The third cycle of the final Phase I MS4 individual permits should be completed by June 2031. Regardless of the final MS4 permit completion date, progress to date is proceeding ahead of permit requirements and any reduction shortfall for the MS4 sector as of 2025 will be made up by over performance by the wastewater sector. Chesapeake Assessment Scenario Tool (CAST) modeling indicates that Virginia's remaining urban sector reduction goals (beyond 2018 progress) are approximately 1.3 million pounds of TN and 182,000 pounds of TP. These values include both regulated and unregulated urban sectors. These reductions compare favorably to the 6 million pounds of additional TN reductions and 640,000 pounds of additional TP reductions currently produced on average by the wastewater sector. The additional reductions are expected to continue for the foreseeable future as outlined in Initiative #48 in Chapter 7.

Financing of urban reductions has been partially achieved through the Virginia Stormwater Local Assistance Fund (SLAF). Under § 62.1-44.19:21.A of the Code of Virginia, MS4s are also able to take advantage of point source and nonpoint source trading programs to achieve their nutrient and sediment reduction goals. Trading activity is expected to increase in the future as incremental reductions in urban sector nutrient and sediment loads become more challenging to achieve and urban retrofits are phased in over time.

Wastewater

VPDES Watershed General Permit – Virginia has implemented one of the most successful point source trading programs in the nation to achieve significant nutrient reductions from the wastewater sector. The General Permit for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia (9VAC25-820-70) was originally issued with an effective date of January 1, 2007. The permit included a four-year schedule of compliance requiring 120 "significant" wastewater treatment plants to achieve aggregate nutrient reductions necessary to meet the goals of the Tributary Strategies. The general permit includes monitoring and reporting requirements and allows wastewater facilities to trade within five distinct basins (Potomac, Rappahannock, York, James, and Eastern Shore) to meet their nutrient reduction goals. The general permit also requires that new or

[1] L2 implementation equates to an average reduction of 9% of nitrogen loads, 16% of phosphorus loads and 20% of sediment loads beyond 2009 progress loads from impervious regulated acres. From pervious regulated acreage, L2 calls for an average reduction of 6% of nitrogen loads, 7.25% of phosphorus loads and 8.75% of sediment loads beyond 2009 progress loads and urban nutrient management reductions.

expanding “nonsignificant” facilities offset any increase in nutrient loads effectively capping the growth of loads from the wastewater sector. By implementing this innovative trading program Virginia became the only state to meet the original Tributary Strategies significant point source nutrient load reductions by 2011.

The permit has been reissued twice since 2007 and with each reissuance it has included additional reductions required by the 2010 TMDL. Under the watershed general permit, point source delivered loads have decreased by 9,934,382 pounds per year of total nitrogen (-50 %) and 437,410 pounds per year of total phosphorus (-38%) since 2010. A listing of existing VPDES individual permits and VPDES general permits are available on DEQ’s website.

Virginia’s trading program also allows for the use of point source credits generated under the watershed general permit to be used to meet the reduction goals of the MS4 sector. This provision allows for MS4 jurisdictions to cost effectively phase in their stormwater reductions over a number of years. The program also allows for the generation of nonpoint source credits that can be used to offset new or expanding point source loads, to meet the reduction goals of the MS4 sector or to offset the impacts of new development or redevelopment under the VSMP. Virginia currently has over 100 nonpoint source nutrient banks within the Chesapeake Bay watershed providing credits to these sectors.

2.2 Nutrient Load Reduction Progress

One of the ways we evaluate our progress in achieving the Chesapeake Bay load reduction goals is by using models of the watershed to estimate the effects of implemented practices. Each year, Virginia, as well as the other Bay jurisdictions, reports information about implemented practices to the EPA, which takes the information and runs it through the Chesapeake Bay Watershed Model. The results estimate the amount of nitrogen, phosphorus and sediment that would make it to the Bay under average conditions. By comparing the model results across a period of time, we can see the expected collective impact of our actions and how close we are getting to our pollution targets. Figure 1 below shows Virginia’s past progress in reducing nitrogen and phosphorus. These model results clearly show significant progress in Virginia’s efforts to reduce nitrogen and phosphorus.

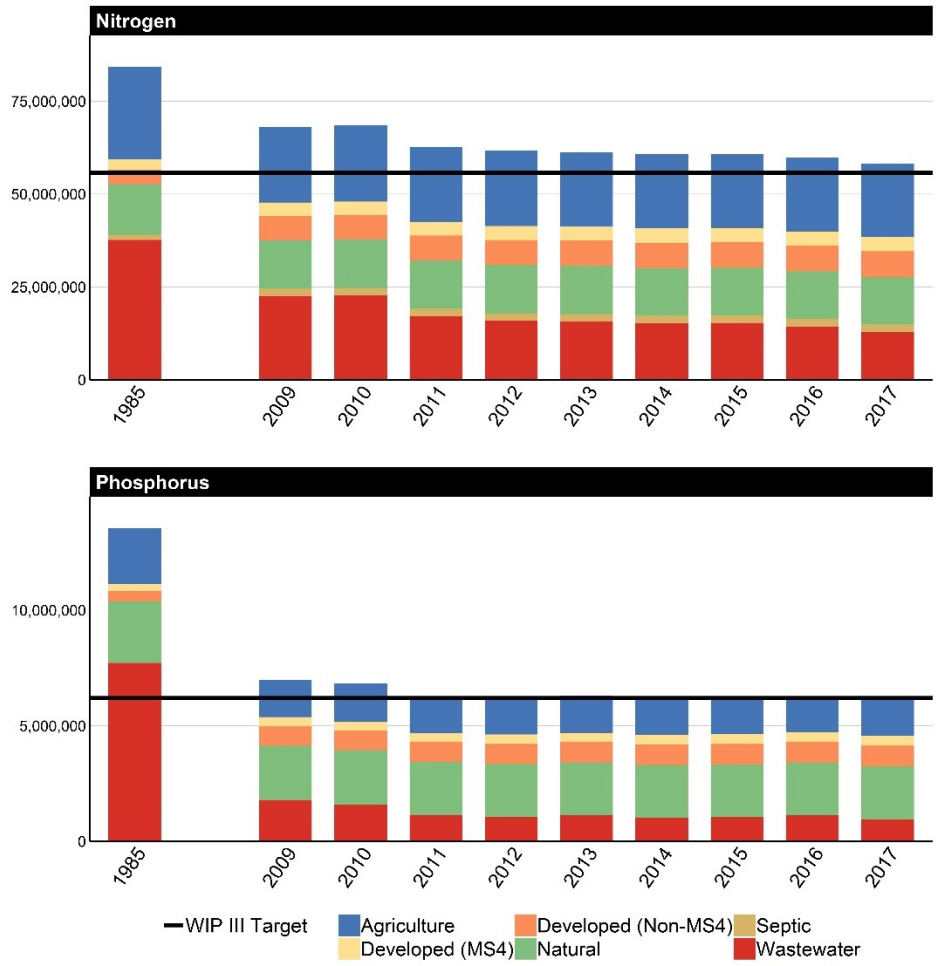

Figure 2: Nitrogen and Phosphorus Load Progress (Phase 6 Watershed Model, Edge of Tide)

Using this data along with other lines of evidence, EPA assesses each Bay jurisdiction's progress every two years. The two-year period ending in 2017 was referred to as the Midpoint Assessment because it represented the midpoint of our Bay TMDL implementation period (2009-2025). The Chesapeake Bay Partnership set a goal that they would have practices in place to achieve 60% of the required reductions by the 2017 Midpoint Assessment. EPA's Midpoint Assessment reports for each jurisdiction are available for review on the EPA Chesapeake Bay TMDL website. Virginia's Midpoint Assessment Evaluation stated, "According to the data provided by Virginia for the 2017 progress run, Virginia achieved its statewide 2017 targets for nitrogen and phosphorus, but did not achieve its statewide target for sediment. Virginia achieved its 2017 targets for all pollutants in all major basins except for nitrogen in the Rappahannock and for sediment in the James and the Rappahannock."

Another way to evaluate our efforts is to use the network of water quality monitoring stations that is in place throughout the Chesapeake Bay watershed. Figure 2 shows the network of water quality monitoring stations in Virginia that collect the necessary measurements and have a sufficient record of data to be useful for evaluating our efforts.

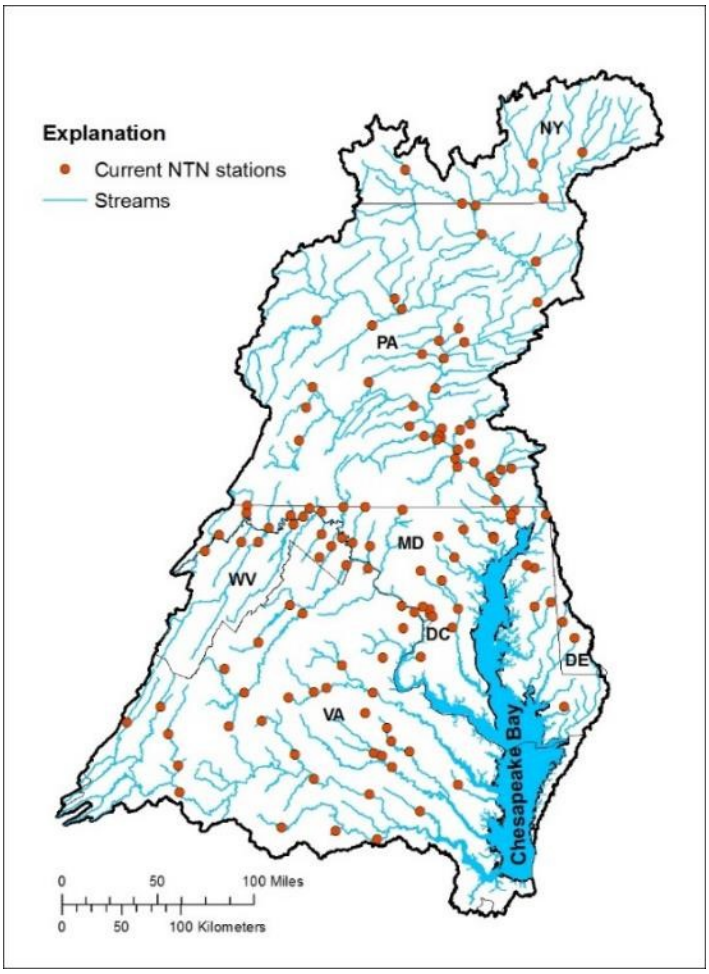

Figure 3: Chesapeake Bay Monitoring Network

The United States Geological Survey (USGS), in partnership with the Chesapeake Bay Program watershed water-quality monitoring partnership, uses the continuous streamflow monitoring and extensive water-quality sampling from this network, along with advanced statistical analysis, to produce loads and trends information for each monitoring station. This information can help scientists and managers assess water-quality conditions as well as long-term and short-term trends. These products are accessible on the USGS website. It is important to note that the management practices implemented on the landscape are just one of many variables that can influence the amount of nitrogen and phosphorus reaching the streams in the watershed and the Bay. Changing land use, groundwater lag times and extreme weather events along with large stores of nitrogen in the groundwater and phosphorus in soils can often mask the benefits of management practices and associated water quality improvements when using stream monitoring results.

There is also a network of approximately 100 monitoring sites in the tidal estuary of the Bay. Trends are assessed for short-term and long-term periods at each of these sites for surface and bottom waters for nitrogen, phosphorus, sediment, water temperature, salinity and dissolved oxygen. The most recent long-term trends for bottom nitrogen are shown in Figure 3 below. Additional trend maps are available on the Bay Program Integrated Trends Analysis Team website. They are also being incorporated as interactive maps into the Bay Watershed Implementation Plan Data Dashboard on the Tidal Water Quality tab.

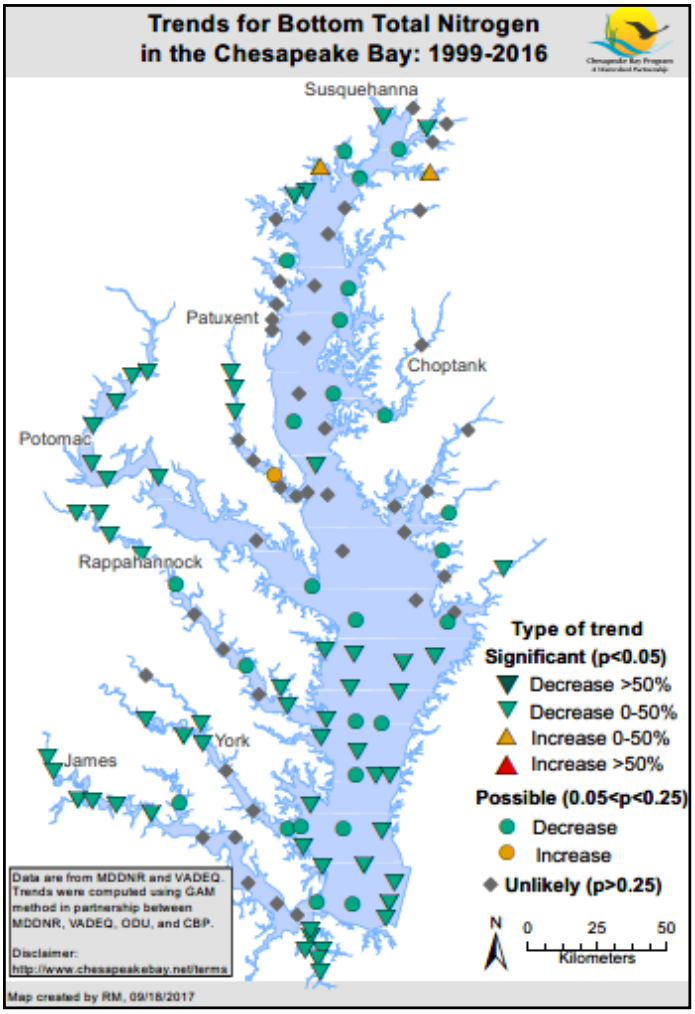

Figure 3: Long-term Trends Map – Bottom Total Nitrogen

2.3 Bay/River Report Cards

Many organizations provide "report cards" on the status of the quality of Bay waters and/or Virginia rivers and living resources. A few examples are provided here.

Chesapeake Bay Foundation 2018 State of the Bay Report

The Chesapeake Bay Foundation's 2018 State of the Bay report assigned a score of 33 (D+) for the health of the Bay in its most recent biennial report card. The score reflects a one-point reduction from 2016; this is the first noted decline in score since 2007. The drop indicates the impact of increased pollution (nitrogen and phosphorus) and poor water clarity due to record rainfall observed throughout the watershed. Data for underwater grasses, dissolved oxygen and resource lands reflected improvement and several other indicators remained unchanged.

James River Association 2017 State of the James Report

The James River Association (JRA) assigned the health of the James River a B- grade in its 2017 State of the James report. According to JRA, "the overall score for the river rose to 62%, which represents an increase of 10 points since the report was first published in 2007 and three points over the past two years." The State of the James is a biennial report that examines the status and trends of nineteen indicators in four indicator categories – Fish and Wildlife, Habitat, Pollution Reductions and Protection and Restoration Actions. Fourteen indicators showed improvement while three remained the same and two declined. Declining grades were designated for underwater grasses and American shad.

University of Maryland Center for Environmental Science 2018 Chesapeake Bay Report Card

In the 2018 Chesapeake Bay Report Card, researchers from the University of Maryland Center for Environmental Science (UMCES) scored the health of the Chesapeake Bay with a C grade (47%). The 2018 report card reflects a slight decline from the previous year despite the overall grade remaining the same. According to UMCES, high rainfall negatively influenced almost of all of the Bay health indicators however, "the overall Bay-wide trend is improving."

Virginia's 2018 Draft 305(b)/303(d) Water Quality Assessment Integrated Report

The Virginia Department of Environmental Quality (DEQ) released the Draft 2018 305(b)/303(d) Water Quality Assessment Integrated Report (Integrated Report) on January 22, 2019. The 2018 Integrated Report is a summary of the water quality conditions in Virginia from January 1, 2011, through December 31, 2016. This biennial report satisfies the requirements of the U.S. Clean Water Act sections 305(b) and 303(d) and the Virginia Water Quality Monitoring, Information and Restoration Act. The goals of Virginia's water quality assessment program are to determine whether waters meet water quality standards, and to establish a schedule to restore waters with impaired water quality.

The 2018 draft Integrated Report for Virginia indicates, "that several Chesapeake Bay segments that were previously listed as impaired for the 30-day mean dissolved oxygen criterion are now meeting (for Open Water subuse). These segments include CB5MH and CB6MH in the mainstem of the Bay as well as the oligohaline portion of the Potomac embayments (POTOH)."

Other notable Bay water quality restoration progress includes:

- The Southern Branch of the Elizabeth River is now attaining the 30-Day mean dissolved oxygen criterion for the Deep Water sub-use
- The 2018 Integrated Report will be the first time we can report over half (55%) of the overall sum of segment-specific SAV acreage goals was achieved
- The chlorophyll standards were fully attained in each James River segment during the spring months

2.4 Living Marine Resource Response

Figure 4: Rappahannock River Shad Run by Edward Episcopo (Courtesy of Scenic Virginia)

The Chesapeake Bay Program uses data from across the watershed to develop the State of the Chesapeake, a web-based resource highlighting the current state of habitats, wildlife and environmental threats in the Chesapeake. The following is a brief update of living marine resources:

- Submerged Aquatic Vegetation – Approximately 91,559 acres of underwater grasses in the Chesapeake Bay were mapped in 2018. According to the Virginia Institute of Marine Science (VIMS), the entire Bay was not fully mapped in 2018 "due to prolonged turbidity, weather conditions and security restrictions." The Bay may have supported 108,960 acres of submerged aquatic vegetation in 2018 if using the 2017-recorded levels for unmapped areas.
- Oysters – As of January 2018, Virginia restored 480 acres of oyster reefs and 66 acres are slated for restoration in the Lafayette and Lynnhaven rivers. The Great Wicomico, Lower York and Piankatank restoration targets are under development. In addition to contributing greatly to the overall health of the Chesapeake Bay, shellfish aquaculture thrives with improved water quality conditions and is a significant economic driver. As indicated in the July 2018 Virginia Shellfish Aquaculture Situation and Outlook Report published by VIMS, the 2017 farm gate value for Virginia shellfish aquaculture was $53.4 million. Virginia is first in the U.S. for hard clam production and first on the East Coast of the U.S. for oyster production.

- Blue Crabs – The Chesapeake Bay blue crab population was approximately 594 million in 2019 reflecting an almost 60% increase from 2018.
- Striped Bass – Scientists measured 1,998 juvenile striped bass in Virginia tributaries of the Chesapeake Bay during their 2017 assessment of juvenile striped bass. However, preliminary results from the 2018 benchmark stock assessment study presented to the Atlantic States Marine Fisheries Commission in February 2019 reflects declining female spawning striped bass populations, suggesting the stock is overfished.

2.5 State Investments (costs expended) in Bay Restoration

The following section provides a brief summary of state investments in implementation of BMPs. In most cases, state funds must be matched, often by farmers, landowners, local governments and wastewater treatment facilities.

Agriculture

State investments in agricultural BMPs by the Commonwealth in the Bay watershed totaled about $289.9 million since 1988. This includes $171.6 million through the Virginia Agricultural Cost-Share Program and an additional $11.6 million through the Agricultural Tax Credit Program. The state contributions to the federal Conservation Reserve Enhancement Program totaled an additional $7 million. Farmers most often match these funds.

Stormwater

Since its inception in 2013, the Stormwater Local Assistance Fund has provided $100 million in matching grants to local governments for the planning, design and implementation of stormwater BMPs that address cost efficiency and commitments related to reducing pollutant loads to the state's surface waters. An additional $100 million in BMP investments from local governments matches these funds.

Wastewater

The Water Quality Improvement Fund (WQIF) point source grants provide critical support for compliance with the nutrient discharge control regulations and achieving Chesapeake Bay nitrogen and phosphorus waste load allocations through design and installation of nutrient reduction technology at Bay watershed point source discharges. To date, nearly $800 million in state grants have been awarded with local matching funds ranging from 10% to 65%.

Chesapeake Bay Restoration Spending Estimate (Federal FY 2016 – FY 2019)

According to the United States Office of Management and Budget, it is estimated that more than $1 billion has been expended in Virginia for Chesapeake Bay restoration activities from FY2016 through FY2019. This estimate includes state funds as well as federal funds. For a comprehensive overview of Chesapeake Bay funding, refer to the FY2018 Chesapeake Bay Accountability and Recovery Act Report to Congress.

Financing of urban reductions has been partially achieved through the Virginia Stormwater Local Assistance Fund (SLAF). Under § 62.1-44.19:21.A of the Code of Virginia, MS4s are also able to take advantage of point source and nonpoint source trading programs to achieve their nutrient and sediment

reduction goals. Trading activity by MS4s to date has been very limited as MS4s have achieved required reductions through the implementation of onsite BMPs. Trading activity by MS4s is expected to increase in the future as incremental reductions in urban sector nutrient and sediment loads become more challenging to achieve and urban retrofits are phased in over time.

CHAPTER 3. VIRGINIA'S GOALS FOR THE PHASE III WIP

Figure 1: Chesapeake Bay Bridge Tunnel (Courtesy of Virginia Tourism)

3.1 EPA Expectations

In June 2018, EPA provided their final expectations for the Phase III WIP to the seven Chesapeake Bay watershed jurisdictions, followed by their expectations for federal agency participation in August 2018. The full text of the documents are accessible via the following web links:

- EPA Phase III WIP Expectations Fact Sheet
- EPA Phase III WIP Expectations
- EPA Phase III WIP Expectations for Federal Lands and Facilities

As described in EPA's press release, "The expectations are built upon decisions made by the Chesapeake Bay Program partnership, which includes the EPA as well as the seven Bay jurisdictions, and addresses how to account for changing conditions due to the Conowingo Dam, climate, and growth."

According to the document, jurisdictions should:

- Further optimize their choices of pollutant reduction practices.
- Incorporate lessons learned and new science and information from the midpoint assessment.
- Develop comprehensive local and federal engagement strategies so their contributions are clearly articulated.
- Ensure new and increased pollutant loads are offset.
- Build and sustain the necessary capacity needed to achieve their Phase III WIP commitments by 2025.

The expectations for the Phase III WIPs and the chapters for Virginia's Final Phase III WIP that generally address these expectations are as follows:

- Engage local partners in local planning goal development and implementation (Chapter 5).
- Develop comprehensive local, regional and federal engagement strategies and commitments (Chapter 6).
- Specify the programmatic and numeric commitments needed to achieve the Phase III WIP planning targets by 2025 (Chapters 7 and 8).
- Account for changes due to climate change (Chapter 4) and growth (Chapter 5).
- Consider adjustments of state-basin targets and Phase II WIP source sector goals (Chapter 8).
- Target implementation at the Bay segment-shed scale (Chapter 10).

3.2 State-Basin Planning Targets and Local Engagement

In July 2018, the EPA issued State-Basin Planning Targets (Chapter 5) for nitrogen and phosphorus. These targets cumulatively represent the assimilative capacity of the Chesapeake Bay to meet the dissolved oxygen water quality criteria. These target loads represent caps that need to be achieved and maintained through time. For Virginia's Phase III WIP, the state-basin planning targets for the Potomac, Rappahannock, York, and James Rivers, and the Eastern Shore represent our responsibility for meeting the Bay TMDL. In the James River, additional water quality targets must be achieved for chlorophyll-A water quality criteria (Chapter 8.4).

In addition to these targets and expectations, the Commonwealth's goals for the Phase III WIP are to engage local partners in developing a practical plan to improve cost-effectiveness, maximize the potential for co-benefits, and tackle the impacts from climate change. Co-benefits include improvement to living marine resources, restoration and conservation of vital habitats, improving public access and awareness, increasing climate resilience, improving the water quality of local streams and driving economic development.

3.3 Schedule

A timeline of the various steps in developing the Phase III WIP are shown in Figure 2. Virginia developed local area planning goals (Chapter 5) to ensure engagement with local partners (Chapter 6) in identifying on-the-ground BMPs and programmatic actions needed to achieve the Phase III WIP planning targets by 2025. As part of this engagement process, Virginia explicitly asked for consideration of co-benefits, cost-effectiveness and past experience with BMP implementation to gather information about implementation scenarios that reflect local conditions and priorities.

Figure 5: Phase III WIP Development Timeline

3.4 Other Factors

Modeling estimates indicate that the impacts of climate change, including increased precipitation and storm intensity as well as sea level rise, will result in additional loads of nitrogen and phosphorus through 2025. Virginia's plan therefore accounts for that additional load due to climate change (Chapter 4).

The Bay Program Partnership agreed to develop the Phase III WIPs using forecasted 2025 conditions for population, land use, septic systems and agricultural animals. By using these 2025 base conditions as the starting point for Virginia's WIP and designing a plan to meet the state-basin planning targets, we have explicitly accounted for forecasted growth. The Bay Program will continue to update the 2025 base conditions every two years as new information becomes available and Virginia will adaptively manage its implementation process through the two-year milestone process.

In development of the Chesapeake Bay TMDL in 2010, EPA had assumed a steady state condition for the trapping capacity of the Conowingo Dam through 2025. However, recent studies by the U.S. Army Corps of Engineers[2] and the Chesapeake Bay Program (CBP) Partnership[3] have indicated that conditions have changed since 2010 and that an additional reduction of 6 million pounds of nitrogen and 0.26 million pounds of phosphorus will be needed to address the water quality impacts of the Conowingo Dam infill.

The CBP Principals' Staff Committee (PSC) works on behalf of the Executive Council to translate the restoration vision into policy and implementation actions. At the December 2017 PSC, the PSC agreed to assign the total pollutant reductions attributed to the Conowingo Dam Infill to a separate Conowingo Planning Target and collectively develop a separate Conowingo WIP. As such, this plan does not include any actions or commitments to address the additional loads coming from the Conowingo Dam. The PSC has established a Conowingo WIP Steering Committee, consisting of representatives from each jurisdiction and the Chesapeake Bay Commission, to oversee development of the Conowingo WIP. More information regarding the Conowingo WIP can be found on the CBP Conowingo WIP Steering Committee web page.

[2] U.S. Army Corps of Engineers. (2017, March 7). Lower Susquehanna River Watershed Assessment, Maryland and Pennsylvania.
[3] Chesapeake Bay Program Phase 6 Model Analyses

CHAPTER 4. ACCOUNTING FOR THE IMPACTS OF CLIMATE CHANGE

4.1 Overview

Our changing climate has – and will continue to have – an effect on our efforts to meet our Chesapeake Bay restoration goals. Increasing temperatures in Bay waters reduce the water's ability to hold dissolved oxygen and alters the composition of plant and animal species in the ecosystem. More precipitation and greater precipitation intensity increase the potential for nutrient and sediment laden runoff from our landscapes to reach our streams, rivers and the Bay (Figure 1). Sea level rise alters the salinity, circulation and mixing of the Bay's waters, exacerbates the erosion of shorelines and threatens tidal wetlands.

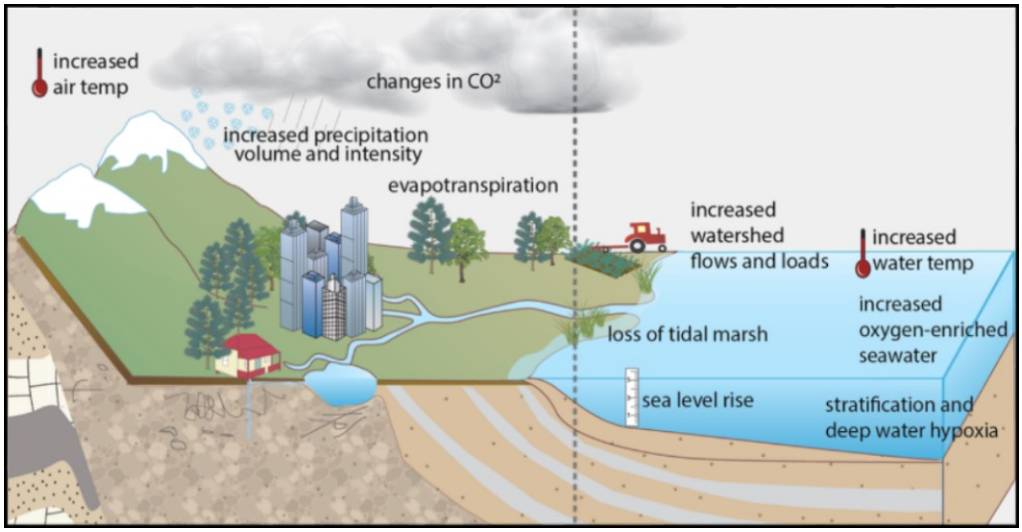

Figure 1: Diagram of future climate risk on Chesapeake Bay watershed and Tidal Bay (Courtesy of CBP)

Recognizing these impacts, the Chesapeake Bay Program PSC agreed to a three-pronged approach for addressing climate change impacts in the Phase III WIPs and future two-year milestones. The approach included the following commitments:

1. **Incorporate Climate Change in the Phase III WIPs** by including a narrative strategy that describes the state and local jurisdictions' current action plans and strategies to address climate change.
2. **Understand the Science** by refining the climate modeling and assessment framework; continue to sharpen the understanding of the science, the impacts of climate change, and any research gaps and needs.
3. **Incorporating Climate Change into Two-year Milestones** by no later than 2022-2023, starting to account for additional nutrient and sediment pollutant loads due to 2025 climate change, determining how climate change will impact the BMPs included in the WIPs and address these vulnerabilities. The PSC also acknowledged that jurisdictions could address additional nutrient and sediment pollutant loads due to 2025 climate change in the Phase III WIPs.

In developing our strategy to address climate change, Virginia has adopted the guiding principles developed and approved by the Chesapeake Bay Program Partnership's Climate Resilience Workgroup:

1. **Capitalize on co-benefits** – Maximize BMP selection to increase climate or coastal resilience, soil health, flood attenuation, habitat restoration, carbon sequestration, or socioeconomic and quality of life benefits.
2. **Account for and integrate planning and consideration of existing stressors** – Consider existing stressors, such as future increase in the amount of paved or impervious area, future population growth and land-use change in establishing reduction targets or selecting/prioritizing BMPs.
3. **Align with existing climate resilience plans and strategies where feasible** – Align with implementation of existing greenhouse gas reduction strategies; coastal/climate adaptation strategies; hazard mitigation plans; floodplain management programs; DoD Installation Natural Resource Management Plans (INRMPs); fisheries/habitat restoration programs, etc.
4. **Manage for risk and plan for uncertainty** – Employ iterative risk management and develop robust and flexible implementation plans to achieve and maintain the established water quality standards in changing, often difficult-to-predict conditions.
5. **Engage federal and local agencies and leaders** – Work cooperatively with agencies, elected officials and staff at the local level to provide the best available data on local impacts from climate change and facilitate the modification of existing WIPs to account for these impacts.

A number of tools are available to support sound decision-making related to climate change and resilience:

- Adapt Virginia – A gateway to information on climate adaptation integrating the best available science, legal guidance and planning strategies.
- Resilient BMPs: Planning Tools and Resources – Fact sheet with links to available tools and resources.
- Chesapeake Bay Program, Climate Smart Framework and Decision Support Tool – This report details "Climate Smart" decision-making processes for implementation of goals, strategies and actions.
- Climate Data for the Mid-Atlantic – Portal with gridded climate datasets for the Chesapeake Bay watershed.
- National Climate Assessment – A report on the impact of climate change on the U.S. with regional information.
- Climate Resilience Toolkit – A compilation of tools, resources, data and projections, and case studies.
- BASINS Climate Assessment Tool – Combines GIS, national watershed data and watershed modeling tools to model potential climate change scenarios.
- Tools for Water Related Climate Change Adaptation – A database of climate adaptation tools for communities.
- Coastal Virginia Ecological Value Assessment (VEVA) Tool – A comprehensive GIS-based tool to guide the land use and conservation planning of local governments and planning districts in the Coastal Zone of Virginia.

The modeling estimates indicate that across the Bay watershed an additional 9 million pounds of nitrogen and 0.5 million pounds of phosphorus reductions are needed to offset the effects of climate change by 2025. Virginia's share of that additional load reduction is 1.72 million pounds of nitrogen and 0.19 million pounds of phosphorus. Additional information on the background and basis for these estimates is on the Bay Program's Climate Resiliency Workgroup's website. Additional work is underway by the Bay

Program regarding the load changes resulting from climate change. That work is expected to be completed in 2021. Virginia's Phase III WIP includes sufficient practices and policies that when fully implemented account for these additional load reductions. Planning for these reductions now will give Virginia a longer window to achieve the additional implementation and prevent the need for more aggressive actions between 2022 and 2025.

4.2 Actions to Address Climate Resilience

Virginia's actions to address climate resilience include strategies in two categories: reducing air pollution and building resilience. Reducing air pollution is healthy for the Chesapeake Bay, because it helps mitigate climate change and reduces the pollutants that could be deposited in water bodies. Both climate change and air pollution have a negative effect on the Bay. Building resilience capacity at both the state and local levels is key to Virginia's approach to adapting to climate change impacts.

Figure 2: Tangier Island boat (Courtesy of CBP)

Reducing Greenhouse Gas Emissions

Virginia is committed to taking proactive steps to protect our air and water, as is evidenced in the following climate initiatives, which will lessen harmful impacts to the Bay. Each of the efforts described below will have the additional benefit of reducing nitrogen emissions into the air. Virginia has been working with the Chesapeake Bay Program Partnership to quantify these nitrogen emission reductions and include them in future progress reports.

Reducing Transportation Sector Pollution – More than one third of carbon pollution comes from the transportation sector, making it the largest source. In Virginia, transportation is the largest contributor of greenhouse gases, nitrogen oxide and ozone pollution. These air pollutants can severely affect the Bay.

Virginia is taking steps to reduce transportation sector pollutants. In 2018, Virginia joined the Transportation and Climate Initiative (TCI), a regional collaboration with states to reduce pollution from

the transportation sector.[4] Through TCI, Virginia and other states will work together to develop a regional low-carbon transportation policy to help mitigate the impacts of transportation pollution. TCI states will be coordinating and sharing information to develop the best mechanisms to allow for a shared approach to reducing air pollutants from the transportation sector. Virginia is also making significant investments in large-scale public transportation such as the Washington Metropolitan Area Transit.

Additionally, electric vehicle (EV) use is increasing and Virginia is working to advance the infrastructure to allow for EV growth. The Commonwealth was a beneficiary in the Volkswagen Diesel Emission Mitigation Settlement (VW Settlement Agreement), which resulted from the allegations that Volkswagen violated the Clean Air Act (CAA) by selling vehicles with emissions exceeding the nitrogen oxide limitations.[5] In 2018, Virginia used the VW Settlement Agreement funds to secure a contract to develop a statewide charging network to accelerate EV usage. DEQ collaborated with EPA to develop a white paper (*Influence of Volkswagen Settlement Agreements on Chesapeake Water Quality)*, which provides a standard method for quantifying nitrogen oxide (NOx) emissions reductions through the implementation of the VW Settlement Agreement. The findings are then converted to reduced nitrogen loads to the Bay.[6] After evaluation, it was determined that each ton of NOx reduced in Virginia would result in an estimated 3.36 %, or about 67 pounds, reduction of nitrogen distributed to the Bay.

Reducing Fossil Fuel Electric Power Carbon Dioxide Pollution – On April 19, 2019, the State Air Pollution Control Board approved a carbon pollution control rule. The final regulation enables Virginia to be trading-ready and able to link with a market-based carbon allowance trading program. This program essentially allows for a cap on carbon pollution from fossil-fuel electric power generating facilities in Virginia; the cap will decline over time. The Virginia rule could reduce our carbon emissions by 30% by 2030. As power-generating units add new technologies to meet this goal, they will also reduce nitrogen emissions, benefiting Chesapeake Bay water quality. DEQ will be using the same method that was developed for the VW Settlement Agreement to quantify the nitrogen reductions resulting from the carbon rule. Together, it is estimated that these two efforts will result in a nitrogen reduction of about 10,000 pounds by 2025 and 45,000 pounds by 2030.

Building Resilience to Climate Change Impacts

Building resilience capacity at the state, regional and local level is key to Virginia's approach to adapting to climate change impacts. Virginia is committed to taking proactive steps to ensure its assets and communities are as resilient as possible to the impacts of natural hazards as well as climate change. Creating and protecting vegetated buffers and living shorelines can improve and expand coastal resilience and pollution reduction. The following resilience actions by the Commonwealth will also help reduce nonpoint pollution to the Chesapeake Bay.

Executive Order 24: Increasing Virginia's Resilience to Sea Level Rise and Natural Hazards – On Nov. 2, 2018, Governor Ralph Northam signed an executive order to bolster Virginia's resilience to sea level rise and natural hazards. The order lays out a series of actions the Commonwealth will undertake to limit the impact of coastal and recurrent flooding, extreme weather events and wildfires. To lead by example and ensure its facilities and holdings are resilient, the order lays out steps Virginia's government will undertake to develop a facility assessment process of current and future state-owned structures as well as

[4] Georgetown Climate Center's Transportation and Climate Initiative website.
[5] DEQ's VW Mitigation website.
[6] CBP Influence of Volkswagen Settlement Agreements on Chesapeake Bay Water Quality.

set sea level rise planning and freeboard standards to increase resilience. In addition, EO 24 creates a series of reviews and planning efforts that will benefit citizens, local governments, regions, public and private property.

Of greatest significance, the Executive Order mandates the creation and implementation of a "Coastal Resilience Master Plan." The plan will detail specific actions to assist local governments in reducing flood risk through planning and implementation of large-scale flood reduction and adaptation initiatives to both adapt and protect Virginia's coastal regions. The Master Plan will incorporate nature and nature-based infrastructure and flood control whenever possible, resulting in expanded buffers and reduced runoff to the Chesapeake Bay and its tributaries.

Figure 3: Fiddler crabs at Money Point in Chesapeake, Virginia (Courtesy of CBP)

Virginia Coastal Zone Management (CZM) Program – Wetlands and other natural or nature-based features (NNBF) have a proven capacity for reducing the impacts of coastal storms and flooding on nearby communities. They also filter sediment and absorb nutrients from coastal waters and provide critical habitat. Wetlands are threatened by sea level rise, hardening of shorelines associated with development and invasive species. Retaining and restoring wetlands and other NNBF is critical for climate change adaptation and meeting Chesapeake Bay restoration goals.

The Virginia CZM Program is supporting the use of NNBF through a range of initiatives, including promoting the use of living shorelines, protecting beaches and dunes, and using dredged material as a resource for building coastal resilience. The program has funded 53 grant projects since 2000 to support policy changes, collect and analyze data, conduct research, train resource managers and private contractors, and educate the public. A new initiative that began in the fall of 2018 will develop a database of potential coastal habitat restoration projects and a methodology for prioritizing these sites according to various funding or other criteria. This should better position the Commonwealth to obtain funding for these projects as grant opportunities arise and will support the Coastal Resilience Master Plan development process.

The Virginia CZM Program also funds land acquisition based on its VEVA tool. Available in the Coastal Geospatial and Educational Mapping System (GEMS), it provides a gateway to coastal resource data and

maps, including a sea level rise viewer. Overlaying the sea level rise viewer onto VEVA helps identify acquisition targets that provide opportunities for wetland migration and act as a protective buffer for inland development.

CHAPTER 5. PLANNING TARGETS AND LOCAL AREA PLANNING GOALS

5.1 Planning Targets

On July 9, 2018, the Bay Program Partnership finalized the State-Basin Planning Targets for the Phase III WIPs. These State-Basin Planning Targets cumulatively represent the nitrogen and phosphorous assimilative capacity of the Chesapeake Bay in order to meet the dissolved oxygen water quality criteria. These target loads represent caps that need to be achieved and maintained through time. At Virginia's State-Basin scale, the planning targets for all sources combined are shown in Table 1 below.

Table 1: State Basin Planning Targets (million pounds per year)

State-Basin	Nitrogen	Phosphorus
Eastern Shore	1.43	0.164
Potomac River Basin	16.00	1.892
Rappahannock River Basin	6.85	0.849
York River Basin	5.52	0.556
James River Basin	25.92	2.731
Total for Virginia	55.73	6.192

Since these planning targets are based on meeting the Bay's dissolved oxygen water quality criteria, and since sediment has minimal effect on dissolved oxygen levels, the Bay Program Partnership did not set sediment targets as part of this process. The sediment targets will be developed following the completion of the Phase III WIPs and will be based on the sediment reductions realized from the WIP III implementation scenario.

In order to achieve these planning targets, additional reductions of nitrogen and phosphorus loads are needed between now and 2025. To facilitate this effort, the State-Basin scale planning targets were disaggregated into more local scales. This chapter describes how the Commonwealth developed these "Local Area Planning Goals."

5.2 Sediment Targets

Sediment loads are managed in the Bay TMDL to specifically address the water clarity/ submerged aquatic vegetation (SAV) water quality standards. Intuitively, it makes sense that the more sediment suspended in the water, the less light makes it down to the SAV. Interestingly, research in the Chesapeake Bay has shown that the water clarity/ SAV water quality standard is generally more responsive to nutrient load reductions than it is to reduction of sediment loads. This is because the algae that are fueled by the nutrients can block as much, or more, light from reaching the SAV as suspended sediments.

The sediment targets will not affect the BMPs called for in the WIP, and are not intended to be the driver for implementation moving forward. The sediment targets developed for the Phase III WIP as they have been for previous WIPs, will be formed on the basis of the sediment load delivered to the Bay associated with management actions taken to address the nutrient planning targets. In other words, the BMPs that are identified in this Phase III WIP to meet the Bay nutrient targets will be run through the Bay models, and the resulting sediment loads will form the basis for the sediment targets. These sediment loads will be adjusted proportionally to account for any overshooting or undershooting of the nutrient targets. Then an additional 10% allowance will be added to the calculated sediment target in each major basin.

The resulting final Phase III WIP sediment targets will be appended to this WIP in October 2019, once they have been approved by the Bay Program Partnership.

5.3 Accounting for Growth

The Chesapeake Bay Partnership decided that all jurisdictions would develop their Phase III WIPs using 2025 "base conditions." This approach explicitly plans for forecasted changes in population, land use, septic systems and animal agriculture through 2025. By using these 2025 base conditions as the starting point for Virginia's WIP, and designing a plan to meet the state-basin planning targets, Virginia has explicitly accounted for forecasted growth. The Bay Program will continue to update the forecasted 2025 base conditions every two years as new information becomes available. This new information will include regular updates from the Agricultural Census and updates to reevaluate land cover data. Virginia will adaptively manage its implementation process through the two-year milestone process to account for any changes resulting from these updates to forecasted 2025 base conditions.

In addition, provisions in §62.1-44.19:15 implemented through the Watershed General Permit have effectively capped aggregate nutrient loads from the wastewater sector since 2007. Additional reductions will be provided by the wastewater sector in accordance with Initiative 48 to meet the overall nutrient reduction goals of the Phase III WIP.

In May 2011, the VSMP regulation was revised to adopt new post-development stormwater management requirements to further protect local receiving streams with an implementation date of July 1, 2014. Through the 2011 regulation revisions, Virginia dedicated itself to achieving no net increase in nutrients from new development, a feat made more remarkable by Virginia's growing population and developed areas. The VSMP now requires greater reductions of runoff pollutant loadings (where phosphorus is the keystone pollutant) from new development and redevelopment than previously established.

5.4 Local Area Planning Goals

On June 20, 2018, EPA issued the Final Expectations for Chesapeake Bay Jurisdictions' Phase III Watershed Implementation Plans document, which includes an expectation that Bay jurisdictions establish local area planning goals (LAPGs) for nitrogen and phosphorus. The purpose of these LAPGs is to lead to the development of more meaningful local strategies for incorporation into the Phase III WIP. The expectations document gives jurisdictions significant flexibility in determining how planning targets are set, the scale at which they are established and the form the targets will take.

The Partnership decisions related to local planning goals stem from the work of the Local Planning Goals Task Force whose report was largely incorporated into the EPA expectations. The Task Force Report states "It is up to each jurisdiction to decide how to track and report progress towards achievement of local planning goals through their two-year milestones and/or annual progress reporting to EPA." and this language was carried forward into the EPA expectations. The Task Force report also recommended that EPA include in their expectations that "in no way do the targets supersede or modify locality obligations under statutes or regulations, that local planning goals do not establish any new requirement or rights for localities, and that decisions regarding how local stakeholders may be involved in achieving local planning goals will remain with the jurisdiction. The Task force report also includes a paragraph that communicates the concerns of Task Force members that "establishment of local planning goals could imply the subsequent delegation of responsibility for achieving those goals to the localities."

Given these concerns expressed from the Local Planning Goals Task Force and similar concerns expressed repeatedly during the local engagement process described in the next chapter, Virginia views the local planning goals as a tool to encourage and facilitate local participation in the WIP III planning process. Implementation of the WIP will be driven by the resulting state programs and initiatives described in Chapter 7. Tracking and reporting of implementation progress will continue to be done in accordance with Virginia's approved Verification Program Plan and with as much geographic specificity as is available and appropriate for the Chesapeake Bay Watershed Model. The assessment of the resulting reductions will continue to be done at the State-Basin scale.

Virginia's approach to establishing local area planning goals started from the following requirements:

- The LAPGs will be established only for the Load Allocation (unregulated) sectors. Regulated sectors are expected to meet their permit requirements.
- The LAPGs will be established at the scale of regional PDCs (15 in the Bay Watershed, see Figure 1) for the urban, septic and urban forestry sectors.
- The LAPGs will be established at the scale of SWCDs Areas (four in the Bay Watershed that include Chesapeake Bay drainage areas, see Figure 1) for the agriculture and forestry sectors.
- The sum of the regulated sectors and the LAPG loads, together with any resulting state initiatives, is expected to meet the State-Basin Planning targets on 2025 base conditions and account for additional loads due to climate change.

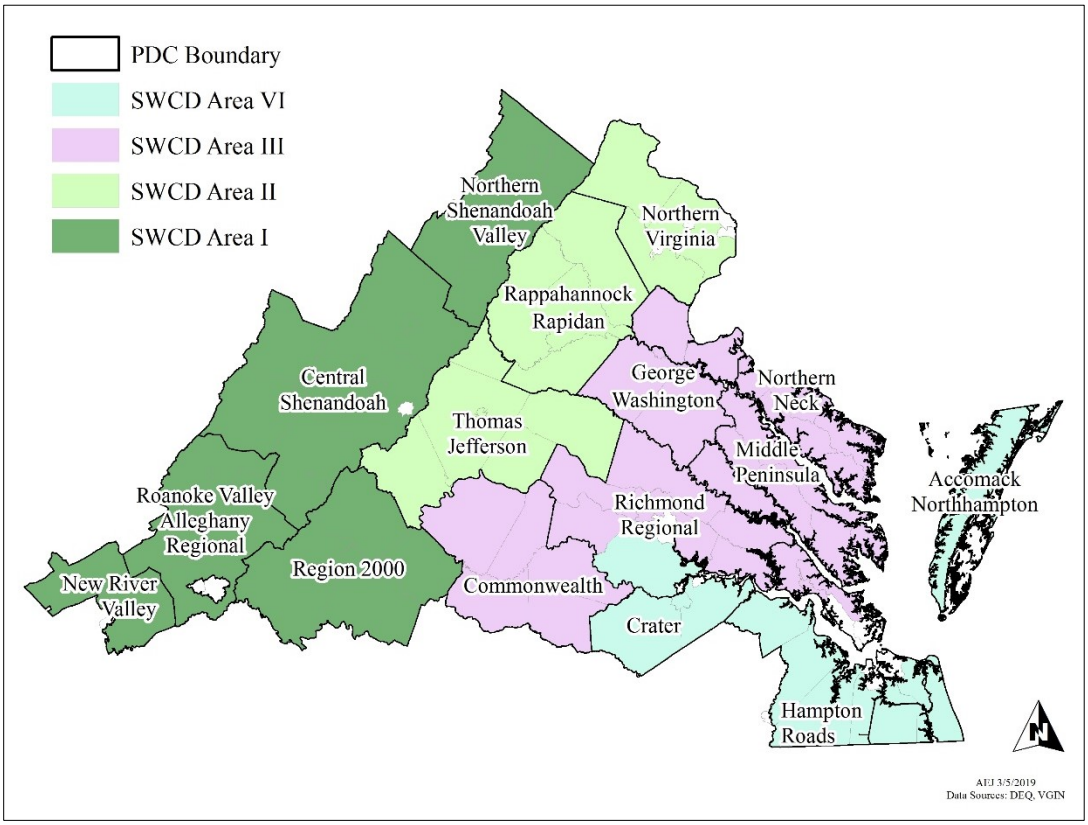

Figure 1: PDC/ SWCD Area Boundaries

The first step in developing the LAPGs was to take the Phase II WIP implementation scenario and run it in the new Phase 6 Chesapeake Bay Watershed Model on forecasted 2025 base conditions. The results met State-Basin Planning targets and, therefore, the WIP II scenario was deemed appropriate for use in establishing the LAPGs.

The next step was to separate the model outputs to isolate the Load Allocation sources and to exclude all loads originating from regulated and federal lands. Federal agencies were assigned their own LAPGs as described below. Finally, loads from the urban, septic and urban forest sectors were combined geographically according to PDCs. The model outputs for the agriculture and forestry sectors were geographically combined by SWCD Areas, with bordering SWCDS as described below in Chapter 6, Section 2. Collectively, these SWCD Area and PDC summaries of BMPs and Loads represent the required LAPGs described in the EPA Expectations document. The LAPGs are summarized in Appendix A and are available on the DEQ Chesapeake Bay TMDL Local Area Planning Goals website.

5.5 Federal Agency Planning Goals

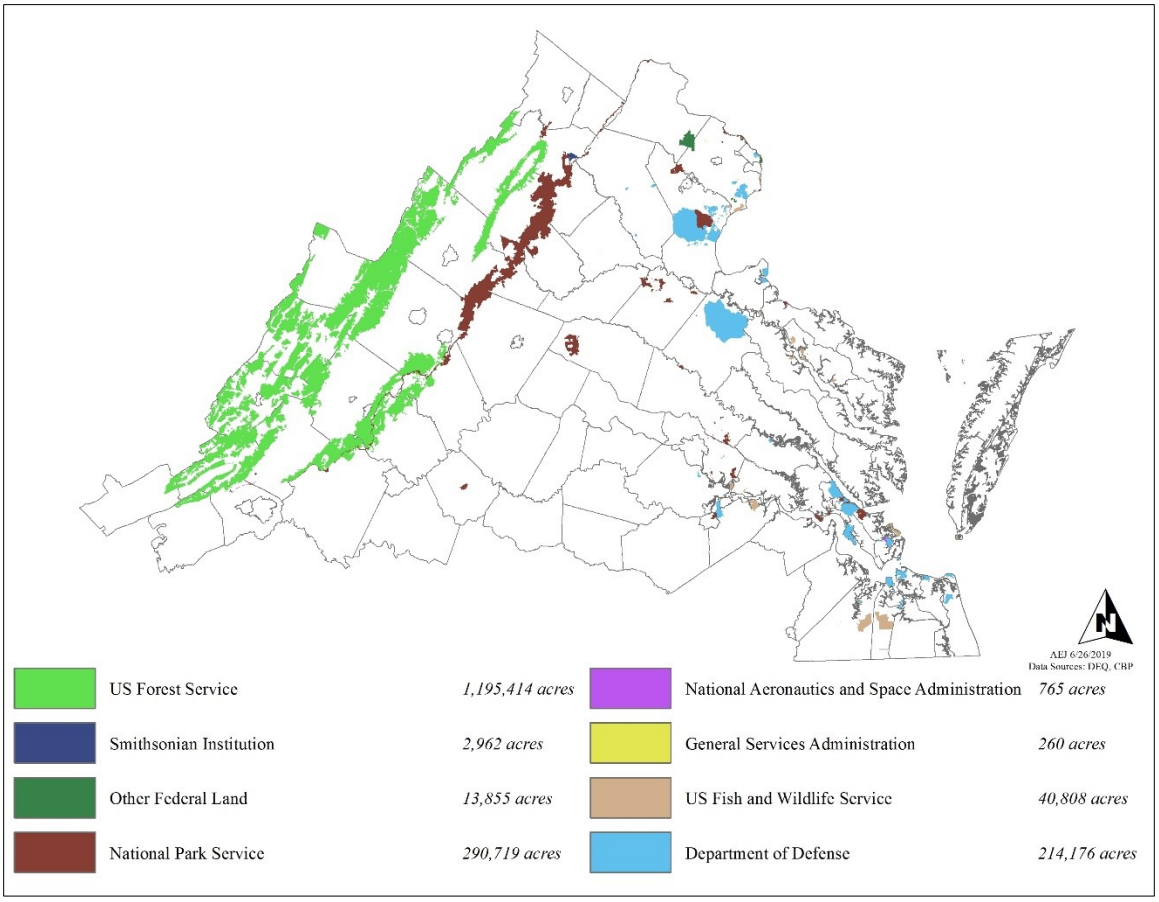

Figure 2: Federal agency lands within Virginia's Chesapeake Bay watershed

Federal Agency Planning Goals were developed based on WIP II level of effort, similar to the PDC and SWCD Area LAPGs. It was determined that the federal planning goals would be aggregated for all

facilities owned by each of the agencies[7] as represented in the Phase 6 Chesapeake Bay watershed model (Figure 2).

Federal agencies are expected to meet all applicable permit requirements and to achieve the LAPG reductions from their unregulated lands. In addition, federal departments are expected to:

- Ensure implementation at the WIP III agricultural level for all federally owned and managed agriculture lands by carrying out RMPs.
- Offset any increases in loads resulting from land use change through 2025.
- Federal departments are expected to reduce loads from all onsite systems (septic and alternative onsite systems) on federally owned lands (6% Nitrogen reduction goal from 2017 levels).
- Ensure that any forest harvesting is accompanied by implementation of the full suite of silviculture water quality BMPs.

The federal agency planning goals provided to these entities are summarized in Appendix B.

[7] Agencies with landholdings in Virginia: Department of Defense, General Services Administration, NASA, National Park Service, Smithsonian Institute, United States Fish and Wildlife Service, United States Forest Service and other federal land.

CHAPTER 6. PHASE III LOCAL ENGAGEMENT

6.1 Overview

Virginia focused its local engagement on addressing the LAPGs that are comprised of the load allocations for the agricultural, urban/developed, septic, and forest lands as described in Chapter 5. Virginia utilized a comprehensive local engagement process involving collaboration among localities, PDCs, SWCDs, stakeholders from the agriculture and conservation communities, citizens and numerous state agencies involved with nutrient and sediment reductions.

In support of the ongoing engagement activities, Virginia developed a Phase III WIP web page, hosted training seminars for PDC and state agency staff on the use of the Chesapeake Assessment Scenario Tool, hosted question and answer webinars for PDC staff and developed fact sheets for the public. DEQ also maintains a Chesapeake Bay TMDL Resources and Tools webpage to share information with its partners and the public.

Virginia conducted its regional area engagement by collaborating with PDCs and SWCDs, which are well-suited key partners in the local engagement strategy. Both are organized entities authorized under the Code of Virginia with existing staff resources and offices and have experience working on pollution reduction initiatives. PDCs are strong candidates as regional partners because of their long record of accomplishments of engaging in regional environmental issues and because they have active participation from their member localities. The SWCDs have worked with the agricultural community within Virginia for decades and have successfully assisted landowners in managing farm operations and employing agricultural BMPs not only in the Bay Watershed, but also throughout all of Virginia.

The regional engagement process began with eight initial outreach events from January through December 2017. The purpose was to provide information on the status of Chesapeake Bay water quality, recent state initiatives and Virginia's expectations and timelines for the Phase III WIP process. These meetings were well attended, with almost 250 individuals representing localities, SWCDs, PDCs, federal and state agency staff, local stakeholder groups, and other interested parties participating.

During the second engagement phase throughout 2018, Virginia established two parallel paths. For the agriculture and forest sectors, the Commonwealth conducted extensive outreach to SWCDs, agricultural industry representatives, the conservation community and other state agencies involved with agriculture in the development of the agricultural components of the Phase III WIP. For the developed lands/septic sector, the state worked through PDCs within the Chesapeake Bay watershed to convene local officials, staff and stakeholders to evaluate BMPs and programmatic actions, as well as gaps in funding and capacity, local co-benefits and gaps in authority. A number of state agencies (DEQ, DCR, VDOT, VDACS, VDH and VDOF) participated in these discussions as well and served as valuable resources to the SWCDs, PDCs and localities.

6.2 Local Engagement Meetings

Soil and Water Conservation District Area Meetings

Thirty-two SWCDs in Virginia are either partially or entirely located within the Chesapeake Bay watershed. One of these, Southside SWCD, has a very small area in the Chesapeake Bay and no additional nutrient reductions are needed from that portion of their district. The remaining 31 SWCDs

were provided with a workbook containing LAPGs for the agricultural and large-tract forest sectors, draft input decks for the above sectors, BMP definitions and a BMP cost effectiveness table. SWCDs were asked to submit agricultural best management practice (BMP) input decks (projections of the number of additional agricultural BMPs that could be implemented from 2017-2025), as well as any information or recommendations on programmatic, capacity, funding or authority constraints that might impede BMP implementation.

The 31 Chesapeake Bay watershed SWCDs are grouped into four existing "Areas" previously established by the Virginia Association of Soil and Water Conservation Districts (VASWCD). The SWCDs that were not in these four areas, but are still partially within the Chesapeake Bay watershed, participated in one of the four areas in closest proximity to them. Public meetings were held in each of these four areas in May and August 2018 to discuss agricultural BMP input deck development for WIP III. For the third round of meetings in October, these four areas were combined for two meetings to review the agricultural input deck submittals. SWCDs were then asked to make any final revisions prior to submittal to DCR. Overall, about 65 individual stakeholders attended these meetings. The number of attendees at individual meetings ranged from 18 to 45, and the number of SWCDs represented ranged from three to 10.

In addition to the meetings hosted for the SWCDs, DCR, DEQ, and representatives from the offices of the Secretary of Natural Resources and the Secretary of Agriculture and Forestry participated in four outreach meetings organized by the Virginia Farm Bureau Federation. Representatives of local SWCDs, federal agencies, conservation organizations and others also attended these meetings.

Figure 1: Eastern Shore Public Outreach Meeting (Courtesy of DEQ)

Planning District/ Regional Commission Meetings

In early July 2018, grants using local engagement funds provided by the Chesapeake Bay Program were awarded to fourteen PDCs to work with localities and other stakeholders on the Phase III WIP local engagement process. The PDCs' role in this process was to facilitate meetings with the localities and other stakeholders in their areas, to select a mix of BMPs based on a draft input deck developed as outlined in Chapter 5, and to identify corresponding programmatic actions that would work best within the PDC area to drive implementation. PDCs were also asked to identify capacity and funding needs for the identified programmatic actions and BMP input decks. In addition, DEQ hosted a kickoff meeting for localities where the PDC was unable to assume these responsibilities. PDCs were provided a Phase III

WIP workbook containing the following tools and information: final LAPGs for the urban/developed, urban forest and septic sectors; draft input decks for the above sectors; programmatic action template; programmatic action examples; BMP definitions; and BMP cost effectiveness table. From July to December 2018, the PDCs conducted at least three public meetings with localities, local stakeholders and SWCDs to evaluate and update draft input decks for the urban/ developed, septic and urban forest source sectors. Meeting attendance and the broad cross-section of stakeholders represented at those meetings are provided in Table 1.

Table 1: Summary of PDC Stakeholder Engagement

Organization	**Avg. number of attendees/number of meetings**	**Representing**
Accomack-Northampton PDC	25/3	Accomack and Northampton Counties; Towns of Cape Charles, Cheriton, and Onancock; Eastern Shore SWCD, Chesapeake Bay Foundation, Clean Water Council, NRCS, Virginia Tech Cooperative Extension, DEQ, VDOF, VDOT, VDH, Virginia Institute for Marine Science, other stakeholders and citizens.
Central Shenandoah PDC	25/3	Augusta, Bath, Rockbridge and Rockingham Counties; Cities of Harrisonburg, Lexington, Staunton and Waynesboro; Town of Glasgow; Natural Bridge and Headwaters SWCDs; VA Wilderness Committee, Valley Conservation Council, Shenandoah Valley Battlefield Foundation, Community Alliance for Preservation, Augusta County Service Authority, Harrisonburg Rockingham Regional Sewer Authority, DEQ, DCR, VDOT, Stantec Consulting for VDOT, VDH, VDOF, other stakeholders and citizens.
Commonwealth Regional Council	10/3	Amelia, Buckingham, Charlotte, Lunenburg, and Prince Edward Counties; Friends of the Appomattox River, Clean Virginia Waterways, VDH, DEQ, Longwood, Hampden-Sydney, and Prince Edward County Public Schools, other stakeholders and citizens.
Crater PDC	25/4	Charles City, Chesterfield, Dinwiddie, Prince George, Surry and Sussex Counties; Cities of Colonial Heights, Hopewell, Petersburg; Appomattox River, Colonial, James River and Peanut SWCDs; Friends of the Appomattox River, Virginia Forestry Association, South Central Wastewater Association; Ft. Lee, DEQ, VDOF, VDOT, VDH, other stakeholders and citizens.
George Washington Regional Commission	20/3	Caroline, King George, Spotsylvania and Stafford Counties; City of Fredericksburg, Tri-County/City SWCD, Friends of the Rappahannock, Land Trust Alliance, N. VA Conservation Trust, Naval Dist. of Washington, NSF Dahlgren, DEQ, VDOF, VDOT, other stakeholders and citizens.
Hampton Roads PDC	35/4	Isle of Wight, James City, Southampton and York Counties; Cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg; Town of Smithfield; Colonial, Peanut and Virginia Dare SWCDs, Chesapeake Bay Foundation, The Elizabeth River Project, Wetlands Watch, Department of the Navy, Port of Virginia, Hampton Roads Sanitation District, VA Coastal Policy Center, DEQ, VDOF, VDOT, VDH, other stakeholders and citizens.
Middle Peninsula PDC	15/3	Essex, Gloucester, King & Queen, King William, Mathews and Middlesex Counties; Towns of Tappahannock, Urbanna and West Point; Three Rivers and Tidewater SWCDs, Chesapeake Bay Foundation, Friends of the Rappahannock, The Nature Conservancy,

Organization	Avg. number of attendees/number of meetings	Representing
		DCR, DEQ, Stantec Consulting for VDOT, VDH, VIMS, other stakeholders and citizens.
Northern Neck PDC	25/3	Essex, Lancaster, Northumberland, Richmond and Westmoreland Counties; Towns of Colonial Beach, Kilmarnock, Montross and White Stone; Northern Neck SWCD, Bay Aging, Northern Neck Chesapeake Bay Regional Partnership, Northern Neck Electric Cooperative, Northern Neck Tourism Commission, Northumberland County Economic Development, DCR/SEAS, DEQ, Stantec Consulting for VDOT, VDH, VIMS, other stakeholders and citizens.
Northern Shenandoah Valley Regional Commission	10/3	Clarke, Frederick, Page, Shenandoah and Warren Counties; City of Winchester; Towns of Berryville, Boyce, Middletown, Stephens City, Luray, Shenandoah, Stanley, Edinburg, Mount Jackson, New Market, Strasburg, Toms Brook, Woodstock and Front Royal; Lord Fairfax SWCD; DEQ, VDOT/Stantec, VDOF, VDH, other stakeholders and citizens.
Northern Virginia Regional Commission	14/3	Arlington, Fairfax, Loudoun and Prince William Counties; Cities of Alexandria, Fairfax, Falls Church, Manassas and Manassas Park; Town of Leesburg; Northern Virginia SWCD, No. VA Conservation Trust, Metropolitan Council of Governments, DEQ, VDOF, VDOT, Stantec consulting for VDOT, other stakeholders and citizens.
Rappahannock-Rapidan Regional Commission	18/4	Culpeper, Fauquier, Madison, Orange and Rappahannock Counties; Town of Warrenton; Culpeper and John Marshall SWCDs; Rappahannock-Rapidan River Basin Commission, Friends of the Rappahannock, Piedmont Environmental Council, Land Trust Alliance, N. VA Conservation Trust, Chesapeake Bay Foundation, VA Farm Bureau, DEQ, VDOF, VDOT, VDH, other stakeholders and citizens.
Region 2000	18/3	Amherst and Campbell Counties; Cities of Lynchburg and Bedford; SWCDs, VDH, VDOF, VDOT/Stantec, DEQ, citizens, other stakeholders and citizens.
Roanoke Valley-Alleghany Regional Commission	15/5	Alleghany, Botetourt, Craig and Roanoke Counties; City of Covington; Towns of Buchanan and Clifton Forge; Blue Ridge and Mountain Castles SWCDs; Botetourt Community Partnership, Craig County Public Service Authority, Western VA Water Authority, Wetland Studies and Solutions; DEQ, Stantec Consulting for VDOT other stakeholders and citizens.
Thomas Jefferson PDC	15/4	Albemarle, Fluvanna, Greene, Louisa, and Nelson Counties; City of Charlottesville; Thomas Jefferson SWCD; Piedmont Environmental Council, Rivanna Conservation Alliance, Virginia Conservation Network, UVA, VDH, DEQ, VDOT/Stantec, VDOF, other stakeholders and citizens.
Richmond Region (hosted by DEQ)	30/2	Charles City, Chesterfield, Goochland, Hanover and Henrico Counties, City of Richmond; James River Association, Chesapeake Bay Foundation, Chesapeake Bay Commission, Alliance for the Chesapeake Bay, Crater PDC, Richmond Regional PDC, Virginia Tech Cooperative Extension, VA Farm Bureau, DEQ, VDH, VDOT, VDOF, other stakeholders and citizens.

Table 2: Summary of Combined PDC/SWCD Meetings

Organization	Number of attendees	Representing
Shenandoah Valley area	36	4 PDCs, 7 SWCDs, 5 localities, conservation groups, state and federal agencies, other stakeholders and citizens.
Fredericksburg area	52	4 PDCs, 9 SWCDs, 9 localities, conservation groups, state and federal agencies, other stakeholders and citizens.
Eastern Shore area	35	2 PDCs, 1 SWCD, 4 localities, conservation groups, state and federal agencies, other stakeholders and citizens.
Northern Virginia area	35	4 PDCs, 6 SWCDs, 7 localities, conservation groups, state and federal agencies, other stakeholders and citizens.

