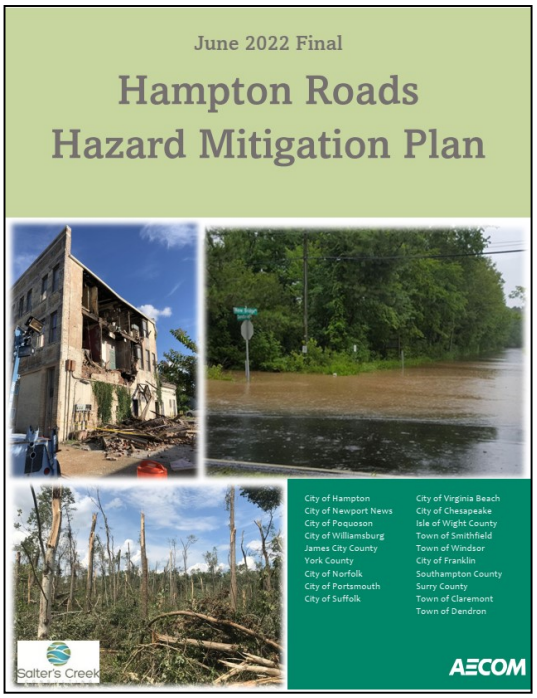
ENVIRONMENT

INTRODUCTION

The natural environment encompasses our entire surroundings: the land we live on, the air we breathe, and the water we drink. Blessed with lush vegetation, 235 miles of tidal shoreline, rolling hills, and bluffs, York County is a place of great natural beauty. It is also an area where these and other natural features can be threatened by development that is not properly managed. Development regulations in York County seek to encourage the proper use, management, and protection of sensitive and unique lands and waterways in the County that contribute to the economy of the region and the environmental quality of the County. They are not necessarily meant to preclude development or use of these areas but rather to ensure that any development that occurs is undertaken in recognition of environmental qualities and conditions in accordance with state and federal requirements. The importance of preserving York County's natural environment is reflected in the fact that one of the Board of Supervisors' six strategic priorities is "Environmental stewardship with a focus on resiliency."

CLIMATE

York County's climate in all four seasons is relatively mild. On the Peninsula, the average annual temperature ranges from a low of approximately 50 degrees Fahrenheit to a high of approximately 70 degrees Fahrenheit. Average annual precipitation is about 45 to 50 inches and does not vary significantly from month to month. Because of their climate and geography, York County and the other counties and cities in southeastern Virginia are vulnerable to a variety of weather-related natural hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property as well as disrupt the local economy and overall quality of life. These include but are not limited to tropical and coastal storms, winter storms, flooding, tornados, coastal erosion, wildfires, drought, and extreme heat. In order to lessen the potential impact of such natural hazards, the County joined with James City County and the cities of Hampton, Newport News, and Williamsburg to develop the *Peninsula Multi-Jurisdictional Natural Hazards Mitigation Plan*. The Federal Emergency Management Agency (FEMA) defines hazard mitigation as "any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards," and the federal Disaster Mitigation Act of 2000 requires localities to adopt a hazard mitigation plan in order to be eligible for Pre-Disaster Hazard Mitigation Program and Hazard Mitigation Grant Program funding from FEMA. The plan, completed in 2005 and incorporated by reference into the York County Comprehensive Plan, identifies goals, information, and measures for hazard mitigation and risk reduction to make York County more disaster-resistant and contribute to the area's long-term sustainability. The plan is updated on a regular basis and, as part of the 2017 update process, the Peninsula's Plan was combined with five other hazard mitigation plans in the region into a single *Hampton Roads Hazard Mitigation Plan*. In 2021-2022, York County participated with its regional partners in another update of the plan, which was adopted by the Board of Supervisors on August 2, 2022. That document, like its predecessors, is incorporated into this Comprehensive Plan by reference.



AIR

Air quality is regulated through implementation of the federal Clean Air Act, first passed by Congress in 1970. This legislation is incorporated in regulations promulgated by the U.S. Environmental Protection Agency (EPA) and enforced by the individual states. In Virginia, these regulations are enforced by the Department of Environmental Quality (DEQ) pursuant to the Air Pollution Control Law of Virginia, which gives the DEQ the legal authority to carry out state air quality programs established by the State Air Pollution Control Board and intended to protect public health and welfare. It also provides the authority to carry out federally mandated air quality programs.

In accordance with the Clean Air Act, air quality is monitored throughout the state for compliance with the National Ambient Air Quality Standards (NAAQS). These standards, which are set by the EPA, establish maximum limits for "criteria pollutants" that are allowed to be emitted to the ambient (outside) air. The criteria pollutants are ozone, nitrogen oxides, sulfur dioxide, carbon monoxide, lead, and particulate matter. Areas that meet these standards are classified as attainment areas, while those that fail to meet one or more of the NAAQS are classified as non-attainment areas. A third category – maintenance area – applies to any geographic region previously designated as a non-attainment area and subsequently redesignated to attainment subject to the requirement to develop a maintenance plan. Hampton Roads is classified as a maintenance area, having been classified in 2004 as a marginal non-attainment area for ozone. In June 1, 2007, the EPA re-designated Hampton Roads as an attainment area for ozone.

The EPA requires that each state submit a State Implementation Plan (SIP) to show how air pollution will be reduced to levels at or below the NAAQS and how the state will maintain air pollution at the reduced levels. Virginia's SIP was submitted to EPA in early 1972, and more than 100 revisions have been made to the plan since its original submittal. The key element of the SIP is the control strategy, which describes the emission reduction measures to be used by the state to attain and maintain the air quality standards. There are three basic types of control strategy measures:

- Stationary source control measures, which limit emissions primarily from commercial/industrial facilities and operations.

- Mobile source control measures, which limit tailpipe and other emissions primarily from motor vehicles and include federal motor vehicle emission standards, fuel volatility limits, reformulated gasoline, emissions control system anti-tampering program, and the Inspection and Maintenance program.

- Transportation control measures, which limit the location and use of motor vehicles and include carpools, special bus lanes, rapid transit, commuter park-and-ride lots, bicycle lanes, and signal system improvements.

In recent years, federal emissions standards led to the phased shutdown of one of the County's major stationary sources – the Dominion Energy Yorktown Power Station on Waterview Road – that began in 2019 with the decommissioning of its two coal-fired generators and is scheduled to be complete in the spring of 2023 with the retirement of its oil-burning generator.

In addition to the human health impacts associated with air pollution, non-attainment status can jeopardize a region's federal transportation funding. Regions that receive federal highway funding must demonstrate that their transportation improvements plans conform to EPA air quality standards.

Although regulation of air quality is primarily a federal and state responsibility, the County can play a role in promoting clean air. In recent years, for example, the County has installed nine free electric vehicle chargers at stations in various locations from one end of the County to the other, including the