Combined SWCD/ PDC Meetings

In November and early December 2018, four public meetings were held that included SWCDs, PDCs, localities represented by PDCs and any other interested stakeholders. The meetings were hosted by the Office of the Secretary of Natural Resources (OSNR) and were well attended (see Table 2). During these meetings, DCR reported the results of the agricultural sector discussions with the SWCDs and all fourteen PDCs reported the results of urban/developed land sector discussions. DCR and the PDCs identified the top selected BMPs and programmatic actions needed to support those BMPs. The OSNR then led facilitated discussions on how all partners can coordinate and collaborate on the implementation of these BMPs and programmatic actions.

Figure 2: Eastern Shore Public Outreach Meeting (Courtesy of DEQ)

6.3 Engagement Results

SWCDs and the PDCs responded to the challenge of identifying BMPs and programmatic actions that are most likely to be implemented by 2025 to restore the Chesapeake Bay. Figure 3 shown below provides the BMPs most frequently selected by SWCDs, PDCs, localities and stakeholders for the non-MS4 urban, septic and agricultural sectors for the entire Chesapeake Bay Watershed as small circles representing WIP III Initial inputs. The specific load reductions accomplished by their revised input decks as well as state policy actions and initiatives are discussed in more detail in the river-basin specific sections of Chapter 8.

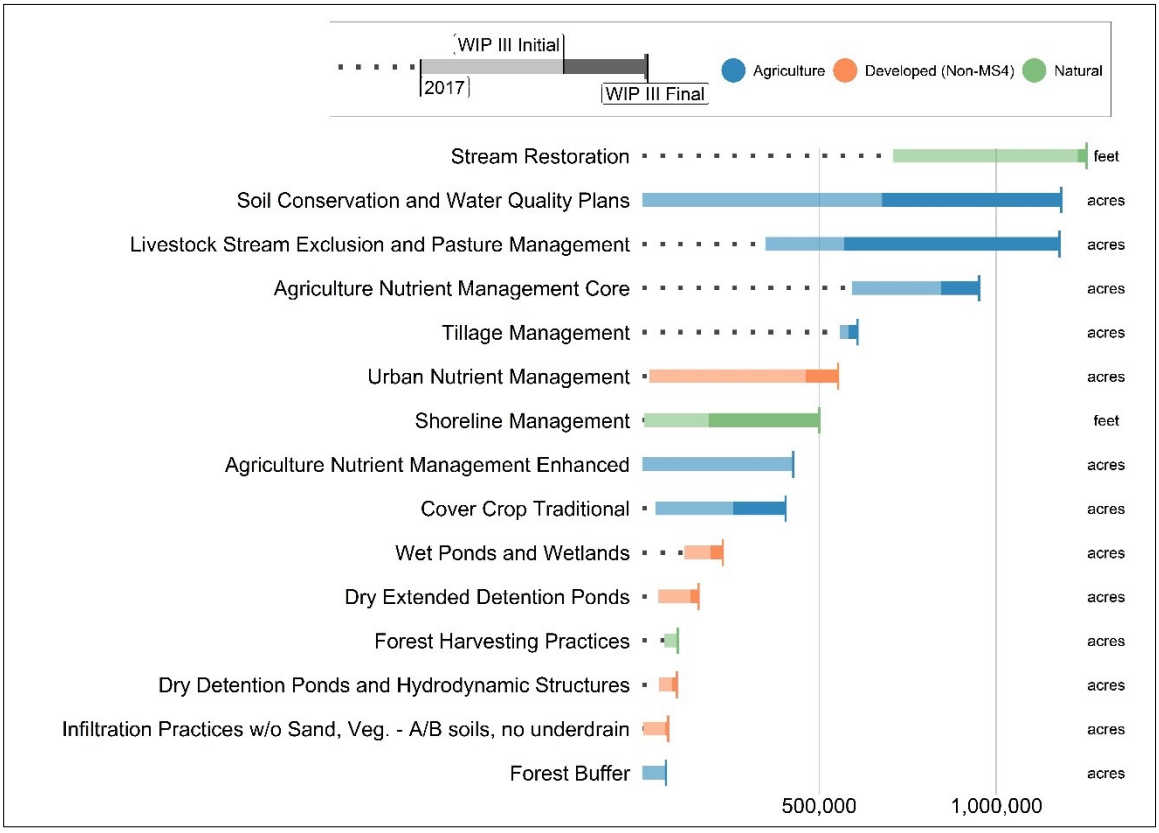

Figure 3: Top BMPs by acreage/ footage

Table 3 at the end of this chapter summarizes the BMPs and programmatic actions as presented by DCR and each PDC during the joint meetings. Since one of the highlights of the discussions was the importance of local co-benefits, the co-benefits identified during the PDCs' local engagement activities have been added to the table as well.

From over 500 ideas and suggestions submitted by the PDCs, the common themes among the programmatic actions for the urban/ developed sector include:

- Increase DEQ's Stormwater Local Assistance Fund (SLAF).
- Expand use of the Virginia Conservation Assistance Program (VCAP).
- Increase funding for voluntary BMPs.
- Conduct more urban nutrient management planning.

- Enhance promotion of living shoreline techniques to address shoreline erosion.
- Expand septic pump out and other maintenance programs statewide.
- Improve coordination of local reporting of BMPs by DEQ.

The input decks and programmatic actions submitted by the PDCs can be found on the DEQ Phase III WIP Data website. The programmatic actions recommended by the PDCs will serve as a guide and reference for ongoing engagement and implementation, for example through the current PDC project initiative described in Section 6.4 below.

Implementation levels provided by five PDCs fell significantly below the average level identified across the Bay watershed. In these regions, the implementation levels of the BMPs identified were increased so that the region met 70% of the LAPG. The PDCs raised concerns regarding the growth forecasting through 2025 and BMP reporting. It is anticipated that these issues will be addressed once the growth forecasts are updated as part of subsequent milestones and BMP reporting continues to improve.

For the agricultural sector, Virginia asked each SWCD within the Chesapeake Bay drainage area to submit projected levels of achievable additional agricultural best management practice implementation within their SWCD for years 2017-2025. Based on analysis through the Chesapeake Bay model, 10 out of the 32 SWCDs with Bay drainage area are critical to the success of the entire agricultural sector towards meeting Phase III WIP nutrient reduction targets. Critical SWCDs include Culpeper, Eastern Shore, Hanover-Caroline, Headwaters, Lord Fairfax, Northern Neck, Robert E. Lee, Shenandoah Valley, Thomas Jefferson and Three Rivers. Based on their BMP projections, combined these SWCDs would achieve 73% of the nitrogen and phosphorus reductions of all 32 SWCDs with Bay drainage.

From over 220 suggestions submitted by the SWCDs, the following themes emerged for programmatic actions in the agricultural sector:

- Create additional incentives for a variety of buffer widths and lifespans.
- Create new incentives for extended BMP lifespans.
- Establish an equine workgroup to address the implementation of BMPs on equine operations including horse pasture management.
- Remove or increase annual participant caps for cost share.
- Bundle BMPs into single cost share contracts to increase reporting of BMPs.
- Increase maximum tax credits for BMPs and conservation equipment.
- Modify practice specifications for cover crops, animal waste, stream protection, forest buffers and nutrient management.
- Move towards regional agricultural BMP priorities.

Based on the submitted input decks, the recommendations and gaps identified as part of the SWCD and PDC analyses and in consideration of the planning targets, over 50 state policy actions and initiatives were identified for inclusion in this Phase III WIP. Chapter 7 describes these items in more detail. Items addressed by state policy initiatives in Table 3 are italicized, where applicable. BMP input decks by river basin for all source categories are presented in Chapter 8.

6.4 On-going Engagement for Implementation

Some initial steps taken by the Commonwealth towards ongoing local stakeholder engagement driving toward implementation of the Phase III WIP are presented below.

Agriculture

For the agricultural sector, Virginia took the first step towards implementing many of the programmatic recommendations by conducting a thorough review of the VACS Program. DCR solicited suggestions from stakeholders across the state that would promote additional implementation of agricultural BMPs. The existing Agricultural Best Management Practice Technical Advisory Committee (Ag BMP TAC) was greatly expanded, from the usual number of about two dozen members, to over 70 voting members and over 20 resource persons who advised the voting members. Since approximately 190 suggestions for changes to VACS were received for consideration, six subcommittees were formed and the recommendations were divided by subject area. The subcommittees were Agricultural Waste, Cover Crop, Forestry, Nutrient Management, Programmatic and Stream Protection.

The Ag BMP TAC scheduled monthly meetings from September 2018 to January 2019. Each of the subcommittees also met at least monthly during this period until all recommendations assigned to them were discussed. All meetings were advertised and open to the public. Meeting minutes were recorded and made available to the public on the Virginia Regulatory Town Hall.

Recommendations for changes to VACS were discussed in the appropriate subcommittee and voted on. An 80% agreement by the subcommittee members was required to recommend either advancing, amending, or tabling each recommendation assigned to them. At the full Ag BMP TAC meetings, each subcommittee presented their recommendations. The full Ag BMP TAC then voted on each of the subcommittee recommendations, requiring 80% agreement of the members to affirm the subcommittee's recommendation.

Recommendations that passed in the full Ag BMP TAC were presented to the Virginia Soil and Water Conservation Board in March 2019 for consideration. Some of the recommendations advanced by the Ag BMP TAC and approved by the Board will be incorporated in the VACS Program in fiscal year 2020. However, other approved recommendations will be delayed until fiscal year 2021 as some proposals may require legislative action in the 2020 session of the General Assembly including additional research and clarification, additional budget authority, or more detailed policy development.

Several proposals submitted to the Ag BMP TAC are still under discussion and will be carried over to next year's meetings beginning in the summer 2019. A summary of the Ag BMP TAC Recommendations (2018-2019) is presented below.

Animal waste practices:

- Increase cost-share practice caps to reflect increased construction costs (animal waste storage facilities and associated seasonal feeding pads and loafing lot management systems for dairies).
- Increase lifespan of animal waste storage facilities and associated seasonal feeding pads, loafing lot management systems for dairies, and mortality composter facilities from 10 to 15 years.
- Develop a new cost-share practice for manure injection into soils, reducing nitrogen runoff and the need for additional nitrogen applications.

- Allow the use of mortality freezers for poultry operations when providing cost share funding for mortality composter facilities.

Cover crop practices:

- Recognize that growing seasons have become longer in Virginia and request a review of existing planting dates by the CBP partnership.
- Extend the kill date for fall or winter cover crops to no later than June 1.

Figure 4: Agricultural fields in Orange County, Virginia (Courtesy of CBP)

Forestry practices:

- Increase cost-share payment cap to incentivize planting of riparian buffers, both as an individual practice and in conjunction with a livestock stream exclusion practice.
- Revise practice specifications to allow VDOF riparian buffer density standards to replace the existing Natural Resource Conservation Service (NRCS) standards.

Livestock stream exclusion practices:

- Revise cost-share payments rates based on buffer width and lifespan of practice.
    - The larger the buffer width and the longer the lifespan of the contract for the practice, the higher the percentage of cost-share funding provided.
- Include buffer payments to incentivize larger buffer widths and to compensate for the loss of productive agricultural land.
- Expand existing practices to provide cost-share funding to producers to maintain existing exclusion practices and extend/renew lifespans.
    - Amount of funding provided is based on buffer width and the complexity of the practices (existence of watering troughs and watering systems).

Nutrient management practices:

- Develop specification for use by DCR in contracting with private nutrient management planners to verify nutrient management plans (FY2021).

Figure 5: Grazing cattle on pasture, Augusta County, Virginia (Courtesy of CBP)

Programmatic:

- Work to ensure necessary funding for both SWCDs and the Virginia Agricultural Cost Share Program.
- Examine the methodology by which funds are allocated to individual SWCDs (FY2021).
- Recognize need for additional funding mechanisms for agricultural operations (revive the revolving loan program, new funding options for conservation on equine operations).
- Increase limits on tax credit amounts claimed by producers for equipment purchases and installation of practices (FY2021).
- Develop and fund a bundling pilot program for row crop operations (includes nutrient management plans, cover crops, continuous conservation no-till, and more precise fertilizer applications).
- Regionalize the Virginia Agricultural Cost Share Program to reflect priority practices and producer preferences (FY2021).
- Develop specifications to encourage alternative crops (such as hemp) and operations (such as orchards and vineyards) to install BMPs (FY2021).
- Increase the one-time incentive payment for conversion of cropland and pastureland to grass-covered or legume-covered land.

Developed Lands

For the urban/ developed, septic and urban forest sector, discussions with the PDCs are ongoing to identify their continued role working with localities and stakeholders to implement the BMPs and programmatic actions that were developed during the Phase III WIP engagement process. Similar to the Rural Transportation Planning (RTP) Program, PDCs propose to establish a long-term collaborative effort with DEQ, subject to available funding, to provide annual technical and administrative assistance to local governments within the Chesapeake Bay watershed as approved by an annual work plan. The PDC proposal includes the following items for possible inclusion in PDC-specific scopes of work:

- A yearly performance report of the regional WIP.
- Coordination with local and state governments, including liaison activities with federal agencies, SWCDs, state created river basin commissions -including River Basin Commissions (RBCs), as well as environmental non-profits.
- Advisory committee management.
- Technical committee management.
- Regulation and funding research for localities.
- Information technology, citizen communication and specific project assistance for localities or a region.

Potential PDC services in those areas could include:

- Reporting
- Data Collection/ Confirmation
- Convening
- Facilitating
- Grant Writing
- Mapping
- Engagement for Implementation
- Training
- Outreach and public education
- Tracking and verification
- Watershed planning

Based on the PDC proposal, and in continuance of the Phase III WIP development and implementation, the DEQ has made grant funds available to all 15 PDCs in Virginia's Chesapeake Bay watershed as authorized in the federally-funded 2018 Commonwealth of Virginia Chesapeake Bay Regulatory and Accountability Program (CBRAP) Work Plan approved by EPA. The intent of this project initiative is for each PDC with Chesapeake Bay watershed localities to provide interim technical and administrative assistance to these local governments within several specified activities described below. This project will allow for continued momentum of operations, discussions and relationships with local governments and stakeholders on the Phase III WIP.

Specific activities include facilitation of Phase III WIP implementation with localities and regional partners, development and distribution of implementation tools and resources, BMP implementation reporting and liaison with DEQ. An initial contract to begin these activities in 2019 was awarded to 15 PDCs in March 2019. The specific deliverable as included in the contract is provided as Appendix C.

6.5 Other Stakeholder Engagement Activities

Chesapeake Bay Stakeholder Advisory Group

In addition to the local stakeholder engagement process described above, Virginia also maintained an ongoing stakeholder dialog through its Chesapeake Bay Stakeholder Advisory Group (CBSAG). The Secretary of Natural Resources convenes this long-standing advisory group. The CBSAG met five times in 2018 and twice thus far in 2019. Secretary Strickler has attended all meetings. CBSAG Membership includes a broad cross-section of interest groups, with representatives of local governments, the agriculture and conservation communities, wastewater agencies, development community and business and other stakeholder organizations. The group provides regular input on Virginia's Chesapeake Bay restoration efforts, including the Phase III WIP planning process.

Staff from the Secretary of Natural Resources, DEQ, DCR and others gave presentations and updates to the CBSAG, and individually to a number of member organizations, including:

- Virginia Association of Counties
- Virginia Municipal Stormwater Association
- Virginia Association of Soil and Water Conservation Districts
- Virginia Farm Bureau Federation
- Virginia Agribusiness Council
- Virginia Manufacturers Association
- Virginia Association of Municipal Wastewater Agencies
- Virginia Conservation Network
- Chesapeake Bay Commission
- Vectre Corp
- Center for Coastal Policy, William and Mary Law School
- Fairfax County Public Works
- Virginia Poultry Federation
- American Forest Foundation
- Virginia's Cattlemen's Association
- Virginia Association of Homebuilders
- Restoration Systems
- Virginia Onsite Wastewater Recycling Association
- Alliance for the Chesapeake Bay
- U.S. Navy
- Rappahannock/Rapidan Regional Commission
- Farm Credit of the Virginias
- Northern Virginia Regional Commission
- Fairfax County, Supervisor
- Hanover County Public Works
- Hirschman Water & Environment, LLC
- Hampton Roads Planning District Commission
- Northampton County Citizen
- Virginia Environmental Endowment
- Virginia State Dairyman's Association
- Wetland Studies and Solutions

- Chesapeake Bay Foundation
- American Society for Civil Engineers
- International Paper Company
- James River Association
- Alliance for the Shenandoah Valley

These presentations frequently resulted in direct feedback, especially as they related to potential programmatic actions and state initiatives. Together with the suggestions and recommendations from the SWCD and PDC engagement efforts, they contributed to the state policies and initiatives described in Chapter 7. Ongoing consultation with the CBSAG and its member organizations will be a critical part of the Phase III WIP implementation.

Local Government Roundtables

The Local Government Advisory Committee (LGAC) to the Chesapeake Bay Program Executive Council sponsored seven local government roundtables across Virginia's Chesapeake Bay watershed in June of 2018 and one in April 2019. Each roundtable involved a facilitated discussion among elected officials in regional areas about the challenges and opportunities for watershed protection within their communities. Participants also received information about the Phase III WIP development process. Input provided by participants was delivered to the Commonwealth to help inform Phase III WIP development. The Virginia Environmental Endowment provided the funding for the roundtables.

Federal Agencies

In July 2018, EPA issued an expectations document for federal agencies with landholdings in the watershed. The document directs "federal agencies to work with the Bay watershed jurisdictions to ensure that they have the information necessary to prepare their Phase III WIPs." Working through the Federal Facilities Workgroup at the Chesapeake Bay Program, Virginia provided each federal agency that has landholdings in Virginia's Bay watershed with local planning goals on October 2, 2018. Federal departments were asked to provide a scenario of BMPs that achieve their Agency's planning goals, see Appendix B for details. Federal departments were requested to include a narrative with the programmatic, policy and funding initiatives that will be used to implement the BMPs in their Phase III WIP scenario. Virginia continues to engage federal agencies with landholdings in the Commonwealth through the Federal Facilities Workgroup.

For federal agencies with lands located in Virginia's Bay watershed, as listed in Chapter 5, only the Department of Defense (DoD) provided input for the Draft Phase III WIP. Four additional agencies, U.S. Forestry Service (USFS), U.S. Fish and Wildlife Service (USFWS), National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC), and the U.S. National Park Service (NPS), have provided input since then. Each agency's input is included in Appendix E and in Virginia's Final WIP III CAST scenario. For the remaining federal agencies that did not provide input, Virginia's WIP assumes all those federally owned lands achieve their planning goals.

Table 3: BMPs and Programmatic Actions Recommended by DCR/SWCDs and the PDCs (items and numbers in italics generally reflect state policy initiatives included as part of this Phase III WIP, see Chapter 7 for corresponding initiative)

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
DCR/SWCDs	• Animal Waste Facilities • Grass and Forested Buffers (incl. CREP) • Cover Crops • Nutrient Management (all types) • Poultry Litter Transport • Livestock Stream Exclusion	• *More consistent funding for VACS and technical assistance (#16-19)* • *Establish equine workgroup (#28)* • *Remove participant caps; more practice caps (#20)* • *Bundle practices (#24)* • *Increase Maximum Tax Credits (#21)* • *Modify practice specifications for cover crops, animal waste and stream protection, forest buffers and nutrient management (#20)* • *Move towards regionalized BMP priorities (#20)*	n/a
Accomack-Northampton PDC	• Erosion and Sediment Control – Level 2 • Increased septic pump outs to 20% • Increased number of Dry Extended Detention Ponds • Increased amount for Urban Shoreline Management • Added oyster BMPs • Added Growth Management Policy	• *Program Administration (#1-4, 7, 35-37, 46, 56)* • *BMPs – co-benefit with economic development (#4-7)* • *Funding (#40, 41, 43-46))* • *Septic System Topics (#51, 53-56* • *Shoreline Topics (#1, 4)*	• Job creation • Flood control • Coastal resilience
Central Shenandoah PDC	• Bioretention / Raingardens • Forest Buffer • Nutrient Management Plan • Urban Stream Restoration • Tree Planting • Street Cleaning • Storm Drain Cleaning • Septic Connection • Septic Pumping • Impervious Surface Reduction	• *Create new funds for stormwater design projects and engineering assistance (#43, 44)* • *Create consistent SLAF funding and expand categories for funds, including: Stream Restoration, Nutrient Trading, and Urban Stormwater BMPs (#43)* • *Identify opportunities for stream restoration/bank stabilization, implement*	• Local water quality improvement, habitat/fisheries improvement • Economic improvement, increased property values • Beautification • Human health • Flood control, drainage improvement • Education, community service

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		as part of a larger watershed plan (#4, 6, 7, 43, 44) • *Create Nutrient Management Plan that would be implemented or required by HOAs; may need a consultant to organize (#40-43)* • *Expand VCAP cost-share program and other urban cost share funds; VCAP funds need to be more consistent (#43, 44)* • *Create new funds to address project pairing. For example, pairing transportation and drainage with water quality projects (#6, 7)* • *Develop a program to capture and track sewer pumping. Pumping companies could report more information on when and where they pump (#1, 53)* • *Implement a "community first" program that promotes the local area instead of focusing in the bay area. A local program would engage citizens and encourage them to participate by promoting benefits to local communities (#46)*	
Commonwealth Regional Council	• Erosion and Sediment Control • Septic Secondary Treatment Conventional/Enhanced • Septic Pumping	• *Stream restoration (#4, 36)* • *Updated BMP Warehouse (#1)*	• Local water quality • Economic development • Outdoor recreation at our local public schools • Flood control
Crater PDC	• Bioretention/raingardens • Infiltration • Vegetated Open Channels • Septic Pumping	• Create a drainage risk assessment database in order to use VCAP funding. Coordination between Dinwiddie County Environmental and the SWCD	• Aesthetics, quality of life, outdoor/environmental education • Flooding concerns • Local water quality improvement

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		• *Educational outreach programs for rain barrel workshops, rain garden programs, etc. (#43)* • *By 2020, add provisions to local land use ordinances to prevent excessive changes to existing topography and tree cover outside of designated growth areas* (#39)	habitat/fisheries improvement • Drinking water protection • Economic development
George Washington Regional Commission	• Erosion and Sediment Control – Level 2 • Calculated septic pump outs at 20% of revised total • Retrofits / conversions • Conservation • VDOT collaboration	• *Program Administration (#1-4, 7, 35-37, 46, 55)* • BMPs – co-benefit with economic development • *Funding (#40, 41, 43-46)* • *Septic System Topics (#51, 53-55)*	• Job creation, economic development • Ecosystem services, native species • Flood control • Water quality, habitat improvement incl. pollinators • Fisheries improvement • Aesthetics, quality of life • CO2 reduction/air quality improvement
Hampton Roads PDC	• Urban Shoreline Management • Urban Stream Restoration • Wet Ponds and Wetlands • Erosion and Sediment Control – Level 2 • Septic Pumping	• *Create incentive programs and increase funding (SLAF, VCAP, voluntary BMPs, septic programs) (#43-45)* • *Research and increase BMP crediting (shoreline management, coastal resilience BMPs, boat pump-outs, litter BMP, tidal wetlands) (#1)* • *Reporting & Verification (BMP warehouse, BMP verification, VDH requirements, future land use) (#1)*	• Coastal resilience • Flooding concerns • Educating citizens • Aesthetics, quality of life, health benefits • Local water quality improvement
Middle Peninsula PDC	• Erosion and Sediment Control – Level 2 • Added oyster BMPs	• *Research BMPs that support job creation (in-water BMPs, riparian buffer enhancements, septic system BMPs, agricultural BMPs) (#1)* • Remove local match commitment for Go Virginia for any water	• Improved water quality • Economic development opportunities • Jobs • Ecosystem services • Decreased erosion rates • Flood control • Sea level rise

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		quality business that can remove N,P and S • Allow MS4's regardless of location to purchase water quality credits from any rural coastal locality that leverages Blue and Green assets for water quality • Establish a Chesapeake Bay Natural Resource extraction fee for any business leveraging B&G • *Align FEMA Nature Based Solutions $ for storm resilience with WIP3 (#4, 6)* • VDOT&D- Direct VDOT to manage drainage for water quality improvements in unregulated communities	
Northern Neck PDC	• Growth Management Policy • Forest Retention and Conservation • Shoreline Management • Septic & Sewer • Nutrient Management Plans • Stormwater Management	• *Regulate Septic Pump-out Requirements (VDH) (#51)* • *Improved Shoreline Management & Natural/Nature-Based Features (#4, 6)* • *Program Funding (Urban Cost Share Program, VCAP)(#43-45)* • Streamline existing funding sources and matching opportunities • Fund increased capacity for all agencies, organizations and localities dedicated to water quality	n/a
Northern Shenandoah Valley Regional Commission	• Erosion and Sediment Control – Level 2 • Nutrient Management Planning • Advanced Grey Infrastructure Nutrient Discovery Program (IDDE) • Septic Pumping • Forest Planting	• Provide dedicated funding source specifically for public agencies to further offset costs of implementing LID practices and associated educational campaigns • *Fund Ag Extension Offices to specifically implement an Urban*	n/a

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		Nutrient Management Education Program (#41) • Training and outreach on IDDE for local government staff, more refined outfall monitoring protocols and upgrades to technology and sampling equipment • *Leverage Clarke Co experience with implementing pump outs in a rural area West of the I-95 corridor (#2)* • *Funds to allow the VDOF to hire an intern to track tree planting projects; VCAP Conservation Landscaping (#36)* • Increased communication with VVDOF regarding annual accomplishments	
Northern Virginia Regional Commission	• Dry Detention ponds and Hydrodynamic Structures • Dry Extended Detention Ponds • Stormwater Performance Standard • Wet Ponds and Wetlands • Urban Stream Restoration	• Revisit "Baseline Load" for retrofits by MS4 in unregulated lands • *Expand VCAP beyond SWCD's, provide more funding for VCAP (#43)* • *Provide funding opportunities for retrofitting, reporting and verifying BMPs in unregulated developed lands, especially septic (#43-45)*	• Local water quality • Educating citizens • Flood control • Health benefits • Reduced blight
Rappahannock-Rapidan Regional Commission	• Growth Management Policy • Low Impact Development BMPs • Stream Restoration • Tree Planting, and Forest Planting • Wetponds and Wetlands • Dirt and Gravel Road E&S - Outlets • Street Sweeping, and Storm Drain Cleaning • Nutrient Management	• Develop a Watershed Management Plan for the Upper Rappahannock River • *Implement Healthy Watershed Forest Initiative recommendations (#35,36)* • *Identify opportunities for stormwater BMP retrofits and stream restoration/stabilization, and implement as part of watershed plan (#444)*	• Local water quality improvement • Reduced flooding • Habitat/fisheries improvement • Drinking water protection • Economic development • CO2 reduction, air quality improvement • Recreation, beautification • Local program improvements, such as less redundancy, less expense for local

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		• *Education and Outreach- dirt/gravel road design and maintenance, forestry practices, conservation landscaping, septic maintenance, etc. (#45)* • *Tracking BMPs– septic pump outs, tree seedling sales, VDOT impervious surface reduction, etc. (#1)* • *Expand Rainscaping/Green Grass Programs (#40)* • *Expand/encourage use of locality and non-profits' conservation easement programs* (#12) • Reinstate annual regional ESC/stormwater workshops for locality staff led by DEQ regional staff • *Expand VCAP and other urban cost-share funding (#43)* • *Grant/cost-share funding targeting non-MS4 land (#44, 45)* • *Dedicated PDC Environmental staff funding (#46)* • Adequate local and DEQ staff funding • Credit in the Bay Model for permanent easements • Clarification of ag and forestry exemptions in state E&S and SWM law to eliminate loopholes	government and private construction sector • Habitat improvement (including pollinators) • Increased property values • Groundwater protection
Region 2000	• Bioretention/raingardens • Dry Detention Ponds/Dry extended Detention Ponds • Infiltration • Nutrient Management • Wet Ponds/Wetlands • Septic Pumping/Denitrification-Conventional	• *Program & capacity level funding through VCAP, SLAF (#43-45)* • *Increase voluntary program incentives. (#40, 41, 43, 46)* • *Technical Assistance, uniform forms/reporting practices to increase reporting/tracking*	n/a

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
	• Wetland Enhancement • Tree Planting/Canopy • Growth Management Practices	*reliability (e.g. street sweeping, septic pump out); Important near-term activities (#1)* • Highlight stormwater control practices and Hazard Mitigation Planning • *Increased local agency coordination. (#46)* • Preserve existing regulations threatened through development challenges • *Expand practices to incorporate current ineligible program practices (e.g. storm drain cleaning) (#1)*	
Roanoke Valley-Alleghany Regional Commission		• *Expand the DCR Nutrient Management Plan Program to include urban areas (#41)* • Work with VDOT to improve unpaved road maintenance and conversion • Expand flexibility in existing grant funds to allow for state partnerships with private entities on water quality projects • Improve frequency and availability of DEQ training to locality employees and contractors, and consider expanding curriculums • *Provide funding for public outreach and education programs to educate citizens on how the Chesapeake Bay Watershed impacts them and how they can help (#46)* • Work with VDOT to expand street cleaning practices in Botetourt,	n/a

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		Alleghany, and Roanoke Counties • *Generally pursue more communication and coordination between state agencies to meet Chesapeake Bay Watershed Improvement goals (#42)* • *Generally increase state funding for wastewater improvements, septic improvements, nonpoint source water quality programs, etc., without decreasing existing funding in areas of water quality and environmental programs (#7, 40, 43, 44)*	
Thomas Jefferson PDC	• Nutrient Management Plan • Wet Ponds and Wetlands • Urban Stream Restoration • Septic Pumping • Septic Denitrification-Conventional • Septic Connection • Tree Planting-Canopy	• *Create a position at the PDC level to contract with the Virginia DEQ to provide annual technical and administrative assistance to local governments of the Chesapeake Bay Watershed Area as approved by an Annual Work Program (#46)* • *Expand VCAP Program and BMP eligibility (#43-45)* • *Locality outside the Bay Act area to amend the local erosion and sediment control ordinance to adjust the threshold at which erosion control practices are applied from 10,000 square feet to 2,500 square feet (#2)* • Update the DEQ erosion and sediment control handbook • *Legislation to fund existing and future programs that grow and provide trees (#35-37)*	• Climate resilience • Toxic contaminant retention • Reduced localized flooding • Aesthetic • Community health • Additional revenues for locality • Job creation • Decreased maintenance for homeowners • Public outreach and education • Improved fisheries/habitat • Tree canopy • Public access

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		• *Create a certification program for landscape companies that certify they have acquired a license in accordance with nutrient management (#42)* • *Annually, provide opportunities for homeowners with septic systems to connect to the municipal wastewater system at a reduced cost (#51)*	
Richmond Region (hosted by DEQ)		• *Incentive based solutions: monetary – funding, stormwater credits, tax incentives; regulatory-level playing field; trade-off benefit (#40, 41, 43-45)* • *Use of NGOs to facilitate collaborative partnerships for BMPs (#46)* • *Provide additional resources to SWCDs (staff, technical assistance) (#13, 15-17, 21, 22)* • Focus on co-benefits • *Expand Bay Act requirements to the entire CB watershed: RPA, E&S and stormwater at 2,500 square feet of land disturbance (#2)* • *BMP "Greenway" of stream restoration projects via easement or another alternative to pass authority/ownership to localities (#4, 36)* • *BMP "patient advocate" staff person at the regional or local level who could assist with coordination of timing, permitting, funding, etc. of BMPs to facilitate the process (#46)*	n/a

Organization	BMPs	Programmatic Actions	Co-Benefits Identified During Local Engagement Process
		• *Education and outreach: targeted mailings; HOAs and social media; CEUs for designers, developers, political leaders; CBLP certifications (#46)*	

CHAPTER 7. STATE INITIATIVES FOR THE CHESAPEAKE BAY PHASE III WIP

Based on the BMP implementation levels and experiences over the last several years, it is clear that Virginia's nutrient reduction goals for 2025 are ambitious and will require significant effort, sustained funding and increased technical capacity in all sectors. The following 56 initiatives support these efforts, and address many of the resource and capacity gaps identified by the SWCDs, PDCs and their stakeholders through their local engagement process. In addition to stakeholders already identified during the public engagement phase of the development of this plan, the Commonwealth will continue to work with NGOs, philanthropic organizations and other private entities to implement these strategies. We will work to identify nutrient and sediment reduction practices that are implemented by these organizations and pursue grants and other funding mechanisms to support state goals and programs. These initiatives also ensure the LAPGs for the load allocation sectors are achieved in each state basin.

Figure 1: Living Shoreline, York River State Park (Courtesy of CBP)

7.1 Multi-Sector Policy Initiatives for WIP III – Explanations

(1) Enhance reporting of BMP implementation

In order to continue and improve Virginia's BMP reporting effort, DEQ has initiated several activities related to urban and septic BMP reporting that will extend through the next twelve to eighteen months. First, DEQ staff is in the process of loading BMP information for localities that currently have less than 300 records in the BMP Warehouse. BMP data from all other localities was updated through December 2018. Second, upgrades to the BMP Warehouse are under development that will allow localities and federal agencies to view/retrieve all BMPs installed in their jurisdiction, regardless of whether or not they are the VSMP authority.

In the interim, DEQ will generate reports by locality or federal agency and distribute them for review. Reports for jurisdictions with up-to-date records will be sent by December 31, 2019. Reports for jurisdictions and other organizations where records still need to be uploaded will be sent by April 30,

2020. Third, DEQ will work with the Virginia Association of Municipal Stormwater Agencies (VAMSA) and the PDCs throughout 2019 to develop a Bay Watershed specific training module on reporting requirements. The module can be delivered periodically in person to the PDCs or groups of PDCs within the Bay area and can be posted online for reference. The training module will include updates on BMP crediting by the Chesapeake Bay Program. Fourth, in 2019, DEQ will work with VDH to align septic pump-out reports from Chesapeake Bay Preservation Act localities as captured in the 2018 annual reports with the VDH database and discuss data improvements. Fifth, DEQ will continue to work with partner state and federal agencies, private funders, and NGOs to provide training and establish reporting protocols and verification procedures to ensure that implementation of BMPs resulting from programs run by those organizations are reported into state tracking systems. DEQ has also initiated a new contract with the Chesapeake Bay PDCs, which includes enhanced reporting as one of the deliverables. In addition to these five high priority activities, data reporting and verification is a critical part of Virginia's Phase III WIP and is further discussed in Chapter11. (Lead agency: DEQ; target date: 2019.)

(2) Evaluate improvements and extension of the Chesapeake Bay Preservation Act

The Commonwealth has formed a work group to develop recommendations for extending the beneficial management measures established under the Chesapeake Bay Preservation Act (CBPA) throughout Virginia's Chesapeake Bay watershed. The work group will include potentially impacted stakeholders and the public. The work group will evaluate identifying, mapping and protecting sensitive natural resources on lands through Virginia's Chesapeake Bay watershed; protecting water quality through local land use planning and decisions; ensuring septic pump outs are increased to equal 20% of all systems in the Bay watershed being pumped in a year; determining financial and technical assistance needs of local governing bodies ; and existing state and federal programs that provide water quality protections. The workgroup will also assess implementation of the current CBPA to recommend needs for improvement. (Lead agency: OSNR; target date: 2019-2020.)

(3) *Prepare a State Lands Watershed Implementation Plan*

The Secretary of Natural Resources, in consultation with the Secretary of Administration and the Governor's Conservation Cabinet[8], will establish a team of state agency staff to develop a state agency watershed implementation plan to achieve significant reductions in nonpoint source nutrient and sediment pollution originating from the lands and activities of all state agencies, public institutions of higher learning and other state governmental entities that own/or manage land in Virginia. The first step in this process is the identification and mapping of all state owned and/or managed lands not already encompassed in local government efforts. Once the area of state-owned lands is established, the land use on these areas will be used to determine the aggregate level of nutrient reductions needed. Virginia will strive to achieve reductions of nutrient and sediment pollution from state-owned and/or managed lands consistent with expectations of this WIP. The team will consider innovative approaches to achieving the aggregate reductions most cost-effectively, including geographic targeting, trading, and maximizing co-benefits. (Lead agency: OSNR; target date: 2020-2021.)

[8] In October 2018, Governor Ralph Northam issued Executive Order Twenty Two, establishing the Governor's Conservation Cabinet, a new initiative to better protect Virginia's vulnerable natural resources and improve environmental quality across the Commonwealth. The Conservation Cabinet is comprised of the Secretaries of Agriculture and Forestry, Commerce and Trade, Finance, Natural Resources, and Transportation. The Secretary of Natural Resources chairs the Conservation Cabinet.

(4) Pursue the restoration and enhancement of wetland habitats

DGIF will implement its existing wetlands conservation and restoration program statewide under federal grants from the U.S. Fish and Wildlife Service, license revenues and complementary funding from the sale of the Virginia Migratory Waterfowl Conservation Stamp. Program activities, coordinated by DGIF's statewide wetland project leader, include technical assistance to public and private landowners about wetlands restoration options and regulatory permitting, development and implementation of restoration projects on DGIF lands, and partnership with conservation partners in their efforts to identify and secure funding for restoration projects. Additionally, the DGIF makes annual awards for wetlands restoration and enhancement projects to non-governmental partners through a grant program disbursing a portion of revenues collected from the sale of Virginia Migratory Waterfowl Conservation Stamps. The Phase III WIP as well as other national, regional and state plans, such as the North American Waterfowl Management Plan, Atlantic Coast Joint Venture Plan and Virginia's Wildlife Action Plan, will guide the agency's restoration priorities. (Lead agency: DGIF; target date: ongoing.)

(5) Determine method to quantify nitrogen reductions from finalized carbon trading regulations

The State Air Pollution Control Board approved a carbon pollution control rule. The Virginia rule could reduce our carbon emissions by 30% by 2030. As power-generating units add new technologies to meet this goal, they will also reduce nitrogen emissions, benefiting Chesapeake Bay water quality. After evaluation using protocols established to evaluate the reductions from the Volkswagen Diesel Emission Mitigation Settlement (Chapter 4), it was determined that implementation of the carbon control rule in Virginia would reduce nitrogen delivered to the Bay by about 8,000 pounds by 2025. This number would increase to about 40,000 pounds by 2028. Virginia will pursue formal recognition of these reductions by the Chesapeake Bay program. (Lead agency: DEQ; target date: 2020.)

(6) EO 24 – Section 2A, Coastal Resilience Master Plan

Chapter 4 includes a discussion of Executive Order 24 - Increasing Virginia's Resilience to Sea Level Rise and Natural Hazards, which was signed on November 2, 2018 by Governor Ralph Northam. Of greatest significance, the Executive Order mandates the creation and implementation of a "Coastal Resilience Master Plan" that will detail specific actions to assist local governments in reducing flood risk, through planning and implementation of both large scale flood reduction and adaptation initiatives to both adapt and protect Virginia's Coastal Regions. The Master Plan will incorporate nature and nature-based infrastructure and flood control whenever possible, resulting in expanded buffers and reduced runoff to the Chesapeake Bay and its tributaries. (Lead agency: Chief Resilience Officer; target date: 2019.)

(7) Evaluate WIP eligibility for Section 319 nonpoint source BMP funding

Section 319(b) of the Federal Clean Water Act requires states to develop and implement NPS pollution management programs. States are required to develop Nonpoint Source Management Plans in order to implement these programs. Under Section 319(h), states are eligible to receive federal funding to implement those programs. Virginia has a robust, multi-stakeholder Nonpoint Source Management program, of which the Chesapeake Bay watershed implementation is a significant effort.

Virginia has historically received more than $3 million per year in Section 319 funding. Current guidance requires a minimum of 50% of a state's allocation to support on-the-ground implementation of EPA-approved watershed-based plans (implementation plans); this is accomplished through sub-grant awards to partner organizations to install BMPs in watersheds with an implementation plan. The remaining funds

support administration of a state's Nonpoint Source Management Plan. Programmatic activities include enhancing the state program capabilities by providing staff and technology support to the state's core programs, and technical assistance and training to partners and the public. Federal funds also provide for staff positions in multiple state agencies for program coordination and implementation. Over the years, the program has documented many instances of water quality improvement, often called success stories.

In order to be eligible for Section 319 funding, the Phase III WIP must meet all of the nine criteria to be considered an approved implementation plan, making implementation activities eligible for funding under Section 319. Virginia envisions that the marriage of the WIP and Section 319 funds will be highly beneficial for both programs and provide significant water quality improvements. Specifically, it would allow for the installation of BMPs identified in the WIP (to address nutrients and sediment) in watersheds with an existing local implementation plan. In many cases, these implementation plans are written to address bacteria impairments, which can be addressed by installing many of the same BMPs that are used for nutrient and sediment impairments. This overlap would improve flexibility for local partners to broaden the technical reach of implementation efforts and address multiple pollutants simultaneously, while retaining the geographic focus that underlies the Section 319 program. This initiative will enhance local TMDL implementation projects by making additional BMPs eligible for 319 funding. (Lead agency: DEQ; target date: 2019.)

Figure 2: Connecting home sewer line to new alternative onsite sewage system, Matthews County, Virginia (Courtesy of VDH)

(8) Expand voluntary use of Innovative BMPs/bioreactors

Nitrogen reducing bioreactors were originally designed and installed to treat nitrogen in subsurface flow from tiled and ditched agricultural fields. Work currently ongoing at Virginia Tech suggests that this technique can also be used to foster denitrification, removing legacy nitrogen loads from emergent groundwater (springs). Studies indicate that this approach could be viable on hundreds of springs in Virginia's Bay watershed, including many in the Shenandoah Valley. A program to seek voluntary

adoption of these practices in areas where groundwater nitrogen concentrations are elevated would increase the potential for reductions. These practices are highly cost effective and can be equipped with water quality monitoring equipment to measure the actual nitrogen reductions achieved. This additional data will help build the body of science on the use of bioreactors on springs. (Lead agency: DEQ; target date: 2020.)

(9) N:P and Basin:Basin exchanges

The Chesapeake Bay Program Partnership basin targets for the Phase III WIP result in higher levels of implementation needed to achieve the targets in the Potomac Basin and on the Eastern Shore with progressively less effort needed in the more southern basins due to their reduced influence on Chesapeake Bay water quality standards. As Virginia pursues state policies and initiatives to drive WIP implementation, the Commonwealth will seek to target implementation in areas where the greatest reductions can be realized while striving to maintain a balanced level of implementation across all Basins. In doing so, some Basins may reach or exceed their planning targets before others. Similarly, the targets for phosphorus are likely to be reached before the targets for nitrogen. To balance all of this, and thereby minimize the collective cost and effort required across the Commonwealth, the Chesapeake Bay Program Partnership allows phosphorus to be exchanged for nitrogen and for loads to be exchanged between state-basins. These exchanges are a way for Bay states to adjust the Basin planning targets while ensuring at least the same water quality response and are not synonymous with the Commonwealths nutrient trading program. These exchanges have been evaluated using the Partnership's Models and the resulting loadings were found to be at least as protective of water quality criteria as the state-basin planning targets. Utilizing these exchanges balances effort and reduces overall costs to achieve the overarching watershed goals. (Lead agency: DEQ; target date: 2019.)

(10) Consider options for additional No Discharge Zones

The Commonwealth, in consultation with stakeholders, will consider options available under the Clean Water Act to apply to the Administrator of the EPA for a No Discharge Zone (NDZ) for all or portions of the Chesapeake Bay mainstem and its tributaries, including evaluating whether or not state legislative changes may be required to facilitate such an application. A NDZ is a designated water body where the discharge of sewage (whether treated or untreated) from all vessels is prohibited. In a NDZ vessels must retain their sewage discharges onboard for discharge at sea (beyond three miles from the shore) or onshore at a pump-out facility. Some NDZs have already been established in Virginia. This initiative would explore options for increasing the numbers of NDZs in Virginia waters. (Lead agency: OSNR/DEQ; target date: 2020-2025.)

(11) Advance oyster restoration efforts in Virginia

The 2014 Chesapeake Bay Watershed Agreement, which guides the work of the Chesapeake Bay Program, calls for state and federal partners to "restore native oyster habitat and populations in 10 Bay tributaries by 2025, and ensure their protection." Five of the tributaries in this outcome are in Virginia, Lafayette River, Lynnhaven River, Piankatank River, Lower York River, and Great Wicomico River. Efforts are underway to set tributary-specific restoration goals and develop plans describing how these tributaries will be restored. This effort will add to previous Virginia oyster restoration work in the James River, Rappahannock River and Tangier Sound. (Lead agency: VMRC; target date: 2020.)

(12) Guide Land Conservation in Virginia to the Highest Conservation Value Lands

Conserving land can help meet the Commonwealth's Chesapeake Bay water quality goals by targeting additional BMP implementation on conserved lands and by avoiding the potential for load increases resulting from future land use changes. The recently developed *ConserveVirginia* tool can be used to help maximize the benefits derived from land conservation efforts in the Commonwealth.

ConserveVirginia identifies 6.3 million acres of high priority conservation areas across the Commonwealth. These mapped acres will help guide a long-term land conservation strategy for Virginia by serving as a "menu" to guide and inform state land acquisitions, environmental mitigation projects, and Virginia Land Conservation Foundation Grants.

The *ConserveVirgini*a map is designed to be updated regularly as new data becomes available and additional resources and protection tools emerge. Similarly, the administration will work to add new data models to the *ConserveVirginia* map as data and technology allow. One such effort currently underway will identify high nutrient and sediment load areas in need of conservation and restoration to protect and restore the Chesapeake Bay water quality. (Lead agency: DCR; target date: 2020)

7.2 Agricultural Sector Policy Initiatives for WIP III – Explanations

(13) Establish state-federal-private collaborative approach to document voluntary agriculture best management practices (BMP), particularly cover crops, stream exclusion and nutrient management (NM) plans

The Office of the Secretary of Natural Resources formed a voluntary BMP task force consisting of several agencies and organizations[9]. The goal of the task force is to identify an efficient and effective method or methods to document agriculture BMPs, which are employed without federal or state incentive payments. The task force is reviewing existing methods including, but not limited to, a farm survey protocol developed and implemented by Pennsylvania State University[10] as well as potential surveys or other methods to account for voluntarily implemented cover crops and livestock exclusion practices. The task force is also reviewing staff and funding needs to successfully document voluntary BMPs. Such review shall specifically consider the agriculture technical assistance roles of the VCE and local SWCDs. They will also determine approaches for engaging the farm community in method(s) employed to effectively document the implementation of voluntary BMPs. (Lead agency: OSNR; target date: 2019-2020.)

(14) Enhance Coordination among State Agencies assisting farmers

Multiple state and local agencies provide technical assistance to farmers employing management practices to improve farm operations and reduce runoff of excess nutrients and sediment. These state agencies include the VCE, DCR, VDOF, and VDACS. Farmers also receive assistance from their local SWCDs.

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[9] U.S. Department of Agriculture Natural Resources Conservation Service and Farm Service Agency (USDA), the U.S. Environmental Protection Agency (EPA), Virginia Department of Conservation and Recreation (DCR), Virginia Department of Agriculture and Consumer Services (VDACS), Virginia Cooperative Extension (VCE), Virginia Department of Environmental Quality (DEQ), Virginia Department of Forestry (VDOF), Virginia Association of Soil and Water Conservation Districts (SWCDs), Virginia Farm Bureau Federation, and Virginia Agribusiness Council.

[10] Pennsylvania State College of Agricultural Sciences. (2016). PA Farm Conservation Practices Inventory.

These agencies work collaboratively, but also recognize the opportunity to enhance that collaboration. Through a joint letter of agreement between the Secretaries of Natural Resources, Agriculture and Forestry, and Education and the Virginia Association of SWCDs, Virginia will identify and implement avenues for cross-collaboration that address technical assistance, education and training, research needs, and agriculture incentives. Agency capacity needs will also be identified.

Many federal agencies also provide valuable technical assistance to farmers. The Office of Natural Resources, in partnership with the Office of Agriculture and Forestry and DCR, will convene regular meetings with the USDA Natural Resources Conservation Service and Farm Service Agency to identify opportunities for collaborative engagement. (Lead agency: OSNR; target date: 2020.)

(15) Reinstate Virginia's Agriculture BMP Loan Program

Virginia DEQ's Clean Water Financing and Assistance Program administers the Agricultural BMP Loan Program. The program was suspended in 2016 due to low demand. The program has been updated and reinstated to assist in meeting Virginia's Chesapeake Bay Phase III WIP goals. Legislation (HB 2637) passed during the 2019 session of the General Assembly 1) conforms Virginia law to Federal law with respect to principal forgiveness and 2) expands the list of eligible applicants and practices. Using this loan program to cover the upfront costs of BMPs until cost-share programs can reimburse those costs upon project completion will help overcome financial constraints that are preventing the implementation of more BMPs. The Clean Water Financing and Assistance Program worked with stakeholders to update the program guidelines. The State Water Control Board approved the revised guidelines on June 27, 2019 and the program resumed July 1, 2019. Updates to the guidelines incorporate changes based on the 2019 legislation and provide additional incentives for producers, including zero percent interest on all loans, no long-term loan requirement, and the possibility for principal forgiveness. More information can be found on DEQ's Agricultural BMP Loan Program website (Lead agency: DEQ; target date: 2019.)

(16) ***Adequate and consistent funding for VACS***

The Phase III WIP will require a significant increase in agricultural BMP implementation in Virginia's Chesapeake Bay watershed. This needs to be accomplished while sustaining the existing local water quality benefits of agricultural BMPs in the substantial portion of Virginia that is outside of the Bay's watershed. The Agricultural Needs Assessment of the annual funding amount necessary for effective SWCD technical assistance and implementation of agricultural best management practices as called for in § 10.1-2128.1(C) documents the financial assistance and technical assistance needed to meet WIP nutrient and sediment reduction goals. This assessment also includes those needs outside of the Chesapeake Bay watershed to meet other water quality objectives. The assessment includes the projected contribution from federal programs and the participant portion of cost-shared practices. WIP III will be used to update the Agricultural Needs Assessment and the Budget Template submissions of applicable SWCDs. This assessment will be used to quantify the level of funding needed to achieve year 2025 reduction targets. Virginia will continue to pursue funding from federal, state and private sources to meet nutrient and sediment reduction goals. This funding is recognized as critical not only because of the significant water quality benefits, but also because of the volatility of the agriculture industry. This volatility is largely due to the risks associated with uncertainties, such as weather, yields, prices, government policies, global markets and other factors. (Lead agency: DCR; target date: 2019, and each year thereafter.)

(17) ***Provide adequate and consistent funding for technical assistance***

A significant increase in agricultural BMP implementation cannot be achieved without an adequate number of technical staff in the SWCDs throughout the implementation period of Phase III WIP. A

sustained increase in technical assistance funding through 2025 – from the current 8% to 13% of cost share funding– will enable SWCDs to hire and retain enough qualified staff to provide on-farm technical assistance to farmers throughout the design and installation of the significantly increased number of agricultural BMPs needed to meet the nutrient reduction goals. The Virginia Soil and Water Conservation Board approved the creation of an Allocation Subcommittee that will provide recommendations on the ways to provide adequate, level and fair base technical assistance funding to all SWCDs in Virginia. A consistent level of base technical assistance funding will help ensure that SWCDs have adequate staffing to support all of the programs that they help to implement. The Allocation Subcommittee will provide its recommendations to the Virginia Soil and Water Conservation Board in December 2019. (Lead agency: DCR; target date: 2019.)

(18) Direct 70% of cost share funding for Chesapeake Bay needs

In order to accelerate agricultural BMP implementation in Virginia's Chesapeake Bay watershed, a higher percentage of total cost share funding will be directed into the watershed as directed by the Appropriations Act. Shifting a higher percentage into the Chesapeake Bay watershed is necessary to guarantee successful implementation and to ensure the Commonwealth reaches its nutrient and sediment targets by 2025. (Lead agency: DCR; target date: 2019.)

(19) Direct increased cost share funding to key WIP III SWCDs

More than 73% of the total nitrogen and phosphorus reductions by 2025 projected by the 32 SWCDs, either entirely or partially within Virginia's Chesapeake Bay watershed, will likely be achieved by 10 SWCDs. As a result, a higher level of funding will be allocated to these areas. Should other SWCDs develop strategies to achieve greater reductions than currently projected, they will require additional cost share funding. (Lead agency: DCR; target date: 2020.)

(20) ***Make revisions to the VACS Program, including but not limited to, regionalizing the program. Direct increased cost share funding to key BMPs in key Phase III WIP SWCDs***

An extensive stakeholder outreach effort in 2018 resulted in more than 190 suggestions for changes to the state agricultural cost share program. A significant number of these, as described in detail in Chapter 6, will be implemented in either state fiscal year 2020 or 2021. These changes include increasing VACS participant caps to $100,000 per year, more flexible carryover guidelines to enable farmers to complete BMP installations, a greater variety of options for livestock stream exclusion, cost share for tidal shorelines on agricultural or forest land, and changes to specifications for animal waste control facilities. All of the many changes previously adopted can be found in the FY2020 Virginia Agricultural BMP Cost Share Program Manual. Farming practices differ across Virginia's Chesapeake Bay watershed. There is more livestock in the central and western portions of the Bay watershed and more crop farming in the eastern portion. Phase 6.0 of the Chesapeake Bay Model, assigns different reductions in delivered nutrient loads to identical best management practices depending on where they are located within the Chesapeake Bay watershed. Consequently, as the agricultural cost share program becomes more regionalized in its priorities, new policies will be developed to prioritize funding for those BMPs, which will result in greater cost efficiencies in each established region. The VACS Program provides SWCDs with a "Conservation Efficiency Factor" (CEF) tool within the cost share database. CEF enables SWCDs to compare the cost efficiency of cost share applications they received, based on a number of factors. SWCDs will be encouraged to make even greater use of CEF in order to maximize cost-effectiveness. Furthermore, DCR will charge a subcommittee of the VACS technical advisory committee to evaluate

means to increase program cost effectiveness and targeting. This will result in different agricultural BMPs being emphasized in different areas of the watershed.

The VACS Program will also strive to sustain a level of tillage management practices consistent with 2017 levels of implementation, at a minimum, and increase development of conservation plans (including RMP plans, CBPA agricultural assessments, NRCS and DCR conservation plans and other soil conservation plans) to cover 70% of all agricultural lands. Cover crop levels in the Phase III WIP will be increased to approximately 70% of available cropland acres. These acres include both traditional cover crops and harvested cover crops. The VACS Program will be revised to increase cost-share caps, modify seeding rates for cover crops and modify allowable cover crop planting dates (with EPA approval) in order to help achieve these levels. (Lead agency: DCR; target date: 2020-2021.)

(21) Increase tax credits for agriculture BMPs and equipment

A significant number of farmers in Virginia will not accept either state or federal cost share assistance. However, farmers often will apply for agricultural BMP and equipment tax credits. These refundable state tax credits have not increased in many years and are, therefore, no longer an adequate incentive for many farmers to help offset the expense of precision agricultural equipment and/or implementation of other agricultural BMPs. Legislative action will be necessary to increase these credits. DCR is working to develop a proposal to increase some agricultural conservation tax credits. (Lead agency: DCR; target date: 2020.)

(22) Support SWCD technical assistance staff implementing tax credit projects

Currently, SWCDs receive no financial assistance from the state agricultural cost share program to support staff that administer agricultural BMP and equipment tax credits. In certain SWCDs, this has created a burden that will be addressed by stabilizing technical staffing support from the state. Since 2012, a stakeholder advisory group of SWCD representatives has examined the funding needs for administration and operation of SWCDs as well as technical assistance provided by SWCDs for the implementation of agricultural BMPs needed to address the Chesapeake Bay Watershed Implementation Plan and water quality impairments across the Commonwealth. The Budget Template has focused on two general scenarios, current agricultural cost share funding at the time, and a minimum $50 million/year cost share program. The challenge of funding technical assistance for SWCDs, particularly for administration of state tax credits and most other nonpoint source pollution reduction programs, is that technical assistance funding fluctuates every year, as a percentage of the amount of agricultural best management practice cost share. The Virginia Soil and Water Conservation Board has approved the creation of an Allocation Subcommittee to address base technical assistance funding for SWCDs to administer the tax credit program. The subcommittee will provide recommendations to the Virginia Soil and Water Conservation Board in December 2019. (Lead agency: DCR; target date: 2019.)

(23) Enhance implementation of RMP program through scheduled periodic review of regulations

The RMP program provides a plan to farmers ensuring that an adequate level of BMP implementation addresses water quality concerns on an average farming operation. Fully implemented RMPs also provide farmers with certainty that they will not be subject to increased state requirements related to nutrient or sediment reduction for a period of nine years. With continued implementation of required practices, RMPs are also renewable. The Virginia Soil and Water Conservation Board has authorized DCR to initiate a periodic review of the RMP regulations, for which public comment will be solicited. Periodic

review of the RMP regulations will help identify obstacles to implementation and certification, and will lead to changes in the regulations to address these obstacles. (Lead agency: DCR; target date: 2019-2020.)

(24) Bundle all RMP BMPs into one cost share contract

To promote more enrollment in RMPs and to accelerate RMP implementation, DCR proposed a pilot project in a SWCD to provide cost share funding for the implementation of all BMPs included in RMPs. The Virginia Soil and Water Conservation Board has approved the pilot project. If this project results in a faster rate of RMP implementation, it will be expanded to additional SWCDs. (Lead agency: DCR; target date: 2020.)

(25) Improve water quality benefits, soil health and farm operations through revisions to the NMP regulations

The Virginia Soil and Water Conservation Board and DCR have modified nutrient management BMP specifications in recent years – for example, precision nutrient management BMPs – to help improve the program. DCR will also conduct a periodic review of the Nutrient Management Program Regulations in Fall 2020 and will consider additional changes to the VACS Program, which could include additional measures to incorporate soil health, such as bundling together applicable BMPs. Improved soil health can improve soil function, resilience, productivity and ultimately farmers profitability. Furthermore, DCR will review and revisit education requirements for certified NM planners, including but not limited to, qualifications for certification via the DCR Agriculture Training School and the applicability of two-year undergraduate agriculture programs at colleges with an agricultural curriculum. (Lead agency: DCR; target date: 2020-2021.)

(26) Increase NMP implementation on agricultural lands

Virginia's Phase III WIP seeks 85% implementation of NMPs on all cropland acres in the Chesapeake Bay watershed. It is expected that in many areas, these plans will include advanced actions, such as precision application, which further enhance the timing, rate and placement of nutrients. The Commonwealth will pursue this level of implementation through the VACS Program, federal programs and enhanced documentation of voluntary implementation of NMPs. Virginia will pursue legislation specifying that if the implementation target of 85% is not achieved by December 31, 2025, agriculture operations in the Chesapeake Bay watershed larger than 50 acres that apply fertilizer, manure, sewage sludge, or other compounds containing nitrogen or phosphorus to support plant growth must develop and implement nutrient management plans in accordance with the regulations adopted pursuant to § 10.1-104.2. . This effort will take into account both the capacity of certified Nutrient Management Plan writers and the availability of cost share and other applicable funding sources.

Additionally, Virginia will pursue legislation specifying that all contractor-applicators – i.e., persons required to hold a permit to apply any regulated product pursuant to § 3.2-3608, – must apply commercial fertilizer on farm operations in the Chesapeake Bay watershed larger than 50 acres pursuant to an NMP, developed in accordance with the regulations adopted under § 10.1-104.2. Consideration will be provided for tiered levels of certification, including for individuals working under the supervision of a certified applicator (Lead agency: DCR/ VDACS; target date: 2020-2021.)

(27) Livestock stream exclusion

Virginia's Phase III WIP seeks the exclusion of livestock from all perennial streams in the Chesapeake Bay watershed. In accordance with other initiatives, the Commonwealth will pursue this level of implementation through substantial revisions to and incentives from the VACS Program and commits to pursuing additional flexibility in the program for participating landowners and operators. Effective July 1, 2019 the Virginia Agricultural Cost Share Program was revised to provide greater flexibility of buffer widths, length of contracts, and payment rates, for livestock stream exclusion practices, including payments for converting productive farm land into buffer areas. Funding for maintaining existing livestock stream exclusion practices also became available to producers as of July 1, 2019. DCR will issue a contract in 2019 for a pilot project in one county, with a significant livestock population, to use imagery to determine: where livestock are currently located, whether a perennial stream is also present on site, and whether stream exclusion fencing has been installed. This project is intended to demonstrate a methodology that can be repeated in additional counties with significant livestock populations in the Chesapeake Bay watershed. DCR will establish a means of determining where livestock stream exclusion fencing is needed. DCR in partnership with the VACS Technical Advisory Committee will also evaluate temporary fencing options for use on rented grazing land. The Commonwealth will also pursue legislation specifying that if the implementation target for livestock stream exclusion is not achieved by December 31, 2025, that all farms in the Chesapeake Bay watershed with livestock accessing perennial streams must provide exclusion measures. The availability of state and federal cost-share funds for exclusion practices will be taken into account. (Lead agency: DCR; target date: 2019-2020.)

(28) ***Horse manure and pasture management through incentives***

DCR has organized an Equine Workgroup via its Agricultural BMP Technical Advisory Committee to develop recommendations for BMPs and funding mechanisms for non-commercial equine operations that do not qualify for funding from the VACS Program. The Workgroup is also charged with providing recommendations that clarify which commercial equine operations are eligible to receive VACS cost-share funding. In addition, DCR will work with Virginia Cooperative Extension to investigate practical options for the disposal and use of horse manure from both commercial and non-commercial operations. (Lead agency: DCR; target date: 2020.)

(29) ***Expand poultry litter transport in the Chesapeake Bay***

The Phase III WIP will include a strategy to increase the number of eligible counties for DCR's Poultry Litter Transport Program from two to three, and to annually increase the amount of litter transported from these counties from 5,000-6,000 tons per year up to 89,000 tons per year. This total will include non-subsidized litter transported to and from three counties (Rockingham, Page and Accomack) to other counties with low phosphorus soils. DCR has identified 27 counties in Virginia, plus portions of 16 other localities, where this poultry litter could be land applied, consistent with a nutrient management plan, without the threat of phosphorus enrichment. The Commonwealth will also explore development of alternative uses of poultry litter. This will directly decrease nutrient loads attributed to land-applied animal manure in the Chesapeake Bay watershed. (Lead agency: DCR; target date: 2019-2025.)

(30) ***Improve poultry litter transport accounting***

Since 2010, the Virginia Pollution Abatement Regulation for Poultry Waste Management has required that permitted poultry growers keep certain records when they transfer more than 10 tons of poultry waste to another person in any 365-day period. Some of these records include the recipient's name and address, amount of poultry waste transferred, locality name, identification of the nearest stream in proximity to

poultry waste application site, and if the recipient is or is not a poultry waste broker. DEQ collects the growers' transport records during routine inspections of permitted facilities, which occur on a risk-based frequency every one to four years. Poultry waste end-users are also required to keep records regarding land application practices. Poultry waste brokers are required to keep similar records and report them annually to DEQ. The current regulation also requires growers, brokers, and end-users to make all records available to DEQ upon DEQ's request.

During the regulatory process to reissue the Virginia Pollution Abatement Regulation and General Permit for Poultry Waste Management, DEQ will consider options with input from a TAC, to provide more accurate accounting of progress towards WIP goals associated with poultry litter transport and utilization . Options include using existing or modified regulatory requirements to obtain certain records from growers, brokers, and/or end users on at least an annual basis. Additional access to poultry litter transfer data would bolster accuracy of modeled effects of litter applications, and may offer the opportunity to verify end-user implementation of NM practices. In its evaluation, DEQ will consider ways to reduce the possibility that regulatory requirements would discourage end-users from using poultry litter in areas that could benefit due to soil phosphorus needs or other factors. (Lead agency: DEQ; target date: 2020.)

(31) Increase grass and forest buffers through the Conservation Reserve Enhancement Program (CREP)

Both forested and grass buffers next to streams and other state waters are among the most cost-effective BMPs for reducing nonpoint source nutrient runoff. Consequently, the state match percentage for U.S. Department of Agriculture CREP buffer projects has been increased from 25% match to 35% match in fiscal year 2020 to encourage additional signup. This will increase total financial reimbursement to participants to at least 85%. (Lead agency: DCR; target date: 2019.)

(32) Pilot long-term marketing plan to promote certain farm products grown on farms that participate in the RMP program

VDACS marketing staff will research opportunities for enhanced marketing to promote farm-grown products that are grown on farms that are fully implementing an RMP. Products could be marketed and sold under a specific brand to identify they were produced on an operation that has all necessary BMPs to protect water quality. Virginia could look to emulate marketing programs, such as Michigan's Agriculture Environmental Assurance Program (MAEAP), which is similar to Virginia's RMP program. MAEAP created a recognizable logo that is proudly used by Michigan farmers on their product packaging and signage to attract consumers who care about environmental stewardship. (Lead agency: VDACS; target date: 2020.)

(33) Enhance verification of BMPs implemented as a result of the Agricultural Stewardship Act (ASA)

VDACS will increase the current ASA program staffing levels to allow more focus on Stewardship Plan BMP tracking and verification of BMPs implemented as a result of the program. The program will need additional resources to keep up with the verification schedule necessary to ensure those BMPs are accounted for as part of the Bay model. As the number of stewardship plans increase, so will the staff time needed to verify BMPs in those plans. Verifying that the BMPs implemented as part of the stewardship plan are in place and functioning properly is a current requirement of the Agricultural Stewardship Act and will ensure these BMPs are accounted for in the Bay model. (Lead agency: VDACS; target date: 2020.)

(34) Support growth of private sector native plant nurseries and oyster aquaculture

The Governor's Agriculture and Forestry Industries Development (AFID) Fund grants are discretionary economic development incentive funds made to a local government for projects that create new capital investment and jobs in Virginia, and produce value-added agriculture or forest products, 30% of which must be grown in the state. VDACS will promote the availability of the AFID grant program for projects involving operations such as oyster aquaculture or nurseries that produce native plants needed for stormwater BMPs and encourage localities to consider submitting such projects to VDACS. The definition of "agricultural products" in the code as it relates to the AFID Fund includes aquaculture. (Lead agency: VDACS; target date: 2020.)

7.3 Forestry Sector Policy Initiatives for WIP III – Explanations

Figure 3: Natural forest buffer (Courtesy of VDOF)

(35) Implement DOFs Healthy Watershed Initiative

The Virginia led Healthy Watersheds Forests Project, now in its fourth year, is sponsored by the Department of Forestry and the Rappahannock River Basin Commission. It is funded by the Chesapeake Bay Program (CBP) through the Chesapeake Bay Trust and the U.S. Endowment for Forests and Communities.

The goal of phase III of the project is to create the policy and financial infrastructure needed to facilitate forest and agricultural land conservation and retention at a landscape scale on a sustainable, long-term basis. The project has two principal programmatic tasks and a third integration task. Task 1 is to work with two Rappahannock River basin localities to develop and implement plans, policies and ordinances that foster high quality forest and agricultural land retention. Task 2 is to develop, model and pilot long-term funding mechanisms supported by the private sector to create additional funding for landowners and income incentives for rural localities to make retention of forest and agriculture lands a priority. Task 3 is to coordinate with other CBP workgroups to integrate the findings and tools developed in phase III with those of other initiatives. The goal is to institutionalize changes and actions required to achieve land use

policy actions that prioritize forest and agricultural land retention, and fund land conservation through the private sector.

The phase III project received funding and authorization in April 2018, and began by conducting policy, regulatory and financial analyses. The goal is to build an inventory of regulatory and voluntary land stewardship programs for Virginia landowners. Such programs include additional landowner revenue for BMPs for project specific conservation activities and benefits resulting from optimal use of tax laws.

The other major objective was to identify possible candidate jurisdictions to serve as phase III pilots and secure the endorsement and support of elected and appointed leadership and a broad sample of landowners within the geographic area of interest. The Rappahannock River Basin Commission would help the project team to identify how best to meet landowner and locality needs to prioritize and incentivize land conservation actions. Two counties – Essex in the lower Rappahannock basin and Orange in the middle Rappahannock basin – agreed to participate in the project and committed to hosting the pilot program resulting from the project.

Studies reviewed by the team have shown that there is considerable private capital looking to invest in forest conservation as an offset for environmental impact elsewhere. Through their interviews with landowners in the pilot counties, team members have also found there is significant interest among forest landowners to access this investment capital as another income stream. The barrier is the scale mismatch. Institutional investors need to make investments at a minimum project size of $50 million; because it takes them the same due diligence to do a billion-dollar deal as it does a few million. The key, therefore, is to aggregate landowner interests and bundle them to produce a return on investment model, rather than promote a philanthropic incentive. A principal goal of phase III is to develop and test such a model. (Lead agency: VDOF; target date: 2019-2020.)

(36) Improve technical assistance, collaboration and oversight of stream protection projects. Increase riparian forest buffers and urban tree canopy

The VDOF is actively pursuing the creation of a Watershed Program Manager position for the Chesapeake Bay Initiative. This position will work with our partner agencies to promote Riparian Forest Buffers, Urban Tree Canopy, a watershed wide focus and enhanced urban stormwater efforts. These efforts will be combined with our land conservation division to strategically focus on multiple organizational goals with our land conservation partners. The position will coordinate all watershed initiatives for the agency to include identifying and applying for appropriate grant funding sources.

Specific focus areas for this effort include riparian forest buffer establishment along streams and associated lands, tree planting on urban/suburban riparian lands, and BMPs to mitigate concentrated flow to existing buffers. Traditional and new methods for implementing conservation projects will be utilized. Examples include more emphasis on natural regeneration, higher dependence on trees that grow quickly, utilization of forestry BMPs to address concentrated flow issues, and deployment of multi-use riparian buffers that meet both state water quality and landowner economic objectives.

Similar to the Agricultural Soil and Water Conservation Plans, VDOF will seek to ensure that the plans developed for rural and urban forestland owners (Pre-harvest Plans, Urban Forest Management Plans and Forest Stewardship Management Plans and Land-Use plans) receive appropriate credit for the water quality benefits provided. Each of these plans encompass efforts to improve forest health, forest roads, improve wildlife habitat and capture positive impacts of silvicultural activities. Further, Green Infrastructure Plans are an important tool for localities for the wise use of their resources. Credit

methodology needs to be developed with assistance from DEQ to capture the improved land use attributes that are complimentary to this effort.

Further, efforts will be made in harnessing contributions of the tree ordinances and per capita investment of localities that participate in the Tree City USA, Tree Campus USA to capture appropriate crediting. (Lead agency: VDOF; target date: 2021.)

(37) Urban Tree Canopy Program

The Virginia Urban Tree Canopy program assists communities in attaining the WIP III goals for canopy expansion by providing cost share funding to plant and maintain more trees on both public and private land. The program proposes to provide a tracking platform for both communities and private citizens to report new tree plantings using ESRI® software. Funding will be used to educate communities on how to use the platform for tracking and reporting, and for compiling the data for DEQ. Some funding will be used for VDOF staff to assist communities in conducting inspections, reporting and coordinating the cost-share program and data management. USFS Urban and Community Forestry Program funds will also be used to support Urban Tree Canopy analyses and tree inventories for communities to give better data and encourage better management of existing canopy.

Through the Chesapeake Bay Program Partnership, the VDOF will actively pursue efforts that will allow for an improved accounting for the acquired benefits of enhanced riparian buffer growth, tree canopy expansion/growth, natural regeneration, projects completed in the absence of cost-share, and municipal and community planting achievements. This methodology of capturing growth will be titled, the "Maturity Measurement" approach. Through this method, the VDOF and their partners will be able to account for additional contributions and growth that are measurable from year to year as Land Cover Assessment data is acquired and/or data is provided regarding practice installation or discovery. The Maturity Measurement calculation will be used to achieve a significant percentage of the goals for the urban sector that are provided in the Phase III WIP.

The goal of this maturity measurement approach is to recognize the benefits of existing trees and their continuous growth while establishing more community trees. The implementation goals for the Tree Planting – Canopy BMP in this plan include a combination of new plantings as well as the accounting for the growth of existing canopy through updates to the Chesapeake Bay land cover data. The trees will provide green stormwater infrastructure benefits, thereby improving water quality across Virginia and, specifically, in the Chesapeake Bay. Funding will be used from the Virginia WQIF, USFS Chesapeake Watershed Forestry Program, USFS Urban and Community Forestry Program and private funds as they become available. VDOF is strategically addressing areas of need with staff support for enhancing canopy goals, riparian plantings and effective community engagement. Funding for the two current positions at VDOF is solely provided by the USFS. Stable funding through the Commonwealth is needed to ensure program viability. (Lead agency: VDOF; target date: 2019.)

(38) Pursue Sentinel Landscapes Partnerships

Sentinel Landscapes Partnerships are being pursued to sustain military readiness, reduce the effects of incompatible development around military installations, preserve working forests and agricultural lands and protect wildlife habitat by focusing on areas where these priorities overlap. The military, government agencies, including the Departments of Defense, Agriculture and the Interior (DoD, USDA and DOI), NGOs, and other partners will coordinate their conservation and working lands programs in support of

ranching, farming, forestry, and conservation practices compatible with the military installations in partnership with the federal landowners.

Agriculture and forestry are two of Virginia's biggest economic drivers. In addition, the Commonwealth has significant military infrastructure, the result of billions of dollars of investment by DoD. Virginia's 2017 Regional Joint Land Use Study of six major military installations and their surrounding jurisdictions recognized incompatible land uses that threaten the military mission also endanger Virginia's working lands - farms and forests - which are vital to sustaining agricultural productivity, safeguarding natural resources and maintaining a rural way of life. A Sentinel Landscape designation can act as a driving force in the creation of a landscape-scale national security and conservation corridor that ensures the security of the Nation, prioritizes conservation of working lands, contributes to the health of the Chesapeake Bay, and enhances compatible rural economic development opportunities. VDOF will strengthen these efforts to protect high conservation value lands in concert with military land requirements, land development and growth management utilizing the *ConserveVirginia* mapping program and VDOF assets. (Lead agency: VDOF; target date: 2019.)

(39) Encourage Tree Conservation

Mature trees sequester carbon, retain soil, reduce heat island effects, reduce urban and suburban runoff, and add significantly to the urban tree canopy. Multiple benefits arise from good urban tree planning and care. Increased public health, reduced energy cost and economic benefits are all congruent with retention and conservation efforts. The Commonwealth will explore the possibility of broadening existing local government authorities in state code to enhance conservation of trees providing environmental benefits (maintaining existing exemptions, such as the right to practice forestry act, silviculture and hazard trees). Such local ordinances could include requirements for permits for tree removal, variable fees for tree removal based on the size/type of tree, requirements that developers conserve trees, and requirements to plant trees to offset trees removed. (Lead agency: VDOF; target date: 2020.)

7.4 Developed Lands (incl. MS4) Sector Policy Initiatives for WIP III – Explanations

(40) Expand the Healthy Virginia Lawns Program

Healthy Virginia Lawns is a VCE educational program that helps homeowners learn and implement best management practices for their lawns. Healthy Virginia Lawns offers personalized lawn care recommendations based on specific needs. This program begins with a site visit and soil analysis and ends with a complete management plan. When followed, these recommendations can lead to a “green” lawn that is both beautiful and environmentally friendly. The Healthy Virginia Lawns Program is offered through the VCE Master Gardener program. Agriculture and Natural Resources (ANR) Extension agents provide leadership to the Master Gardener program at the local level. Healthy Virginia Lawns is just one example of many VCE educational programs that have the potential to positively impact water quality. (Lead agency: OSNR; target date: 2020.)

(41) Pilot and expand an Urban Nutrient Management (NM) Program for Virginia Youth

To further address Virginia’s needs for urban NM acreage on private land, VCE will pilot an Urban Nutrient Management Program for Virginia Youth. Existing strategies will be expanded to include innovative youth STEAM (science, technology, engineering, agriculture, and math) programming, positive development and career pathways. A public-private partnership will be formed between VCE

land-grant universities, youth organizations, the DCR and a private entity with a unique mobile application to provide fertilizer recommendations based on soil test results.

Curriculum for the program will be developed in the framework of 4-H and the Future Farmers of America (FFA). This curriculum will include lessons in turf grass identification/management, soil testing, NM planning, fertilizer applications, entrepreneurial skills, regulations and environmental implications. Participants will complete a project to calculate area, collect soil samples, practice consulting, and write NM recommendations for turf grass areas in their communities while developing important job and life skills. The amount of creditable acreage and verification of implementation information from follow-up visits or surveys will be reported to DCR. Upon program completion, students will have the option to complete the requirements to become a Certified Fertilizer Applicator. Students will also gain basic knowledge and experience needed to become a Certified NM Planner. These outcomes support state agency certification programs and allow students to have career options to start their own businesses, write NM plans, or obtain employment in state government, environmental consulting, scientific research, turf grass management, or agriculture. Grant funding to initiate this project will be available in 2019. (Lead agency: VCE; target date: 2019-2020.)

(42) Audit and verify contractor-applicator reports of fertilizer applied to urban lands

To achieve the goal of urban NM plans on 40% of available unregulated developed turf acres as well as urban NM goals for MS4 localities, the Commonwealth will strengthen the laws pertaining to contractor-applicators of fertilizer to nonagricultural property. Currently, 2 VAC 5-405, regulations for the Application of Fertilizer to Nonagricultural Lands, requires contractor-applicators to apply lawn fertilizer at rates consistent with the regulations adopted pursuant to § 10.1-104.2. The program ensures that lawn fertilizer with phosphorus is not used unless to establish, patch or renovate a lawn and that lawn fertilizer is not applied to sidewalks or other impervious surfaces, to ground that is frozen, to lawns if heavy rain is predicted, or close to waterways. In addition, contractor-applicators are required to submit an annual report to VDACS on or before February 1 on the total acreage or square footage by zip code of the land receiving lawn fertilizer on more than a cumulative total of 100 acres of nonagricultural lands.

VDACS will create a position to audit and verify the contractor-applicator reports. Currently contractor applicators that apply fertilizer to at least 100 acres of non-agricultural land must submit a report. VDACS will annually verify a minimum of 10% of reported acres. This position would verify that the fertilizer applications were done in accordance with § 10.1-104.2. and 2VAC-5-405 et seq. which requires certain records to be available for inspection by the VDACS Commissioner. Such records include the area applied to; the analysis of the fertilizer applied; and the amount of fertilizer applied by weight or volume.

In addition, the Commonwealth will pursue modifications to the program such as:

- Increasing the civil penalty for failure to comply with the regulations to ensure a “level playing field” for the industry.
- Expanding annual reporting requirements to a total of 50 acres of nonagricultural lands receiving lawn fertilizer by a contractor-applicator.
- Providing local governments with the option to assist in enforcement of the contractor applicator program.

Virginia will also pursue opportunities to encourage homeowners and homeowners' associations to utilize the services of a certified contractor-applicator in good standing. The Commonwealth will continue to investigate incentive-based homeowner education and regulatory approaches to better manage the use of lawn fertilizer by individual homeowners.(Lead agency: VDACS; target date: 2020.)

(43) Establish state cost share for residential homeowners, small businesses and churches, etc.

Nutrient reductions from all source sectors are needed to meet the nutrient reduction goals in the Phase III WIP. This includes urban best management practices. The Virginia Conservation Assistance Program (VCAP), administered by the Virginia Association of SWCDs (Association), has been working with homeowners and other small properties, to provide cost share funding and technical assistance to this underserved group of property owners. The Association has utilized several different sources of short-term funding to implement VCAP. State funding for VCAP in fiscal year 2020 has been provided for the first time, in the amount of $1 million. A consistent source of funding will be sought to continue these activities. Additionally, localities not supported by SWCDs will be encouraged to enter into agreements with SWCDs to employ VCAP in those communities. (Lead agency: DCR; 2019.)

Figure 4: Prince William County, Virginia (Courtesy of CBP)

(44) Enhance marketing of funding opportunities for Non-MS4 localities

Localities that are not regulated under municipal separate storm sewer system (MS4) permits are eligible to apply for SLAF funding for stormwater BMP projects under the current program guidelines. The Clean Water Financing and Assistance Program, which administers the SLAF, plans to engage and educate these stakeholders on funding opportunities, providing information and assistance to enhance fund utilization for non-MS4 stormwater projects. (Lead agency: DEQ; target date: 2020.)

(45) Prepare annual estimate of the amount of stormwater local assistance needs and pursue adequate funding

House Bill 1822 passed the General Assembly in 2019. It requires DEQ, in consultation with stakeholders[11], to estimate annually the amount of stormwater local assistance grants expected to be requested by local governments for projects related to planning, designing and implementing stormwater BMPs and eligible for funding. The assessment will include MS4 and non-MS4 locality needs. DEQ worked with wastewater and stormwater stakeholders to initiate the first needs assessment for WQIF and SLAF funding. A needs survey was provided to localities to capture funding needs for FY2020 through FY2024. Localities completed the survey in early July and results will be reported in both the biennial funding report to the Governor, submitted pursuant to §2.2-1504, and the annual progress report on the impaired waters clean-up plan, submitted pursuant to §62.1-44.118. Virginia will continue to pursue adequate funding from federal, state and private sources for this critical program. (Lead agency: DEQ; target date: 2019.)

(46) Establish long-term partnership with local Planning District Commissions

Virginia's PDCs, as authorized in the Code of Virginia (§15.2-4207), encourage and facilitate local government and state-local cooperation in addressing, on a regional basis, problems beyond local significance, specifically in the area of environmental management. PDCs are accustomed to undertaking technical assistance grant projects and regularly providing coordination with local government representatives. Their work typically focuses on data and information exchanges between local, state and federal partners, and analyses of resource management issues resulting in reports, maps, data inputs and outreach tools, among other materials.

PDCs provided process facilitation, data scenario and strategy development in Virginia's Phase III WIP development. They proposed ongoing support for implementation efforts through an annual scope of work with additional funding (Chapter 6). As of August 2019, all 15 Bay watershed PDCs are currently under cost-share contract with a work plan ending September 2019, using pass-through funds from EPA. This funding allows PDCs to begin the transition from planning to implementation, building on the momentum gained through the local engagement process. Work includes continued support for the PDCs to serve as liaisons to localities and stakeholders, along with geographic targeting of implementation to maximize nutrient reductions and co-benefits. The PDCs will lead efforts to support and encourage implementation of non-agricultural BMPs and strategies to meet local area planning goals based on local conditions, knowledge and needs. DEQ plans to request additional funding from EPA to contract with PDCs for their ongoing partnership and support.

As future funding is identified from state and federal sources, each PDC will be able to develop annual scopes of work to assist localities in their region so non-regulated developed areas can explore ways to implement identified BMPs and establish long-range programs for implementation of the Phase III WIP recommendations. (Lead agency: DEQ; target date: 2019.)

[11] Including representatives of the Virginia Municipal Stormwater Association, local governments and conservation organizations.

(47) Add nutrient management provisions to E&S requirements

The Commonwealth will initiate a regulatory action to amend the Erosion and Sediment Control Regulations, 9VAC25-840-10 et seq., to require NM planning for regulated land-disturbing activities equal to or greater than one acre, with the exception of approved activities conducted in accordance with an agreement in lieu of an erosion and sediment control plan. Permanent vegetative cover would be established on denuded areas not otherwise permanently stabilized in accordance with an approved NM plan. Revisions to Virginia's Erosion and Sediment Control Handbook and Virginia's Nutrient Management Standards and Criteria may also be necessary to ensure consistency among regulatory programs. (Lead agency: DEQ; target date: 2020)

(48) Re-evaluate post-construction water quality requirements under the VSMP

The Commonwealth will initiate a review of the post-development water quality design criteria requirements established under the VSMP Regulation, 9VAC25-870-63. In May 2011, the Commonwealth adopted scientifically based post-development water quality design criteria, with an implementation date of July 1, 2014, to protect local receiving streams. Coincidently, these criteria also satisfied the requirement to offset future growth resulting from development under the Chesapeake Bay TMDL. The Commonwealth's review will determine if the criteria continue to satisfy the offset requirement of the TMDL. Subsequent amendments to the VSMP Regulation may be necessary if the criteria are no longer consistent with the TMDL. (Lead agency: DEQ; 2021.)

(49) Establish 5-year program review of VSMP Authorities

To implement VSMP review as envisioned under the VSMP Regulation, 9VAC25-870-144, the Commonwealth has identified a need of three additional staff positions at DEQ. Until staff and funding are secured, the Commonwealth will continue to perform a limited review of VSMP implementation under its federally-delegated MS4 permitting and compliance programs. Approximately 60% of the existing VSMP authorities are MS4 permittees. (Lead agency: DEQ; target date: 2019.)

(50) Reevaluate MS4 TMDL Action Plan Guidance elements addressing crediting of MS4 projects in unregulated areas and the urban tree canopy BMP

MS4 Permittees are currently developing and implementing Chesapeake Bay TMDL Action Plans under DEQ Guidance Memo No. 15-2005, which establishes baseline nutrient and sediment reductions that an MS4 must provide prior to receiving any credit for BMPs placed on unregulated lands. These projects are often easier to site and more cost effective to implement than projects within the more densely developed MS4 regulated areas. However, the current baseline requirements often account for most and in some case all of the reductions provided by a BMP and therefore provide no incentive for an MS4 permittee to implement the project. In partnership with stakeholders, DEQ will reevaluate the current baseline requirements and if appropriate revise the guidance to provide additional incentive for the implementation of BMPs on unregulated urban lands.

With this initiative, DEQ will also evaluate existing guidance to ensure that the crediting of the urban tree canopy BMP is consistent with the recommendations of the Bay Program's expert panel report, *Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy Expansion*. (Lead agency: DEQ; target date: 2019.)

7.5 Wastewater Sector Policy Initiatives for WIP III - Explanations

(51) Consult with the Wastewater Infrastructure Work Group

The Commonwealth established, by joint letter of agreement between the Secretaries of Natural Resources, Health and Human Resources, and Commerce and Trade, a Wastewater Infrastructure Work Group (Work Group) consisting of representatives of DEQ, VDH, DHCD[12] and VRA[13]. The goal of the work group is to coordinate and maximize grants to landowners and localities to protect water quality, human health and economic disadvantages from inadequate, failing or failed onsite septic systems. To support this effort, VDH will seek an additional position to serve as grant manager.

The Work Group will be advised by the Center for Coastal Resources Management at the College of William & Mary Virginia Institute of Marine Science on the presence of "wastewater islands"[14] within the Chesapeake Bay watershed. (Lead agency: OSNR; target date: 2019)

(52) Require additional nutrient reductions from wastewater treatment plants (WWTP)

The Commonwealth will initiate actions to achieve additional nutrient reductions from significant municipal treatment facilities that have not yet upgraded to achieve 4 mg/l of TN and 0.3 mg/l of TP. This action will consist of modifications to the Water Quality Management Planning Regulation to include secondary, "floating" wasteload allocations for significant municipal facilities. The floating wasteload allocations will be based on the flow treated by the facility in a given year and nutrient concentrations of 4 mg/l TN and 0.3 mg/l TP. Existing "primary" wasteload allocations will remain and in any given year the facility will be required to meet the lesser of the primary or floating allocations. A few facilities with special circumstances could be assigned alternative floating wasteload allocations (e.g. UOSA: 8 mg/l TN; Richmond: 8 mg/l TN; Lynchburg: 8 mg/l TN; and Hopewell: 12 mg/l TN) or possibly no floating wasteload allocation (e.g. UOSA TN). The Commonwealth may choose to exempt a subset of the smallest significant facilities that in aggregate represent a minor percentage of the expected load reductions from this initiative. Because this initiative is being implemented through the Water Quality Management Planning Regulation and the Watershed General Permit, no facilities will be required to upgrade but rather may choose to trade nutrient credits to achieve their reduction goals. Of the 87 significant publicly owned treatment works (POTWs) included in the Watershed General Permit, 41 have already upgraded their facilities to achieve 4 mg/l TN and 0.3 mg/l TP.

Under §62.1-44.19:14.D, DEQ is required to review the basis for allocations granted in the Water Quality Management Planning Regulation every 10 years (beginning in 2020) and propose the reallocation of any unneeded allocations to other facilities registered under the general permit or reserve such allocations for future use. See Report Prepared Pursuant to Executive Order 52 (2016).

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[12] Virginia Department of Housing and Community Development.
[13] Virginia Resources Authority.
[14] "Areas throughout the Commonwealth and the nation where individuals and communities do not have access to affordable wastewater solutions that are protective of public health and the environment. These 'wastewater islands' can be found in rural areas with poor soils that do not support COSS, as well as small lots in urban and suburban communities with older homes that do not have access to centralized sewerage." ("Onsite Sewage Systems and Environmental Justice in Virginia," Danna L. Revis and James L. Gregory, VDH.)

In this Phase III WIP Virginia relies upon the continued over performance by the wastewater sector to make up for slower implementation of TMDL reductions in other more challenging sectors. This phased, adaptive management approach is critical to the success of the WIP. Virginia has evaluated the compliance history of the wastewater sector under the Watershed General Permit and is confident that the sector will continue to out-perform their regulatory requirements. Aggregate delivered TN loads for facilities registered under the Watershed General Permit have declined every year since 2010 and the facilities currently produce greater than 6 million pounds of unused TN credits every year (Figure 5). The TP performance has varied from year to year but has averaged more than 640,000 pounds of unused TP credits over the past 8 years (Figure 6). This dependable supply of credits has occurred despite implementation of lower wasteload allocations in the York (TP) and James River (TP and TN) basins over the past two permit cycles. Implementation of additional nutrient reductions from significant municipal point sources as discussed above will ensure the continued supply of credits through 2025 and beyond.

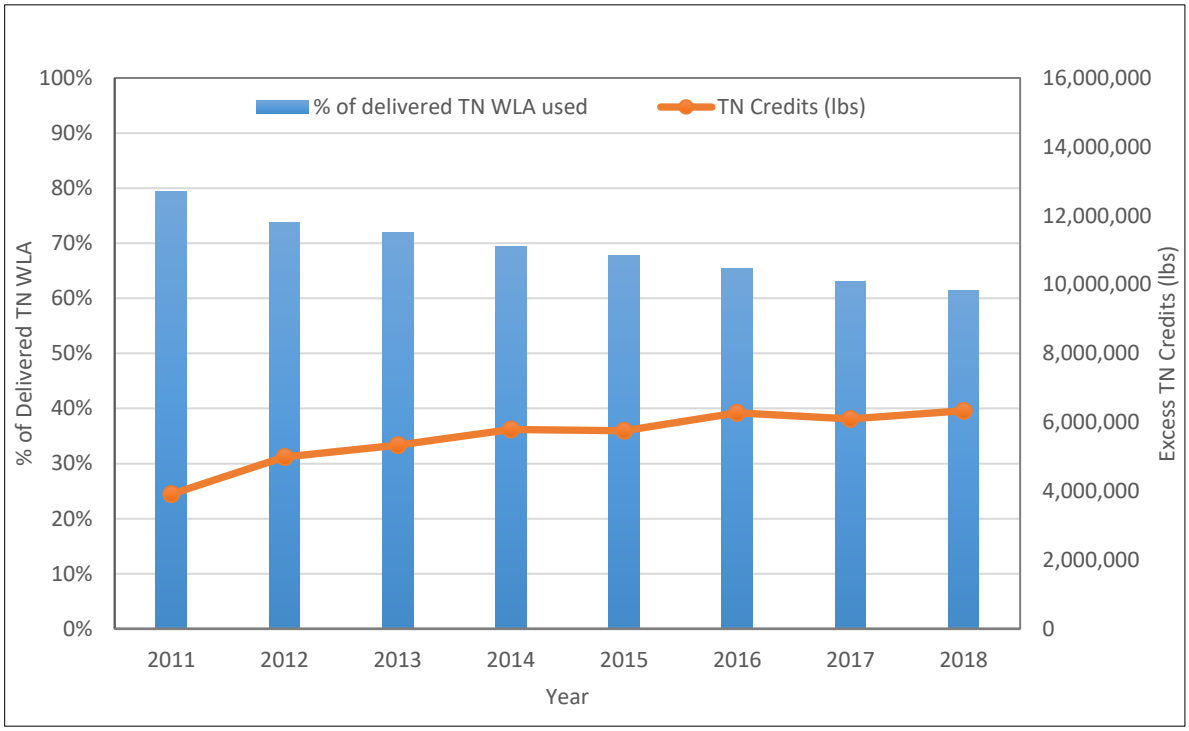

Figure 5: Virginia Point Source Waste Load Allocation for Total Nitrogen

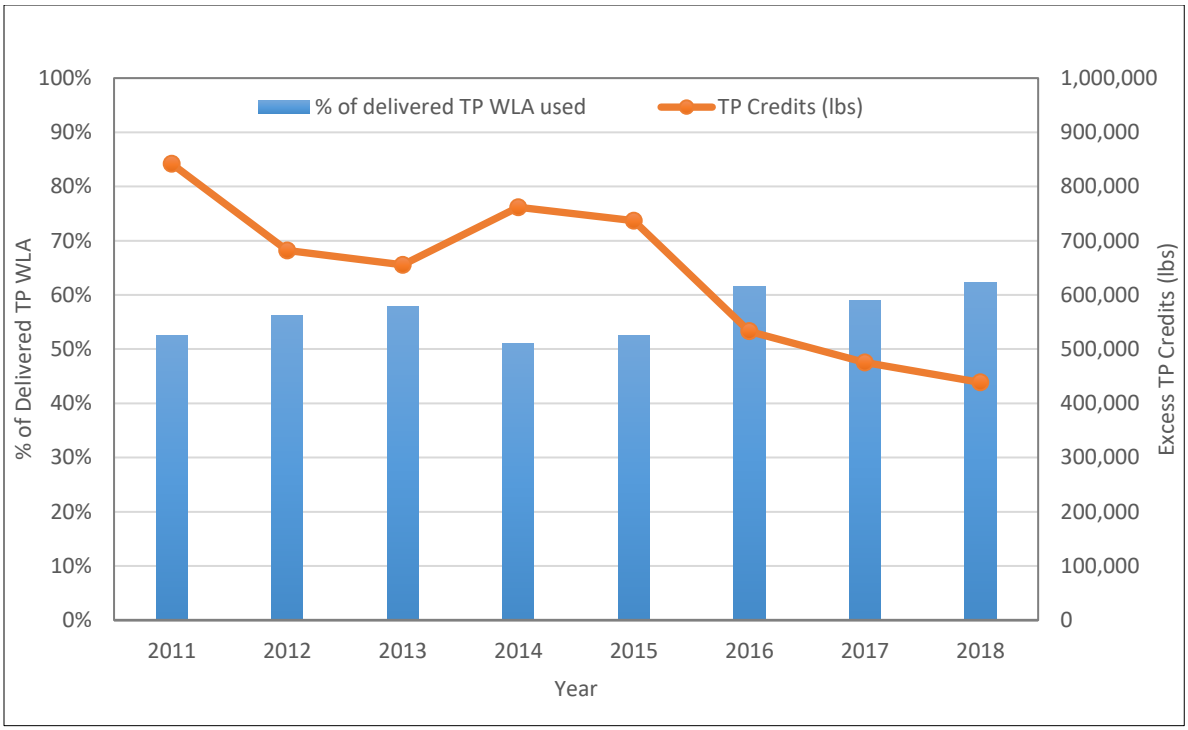

Figure 6: Virginia Point Source Waste Load Allocation for Total Phosphorus

The Phase III WIP input deck includes significant industrial point sources discharging at their full wasteload allocations. The significant municipal point source loads are established at 2018 flows and the concentrations at 4 mg/l TN and 0.3 mg/l TP with the exception of the Potomac River facilities already meeting 3 mg/l TN and 0.18 mg/l TP and the four facilities with special circumstances addressed above (i.e. UOSA, Richmond, Lynchburg and Hopewell). On a statewide basis, year-to-year variability of municipal wastewater flows is impacted much more by weather than it is by growth (Figure 7). Virginia experienced near record rainfall throughout most of the Chesapeake Bay watershed in 2018. The use of 2018 flows and the concentration assumptions included in the WIP III input deck for the significant municipal facilities is expected to generate conservative loading projections for 2025.

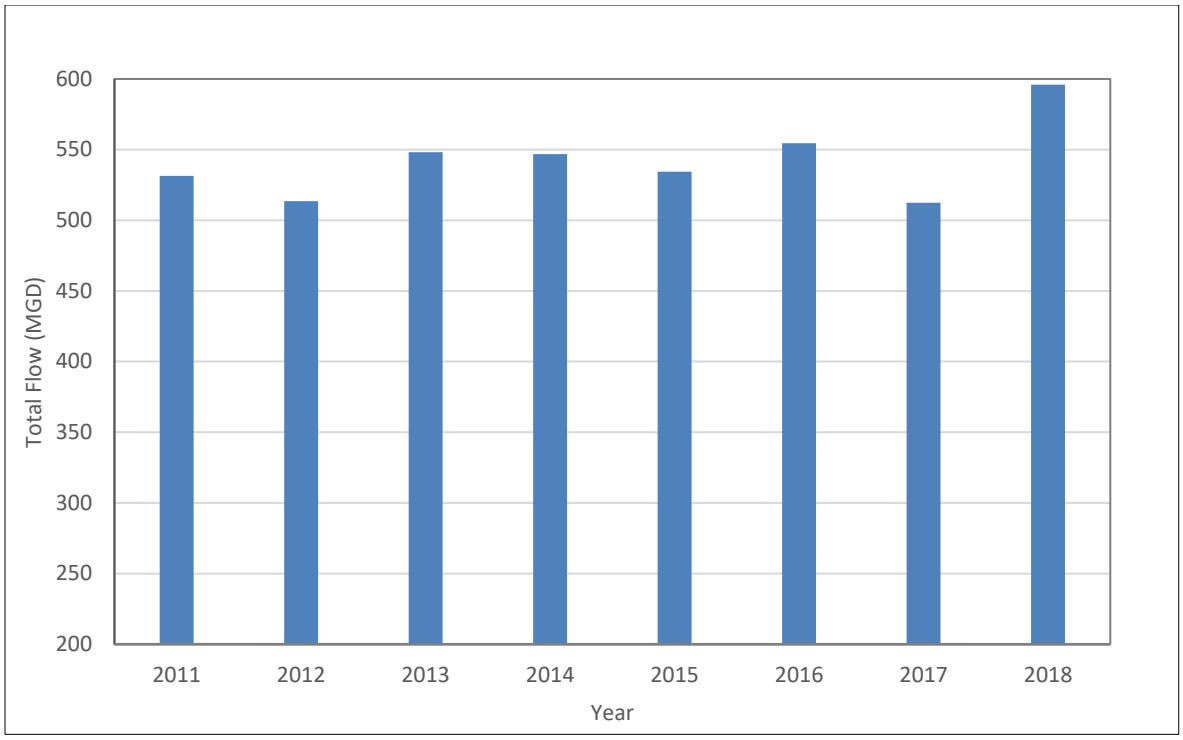

Figure 7: Significant Municipal Average Monthly Flow

Significant sampling of nonsignificant point sources has occurred in Virginia over the past permit cycle including required VPDES monitoring and a DEQ sampling effort funded by an EPA CBRAP Grant. The Phase III WIP input deck reflects a detailed analysis of the available data and includes updated flow and nutrient concentration data for small municipal facilities, individual industrial facilities and seven different general VPDES permit categories. Although the results vary from one category to another, in aggregate the sampling results indicated that current nonsignificant nutrient loads are well below the wasteload allocations included in the TMDL. (Lead agency: DEQ; target date: 2019.)

(53) Require reporting of sewer connections by wastewater utilities

The Commonwealth will initiate a regulatory action to amend the existing Sewage Collection and Treatment Regulations (9VAC25-790-10 et seq.) to include a reporting requirement for all septic systems (or other on-site sewage disposal systems) taken off-line and connected to sewage collection systems. This requirement will ensure a more accurate count of nutrient reductions resulting from septic connected to sewer. (Lead agency: DEQ; target date: 2020.)

(54) *Develop plan for transferring oversight of the septic pump-out program from certain localities to the VDH*

VDH is responsible for enforcing operation and maintenance requirements for alternative onsite sewage systems. Individual localities are responsible for enforcing pump-outs of conventional systems under the Chesapeake Bay Preservation Act. HB 2322 (2019) passed in the General Assembly and was signed by Governor Northam. The bill "directs VDH to develop a plan for the oversight and enforcement by the Department of requirements related to the inspection and pump-out of onsite sewage treatment systems."

The bill specifies that the plan address localities in the Northern Neck, Middle Peninsula and Eastern Shore. VDH will work with stakeholders in the identified areas to develop a plan to transfer the oversight and enforcement of pump-out requirements from localities to the agency. The plan will include analysis of resource needs and any additional legislative actions required to implement the plan. The plan will also include methods to track the pump-outs and consideration of requiring Onsite Sewage System (OSS) operators (not just Alternative OSS operators) and waste treatment facilities to report. The plan for the General Assembly is scheduled to be complete by January 1, 2020. Implementation of the plan will potentially be dependent on passage of legislation identified in the plan. (Lead agency: VDH; target date: 2020-2021.)

(55) Designate VDH as a state certifying authority and provide sales tax exemption for community systems serving 10 or more households that use total nitrogen (TN) reducing treatment systems

HB 2811 (2019) passed in the General Assembly and was signed by Governor Northam with an immediate enactment clause. The bill amended § 58.1-3660 of the Code of Virginia to designate VDH as a "state certifying authority." This designation means VDH can certify certain equipment as "pollution control equipment," exempting it from state and local taxation. The exemption applies only to equipment for onsite sewage systems serving 10 or more households that use nitrogen-reduction processes and technology and that are constructed, wholly or partially, with public funds. (Lead agency: VDH; target date: 2019.)

(56) VDH to establish by regulation TN limits for all OSS dispersing greater than 1,000 gallons per day (GPD), including Conventional OSS

VDH currently has specific regulatory authority to develop total nitrogen (TN) limits for alternative onsite sewage systems (AOSS) in § 32.1-164.B (15) of the Code of Virginia. The Code of Virginia gives authority to the Board of Health to include "Performance requirements for nitrogen discharged from alternative onsite sewage systems that protect public health and ground and surface water quality." While there is no specific mention of performance requirements for small or large conventional onsite sewage systems (COSS), section 32.1-164.A provides VDH broad authority to develop regulations for the safe and sanitary collection, conveyance, transportation, treatment and disposal of sewage by onsite sewage systems. Such regulations shall protect the quality of both surface and ground water. VDH will pursue such regulation. The strategy would have a minimal impact on VDH resources. COSS represent the majority of the TN load from the onsite sector. This regulatory authority would not seek to disallow the use of large COSS but would seek to control TN load from the largest systems to aid in reducing the onsite sector's impact on the Chesapeake Bay and its tributaries as well as protecting groundwater drinking water supplies. (Lead agency: VDH; target date: 2020.)

CHAPTER 8. WATERSHED IMPLEMENTATION PLANS BY BASIN

8.1 Virginia's Potomac River Basin

Figure 1: Great Falls by Denise Martin (Courtesy of Scenic Virginia)

Overview

"The Potomac River is often referred to as our nation's river because it flows through Washington D.C. – the nation's capital. With a total drainage area of 14,670 square miles, it is a shared resource among four states: Virginia (5,723 square miles), Maryland (3,818 square miles), West Virginia (3,490 square miles), Pennsylvania (1,570 square miles), and the District of Columbia (69 square miles)."[15] Virginia's portion of the Potomac-Shenandoah River basin occupies the northern portion of the state, covers about 13% of the Commonwealth's total land area and is referenced simply as the Potomac River basin in the discussion below.

"Captain John Smith explored the Potomac in 1608 and found fish 'lying so thick with their heads above water, that for want of nets, we attempted to catch them with a frying pan.' Times and populations have changed greatly since then."[16] In 2010, the estimated total population of the watershed was 6.11 million people, with Virginia's portion at slightly more than 2.8 million.

The 3,063 square mile Shenandoah River watershed feeds into the Potomac (Figure 2). The main stem begins in Front Royal, at the confluence of the North Fork and the South Fork. The North Fork originates in Rockingham County and the headwaters of the South Fork are in Augusta County. The 60-mile-long

[15] Commonwealth of Virginia. (2005). Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the Shenandoah and Potomac River Basins
[16] Commonwealth of Virginia. (2005). Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the Shenandoah and Potomac River Basins

Shenandoah River empties into the Potomac River at Harper's Ferry, West Virginia, and its watershed comprises almost 5% of Virginia's entire Chesapeake Bay basin.

Figure 2: Virginia's Potomac River Basin Boundary

The Virginia portion of the Potomac basin also includes numerous embayments, tidal creeks and streams. Based on the draft 2018 Integrated Report on Water Quality Assessment and Impaired Waters (2018 IR), the basin includes about 13,230 miles of rivers/ streams, 4,240 acres of lakes and 60 square miles of tidal estuary. Detailed information on the current conditions in Virginia's Potomac basin can be found in the 2018 IR, including the length and area of waterbodies assessed for compliance against Virginia's water quality standards as well as analyses of designated uses supported, significant causes of use impairment and suspected sources of pollution.

As represented in the Chesapeake Bay Watershed Model Version 6, 58.5% of the basin's land area is classified as natural. Agriculture makes up 22.8% of the basin while unregulated developed area accounts for 13.1% and regulated MS4 developed is 5.6%. For the Final Phase III WIP, the land use conditions projected for 2025 were used as the basis for local area planning goals, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3 for Virginia's portion of the watershed.

State landholdings total nearly 49,000 acres (Figure 4) plus another approximate 50,000 acres of non-MS4 roads. Federal landholdings are significant, totaling nearly 611,000 acres (Figure 5).

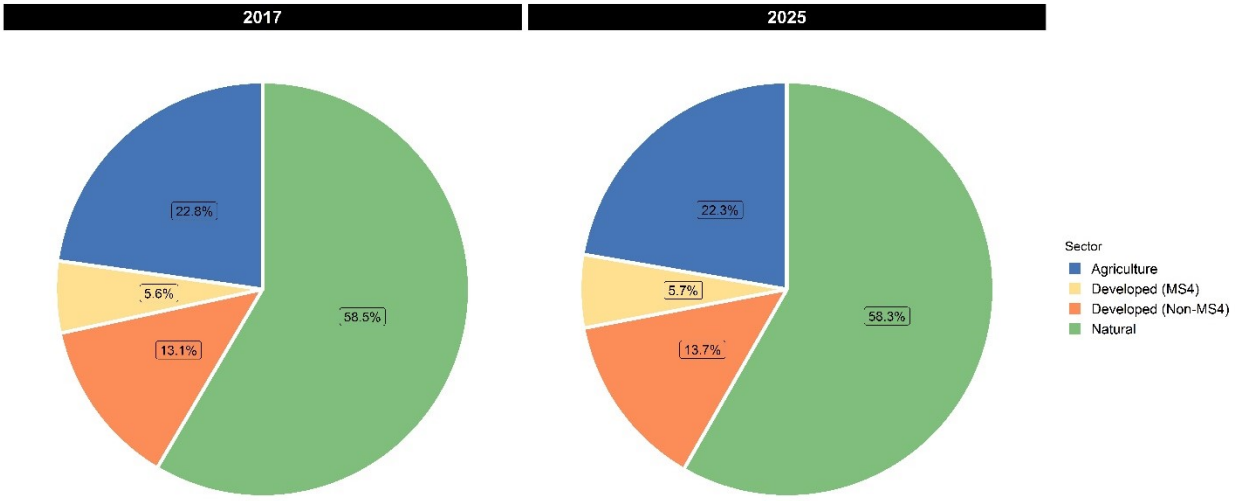

Figure 3: Comparison of 2017 Versus 2025 Modeled Land Use for Virginia's Potomac River Basin

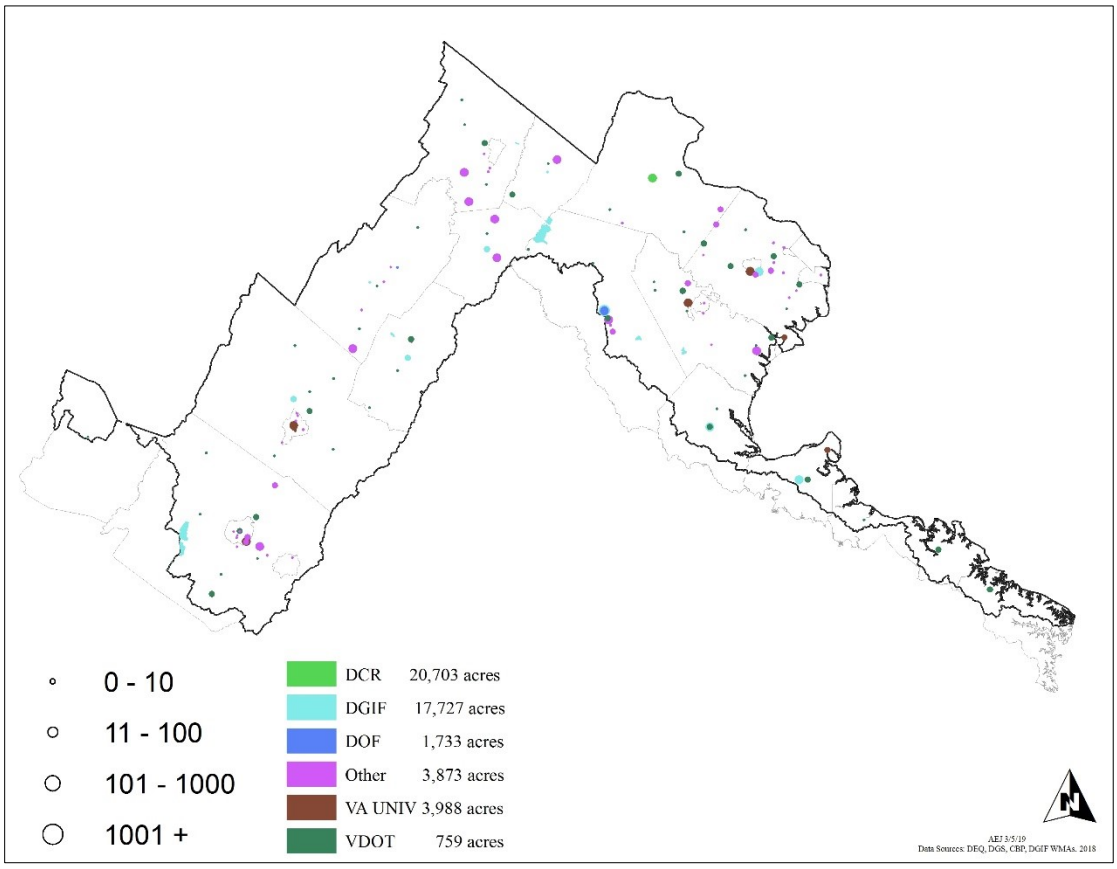

Figure 4: State Owned Lands in Virginia's Potomac Basin

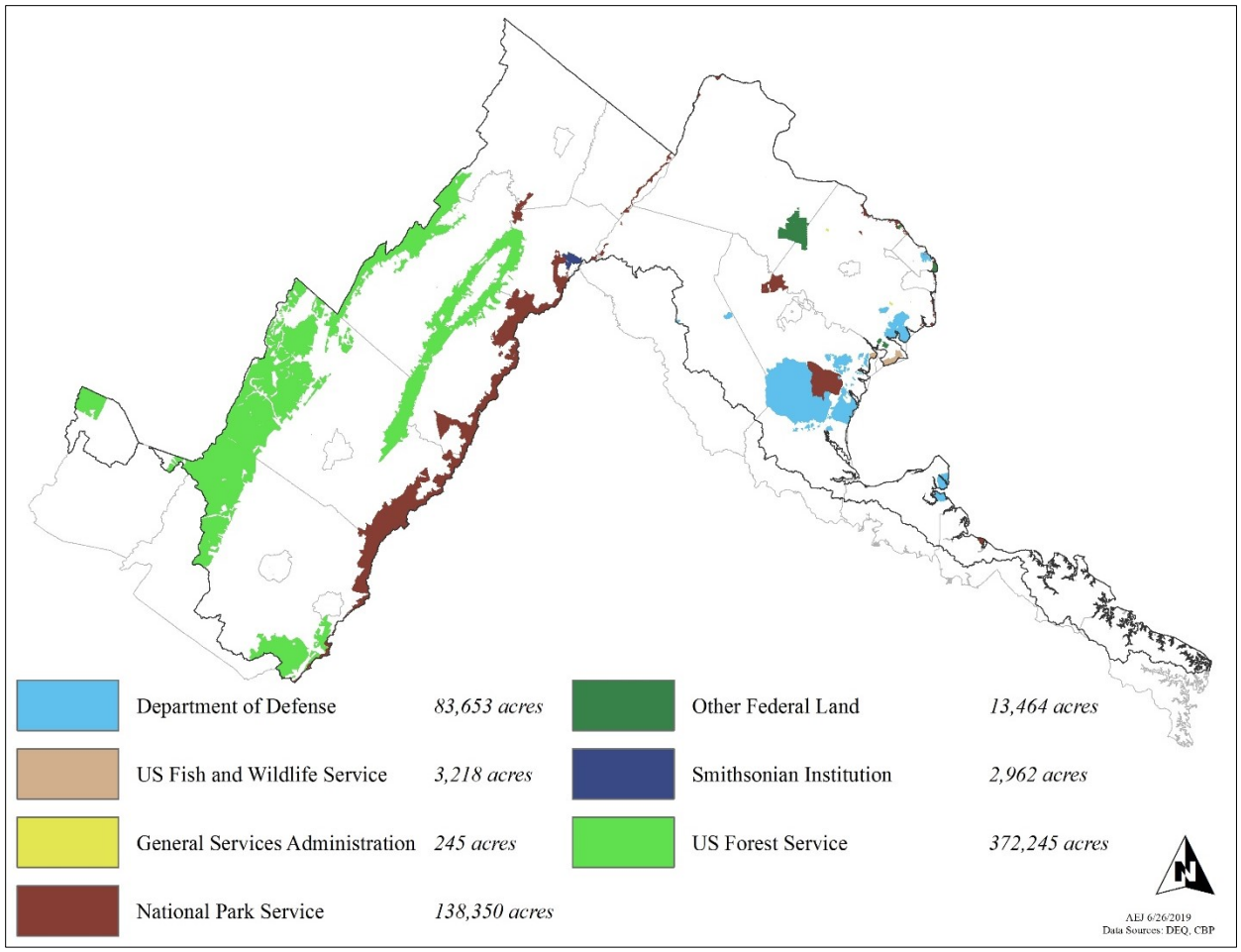

Figure 5: Federal Facilities in Virginia's Potomac River Basin

All or part of the following 26 counties/ cities lie within the basin: counties – Arlington, Augusta, Clarke, Fairfax, Fauquier, Frederick, Highland, King George, Loudoun, Northumberland, Page, Prince William, Rockingham, Shenandoah, Stafford, Warren, and Westmoreland; cities – Alexandria, Fairfax, Falls Church, Harrisonburg, Manassas, Manassas Park, Staunton, Waynesboro, and Winchester.

The six PDCs (Figure 6) and 10 SWCDs (Figure 7) located wholly or in part within the Potomac River Basin are shown on the following maps. The basin also includes two watershed roundtables: the Potomac Watershed Roundtable and the Shenandoah Valley Pure Water Forum. Watershed roundtables are designed to bring together diverse local stakeholders with a vested interest in their communities and concern for local water quality. Common roundtable activities include collecting and analyzing water quality data, planning and implementing watershed-wide water quality goals, coordinating workshops/forums and developing outreach and education resources. DEQ provides funding opportunities for watershed roundtable activities in Virginia to help roundtables achieve water quality improvement goals.

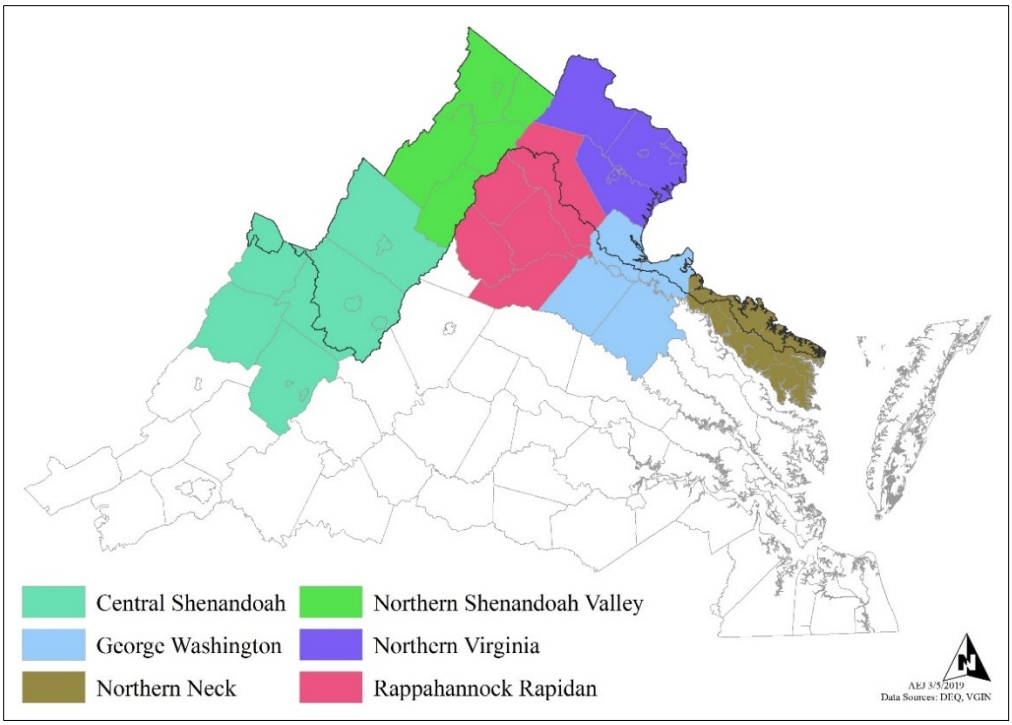

Figure 6: PDCs in the Potomac River Basin

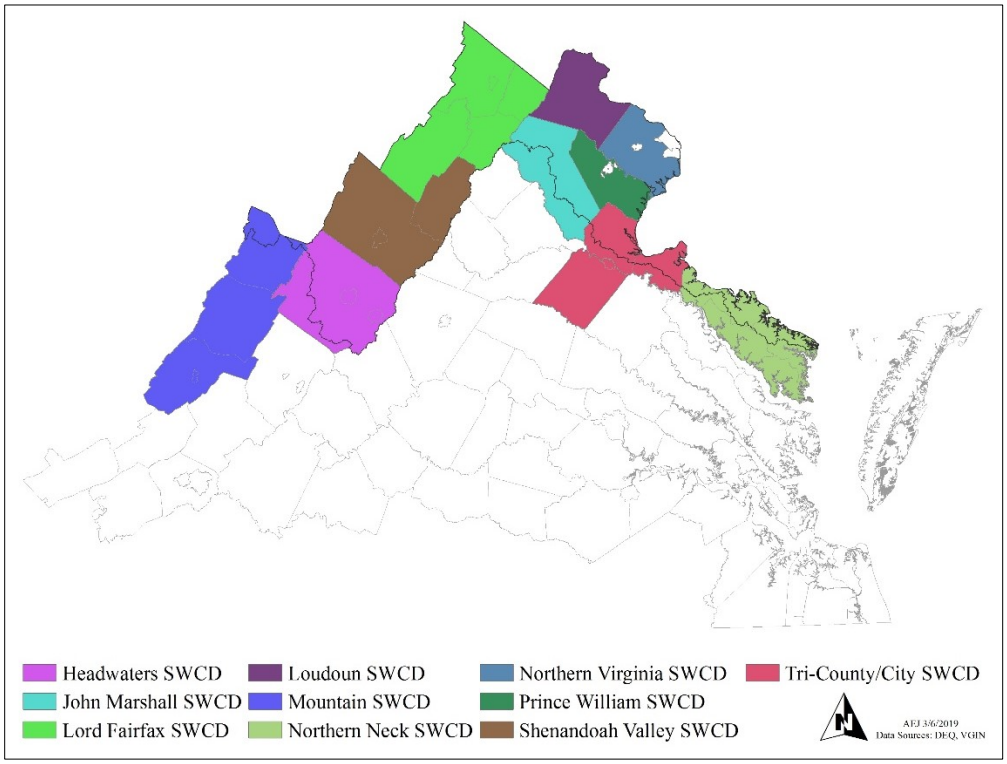

Figure 7: SWCDs in the Potomac River Basin

Final Phase III WIP Development

In 1985, the nitrogen and phosphorus loads from Virginia's portion of the Potomac River Basin were 26.2 million pounds and 2.72 million pounds respectively. When the Chesapeake Bay TMDL was released in 2010, the Potomac loads were 18.6 million pounds of nitrogen and 2.29 million pounds of phosphorus. According to the 2017 progress, update loads contributed from this basin were 17.1 million pounds of nitrogen and 1.98 million pounds of phosphorus. The major contributing sources of nitrogen and phosphorus in the Potomac River Basin as of 2017 are the agricultural sector followed by the developed (including MS4) and natural sectors.

The Final Phase III WIP 2025 target loads allocated to this basin are 16 million pounds of nitrogen and 1.89 million pounds of phosphorus. The Chesapeake Bay Program's estimate of loads that must be reduced to account for climate change in the basin are an additional 620,000 pounds of nitrogen and 82,000 pounds phosphorus. These climate change loads are represented as an additional load on the WIP III Final bars shown in Figure 8.

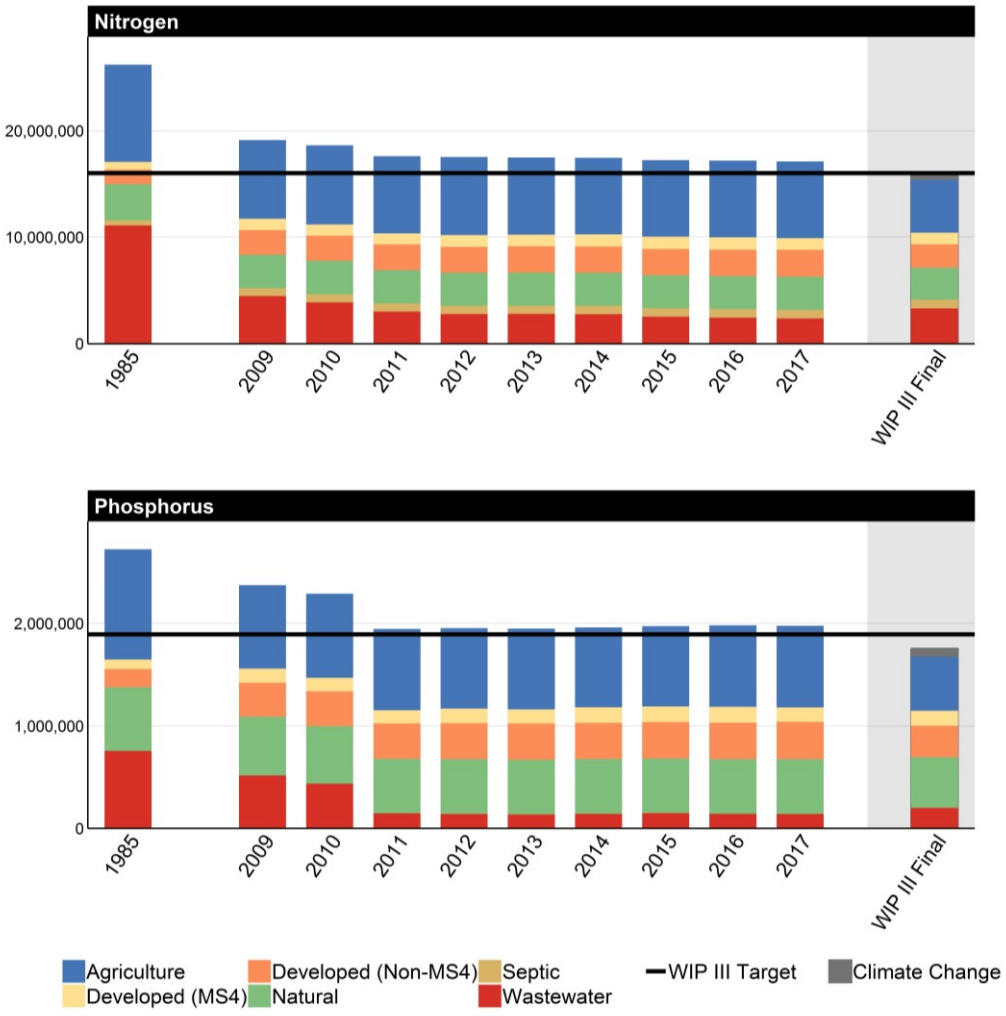

Figure 8: Nutrient Load Reductions for the Potomac River Basin

The BMP inputs received from the PDCs and SWCDs in the Potomac River Basin were combined with the regulated wastewater facilities and MS4s at their permit limits and federal facilities, then run through the Chesapeake Bay Watershed Model Version 6. Further adjustments were made based on additional state initiatives. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final. Exchanges discussed in Chapter 7 are needed to meet the WIP III target for the Potomac basin and are presented in Table 3 at the end of this section.

Wastewater

Wastewater treatment plant upgrades and operational improvements in the wastewater sector in Virginia's portion of the Potomac River Basin, focused mostly on the 42 significant point source dischargers (Figure 9), were put in place to achieve significant reductions since 1985. As of 2017, these loads are well below the wasteload allocation (WLA) limits, at 2.34 million pounds nitrogen and 140,600 pounds phosphorus.

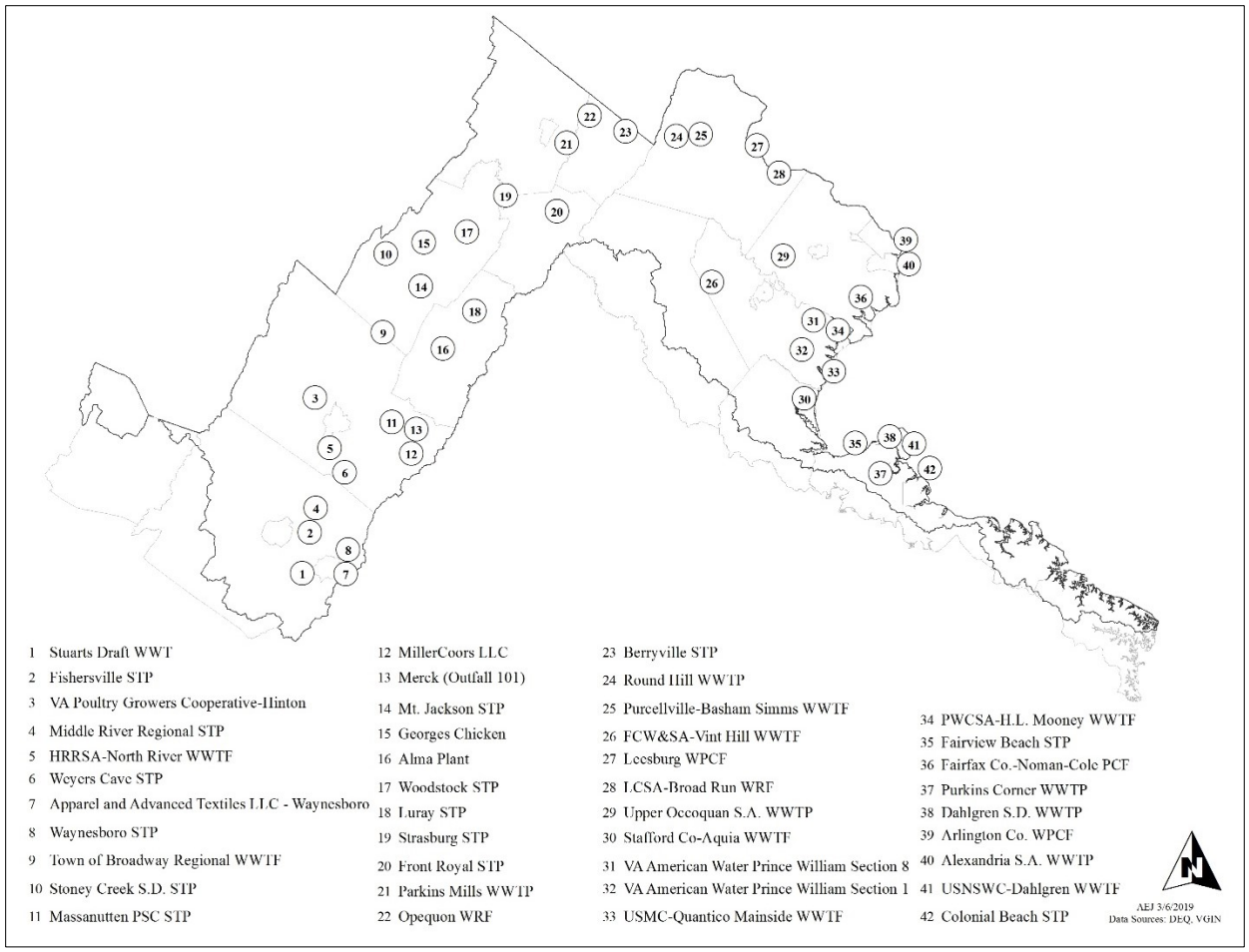

Figure 9: Significant Dischargers in the Potomac River Basin

The expectation through 2025 is that these loads will generally be maintained at those levels, but will slowly increase beyond 2025 as population increases continue in the Potomac River Basin. Regulations have been issued to ensure that these loads are maintained at or below the WLA limits set by the TMDL.[17]

Municipal Separate Storm Sewer Systems (MS4s)

The 32 MS4 permittees in the Potomac River Basin (Figure 10) are implementing nutrient and sediment reductions through TMDL Action Plans that are required by permit or regulation. The Phase II WIP established a schedule for achieving these reductions; 5% in the first five-year permit cycle, 35% in the second cycle and 60% in the third permit cycle. This plan proposes to maintain the previously established MS4 requirements over three permit cycles. The MS4s will not complete their third permit cycle prior to 2025; however, they will be in their third phase of TMDL Action Plan implementation. Virginia will honor its commitment to these regulated entities allowing them three full permit cycles to meet their reductions requirements. Any gap in this sector meeting its permit requirements by 2025 that are due to timing will be offset by the excess capacity achieved in the wastewater sector.

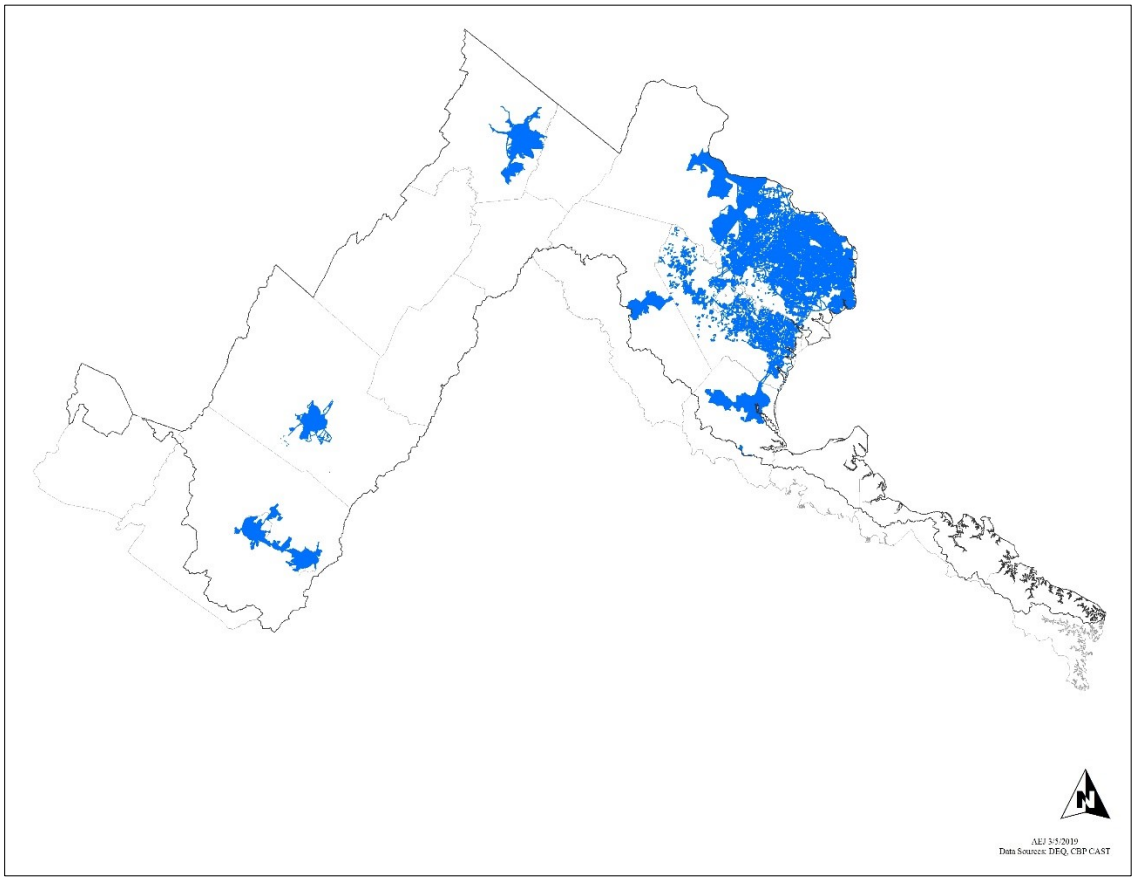

Figure 10: MS4 Permittees in the Potomac River Basin

[17] 9VAC25-40-70 Strategy for Chesapeake Bay Watershed, 9VAC25-820 General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Agricultural, Natural and Non-MS4 Developed Lands

Initial BMPs and programmatic actions for agricultural, natural and non-MS4 developed lands were explored through the local and regional engagement described in Chapter 6 of this report. The final BMPs identified for implementation through 2025 based on the draft WIP and public review, assuming sufficient resources are made available, result in reductions of 1.73 million pounds of nitrogen and 302,500 pounds of phosphorus compared to 2017 levels and are shown in Figure 11 as WIP III Final. The WIP III Final BMP implementation levels and resulting nutrient reductions provide a solid foundation to meet the Commonwealth's reduction targets for 2025. The cumulative BMP implementation levels for the WIP III Final can be seen in Table 3 and the resulting loads in Table 2. Input decks and programmatic actions submitted by the SWCDs and PDCs are available on the DEQ Chesapeake Bay TMDL Phase III WIP Data website. The BMP implementation scenario for the WIP III Final is available on CAST.

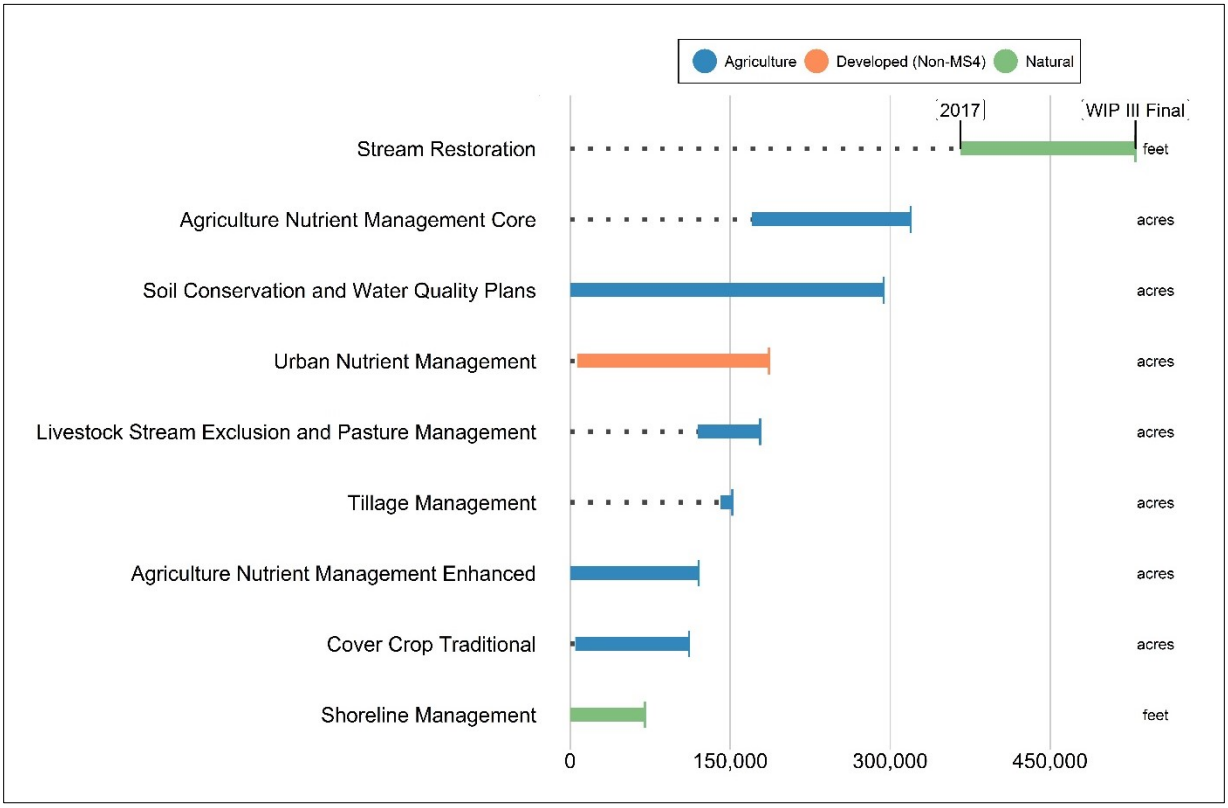

Figure 11: Summary of top BMPs by spatial extent in the Potomac River Basin

Federal Facilities

Federal facilities were expected to provide BMP inputs and programmatic actions to support the Phase III WIP (see federal section of Chapters 3 and 5). Inputs from the DoD, USFWS, USFS, NASA LaRC, and NPS were received. The narratives describing federal agency approaches to meeting their planning goals are included in Appendix E. For the purpose of the Phase III WIP, federal agencies are assumed to be treating all lands they own at levels sufficient to meet their local planning goals and current permit requirements. The BMPs used in this plan for federal facilities that did not provide input are derived from

the Phase II WIP. For those that did provide BMP inputs, their inputs have been included in the official WIP III Final CAST scenario.

Final Phase III WIP Summary

Table 1 below shows the 2017 progress loads, 2025 basin target loads, reductions from 2017 needed to meet the planning target, additional reductions needed to address climate change, and the reductions identified in the WIP III Final for the Potomac River Basin for nitrogen and phosphorus. Table 2 shows the 2017 progress and WIP III Final loads for nitrogen and phosphorus, as well as the reductions from 2017 levels identified in the WIP III Final by pollution source sector for the Potomac River Basin. Table 3 shows a summary of the WIP III Final BMPs for the Potomac River Basin compared to the levels of implementation reported for 2009 and 2017 progress. The detailed input deck is available in CAST and a summary of Virginia's Bay wide BMPs is provided in Appendix D.

The reductions identified in the WIP III Final for the Potomac River Basin, with the exchanges described in Chapter 7, Initiative 9 and shown in Section 8.6 below, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025. The goals set for the Potomac River Basin are ambitious and will require significant sustained funding and technical capacity in all sectors. However, the exchanges to the basin and N:P exchanges within the basin identified in Section 8.6, Table 4 provide a significant buffer and additional assurance that the targets can be met.

Table 1: Potomac River Basin WIP III Final Loads, Targets and Reductions (in pounds)

Potomac River Basin	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	17,109,000	16,000,000	1,109,000	620,000	1,729,000
Phosphorus (pounds)	1,976,000	1,892,000	84,000	82,000	302,500

Table 2: Potomac River Basin Sector Loads and Reductions (in pounds)

Nitrogen (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	2,342,000	3,291,000	-949,000
Agriculture	7,211,000	4,969,000	2,242,000
MS4 Developed	1,060,000	1,048,000	12,000
Non-MS4 Developed	3,232,000	2,923,000	309,000
Natural	2,522,000	2,426,000	96,000
Federal	742,000	722,000	20,000
Total	**17,109,000**	**15,380,000**	**1,729,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	140,600	200,400	-59,800
Agriculture	796,500	526,400	270,100
MS4 Developed	135,800	140,400	-4,600
Non-MS4 Developed	349,700	298,200	51,500
Natural	437,000	397,000	40,000
Federal	116,700	111,400	5,300
Total	**1,976,200**	**1,673,700**	**302,500**

Table 3: Potomac River Basin WIP III Final BMPs

Sector	**BMP**	**Unit**	**2009**	**2017**	**WIP III Final**
Agriculture	Agricultural Stormwater Management	acres	-	-	55
Agriculture	Agriculture Nutrient Management	acres	173,775	170,035	319,301
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	120,459
Agriculture	Alternative Crops	acres	5	63	63
Agriculture	Animal Waste Management System	Animal Units	1,169,969	937,479	1,575,193
Agriculture	Barnyard Runoff Control	acres	52	994	1,552
Agriculture	Cover Crop Commodity	acres	10,450	9,329	12,953
Agriculture	Cover Crop Traditional	acres	19,405	21,656	106,302
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	36	5,091
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units	-	-	38,020
Agriculture	Forest Buffer	acres	4,254	2,193	4,782
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	2,463

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Grass Buffer	acres	568	795	2,970
Agriculture	Grass Buffer - Narrow	acres	-	1,106	2,233
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	82	1,768
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	1,373	2,589	4,692
Agriculture	Horse Pasture Management	acres	-	12	7,737
Agriculture	Land Retirement to Ag Open Space	acres	14,625	15,278	18,614
Agriculture	Land Retirement to Pasture	acres	-	-	1,221
Agriculture	Loafing Lot Management	acres	-	-	67
Agriculture	Manure Compost Static Pile Windrow	dry tons	-	-	5,281
Agriculture	Manure Incorporation	acres	-	-	24
Agriculture	Manure Injection	acres	-	-	8,600
Agriculture	Manure Transport	dry tons	23,090	3,436	85,654
Agriculture	Manure Treatment Slow Pyrolysis	dry tons	-	-	4,391
Agriculture	Mortality Composters	Animal Units	119,445	132,940	1,161,992
Agriculture	Off Stream Watering Without Fencing	acres	19,873	56,788	69,629
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units	-	2,033	22,756
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	27,691	61,749	101,349
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	293,984
Agriculture	Tillage Management	acres	163,943	141,132	152,005
Agriculture	Tree Planting	acres	1,371	4,969	5,590
Agriculture	Water Control Structures	acres	292	68	85
Agriculture	Wetland Restoration - Floodplain	acres	130	134	167
Agriculture	Wetland Restoration - Headwater	acres	-	-	21
Developed	Advanced Grey Infrastructure Nutrient Discovery Program (IDDE)	acres	-	-	17,301
Developed	Bioretention/raingardens	acres	802	1,639	10,825
Developed	Bioswale	acres	62	213	3,798
Developed	Conservation Landscaping Practices	acres	-	-	4,609
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	32,932	35,086	37,896

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Dry Extended Detention Ponds	acres	28,572	32,106	66,497
Developed	Erosion and Sediment Control	acres	10,673	8,313	8,324
Developed	Filtering Practices	acres	365	757	15,627
Developed	Floating Treatment Wetland	acres	-	-	141
Developed	Forest Buffer	acres	-	-	5,676
Developed	Forest Planting	acres	6	19	6,212
Developed	Impervious Surface Reduction	acres	199	239	10,856
Developed	Infiltration Practices	acres	3,389	4,496	23,339
Developed	Permeable Pavement	acres	17	59	4,313
Developed	Storm Drain Cleaning	pounds of sediment	-	-	307,855
Developed	Stormwater Performance Standard-Runoff Reduction	acres	1,067	1,812	925
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	32,960	37,081	19,982
Developed	Tree Planting - Canopy	acres	-	-	13,313
Developed	Urban Nutrient Management	acres	14,269	6,289	186,448
Developed	Vegetated Open Channels	acres	113	261	666
Developed	Wet Ponds and Wetlands	acres	31,711	37,018	65,937
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	200,000
Natural	Forest Harvesting Practices	acres	5,630	4,642	18,851
Natural	Oyster Aquaculture	oysters harvested	-	-	34,055,886
Natural	Oyster Reef Restoration	acres	-	-	19
Natural	Shoreline Management	feet	-	-	70,051
Natural	Stream Restoration	feet	323,899	365,738	529,964
Natural	Wetland Rehabilitation	acres	-	-	63
Septic	Septic Connection	systems	8	307	6,834
Septic	Septic Denitrification - Conventional	systems	801	1,461	12,771
Septic	Septic Denitrification - Enhanced	systems	6	239	1,731

Sector	BMP	Unit	2009	2017	WIP III Final
Septic	Septic Effluent - Enhanced	systems	165	2	9
Septic	Septic Pumping	systems	9,499	6,831	28,619
Septic	Septic Secondary Treatment - Conventional	systems	3,742	2,109	2,807
Septic	Septic Secondary Treatment - Enhanced	systems	90	78	120

8.2 The Rappahannock River Basin

Figure 1: Rappahannock River Sunset by Harlow Chandler (Courtesy of Friends of the Rappahannock)

Overview

Stretching from the Blue Ridge Mountains through the Piedmont to the Chesapeake Bay, the challenges in developing Watershed Implementation Plan III for such a diverse watershed and nearby coastal basins were many. "The streams, creeks and tidal marshes of the watershed encompass rolling farmland, growing urban and suburban development along the I-95 corridor, and localities that draw much of their livelihood directly from the tidal waters. Their worth includes their bounty, beauty, and recreational value, as well as their ties to the history, tradition, and quality of lands within the Rappahannock basin. These connections have fostered a common esteem and appreciation for the Rappahannock River that reaches from its headwaters to the mouth."[18]

"The Rappahannock River Basin is located in the northeastern portion of Virginia and covers 2,712 square miles or approximately 6% of the Commonwealth's total land area (Figure 2). The headwaters lie in Fauquier and Rappahannock counties and flow in a southeasterly direction to its confluence with the Chesapeake Bay between Lancaster and Middlesex counties. The Rappahannock River Basin is 184 miles in length and varies in width from 20 to 50 miles. The Rappahannock's major tributaries are the Hazel River, Thornton River, Mountain Run, Rapidan River, Robinson River, Cat Point Creek, and the Corrotoman River. The 2010 population of the basin was approximately 484,000 and is mostly rural in

[18] Commonwealth of Virginia. (2005). Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the Rappahannock River and Northern Neck Coastal Basins

character with no large population centers. However, the basin has seen increasing urban pressure from the influence of metropolitan Washington in the Fredericksburg and Fauquier areas of the basin."[19]

Based on the draft 2018 IR, the basin includes about 6,500 miles of rivers/streams, 950 acres of lakes and 155 square miles of tidal estuary. Detailed information on the current water quality conditions in the Rappahannock Basin can be found in the 2018 IR, including the length and area of waterbodies assessed for compliance against Virginia's water quality standards as well as analyses of designated uses supported, significant causes of use impairment and suspected sources of pollution.

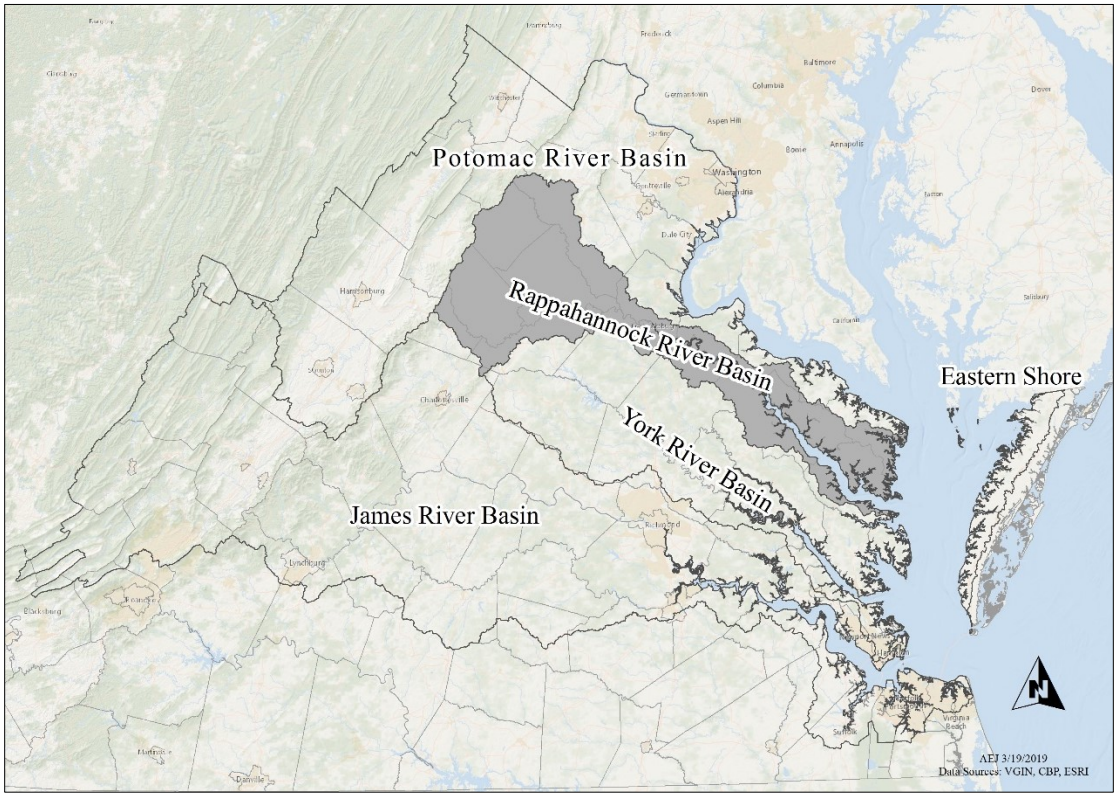

Figure 2: Rappahannock River Basin Boundary

As represented in the Chesapeake Bay Watershed Model Version 6, 67.5% of the basin's land area is classified as natural. Agriculture makes up 22% of the basin while developed (non-MS4) area accounts for 9.5% and developed (MS4) is 0.9% (Figure 3).

State landholdings total nearly 20,273 acres (Figure 4) plus another approximately 18,000 acres of non-MS4 roads. Federal landholdings are significant, totaling nearly 169,631 acres (Figure 5). For the Phase III WIP, the land use conditions projected for 2025 were used as the basis for local area planning goals, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3.

[19] Commonwealth of Virginia. (2005). Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the Rappahannock River and Northern Neck Coastal Basins

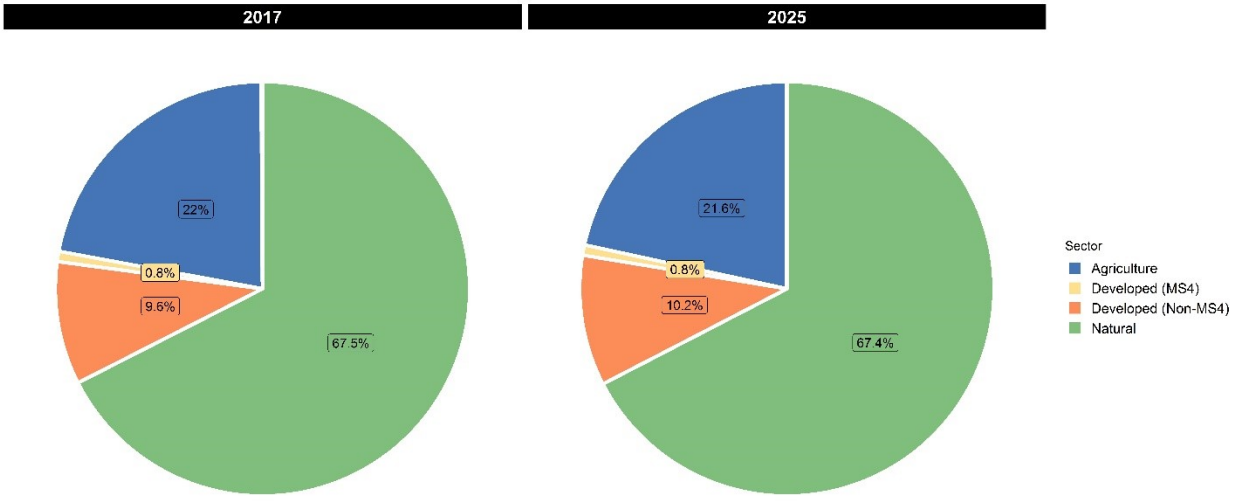

Figure 3: Comparison of 2017 Versus 2025 Modeled Land Use for the Rappahannock River Basin

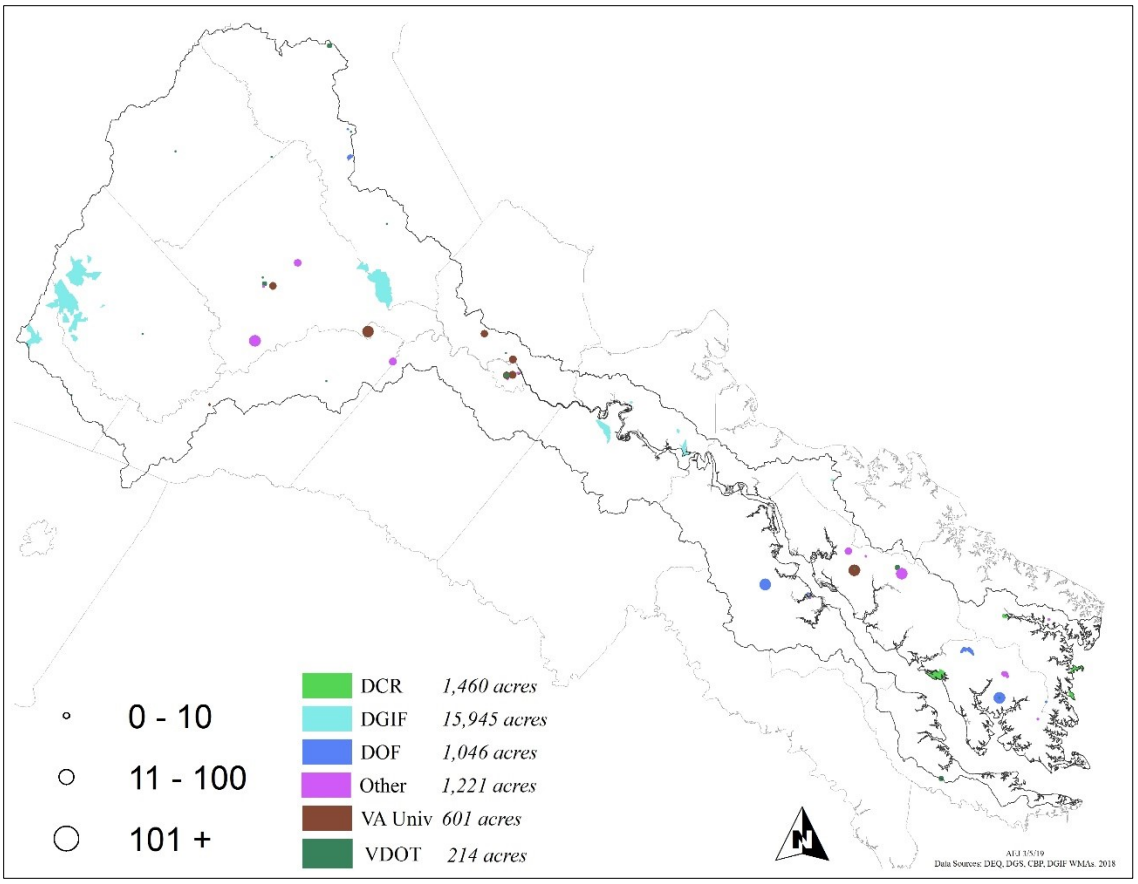

Figure 4: State Owned Lands in the Rappahannock River Basin

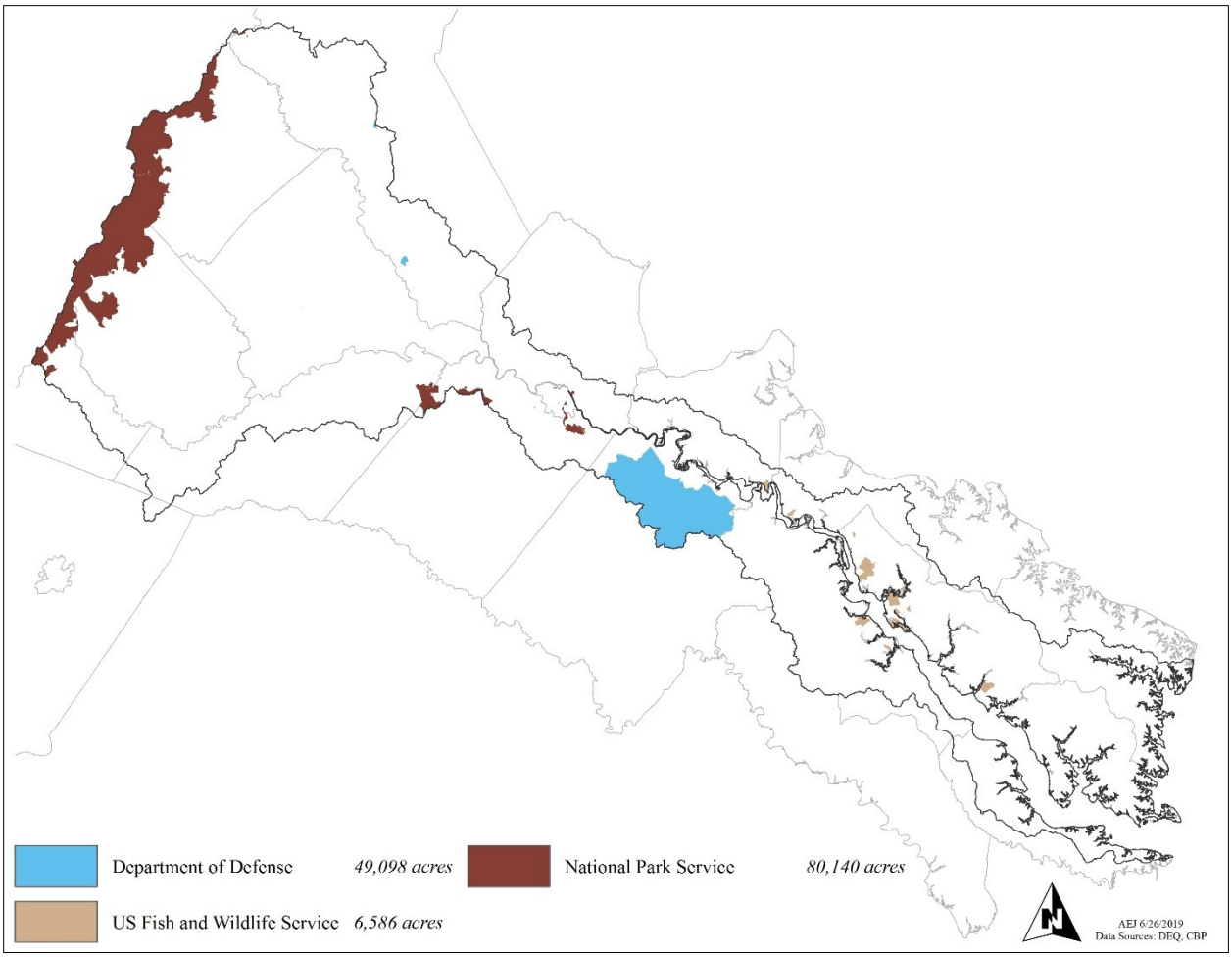

Figure 5: Federal Facilities in the Rappahannock River Basin

All or portions of the following 17 counties lie within the basin: Albemarle, Caroline, Culpeper, Essex, Fauquier, Greene, King George, Lancaster, Madison, Middlesex, Northumberland, Orange, Rappahannock, Richmond, Spotsylvania, Stafford, and Westmoreland. Fredericksburg is the only city in the Basin.

The five PDCs (Figure 6) and eight SWCDs (Figure 7) located wholly or in part within the Rappahannock River Basin are shown in the following maps. The basin also includes the Rappahannock River Basin Roundtable. Watershed roundtables are designed to bring together diverse local stakeholders with a vested interest in their communities and concern for local water quality. Common roundtable activities include collecting and analyzing water quality data, planning and implementing watershed-wide water quality goals, coordinating workshops/forums and developing outreach and education resources. DEQ provides funding opportunities for watershed roundtable activities in Virginia to help achieve water quality improvement goals.

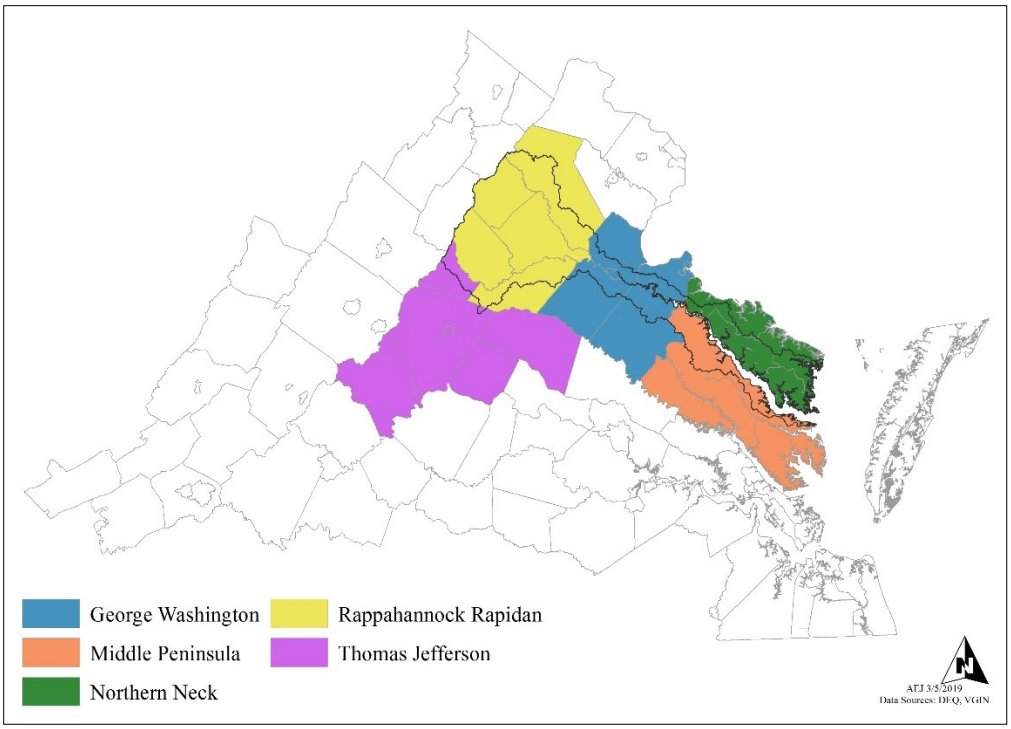

Figure 6: PDCs in the Rappahannock River Basin

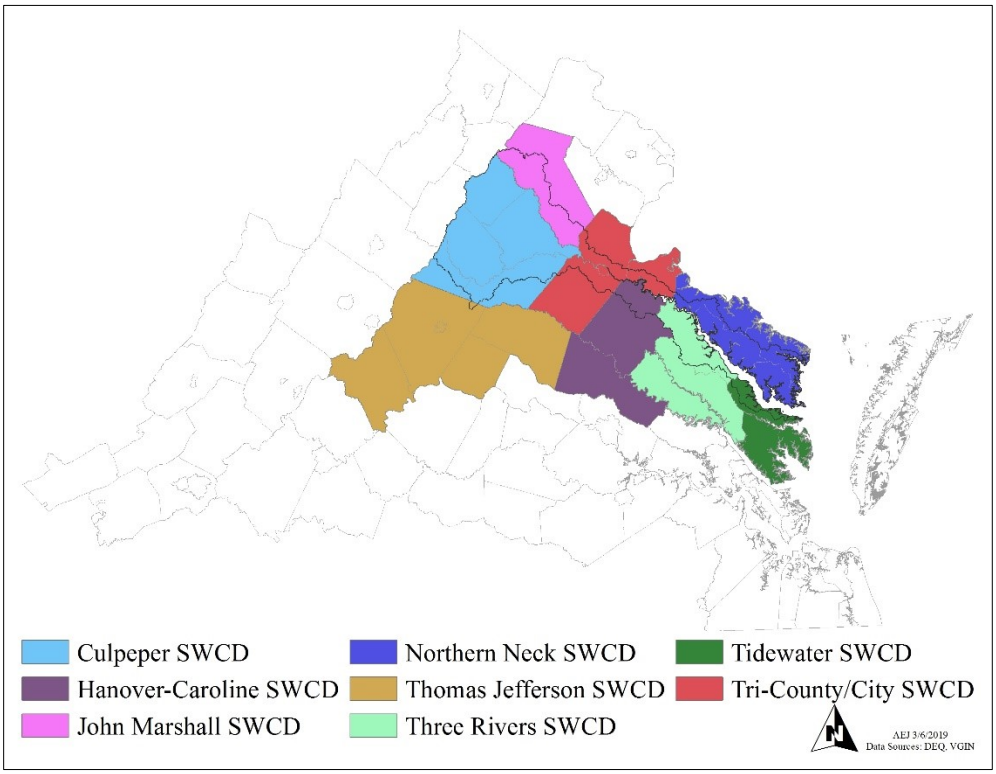

Figure 7: SWCDs in the Rappahannock River Basin

Final Phase III WIP Development

In 1985, the nitrogen and phosphorus loads from the Rappahannock River Basin were 9.2 million pounds and 1.27 million pounds respectively. When the Chesapeake Bay TMDL was released in 2010, the Rappahannock loads were 8.46 million pounds of nitrogen and 0.97 million pounds of phosphorus. According to the 2017 progress update loads contributed from this basin were 8.09 million pounds of nitrogen and 0.91 million pounds of phosphorus. The major contributing sources of nitrogen and phosphorus in the Rappahannock River Basin as of 2017 are the agriculture sector followed by the natural and developed sectors.

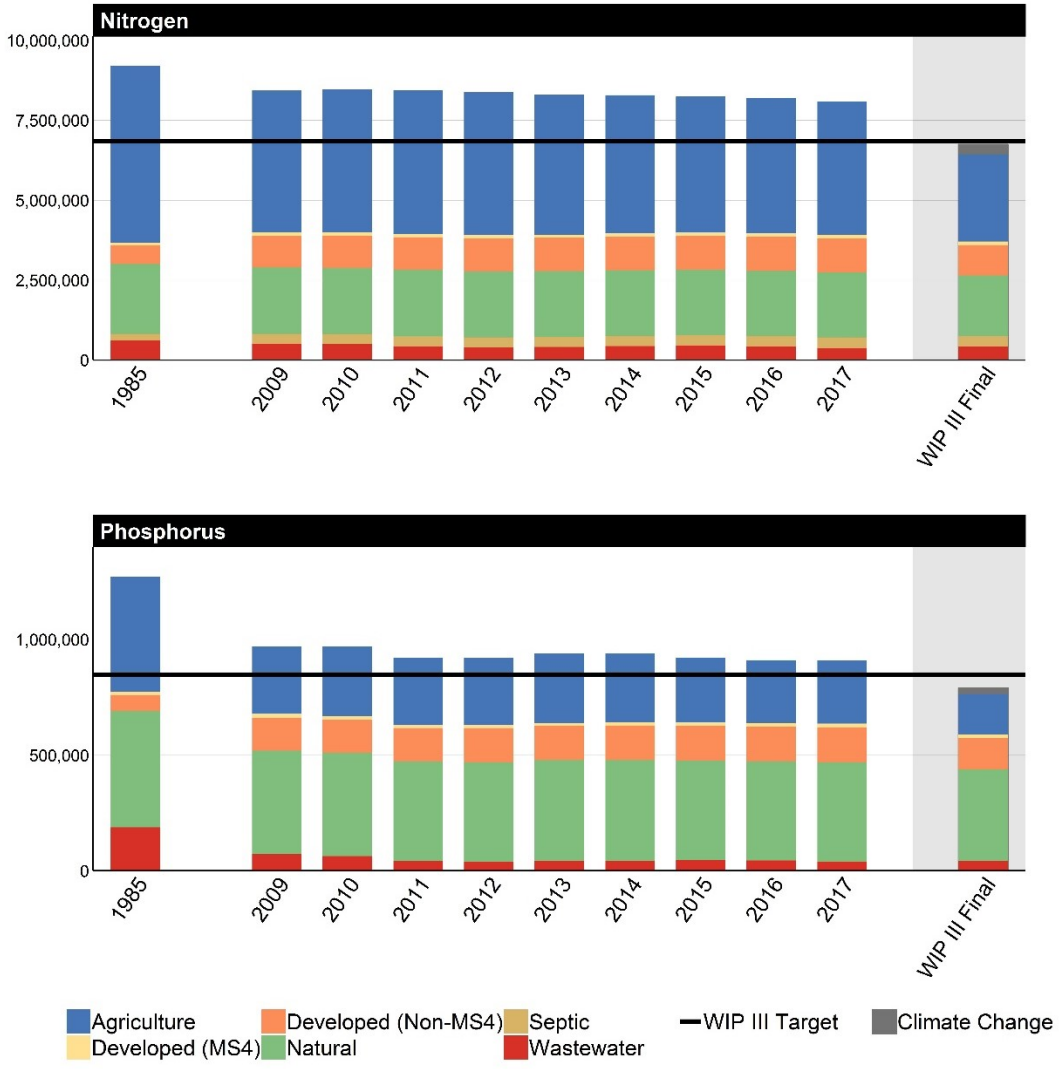

Figure 8: Nutrient Load Reductions for the Rappahannock River Basin

The Final Phase III WIP 2025 target loads allocated to this basin are 6.85 million pounds of nitrogen and 0.849 million pounds of phosphorus. The Chesapeake Bay Program's estimate of loads that must be

reduced to account for climate change in the basin are an additional 310,000 pounds of nitrogen and 27,000 pounds of phosphorus. These climate change loads are represented as an additional load on the WIP III Final bars shown in Figure 8.

The BMP inputs received from the PDCs and SWCDs in the Rappahannock River Basin were combined with the regulated wastewater facilities and MS4s at their permit limits and federal facilities, then run through the Chesapeake Bay Watershed Model Version 6. Further adjustments were made based on additional state initiatives. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final. Exchanges as discussed in Chapter 7 are needed to meet the WIP III target for the Rappahannock River Basin and are presented in Table 3 at the end of this section.

Wastewater

Wastewater treatment plant upgrades and operational improvements in the wastewater sector in the Rappahannock River Basin, focused mostly on the 24 significant point source dischargers, which were put in place to achieve significant reductions (Figure 9). As of 2017, these loads are well below the Waste Load Allocation (WLA) limits, at 0.38 million pounds of nitrogen and 40,000 pounds of phosphorus. The expectation through 2025 is that these loads will decline by approximately 10% in response to Initiative #48, but will slowly increase beyond 2025 as population increases continue in the Rappahannock Basin.

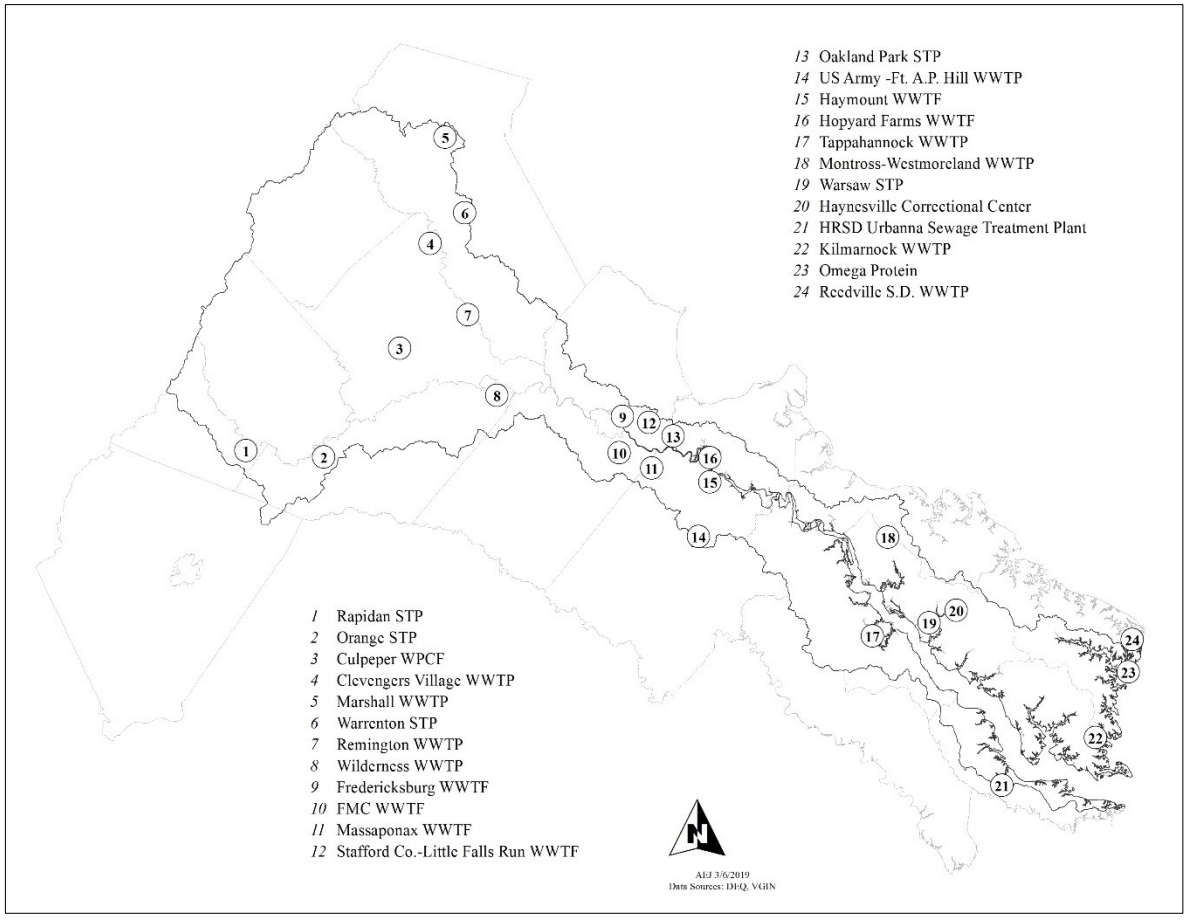

Figure 9: Significant Dischargers in the Rappahannock River Basin

Regulations have been issued to ensure that these loads are maintained at or below the limits set by the TMDL.[20]

Municipal Separate Storm Sewer Systems (MS4s)

The seven MS4 permittees in the Rappahannock River Basin (Figure 10) are implementing nutrient and sediment reductions through TMDL Action Plans that are required by permit or regulation. The Phase II WIP established a schedule for achieving these reductions; 5% in the first five-year permit cycle, 35% in the second cycle and 60% in the third permit cycle. This plan proposes to maintain the previously established MS4 requirements over three permit cycles. The MS4s will not complete their third permit cycle prior to 2025; however, they will be in their third phase of TMDL Action Plan implementation. Any gap in this sector meeting its permit requirements by 2025 due to timing will be offset by the excess capacity achieved in the wastewater sector.

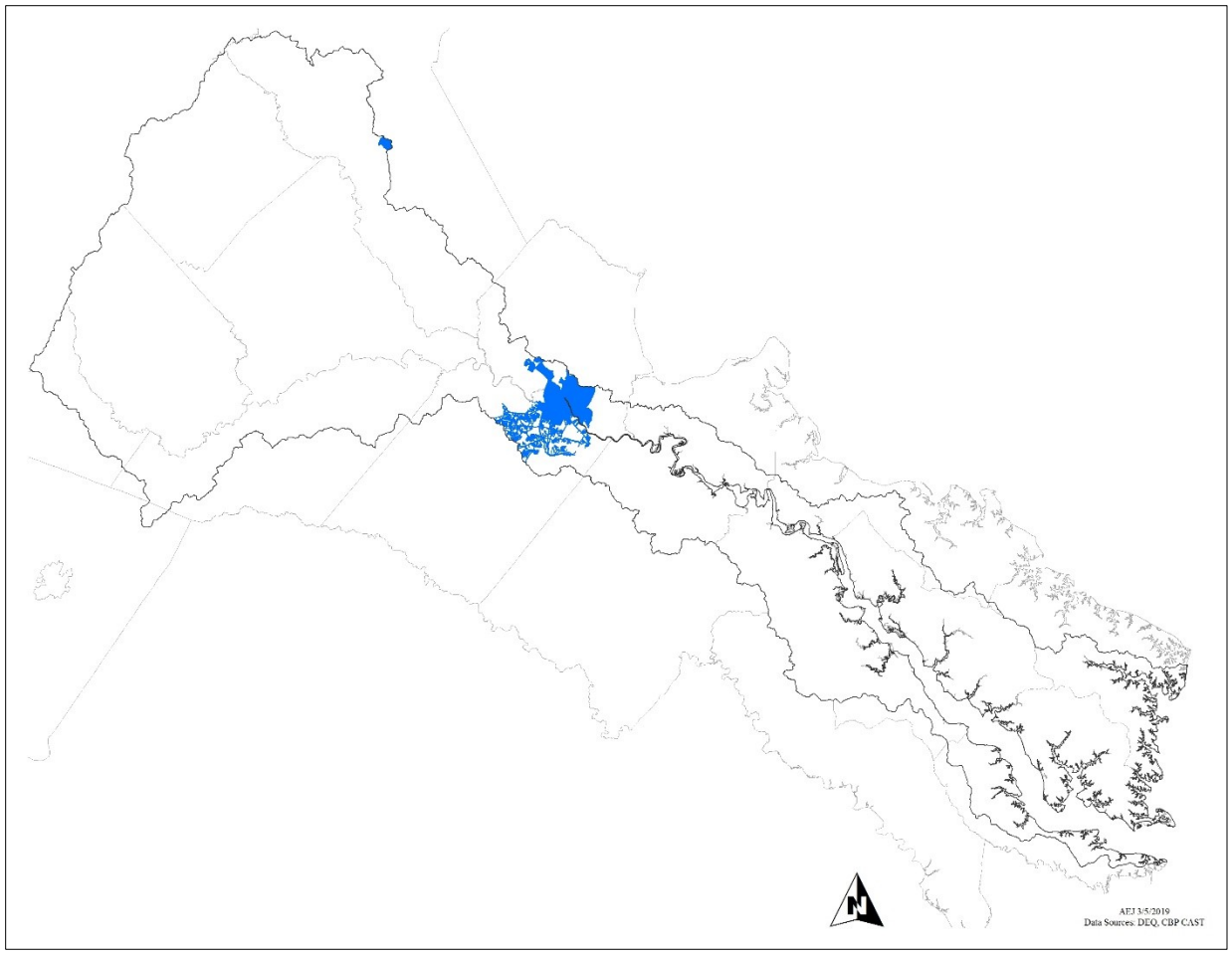

Figure 10: MS4 Permittees in the Rappahannock River Basin

[20] 9VAC25-40-70 Strategy for Chesapeake Bay Watershed, 9VAC25-820 General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Agricultural, Natural and Non-MS4 Developed Lands

Initial BMPs and programmatic actions for agricultural, natural and non-MS4 developed lands were explored through the local and regional engagement described in Chapter 6 of this report. The final BMPs identified for implementation through 2025 based on the draft WIP and public review, assuming sufficient resources are made available, result in reductions of 1.66 million pounds of nitrogen and 145,300 pounds of phosphorus compared to 2017 levels and are shown in Figure 11 as WIP III Final. The WIP III Final BMP implementation levels and resulting nutrient reductions provide a solid foundation to meet the Commonwealth's reduction targets for 2025. The cumulative BMP implementation levels for the WIP III can be seen in Table 3 and the resulting loads in Table 2. Input decks and programmatic actions submitted by the SWCDs and PDCs are available on the DEQ Chesapeake Bay TMDL Phase III WIP Data website. The BMP implementation scenario for the WIP III Final is available on CAST.

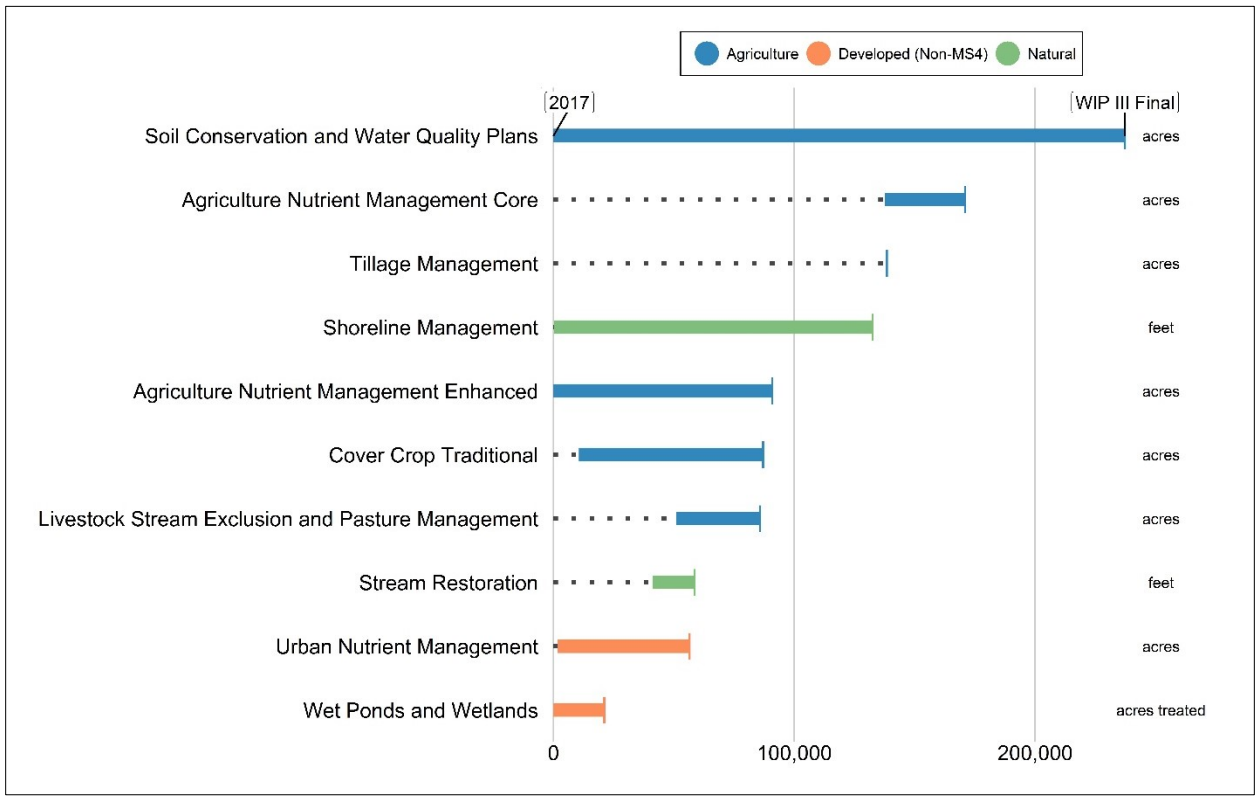

Figure 11: Summary of Top BMPs by Spatial Extent in the Rappahannock River Basin

Federal Facilities

Federal facilities were expected to provide BMP inputs and programmatic actions to support the Final Phase III WIP (see federal section of Chapters 3 and 5). Inputs from the DoD, USFWS, USFS, NASA LaRC, and NPS were received. The narratives describing federal agency approaches to meeting their planning goal are included in Appendix E. For the purpose of the Phase III WIP, federal agencies are assumed to be treating all lands they own at levels sufficient to meet their local planning goals and current permit requirements. The BMPs used in this plan for federal facilities that did not provide input are derived

from the Phase II WIP. For those that did provide BMP inputs, their inputs have been included in the official WIP III Final CAST scenario.

Final WIP III Summary

Table 1 below shows the 2017 progress loads, 2025 basin target loads, reductions from 2017 needed to meet the planning target, additional reductions needed to address climate change, and the reductions identified in the WIP III Final for the Rappahannock River Basin for nitrogen and phosphorus. Table 2 shows the 2017 progress and WIP III Final loads for nitrogen and phosphorus, as well as the reductions from 2017 levels identified in the WIP III Final by pollution source sector for the Rappahannock River Basin. Table 3 shows a summary of the WIP III Final BMPs for the Rappahannock River Basin compared to the levels of implementation reported for 2009 and 2017 progress. The detailed input deck is available in CAST and a summary of Virginia's Bay wide BMPs is provided in Appendix D.

The reductions identified in the WIP III Final for the Rappahannock River Basin, with the exchanges described in Chapter 7, Initiative 9 and shown in Section 8.6 below, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025. The goals set for the Rappahannock River Basin are ambitious and will require significant sustained funding and technical capacity in all sectors. However, the exchanges to the basin and N:P exchanges within the basin identified in Section 8.6, Table 4 provide a significant buffer and additional assurance that the targets can be met.

Table 1: Rappahannock River Basin WIP III Final Loads, Targets and Reductions (in pounds)

Rappahannock River Basin	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	8,093,000	6,850,000	1,243,000	310,000	1,662,000
Phosphorus (pounds)	910,000	849,000	61,000	27,000	145,400

Table 2: Rappahannock River Basin Sector Loads and Reductions (in pounds

Nitrogen (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	379,000	424,000	-45,000
Agriculture	4,171,000	2,721,000	1,450,000
MS4 Developed	116,000	114,000	2,000
Non-MS4 Developed	1,369,000	1,255,000	114,000
Natural	1,885,000	1,757,000	128,000
Federal	173,000	162,000	11,000
Total	**8,093,000**	**6,432,000**	**1,661,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	40,000	43,000	-3,000
Agriculture	273,100	174,300	98,800
MS4 Developed	15,700	16,600	-900
Non-MS4 Developed	149,900	134,700	15,200
Natural	409,900	376,000	33,900
Federal	21,100	19,700	1,400
Total	**909,600**	**764,300**	**145,300**

Table 3: Rappahannock River Basin WIP III Final BMPs

Sector	**BMP**	**Unit**	**2009**	**2017**	**WIP III Final**
Agriculture	Agricultural Stormwater Management	acres	-	-	27
Agriculture	Agriculture Nutrient Management	acres	130,230	137,634	170,889
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	90,814
Agriculture	Alternative Crops	acres	-	336	383
Agriculture	Animal Waste Management System	Animal Units	11,913	4,960	30,718
Agriculture	Barnyard Runoff Control	acres	3	110	255
Agriculture	Cover Crop Commodity	acres	4,602	5,409	4,991
Agriculture	Cover Crop Traditional	acres	14,549	43,155	86,925
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	23	76
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units	-	-	5,398
Agriculture	Forest Buffer	acres	2,992	614	5,012
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	5,097

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Grass Buffer	acres	644	618	3,822
Agriculture	Grass Buffer - Narrow	acres	-	142	242
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	107	229
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	1,364	1,876	6,774
Agriculture	Horse Pasture Management	acres	-	-	2,731
Agriculture	Land Retirement to Ag Open Space	acres	3,424	4,699	10,072
Agriculture	Land Retirement to Pasture	acres	-	-	308
Agriculture	Loafing Lot Management	acres	-	-	22
Agriculture	Manure Incorporation	acres	-	-	162
Agriculture	Manure Transport	dry tons	219	73	-
Agriculture	Mortality Composters	Animal Units	-	26	15,202
Agriculture	Off Stream Watering Without Fencing	acres	14,483	16,352	17,943
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units	-	14	488
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	12,202	33,922	57,151
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	237,295
Agriculture	Sorbing Materials in Ag Ditches	acres	-	-	186
Agriculture	Tillage Management	acres	155,338	143,284	138,441
Agriculture	Tree Planting	acres	654	2,214	8,073
Agriculture	Water Control Structures	acres	145	64	92
Agriculture	Wetland Restoration - Floodplain	acres	51	50	1,672
Agriculture	Wetland Restoration - Headwater	acres	-	-	5
Developed	Advanced Grey Infrastructure Nutrient Discovery Program (IDDE)	acres	-	-	5
Developed	Bioretention/raingardens	acres	116	287	6,436
Developed	Bioswale	acres	5	14	1,981
Developed	Conservation Landscaping Practices	acres	-	-	2,419
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	2,352	2,886	6,833
Developed	Dry Extended Detention Ponds	acres	1,925	3,235	10,356

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Erosion and Sediment Control	acres	3,594	2,210	2,016
Developed	Filter Strip Runoff Reduction	acres	1	1	3
Developed	Filter Strip Stormwater Treatment	acres	-	-	0
Developed	Filtering Practices	acres	34	96	4,774
Developed	Floating Treatment Wetland	acres	-	-	224
Developed	Forest Buffer	acres	-	-	298
Developed	Forest Planting	acres	-	-	338
Developed	Impervious Surface Reduction	acres	-	1	2,444
Developed	Infiltration Practices	acres	94	205	5,216
Developed	Permeable Pavement	acres	1	3	154
Developed	Storm Drain Cleaning	pounds of sediment	-	-	7,603
Developed	Stormwater Performance Standard-Runoff Reduction	acres	-	24	89
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	-	-	8
Developed	Tree Planting - Canopy	acres	-	-	2,975
Developed	Urban Nutrient Management	acres	703	1,812	56,537
Developed	Vegetated Open Channels	acres	16	75	670
Developed	Wet Ponds and Wetlands	acres	3,524	4,689	21,101
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	20,000
Natural	Forest Harvesting Practices	acres	12,190	8,752	12,985
Natural	Oyster Aquaculture	oysters harvested	-	-	20,384,772
Natural	Oyster Reef Restoration	acres	-	-	145
Natural	Shoreline Management	feet	-	170	132,484
Natural	Stream Restoration	feet	39,616	41,043	58,593
Natural	Wetland Rehabilitation	acres	-	-	30
Septic	Septic Connection	systems	2	9	2,422
Septic	Septic Denitrification - Conventional	systems	101	208	3,299
Septic	Septic Denitrification - Enhanced	systems	2	12	133

Sector	BMP	Unit	2009	2017	WIP III Final
Septic	Septic Effluent - Enhanced	systems	-	1	18
Septic	Septic Pumping	systems	1,416	432	11,063
Septic	Septic Secondary Treatment - Conventional	systems	585	465	895
Septic	Septic Secondary Treatment - Enhanced	systems	11	24	71

8.3 The York River Basin

Figure 1: Canoe trip at York River State Park (Courtesy of DCR)

Overview

"At 2,669 square miles, or about 6% of the Commonwealth's total land area, the York is among the smallest of Virginia's Chesapeake Bay watersheds (Figure 2). However, population there grew from about 263,600 in 2000 to approximately 435,400 in 2010, making it among the Bay's fastest growing watersheds in terms of population. In addition to the York River watershed, this section also covers the adjoining Lower York Coastal Basins: Piankatank River and Mobjack Bay."[21]

"The headwaters of the York River begin in Orange County and flow in a southeasterly direction for approximately 220 miles to its mouth at the Chesapeake Bay. The basin's width varies from 40 miles at its headwaters to five miles at the mouth. The basin is comprised of the York River and its two major tributaries, the Pamunkey and the Mattaponi Rivers. The York River itself is only about 30 miles in length. The Pamunkey River's major tributaries are the North and South Anna Rivers and the Little River, while the major Mattaponi tributaries are the Matta, Po, and Ni Rivers."[22]

Based on the draft 2018 IR, the basin includes about 6,700 miles of rivers/streams, 11,330 acres of lakes and 82 square miles of tidal estuary. Detailed information on the current water quality conditions in the York River Basin can be found in the 2018 IR, including the length and area of waterbodies assessed for compliance against Virginia's water quality standards as well as analyses of designated uses supported, significant causes of use impairment and suspected sources of pollution.

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[21] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the York River and Lower York Coastal Basins*

[22] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy for the York River and Lower York Coastal Basins*

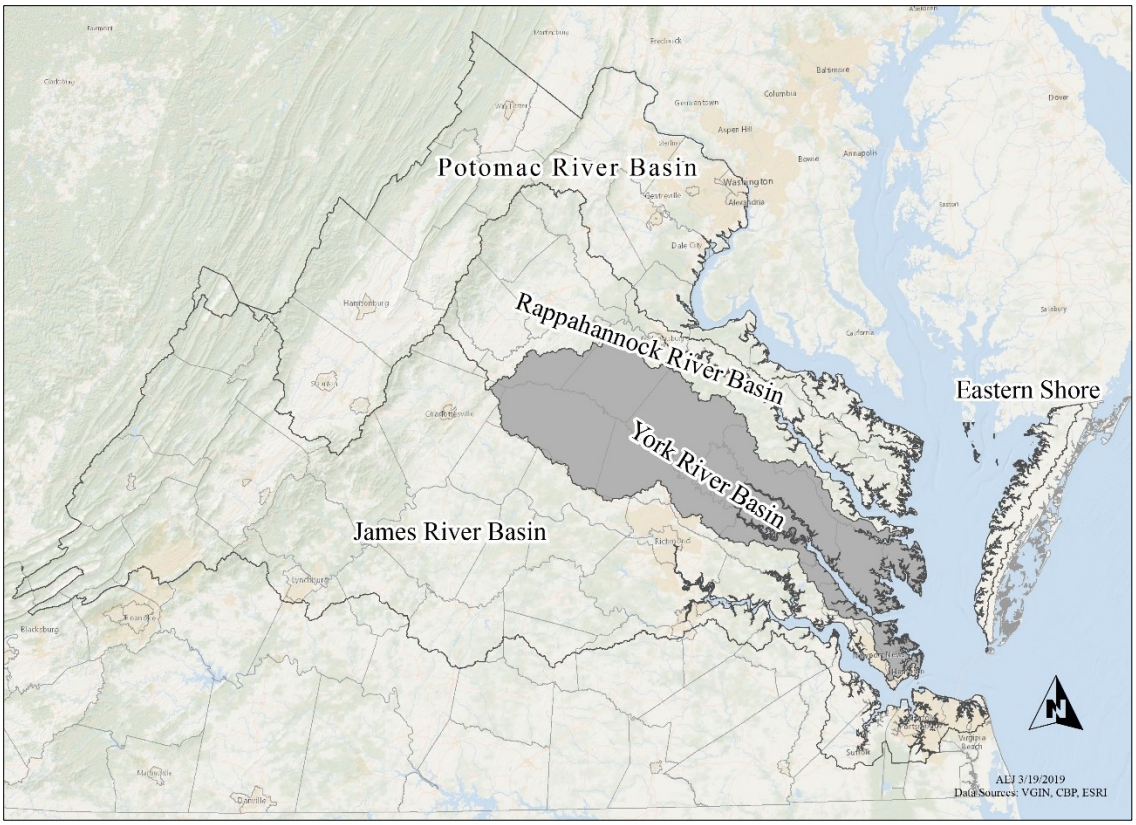


Figure 2: York River Basin Boundary

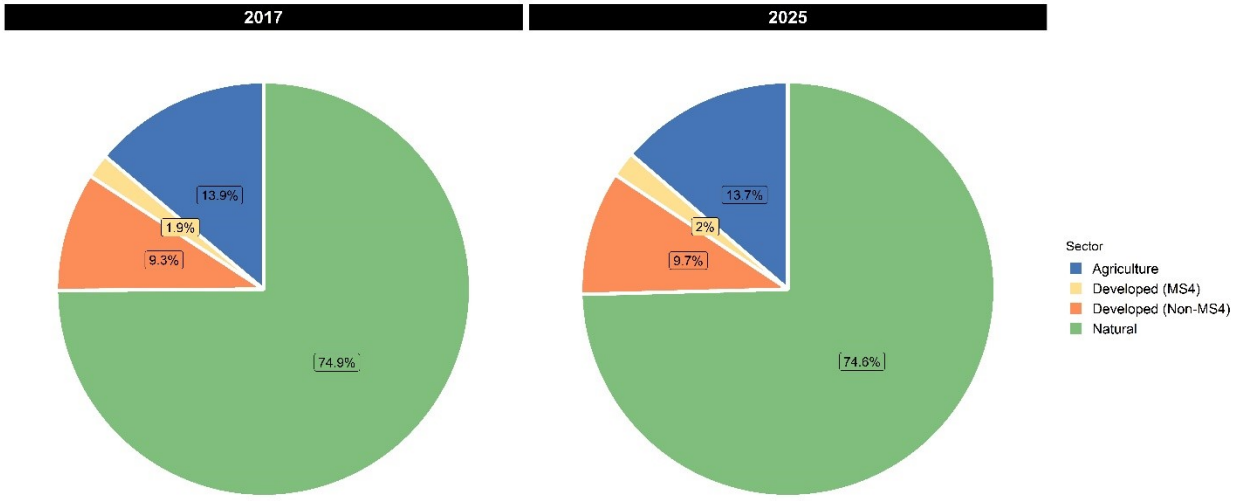


Figure 3: Comparison of 2017 Versus 2025 Modeled Land Use for the York River Basin

As represented in the Chesapeake Bay Watershed Model Version 6, 75% of the basin's land area is classified as natural. Agriculture makes up 14% of the basin while developed (Non-MS4) area accounts for 9% and developed (MS4) is 2% (Figure 3). For the Final Phase III WIP, the land use conditions

projected for 2025 were used as the basis for local area planning goals, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3.

State landholdings total nearly 34,625 acres (Figure 4) plus another approximate 19,000 acres of non-MS4 roads. Federal landholdings total nearly 75,414 acres (Figure 5). For the Final Phase III WIP, the land use conditions projected for 2025 were used as the basis for planning targets, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3.

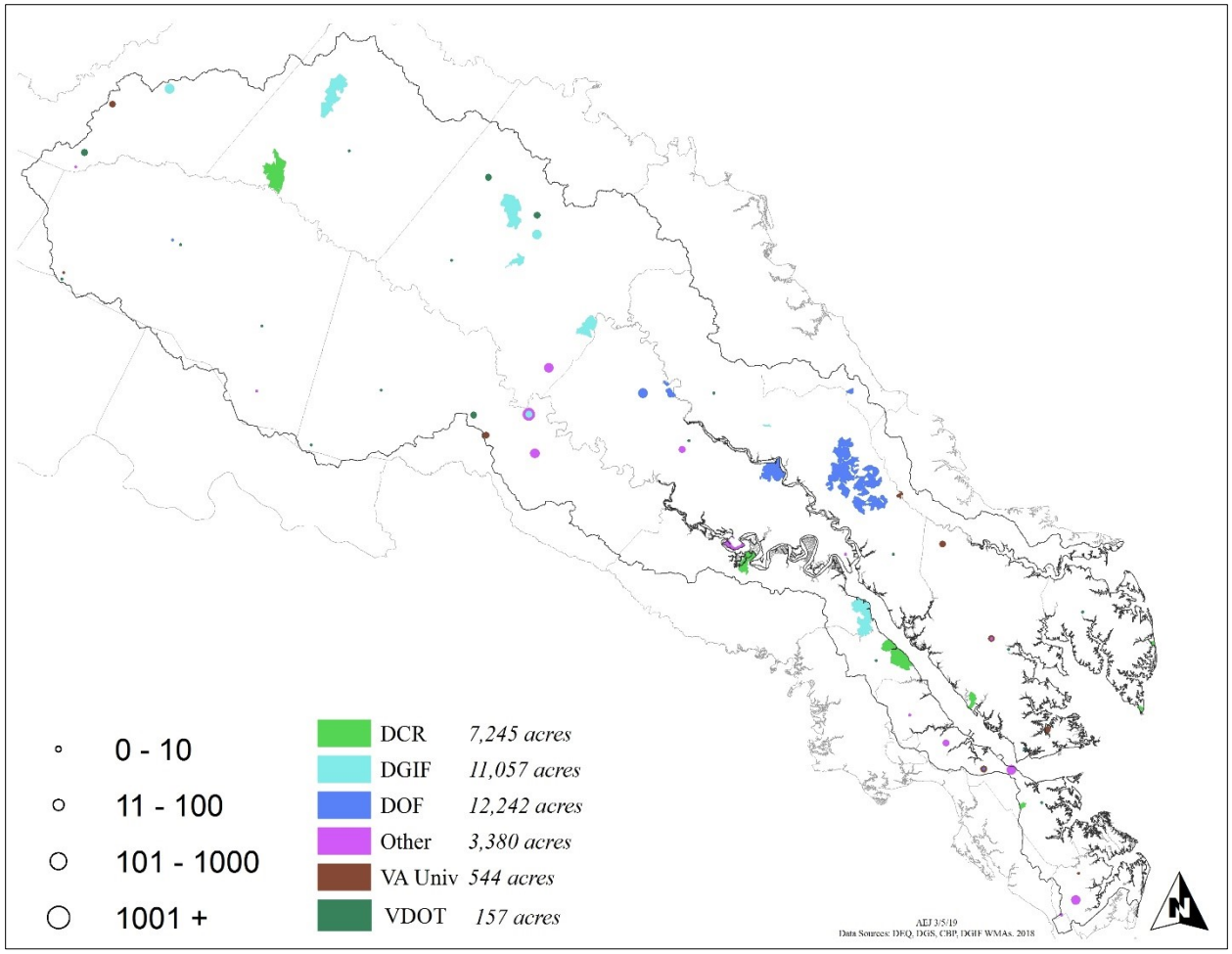


Figure 4: State Owned Lands in the York River Basin

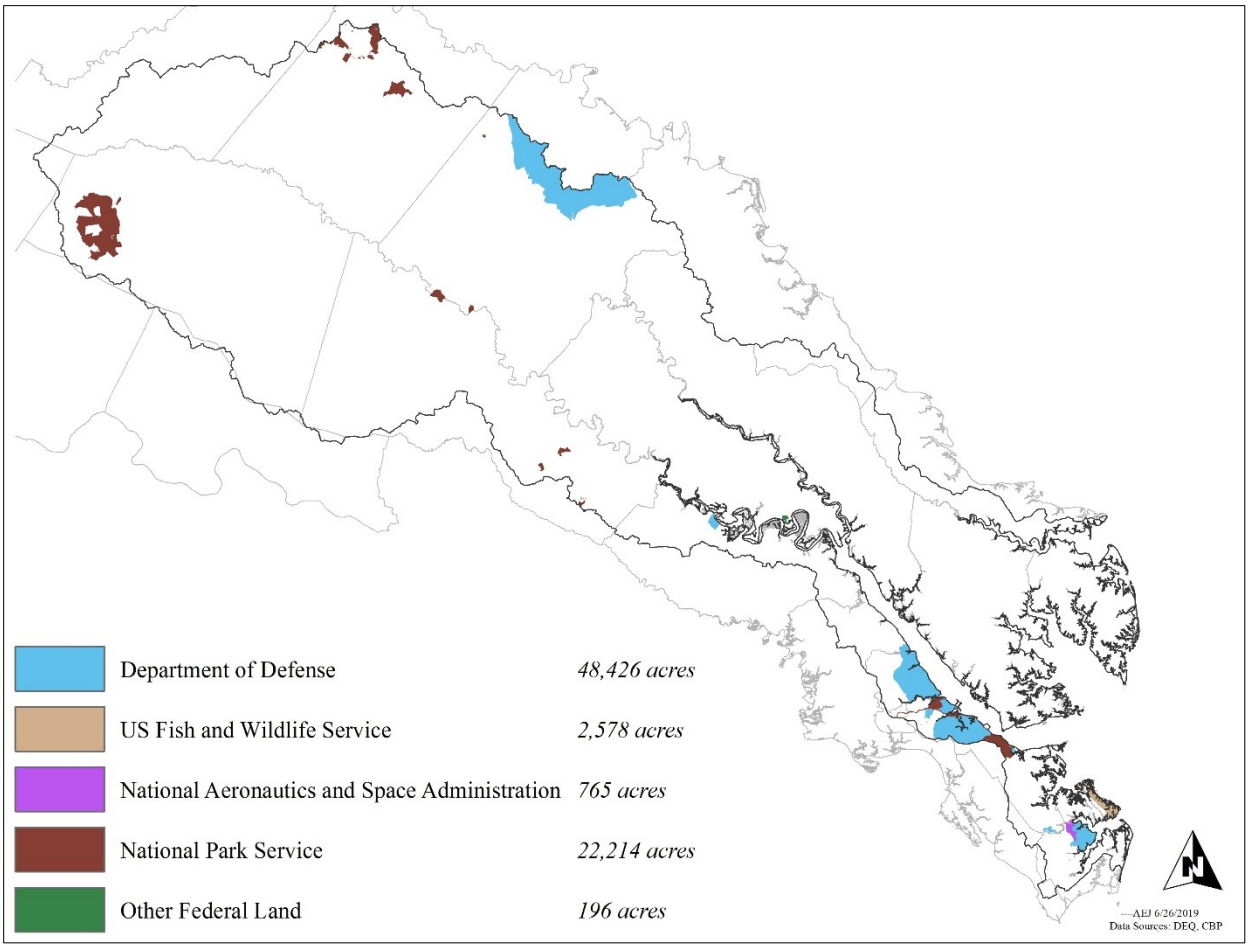


Figure 5: Federal Facilities in the York River Basin

The majority of the York basin is rural in character with the population evenly distributed throughout. The only major city that falls within this basin is a portion of Williamsburg. All or portions of the following 14 counties lie within the basin: Albemarle, Caroline, Fluvanna, Gloucester, Goochland, Hanover, James City, King and Queen, King William, Louisa, New Kent, Orange, Spotsylvania, and York.

The six PDCs (Figure 6) and seven SWCDs (Figure 7) located wholly or in part within the York River Basin are shown in the following maps. The basin also includes the York and Small Coastal Basin Watershed Roundtable. Watershed roundtables are designed to bring together diverse local stakeholders with a vested interest in their communities and concern for local water quality. Common roundtable activities include collecting and analyzing water quality data, planning and implementing watershed-wide water quality goals, coordinating workshops/ forums and developing outreach and education resources. DEQ provides funding opportunities for watershed roundtable activities in Virginia to help achieve water quality improvement goals.

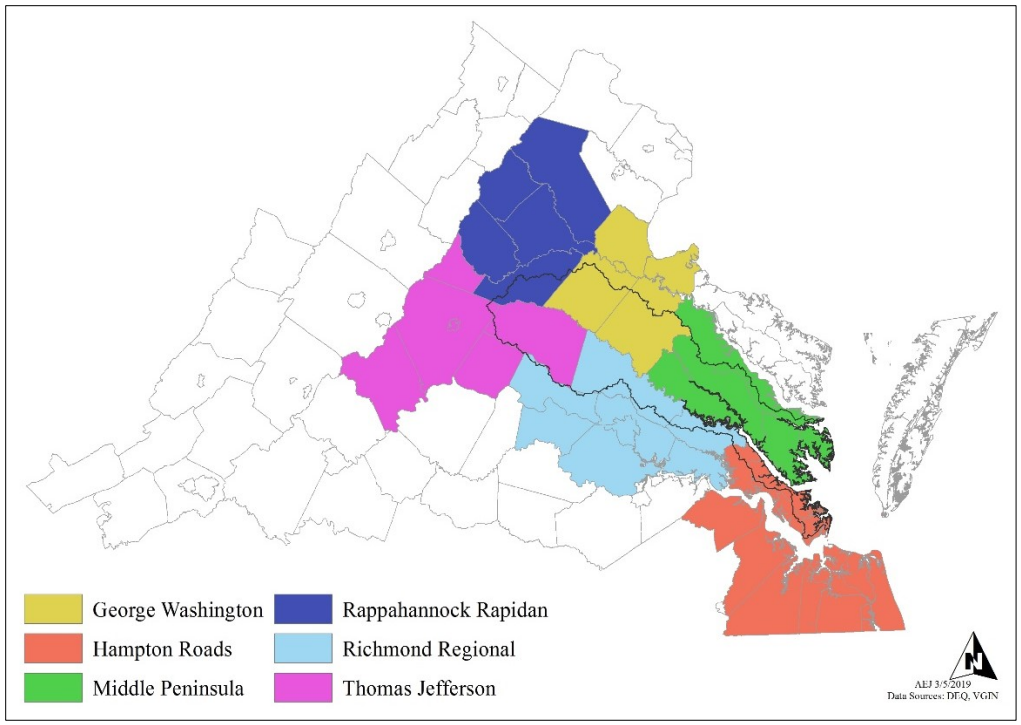


Figure 6: PDCs in the York River Basin

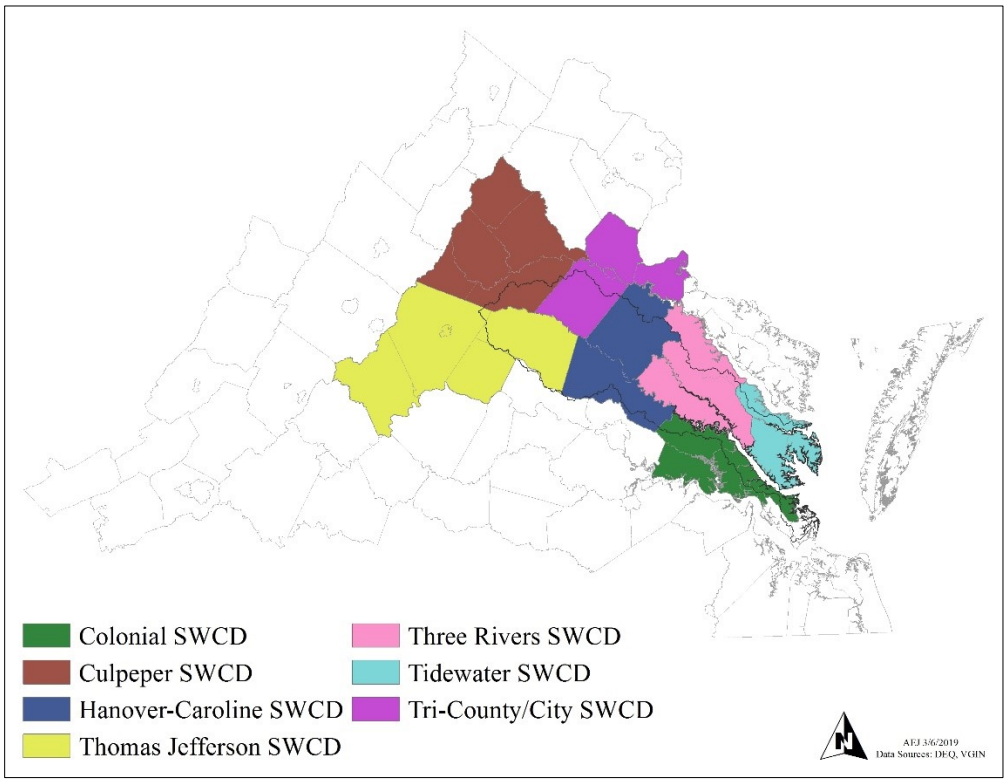


Figure 7: SWCDs in the York River Basin

Final Phase III WIP Development

In 1985, the nitrogen and phosphorus loads from the York River Basin were 7 million pounds and 921,000 million pounds respectively. When the Chesapeake Bay TMDL was released in 2010, the York loads were 6.9 million pounds of nitrogen and 592,000 pounds of phosphorus. According to the 2017 progress update, loads contributed from this basin were 6.2 million pounds of nitrogen and 0.56 million pounds of phosphorus. The major contributing sources of nitrogen and phosphorus in the York River Basin as of 2017 are the agriculture sector followed by the natural and developed sectors.

The Final Phase III WIP 2025 target loads allocated to this basin are 5.5 million pounds of nitrogen and 0.56 million pounds of phosphorus. The Chesapeake Bay Program's estimate of loads that must be reduced to account for climate change in the basin are an additional 200,000 pounds of nitrogen and 14,000 pounds phosphorus. These climate change loads are represented as an additional load on the WIP III Final bars shown in Figure 8.

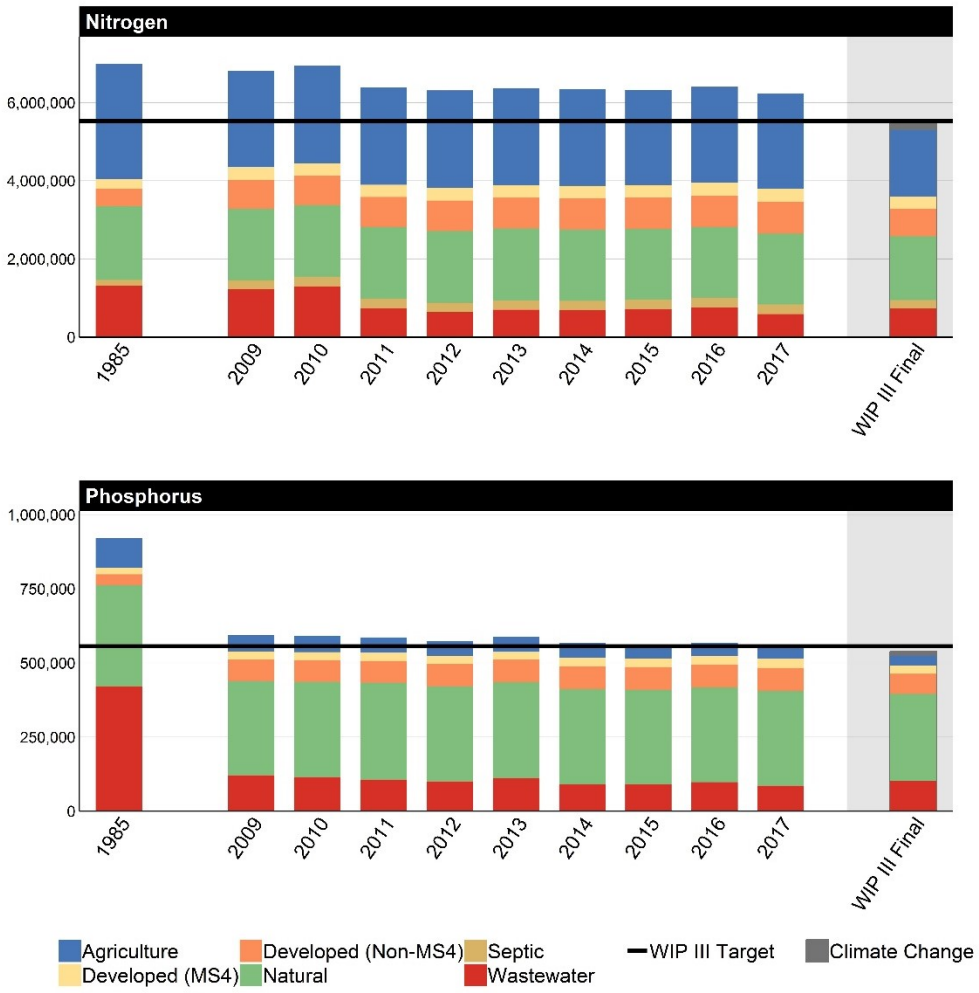


Figure 8: Nutrient Load Reductions for the York River Basin

The BMP inputs received from the PDCs and SWCDs in the York River Basin were combined with the regulated wastewater facilities and MS4s at their permit limits and federal facilities, then run through the Chesapeake Bay Watershed Model Version 6. Further adjustments were made based on additional state initiatives. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final. Exchanges as discussed in Chapter 7 are needed to meet the WIP III target for the York basin and are presented in Table 3 at the end of this section.

Wastewater

Wastewater treatment plant upgrades and operational improvements in the wastewater sector in the York River Basin, focused mostly on the 11 significant point source dischargers (Figure 9), were put in place to achieve significant reductions since 1985. As of 2017, these loads meet the WLA limits, at 0.58 million pounds nitrogen and 85,000 pounds phosphorus. The expectation through 2025 is that these loads will

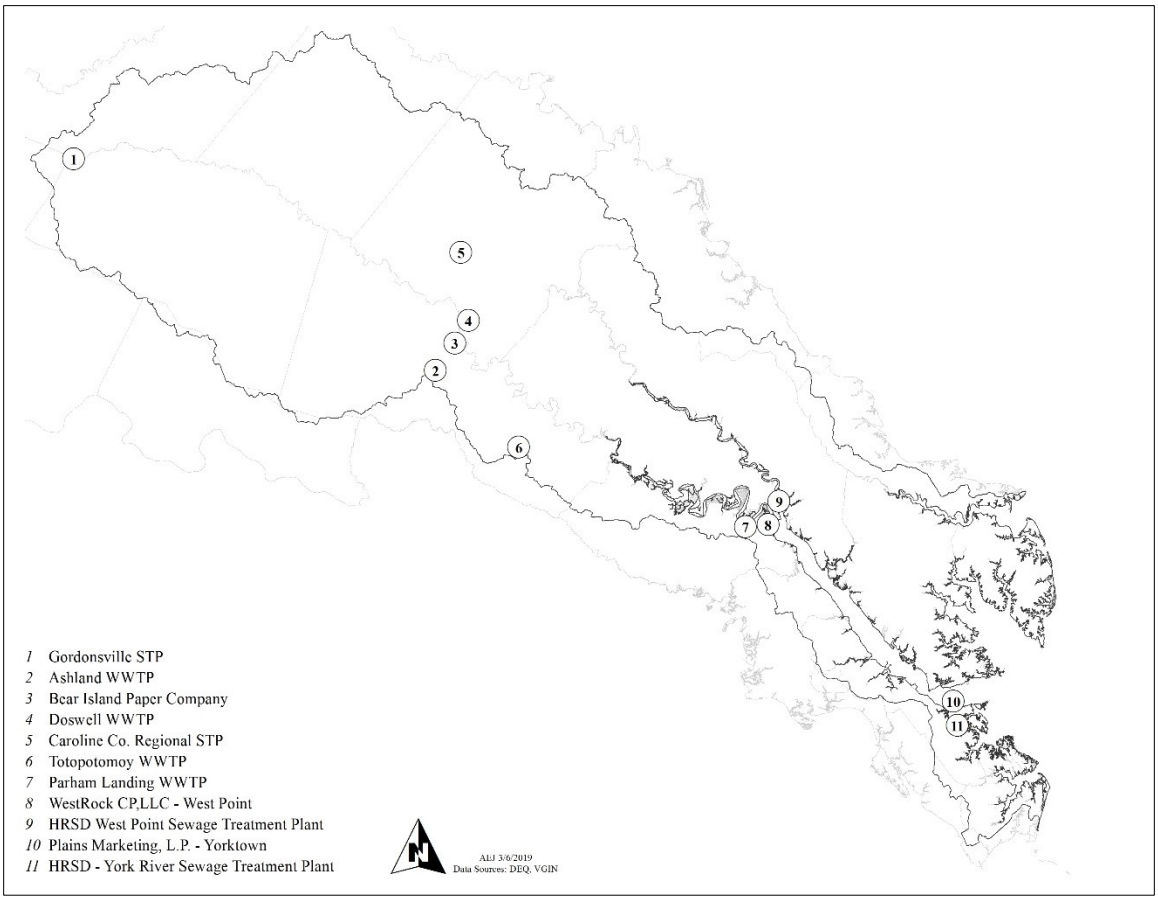


Figure 9: Significant Dischargers in the York River Basin

decline by approximately 10% in response to Initiative #48, but will slowly increase beyond 2025 as population increases continue in the York Basin. Regulations have been issued to ensure that these loads

are maintained at or below the limits set by the TMDL.[23]

Municipal Separate Storm Sewer Systems (MS4s)

The 13 MS4 permittees in the York River Basin (Figure 10) are implementing nutrient and sediment reductions through TMDL Action Plans that are required by permit or regulation. The Phase II WIP established a schedule for achieving these reductions: 5% in the first five-year permit cycle, 35% in the second cycle and 60% in the third permit cycle. This plan proposes to maintain the previously established MS4 requirements over three permit cycles. The MS4s will not complete their third permit cycle prior to 2025; however, they will be in their third phase of TMDL Action Plan implementation. Virginia will honor its commitment to these regulated entities allowing them three full permit cycles to meet their reductions requirements. Any gap in this sector meeting its permit requirements by 2025 due to timing will be offset by the excess capacity achieved in the wastewater sector.

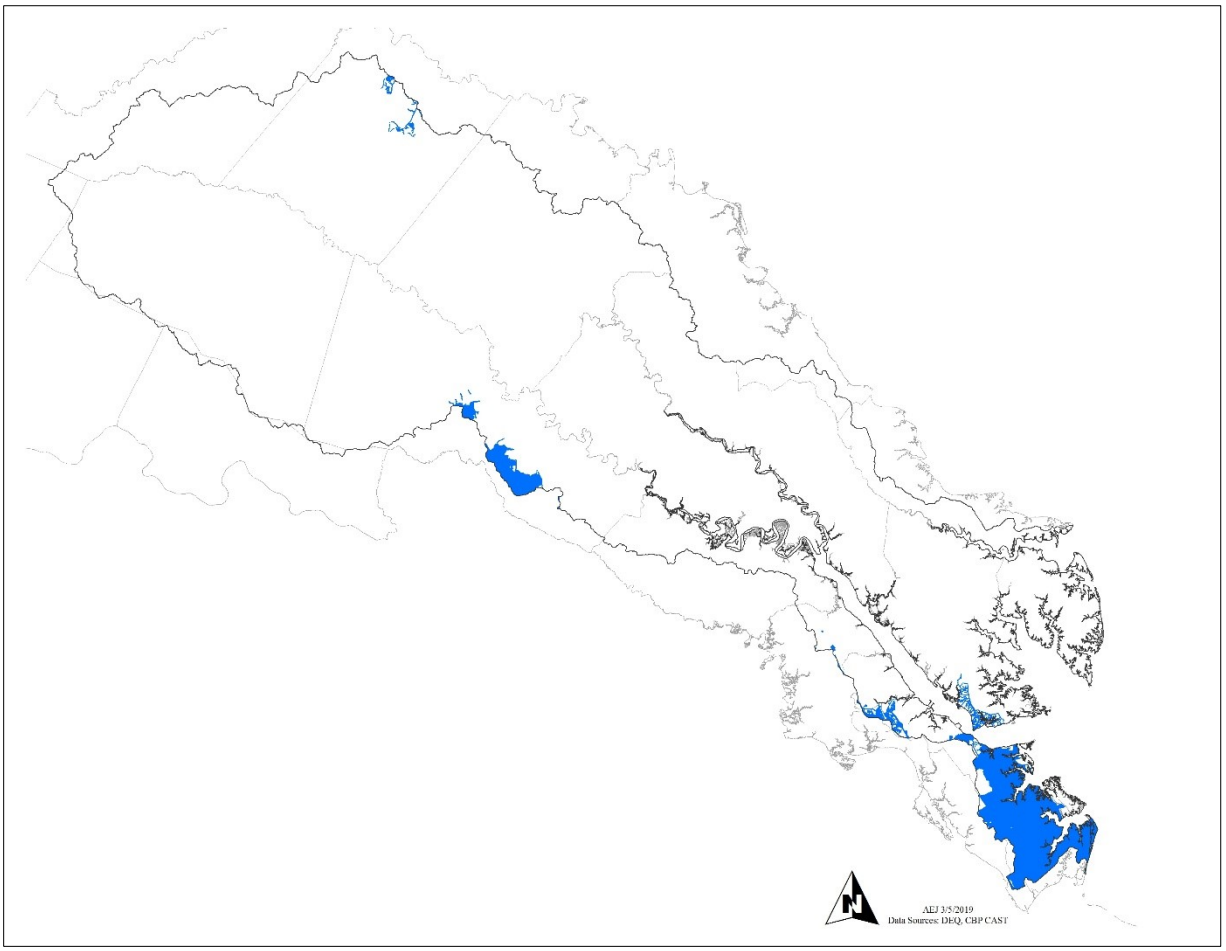
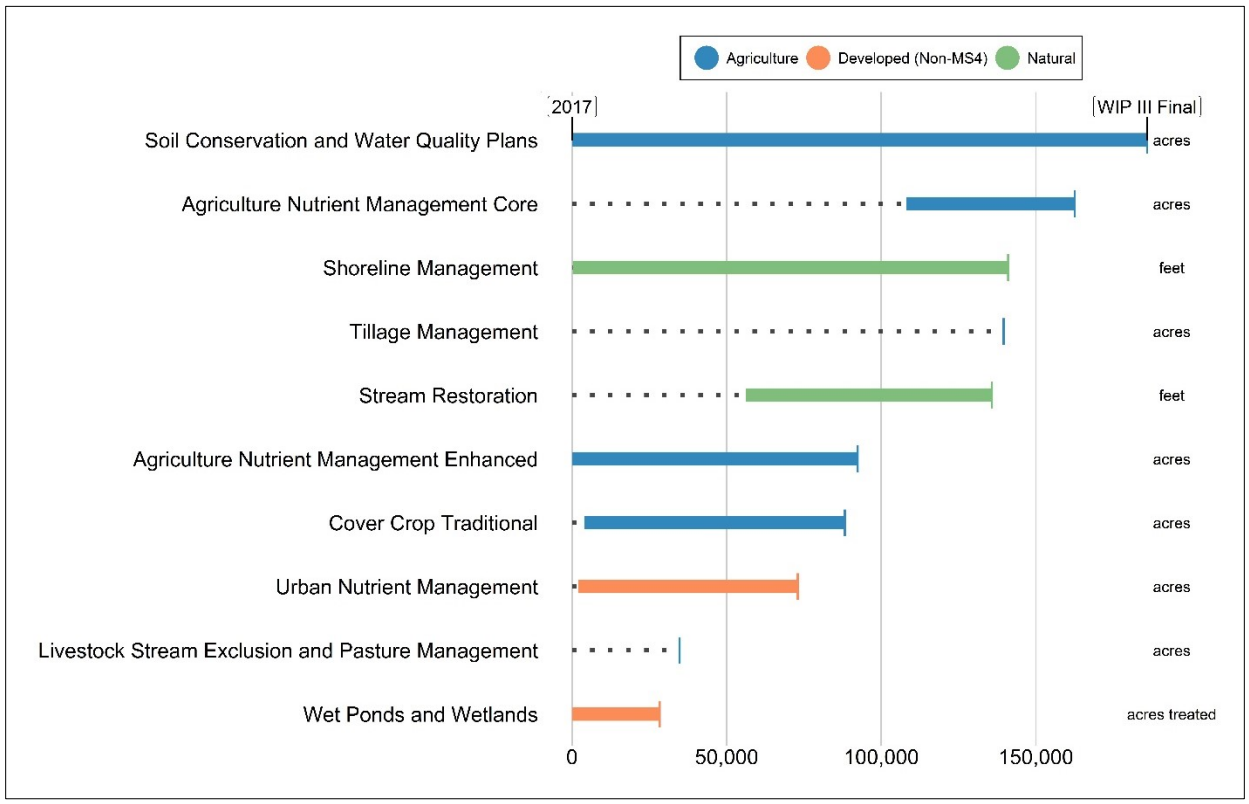


Figure 10: MS4 Permittees in the York River Basin

[23] 9VAC25-40-70 Strategy for Chesapeake Bay Watershed, 9VAC25-820 General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Agricultural, Natural and Non-MS4 Developed Lands

Initial BMPs and programmatic actions for agricultural, natural and non-MS4 developed lands were explored through the local and regional engagement described in Chapter 6 of this report. The final BMPs identified for implementation through 2025 based on the draft WIP and public review, assuming sufficient resources are made available, result in reductions of 928,000 pounds of nitrogen and 35,300 pounds of phosphorus compared to 2017 levels and are shown in Figure 11 as WIP III Final. The WIP III Final BMP implementation levels and resulting nutrient reductions provide a solid foundation to meet the Commonwealth's reduction targets for 2025. The cumulative BMP implementation levels for the WIP III Final can be seen in Table 3 and the resulting loads in Table 2. Input decks and programmatic actions submitted by the SWCDs and PDCs are available on the DEQ Chesapeake Bay TMDL Phase III WIP Data website. The BMP implementation scenario for the WIP III Final is available on CAST.



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the Phase II WIP. For those that did provide BMP inputs, their inputs have been included in the official WIP III Final CAST scenario.

Final Phase III WIP Summary

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The reductions identified in the WIP III Final for the York River Basin, with the exchanges described in Chapter 7, Initiative 9 and shown in Section 8.6 below, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025. The goals set for the York River Basin are ambitious and will require significant sustained funding and technical capacity in all sectors. However, the exchanges to the basin and N:P exchanges within the basin identified in Section 8.6, Table 4 provide a significant buffer and additional assurance that the targets can be met.

Table 1: York River Basin WIP III Final Loads, Targets and Reductions (in pounds)

York River Basin	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	6,225,000	5,520,000	705,000	200,000	928,000
Phosphorus (pounds)	559,000	556,000	3,000	14,000	35,300

Table 2: York River Basin Sector Loads and Reductions (in pounds)

Nitrogen (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	585,000	725,000	-140,000
Agriculture	2,435,000	1,699,000	736,000
MS4 Developed	312,000	295,000	17,000
Non-MS4 Developed	1,034,000	907,000	127,000
Natural	1,725,000	1,548,000	177,000
Federal	135,000	122,000	13,000
Total	**6,225,000**	**5,297,000**	**928,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	85,400	101,100	-15,700
Agriculture	45,800	32,500	13,300
MS4 Developed	28,700	27,400	1,300
Non-MS4 Developed	75,600	66,400	9,200
Natural	296,400	272,300	24,100
Federal	27,500	24,500	3,000
Total	**559,500**	**524,200**	**35,300**

Table 3: York River Basin WIP III Final BMPs

Sector	**BMP**	**Unit**	**2009**	**2017**	**WIP III Final**
Agriculture	Agricultural Stormwater Management	acres	-	-	9
Agriculture	Agriculture Nutrient Management	acres	123,884	108,041	162,586
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	92,361
Agriculture	Alternative Crops	acres	-	80	783
Agriculture	Animal Waste Management System	Animal Units	7,149	7,331	30,980
Agriculture	Barnyard Runoff Control	acres	3	60	90
Agriculture	Cover Crop Commodity	acres	2,064	1,641	7,540
Agriculture	Cover Crop Traditional	acres	16,429	26,851	86,620
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	3	1,575
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units	-	-	2,423
Agriculture	Forest Buffer	acres	699	417	1,905
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	1,649

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Grass Buffer	acres	284	245	1,823
Agriculture	Grass Buffer - Narrow	acres	-	519	640
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	30	621
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	374	629	2,261
Agriculture	Horse Pasture Management	acres	-	-	2,049
Agriculture	Land Retirement to Ag Open Space	acres	4,895	3,199	4,906
Agriculture	Land Retirement to Pasture	acres	-	-	1,905
Agriculture	Loafing Lot Management	acres	-	-	1
Agriculture	Manure Compost Static Pile Windrow	dry tons	-	-	1,921
Agriculture	Manure Incorporation	acres	-	-	370
Agriculture	Manure Injection	acres	-	-	4
Agriculture	Manure Transport	dry tons	41	-	-
Agriculture	Mortality Composters	Animal Units	379	808	35,064
Agriculture	Off Stream Watering Without Fencing	acres	6,418	14,100	11,663
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units	-	27	398
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	5,712	22,719	19,094
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	185,933
Agriculture	Sorbing Materials in Ag Ditches	acres	-	-	381
Agriculture	Tillage Management	acres	152,689	144,950	139,569
Agriculture	Tree Planting	acres	405	1,544	3,191
Agriculture	Water Control Structures	acres	470	190	135
Agriculture	Wetland Restoration - Floodplain	acres	59	49	208
Agriculture	Wetland Restoration - Headwater	acres	-	-	20
Developed	Bioretention/raingardens	acres	320	344	4,452
Developed	Bioswale	acres	290	250	512
Developed	Conservation Landscaping Practices	acres	-	-	2,271
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	2,448	2,446	10,568
Developed	Dry Extended Detention Ponds	acres	1,934	1,877	17,074

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Erosion and Sediment Control	acres	2,159	2,523	2,247
Developed	Filter Strip Runoff Reduction	acres	-	-	25
Developed	Filtering Practices	acres	12	22	8,785
Developed	Forest Buffer	acres	-	2	750
Developed	Forest Planting	acres	-	-	472
Developed	Impervious Surface Reduction	acres	6	12	4,335
Developed	Infiltration Practices	acres	768	790	9,562
Developed	Permeable Pavement	acres	6	12	15
Developed	Storm Drain Cleaning	pounds of sediment	-	-	4
Developed	Stormwater Performance Standard-Runoff Reduction	acres	7	39	142
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	148	183	86
Developed	Tree Planting - Canopy	acres	-	-	2,929
Developed	Urban Nutrient Management	acres	877	2,062	72,996
Developed	Vegetated Open Channels	acres	31	78	416
Developed	Wet Ponds and Wetlands	acres	13,882	13,881	28,368
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	20,000
Natural	Forest Harvesting Practices	acres	18,570	18,316	16,812
Natural	Oyster Aquaculture	oysters harvested	-	-	20,109,343
Natural	Oyster Reef Restoration	acres	-	-	638
Natural	Shoreline Management	feet	-	181	141,042
Natural	Stream Restoration	feet	55,392	56,126	135,808
Natural	Wetland Rehabilitation	acres	-	-	26
Septic	Septic Connection	systems	2	45	7,657
Septic	Septic Denitrification - Conventional	systems	95	246	11,956
Septic	Septic Denitrification - Enhanced	systems	-	23	96
Septic	Septic Effluent - Enhanced	systems	-	2	4
Septic	Septic Pumping	systems	6,097	266	14,278

Sector	BMP	Unit	2009	2017	WIP III Final
Septic	Septic Secondary Treatment - Conventional	systems	1,026	908	1,074
Septic	Septic Secondary Treatment - Enhanced	systems	2	25	40

8.4 The James River Basin

Figure 1: Railroad Bridge at Sunset by Bill Piper (Courtesy of Scenic Virginia)

Overview

"The James is the largest of Virginia's Chesapeake Bay watersheds, stretching from the West Virginia border east to the mouth in Hampton Roads. This nation was born on the banks of the James River, but it is also a distinctly Virginia river."[24] The James runs about 350 miles through the heart of Virginia, beginning in the Alleghany Mountains and flowing southeasterly to Hampton Roads where it enters the Chesapeake Bay (Figure 2). The James is formed by the confluence of the Jackson and Cowpasture Rivers and flows 242 miles to the fall line at Richmond and another 106 miles to the Bay. Notable tributaries to the tidal James include the Appomattox, Chickahominy, Pagan, Nansemond and Elizabeth Rivers. "It is the nation's longest river to be contained in a single state. The mountain streams, Piedmont creeks and tidal marshes share the watershed with mountain villages, rolling pastures and broad expanses of croplands."[25]

The James River Basin occupies the central portion of Virginia and covers 10,265 square miles or approximately 24% of the Commonwealth's total land area. The 2010 population for the James River basin was approximately 2,892,000, with concentrations in two large metropolitan areas: the Greater Richmond – Petersburg area with over 650,000 and Tidewater, with over one million people. Two smaller population centers are the Lynchburg and Charlottesville areas, each with over 100,000 people.

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[24] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Strategy for the James River, Lynnhaven and Poquoson Coastal Basins*

[25] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Strategy for the James River, Lynnhaven and Poquoson Coastal Basins*

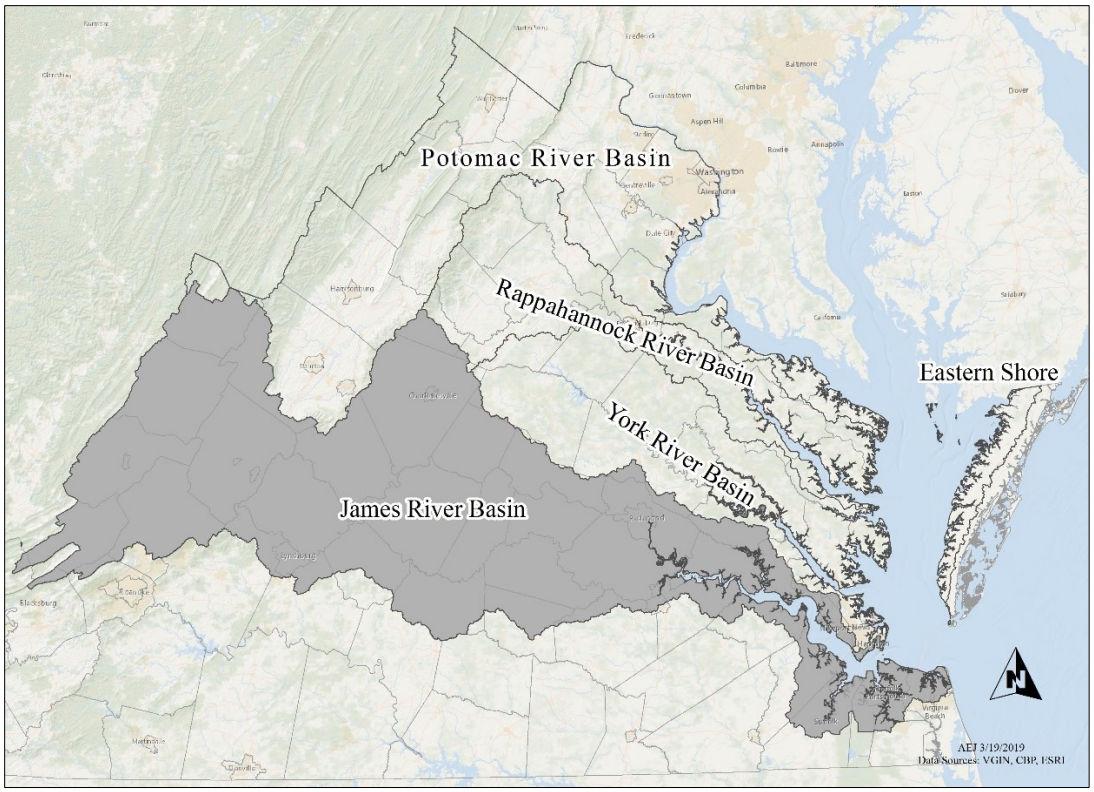

Figure 2: James River Basin Boundary

Based on the draft 2018 IR, the basin includes about 26,100 miles of rivers/ streams, 18,500 acres of lakes and 265 square miles of tidal estuary. Detailed information on the current water quality conditions in the James Basin can be found in the 2018 IR, including the length and area of waterbodies assessed for compliance against Virginia's water quality standards as well as analyses of designated uses supported, significant causes of use impairment and suspected sources of pollution.

As represented in the Chesapeake Bay Watershed Model Version 6, 75.8% of the basin's land area is classified as natural. Agriculture makes up 11.7% of the basin while developed (non-MS4) area accounts for 7.5% and developed (MS4) is 5%. For the Phase III WIP, the land use conditions projected for 2025 were used as the basis for local area planning goals, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3.

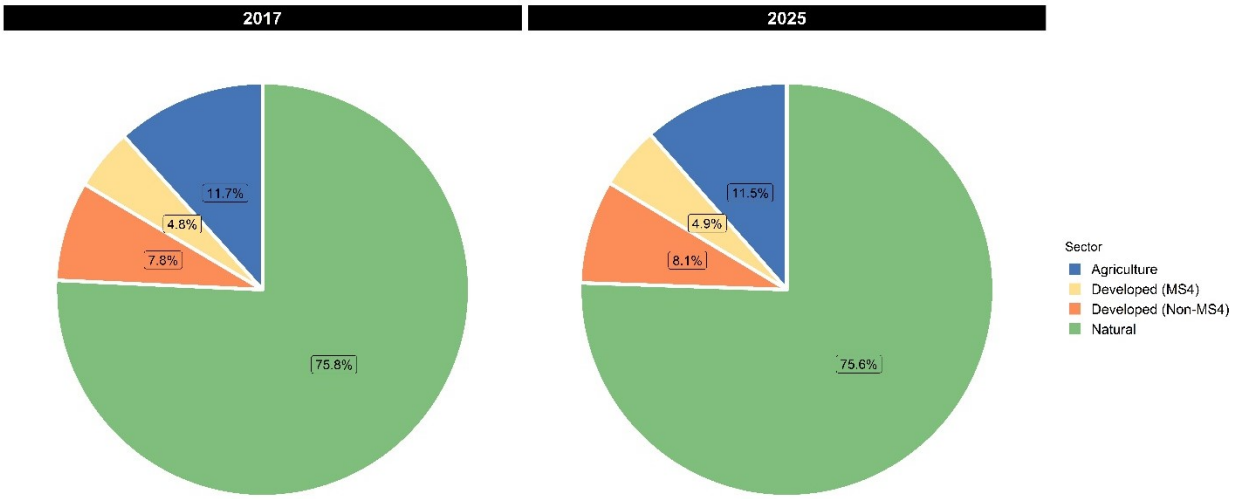

Figure 3: Comparison of 2017 Versus 2025 Modeled Land Use in the James River Basin

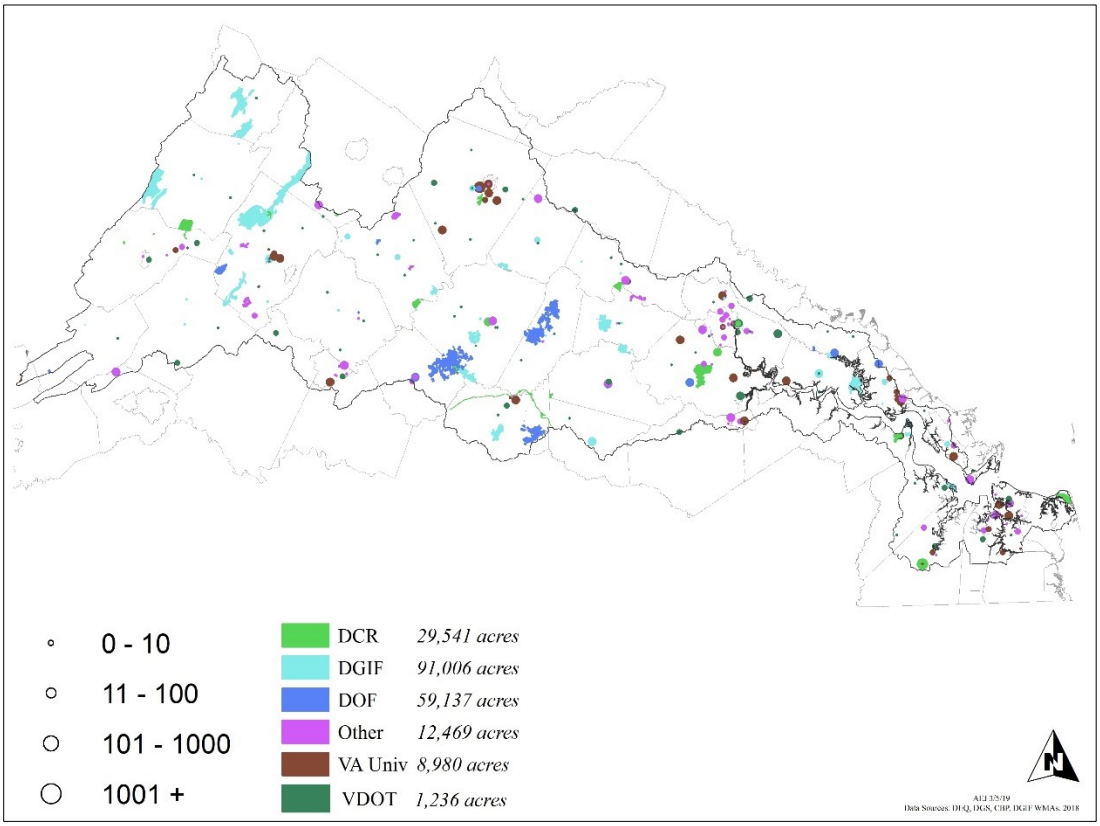

Figure 4: State Owned Lands in the James River Basin

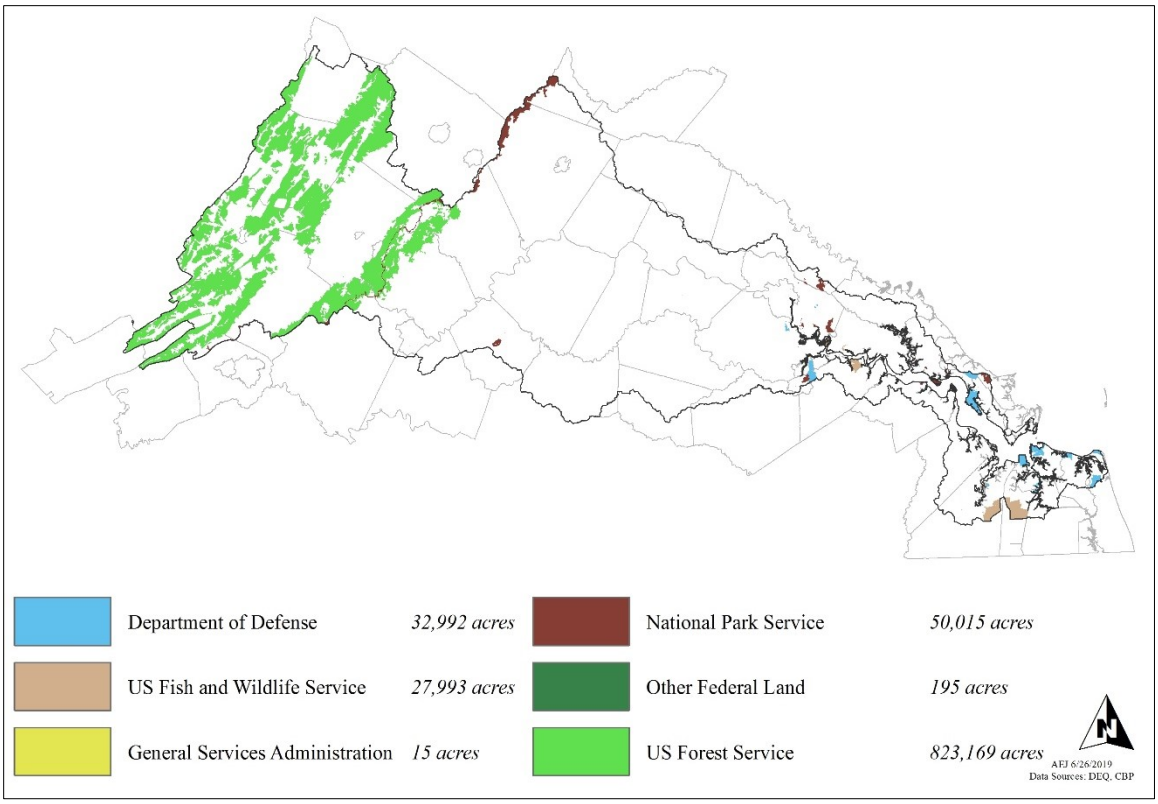

Figure 5: Federal Facilities in the James River Basin

State landholdings total nearly 202,369 acres (Figure 4) plus another approximate 54,000 acres of non-MS4 roads. Federal landholdings are significant, totaling nearly 1,221,064 acres (Figure 5).

All or part of the following 38 counties lie within the basin: Albemarle, Alleghany, Amelia, Amherst, Appomattox, Augusta, Bath, Bedford, Botetourt, Buckingham, Campbell, Charles City, Chesterfield, Craig, Cumberland, Dinwiddie, Fluvanna, Giles, Goochland, Greene, Hanover, Henrico, Highland, Isle of Wight, James City, Louisa, Montgomery, Nelson, New Kent, Nottoway, Orange, Powhatan, Prince Edward, Prince George, Roanoke, Rockbridge, Surry, and York. There are also 17 cities in the watershed: Buena Vista, Charlottesville, Chesapeake, Colonial Heights, Covington, Hampton, Hopewell, Lexington, Lynchburg, Newport News, Norfolk, Petersburg, Portsmouth, Richmond, Suffolk, Williamsburg, and Virginia Beach.

The 10 PDCs (Figure 6) and 20 SWCDs (Figure 7) located wholly or in part within the James River Basin are shown in the following maps. The basin also includes three watershed roundtables: the Upper James Watershed Roundtable, the Middle James Watershed Roundtable and the Lower James Watershed Roundtable. Watershed roundtables are designed to bring together diverse local stakeholders with a vested interest in their communities and concern for local water quality. Common roundtable activities include collecting and analyzing water quality data, planning and implementing watershed-wide water quality goals, coordinating workshops/forums and developing outreach and education resources. DEQ provides funding opportunities for watershed roundtable activities in Virginia to help achieve water quality improvement goals.

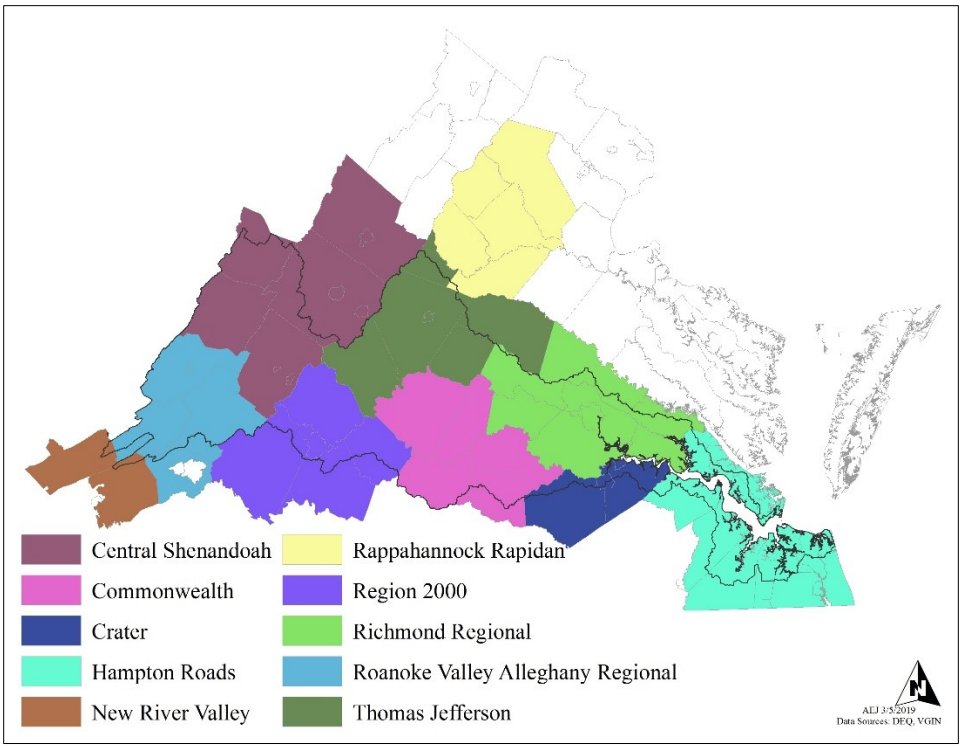

Figure 6: PDCs in the James River Basin

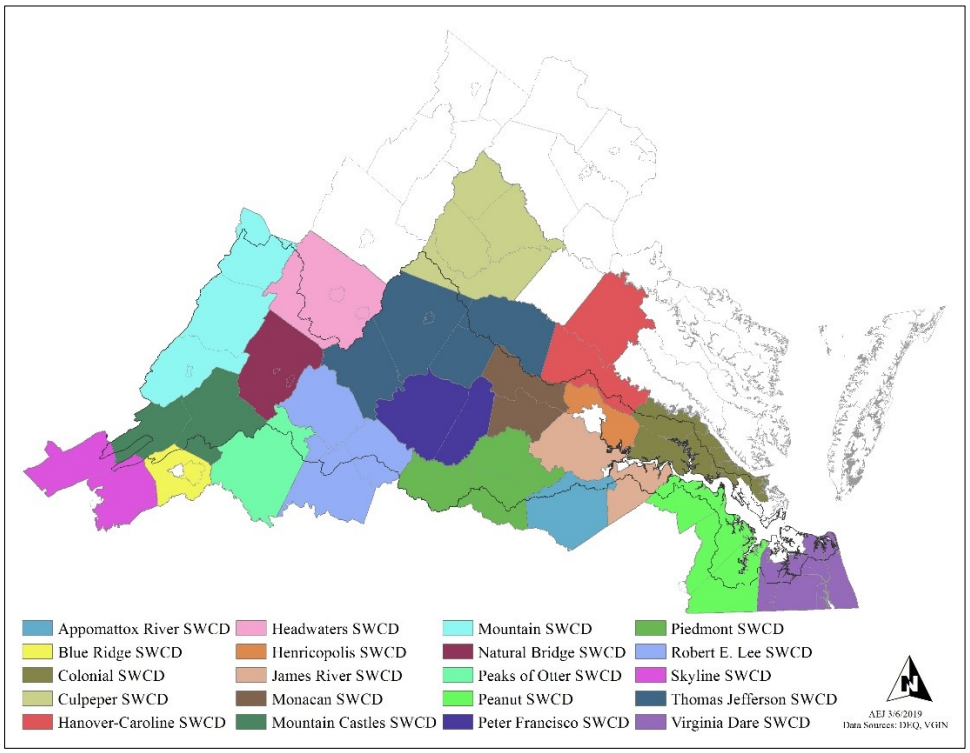

Figure 7: SWCDs in the James River Basin

Final Phase III WIP Development

In 1985, the nitrogen and phosphorus loads from the James River Basin were 39.4 million pounds and 8.4 million pounds respectively. When the Chesapeake Bay TMDL was released in 2010, the James loads were 32 million pounds of nitrogen and 2.8 million pounds of phosphorus. According to the 2017 progress update loads contributed from this basin were 24.4 million pounds of nitrogen and 2.5 million pounds of phosphorus. The major contributing sources of nitrogen and phosphorus in the James River Basin as of 2017 are the wastewater sector followed by the natural and agriculture sectors.

The Final Phase III WIP 2025 target loads allocated to this basin are 25.9 million pounds of nitrogen and 2.7 million pounds of phosphorus. The Chesapeake Bay Program's estimate of loads that must be reduced to account for climate change in the basin are an additional 480,000 pounds of nitrogen and 59,000 pounds of phosphorus. These climate change loads are represented as an additional load on the WIP III Final bars shown in Figure 8.

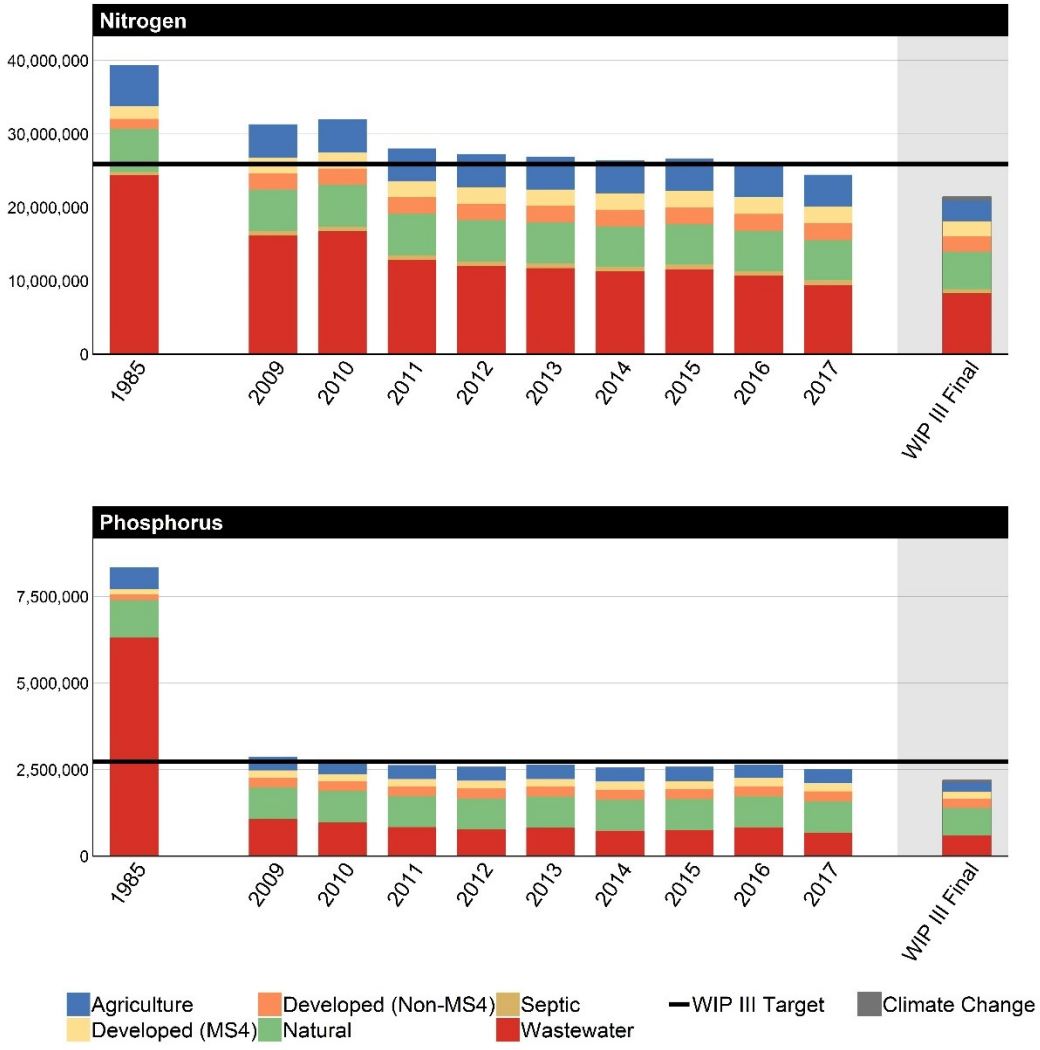

Figure 8: Nutrient Load Reductions for the James River Basin

The BMP inputs received from the PDCs and SWCDs in the James River Basin were combined with the regulated wastewater facilities and MS4s at their permit limits and federal facilities, then run through the Chesapeake Bay Watershed Model Version 6. Further adjustments were made based on additional state initiatives. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final. Exchanges as discussed in Chapter 7 are available from the James River Basin to meet the WIP III target for other river basins, ensuring an equitable level of effort from all stakeholders and local water quality improvements throughout Virginia's Chesapeake Bay watershed, and are presented in Table 3 at the end of this section.

Wastewater

Wastewater treatment plant upgrades and operational improvements in the wastewater sector in the James River Basin focused mostly on the 36 significant point source dischargers (Figure 9) put in place to achieve significant reductions since 1985. As of 2017, these loads are well below the WLA limits, at 9.4 million pounds nitrogen and 677,000 pounds phosphorus. The expectation through 2025 is that these loads will decline by approximately 30% in response to Initiative #38, but will slowly increase beyond 2025 as population increases continue in the James River Basin.

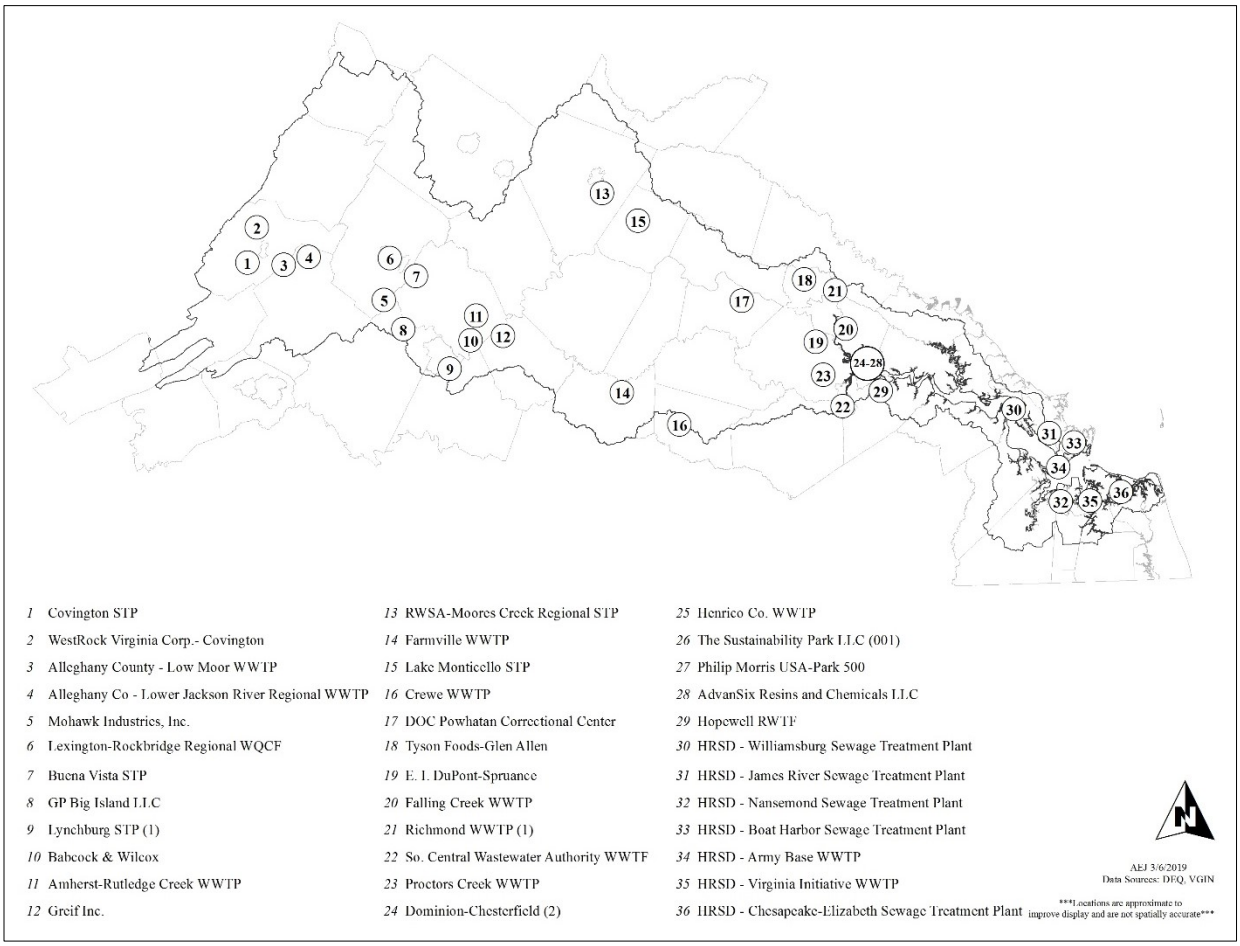

Figure 9: Significant Dischargers in the James River Basin

Regulations have been issued to ensure that these loads are maintained at or below the WLA limits set by the TMDL for dissolved oxygen criteria compliance. A discussion of the James River chlorophyll study and associated regulatory actions can be found at the end of this chapter.[26]

Municipal Separate Storm Sewer Systems (MS4s)

The 50 MS4 permittees in the James River Basin (Figure 10) are implementing nutrient and sediment reductions through TMDL Action Plans that are required by permit or regulation. The Phase II WIP established a schedule for achieving these reductions; 5% in the first five-year permit cycle, 35% in the second cycle and 60% in the third permit cycle. This plan proposes to maintain the previously established MS4 requirements over three permit cycles. The MS4s will not complete their third permit cycle prior to 2025; however; they will be in their third phase of TMDL Action Plan implementation. Virginia will honor its commitment to these regulated entities allowing them three full permit cycles to meet their reductions requirements. Any gap in this sector meeting its permit requirements by 2025 due to timing will be offset by the excess capacity achieved in the wastewater sector.

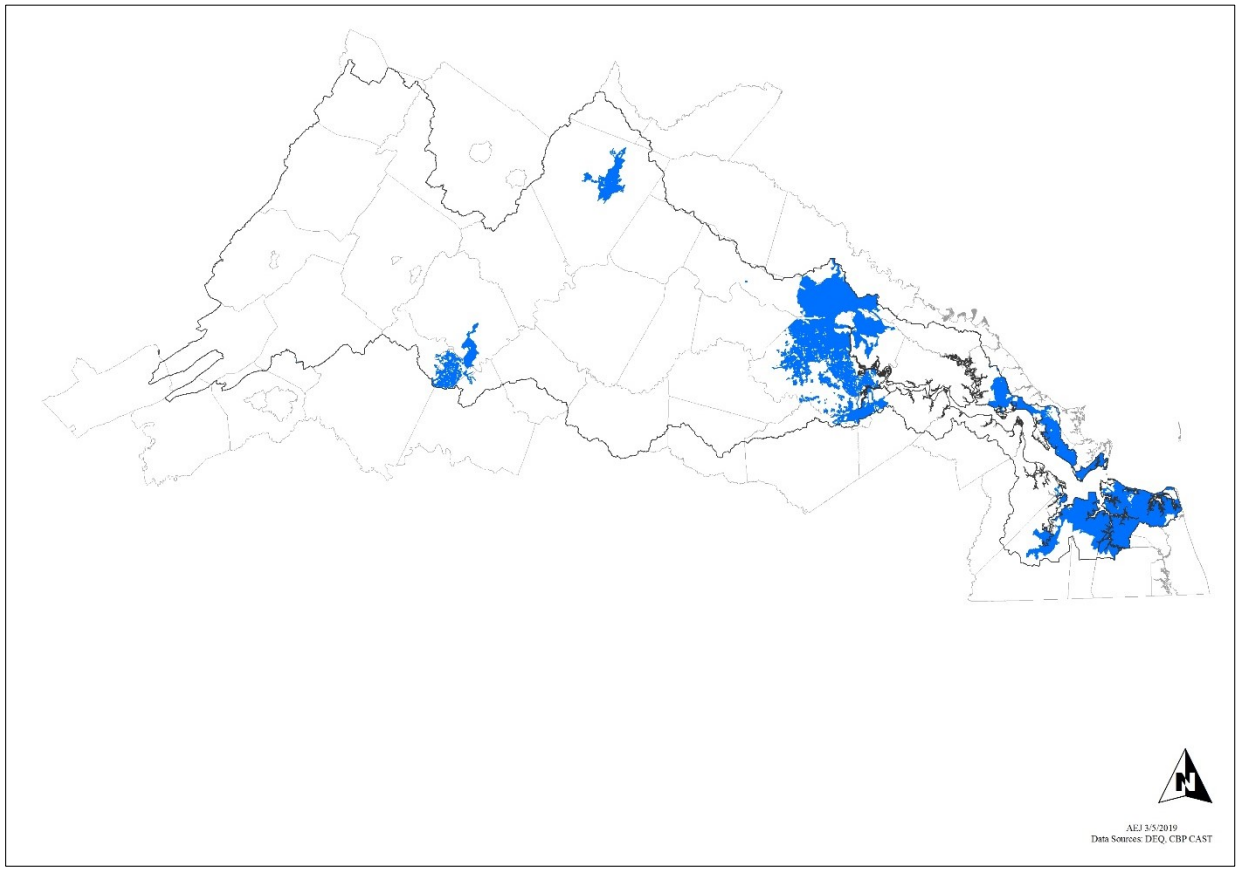

Figure 10: MS4 Permittees in the James River Basin

[26] 9VAC25-40-70 Strategy for Chesapeake Bay Watershed, 9VAC25-820 General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Agricultural, Natural and Non-MS4 Developed Lands

Initial BMPs and programmatic actions for agricultural, natural and non-MS4 developed lands were explored through the local and regional engagement described in Chapter 5 of this report. The final BMPs identified for implementation through 2025 based on the draft WIP and public review, assuming sufficient resources are made available, result in reductions of 3.51 million pounds of nitrogen and 376,800 pounds of phosphorus compared to 2017 levels and are shown in Figure 11 as WIP III Final. The WIP III Final BMP implementation levels and resulting nutrient reductions provide a solid foundation to meet the Commonwealth's reduction targets for 2025. The cumulative BMP implementation levels for the WIP III can be seen in Table 3 and the resulting loads in Table 2. Input decks and programmatic actions submitted by the SWCDs and PDCs are available on the DEQ Chesapeake Bay TMDL Phase III WIP Data website. The BMP implementation scenario for the WIP III Final is available on CAST.

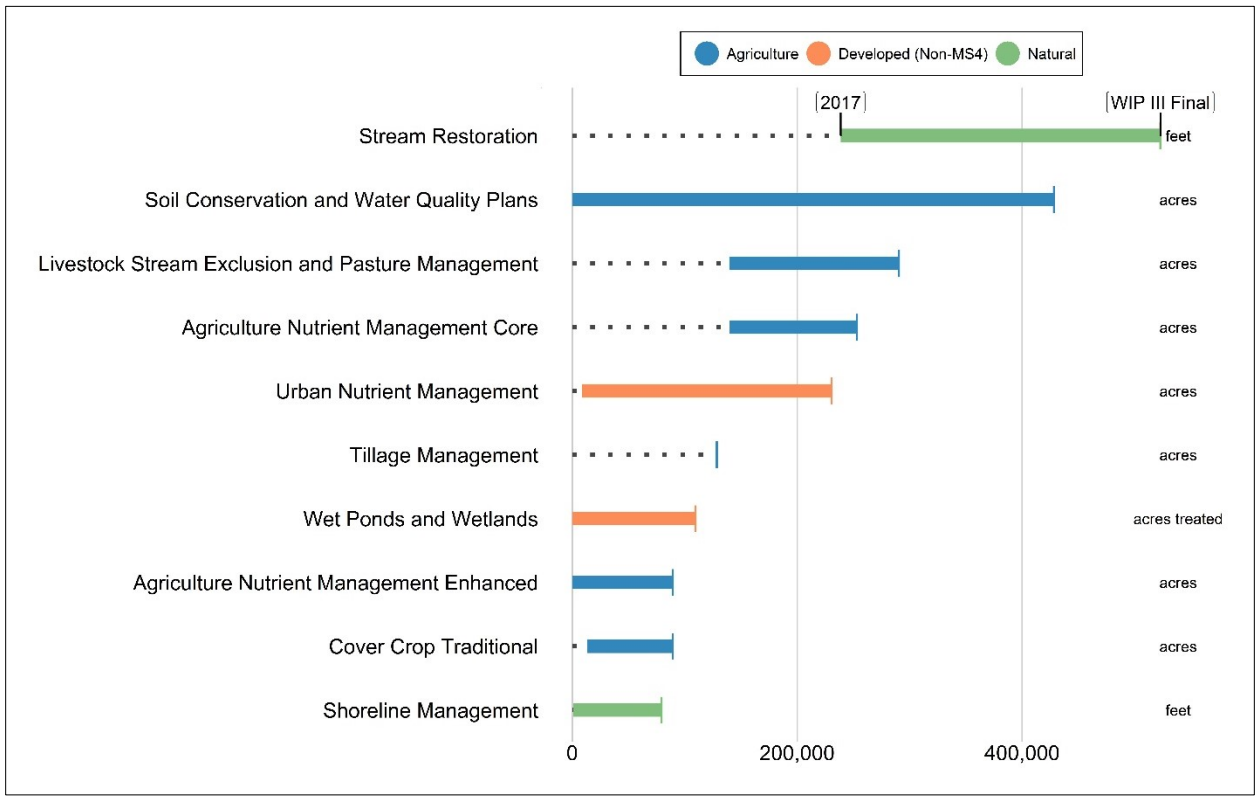

Figure 11: Summary of top BMPs by spatial extent in the James River Basin

Federal Facilities

Federal facilities were expected to provide BMP inputs and programmatic actions to support the Final Phase III WIP (see federal section of Chapters 3 and 5). Inputs from the DoD, USFWS, USFS, NASA LaRC, and NPS were received. The narratives describing federal agency approaches to meeting their planning goal are included in Appendix E. For the purpose of the Phase III WIP, federal agencies are assumed to be treating all lands they own at levels sufficient to meet their local planning goals and current permit requirements. The BMPs used in this plan for federal facilities that did not provide input are derived from the Phase II WIP. For those that did provide BMP inputs, their inputs have been included in the official WIP III Final CAST scenario.

Final Phase III WIP Summary

Table 1 below shows the 2017 progress loads, 2025 basin target loads, reductions from 2017 needed to meet the planning target, additional reductions needed to address climate change, and the reductions identified in the WIP III Final for the James River Basin for nitrogen and phosphorus. Table 2 shows the 2017 progress and WIP III Final loads for nitrogen and phosphorus, as well as the reductions from 2017 levels identified in the WIP III Final by pollution source sector for the James River Basin. Table 3 shows a summary of the WIP III Final BMPs for the James River Basin compared to the levels of implementation reported for 2009 and 2017 progress. The detailed input deck is available in CAST and a summary of Virginia's Bay wide BMPs is provided in Appendix D.

The reductions identified in the WIP III Final for the James River Basin, with the exchanges described in Chapter 7, Initiative 9 and shown in Section 8.6 below, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025. The goals set for the James River Basin are ambitious and will require significant sustained funding and technical capacity in all sectors. However, the exchanges to the basin and N:P exchanges within the basin identified in Section 8.6, Table 4 provide a significant buffer and additional assurance that the targets can be met.

Table 1. James River Basin WIP III Final Loads, Targets and Reductions (in pounds)

James River Basin	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	24,423,000	25,920,000	-1,497,000	480,000	3,506,000
Phosphorus (pounds)	2,503,000	2,731,000	-228,000	59,000	376,800

Table 2 James River Basin Sector Loads and Reductions (in pounds)

Nitrogen (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	9,391,000	8,280,000	1,111,000
Agriculture	4,307,000	2,791,000	1,516,000
MS4 Developed	2,209,000	2,023,000	186,000
Non-MS4 Developed	2,890,000	2,571,000	319,000
Natural	4,736,000	4,406,000	330,000
Federal	890,000	847,000	43,000
Total	**24,423,000**	**20,917,000**	**3,506,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	677,400	599,800	77,600
Agriculture	401,600	261,200	140,400
MS4 Developed	228,500	210,000	18,500
Non-MS4 Developed	287,600	252,800	34,800
Natural	782,100	687,200	94,900
Federal	126,000	115,500	10,500
Total	**2,503,200**	**2,126,400**	**376,800**

Table 3: James River Basin WIP III Final BMPs

Sector	**BMP**	**Unit**	**2009**	**2017**	**WIP III Final**
Agriculture	Agricultural Stormwater Management	acres	-	-	241
Agriculture	Agriculture Nutrient Management	acres	98,402	140,100	253,142
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	89,384
Agriculture	Alternative Crops	acres	108	-	1
Agriculture	Animal Waste Management System	Animal Units	185,709	123,341	402,331
Agriculture	Barnyard Runoff Control	acres	7	331	650
Agriculture	Cover Crop Commodity	acres	5,542	4,981	8,121
Agriculture	Cover Crop Traditional	acres	19,572	34,925	79,341
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	-	9,993
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units	-	-	6,407
Agriculture	Forest Buffer	acres	4,184	2,129	7,957
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	17,116

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Grass Buffer	acres	648	818	6,891
Agriculture	Grass Buffer - Narrow	acres	-	1,133	5,173
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	133	8,220
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	2,148	3,409	21,134
Agriculture	Horse Pasture Management	acres	25	47	7,314
Agriculture	Land Retirement to Ag Open Space	acres	6,755	6,861	16,577
Agriculture	Land Retirement to Pasture	acres	-	-	7,386
Agriculture	Loafing Lot Management	acres	-	-	70
Agriculture	Manure Compost Static Pile Windrow	dry tons	-	-	6,530
Agriculture	Manure Incorporation	acres	-	-	1,649
Agriculture	Manure Injection	acres	-	-	1,896
Agriculture	Manure Transport	dry tons	11,115	1,687	-
Agriculture	Manure Treatment Slow Pyrolysis	dry tons	-	-	2,600
Agriculture	Mortality Composters	Animal Units	31,873	32,154	311,226
Agriculture	Off Stream Watering Without Fencing	acres	27,142	50,125	76,859
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units	-	435	15,714
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	38,686	88,263	169,671
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	428,267
Agriculture	Sorbing Materials in Ag Ditches	acres	-	-	43
Agriculture	Tillage Management	acres	138,391	136,780	128,450
Agriculture	Tree Planting	acres	1,562	5,470	17,115
Agriculture	Water Control Structures	acres	580	500	571
Agriculture	Wetland Restoration - Floodplain	acres	71	114	312
Agriculture	Wetland Restoration - Headwater	acres	-	-	307
Developed	Bioretention/raingardens	acres	874	1,643	11,387
Developed	Bioswale	acres	394	391	2,472
Developed	Conservation Landscaping Practices	acres	-	-	8,321
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	6,713	7,119	40,755

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Dry Extended Detention Ponds	acres	8,439	8,658	62,141
Developed	Erosion and Sediment Control	acres	10,354	15,771	9,661
Developed	Filter Strip Runoff Reduction	acres	1	1	72
Developed	Filter Strip Stormwater Treatment	acres	-	-	1
Developed	Filtering Practices	acres	362	550	27,630
Developed	Floating Treatment Wetland	acres	-	-	11
Developed	Forest Buffer	acres	34	25	3,200
Developed	Forest Planting	acres	-	5	1,435
Developed	Impervious Surface Reduction	acres	10	39	18,169
Developed	Infiltration Practices	acres	1,176	1,206	33,689
Developed	Permeable Pavement	acres	59	91	74
Developed	Storm Drain Cleaning	pounds of sediment	-	-	70,295
Developed	Stormwater Performance Standard-Runoff Reduction	acres	95	437	205
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	375	1,525	358
Developed	Tree Planting - Canopy	acres	-	-	10,135
Developed	Urban Nutrient Management	acres	4,750	8,950	230,681
Developed	Vegetated Open Channels	acres	218	2,120	1,703
Developed	Wet Ponds and Wetlands	acres	69,106	62,909	109,733
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	60,000
Natural	Forest Harvesting Practices	acres	45,270	30,554	50,882
Natural	Oyster Aquaculture	oysters harvested	-	-	50,400,000
Natural	Oyster Reef Restoration	acres	-	-	817
Natural	Shoreline Management	feet	-	1,053	79,446
Natural	Stream Restoration	feet	232,390	238,705	522,922
Natural	Wetland Rehabilitation	acres	-	-	403
Septic	Septic Connection	systems	8	364	16,139
Septic	Septic Denitrification - Conventional	systems	427	607	18,551

Sector	BMP	Unit	2009	2017	WIP III Final
Septic	Septic Denitrification - Enhanced	systems	14	101	608
Septic	Septic Effluent - Enhanced	systems	2	-	1
Septic	Septic Pumping	systems	1,470	575	27,060
Septic	Septic Secondary Treatment - Conventional	systems	1,083	1,114	1,350
Septic	Septic Secondary Treatment - Enhanced	systems	25	60	79

Chlorophyll Study and Regulatory Actions

On September 20, 2018, the State Water Control Board gave approval for DEQ to go to public hearing and comment on amendments to the Water Quality Standards Regulation (9 VAC25-260-310 (bb)), addressing the numeric chlorophyll-*a* criteria applicable to the tidal James River. The proposed amendments were the outcome of a seven-year-long effort to update the regulation with best available science, evaluating the protectiveness of the current criteria and determining if revisions were appropriate, as well as modifying the methods used to assess criteria attainment. The new criteria and assessment method take into consideration the recommendations of a scientific advisory panel (SAP) and a regulatory advisory panel (RAP). The final chlorophyll criteria amendments were presented to the State Water Control Board for adoption at their June 27, 2019, meeting with additional text included, in response to comments received, to describe additional lines of evidence that would be examined to render an appropriate assessment determination for the aquatic life use if "back-to-back" seasonal mean exceedances were to occur. Additional background information on the revised criteria can be found on the DEQ Nutrient Criteria Development website.

In addition, during the James River chlorophyll study an enhanced water quality model was developed to simulate chlorophyll concentrations in response to varying levels of point source nutrient reduction. Modeling scenarios have been run and indicate that water quality conditions protective of the revised chlorophyll criteria can be attained with the point source loads at the DO-based WLAs currently required by the Chesapeake Bay Watershed General Permit and nonpoint source loads controlled at the WIP II level of effort.

Appendix X of the TMDL identified two phases of additional TN and TP reductions necessary in the James Basin to meet the DO criteria. These reductions have been implemented in the last two phases of the Watershed General Permit and are currently incorporated in 9VAC25-820-80. The only remaining WLA reduction yet to be implemented in the Watershed General Permit is an additional one million pounds of TN from the aggregate HRSD James River WLA. In accordance with Part I.C. of the Watershed General Permit, this reduction in WLA is effective January 1, 2022. It should be noted that the Virginia point sources have met the DO-based WLAs in aggregate since 2012.

Following Executive Review by the Office of the Secretary of Natural Resources and the Governor's Office, the revised chlorophyll criteria will be submitted to EPA for their review and approval. Upon EPA approval, DEQ will consider Appendix X to the TMDL to be no longer applicable provided that the final modeling confirms that the DO-based wasteload allocations are protective of the revised chlorophyll criteria. No later than 2020, Virginia will initiate modifications to the Water Quality Management Planning (WQMP) Regulation (9 VAC 25-720) to include wasteload allocations that are protective of

both DO and chlorophyll. Additional nutrient load reductions provided by the point source sector in accordance with Initiative 52 in Chapter 7 will enable the Commonwealth to meet the overall goals of the Phase III WIP and provide a significant margin of safety to ensure chlorophyll criteria are met in the James River.

8.5 The Eastern Shore Basin

Figure 1: Chincoteague by Laura Frazier (Courtesy of Scenic Virginia)

Overview

"The Eastern Shore is long and narrow with numerous small watersheds that comprise a complex system of tidal creeks, guts and inlets."[27] About half of these watersheds drain westerly into the Chesapeake Bay; the other half (generally east of Route 13) drain toward the Atlantic side embayments or directly into the ocean (Figure 2). "Eastern Shore tributaries draining into Chesapeake Bay include the Pocomoke, Onancock, Pungateague, Occohannock and Nassawadox creeks, and numerous smaller waterways such as the Old Plantation, Kings, Hungars, Cherrystone, Pitts and Holdens creeks. Tidal portions of these creeks are generally deeper and wider at their mouths and very shallow inland. Freshwater portions of these creeks can be very shallow and narrow, and the watersheds of the coastal creeks are small, particularly when compared with watersheds of the lower Bay rivers. The creeks and streams that flow into the Bay are influenced by tides and as a result have a more direct connection to Bay waters"[28].

Virginia's Eastern Shore is a 70-mile long region located at the southern end of the Delmarva Peninsula and covers a total of about 2,100 square miles in two counties: Accomack and Northampton. Roughly half this area drains to the Chesapeake Bay, or about 2% of the Commonwealth's total land area, and is mostly rural in character with very flat overall terrain, ranging from sea level to just 50 feet above sea level. The 2010 population of the entire Eastern Shore was approximately 45,600.

Based on the draft 2018 IR, the Eastern Shore basin draining to the Bay includes about 575 miles of rivers/streams and 44 square miles of tidal estuary. Detailed information on the current water quality conditions in the Eastern Shore Basin can be found in the 2018 IR, including the length and area of

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[27] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Strategy for Virginia's Eastern Shore*

[28] Commonwealth of Virginia, (2005). *Chesapeake Bay Nutrient and Sediment Reduction Strategy for Virginia's Eastern Shore*

waterbodies assessed for compliance against Virginia's water quality standards as well as analyses of designated uses supported, significant causes of use impairment and suspected sources of pollution.

Figure 2: Eastern Shore Basin Boundary

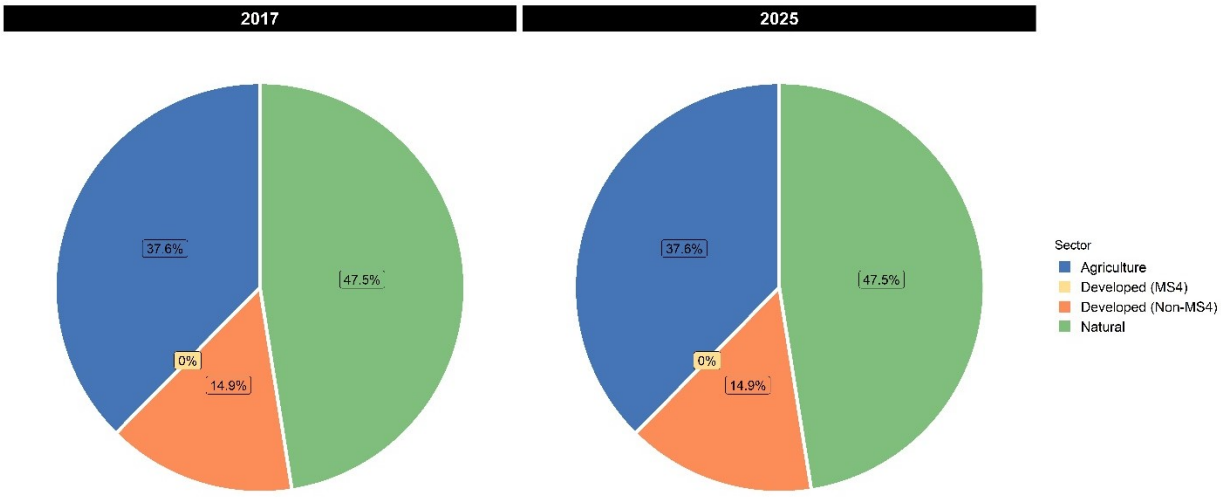

Figure 3: Comparison of 2017 Versus 2025 Modeled Land Use for the Eastern Shore Basin

As represented in the Chesapeake Bay Watershed Model Version 6, 47.5% of the basin's land area is classified as natural. Agriculture makes up 37.6% of the basin while developed (non-MS4) area accounts for 14.9% (Figure 3). For the Phase III WIP, the land use conditions projected for 2025 were used as the basis for planning targets, as discussed in Chapter 5. The 2017 and 2025 modeled land use acres by sector are shown in Figure 3.

State landholdings total nearly 10,788 acres (Figure 4), plus another approximate 2,400 acres of non-MS4 roads. Federal landholdings total 440 acres (Figure 5).

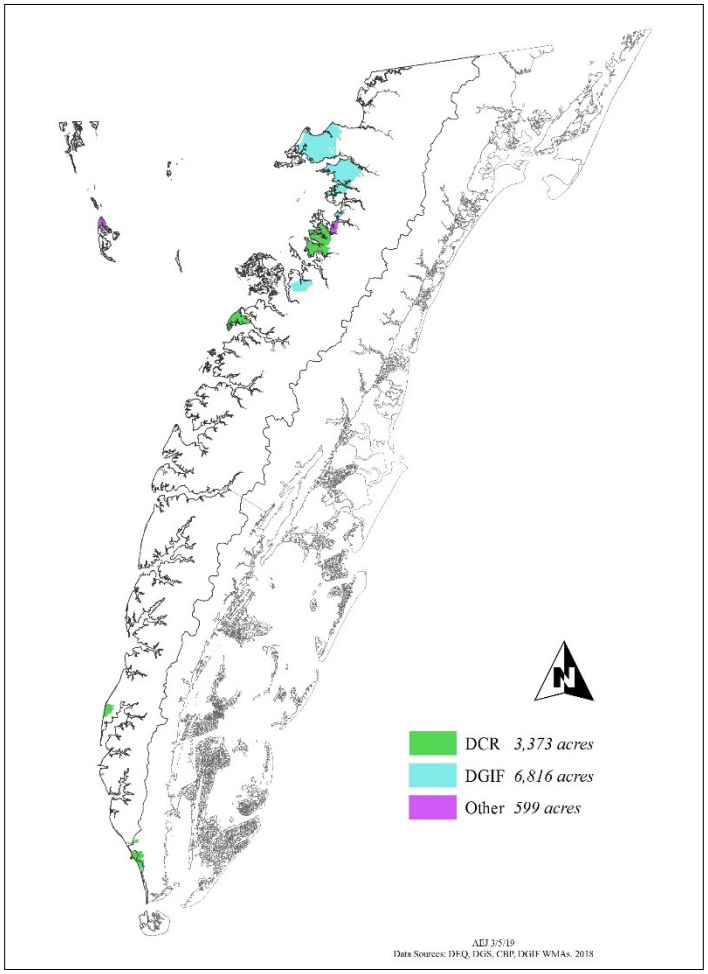

Figure 4: State Owned Lands in the Eastern Shore Basin

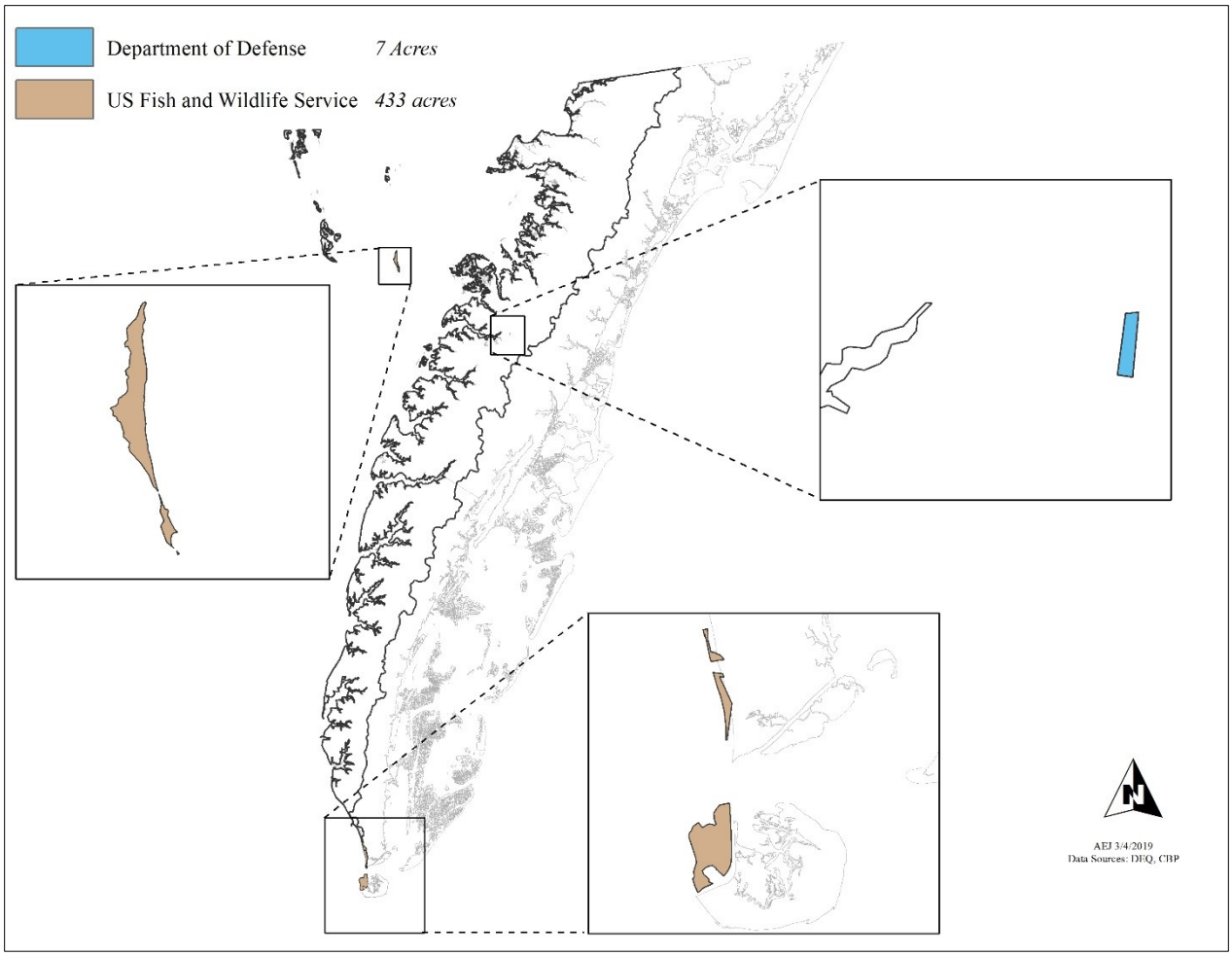

Figure 5: Federal Facilities in the Eastern Shore Basin

All or part of the following two counties lie within the basin: Accomack and Northampton.

One PDC (Figure 6) and one SWCD (Figure 7) located wholly or in part within the Eastern Shore Basin are shown in the following maps. The basin also includes the Eastern Shore of Virginia Watershed Roundtable. Watershed roundtables are designed to bring together diverse local stakeholders with a vested interest in their communities and concern for local water quality. Common roundtable activities include: collecting and analyzing water quality data, planning and implementing watershed-wide water quality goals, coordinating workshops/forums and developing outreach and education resources. DEQ provides funding opportunities for watershed roundtable activities in Virginia to help achieve water quality improvement goals.

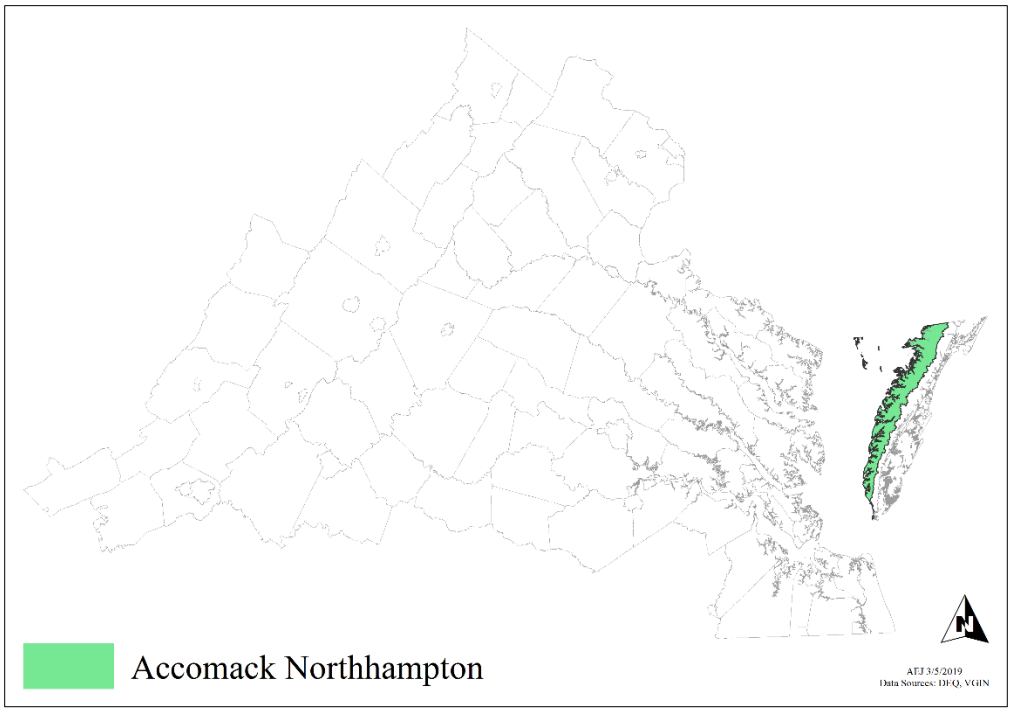

Figure 6: PDCs in the Eastern Shore Basin

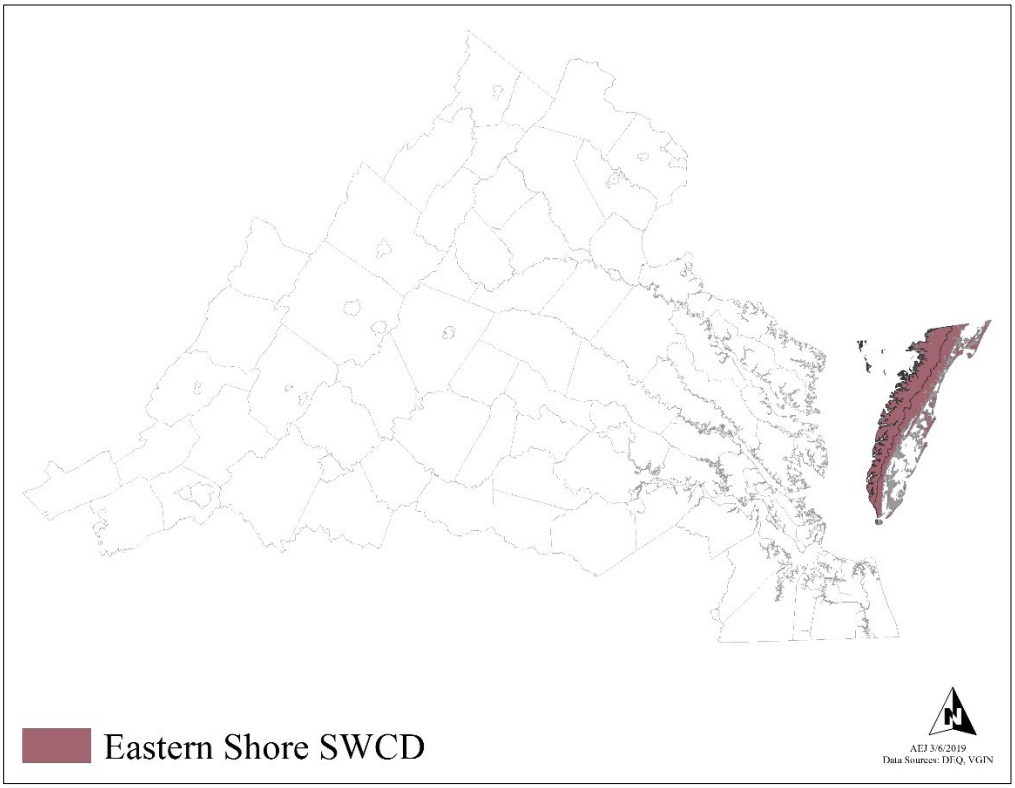

Figure 7: SWCDs in the Eastern Shore Basin

Final Phase III WIP Development

In 1985, the nitrogen and phosphorus loads from the Eastern Shore Basin were 2.53 million pounds and 0.28 million pounds respectively. When the Chesapeake Bay TMDL was released in 2010, the Eastern Shore loads were 2.53 million pounds of nitrogen and 0.18 pounds of phosphorus. According to the 2017 progress update loads contributed from this basin were 2.30 million pounds of nitrogen and 0.17 million pounds phosphorus. The major contributing sources of nitrogen and phosphorus in the Eastern Shore Basin as of 2017 are the agriculture sector followed by the natural and developed (non-MS4) sectors.

The Final Phase III WIP 2025 target loads allocated to this basin are 1.43 million pounds of nitrogen and 0.16 million pounds of phosphorus. The Chesapeake Bay Program's estimate of loads that must be reduced to account for climate change in the basin are an additional 110,000 pounds of nitrogen and 5,000 pounds of phosphorus. These climate change loads are represented as an additional load on the WIP III Initial and WIP III Final bars shown in Figure 8.

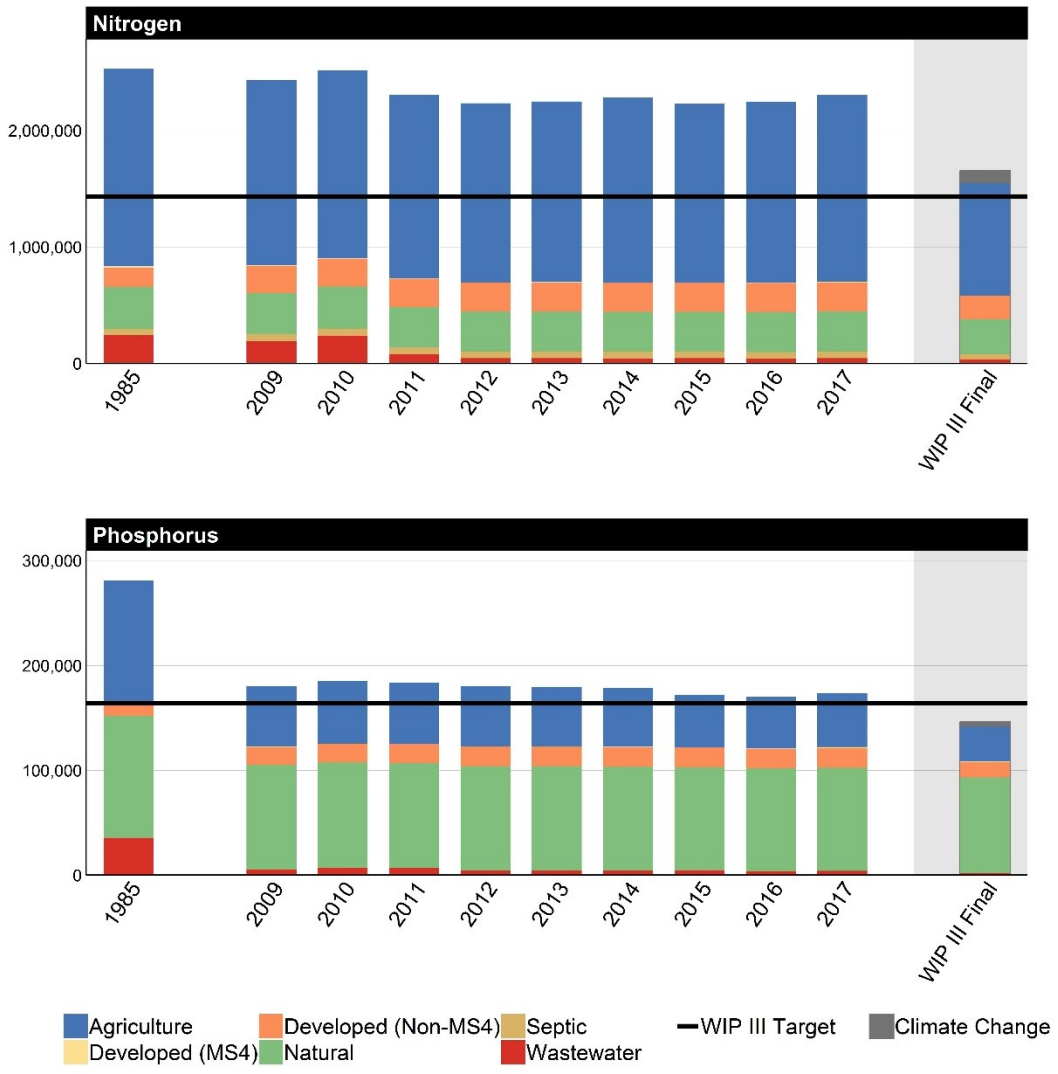

Figure 8: Nutrient Load Reductions for the Eastern Shore Basin

The BMP inputs received from the PDC and SWCD on the Eastern Shore Basin were combined with the regulated wastewater facilities at their permit limits and federal facilities, then run through the Chesapeake Bay Watershed Model Version 6. Further adjustments were made based on additional state initiatives. Final modifications were made after the public review period and these results are shown in Figure 8 as WIP III Final Exchanges as discussed in Chapter 7 are needed to meet the WIP III target for the Eastern Shore Basin and are presented in Table 3 at the end of this section.

Wastewater

Wastewater treatment plant upgrades and operational improvements in the wastewater sector in the Eastern Shore Basin, focused mostly on the five significant point source dischargers (Figure 9), were put in place to achieve significant reductions since 1985. As of 2017, these loads are below the WLA limits, at 46,000 pounds nitrogen and 4,000 pounds phosphorus. The expectation through 2025 is that these loads will generally be maintained at those levels. Initiative 48 is expected to have marginal impact on the Eastern Shore because the wastewater sector is small in this area. Regulations have been issued to ensure that these loads are maintained at or below the WLA limits set by the TMDL.[29]

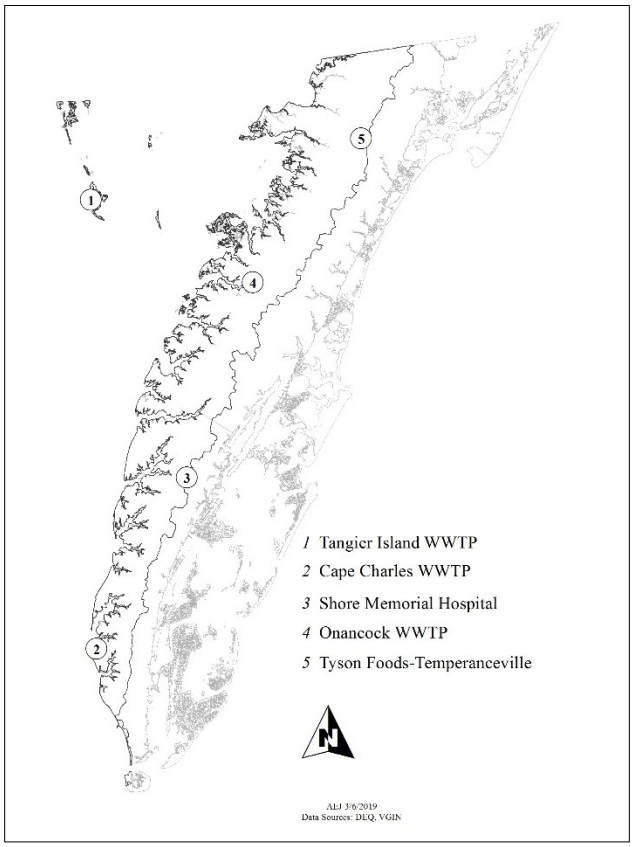

Figure 9: Significant Dischargers in the Eastern Shore Basin

[29] 9VAC25-40-70 Strategy for Chesapeake Bay Watershed, 9VAS25-820 General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Currently under review and consideration on the Eastern Shore is construction of a force main from Nassawadox to the existing wastewater treatment plan in the Town of Onancock. The Town of Onancock owns and operates an advanced wastewater treatment plant that provides state-of-the-art treatment of wastewater flows. There is unused capacity in that plant. The project under consideration would have the potential to eliminate existing wastewater treatment systems in multiple areas and to address failing septic systems through connection to the Onancock plant.

Municipal Separate Storm Sewer Systems (MS4s)

No MS4 permittees are operating in the Eastern Shore Basin.

Agricultural, Natural and Non-MS4 Developed Lands

Initial BMPs and programmatic actions for agricultural, natural and non-MS4 developed lands were explored through the local and regional engagement described in Chapter 5 of this report. The final BMPs identified for implementation through 2025 based on the draft WIP and public review, assuming sufficient resources are made available, result in reductions of 756,000 pounds of nitrogen and 32,300 pounds of phosphorus compared to 2017 levels and are shown in Figure 10 as WIP III Final. The WIP III Final BMP implementation levels and resulting nutrient reductions provide a solid foundation to meet the Commonwealth's reduction targets for 2025. The cumulative BMP implementation levels for the WIP III

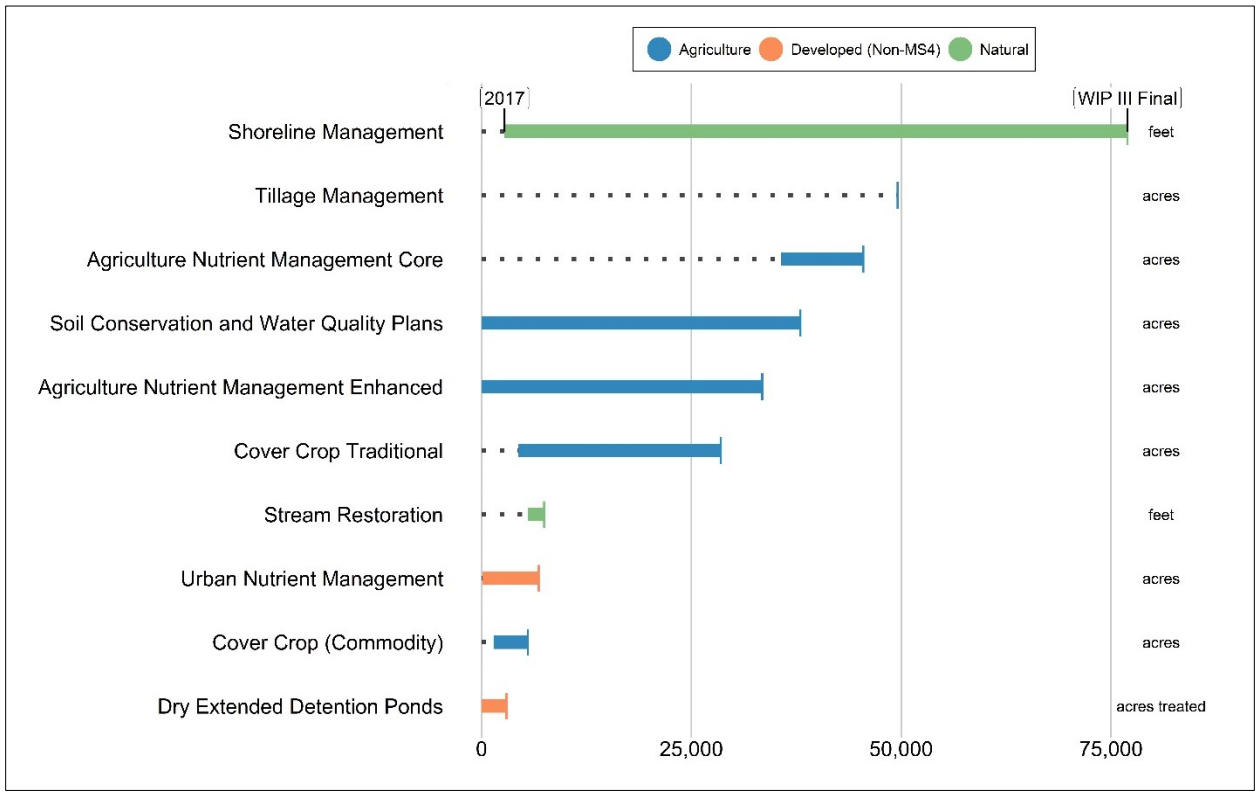

Figure 10: Summary of top BMPs provided by SWCD and PDC by spatial extent in the Eastern Shore Basin

Final can be seen in Table 3 and the resulting loads in Table 2. Input decks and programmatic actions submitted by the SWCDs and PDCs are available on the DEQ Chesapeake Bay TMDL Phase III WIP Data website. The BMP implementation scenario for the WIP III Final is available on CAST.

Federal Facilities

Federal facilities were expected to provide BMP inputs and programmatic actions to support the Final Phase III WIP (see federal section of Chapters 3 and 5). Inputs from the DoD, USFWS, USFS, NASA LaRC, and NPS were received. The narratives describing the federal agency approaches to meeting their planning goal are included in Appendix E. For the purpose of the Phase III WIP, federal agencies are assumed to be treating all lands they own at levels sufficient to meet their local planning goals and current permit requirements. The BMPs used in this plan for federal facilities that did not provide input are derived from the Phase II WIP. For those that did provide BMP inputs, their inputs have been included in the official WIP III Final CAST scenario.

Final Phase III WIP Summary

Table 1 below shows the 2017 progress loads, 2025 basin target loads, reductions from 2017 needed to meet the planning target, additional reductions needed to address climate change, and the reductions identified in the WIP III Final for the Eastern Shore Basin for nitrogen and phosphorus. Table 2 shows the 2017 progress and WIP III Final loads for nitrogen and phosphorus, as well as the reductions from 2017 levels identified in the WIP III Final by pollution source sector for the Eastern Shore Basin. Table 3 shows a summary of the WIP III Final BMPs for the Eastern Shore Basin compared to the levels of implementation reported for 2009 and 2017 progress. The detailed input deck is available in CAST and a summary of Virginia's Bay wide BMPs is provided in Appendix D.

The reductions identified in the WIP III Final for the Eastern Shore Basin, with the exchanges described in Chapter 7, Initiative 9 and shown in Section 8.6 below, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025. The goals set for the Eastern Shore Basin are ambitious and will require significant sustained funding and technical capacity in all sectors. However, the exchanges to the basin and N:P exchanges within the basin identified in Section 8.6, Table 4 provide a significant buffer and additional assurance that the targets can be met.

Table 1: Eastern Shore Basin WIP III Final Loads, Targets and Reductions (in pounds)

Eastern Shore Basin	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	2,304,000	1,430,000	874,000	110,000	757,000
Phosphorus (pounds)	174,000	164,000	10,000	5,000	32,300

Table 2: Eastern Shore Basin Sector Loads and Reductions (in pounds)

Nitrogen (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	46,000	33,000	13,000
Agriculture	1,602,000	965,000	637,000
MS4 Developed	11,000	3,000	8,000
Non-MS4 Developed	302,000	246,000	56,000
Natural	341,000	299,000	42,000
Federal	3,000	2,000	1,000
Total	**2,304,000**	**1,548,000**	**756,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	4,000	1,800	2,200
Agriculture	51,500	33,200	18,300
MS4 Developed	1,300	300	1,000
Non-MS4 Developed	18,200	14,800	3,400
Natural	97,600	90,500	7,100
Federal	1,000	900	100
Total	**173,700**	**141,400**	**32,300**

Table 3: Eastern Shore Basin WIP III Final BMPs

Sector	**BMP**	**Unit**	**2009**	**2017**	**WIP III Final**
Agriculture	Agricultural Stormwater Management	acres	-	-	103
Agriculture	Agriculture Nutrient Management	acres	17,258	35,719	45,477
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	33,434
Agriculture	Animal Waste Management System	Animal Units	74,083	96,489	189,678
Agriculture	Barnyard Runoff Control	acres	-	28	75
Agriculture	Cover Crop Commodity	acres	1,740	1,405	5,519
Agriculture	Cover Crop Traditional	acres	7,335	8,684	25,208
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	-	3,303
Agriculture	Forest Buffer	acres	118	80	2,309
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	64
Agriculture	Grass Buffer	acres	397	210	234
Agriculture	Grass Buffer - Narrow	acres	-	30	30

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	2	2	66
Agriculture	Horse Pasture Management	acres	-	-	20
Agriculture	Land Retirement to Ag Open Space	acres	256	544	283
Agriculture	Manure Transport	dry tons	38	-	3,567
Agriculture	Mortality Composters	Animal Units	9,905	9,212	150,743
Agriculture	Off Stream Watering Without Fencing	acres	56	94	94
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units	-	253	18,434
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	36	37	98
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	37,981
Agriculture	Tillage Management	acres	43,560	50,366	49,580
Agriculture	Tree Planting	acres	97	306	288
Agriculture	Water Control Structures	acres	23	9	11
Agriculture	Wetland Restoration - Floodplain	acres	9	8	479
Agriculture	Wetland Restoration - Headwater	acres	-	-	475
Developed	Bioretention/raingardens	acres	-	-	631
Developed	Conservation Landscaping Practices	acres	-	-	1,250
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	1	-	1,213
Developed	Dry Extended Detention Ponds	acres	-	-	2,963
Developed	Erosion and Sediment Control	acres	84	488	99
Developed	Filtering Practices	acres	-	-	1,296
Developed	Forest Buffer	acres	-	-	57
Developed	Forest Planting	acres	-	-	14
Developed	Impervious Surface Reduction	acres	-	1	500
Developed	Infiltration Practices	acres	-	-	1,232
Developed	Permeable Pavement	acres	-	12	8
Developed	Stormwater Performance Standard-Runoff Reduction	acres	-	-	1
Developed	Tree Planting - Canopy	acres	-	-	648
Developed	Urban Nutrient Management	acres	13	82	6,808

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Vegetated Open Channels	acres	1	5	31
Developed	Wet Ponds and Wetlands	acres	1	1	2,374
Natural	Forest Harvesting Practices	acres	264	28	713
Natural	Oyster Aquaculture	oysters harvested	-	-	25,050,000
Natural	Oyster Reef Restoration	acres	-	-	42
Natural	Shoreline Management	feet	-	2,748	76,977
Natural	Stream Restoration	feet	5,437	5,512	7,467
Septic	Septic Connection	systems	-	-	1,011
Septic	Septic Denitrification - Conventional	systems	7	7	1,864
Septic	Septic Denitrification - Enhanced	systems	-	1	1
Septic	Septic Pumping	systems	324	28	1,713
Septic	Septic Secondary Treatment - Conventional	systems	88	74	75
Septic	Septic Secondary Treatment - Enhanced	systems	2	4	4

8.6 Virginia's Bay Watershed Summary

Table 1 below shows the 2017 progress loads, 2025 basin target loads, reductions from 2017 needed to meet the planning target, additional reductions needed to address climate change, and the reductions identified in the WIP III Final for Virginia's Bay Watershed. Table 2 shows the 2017 progress loads and WIP III Final loads for nitrogen and phosphorus, as well as the reductions from 2017 levels identified in the WIP III Final by pollution source sector for Virginia's Bay Watershed. Table 3 shows a summary of the WIP III Final BMPs for Virginia's Bay Watershed compared to the levels of implementation reported for 2009 and 2017 progress. The detailed input deck is available in CAST.

Table 1: Virginia's Bay Watershed WIP III Final Loads, Targets and Reductions (in pounds)

Virginia's Bay Watershed Total	2017 Progress Load	2025 Basin Target Load	Reductions Needed to Meet Target	Additional Reductions Needed to Address Climate Change	Reductions Identified in WIP III Final
Nitrogen (pounds)	58,154,000	55,720,000	2,434,000	1,720,000	8,582,000
Phosphorus (pounds)	6,122,000	6,192,000	-70,000	187,000	892,300

Table 2: Virginia's Bay Watershed Sector Loads and Reductions (in pounds)

Nitrogen (pounds)	2017 Progress Load	WIP III Final Load	Reductions Identified in WIP III Final
Wastewater	12,743,000	12,754,000	-11,000
Agriculture	19,726,000	13,145,000	6,581,000
MS4 Developed	3,708,000	3,483,000	225,000
Non-MS4 Developed	8,827,000	7,902,000	925,000
Natural	11,208,000	10,436,000	772,000
Federal	1,942,000	1,855,000	87,000
Total	**58,155,000**	**49,573,000**	**8,582,000**
Phosphorus (pounds)	**2017 Progress Load**	**WIP III Final Load**	**Reductions Identified in WIP III Final**
Wastewater	947,300	946,000	1,300
Agriculture	1,568,500	1,027,500	541,000
MS4 Developed	410,000	394,700	15,300
Non-MS4 Developed	881,100	766,900	114,200
Natural	2,023,000	1,822,900	200,100
Federal	292,200	272,000	20,200
Total	**6,122,200**	**5,230,000**	**892,200**

Table 3: Virginia's Bay Watershed WIP III Final BMPs

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Agricultural Stormwater Management	acres	-	-	436
Agriculture	Agriculture Nutrient Management	acres	543,549	591,528	951,395
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	426,452
Agriculture	Alternative Crops	acres	113	479	1,231
Agriculture	Animal Waste Management System	Animal Units	1,448,824	1,169,600	2,228,900
Agriculture	Barnyard Runoff Control	acres	64	1,523	2,622
Agriculture	Cover Crop Commodity	acres	24,398	22,766	39,124
Agriculture	Cover Crop Traditional	acres	77,290	135,272	384,396
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	62	20,038
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units			52,247
Agriculture	Forest Buffer	acres	12,247	5,433	21,965
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	26,390
Agriculture	Grass Buffer	acres	2,542	2,685	15,739
Agriculture	Grass Buffer - Narrow	acres	-	2,929	8,319
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	351	10,839
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	5,262	8,506	34,927
Agriculture	Horse Pasture Management	acres	25	59	19,851
Agriculture	Land Retirement to Ag Open Space	acres	29,954	30,582	50,451
Agriculture	Land Retirement to Pasture	acres	-	-	10,820
Agriculture	Loafing Lot Management	acres	-	-	159
Agriculture	Manure Compost Static Pile Windrow	dry tons	-	-	11,063
Agriculture	Manure Incorporation	acres	-	-	2,205
Agriculture	Manure Injection	acres	-	-	10,501
Agriculture	Manure Transport	dry tons	32,643	6,659	89,221
Agriculture	Manure Treatment Slow Pyrolysis	dry tons	-	-	6,609
Agriculture	Mortality Composters	Animal Units	161,601	175,141	1,674,227

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Off Stream Watering Without Fencing	acres	67,972	137,459	176,188
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units		2,762	57,791
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	84,328	206,691	347,363
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	1,183,460
Agriculture	Sorbing Materials in Ag Ditches	acres	-	-	610
Agriculture	Tillage Management	acres	653,921	616,511	608,044
Agriculture	Tree Planting	acres	4,089	14,503	34,256
Agriculture	Water Control Structures	acres	1,511	831	894
Agriculture	Wetland Restoration - Floodplain	acres	321	354	2,838
Agriculture	Wetland Restoration - Headwater	acres	-	-	828
Developed	Advanced Grey Infrastructure Nutrient Discovery Program (IDDE)	acres	-	-	17,306
Developed	Bioretention/raingardens	acres	2,112	3,913	33,730
Developed	Bioswale	acres	751	868	8,764
Developed	Conservation Landscaping Practices	acres	-	-	18,871
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	44,445	47,538	97,265
Developed	Dry Extended Detention Ponds	acres	40,871	45,875	159,030
Developed	Erosion and Sediment Control	acres	26,864	29,305	22,346
Developed	Filter Strip Runoff Reduction	acres	2	2	100
Developed	Filter Strip Stormwater Treatment	acres	-	1	1
Developed	Filtering Practices	acres	773	1,425	58,112
Developed	Floating Treatment Wetland	acres	-	0	377
Developed	Forest Buffer	acres	35	27	9,982
Developed	Forest Planting	acres	6	24	8,471
Developed	Impervious Surface Reduction	acres	214	291	36,303
Developed	Infiltration Practices	acres	5,428	6,697	73,037
Developed	Permeable Pavement	acres	83	176	4,564
Developed	Storm Drain Cleaning	pounds of sediment	-	-	385,757

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Stormwater Performance Standard-Runoff Reduction	acres	1,169	2,312	1,362
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	33,483	38,789	20,434
Developed	Tree Planting - Canopy	acres	-	-	30,000
Developed	Urban Nutrient Management	acres	20,613	19,194	553,470
Developed	Vegetated Open Channels	acres	379	2,538	3,486
Developed	Wet Ponds and Wetlands	acres	118,224	118,497	227,512
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	300,000
Natural	Forest Harvesting Practices	acres	81,923	62,292	100,244
Natural	Oyster Aquaculture	oysters harvested	-	-	150,000,001
Natural	Oyster Reef Restoration	acres	-	-	1,661
Natural	Shoreline Management	feet	-	4,152	500,000
Natural	Stream Restoration	feet	656,735	707,123	1,254,754
Natural	Wetland Rehabilitation	acres	-	-	521
Septic	Septic Connection	systems	20	726	34,063
Septic	Septic Denitrification - Conventional	systems	1,432	2,529	48,441
Septic	Septic Denitrification - Enhanced	systems	22	375	2,569
Septic	Septic Effluent - Enhanced	systems	167	5	31
Septic	Septic Pumping	systems	18,806	8,131	82,733
Septic	Septic Secondary Treatment - Conventional	systems	6,524	4,671	6,201
Septic	Septic Secondary Treatment - Enhanced	systems	129	191	314

The reductions identified in the WIP III Final for Virginia's Bay Watershed, are sufficient to meet the 2025 Basin Targets, and account for forecasted growth and climate change through 2025, as shown in Figure 1. As Virginia pursues state policies and initiatives to drive WIP implementation, the Commonwealth will seek to target implementation in areas where the greatest reductions can be realized while striving to maintain a balanced level of implementation across all Basins. In doing so, some Basins may reach or exceed their planning targets before others. Similarly, the targets for phosphorus are likely to be reached before the targets for nitrogen. Some exchanges as described in Chapter 7, Initiative 9 and detailed in Table 4 will be needed in 2025. This ability to make exchanges between pollutants and basins provides the Commonwealth with the flexibility to adaptively manage as implementation is realized through 2025. These exchanges also provide a significant buffer and additional assurance that the planning targets can be met in all basins. Similar levels of exchanges in the WIP III Draft have been evaluated using the

Partnership's Models and the resulting loadings were found to be at least as protective of water quality criteria as the state-basin planning targets. It is anticipated that the exchanges shown in Table 4 will be similarly evaluated as part of the EPA review of the Final Phase III WIP.

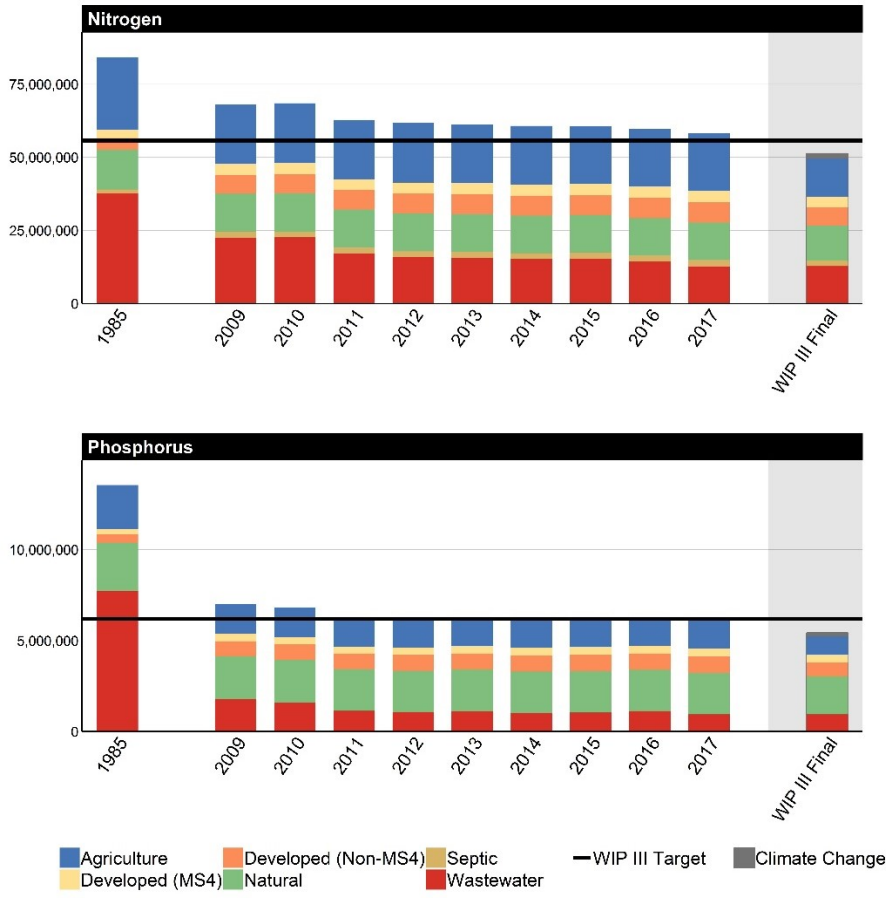

Figure 1: Nutrient Load Reductions for Virginia's Bay Watershed

Table 4: Phosphorus:Nitrogen and Basin:Basin Exchanges

Exchange From	**From Amount** (pounds)	**Exchange To**	**To Amount** (pounds)
Potomac P	68,500	Potomac N	115,000
James N	2,270,000	Potomac N	404,000
Eastern Shore P	11,900	Eastern Shore N	20,000
James N	2,320,000	Eastern Shore N	358,000
Rappahannock P	29,800	Rappahannock N	50,000
James N	670,000	Rappahannock N	170,000
York P	8,700	York N	15,000
James N	360,000	York N	164,000
James P	490,800	James N	1,552,000

CHAPTER 9. COST ESTIMATES AND FUNDING SOURCES

9.1 Virginia Tools to Estimate Implementation Costs

Virginia has established several stakeholder-informed approaches to determine the funding necessary to implement the Commonwealth's WIP. Several of these tools have become the definitive assessments for Administration and Virginia General Assembly decisions on Chesapeake Bay restoration funding for the Commonwealth's biennial budget.

Virginia Code §10.1-2128.1(C) requires DCR[30], at least every two years, to determine annual funding amounts for effective SWCD technical assistance and implementation of agricultural BMPs through the VACS Program. This is often referred to as the "Agricultural Needs Assessment." Funding calculations are based on a formula originally established through stakeholder input but now guided largely by the WIP input deck. DCR provides updates to the Agricultural Needs Assessment to this stakeholder group for their input before it is finalized and submitted to DEQ. The annual funding amount must be reported to the Governor (§ 2.2-1504) as well as to the House Committees on Appropriations and Agriculture, Chesapeake, and Natural Resources and the Senate Committees on Finance and Agriculture, Conservation, and Natural Resources (§ 62.1-44.118). The most recent "Agricultural Needs Assessment" can be found in Chapter 2 of the FY 2018 Chesapeake Bay and Virginia Waters Clean-Up Plan. The Agricultural Needs Assessment will be significantly revised in 2019 based on the Commonwealth's WIP III. It will estimate both the financial and technical assistance costs that need to be funded in order to fully implement the WIP.

WQIF (§ 10.1-2131) requires the director of DEQ to enter into grant agreements with publicly owned waste treatment facilities designated as significant dischargers or eligible non-significant dischargers that apply for grants for the sole purpose of designing and installing nutrient removal technologies. All such grant agreements contain provisions that payments are subject to the availability of funds. WQIF grants are awarded for 35% to 75% of the costs of the design and installation of nutrient removal or wastewater diversion technology based on the ratio of annual sewer charges to reasonable sewer cost. The grant amount owed under existing, signed WQIF agreements are reported to the Governor and Virginia General Assembly committees annually in the Chesapeake Bay and Virginia Waters Clean-Up Plan.

Based partially on the utility of the "Agricultural Needs Assessment," the 2019 Virginia General Assembly passed HB 1822, which requires DEQ[31] to annually estimate WQIF funding expected by local governments for eligible waste treatment projects. Beginning in fiscal year 2020, this "Wastewater Needs Assessment" will be reported to the Governor (§ 2.2-1504) as well as to the House Committees on Appropriations and Agriculture, Chesapeake, and Natural Resources and the Senate Committees on Finance and Agriculture, Conservation, and Natural Resources (§ 62.1-44.118).

HB 1822 also requires DEQ[32] to annually estimate SLAF matching grants expected by local governments for projects related to planning, designing and implementing stormwater BMPs eligible for funding.

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[30] In consultation with stakeholders, including representatives of the agricultural and conservation communities as well as SWCDs.
[31] In consultation with stakeholders, including representatives of the Virginia Association of Municipal Wastewater Agencies, local governments and conservation organizations.
[32] In consultation with stakeholders, including representatives of the Virginia Municipal Stormwater Association, local governments and conservation organizations.

Beginning in fiscal year 2020, this annual assessment will be reported to the Governor (§ 2.2-1504) as well as to the House Committees on Appropriations and Agriculture, Chesapeake, and Natural Resources and the Senate Committees on Finance and Agriculture, Conservation, and Natural Resources (§ 62.1-44.118). As noted in Chapter 7, this "Stormwater Needs Assessment" will include both MS4 and non-MS4 locality needs.

DEQ worked with wastewater and stormwater stakeholders to initiate the first needs assessments for WQIF and SLAF funding. A needs survey was provided to localities to capture funding needs for FY2020 through FY2024. Localities completed the survey in early July and results will be reported in the biennial funding report to the Governor and the annual Chesapeake Bay and Virginia Waters Clean-up Plan Report submitted to legislative committees.

As these agriculture, stormwater and wastewater funding needs assessments are completed, the results will be published in the annual Chesapeake Bay and Virginia Waters Clean-up Plan Report and made available on DEQ's website. Identified gaps and contingencies to close those gaps will be included in Virginia's two-year milestones.

9.2 Funding Sources

Agriculture – USDA programs funded through the Farm Bill provide cost-share to agricultural producers and stakeholders to research, pilot and implement BMPs on farms. The NRCS and FSA in Virginia administer these programs. The Regional Conservation Partnership Program (RCPP) provides funding for multi-state or watershed-scale projects. The Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP) and CREP provide cost share assistance for various BMPs, including agronomic and structural practices, wetland restoration and streamside buffers. The Agricultural Conservation Easement Program (ACEP) assists with conserving working agriculture lands and wetlands. The Conservation Incentive Program (CIP) supports market-based solutions to resource challenges and the tools, technologies and strategies for next-generation conservation efforts on working farmlands. Congress enacted a new Farm Bill in 2018, and changes are anticipated to NRCS and FSA programs. Additional details on the new Farm Bill are provided in the Chesapeake Bay Commission's "Farm Bill Conservation Title Funding and Policy Changes."

Agriculture – DCR and local SWCDs implement the Virginia Agricultural BMP Cost-share (VACS) Program. The program provides cost-share and technical assistance through local SWCDs to agricultural producers to encourage voluntary installation of BMPs. Funding for the VACS Program is provided through the Natural Resources Commitment Fund (§ 10.1-2128.1), a sub-fund of the Virginia WQIF (§ 10.1-2128 through § 10.1-2134).

Additionally, § 3-6.01 Recordation Tax Fee provides dedicated funding to the Natural Resources Commitment Fund: "There is hereby assessed a twenty dollar fee on (i) every deed for which the state recordation tax is collected pursuant to § 58.1-801 A and § 58.1-803, Code of Virginia; and (ii) every certificate of satisfaction admitted under § 55-66.6, Code of Virginia. The Revenue generated from fifty percent of such fee shall be deposited to the general fund. The revenue generated from the other fifty percent of such fee shall be deposited to the Virginia Natural Resources Commitment Fund, a subfund of the WQIF, as established in § 10.1-2128.1, Code of Virginia. The funds deposited to this subfund shall be disbursed for the agricultural best management practices cost share program, pursuant to § 10.1-2128.1, Code of Virginia."

Agriculture – DCR and local SWCDs administer the Virginia Agricultural BMP Tax Credit Program that provides tax credits to agricultural producers to encourage voluntary installation of BMPs.

Developed – VCAP is an urban cost-share program administered through the VASWCD. The program provides financial incentives and technical and educational assistance to property owners installing eligible BMPs in Virginia's Chesapeake Bay Watershed.

Developed –SLAF is a financial assistance program administered by DEQ. The program provides matching grants to local governments for the planning, design and implementation of stormwater BMPs. The intent is to help meet: 1) obligations related to the Chesapeake Bay TMDL requirements; 2) requirements for local impaired stream TMDLs; 3) water quality requirements of the Chesapeake Bay WIP; and 4) water quality requirements related to the permitting of small MS4s.

Developed – VDOF administers federal funding from USFS for the Urban and Community Forestry Assistance Program Grants. It is designed to encourage projects that promote tree planting, the care of trees, the protection and enhancement of urban and community forest ecosystems, and education on tree issues in cities, towns and communities.

Developed – The Virginia Trees for Clean Water program is designed to improve water quality in the Chesapeake Bay through on-the-ground efforts to plant trees where they are needed most. The program is administered by VDOF with funding from USFS Chesapeake Watershed Forestry Program.

Multiple Source - The Virginia Clean Water Revolving Loan Fund provides low interest loans to local governments, public service authorities, agricultural producers, partnerships and corporations for the construction of facilities or structures or the implementation of BMPs that reduce or prevent pollution of state waters. Some of these loans may be eligible for principal forgiveness. The program is administered by DEQ.

Multiple Source – The Section 319 NPS Management Implementation Grant Program is a federal grant administered by DEQ to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and associated technical and program staff for nonpoint source pollution prevention and control.

Multiple Source – The Section 117 Chesapeake Bay Implementation Grant Program is a federal grant from EPA, administered by DEQ to fund work toward meeting the goals of the Chesapeake Bay Watershed Agreement, with particular emphasis on programs to reduce nutrient and sediment pollution. When competitive or special funding is made available for implementation activities and capacity development assistance, it is posted for public announcement and disseminated through the partnerships.

Multiple Source – The Section 117 Chesapeake Bay Regulatory and Accountability Program is a federal grant from EPA, administered by DEQ to implement and expand regulatory, accountability, assessment, compliance and enforcement capabilities to reduce nitrogen, phosphorus and sediment loads to meet the water quality goals of the Watershed Agreement and the Chesapeake Bay TMDL. When competitive or special funding is made available for implementation activities and capacity development assistance, it is posted for public announcement and disseminated through the partnerships.

Multiple Source – NFWF, in partnership with government agencies and private corporations, administers the Chesapeake Bay Stewardship Fund, which offers two competitive grant programs: the Innovative

Nutrient and Sediment Reduction Grant Program and the Small Watershed Grants Program. These programs benefit the communities, farms, habitats and wildlife of the Chesapeake Bay region.

Multiple Source – The Chesapeake Bay Trust administers a number of grant programs supporting environmental education, demonstration-based restoration and community engagement in the Chesapeake Bay region.

Septic Systems – VDH and other industry stakeholders frequently seek sources of funding to help septic system owners. Since 2012, VDH has received $1.25 million in grant funding to help Virginians with septic issues. VDH also connects homeowners with the South Eastern Rural Community Assistance Partnership, USDA and DHCD Indoor Plumbing Rehabilitation (IPR) to help homeowners with septic issues.

Multiple Sources – The Virginia WQIF established a special permanent, non-reverting fund in the state treasury, consisting of sums appropriated to it by the General Assembly. These include, unless otherwise provided in the general appropriation act, 10% of the annual general fund revenue collections in excess of the official estimates, and 10% of any unrestricted and uncommitted general fund balance at the close of each fiscal year whose reappropriation is not required. Moneys in the fund shall be used solely for Water Quality Improvement Grants. For the wastewater sector, the Virginia Water Quality Improvement Act specifies that the DEQ director "shall enter into grant agreements with all facilities designated as significant dischargers or eligible nonsignificant dischargers that apply for grants; however, all such grant agreements shall contain provisions that payments thereunder are subject to the availability of funds" (§ 10.1-2131(B)).

The state budget also specifies (§ 3-1.01(C) that of the unrefunded watercraft fuels tax (§ 58.1-2289 D), $2,583,531 shall be allocated annually to the Virginia WQIF and designated to the reserve fund for ongoing improvements of the Chesapeake Bay and its tributaries.

Multiple Source – The Virginia Chesapeake Bay Restoration Fund was created in 1992 by the General Assembly to support environmental education and restoration projects in the Chesapeake Bay and its tributaries (§ 46.2-749.2). Revenue for the fund is generated from the sale of Friend of the Chesapeake license plates from the DMV.

Multiple Source – The VEE administers philanthropic grants through its Virginia Program and the James River Water Quality Improvement Program. The Virginia Program priorities "are focused on improvement of local rivers and protection of water quality, restoration of the Chesapeake Bay, innovative land conservation and sustainable land use practices, environmental literacy and public awareness, and emerging issues of concern."[33] The James River Water Quality Improvement Program focuses on investments and initiatives that produce significant water quality benefits.

[33] Virginia Environmental Endowment's Virginia Program

CHAPTER 10. NEXT STEPS TO IMPLEMENTATION

10.1 Implementation and Tools

Virginia is committed to achieving the nutrient and sediment load reductions necessary to achieve the Chesapeake Bay TMDL while accounting for future growth and the impacts of climate change by 2025. These objectives are in accordance with the Clean Water Act and the timelines and goals developed by the Chesapeake Bay Program Partnership (Partnership) and those included in the 2014 Chesapeake Bay Watershed Agreement. Virginia's Phase III WIP is built upon a suite of regulatory and nonregulatory actions as well as incentive-based programs. The Phase III WIP includes legislative and regulatory actions linked to the Commonwealth's progress in meeting certain implementation targets. As called for by EPA, the Commonwealth will evaluate contingency actions if necessary to achieve the Chesapeake Bay TMDL. Such evaluation would incorporate input from the Chesapeake Bay Stakeholders Advisory Group, other stakeholders and the public through the two-year milestone process described below.

Further, as much of the implementation called for in this Phase III WIP is contingent on private property owners and businesses making decisions to install BMPs, the ultimate mix of practices installed may be different from those identified in this plan. Virginia and the Partnership will utilize an adaptive management approach anchored in two-year milestones and annual progress reporting to assess implementation progress and adjust programs and priorities to ensure all source nutrient and sediment load reductions are achieved by 2025. It is likely that load reductions among different source sectors and major basins may vary, but the cumulative effect will be achieved by 2025.

Since this plan is developed on forecasted 2025 conditions that are based on historical growth trends, policy changes implemented by local governments that alter the patterns of new development to be more protective of water quality, or that conserve more open space can reduce the level of effort needed to offset that growth. The Chesapeake Bay Program Partnership has developed several model scenarios for various bundles of land policy actions to demonstrate the magnitude of this potential effect. Additional information on these Land Policy BMPs has been developed by the Partnership. Only a few PDC's elected to include these practices as part of their inputs in this WIP III planning process. However, the Commonwealth will continue to work with PDCs and local partners to provide additional information on the benefits of these land policy actions and to encourage their adoption.

In advance of the development of the two-year milestones, the Partnership updates the information in the models, incorporating new information on land use, 2025 growth forecasts and the incorporation of any newly approved BMPs. Every other year there is the opportunity for local partners to provide new local data for inclusion in the models as well as opportunities to review the resulting growth projections. This input and feedback helps make the models more relevant at the local level. The process for evaluating and approving new BMPs is described in the Bay Program BMP Protocol. Anyone can propose a new BMP for the Partnership's consideration, but there is a high standard of scientific evidence needed to justify including a new BMP in the models.

The two-year milestones are finalized in January of even years preceded by proposed draft milestones noticed for public comment the prior fall. They consist of a list of programmatic actions for the upcoming two-year period. The document is Virginia's opportunity to make necessary adjustments to the Phase III WIP and to adapt its approach based on new information and improved understanding. The next set of two-year milestones for 2020-2021 will be drafted in October 2019, with an opportunity for public

comment prior to final milestones published on DEQ's Chesapeake Bay Milestones webpage in January 2020.

The adaptive management process will be strengthened and informed at all levels of implementation actions by integrating the use of new tools and science. One of the challenges faced by implementation managers is the incorporation of large volumes of research that can often offer conflicting information. The Partnership is continuing its efforts to synthesize the volumes of research into products that can help guide management decisions. Many of these synthesis efforts are done as workshops by the Chesapeake Bay Program Scientific and Technical Advisory Committee and can be found on their website. Several have been compiled into a Chesapeake Bay Watershed Data Dashboard. The dashboard empowers decision makers to:

- Find data on tidal and watershed water quality monitoring trends
- Find data on living resources trends and explanations
- Target restoration efforts geographically, by sector, or by practice.
- Develop scenarios to run on the Chesapeake Assessment Scenario Tool (CAST).
- Aid outreach and communication of water quality information.
- Build local stories to engage with stakeholders.

Another tool under development is an optimization engine that will help planners build implementation scenarios that maximize pollution reductions and co-benefits while also minimizing costs. The tool will better support adaptive management and milestone development. More information on the potential for this tool can be found in the STAC optimization workshop report.

The Bay Program Modeling Workgroup has made a series of geographic isolation runs for both point and non-point source loads as part of the development of the Phase III WIP planning targets, and to understand the relative effectiveness of each contributing area of the Chesapeake Bay watershed on dissolved oxygen in each of the 92 modeled Bay segments. These geographic isolation runs will identify those Bay segments that are most vulnerable to nonattainment. When paired with information from the tidal water quality monitoring system indicating a segment that may be lagging in its response to management actions, this tool can guide where to best target implementation geographically (e.g. use segment-shed targeting) to restore water quality in that lagging Bay segment. These tools will empower the Commonwealth and its implementation partners with data that can help target implementation to maximize cost effectiveness, identify opportunities for co-benefits, and to drive implementation to areas that may be lagging in their water quality response. These tools will be critical to the Commonwealth's approach to adaptive management through milestones periods through 2025. Virginia will provide regular updates to our local implementation partners as new data and tools become available. Links to these and other new tools will be added to the DEQ Chesapeake Bay Resources and Tool webpage as they become available.

10.2 Reporting Implementation and Verification

DEQ is the lead state agency for reporting BMP implementation to the Chesapeake Bay Program. These reports are completed annually for each state fiscal year (July 1 through June 30). The annual progress is reported to the Bay Program through the National Environment Information Exchange Network by December 1 of each year. DEQ has developed a system (BMP Warehouse) that can gather data from all nonpoint source implementers and prepare it for submission to the Chesapeake Bay Program as part of the annual progress reporting. All implementation partners are encouraged to use the BMP Warehouse to

upload their implementation information by October 1 of each year. BMPs are reported into the system by state agencies, local governments, regulated entities, federal agencies and non-governmental organizations. This repository of data collects the necessary details of implementation, inspection and maintenance of BMPs to meet the data reporting and verification standards of the Partnership. Additional details on data reporting specific to the developed sector are available in the Urban Data Reporting Fact Sheet.

The Chesapeake Bay Program partners have formally defined BMP verification as "the process through which agency partners ensure practices, treatments and technologies resulting in reductions of nitrogen, phosphorus and/or sediment pollutant loads are implemented and operating correctly."[34] BMP verification can be viewed as a life cycle process that includes initial inspection, follow-up checks and maintenance to ensure BMP performance. It is critical for data reporting partners to verify that BMPs across the region are being implemented correctly and are, in fact, effectively reducing nutrient and sediment pollution as expected. The process and standards for BMP verification in Virginia can be found in Virginia's BMP Verification Program Plan.

One of the concerns identified in the Phase III WIP outreach effort was that there is more work being done on the ground than the Commonwealth currently collects in its data systems. This includes BMPs installed by local governments, homeowners, businesses and farmers voluntarily or as part of private grants. This data collection gap is identified as a state initiative in Chapter 7 and, when filled, will help the Commonwealth meet its Bay goals.

To accurately capture and report new practices, collect data from new programs and gather information from new reporting sources, existing databases at DEQ must be updated and outreach to potential data reporters must include training on BMP tracking systems. Databases must also be improved by partner agencies, such as DCR and VDH. Each of these reporting enhancements must then be translated into updates to the BMP Verification Program Plan, agency Quality Assurance Program Plans, Standard Operating Procedures or guidance documents.

SWCDs that implement the VACS Program at the local level enter all state cost-shared, state tax credit, and state matched agricultural BMPs into a DCR tracking database. DCR nutrient management planners, as well as some planners from the private sector, submit data for entry into other DCR databases. State certified conservation plans and Resource Management Plans are also entered into separate DCR database modules. Each of these databases will require additional programming, using contractual services, to enable them to accommodate many of the recommended changes to the VACS Program outlined in Chapter 6. Additional data staff at DCR will also be needed.

Verification of agricultural BMPs will continue to be accomplished through onsite spot checks by SWCDs to ensure structural and land conversion BMPs continue to function as intended. Spot checks of agronomic practices will ensure nutrient management plan, conservation plan, Resource Management Plans, and related specifications were followed. Spot checks of structural, land conversion and other practices will be conducted in a manner and frequency consistent with the Virginia BMP Verification Plan and DCR's Quality Assurance Project Plan.

VDH is the lead agency for reporting the 22 septic BMPs. At the end of each state fiscal year, VDH staff use data collected during the year to report BMPs. The BMP data is collected throughout the year in

[34] Chesapeake Bay Program BMP Verification website

VDH's database, Virginia Environmental Information System (VENIS), while carrying out regulatory programs of the agency. The primary data collected includes date and location of installation or pump-outs and the treatment components for alternative onsite septic systems (AOSS). In 2017, VDH created the Division of Data Management and Process Improvement (DMPI) tasked with improving and managing VDH environmental health databases. In spring 2019, VDH and DMPI will complete a database transition to a proprietary cloud based system for collecting, storing, and reporting environmental health data. The new system will be more flexible and provide more advanced capabilities than the existing platform.

VDH is also responsible for reporting septic pump-outs in Virginia localities where the Chesapeake Bay Preservation Act (CBPA) does not apply. Generally, this is the area of the Chesapeake Bay watershed west of Interstate 95. The counties, cities and towns that are named in the CBPA are responsible for reporting the septic pump-outs in their areas through annual reports to DEQ. Since VDH does not currently have authority to develop operation and maintenance regulations for conventional onsite sewage system (COSS), repair permits issued by VDH have been used as a proxy to report septic pump-outs. This proxy holds true since septic systems are commonly pumped out before the septic repair is completed. However, after the fiscal year 2018 reporting period, legislative changes will affect the reporting of this BMP.

In 2018, the General Assembly passed HB 887, redefining the definition of "maintenance" of a septic system. The definition change now classifies small adjustments, fixes and modifications of a system as "maintenance" and no longer requires a repair permit from VDH. The results of this bill have been overwhelmingly positive from VDH staff, homeowners, and the private sector, as it facilitates less expensive and timelier fixes to septic system components.

VDH has seen a decrease in repair permits, which will decrease the number of septic pump-outs reported. However, the revised definition effectively leaves the permit requirement only when a failing septic system is repaired and fully replaced with a new system. This increases confidence that the system will be pumped out with the repair permits. Additionally, VDH has implemented the use of a "Condition Assessment" form for all repair permits, which allows VDH to accurately track when a failing COSS is replaced with an AOSS. Therefore, the agency will now be reporting this as an AOSS BMP instead of merely the septic pump-out BMP.

VDH and DEQ share the responsibility of reporting on implementation of the septic connection BMP in the Commonwealth. However, VDH reports limited numbers of the septic connection BMP since there is no requirement to notify the agency that a septic system has been replaced with a municipal sewer connection. VDH is currently exploring ways to collaborate with localities to acquire data when an existing home is connected to a municipal sewer. This would improve reporting numbers of septic connections and improve accuracy of the septic system inventory.

There is much work to be done to improve the completeness of BMP implementation data collection in the Bay watershed. Every BMP that is installed but not reported - or for which the agency fails to capture accurate key maintenance and inspection dates that extend a practice's functional life - reduces the level of effort demonstrated to EPA, Chesapeake Bay Program partners and the public. Improving implementation tracking, reporting and verification procedures, and systems with all partners will be key to the Virginia's success moving forward.

10.3 Tracking Progress

Each spring, the Partnership uses its models to estimate each Bay state's individual and collective progress in reducing nutrient and sediment loads. The results are published on CAST and as part of the Bay Program reporting on the Water Quality Goals in the 2014 Watershed Agreement (see Chesapeake Progress). The annual progress data in CAST can be summarized in reports showing loads as well as BMP implementation progress by using the Public Reports function. CAST can also provide annual progress loads in an interactive map viewer. Additionally, these model results are presented as graphs along with programmatic highlights in the annual Chesapeake Bay and Virginia Waters Clean-up Plan Report to the Virginia General Assembly. Virginia also develops a report on the status of programmatic actions identified as part of the two-year milestones. The Programmatic Milestones and the progress reports can be found on DEQ's Chesapeake Bay Milestones webpage.

Another way to track progress is to use data collected as part of the Partnership's expansive water quality monitoring programs. USGS provides an interactive map that provides information on nutrient and sediment loads, yields and trends for the Chesapeake Bay watershed non-tidal monitoring network. In addition, there are also interactive charts of measured river flows and pollution loads to the Chesapeake Bay on Chesapeake Progress. There is also a network of approximately 100 monitoring sites in the tidal estuary of the Bay. Estuarine trends are assessed for short-term and long-term periods at each of these sites for surface and bottom waters for nitrogen, phosphorus, sediment, water temperature, salinity and dissolved oxygen. These trend maps are available on the Bay Program Integrated Trends Analysis Team website. They are also available as interactive maps in the Bay Watershed Implementation Plan Data Dashboard.

DEQ conducts water quality assessments where monitoring results are compared to water quality standards to determine if the water quality "measures up" – for example, if it is clean enough for swimming, fishing and other uses. Every two years, the results of the water quality assessment work is published in a widely circulated report, the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. There is a chapter that provides assessment results for each of the river basins in the state, a chapter specific to the Chesapeake Bay estuary, and in every third report (every six years), a chapter dedicated to a twenty-year trend analysis. Each of these chapters are useful for tracking progress. The key chapters of the draft 2018 Integrated Report can be found on the following DEQ websites: Individual River Basin Assessment Results, Chesapeake Bay Assessment Results and Trends Analysis Results.

Ultimately, the BMPs being implemented and the nutrient and sediment loads they reduce, aim to improve the Chesapeake Bay's ability to meet water quality standards and, thereby, support its abundant life and critical habitats that make it such a special place. The Chesapeake Bay Program website includes information on the status of numerous important species and habitats on the State of the Chesapeake webpage. There are also numerous progress reports published annually from organizations interested in the Chesapeake Bay, such as the Potomac Conservancy, James River Association, Chesapeake Bay Foundation and the University of Maryland Center for Environmental Science.

CHAPTER 11. WHAT CAN YOU DO?

11.1 Introduction

Pollution sources that degrade our waters are often not visible or entirely evident. Many people think of pollution as only toxic chemicals, yet excess nitrogen and phosphorus inputs are currently a greater concern for the Chesapeake Bay's health. Pollution can be from either a point source or a non-point source. Point source pollution is from an identifiable source, such as a permitted facility. Non-point source pollution is more diffuse and harder to track, as runoff from lawns, farmlands and paved surfaces carry pollutants into streams draining to the Chesapeake Bay. Nutrients in excess can cause algae blooms with harmful effects on public health, fish, shellfish, marine mammals, birds and even tourism. Leaking or failing septic systems contribute bacteria and nutrient pollution that can threaten both human and ecosystem health. Even seemingly harmless activities, such as washing your car, can contribute phosphorus pollution as the soap runs down the driveway and into a storm sewer. A growing human population and increased development adds stress to forests and natural areas, which function as filtration and surface and groundwater recharge areas.

Figure 1: Whitewater Rafting on the James River, Richmond, Virginia (Courtesy of Rich Young)

Clean water supports recreation, small businesses, fish habitat, safe drinking water and adds natural beauty to our landscape. We can work together to implement small changes that will have a large and lasting impact on Virginia's waters and the Chesapeake Bay. Everyone benefits from healthy water, and all of us have a role in keeping our rivers, Bay and groundwater clean for future generations.

11.2 Your Rivers and Your Bay

You do not have to be a scientist or politician to help Virginia meet its pollution reduction goals for the Chesapeake Bay. Everyone lives in a watershed and all rivers eventually drain to a bay or ocean. Citizens can individually make changes that benefit water quality, or collaborate with stakeholder groups to strengthen relationships within the community and watershed.

Learn About Your Watershed – Water quality standards are set to protect aquatic life and wildlife as well as public health for swimming, fishing, drinking and, in specific areas, the production of edible and marketable seafood. DEQ and VDH annually monitor rivers, lakes and tidal waters to determine water quality conditions. If a waterway is found to have water quality conditions that do not meet water quality standards, it is considered an "impaired" water. Learning about specific impairments near your home can help you identify what actions will help clean up nearby waterways. TMDLs are calculations used to determine the amount of a pollutant that a waterbody can accept and still meet water quality standards. These calculations are then used to reduce point source and non-point sources of pollution in an impaired waterway to ensure water quality standards are met. The EPA's How's My Waterway? tool allows you to search for impaired waters based on your zip code. DEQ's online data viewer VEGIS displays water quality improvement projects and TMDL watersheds.

Clean Water Cost-Share – Cost-share programs provide financial incentives and technical assistance to property owners installing eligible BMPs in Virginia's Chesapeake Bay Watershed. Residential, rural and commercial sites, and farmland are potentially eligible for cost-share. SWCDs provide guidance and technical assistance for urban, residential and agricultural cost-share programs.

Figure 2: Raingarden BMP (Courtesy of VCAP)

Virginia Conservation Assistance Program (VCAP) is an urban/suburban cost-share program for BMPs that diminish polluted runoff, such as rain barrels, rain gardens, green roofs, permeable pavement and several other practices. Rain gardens and conservation landscaping also provide a community of native plants to be utilized by insect and bird pollinators (Figure 2). These practices can be installed in areas of your property where erosion, poor drainage, or lack of native vegetation occurs. Rainwater harvesting practices, such as rain barrels or cisterns, capture and store a portion of runoff from a roof downspout, which can later be used for landscaping. Most VCAP BMPs are eligible for 75% cost-share, but that may differ by BMP. In 2018, rainwater harvesting systems were reimbursed at $2 per gallon. For coastal

properties, living shorelines were eligible for 75% cost-share, not to exceed $15,000 per parcel per year. Check with your local SWCD for the most current cost-share rates.

Pasture, hay and cropland farmers within the Chesapeake Bay watershed can receive funding support to voluntarily plant riparian forest buffers, grass and shrub buffers and restore wetlands on lands adjacent to streams from the USDA's Conservation Reserve Enhancement Program (CREP). Check with your local USDA office or local SWCD for more information on CREP or the many other federal Farm Bill programs that assist with agriculture conservation practices and technical assistance. Farmers implementing BMPs are also eligible for state cost-share as assistance through the VACS Program, which is administered through DCR and implemented locally by SWCDs. The VACS Program offers cost-share assistance for many agriculture BMPs, including livestock exclusion fencing, off-stream watering, cover crops, nutrient management plans, rotational grazing and other conservation practices.

VDOF also offers the Virginia Trees for Clean Water Program, which provides localities and nonprofits cost-share funding for urban tree canopy and urban tree buffer establishment. Projects supported by the program provide enhanced water quality improvements in urban and suburban settings.

EPA provides grant funding for state and local nonpoint source pollution reduction projects through the Clean Water Act Section 319 Program. This money can be spent on TMDL Implementation Projects that address local water quality impairments. Local governments, tribes, non-profits and special districts are eligible to apply for "319" funding. Projects that lead to water quality improvement activities are documented as success stories. Citizens can visit DEQ's web page on nonpoint source pollution to find out more about 319 projects in their watershed.

Local governments are also eligible for many state and federal grant opportunities to fund water quality improvement efforts. These grants support activities, such as litter prevention and recycling, stormwater filtration, nonpoint source pollution mitigation and nutrient reductions. For example, the Chesapeake Bay Program has numerous funding opportunities listed on their Grants and Request for Proposal (RFP) webpage.

A comprehensive understanding of cost-share opportunities for urban areas and agricultural land will help keep an open dialogue within local communities.

Support Restoration and Education Activities – Through purchasing a Chesapeake Bay license plate (Figure 3) or contributing to the Chesapeake Bay Restoration Fund, your dollars can support environmental education programs and projects that improve water quality. When purchasing the specialty license plate, $15.00 of the $25.00 fee is transferred to the Chesapeake Bay Restoration Fund Advisory Committee for environmental education and restoration projects for the Bay and its rivers (§30-256). Voluntary contributions may also be made on your tax return to the Chesapeake Bay Restoration Fund which is used by the Commonwealth on projects that are identified in the Phase III Watershed Implementation Plan (§58.1-344.3).

Figure 3: Friend of the Chesapeake License Plate (Courtesy of VDMV)

Conserving Lands – Conservation easements keep rural land as forestry or agriculture, which helps preserve Virginia's open spaces. Qualified landowners work with conservation groups or government

preservation programs, like the Virginia Outdoors Foundation, to voluntarily protect the land or VDOF's land conservation program that protects working forestland.

Environmental Stewardship – VCE and the Master Gardener Program coordinate the Healthy Virginia Lawns program to help landowners implement proper lawn practices.

Some organizations offer certificates for homes and businesses that adopt clean water practices. Homeowners in the Elizabeth River watershed can become a River Star Home through The Elizabeth River Project, once they agree to meet clean water conditions, such as picking up pet waste and reducing lawn fertilizers. Similarly, the James River Association has a River Hero Home program for landowners willing to implement river friendly practices and behaviors.

DCR also offers the Clean Water Farm Award to farmers in each of the 10 major river basins using tools, technologies and practices that protect water quality. SWCDs nominate and, with DCR, select Clean Water Farm Award winners.

For many general practices that you can do every day, see the Chesapeake Bay Programs list of How-To's for inspiring Bay friendly activities.

Pets – Nitrogen, phosphorus and fecal bacteria loads from pets can be a significant contributor to water quality impairments. Pet owners should always carry a bag so they can pick up their pet's waste. Many local governments now have penalties if pet waste is not picked up. Citizens can visit their local government web pages to find out more.

Proper Septic Care – Septic systems provide an efficient process to eliminate waste where centralized sewer systems are not available. However, improperly maintained septic systems can pollute ground, well, surface and Bay waters with excess nutrients and bacteria. This can contribute towards polluted shellfish waters, polluted recreational waters and premature septic system failure. However, there are things a septic system owner can do to help. Landowners using conventional septic systems should have their systems regularly inspected every three to five years by a qualified professional. If the property is within the Chesapeake Bay Preservation Area, septic tanks are required to be pumped or inspected at least once every five years.

Landowners with alternative septic systems should have a qualified professional visit their system more frequently. VDH regulations require at least an annual visit by a licensed operator for all alternative systems. Your operator will document the visit with VDH for compliance. The visit also verifies nitrogen reduction credit of the alternative system.

In addition to regular maintenance, it is important to follow the common tips to improve the longevity of your system and reduce nitrogen pollution. These tips include avoiding pouring harsh chemicals down the drain, discarding non-degradable objects in the trash, keeping vehicles and tree roots away from the drain field, and repairing leaking fixtures quickly.

Get Involved – Environmental groups host many activities for their members as well as the public, such as river cleanups, environmental education opportunities and citizen water quality monitoring. Opportunities to become a citizen water quality monitor are available through a number of organizations, such as the Alliance for the Chesapeake Bay. DEQ's Citizen Monitoring Program trains volunteers to accurately collect data and the state uses this information to expand its biennial assessment of the water quality of

our rivers and the Chesapeake Bay. If the data quality is high enough, the number of waterbodies may be increased in the state's assessments of compliance with water quality standards. In accordance with State law, volunteer water quality monitoring is not used by DEQ to evaluate compliance with regulated activities. Citizen monitoring programs are often run by local governments, Soil and Water Conservation Districts, citizen organizations, community groups and colleges. Virginia DEQ began collaborating with citizen monitoring organizations in 1998, and typically awards grants to citizen water quality monitoring groups on an annual basis as well, subject to the availability of funds. DEQ recently developed a survey to better quantify the amount of time and resources that go into volunteer monitoring. The results suggest volunteers donate a far greater amount of time and resources than was previously thought. For example, based on the average time each volunteer spends per month monitoring, traveling and reporting data, and using a national volunteer hourly wage, it is estimated that Virginia citizen monitors donated a total of more than $2 million in equivalent wages in 2018. A list of participating organizations can be found on DEQ's Citizen Monitoring website, along with a Citizen Water Quality Monitoring Manual that will help in the design of a monitoring program.

The Chesapeake Bay Program Citizen Advisory Committee offers an opportunity for citizens to become directly involved in the Chesapeake Bay Program.

Watershed Roundtables organize meetings and water quality activities to keep the public and other stakeholders informed, motivated and engaged. Roundtables help bridge the communication gap between localities, agencies, environmental groups and the public. Active roundtables are listed on DEQ's web page and citizens can contact a roundtable near them to find out about opportunities to get involved.

Public Notices – To provide information about public hearings, public meetings, public comment periods and other events related to state agency activities, agencies at a minimum publish public notices on the Virginia Regulatory Town Hall. Public notices may also be published in local newspapers and on the agency website. For example, facilities that discharge treated wastes into Virginia waters are required to have a Virginia Pollution Discharge Elimination System (VPDES) permit with DEQ. After the VPDES permit is drafted, the public can provide comments on the draft permit for 30-days. Citizens and stakeholder groups are encouraged to provide comments during the public comment period. Public notices are posted in local newspapers and at the bottom of DEQ's homepage. DEQ annually prepares a report containing the annual loads of nitrogen and phosphorus discharged by each permitted facility. The 2017 Nutrient Load Analysis can be found on DEQ's Water Pollution Discharge website.

Report Pollution – If you see something, say something. State agencies rely on citizens to report pollution incidents or suspected violations of state environmental law. There are several ways to report known or suspected pollution problems:

- Call DEQ Regional Pollution Response and Preparedness.
- Report pollution to DEQ online.
- Contact your local VDACS Agricultural Stewardship coordinator. The Annual Report on the Agricultural Stewardship Act can be found on the VDACS website.

APPENDIX A – LOCAL AREA PLANNING GOALS

Planning District/Regional Commission	Nitrogen Reduction LAPG (Pounds)	Phosphorus Reduction LAPG (Pounds)
Accomack-Northhampton	**82,417**	**7,879**
Developed	43,501	3,841
Natural	30,333	4,038
Septic	8,583	-
Central Shenandoah	**144,665**	**28,197**
Developed	97,224	17,225
Natural	22,193	10,972
Septic	25,248	-
Commonwealth	**109,149**	**23,358**
Developed	24,249	3,719
Natural	72,677	19,639
Septic	12,223	-
Crater	**26,280**	**2,612**
Developed	11,322	1,412
Natural	12,645	1,200
Septic	2,313	-
George Washington	**50,562**	**6,178**
Developed	24,756	2,861
Natural	25,806	3,317
Septic	-	-
Hampton Roads	**81,514**	**7,850**
Developed	53,853	6,907
Natural	24,464	943
Septic	3,197	-
Middle Peninsula	**182,832**	**12,760**
Developed	71,043	5,087
Natural	97,213	7,673
Septic	14,576	-
New River Valley	**124**	**10**
Developed	-	-
Natural	102	10
Septic	21	-
Northern Neck	**123,158**	**5,364**
Developed	61,152	5,121
Natural	50,658	243

Planning District/Regional Commission	Nitrogen Reduction LAPG (Pounds)	Phosphorus Reduction LAPG (Pounds)
Septic	11,349	-
Northern Shenandoah Valley	**142,692**	**25,498**
Developed	87,516	10,980
Natural	28,703	14,518
Septic	26,473	-
Northern Virginia	**15,359**	**-**
Developed	15,359	-
Natural	-	-
Septic	-	-
Rappahannock-Rapidan	**121,471**	**35,541**
Developed	50,125	11,399
Natural	54,348	24,143
Septic	16,998	-
Region 2000	**59,140**	**9,812**
Developed	29,711	3,617
Natural	19,526	6,195
Septic	9,903	-
Richmond Regional	**164,364**	**18,598**
Developed	81,855	9,867
Natural	68,869	8,730
Septic	13,639	-
Roanoke Valley-Alleghany Regional	**37,734**	**10,349**
Developed	20,694	2,656
Natural	9,698	7,693
Septic	7,342	-
Thomas Jefferson	**83,586**	**9,394**
Developed	26,912	2,871
Natural	41,780	6,523
Septic	14,894	-

Soil and Water Conservation District Area	Nitrogen Reduction LAPG (Pounds)	Phosphorus Reduction LAPG (Pounds)
VA SWCD Area 1	**3,569,884**	**506,372**
Agriculture	3,489,661	466,984
Natural	80,222	39,387
VA SWCD Area 2	**1,735,156**	**161,397**
Agriculture	1,651,955	140,637
Natural	83,201	20,761
VA SWCD Area 3	**3,253,898**	**99,617**
Agriculture	2,956,631	67,684
Natural	297,267	31,932
VA SWCD Area 6	**1,188,635**	**39,911**
Agriculture	1,109,715	27,419
Natural	78,920	12,492

APPENDIX B – FEDERAL AGENCY PLANNING GOALS

Table 4: Local Area Planning Goals for Federal Agency Owned Lands in Virginia

Federal Agency	Sector	Nitrogen Reduction	Phosphorus Reduction
Department of Defense	Agriculture	-	-
Department of Defense	Developed	27,112	2,627
Department of Defense	Natural	11,319	166
Department of Defense	Septic	-	-
Department of Defense Total		**38,431**	**2,794**
General Services Administration	Agriculture	-	-
General Services Administration	Developed	-	-
General Services Administration	Natural	-	-
General Services Administration	Septic	-	-
General Services Administration Total		**-**	**-**
National Aeronautics and Space Administration	Agriculture	-	-
National Aeronautics and Space Administration	Developed	-	-
National Aeronautics and Space Administration	Natural	12	2
National Aeronautics and Space Administration	Septic	-	-
National Aeronautics and Space Administration Total		**12**	**2**
National Park Service	Agriculture	-	-
National Park Service	Developed	1,325	182
National Park Service	Natural	5,437	2,049
National Park Service	Septic	-	-
National Park Service Total		**6,762**	**2,231**
Other Federal Land	Agriculture	-	-
Other Federal Land	Developed	970	127

Federal Agency	Sector	Nitrogen Reduction	Phosphorus Reduction
Other Federal Land	Natural	(1,251)	(440)
Other Federal Land	Septic	-	-
Other Federal Land Total		**(281)**	**(313)**
Smithsonian Institution	Agriculture	-	-
Smithsonian Institution	Developed	-	-
Smithsonian Institution	Natural	27	21
Smithsonian Institution	Septic	-	-
Smithsonian Institution Total		**27**	**21**
US Fish and Wildlife Service	Agriculture	-	-
US Fish and Wildlife Service	Developed	152	14
US Fish and Wildlife Service	Natural	(1,496)	(39)
US Fish and Wildlife Service	Septic	-	-
US Fish and Wildlife Service Total		**(1,344)**	**(25)**
US Forest Service	Agriculture	-	-
US Forest Service	Developed	-	-
US Forest Service	Natural	28,940	11,872
US Forest Service	Septic	-	-
US Forest Service Total		**28,940**	**11,872**
Grand Total		**72,546**	**16,583**

The reduction goals in the LAPG Table above are in addition to the following requirements for Federal Lands:

Meet all applicable regulatory requirements (MS4, Industrial Stormwater, Wastewater, Erosion and Sediment Control, Post-Construction Stormwater, Chesapeake Bay Preservation Act).

Reduce loads from all agency owned lands managed for agricultural use (45% Nitrogen reduction goal from 2017 levels).

Reduce loads from all onsite systems (septic and alternative onsite systems) on federal agency owned lands (6% Nitrogen reduction goal from 2017 levels).

Ensure that any forest harvesting is accompanied by implementation of the full suite of silviculture water quality practices.

Account for and offset any load changes resulting from changes in land use through time.

Account for and offset the federal agencies share of load changes resulting from climate change. This will be quantified by the Bay Program by 2021. Current estimate for all of Virginia is 1.72 million pounds of nitrogen and 0.19 million pounds of phosphorus.

APPENDIX C – 2019 PDC CONTRACT DELIVERABLES

Activity 1: Facilitation of Chesapeake Bay Phase III WIP implementation with localities and regional partners

The PDC will continue to engage localities, regional and state partners regarding Bay WIP III programmatic actions and implementation activities. These partners include, but are not limited to, local and regional governments; soil and water conservation districts (SWCDs); river basin commissions (e.g., Rivanna River Basin Commission, Rappahannock River Basin Commission, etc.); environmental non-profits (e.g., Friends of the Rappahannock, James River Association, etc.); state and federal agency representatives. The PDC will focus on liaison activities between localities and all of the partners.

Minimum Deliverables

a) Development of a regionally-specific annual Scope of Work (modeled after the draft developed by TJPDC titled, Local Area Watershed Implementation Plans Sustainability Program) for implementation for fiscal year 2020 should on-going funding for this initiative be realized. (by June 30, 2019)
b) Host and facilitate a minimum of 3 meetings on Bay WIP topics, or include Bay WIP issues on agendas for existing meetings, with participation from membership local governments. Encourage attendance from other partners. (by September 30, 2019)
c) Initiate work with localities and other partner organizations to develop cost estimates and potential budgets for implementation of Bay Program-approved BMP projects and to identify opportunities to align multiple program needs. (by September 30, 2019)

   Any information that can be provided to DEQ for the June 30th interim report may inform the state budgeting process for next year.

d) Work with localities to compile and submit GIS shapefiles to support the Chesapeake Conservancy's Bay High-Resolution Land Cover Update project, where such data exists. Data layers of interest include parcel data, local land use data, building footprints, MS4 boundaries, sewer service areas and planned expansions, street centerlines, zoning data, federal, state and municipally owned lands or other relevant data sets. (by June 30, 2019)

Optional Deliverables

e) Collaborate with other Bay PDCs to establish an "urban sector" network group. Coordinate meetings and/or teleconferences with other Bay PDCs to discuss BMP implementation process and efforts to assist unregulated (non MS4) communities. (by September 30, 2019)
f) Work with localities to begin review of local plans and ordinances and identify whether WIP III BMPs and prioritized programmatic actions are included in goals/objectives or opportunities for future inclusion. (by September 30, 2019)
g) Share information with localities on state, federal, and private BMP implementation funding opportunities. (as available)

Activity 2: **Development and distribution of implementation tools and resources**
The PDC role is for contract-related work that produces outreach and education elements fostering local stakeholder participation in Chesapeake Bay Phase III WIP implementation; and the region-wide dissemination of, and assistance with, tools, collaboration with stakeholders and other partners, and leadership for regional strategies, programmatic actions and planning goal implementation.

Minimum Deliverables

a) Develop a marketing piece and web page that describes/informs local stakeholders about the WIP. (by September 30, 2019)
b) Work with localities and other regional stakeholders to develop a matrix of potential grant project priorities for the region with total project costs, potential funding sources, partners, application deadlines and any other critical information. (by September 30, 2019)

Optional Deliverables

c) Develop a program that educates the local stakeholders about the direct benefits of implementing BMPs in their communities (instead of focusing on the Bay area exclusively); and that engages and encourages citizens to participate by promoting the benefits to their local communities. (by September 30, 2019)
d) Identify opportunities for regional (or multiple locality) projects such as small watershed-scale stream restoration and bank stabilization in the PDC region. (by September 30, 2019)
e) Support local governments with grant writing assistance as opportunities arise based on local government needs. (by September 30, 2019)
f) Develop a library of draft applications (for basic information needs and project drafts) for use within the region to acquire project funding. For example, templates can be developed for: (1) non-profit foundations such as the National Fish and Wildlife Foundation; (NFWF); (2), locally-targeted state resources such as the Stormwater Local Assistance Funds (SLAF); and (3) a potential co-benefit funder applicable in the region (ex. Virginia Department of Emergency Management {VDEM} - Hazard Mitigation, Virginia Department of Transportation {VDOT} - Road Improvements with WQ BMPs, Trout Unlimited - Habitat Improvement, National Oceanic and Atmospheric Administration {NOAA} - Coastal Resiliency). Examples of past, successful projects or representative draft applications for one or more specific BMPs are acceptable for this deliverable. (by September 30, 2019)

Activity 3: BMP implementation reporting and liaison with DEQ
The PDCs identified needs with existing BMP project reporting procedures during the Phase III WIP development process. This section begins to address and improve many aspects of reporting mechanisms for data on implemented BMPs.

Minimum Deliverables

a) Host a training webinar in cooperation with DEQ to assist localities staff, and other agencies as needed (e.g., SWCD, local departments of health) on use of the BMP Warehouse for reporting implementation actions. (by June 30, 2019)
b) Survey local governments and any other partner organizations on BMP data reporting gaps. Compile this information to submit to DEQ for input regarding actions and resources required for BMP data collection, reporting and Bay Model credit. (by September 30, 2019)

i. Identify known gaps in BMP reporting
ii. Identify projects or BMP data known to be absent

c) Survey localities to identify WIP III BMP training needs. (e.g. design, tracking, reporting, verification, maintenance (by September 30, 2019)

Optional Deliverables

d) Participate with the Virginia Department of Health (VDH), SWCDs and local governments to develop a process to capture and track septic tank pumpouts and report to DEQ's BMP Warehouse common reporting forms. (by September 30, 2019)
e) Establish a regional BMP reporting process, as needed by localities and including a process for BMP reporting for those localities that do not want to be included in a regional approach (by September 30, 2019)

Activity 4: Project administration

Minimum Deliverables

a) Submit the interim PDC contract report and initial reimbursement request. (by June 30, 2019)
b) Submit the final PDC contract report and final reimbursement request. (by September 30, 2019)

APPENDIX D – BMP SUMMARY

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Agricultural Stormwater Management	acres	-	-	436
Agriculture	Agriculture Nutrient Management	acres	543,549	591,528	951,395
Agriculture	Agriculture Nutrient Management Enhanced	acres	-	-	426,452
Agriculture	Alternative Crops	acres	113	479	1,231
Agriculture	Animal Waste Management System	Animal Units	1,448,824	1,169,600	2,228,900
Agriculture	Barnyard Runoff Control	acres	64	1,523	2,622
Agriculture	Cover Crop Commodity	acres	24,398	22,766	39,124
Agriculture	Cover Crop Traditional	acres	77,290	135,272	384,396
Agriculture	Cover Crop Traditional with Fall Nutrients	acres	-	62	20,038
Agriculture	Dairy Precision Feeding and/or Forage Management	Animal Units			52,247
Agriculture	Forest Buffer	acres	12,247	5,433	21,965
Agriculture	Forest Buffer-Streamside with Exclusion Fencing	acres	-	-	26,390
Agriculture	Grass Buffer	acres	2,542	2,685	15,739
Agriculture	Grass Buffer - Narrow	acres	-	2,929	8,319
Agriculture	Grass Buffer-Narrow with Exclusion Fencing	acres	-	351	10,839
Agriculture	Grass Buffer-Streamside with Exclusion Fencing	acres	5,262	8,506	34,927
Agriculture	Horse Pasture Management	acres	25	59	19,851
Agriculture	Land Retirement to Ag Open Space	acres	29,954	30,582	50,451
Agriculture	Land Retirement to Pasture	acres	-	-	10,820
Agriculture	Loafing Lot Management	acres	-	-	159
Agriculture	Manure Compost Static Pile Windrow	dry tons	-	-	11,063
Agriculture	Manure Incorporation	acres	-	-	2,205
Agriculture	Manure Injection	acres	-	-	10,501
Agriculture	Manure Transport	dry tons	32,643	6,659	89,221
Agriculture	Manure Treatment Slow Pyrolysis	dry tons	-	-	6,609
Agriculture	Mortality Composters	Animal Units	161,601	175,141	1,674,227

Sector	BMP	Unit	2009	2017	WIP III Final
Agriculture	Off Stream Watering Without Fencing	acres	67,972	137,459	176,188
Agriculture	Poultry Litter Amendments (alum, for example)	Animal Units		2,762	57,791
Agriculture	Precision Intensive Rotational/Prescribed Grazing	acres	84,328	206,691	347,363
Agriculture	Soil Conservation and Water Quality Plans	acres	-	-	1,183,460
Agriculture	Sorbing Materials in Ag Ditches	acres	-	-	610
Agriculture	Tillage Management	acres	653,921	616,511	608,044
Agriculture	Tree Planting	acres	4,089	14,503	34,256
Agriculture	Water Control Structures	acres	1,511	831	894
Agriculture	Wetland Restoration - Floodplain	acres	321	354	2,838
Agriculture	Wetland Restoration - Headwater	acres	-	-	828
Developed	Advanced Grey Infrastructure Nutrient Discovery Program (IDDE)	acres	-	-	17,306
Developed	Bioretention/raingardens	acres	2,112	3,913	33,730
Developed	Bioswale	acres	751	868	8,764
Developed	Conservation Landscaping Practices	acres	-	-	18,871
Developed	Dry Detention Ponds and Hydrodynamic Structures	acres	44,445	47,538	97,265
Developed	Dry Extended Detention Ponds	acres	40,871	45,875	159,030
Developed	Erosion and Sediment Control	acres	26,864	29,305	22,346
Developed	Filter Strip Runoff Reduction	acres	2	2	100
Developed	Filter Strip Stormwater Treatment	acres	-	1	1
Developed	Filtering Practices	acres	773	1,425	58,112
Developed	Floating Treatment Wetland	acres	-	0	377
Developed	Forest Buffer	acres	35	27	9,982
Developed	Forest Planting	acres	6	24	8,471
Developed	Impervious Surface Reduction	acres	214	291	36,303
Developed	Infiltration Practices	acres	5,428	6,697	73,037
Developed	Permeable Pavement	acres	83	176	4,564
Developed	Storm Drain Cleaning	pounds of sediment	-	-	385,757

Sector	BMP	Unit	2009	2017	WIP III Final
Developed	Stormwater Performance Standard-Runoff Reduction	acres	1,169	2,312	1,362
Developed	Stormwater Performance Standard-Stormwater Treatment	acres	33,483	38,789	20,434
Developed	Tree Planting - Canopy	acres	-	-	30,000
Developed	Urban Nutrient Management	acres	20,613	19,194	553,470
Developed	Vegetated Open Channels	acres	379	2,538	3,486
Developed	Wet Ponds and Wetlands	acres	118,224	118,497	227,512
Natural	Denitrifying Bioreactors	pounds of nitrogen	-	-	300,000
Natural	Forest Harvesting Practices	acres	81,923	62,292	100,244
Natural	Oyster Aquaculture	oysters harvested	-	-	150,000,001
Natural	Oyster Reef Restoration	acres	-	-	1,661
Natural	Shoreline Management	feet	-	4,152	500,000
Natural	Stream Restoration	feet	656,735	707,123	1,254,754
Natural	Wetland Rehabilitation	acres	-	-	521
Septic	Septic Connection	systems	20	726	34,063
Septic	Septic Denitrification - Conventional	systems	1,432	2,529	48,441
Septic	Septic Denitrification - Enhanced	systems	22	375	2,569
Septic	Septic Effluent - Enhanced	systems	167	5	31
Septic	Septic Pumping	systems	18,806	8,131	82,733
Septic	Septic Secondary Treatment - Conventional	systems	6,524	4,671	6,201
Septic	Septic Secondary Treatment - Enhanced	systems	129	191	314

APPENDIX E – FEDERAL AGENCY NARRATIVES

Department of Defense Input: Virginia Phase III Watershed Implementation Plan

Section 1. Location and Description of the Federal Land or Facility

1.1 Facility Name

The following Department of Defense (DoD) installations are located within the jurisdictional boundaries of Virginia in the Chesapeake Bay Watershed:

- 99th RSC (VA)
- Arlington National Cemetery
- Army Reserve National Guard (VA)
- Camp Peary
- Defense Supply Center Richmond
- Fort A.P. Hill
- Fort Lee
- Fort Belvoir
- Joint Base Langley-Eustis (Eustis)
- Joint Base Langley-Eustis (Langley)
- Joint Base Myer - Henderson Hall (Fort Myer and Henderson Hall)
- Joint Expeditionary Base Little Creek-Fort Story (Little Creek)
- Joint Expeditionary Base Little Creek-Fort Story (Fort Story)
- Naval Air Station (NAS) Oceana
- Naval Station Norfolk[1]
- Naval Support Activity (NSA) Hampton Roads[2]
- NSA Norfolk Naval Shipyard[3]
- NSA South Potomac - Dahlgren
- NSA Washington - NSF Arlington
- Naval Weapons Station (NWS) Yorktown[4]
- Pentagon
- USMC Base Quantico

[1] Includes Defense Fuel Support Point (DFSP) Craney Island
[2] Includes Lafayette River Annex and Naval Medical Center Portsmouth
[3] Includes Scott Center and Saint Juliens Creek Annex
[4] Includes Cheatham Annex, Yorktown Fuels, and New Kent

1.2 Property Boundaries

GIS property boundary information for each of the installations can be found in the Chesapeake Assessment and Scenario Tool (CAST) located at the following link under the Spatial Data heading: http://cast.chesapeakebay.net/Documentation/BMPsModelsGeography.

1.3 Land Cover

The land cover on DoD installations within the Chesapeake Bay watershed is comprised of developed and natural acres. Table 1 summarizes the acres of various load source groups extracted from CAST for DoD lands. Although CAST does not include the acres of active construction sites on DoD installations, these activities are part of the land cover condition. Once the construction activities are completed, both the developed and natural load source groups will be updated based on the land use changes. As of December 2018, there were 77 active construction permits on DoD installations in Virginia. There are three point sources (i.e. wastewater treatment plants) owned and operated by DoD installations in Virginia. In addition, there are three DoD installations that lease land to farmers for agricultural use. NAS Oceana out-leases approximately 645 crop acres; NWS Yorktown New Kent out-leases approximately 193 crop acres; and Fort A.P. Hill out-leases 162 crop acres.

Table 1: DoD Land Cover Acreages per Load Source Group - CAST Compare Scenarios between 2010 No Action and 2017 Progress V9

Jurisdiction: Virginia	2010 Partnership No Action Scenario	2017 Partnership Progress Scenario V9
Developed	33,809.0	34,532.8
Developed Impervious	18,063.2	18,446.7
CSS Buildings and Other	6.6	6.6
CSS Roads	0.1	0.1
CSS Tree Canopy over Impervious	0.0	0.0
MS4 Buildings and Other	3,920.2	4,033.0
MS4 Roads	2,300.4	2,370.3
MS4 Tree Canopy over Impervious	494.7	509.1
Non-Regulated Buildings and Other	7,641.7	7,761.7
Non-Regulated Roads	2,773.5	2,824.6
Non-Regulated Tree Canopy over Impervious	926.0	941.2
Developed Pervious	15,745.7	16,086.1
CSS Tree Canopy over Turf Grass	1.4	1.4
CSS Turf Grass	4.6	4.6
MS4 Tree Canopy over Turf Grass	1,926.1	1,989.3
MS4 Turf Grass	2,774.5	2,848.0
Non-Regulated Tree Canopy over Turf Grass	4,575.2	4,656.9
Non-Regulated Turf Grass	6,464.1	6,586.0
Developed Construction	0.0	0.0
CSS Construction	0.0	0.0
Regulated Construction	0.0	0.0
Natural	171,653.8	170,929.9
CSS Forest	1.7	1.7
CSS Mixed Open	2.4	2.4
Harvested Forest	0.0	0.0
Headwater or Isolated Wetland	2,530.9	2,519.1
Mixed Open	18,830.6	18,613.6
Non-tidal Floodplain Wetland	6,130.0	6,106.8
True Forest	140,718.7	140,248.7
Water	3,439.4	3,437.6
Total	205,462.7	205,462.7

1.4 Area

In total, DoD installations cover 199,716 acres in Virginia. See Table 2 for a breakdown by Installation.

Table 2: Acreage of DoD Installations within Virginia

Installation	Total Area	Impervious Area	Pervious Area
99th RSC (VA)	206.5	81.9	124.5
Arlington National Cemetery	624.0	74.0	550.0
Army Reserve National Guard (VA)	101.5	33.5	68.0
Camp Peary	9,000.0	326.0	8,674.0
Defense Supply Center Richmond	560.0	292.0	268.0
Fort A.P. Hill	76,000.0	1,149.4	74,850.6
Fort Belvoir	8,579.0	1,250.0	7,329.0
Fort Lee	5,678.0	842.0	4,836.0
Joint Base Langley-Eustis (Eustis)	7,953.6	1,130.9	6,822.7
Joint Base Langley-Eustis (Langley)	3,647.0	1,074.8	2,572.2
Joint Base Myer - Henderson Hall	269.0	132.5	136.5
Joint Expeditionary Base Little Creek - Fort Story	2,105.8	630.5	1,475.3
NAS Oceana	2,299.0	242.0	2,057.0
Naval Station Norfolk	4,300.0	1,456.9	2,843.1
NSA Hampton Roads	110.0	60.0	50.0
NSA Norfolk Naval Shipyard (MIDLANT)	653.9	209.8	444.1
NSA Norfolk Naval Shipyard (NAVSEA)	424.6	373.3	51.4
NSA South Potomac - Dahlgren	4,320.0	421.6	3,898.5
NSA Washington - NSF Arlington	17.7	10.2	7.5
NWS Yorktown	13,539.0	876.0	12,663.0
Pentagon	238.0	170.0	68.0
USMC Base Quantico	59,090.0	1,635.8	57,454.2
Total	199,716.6	11,596.9	188,119.7

1.5 Land Use Types

DoD installations are composed of military, industrial, administrative, recreational, residential and open space land uses. NAS Oceana, NWS Yorktown-New Kent, and Fort A.P. Hill also have agricultural land uses.

1.6 Nature of Activities

DoD installations in Virginia are engaged in a variety of activities including military training, weapon testing, ceremonial activities, research and development, environmental compliance and natural resources protection, enhancement, and restoration.

Section 2. Description and Estimation of Current Releases of Nitrogen, Phosphorus and Sediment from those federal Lands or Facilities (Point and Non-Point Sources) and an Estimate of Anticipated Growth Through 2025

Each year, the DoD collects stormwater Best Management Practice (BMP) records from installations. Those records are then consolidated and reported to all of the Chesapeake Bay Jurisdictions, including Virginia. From there, the records are entered into a state record and assigned state unique ID. Jurisdictions then report their entire progress from all partners which is then compiled in the National Environmental Information Exchange Network (NEIEN). After passing through NEIEN, the stormwater BMP data is uploaded into CAST with a state unique ID numbers. The state unique ID number allows DoD to track crediting through the various stages of reporting. Stormwater BMP crediting is an important step in understanding current releases of total nitrogen (TN), total phosphorus (TP), and total suspended solids/sediment (TSS) because it allows DoD to determine if the Partnership's annual progress scenario properly characterizes our implementation and nutrient and sediment load reductions.

Using preliminary data from the 2018 Partnership Scenario, the BMP crediting analysis indicated that 0% of the implemented BMPs reported to Virginia were credited to DoD. Therefore, DoD implementation is significantly under-represented in the Phase 6 Model for 2018 Progress. Consequently, DoD developed an alternate 2018 Progress Scenario that characterizes our current TN, TP and TSS loads based on installation BMP implementation.

DoD also developed two additional scenarios to assist in understanding the change in TN, TP and TSS loads for the developed and natural load source groups only. The first scenario, which DoD refers to as the 2010 DoD Baseline included BMPs implemented between July 1, 1984 and June 30, 2009 at the State-Chesapeake Bay Watershed only area (State CBWS-only) scale. This scenario helps to determine the loads at the end of the 2009 Progress year. The second scenario, called the 2018 DoD Progress Scenario, included all BMPs implemented between July 1, 1984 and June 30, 2017 at the State CBWS-only scale. This scenario quantifies DoD TN, TP, and TSS loads at the end of the 2018 Progress year. Tables 3 through 5 provide the DoD VA-CBWS only TN, TP, and TSS loads at the Edge of Stream (EOS) and Edge of Tide (EOT) in pounds per year and the 2010 Baseline scenario.

Table 5: DoD TN Loads (in lbs/year)

Jurisdiction	2010 Baseline (EOS)	2018 DoD Progress (EOS)	2010 Baseline (EOT)	2018 DoD Progress (EOT)
Virginia	697,375	688,549	532,253	524,595

Table 6: DoD TP Loads (in lbs/year)

Jurisdiction	2010 Baseline (EOS)	2018 DoD Progress (EOS)	2010 Baseline (EOT)	2018 DoD Progress (EOT)
Virginia	102,361	84,799	91,314	81,888

Table 7: DoD TSS Loads (in lbs/year)

Jurisdiction	2010 Baseline (EOS)	2018 DoD Progress (EOS)	2010 Baseline (EOT)	2018 DoD Progress (EOT)
Virginia	169,480,062	163,129,654	189,069,536	187,371,849

Developing the 2010 DoD Baseline and 2018 Progress TN, TP, and TSS loads allowed DoD to determine the changes in TN, TP, and TSS loads (i.e. reductions/increases) at the EOS and EOT in pounds per year between 2010 and 2018 on DoD installations in Virginia (Table 6). Between 2010 and 2018, loads decreased for TN, TP, and TSS at both the EOS and EOT.

Table 6: DoD Change in Load (in lbs/year EOS and EOT) between 2010 and 2018

Jurisdiction: Virginia	TN	TP	TSS
EOS	↓8,826	↓17,562	↓6,350,408
EOT	↓7,658	↓9,426	↓1,697,687

DoD owns and operates three wastewater treatment plants in Virginia that discharge to the Chesapeake Bay; one is located at NSF Dahlgren and two are located at USMC Base Quantico. The load source is not tracked by EPA in the model for DoD or any other federal agency owned wastewater treatment plant. However, point source data is provided by EPA and DoD is able to track our reductions from wastewater treatment plants. Since 1984, DoD has reduced TN, TP and TSS loads from wastewater treatment plants in Virginia by 88%, 81%, and 95%, respectively. The reductions also demonstrate the significant investments that were made by DoD to address these loads via enhanced nutrient removal technologies. Figure 1 provides the watershed-wide total load TN, TP and TSS reductions for all DoD owned WWTPs.

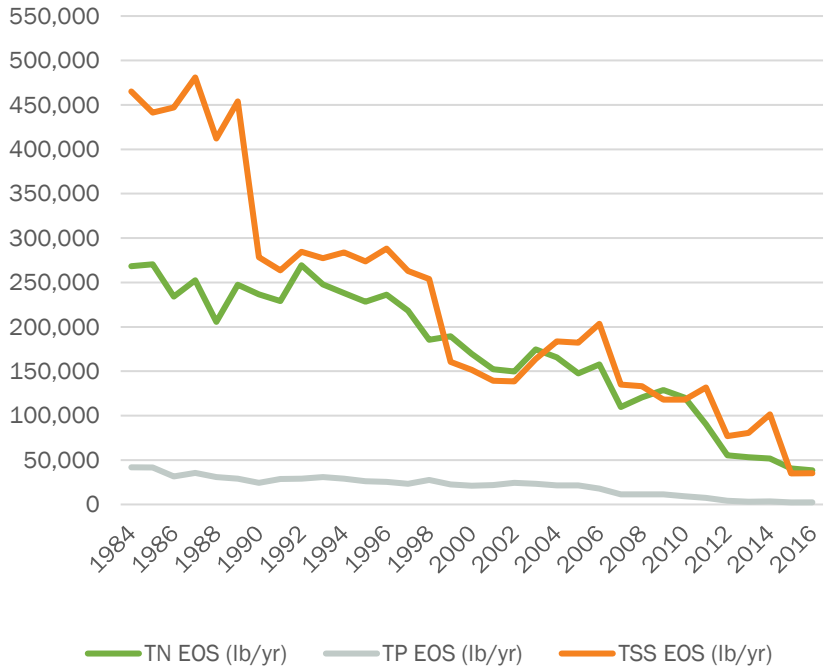

Figure 1: Total Loads from DoD WWTPs at EOS from 1984 to 2016 in Maryland, Virginia, and Pennsylvania

While it is difficult for DoD installations to predict future mission requirements, estimates of anticipated growth through year 2025 were reported by installations during the FY18 CBP datacall and are represented in Table 7 below. The majority of new development and redevelopment is anticipated to take place at five installations: Naval Weapon Station Yorktown, Fort A.P. Hill, Fort Belvoir, Fort Lee, and Arlington National Cemetery with smaller increases at Joint Base Langley-Eustis, Naval Station Norfolk, and JEB Little Creek-Fort Story. However, it should be noted that if DoD mission needs change, revisions to future construction may be needed within Virginia. Nevertheless, based on DoD policies, programs, and strategies identified in Section 4, redevelopment will not result in any additional runoff or pollutant loading to the Chesapeake Bay.

Table 7: DoD Estimates of Anticipated Growth Through 2025 (acres) in Virginia

Installation	2018 New Development	2018 Redevelopment	New Development Through 2025	Redevelopment Through 2025
99th RSC (VA)	0.0	0.0	0.0	0.0
Arlington National Cemetery	36.0	2.0	0.0	50.0
Army Reserve National Guard (VA)	0.0	0.0	0.0	0.0
Camp Peary	0.0	0.0	0.0	0.0
Defense Supply Center Richmond	2.3	39.9	7.0	25.0
Fort A.P. Hill	11.9	0.0	258.0	0.0
Fort Belvoir	128.7	71.7	65.0	95.0
Fort Lee	19.9	17.4	50.0	30.0
Joint Base Langley-Eustis (Eustis)	0.0	0.0	25.0	0.0
Joint Base Langley-Eustis (Langley)	2.2	0.0	15.0	0.0
Joint Base Myer - Henderson Hall	0.0	0.0	5.7	0.0
Joint Expeditionary Base Little Creek - Fort Story	16.5	1.4	20.7	31.0
NAS Oceana	0.0	202.8	2.0	1.0
Naval Station Norfolk	1.5	11.5	25.0	130.0
NSA Hampton Roads	0.0	8.1	0.0	25.0
NSA Norfolk Naval Shipyard (MIDLANT)	0.0	0.0	0.0	0.0
NSA Norfolk Naval Shipyard (NAVSEA)	0.0	0.0	0.0	0.0
NSA South Potomac - Dahlgren	2.2	0.0	3.1	4.0
NSA Washington - NSF Arlington	0.0	0.0	0.0	0.0
NWS Yorktown	48.0	0.0	250.0	73.0
Pentagon	0.0	6.7	0.0	15.0
USMC Base Quantico	80.0	8.0	0.0	0.0
Total	**349.2**	**369.5**	**726.4**	**479.0**

Section 3. Verified Records of the Existing BMPs that have been Implemented and Maintained through 2017

Installations are responsible for ensuring stormwater best management practices are inspected and maintained according to design standards and permit requirements. Virginia Administrative Code (VAC) under 9VAC25-890 provides the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s). Part I E 5 b (2) of this MS4 General Permit requires that permittees inspect stormwater BMPs no less than once per year. An alternative schedule is authorized provided that it is included with the rationale in their MS4 program plan; the alternative inspection frequency is not less than once per five years. Maintenance requirements differ based on the type of

BMP, but is typically performed via contract based on available funding for hydrodynamic structures or when inspections note BMP failure.

Each year, the DoD collects BMP records from installations. Those records are then consolidated and reported to the jurisdiction by the DoD Chesapeake Bay Program (DoD CBP).

As part of DoD's overall reporting framework, which strives to improve the data quality reported by installations, DoD integrated verification into their FY2018 Annual BMP datacall. DoD flagged specific BMPs within the historical record on (1) their inspection and maintenance status and (2) if a BMP was not installed or had not been inspected in the past five years. Installations were expected to update BMP information with inspection dates, inspection status, and maintenance performed.

In 2019, DoD will be developing a BMP crediting report that highlights those BMPs that lost credit due to missing inspection and/or maintenance information. The report will be used to communicate with the installations and leadership the long term consequences that translates into annual nutrient and sediment reductions that DoD cannot get credit for as a result of not providing the required maintenance information or not performing the appropriate maintenance. DoD's intent is to ensure long term credit in the model and acknowledges the importance of proper BMP operations and maintenance. Throughout 2019, DoD will be evaluating the best methods to ensure long term funding of BMP maintenance.

Section 4. Description of Existing Programs, Policies, and Strategies (with examples) Used to Drive BMP Implementation

There are several existing policies and programs that, since their promulgation, have provided the necessary drivers for DoD to fund projects and ultimately drive stormwater BMP implementation. The following provides those existing polices internal and external to DoD.

4.1 Compliance with the Clean Water Act (CWA): Discharges from MS4s are regulated under the Virginia Stormwater Management Act and the Virginia Stormwater Management Program. Fourteen installations are covered by the General Permit for Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems. As part of permit compliance, installations develop stormwater management programs that improve water quality and control the discharge of pollutants through six minimum control measures. In relation to the Chesapeake Bay TMDL and the necessary reductions of TN, TP, and TSS, Virginia included a strategy in their Phase II Watershed Implementation Plan to utilize enforceable MS4 permit language requiring MS4 permitees to develop, implement and maintain Chesapeake Bay Watershed Action Plans that are consistent with the WIP strategy. According to the Phase II WIP and the reductions for MS4s, a Level 2 scoping reduction (equivalent to 9% TN, 16% TP, and 20% TSS) would be utilized to implement BMPs on existing developed lands. Installations with MS4s have been given three permit cycles to implement these reductions. The first permit cycle called for an additional five percent load reduction on existing developed lands to be met by the end of 2018. As part of the second cycle of permit coverage, installations with MS4s had to provide a schedule of implementation to 35% (40% total from permit cycle 1 and 2). MS4 installations are currently operating within cycle 2 where permit coverage began on November 1, 2018 and will expire on October 31, 2023. As part of the reapplication for the third cycle of permit coverage, MS4

installations will be providing a schedule that meets the remaining 60% reductions (100% total) by 2028.

In addition, several DoD installations without MS4 permits are covered by permits that regulate stormwater discharges associated with industrial activities. Those permits also include conditions that require installations to perform monitoring of TN, TP, and TSS to determine if a Chesapeake Bay TMDL Action Plan would be required for controlling the discharge of those pollutants and implementing BMPs. Currently, there are sixteen installations that are covered by industrial stormwater permits. Therefore, most if not all installations within Virginia are completing restoration activities for nutrients and sediment loads delivered to the Chesapeake Bay or have determined that restoration is not necessary from results of monitoring data collected from industrial outfalls. NAS Oceana, Naval Station Norfolk, and Joint Expeditionary Base-Little Creek hold industrial stormwater permits and also are covered by the General MS4 Permit. Since each installation is covered entirely by their MS4 permits, they will be meeting the nutrient and sediment reduction requirements for the CB TMDL and preparing Action Plans via MS4 permit requirements.

4.2 Compliance with Virginia's Stormwater Management regulations governing development and re-development requirements: Installations or contractors performing the construction activities obtain construction general permits to manage stormwater associated with the construction activity when total land disturbance of one or more acres will occur. Compliance with those permits includes erosion and sediment control, stormwater management plans, water quality standards/TMDLs, self-monitoring/inspections and record keeping.

4.3 2014 Chesapeake Bay Watershed Agreement: DoD was one of the first federal agencies to become formally involved in the Chesapeake Bay restoration effort in 1984, and in 1990 we further strengthened our participation and role by linking DoD environmental initiatives to the EPA's Chesapeake Bay Program. The latest Chesapeake Bay Watershed Agreement, signed in 2014, identifies specific Goals and Outcomes for restoration of the Chesapeake Bay. As an engaged partner towards Clean Water, DoD committed to the 2017/2025 WIP Outcome as a participating agency. In addition, the DoD monitors, assesses, and reports on installation efforts that enhance abundant life, conserve lands, and engage communities.

4.4 Local Area Planning Goals/Federal Agency Planning Goals: By definition, local planning goals "are not finer scale waste load and load allocations in the Bay TMDL, but when added together are expected to equal the relevant state-basin TMDL allocation caps."[35] DoD received numeric TN and TP local area planning goals for all installations located in Virginia. In addition, there were several programmatic requirements included with the goals including:

[35] Protocol for Setting Targets, Planning BMPs and Reporting Progress for Federal Facilities and Lands (2015)

- Meet all regulatory requirements (MS4, Industrial Stormwater, Wastewater, Erosion and Sediment Control, Post-Construction Stormwater, Chesapeake Bay Preservation Act);
- Reduce loads from all agency owned lands managed for agricultural use (45% Nitrogen and Phosphorus reduction goal from 2017 levels);
- Reduce loads from all onsite systems (septic and alternative onsite systems) on federal agency owned lands (6% Nitrogen reduction goal from 2017 levels);
- Ensure that any forest harvesting is accompanied by implementation of the full suite of silviculture water quality practices;
- Account for and offset any load changes resulting from changes in land use through time on Federal lands; and
- Account for and offset the federal agencies' share of load changes resulting from climate change. This will be quantified by the Bay Program by 2021. The current estimate for all of Virginia is 1.7 million pounds of nitrogen.

Because the DoD planning, programming, budgeting, and execution (PPBE) process can be long and cumbersome, early indications of future requirements can help secure future funding. Identification of local planning goals that are applied equitably across all entities in the watershed assists DoD, other federal agencies, local governments, and businesses in planning for actual, future requirements. Having local planning goals identified is a good first step in the PPBE cycle since DoD requires actual requirements to assure funding to meet our obligations and supports Virginia in meeting their Phase III WIP Planning Target.

It is important to understand that in terms of regulatory compliance, DoD must ultimately be treated in the same manner (i.e. load calculations and pollutant target reductions) and to the same extent (i.e. implementation schedule) as any other entity. Therefore, DoD continues to follow a strategic approach that emphasizes compliance with CWA and other permit requirements along with reduction of nutrient and sediment from non-permitted sources as funds are made available.

4.5 2009 Executive Order (EO) 13508 / 2010 EO 13508 Strategy: In accordance with EO 13508, the federal government should lead the effort to restore and protect the Chesapeake Bay. DoD continues to demonstrate our commitment to this effort in accordance with the EO and accompanying strategy. Since their release, the DoD has conducted installation-wide BMP inventories or conducted surveys or BMP Opportunity Assessments to determine potential locations for additional stormwater retrofits on developed land that have little to no stormwater management. These assessments identify ways to strengthen and manage stormwater including structural and non-structural BMPs, erosion control, and infrastructure maintenance and repair opportunities.

4.6 Unified Facilities Criteria (UFC) 3-210-10: The UFC provides technical criteria, technical requirements, and references for the planning, design and construction, renovation, repair, maintenance and operation, and equipment installation in new and existing facilities in support of DoD policy goals, including compliance with stormwater requirements under Section 438 of the Energy Independence and Security Act (EISA) enacted in December 2007 and the Deputy Under Secretary of Defense DoD policy on implementation of stormwater requirements under EISA Section 438.

4.7 Section 438 of the Energy Independence and Security Act (EISA) of 2007: EISA Section 438 addresses stormwater runoff requirements for federal development projects. EISA Section 438 requires that the sponsor of any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow. The Deputy Under Secretary of Defense (Installations and Environment) Memorandum of 19 January 2010 directs DoD components to implement EISA 438 using Low Impact Development (LID) techniques. Individual Services may have more stringent implementation and applicability requirements relating to LID.

4.8 Implementation of the Navy's Low Impact Development Policy: Navy installations continue to implement the LID Policy for Stormwater Management. Low Impact Development (LID) minimizes the impact of development by mimicking pre-development runoff hydrology. It uses site planning and Integrated Management Practices (IMPs) to store, infiltrate, evaporate, and detain runoff to restore pre-development infiltration rates. Practicing LID helps DoD installations by recharging groundwater supply, reducing runoff volume and the potential for flooding, improving water quality by reducing pollutant loads, and reducing the impacts from pollution on aquatic habitat and wildlife. The DoD Unified Facilities Criteria (UFC 3-210-10) provides for planning, design, construction, sustainment, restoration, and modernization criteria consistent with LID.

4.9 EO 13834 Efficient Federal Operations: Under Executive Order 13834, federal agencies are directed to prioritize actions that reduce waste, cut costs, enhance the resilience of federal infrastructure and operations, and enable more effective accomplishment of its mission. In implementing policy, federal agencies must meet several goals, which are based on statutory requirements, in a cost-effective manner including reduce potable and non-potable water consumption and comply with stormwater management requirements. As federal agencies work toward meeting the full range of sustainability goals, the Chesapeake Bay watershed will benefit. DoD continues to develop an annual Sustainability Report and Implementation Plan, which includes implementation status, operational issues, and strategies to advance its mission through resilient infrastructure and business practices that improve performance and affordability.

4.10 Army Policy for Sustainable Design and Development (SSD): The Army Sustainable Design and Development Policy builds on the Army's long-standing energy efficiency and sustainability practices with the goal of increasing the resiliency of its facilities and installations, enhance mission effectiveness, reduce the Army's environmental footprint, and achieve levels of energy independence that enhance continuity of mission-essential operations. The policy applies to all infrastructure planning, design, sustainment, restoration, modernization, and construction on Army installations. Accordingly, the Army will plan, design, build, maintain and operate facilities to achieve the highest-performing sustainable design that is life-cycle cost-effective. Construction activities will be planned programmed, budgeted, designed, built, maintained, and operated to

comply with Energy Policy Act of 2005, EISA 2007, and EO 13834 and conform to the Guiding Principles for Federal Sustainable Buildings as detailed in the Policy. The following Policy requirements address water quality issues in the WIP:

- Siting and Site Development: Compact development, in-fill, minimal building footprints and spacing, and greater residential densities will be applied to achieve optimal densities. These practices will also help minimize or reduce impervious surface area and the potential for resulting polluting runoff.
- Stormwater Management. Site development for all projects of 5,000 square feet or greater shall retain the pre-development site hydrology in accordance with EISA 2007 Section 438 and UFC 3-210-10. These projects must be planned, designed, and constructed to manage any increase in storm water runoff (i.e., the difference between pre- and post-project runoff) within the limit of disturbance. Projects will maximize the use of existing site topography including soils, flora, slope, and hydrology to minimize site disturbance including clearing and soil grubbing activities. Documentation of the project's compliance with EISA 438 will be maintained in the project file and will be reported via the chain of command for annual SSPP reporting.
- Water Use: The overall goal is to identify and implement water reuse strategies to use water efficiently including the use of alternative water sources (e.g. rainwater, reclaimed water, greywater, etc.). All projects will use water-efficient landscape strategies that achieve a minimum of 50% water reduction. To further reduce outdoor water use, native plant species and dry-scape architectural alternatives will also be considered. Irrigation will not be used except where specifically required by Army policy or during the initial plant establishment phase. Projects that require irrigation will use alternative water in place of potable water.
- Planning, Design and Construction: All new construction vertical projects and comprehensive building renovations meeting the thresholds in UFC 1-200-02 Table 1-1 will be certified at the Leadership in Energy and Environmental Design (LEED) for Building Design and construction Silver level at a minimum.

4.11 Leadership in Energy and Environmental Design (LEED): LEED is an internationally recognized green building certification system developed by the U.S. Green Building Council. It promotes a whole building sustainability approach through energy savings, water efficiency, materials management, and air emissions. With regard to stormwater management, LEED addresses stormwater quality and quantity and increased water efficiency. For DoD, new construction vertical projects and comprehensive building renovations that meet specific thresholds must be certified at the LEED for Building Design and Construction (LEED-BD+C) Silver level at a minimum.

4.12 Sikes Act: DoD installations with significant natural resources are required by the Sikes Act to develop and implement Integrated Natural Resource Management Plans (INRMPs). They integrate military mission requirements, environmental and master planning documents, cultural resources, and outdoor recreation to ensure both military operations and natural resources conservation are included and consistent with stewardship and legal requirements. INRMPs require installations to

look holistically at natural resources on a landscape or ecosystem basis. They are living documents that provide direction for daily natural resources management activities and they provide a foundation for sustaining military readiness. They describe how to manage natural resources, allow for multipurpose uses of those resources, and define public access—all while ensuring no net loss in the capability of an installation to support its military testing and training mission. Although variations exist among the different Military Services, a basic INRMP includes:

- A description of the installation, its history, and its current mission;
- Management goals and associated timeframes;
- Projects to be implemented and estimated costs;
- A discussion of how the military mission and training requirements are supported while protecting the environment;
- Natural resources' biological needs and legal requirements;
- The role of the installation's natural resources in the context of the surrounding ecosystem; and
- Input from the U.S. Fish & Wildlife Service (USFWS), state fish and wildlife agency, and the general public.

To address installation requirements and regional issues, INRMPs involve appropriate stakeholders, thereby providing for more efficient and effective management of natural resources on a landscape-scale basis, all while ensuring that military readiness is sustained.

INRMPs propose projects to address natural resources, but many of those projects also provide a water quality co-benefit (wetland restoration, tree planting, riparian buffer enhancement, etc.). Projects with water quality co-benefits will be considered for meeting additional TN, TP and TSS reductions and tracked and reported to the jurisdictions for BMP credit in the Bay Model.

Section 5. Inventory of National Pollution Discharge Elimination (NPDES) Permits

Table 8 provides a summary of the types of NPDES permits located on DoD Installations in Virginia that discharge to the Chesapeake Bay.

Table 8: Types of NPDES Permit Coverage located on DoD Installations in Virginia

Installation	MS4	Industrial	WWTP	2018 Construction
99th RSC (VA)	N	N	N	N
Arlington National Cemetery	Y	N	N	Y
Army Reserve National Guard (VA)	N	N	N	N
Camp Peary	N	N	N	N
Defense Supply Center Richmond	Y	Y	N	Y
Fort A.P. Hill	N	Y	N	Y
Fort Belvoir	Y	Y	N	Y
Fort Lee	Y	Y	N	Y
Joint Base Langley-Eustis (Eustis)	Y	Y	N	Y
Joint Base Langley-Eustis (Langley)	Y	Y	N	Y
Joint Base Myer - Henderson Hall	Y	Y	N	N
Joint Expeditionary Base Little Creek - Fort Story	Y	Y	N	Y
NAS Oceana	Y	Y	N	Y
Naval Station Norfolk	Y	Y	N	Y
NSA Hampton Roads	Y	Y	N	Y
NSA Norfolk Naval Shipyard (MIDLANT)	Y	Y	N	N
NSA Norfolk Naval Shipyard (NAVSEA)	N	Y	N	N
NSA South Potomac - Dahlgren	N	Y	Y	Y
NSA Washington - NSF Arlington	N	N	N	N
NWS Yorktown	N	Y	N	Y
Pentagon	Y	Y	N	Y
USMC Base Quantico	Y	Y	Y	Y

Section 6. Description of Facility's Stormwater Management Program including, but not limited to, Municipal Separate Storm Sewer System (MS4) Permit Requirements, if applicable

As mentioned above in Table 8, most major installations located in the Virginia are covered by the MS4 General Permit No. VAR04. DoD complies with regulations governing stormwater management as required by the CWA. In relation to the Chesapeake Bay TMDL, installations with MS4 permits all developed TMDL actions plans that address required nitrogen, phosphorus and sediment action plans. These plans were submitted and approved by DEQ and outlines the path forward for each installation with the MS4 through 2023.

Section 7. Planned Pollutant Reductions from Point and Non-Point Sources Associated with Federal Lands and Facilities that meet the Federal Facility's Share of a Local Planning Goals (as agreed to with the jurisdiction) and Address any Anticipated Growth

In 2019, the DoD funded a follow on analysis that included input from installations and what they estimated for planned implementation through 2025. The following information is provided to demonstrate the TN and TP loads expected through 2025 and a comparison to the DoD Federal Agency Planning Goals issued by Virginia in Tables 9 and 10. The reductions also incorporate recent verification measures that ensure inspections and maintenance are being performed. Some BMPs within the 2018 DoD Progress scenario did not pass verification protocols and were not included in the scenarios to calculate reductions through 2025.

Table 9: DoD TN Load Reductions (in lbs/year EOT) between 2018 and 2025 – DoD Progress and 2025 Planned Implementation Scenarios

Jurisdiction	DoD Federal Planning Goal[36]	2025 Planned Implementation Scenario	Remaining Reductions
Virginia	482,641	526,004	43,363

Table 10: DoD TP Load Reductions (in lbs/year EOT) between 2018 and 2025 - DoD Progress and 2025 Planned Implementation Scenarios

Jurisdiction	DoD Federal Planning Goal	2025 Planned Implementation Scenario	Remaining Reductions
Virginia	79,227	81,700	2,473

DoD estimates of anticipated growth through year 2025 were reported by installations during the FY18 CBP datacall and are represented in Table 7 (see Section 3.0). The majority of new development and redevelopment is anticipated to take place at five installations: Naval Weapon Station Yorktown, Fort A.P. Hill, Fort Belvoir, Fort Lee, and Arlington National Cemetery with smaller increases at Joint Base Langley-Eustis, Naval Station Norfolk, and JEB Little Creek-Fort Story. Based on the DoD programs, policies, and strategies already in place (see Section 4.0), new development and redevelopment is not anticipated to result in any increases in polluted runoff.

Section 8. BMP Implementation Scenarios to Reduce Nitrogen, Phosphorus and Sediment to Reach the New Facility-Specific Targets, Consistent with the [Clean Water Act] CWA

As mentioned above, the 2025 Planning Implementation is a result of data collected by DoD from the installations on estimated BMPs to be installed. DoD developed scenarios in CAST and shared them on June 14, 2019. Those scenarios included the estimated implementation plus implementation that would be necessary to fill the gaps between future progress and the DoD Federal Agency Planning Goal. The fill gap scenario is a hypothetical scenario based on best professional judgement.

Tables 11 and 12 provide the DoD TN and TP load reductions between 2018 and 2025; including the fill gap scenario loads and remaining reductions. Remaining reductions in green parenthesis are negative values that indicate the 2025 implementation plan meets the DoD Federal Planning Goal.

[36] The numeric DoD Federal Planning Goal issued by Virginia only included the non-regulated developed and natural portions of DoD installations. In order to understand the total reductions necessary for all lands owned by DoD, the regulated developed and natural portions were also added to the total federal planning goal. This allows all implementation to be tracked and verified more consistently across the enterprise.

Table 11: DoD TN Load Reductions (in lbs/year EOT) between 2018 and 2025 - DoD 2018 Progress, 2025 Planned Implementation, and 2025 Fill Gap Scenarios

Jurisdiction	DoD Federal Planning Goal	DoD 2018 Progress Scenario	2025 Planned Implementation Scenario	2025 Fill Gap Scenario	Remaining Reductions
Virginia	482,641	524,595	526,004	480,990	(1,651)

Table 12: DoD TP Load Reductions (in lbs/year EOT) between 2018 and 2025 - DoD 2018 Progress, 2025 Planned Implementation, and 2025 Fill Gap Scenarios

Jurisdiction	DoD Federal Planning Goal	DoD 2018 Progress Scenario	2025 Planned Implementation Scenario	2025 Fill Gap Scenario	Remaining Reductions
Virginia	79,227	81,888	81,700	76,090	(3,137)

The DoD approach to fill gaps including applying:

- All previously submitted DoD implemented BMPs from SY 1985 through 2025 Credited, Expired, and Planned
- Urban nutrient management
- Street Sweeping
- Stream/shoreline restoration
- Tree Planting
- Runoff Reduction BMPs

The following graphs provide a visual representation of the current progress (existing), planned, and the fill gap implementation for Virginia.

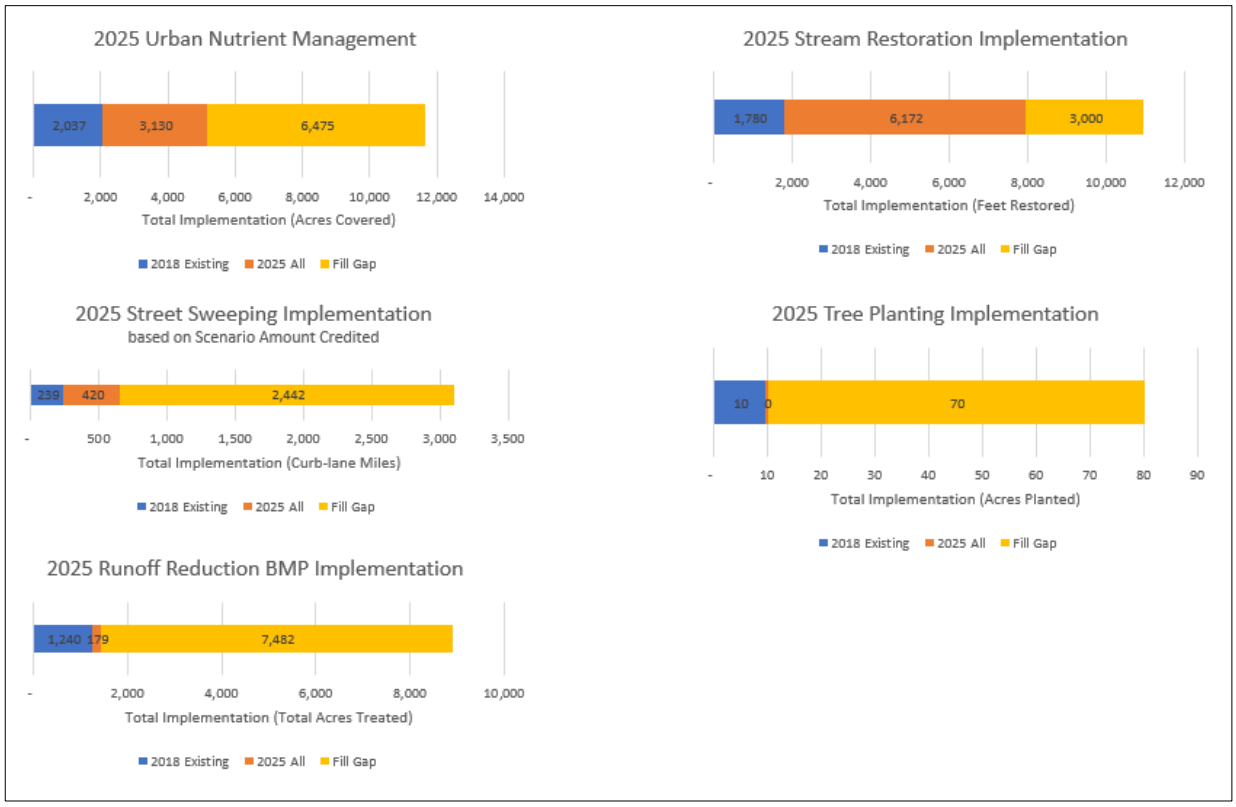

Figure 2: Current progress (existing), planned, and the fill gap implementation for Virginia

As mentioned in prior sections, the DoD local area planning goal is a good first step in the budget process. DoD will make every effort to request and obtain the funding necessary for implementing projects, but changes in mission or budget constraints would mean a project or series of projects may not be executed as planned. The DoD may not be held responsible for failing to implement BMPs that are not required by law.

Section 9. Planned Actions, Programs, Policies, and Resources Necessary Through 2025 to Reduce Nitrogen, Phosphorus, and Sediment Pollutant Loads Associated with Federal Lands and Facilities with Specific Target Dates

Achieving 2025 load targets will require the DoD to account for historical effort (progress through 2018), currently planned effort (2019 planned BMPs), and some remaining effort. Based on DoD data provided by installations in 2018 that requested implementation through 2025, the DoD Chesapeake Bay Program developed a scenario that included those planned BMPs. DoD also developed a "fill gap scenario" of BMPs that may be feasibly implemented on DoD installations based on the level of effort to reduce the remaining TN and TP loads. The scenarios are non-binding and intended for planning purposes only and presented in Section 8.

In addition to the programs already mentioned, while DoD is on track to meet 2025 goals, the following conclusions were gleaned from an initial effort conducted by DoD that generated a hypothetical 2025 scenario to meet 2025 targets that were established by EPA in 2015:

- Continuously improve DoD's historical and current BMP implementation record: ensuring all criteria are populated, providing verification information, filling general data gaps, and reporting annual BMPs such as urban nutrient management;
- Track crediting and communicate errors so that the Partnership's scenarios can be used by DoD without having to generate a separate scenario;
- Get BMPs that were removed from credit as a result of verification back in as soon as feasible;
- Have installations focus on BMPs that reduce TN where a greater effort is needed since TN is the limiting pollutant in meeting reduction goals;
- Implement run-off reduction practices. Many installations are already considering these through development and redevelopment projects;
- Consider older BMPs and identify possibilities for enhancements for added TN, TP and TSS reduction benefits;
- Consider projects listed in INRMPs that have water quality co-benefits for TN, TP and TSS load reductions such as stream/shoreline restoration or wetland creation;
- Through stewardship activities increase the number of trees planted or other land use change BMPs;
- Engage post Phase III WIP development to ensure there is an understanding of changes to the level of effort as a result of climate change inputs and updates to the Bay Model;
- Local TMLDs: Several installations within Virginia are also covered by permits that include local TMDLs that address local water quality impairments. DoD will consider nutrients and sediment when implementing stormwater pollution control devices to meet these local TMDLs that do not directly correlate with TN, TP and TSS reductions.

Section 10. Description of Plans to Address Any Gaps in Achieving the Pollutant Reduction Goals

The gap to address nonregulated loads is a challenge, but many of the planned strategies help to fill those gaps. Installations have performed BMP opportunity assessments to identify new opportunities for BMPs and are looking to enhance those assessments to identify more innovative practices available for retrofit. The DoD performed an internal Midpoint Assessment and it will be used to accurately quantify the gap in Virginia. In addition to projects in the hypothetical 2025 DoD Implementation Plan with high TN removal efficiencies, the DoD will look at proposed INRMP natural resource projects with water quality co-benefits and how other DoD programs can contribute to water quality goals/requirements. Additional load reductions to address climate impacts will be incorporated when estimates of their effects are known.

Section 11. Procedure for Tracking, Verifying and Annually Reporting BMPS to the Jurisdiction (Copy to EPA) in a Manner that is Consistent with the Jurisdiction's Procedures

DoD continues to lead by example through their continued methods that track, verify and report BMPs implemented on their installations. Our process integrates procedures established by the Jurisdictions, including the development of templates for all federal agencies to use. Each year, the DoD issues a support contract to facilitate the development of templates for reporting BMP implementation. The

templates are developed in coordination with each of the jurisdictions and EPA to ensure the latest information for each BMP is collected and compatible with Phase 6 model data needs. Templates are then issued to the installations to provide responses. DoD reviews and then submits a consolidated DoD BMP progress dataset in the format requested by the jurisdiction by 1 October each year. Installations also provide project data that support other aspects of the Chesapeake Bay restoration and protection effort. Over several years, the DoD has evaluated those projects to see if there was a potential to receive additional nutrient and sediment reductions. If projects are identified to have those water quality co-benefits the DoD consolidates and provides a supplemental dataset to the appropriate jurisdiction by 1 November.

DoD installations follow the inspection and maintenance requirements established by Virginia. As part of the verification procedures, the DoD integrated process controls in their reporting template to highlight specific BMPs that needed inspection, status, and maintenance information for the installation to populate in order for that BMP to continue to receive nutrient and sediment reduction credit. If the verification information was not populated for that BMP it was removed from the submittal to the Jurisdiction and did not receive credit.

Section 12. A description for how the Federal Facilities are going to Verify BMPs that is consistent with the CBP Partnership's Basinwide BMP Verification Framework and the Partnership Approved and Published BMP Verification Protocols

Installations are responsible for ensuring stormwater best management practices are inspected and maintained according to design standards and permit requirements. Virginia Administrative Code (VAC) under 9VAC25-890 provides the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s). Part I E 5 b (2) of this MS4 General Permit requires that permittees inspect stormwater BMPs no less than once per year. An alternative schedule is authorized provided that it is included with the rationale in their MS4 program plan; the alternative inspection frequency is not less than once per five years. Maintenance is performed via contract based on available funding for hydrodynamic structures or when inspections note BMP failure.

Section 13. Process for Assessing Implementation Progress and Adapting Management Actions to Continually Improve the Implementation of Practices to Reduce Nitrogen, Phosphorus, and Sediment Loads

In 2017, DoD conducted, the first of its kind among Federal departments, an evaluation of progress at the 2017 Midpoint via Phase 6 CAST using data collected annually from installations. The initiative included reviewing and developing scenarios that captured:

- What installations had already installed in the ground (i.e. historical implementation);
- Planned 2018 and 2019 implementation as part of DoD's numeric two-year water quality milestones; and
- Estimates of 2025 implementation that would be needed to fill gaps towards meeting federal facility goals that were based on the 2015 *Protocol for Setting Targets, Planning BMPs and Reporting Progress for Federal Facilities and Lands*.

This project established baseline scenarios and an overall framework and methodology in order for DoD to utilize lessons learned and support Phase III WIP development and implementation.

In 2018, DoD continued to fund this effort and requested information from installations on implementation planned through 2025. This information was used to build on the scenarios that have already been developed for DoD via CAST including the new DoD 2018 Progress Scenario, DoD 2020-2025 Planned Implementation Scenario, and 2020-2025 DoD Fill Gap Scenario that would meet new federal agency planning goals.

DoD has acknowledged and recognized the value of this effort and will prioritize to ensure funding remains in place to evaluate our progress, track two year periods and develop an appropriate level of implementation as we move towards 2025.

Section 14. Challenges

DoD installation project funds that are needed to reduce loading is contingent upon authorization and appropriation of funds in accordance with appropriate statutes. The DoD will be competing for funding against all other federal entities and there is no guarantee that funding will be available. The DoD will make every effort to obtain necessary funding, but changes in priorities or budget constraints would mean a project or projects may not be executed as planned. As some installations are highly developed, space for new on-the-ground BMPs can be extremely limited. The DoD will look to programmatic BMPs to achieve pollutant reductions in these cases. Securing long term sustainable BMP maintenance funding to safeguard our investments based is a challenge that we are working through.

U.S. Fish and Wildlife Service: Chesapeake Bay TMDL Phase III WIP Narrative

The U.S. Fish and Wildlife Service strives to meet the requirements of environmental policies and programs. These include the Clean Water Act, Executive Order 13508, Section 438 of the Energy Independence and Security Act (EISA) of 2007, as well as state and local policies. Some specific activities of the U.S. Fish and Wildlife Service are shown in the following paragraphs for the four states in the Chesapeake Bay watershed where U.S. Fish and Wildlife Service facilities are located. These four states are Maryland, Pennsylvania, Virginia and West Virginia. The U.S. Fish and Wildlife Service previously completed numerous actions that reduce nitrogen, phosphorus and sediment in the Chesapeake Bay. More actions are planned. Additionally, much of this work directly benefits fish, wildlife and plants and their habitats.

Virginia

U.S. Fish and Wildlife Service stations in the Chesapeake Bay watershed in Virginia are Eastern Shore of Virginia National Wildlife Refuge, Featherstone National Wildlife Refuge, Fisherman Island National Wildlife Refuge, Great Dismal Swamp National Wildlife Refuge, James River National Wildlife Refuge, Martin National Wildlife Refuge, Mason Neck National Wildlife Refuge, Nansemond National Wildlife Refuge, Occoquan Bay National Wildlife Refuge, Plum Tree Island National Wildlife Refuge, Presquile National Wildlife Refuge, Rappahannock River Valley National Wildlife Refuge, and Harrison Lake National Fish Hatchery. The U.S. Fish and Wildlife Service's county locations in Virginia include Northampton County, Chesapeake County, Suffolk County, Prince George County, Fairfax County, Prince William County, Poquoson County, Chesterfield County, Caroline County, Essex County, King George County, Richmond County, and Charles City County. There are about 24,835 acres of land at U.S. Fish and Wildlife Service stations in the Chesapeake Bay watershed in Virginia.

The U.S. Fish and Wildlife Service plans to continue good maintenance practices and to enhance wildlife habitat further. Projects in Virginia may include forest conservation, streamside forest buffers, and completion of conservation plans. Additional water control structures are planned to further slow drainage in the swamps at Great Dismal Swamp National Wildlife Refuge. There may be a study of the extent of the phosphorous, nitrogen and sediment release reductions from Great Dismal Swamp National Wildlife Refuge.

Past BMP project example: Great Dismal Swamp National Wildlife Refuge installed two new weirs that increased water levels, in 4,000 acres of Chesapeake Bay watershed wetlands on the Refuge, to their highest levels in 60 years. The $1.4 million project concluded in 2013. The resulting improved management of water levels slows the release of mercury, nutrients and sediment from the swamp. The project helped reverse the effects of swamp drainage from logging in the 18th and 19th centuries.

U.S. Forestry Service George Washington and Jefferson National Forests: Chesapeake Bay Watershed Implementation Plan Narrative

The following narrative is for the consideration of the Virginia Department of Environmental Quality to complement their Phase III Watershed Implementation Plan for the Chesapeake Total Maximum Daily Load or TMDL.

Contents Outline:

1. Authorities

The USDA Forest Service manages 1.2 million acres in the Chesapeake Bay watershed —the most of any federal agency. According to the Clean Water Act, all federal agencies that own or manage property in the Chesapeake Bay watershed are required to:

–participate in regional and sub-watershed planning and restoration programs (section 117(f)(1))

–ensure that the property, and actions taken by the agency with respect to the property, comply with the Chesapeake Bay Agreement and any subsequent agreements and plans (section 117(f)(2)).

Furthermore, the 2014 Chesapeake Bay Watershed Agreement, which was signed by EPA on behalf of the federal agencies, contains water quality goals and outcomes that directly relate to the jurisdictions' WIPs. And the Chesapeake Executive Order (13508) Strategy sets out that "Federal agencies with property in the watershed will provide leadership and will work with the Bay jurisdictions in the development of their Watershed Implementation Plans."

2. About the National Forest

The George Washington and Jefferson National Forests (GWJ NF) have about 1.1 million acres in the Chesapeake Bay watershed (100,000 acres of the Monongahela National Forest is also in the Bay watershed). All National Forests are managed for the benefit of natural resources –especially clean water-

-while providing for recreation and timber. Careful management of this federal resource is overseen by a team of local natural resource specialists.

Some significant points about the GWJNF:

- Contains the headwaters of the Potomac and James Rivers.
- Provides a diversity of recreation opportunities for approximately 10.5 million people who live within 75 miles from the Forest, including some of the most extensive remote backcountry recreation opportunities east of the Mississippi River.
- Has one of the largest blocks of forested lands under federal management in the eastern U.S.
- Manages habitat for a wide variety of species to meet long-term objectives.
- Provides timber with a total standing volume of about 0.5 billion cubic feet (bcf) and growth estimated at 0.03 bcf per year.
- Provides an important component for biological diversity in the landscape of the eastern U.S.
- Surrounds the Shenandoah Valley, which holds much of this nation's history. Native Americans lived and hunted this valley for several thousand years.

3. Phase III Targets

Phase III of the TMDL (2019-2025) carries certain expectations for the GWJNF including:

• **Annual Progress Reporting:** Federal agencies are expected to report annual BMP progress to the jurisdictions (copy EPA) using tools provided by the jurisdictions that are compatible with requirements for the National Environmental Information Exchange Network (NEIEN). The reporting generally happens in October or November.

• **Water Quality Two-Year Milestones:** Federal agencies are expected to develop two-year programmatic (actions, programs and policies) and two-year BMP implementation (nutrient and sediment load reduction) milestones.

• **Information to support Phase III WIPs:** Federal agencies are expected to compile and provide, or make available to each jurisdiction through other appropriate means, such as the Chesapeake Assessment Scenario Tool or CAST, information to support the development of the Bay watershed jurisdictions' Phase III WIPs. Some of these data has been provided in prior years but may need to be updated. For the National Forest, the most pertinent information includes, but is not limited to:

  – Location and description of the federal land or facility (such as facility name, property boundaries, land cover, area, land use types, nature of activities);

  – Planned pollutant reductions from point and nonpoint sources associated with federal lands and facilities that meet the federal facility's share of a local planning goal (as agreed to with the jurisdiction) and address any anticipated growth;

  – BMP implementation scenarios to reduce nitrogen, phosphorus and sediment to reach the new facility-specific targets, consistent with the CWA;

  – Annual reporting of BMPs to the jurisdiction (copy to EPA) in a manner that is consistent with the jurisdiction's procedures.

4. Activities on GWJNF

As stated above, US Forest Service lands are primarily forested. Except for wilderness areas, these forests may have roads bisecting them, either paved or unpaved, but are otherwise largely intact. There are a limited acreage of grazing that is permitted on USFS lands, and even less land that is developed (e.g., campgrounds, roads, parking lots). Occasionally, the Forest is affected by large energy infrastructure projects that can disrupt and deforest. Examples are windmills and pipelines.

The USDA Forest Service has worked with its partners to put together a guide on how forest-related activities fit within the Chesapeake TMDL and Phase III Watershed Implementation Plans. This manual can be referenced on the Chesapeake Bay Program website.

As for water quality and the Bay TMDL, the forest sector is considered to be non-actionable, that is, there is no action that can improve water quality flowing off undisturbed forest. This is the case for the vast majority of the GWJNF. Exceptions are as follows.

a. **Timber**- Removing timber is considered forest disturbance that can be partially offset by using forest harvest BMPs. In 2018, 616 acres were harvested from the GWJNF in the Bay watershed. All of these acres received a full suite of BMPs and were reforested. The 5-year average for the Forest is 677 acres/year. The GWJNF anticipates maintaining the 677 average which may increase by 10% or 745 acres on any given year through 2025. Even with this potential increase in timber harvest, this activity is less than 0.1% of the total land managed by GWJNF.

   It is difficult to predict with precision how many acres will actually be harvested any given year. In order for the NF to cut timber, there is a lengthy environmental review process that can take years. Putting the potential harvest up for bid/sale is another process that can be protracted and there is uncertainty if it will sell at all.

b. **Grazing**- The GWJNF has a small but active grazing program. Grazing allotments are permitted and managed for healthy productive cover and to prevent over-grazing. There have been favorable changes to the grazing program in the past year. Several allotments have been closed and are no longer part of the grazing program. Other allotments have been reduced in size specifically for water quality concerns. These allotments are on the South Fork Shenandoah River and Cedar Creek (tributary to the Shenandoah River) and there had been issues keeping cattle out of the river and riparian areas. Updated grazing allotment acres are forthcoming.

c. **Roads**- Forest roads are both built and decommissioned at various places according to need. There are 2.15 miles of new systems roads (not temporary roads) that have been proposed in the North Shenandoah. On the other hand, 13.54 miles of system road decommissioning is also proposed there. Decommissioning actions typically include, taking the road off of the Forest Service INFRA system, adding barriers, and allowing passive restoration. Storm-proofing and culvert removal may be included, as necessary. Excessive vehicle use and mud-bogging in riparian areas, in North River watershed and Passage Creek has been blocked to decrease erosion and sedimentation.

Roads in the GWJNF will continue to be monitored and managed for excessive sediment runoff that may reach streams. While road management and decommissioning are beneficial for water quality, total road miles are not tracked and there currently are no plans to report these actions to DEQ or the Chesapeake Bay Model.

d. **Aquatic organism passage**- Under the North Shenandoah proposed action, up to 15 culverts are proposed to be improved to allow aquatic organism passage by restoring stream channel geometry. This is an example of natural resource management that is overseen by specialists and continually occurring on the National Forest.

e. **Stream liming**- Limestone sand is added directly to streams to mitigate acid deposition and improve water quality to support native aquatic biota. In 2018, the GWJNF limed Little Stony and Mill Creeks in Shenandoah County (about 4 miles improved). In the next five years, other streams will be limed for a total of about 15 miles of water quality improvement.

f. **Pipelines-** The Mountain Valley Pipeline and Atlantic Coast Pipeline are two potential projects that could impact up to xxxx acres of forest. However, there is currently no Record of Decision or Special Use Permit at this time so no activities are authorized. If these projects do go forward, they will be reported as part of the 2-year update.

g. **Lower Cowpasture watershed-** The Lower Cowpasture Restoration Project is restoring the health, diversity and resiliency of fire-adapted forests and rare plant communities while working to decrease the risk of wildfire to adjacent communities. Improving water quality, function and connectivity of streams and full passage of aquatic organisms, including surrogate species such as brook trout and other rare fish and mussel species is also a goal. This project is being pursued by a partnership (not just GWJNF) and serves as a good example of the size, scope and watershed benefits that occur on the Forest. The project, which was first funded by partners in 2017, includes the harvesting of timber. A full, updated report of the Lower Cowpasture project is available.

5. Planned Actions, Programs, Policies, and Resources Necessary through 2025 to Reduce Nitrogen, Phosphorus, and Sediment Pollutant Loads Associated with Federal Lands

As has been previously established, there is little opportunity to further reduce nutrients and sediments flowing off GWFNF land. Achieving 2025 load targets will entail a status quo approach but with improved reporting especially on timber harvest and grazing activities. The GWJNF will work more closely with Virginia DEQ to curtail reporting to their specifications to the extent practical.

6. Procedure for Tracking, Verifying and Annually Reporting BMPS to the Jurisdiction (Copy to EPA) in a Manner that is Consistent with the Jurisdiction's Procedures

The GWJNF can track and report any timber harvest, grazing, or stream restoration BMPs on an annual basis. By way of verification, these activities are checked by the local specialist overseeing each activity. Any land use change on the Forest will be reported at the 2-year

milestone. This includes any loss of forest or expansion of impervious acreage. The primary GWJNF contact for reporting is Forest Silviculturist Jeff Matthews (p: 540-881-0110 jeff.matthews@usda.gov) who should be contacted should the state or EPA require further reporting or verification.

National Aeronautics and Space Administration Langley Research Center:
Virginia Phase III Watershed Implementation Plan

Section 1 Introduction and Site Statistics

National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC) is one of two NASA properties in the state of Virginia. It is a relatively small federal facility comprising of 764 total acres – all of which are regulated land. NASA LaRC is situated near the southern end of the lower Virginia Peninsula, approximately 150 miles south of Washington, D.C. and 50 miles southeast of Richmond, Virginia. The cities of Hampton, Poquoson, Newport News, and York County form a major metropolitan statistical area around LaRC. The Center contains several wind tunnels, research facilities, and administrative offices. The Center owns and operates 764 acres of property. LaRC is located within close proximity to several surface water bodies within the tidal zone of the Chesapeake Bay.

LaRC is considered to be in the York River drainage basin, specifically river segment YLO_7370_0000. This river segment is part of the Mobjack Bay segmentshed which is part of the overall York River basin. The Brick Kiln Creek runs along the western boundary of LaRC, joining the northwest branch of the Back River, and drains approximately 40 percent of the Center. Tabbs Creek, which drains a majority of the rest of the Center, flows in a northerly direction to join the Back River near the confluence of its northwest and southwest branches. A small portion of the property in the south drains to Tides Mill Creek. The local waterways are influenced by tides in the Chesapeake Bay. The waters in the local streams are designated by the State as Class IIa, estuarine waters where shellfish can be found.

NASA LaRC is 100% regulated site and the MS4 service boundary matches the property boundary. The land use type is classified as industrial, urban, recreational, and open space. There are no agricultural lands.

Table 1: Size and Extent of MS$

Land Use	Acres
Regulated Urban Impervious	217.66
Regulated Urban Pervious	250.77
TMDL Excluded Forested Lands	295.57
Total	**764 Acres**

Section 2 Property Boundary

GIS property boundary information can be found in the Chesapeake Assessment and Scenario Tool (CAST) located at the following link under the Spatial Data heading:
http://cast.chesapeakebay.net/Documentation/BMPsModelsGeography.

Section 3 TMDL Requirements

The Special Condition for the Chesapeake Bay Total Maximum Daily Load (TMDL) within the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (VAR04), requires the NASA LaRC to develop a Chesapeake Bay TMDL Action Plan ("Action Plan") and submit it to the Virginia Department of Environmental Quality (DEQ). The Phase I Action Plan was approved by DEQ and fully implemented from 2013 – 2018. The Phase 2 Action Plan covers the period of 2018 -2023 and provides a review of the current Municipal Separate Storm Sewer System (MS4) program, demonstrates LaRC's ability to ensure compliance with the Special Condition, and includes the means and methods LaRC will use to meet an additional 35.0% of the Level 2 (L2) scoping run reduction for existing development during the second permit cycle. In combination with the 5.0% reduction of L2 that has already been achieved, this will result in a total reduction of 40% of L2 at the end of this permit cycle. Level 2 implementation equates to an average reduction of 9.0% of nitrogen loads, 16% of phosphorus loads, and 20% of sediment loads from impervious regulated acres and 6.0% of nitrogen loads, 7.25% of phosphorus loads, and 8.75% of sediment loads from pervious regulated acres beyond 2009 progress loads and beyond urban nutrient management reductions for pervious regulated acreage.

Table 2 provides a summary of LaRC's existing source loads to the Bay based on the 2009 progress run condition (start of the TMDL).

Table 2: LaRC's Existing Source Loads (York River Basin Loading Rate)

Sub source	Pollutant	Total Acres (6/30/2009)	2009 Loading Rate (lbs/acre)	Total POC Load Based on 2009 Progress Run
Regulated Urban Impervious	Total Nitrogen (TN)	217.66	7.31	1591.09
Regulated Urban Pervious	Total Nitrogen (TN)	250.77	7.65	1918.39
Regulated Urban Impervious	Total Phosphorous (TP)	217.66	1.51	328.67
Regulated Urban Pervious	Total Phosphorous (TP)	250.77	0.51	127.89
Regulated Urban Impervious	Total Suspended Solids (TSS)	217.66	456.68	99400.97
Regulated Urban Pervious	Total Suspended Solids (TSS)	250.77	72.78	18251.04

Section 4 NASA LaRC Regulatory and Program Controls

LaRC has a robust stormwater management program that has the required regulatory mechanisms in place to ensure compliance with the MS4 General Permit, the Chesapeake Bay TMDL Special Condition, and the TMDL Action Plan. The following is a list of applicable mechanisms and a brief description:

Langley Procedural Requirements (LPR) 8500.1 "Environment and Energy Program Manual" - This LPR sets forth procedural requirements and responsibilities to ensure that LaRC personnel comply with the Center's environmental and energy management program. This is the closest document LaRC has to a traditional "ordinance." Chapter 5 of LPR 8500.1 covers the Water Quality Program. TMDLs are discussed in this section and it is specifically stated that it is LaRC's policy to comply with the Chesapeake Bay TMDL and to reduce pollutant loadings to the maximum extent practicable. The document also details responsibilities for Center personnel to ensure water quality regulations and goals are met.

DEQ-approved NASA LaRC Standards and Specifications for Erosion and Sediment Control (ESC) and Stormwater Management (SWM) – This is the foundation of LaRC's program. LaRC has Annual Standards and Specifications for ESC and SWM that are integral components of LaRC's design, construction, maintenance, and management of the Center's facilities and operations. The primary regulatory driver for NASA LaRC Annual Standards and Specifications is the Virginia Stormwater Management Program (VSMP) regulations (9 VAC 25-870), the General VPDES Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880/VAR10), Erosion and Sediment Control Law (9 VAC 25-840), and LaRC's MS4 permit (VAR040092). The NASA LaRC Annual Standards and Specifications for ESC and SWM has been developed to provide detailed information regarding LaRC's compliance with all regulatory requirements. This program guide discusses staffing, covers all the necessary design standards, discusses how LaRC reviews and approves stormwater-related Plan submittals, and how LaRC enforces its program.

LaRC Master Plan and Revitalization Plan – As this Action Plan will show, LaRC is going through a significant transformation. Through long-term Master Planning, the Center is transforming and creating the LaRC of 2050. This transformation requires significant demolition of older, unsustainable facilitates. LaRC has planned to demolish over 100 structures throughout this process and is on target to meet this goal. Many of these demolished impervious areas are being transitioned back to green space and the overall LaRC footprint is being pulled into a central campus concept. These reductions in impervious surface are an essential element to TMDL compliance for LaRC. In addition, any new construction under this revitalization program is required to be environmentally sustainable with a Leadership in Energy and Environmental Design (LEED) silver or greater rating. All new construction is required to meet State stormwater design standards.

Environmental Management System (EMS) – LaRC has an active EMS. LaRC's EMS is a system that does the following: (1) incorporates people, procedures, and work practices into a formal structure to ensure that the important environmental impacts of the organization are identified and addressed; (2) promotes continual improvement, including periodically evaluating environmental performance; (3) involves all members of the organization, as appropriate; and (4) actively involves senior management in support of the EMS. LaRC senior management approved the creation of the Environmental Management Committee (EMC) in July 2009. The EMC meets quarterly and reports annually to the Center Leadership Council regarding the status, progress, and

challenges of LaRC's Environmental Management System. The EMS is as an excellent tool to assist in Chesapeake Bay TMDL compliance and continues to be used to bring the TMDL visibility to senior management.

Additional Guidance Documents – (NASA LaRC Design Standards FES-ENVENE; NASA LaRC Environmental Master SPEC Section 01 35 40.00 40) – These two documents are incorporated by reference into the NASA LaRC Annual Standards and Specifications for ESC and SWM. In combination, these documents guide NASA on proper ESC and SWM program implementation. The NASA LaRC Environmental Design Standards FES-ENVENE primarily apply to design aspects of projects. They are implemented into project requirements and into contract award packages to ensure projects are designed in accordance with all applicable requirements. The NASA LaRC Master SPEC Section 01 35 40.00 41 primarily apply to construction activities to ensure projects are constructed in compliance with all applicable requirements and that best management practices are utilized throughout the duration of the project.

EISA Section 438 - Section 438 states that federal projects exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature rate, volume, and duration of flow. This is another driver for projects that help achieve compliance with the Chesapeake Bay TMDL.

The regulatory mechanisms above adequately ensure that the necessary means and methods are in place to address discharges from new sources. In particular, NASA's DEQ-approved Annual Standards and Specifications for ESC and SWM detail these means and methods and ensure compliance with Technical Criteria Part II b of the SWM regulations. In addition, LaRC has a specific Environmental Construction Specification (Section 01 35 40.00 41) that ensures all construction contracts on Center are compliant with the most current state stormwater regulations. The construction specification requires sites with over an acre of land disturbance to submit an ESC Plan, SWM Plan, Stormwater Pollution Prevention Plan (SWPPP), Virginia Runoff Reduction Method (VRRM) spread sheets, and Construction General Permit (CGP) coverage (when applicable). Lastly, neither specification allows any land disturbing activities to occur until all required Plan submittals are reviewed and approved by NASA's certified Dual Combined Administrator for ESC and SWM.

Section 5 TMDL Action Summary, 2009 -2018

NASA LaRC has achieved all necessary load reductions required to date. Several management practices and retrofit programs were utilized and implemented to achieve the required 5.0% reductions for existing sources. No nutrient trading was used. NASA Langley does not routinely apply fertilizer on Center. A focus on reducing the impervious footprint has been the key to a successful TMDL program. In summary, a total of fifty (50) impervious structures were demolished and returned to a grass condition. While these areas are mowed periodically, they do not receive nutrient applications, allowing them to be classified as a grass condition. The fifty demolished structures equate to a total of 10.7 acres of impervious areas converted to grass. Street sweeping was utilized during all years of permit cycle one; all roads and parking surfaces on Center were swept on a quarterly basis. Additionally, 3.62 acres were converted to a forested condition (0.32 acres converted from impervious to forest; 3.3 acres converted from pervious to forest). Stormwater retrofits were also completed via the installation of four tree-box filters around the Center.

Table 3 summarizes the load reductions achieved through 2018 based off the projects described above. LaRC is significantly ahead of the required load reductions and is on track for full TMDL compliance. Loads associated with pervious lands remain the primary challenge.

Table 3: Load Reductions Achieved Through 2018

Sub source	Pollutant	Load (lbs) Reduction Required by 2018	Load (lbs) Reduction Achieved
Regulated Urban Impervious	TN	7.16	**233.99**
Regulated Urban Pervious	TN	5.76	**31.48**
Regulated Urban Impervious	TP	2.63	**79.93**
Regulated Urban Pervious	TP	.46	**3.08**
Regulated Urban Impervious	TSS	994.01	**24876.45**
Regulated Urban Pervious	TSS	79.85	**526.56**

Section 6 TMDL Actions, 2018 – 2023

Table 4 shows NASA LaRC's required load reductions through the end of the current MS4 permit cycle which is June 30, 2023. NASA LaRC is currently in Year 1 of this permit cycle. The load reduction required is the additional 35.0% of the Level 2 (L2) scoping run reduction required in combination with the 5.0% reduction of L2 that has already been achieved. This load reduction results in a total reduction of 40% of L2 by 2023.

Table 4: Required Load Reductions Through 2023

Sub source	Pollutant	Total Acres (6/30/2009)	Loading Rate (lbs/acre) to achieve 40% of L2 Run	**Load Reductions Required by 2023**
Regulated Urban Impervious	TN	217.66	0.26316	**57.28**
Regulated Urban Pervious	TN	250.77	0.1836	**46.04**
Regulated Urban Impervious	TP	217.66	0.09664	**21.03**

Sub source	Pollutant	Total Acres (6/30/2009)	Loading Rate (lbs/acre) to achieve 40% of L2 Run	**Load Reductions Required by 2023**
Regulated Urban Pervious	TP	250.77	0.01479	**3.71**
Regulated Urban Impervious	TSS	217.66	36.5344	**7952.08**
Regulated Urban Pervious	TSS	250.77	2.5473	**638.79**

Table 4: Required Load Reductions Through 2023

Sub source	Pollutant	Total Acres (6/30/2009)	Loading Rate (lbs/acre) to achieve 40% of L2 Run	**Load Reductions Required by 2023**
Regulated Urban Impervious	TN	217.66	0.26316	**57.28**
Regulated Urban Pervious		250.77	0.1836	**46.04**
Regulated Urban Impervious	TP	217.66	0.09664	**21.03**
Regulated Urban Pervious		250.77	0.01479	**3.71**
Regulated Urban Impervious	TSS	217.66	36.5344	**7952.08**
Regulated Urban Pervious		250.77	2.5473	**638.79**

Actions planned (or already completed) for 2018 -2023 demonstrate LaRC's ability to ensure compliance with the TMDL and meeting the additional 35.0% of the Level 2 (L2) scoping run reduction required. In combination with the 5.0% reduction of L2 that has already been achieved, this will result in a total reduction of 40% of L2 by 2023. Actions planned over the next few years include new bio-retention systems, increased reduction of the impervious footprint, and increased transition to grass conditions, street sweeping program, catch basin cleaning program, and outreach. Table 5 summarizes the total load reductions projected through 2023.

Table 5: Summary of Planned Loads Reductions through June 30, 2023

Sub source	Pollutant	Load Reduction Required by 2023	Total Load Reduction Achieved 2009 through 2018	Load Reductions Planned through 2023	**Load Reductions Planned/Achieved through 6/30/2023**
Regulated Urban Impervious	TN	**57.28**	233.99	204	**437.99**
Regulated Urban Pervious	TN	**46.04**	31.48	18.12	**49.6**
Regulated Urban Impervious	TP	**21.03**	79.93	73.81	**153.74**
Regulated Urban Pervious	TP	**3.71**	3.08	1.72	**4.8**
Regulated Urban Impervious	TSS	**7952.08**	24876.45	22637	**47513.45**
Regulated Urban Pervious	TSS	**638.79**	526.56	301.16	**827.72**

Section 6 NASA Contact

For additional information, please contact Peter Van Dyke at peter.vandyke@nasa.gov.

National Park Service

Location and description of federal agency land and facilities

The National Capital Region (NCR) and the Northeast Region (NER) of the National Park Service (NPS) owns and manages numerous parks and park units within the Chesapeake Bay watershed. Table 1 summarizes the name and approximate acreage of each park unit in Virginia. The group names are administrative units within the NCR and the NER and within each group are units including memorials, park land, parkways and historic sites. Together these NPS lands consist of approximately 695 square miles. These parks encompass a variety of uses such as national monuments, scenic trails, historical parks, battlefield parks, and national parkways. These acreages were obtained from GIS layers maintained by the NCR (Boundaries, Visitor Use and Management, dated February 2019) and the NER (NER Park Unit Boundaries, dated March 2019).

Table 1 – NPS Land and Acreage in the Chesapeake Bay in Virginia

Group Name	Unit Name	Acreage
National Capital Region (NCR)		
George Washington Memorial Parkway	Arlington House	16.3
George Washington Memorial Parkway	Great Falls Park	734
George Washington Memorial Parkway	George Washington Memorial Parkway	3,069
Harpers Ferry National Historical Park	Harpers Ferry National Historical Park	389
Manassas National Battlefield Park	Manassas National Battlefield Park	4,424
Prince William Forest Park	Prince William Forest Park	12,566
Wolf Trap National Park for the Performing Arts	Wolf Trap National Park for the Performing Arts	119
	Total NCR Lands in Bay (Virginia)	**21,317**
Northeast Region (NER)		
Appalachian National Scenic Trail	Appalachian National Scenic Trail	53,637
Appomattox Court House National Historical Park	Appomattox Court House National Historical Park	2,822
Captain John Smith National Historic Trail	Captain John Smith National Historic Trail	418
Cedar Creek and Belle Grove National Historical Park	Cedar Creek and Belle Grove National Historical Park	5,753
Colonial National Historical Park	Colonial National Historical Park	13,460
Fort Monroe National Monument	Fort Monroe National Monument	243
Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park	Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park	15,060
George Washington Birthplace National Monument	George Washington Birthplace National Monument	1,067
Petersburg National Battlefield Park	Petersburg National Battlefield Park	2,407

Group Name	Unit Name	Acreage
Richmond National Battlefield Park	Maggie L. Walker National Historic Site	2.1
Richmond National Battlefield Park	Richmond National Battlefield Park	13,075
Shenandoah National Park	Shenandoah National Park	315,982
	Total NER Lands in Bay (Virginia)	**423,926**
	Total NPS Lands in Bay (Virginia)	**445,243**

Shenandoah National Park and the Appalachian National Scenic Trail account for 83% of the NPS lands located in the Chesapeake Bay watershed in Virginia.

Description and estimate of anticipated pollutant load and growth

NPS does not anticipate significant development on its properties through 2025. NPS used the Chesapeake Assessment Scenario Tool (CAST) to evaluate pollutant loads from its lands. NPS plans to review the land area assigned to NPS in CAST and to submit corrections, as needed. Table 2 summarizes estimates of anticipated nitrogen, phosphorus and sediment loads from CAST without existing BMPs included.

Table 2 – NPS Pollutant Load Summary*

Source	Nitrogen (lb/year)	Phosphorus (lb/year)	Sediment (lb/year)
Developed: MS4	4,713	682	310,601
Developed: Non-Regulated	41,274	5,348	7,269,864
Natural	291,239	56,158	149,244,393
Total	337,226	62,188	156,824,858

* 2018 Progress, Edge of Tide CAST scenario

Please note that 85-95% of the NPS pollutant loads are generated from natural sources. Considering NPS's ability to implement stormwater management in its natural areas is limited, NPS will focus on implementing reasonable pollutant reductions from its developed areas. NPS welcomes the opportunity to discuss pollutant reduction targets with a focus on continuing to conserve natural areas, which is not easily reflected in CAST.

Verified records of existing BMPs

NPS is in the process of verifying its existing BMPs. Park superintendents were requested to verify information gathered in 2015 for existing BMPs and provide information on new projects. Currently, NPS staff have identified the existing BMPs summarized in Table 3. These BMPs have been included in a CAST existing BMP pollutant scenario. NPS will continue to gather information on these BMPs and other existing BMPs from park staff.

Table 3 – NPS Existing BMPs

BMP Type	Amount	Location
Impervious Surface Reduction	0.02 acres	George Washington Memorial Parkway – Arlington House
Permeable Pavement	0.57 acres	George Washington Memorial Parkway – Arlington House
Forest Planting	4 acres	George Washington Memorial Parkway – Dyke Marsh, Potomac Heritage Trail, Turkey Run, Great Falls
Dirt and Gravel Road Erosion and Sediment Control	0.58 acres or 150 feet (assuming a square area)	Manassas National Battlefield Park
Conservation Landscaping	1,200 acres	Manassas National Battlefield Park
Forest Planting	1 acre	Prince William Forest Park
Wet Ponds and Wetlands	10,460 acres	Prince William Forest Park
Septic Tank Pumping*	32 systems	Prince William Forest Park
Bioretention	1.22 acres	Wolf Trap National Park for the Performing Arts
Conservation Landscaping	2.25 acres	Wolf Trap National Park for the Performing Arts
Impervious Surface Reduction	0.03 acres	Appomattox Court House National Historical Park
Conservation Landscaping	32 acres	Appomattox Court House National Historical Park
Forest Buffer	28 acres	Appomattox Court House National Historical Park
Non Urban Shoreline Management	1,160 feet	Colonial National Historical Park
Dry Detention Ponds and Hydrodynamic Structures	1.86 acres	Colonial National Historical Park
Dirt and Gravel Road Erosion and Sediment Control	3,485 feet	Colonial National Historical Park
Grass Buffer*	50 miles	Colonial National Historical Park
Grass Buffer*	205 acres	Petersburg National Battlefield Park
Impervious Surface Reduction	0.34 acres	Petersburg National Battlefield Park
Forest Buffer	0.68 acres	Richmond National Battlefield Park
Impervious Surface Reduction	0.07 acres	Shenandoah National Park
Forest Planting	2.39 acres	Shenandoah National Park
Land Retirement*	22 acres	Shenandoah National Park

* NPS was not assigned any agricultural or septic loads in CAST, so agricultural and septic BMPs do not currently receive pollutant reduction in the model. A methodology for NPS to document credit for these practices will be developed in the future.

Table 4 summarizes estimates of anticipated nitrogen, phosphorus and sediment loads from CAST with existing BMPs included.

Table 4 – NPS Pollutant Load Summary with Existing BMPs*

Source	Nitrogen (lb/year)	Phosphorus (lb/year)	Sediment (lb/year)
Developed: MS4	5,139	384	128,766
Developed: Non-Regulated	30,905	3,040	2,995,409
Natural	291,369	55,632	143,748,448
Total	327,413	59,056	146,872,623

* 2025 Base Year with 2018 progress BMPs, Edge of Tide CAST Scenario

Inventory of VPDES permits

NPS facilities currently have eight VPDES permits in Virginia as summarized in Table 5.

Table 5 – NPS VPDES Permits

Permit Number	Permit Type	Facility
VA0024406	Individual	Big Meadows Sewage Treatment Plant
VA0089982	Individual	George Washington Birthplace National Monument
VA0024414	Individual	Loft Mountain Sewage Treatment Plant
VA0024431	Individual	Mathews Arm Sewage Treatment Plant
VA0024422	Individual	Skyland Sewage Treatment Plant
VAR051790	General – Stormwater Industrial	George Washington Memorial Parkway Maintenance
VAG750117	General – Vehicle Wash and Laundry	Park Headquarters Vehicle Car Wash
VAR040111	General – MS4	George Washington Memorial Parkway

Planning Targets and Local Planning Goals

Per Appendix B of Virginia's draft WIP III, the NPS local area planning goals are summarized in Table 6.

Table 6 – NPS Local Area Planning Goals in Virginia

Source	Nitrogen Reduction (lb/year)	Phosphorus Reduction (lb/year)
Developed	1,325	182
Natural	5,437	2,049
Total	6,762	2,231

The planning goals provided by Virginia reflect large reductions in natural areas: approximately 80% of the reduction for nitrogen and 92% of the reduction for phosphorus. NPS plans to focus its efforts on

BMPs to improve stormwater quality in its developed areas while conserving land and forest in its natural areas.

These local area planning goals are in addition to the following Virginia requirements for Federal Lands:

- Meet all applicable regulatory requirements (MS4, Industrial Stormwater, Wastewater, Erosion and Sediment Control, Post-Construction Stormwater, Chesapeake Bay Preservation Act).
- Reduce loads from all agency owned lands managed for agricultural use (45% Nitrogen reduction goal from 2017 levels).
- Reduce loads from all onsite systems (septic and alternative onsite systems) on federal agency owned lands (6% Nitrogen reduction goal from 2017 levels).
- Ensure that any forest harvesting is accompanied by implementation of the full suite of silviculture water quality practices.
- Account for and offset any load changes resulting from changes in land use through time.
- Account for and offset the federal agencies share of load changes resulting from climate change. This will be quantified by the Bay Program by 2021. Current estimate for all of Virginia is 1.72 million pounds of nitrogen and 0.19 million pounds of phosphorus.

Strategies to Meet Pollutant Reduction Targets

Planned pollutant reduction targets

Table 7 provides the 2018 progress loads and Virginia local planning area targets with the resulting planned pollutant target.

Table 7 – NPS Planned Pollutant Target and Gap (Edge of Tide)

	Nitrogen (lb/year)	Phosphorus (lb/year)
Pollutant Load: 2018 Progress from CAST	337,226	62,188
Total Reduction Goal from Virginia WIP III	6,762	2,231
Target Pollutant Load	330,464	59,957
Pollutant Load with Existing BMPs*	327,413	59,056
Pollutant Reduction Gap	-3,051	-901

* See Table 4

Based on this evaluation, NPS has met its target pollutant reduction goals using the existing BMPs identified by park staff.

BMP implementation scenarios

NPS is currently implementing and evaluating other specific stormwater project opportunities to improve water quality and hopes to partner with Virginia and other federal agencies on project opportunities in the future. The George Washington Memorial Parkway has been issued a Virginia MS4 permit. Using the MS4 acreage from the first Chesapeake Bay TMDL Action Plan, the pollutant reduction required for the

Parkway is: 2,500 lb/year of nitrogen and 179 lb/year of phosphorus. Compliance with this requirement will be documented in the Parkway's Chesapeake Bay TMDL Action Plan and MS4 Annual Reports.

Stormwater facilities that are currently in design or construction include the following:

- Manassas National Battlefield Park: upgrade and construction of Stone Bridge and Brownsville Hiking Trails to ABAAS Standards: 0.31 acres treated by Flexi-Pave; 0.71 acres treated by hydrodynamic structure
- George Washington Memorial Parkway: Dyke Marsh Restoration: 0.28 miles of urban shoreline erosion control, 40 acres of wetland restoration
- Prince William Forest Park: replacement of sewer systems and sewage tanks
- Petersburg National Battlefield Park: 0.24 miles of urban shoreline erosion control, septic conversion
- Richmond National Battlefield Park: 18 acres of conversion from agriculture to forest
- Shenandoah National Park: 8.4 acres of impervious surface reduction and forest planting

The NPS is currently evaluating site modifications or projects that could present opportunities for potential stormwater BMPs or land use changes that include the following:

- George Washington Memorial Parkway: North Section & Arlington House rehabilitation
- Prince William Forest Park: Comprehensive Trails Plan
- Manassas National Battlefield Park: parking lot stormwater management and tree planting
- Wolf Trap: reconstruction of parking lots and upgrades to stormwater management
- Colonial National Historical Park: adding stormwater management to Colonial Parkway, stabilizing eroding shorelines
- Petersburg National Battlefield Park: shoreline erosion control, tree planting, impervious surface reduction
- Shenandoah National Park: alternative crops and removal of structures from donated property

Existing programs and planned actions

NPS will continue to participate in the Chesapeake Bay Federal Agency workgroup. Furthermore, NPS will continue to implement best management stormwater practices as an instrumental component of park facility or site rehabilitation or new construction projects.

Crediting, Tracking, Reporting, and Verification

NPS is in the process of developing a method for tracking and reporting BMP implementation, inspection, and maintenance activities. The goal is to create a process that NPS staff can use to generate Chesapeake Bay compliance documents and to track pollutant reduction progress.

APPENDIX F – AGENCY CONTACTS

Send inquiries to: chesbayplan@DEQ.Virginia.gov

For additional information, please refer to the following agency contacts:

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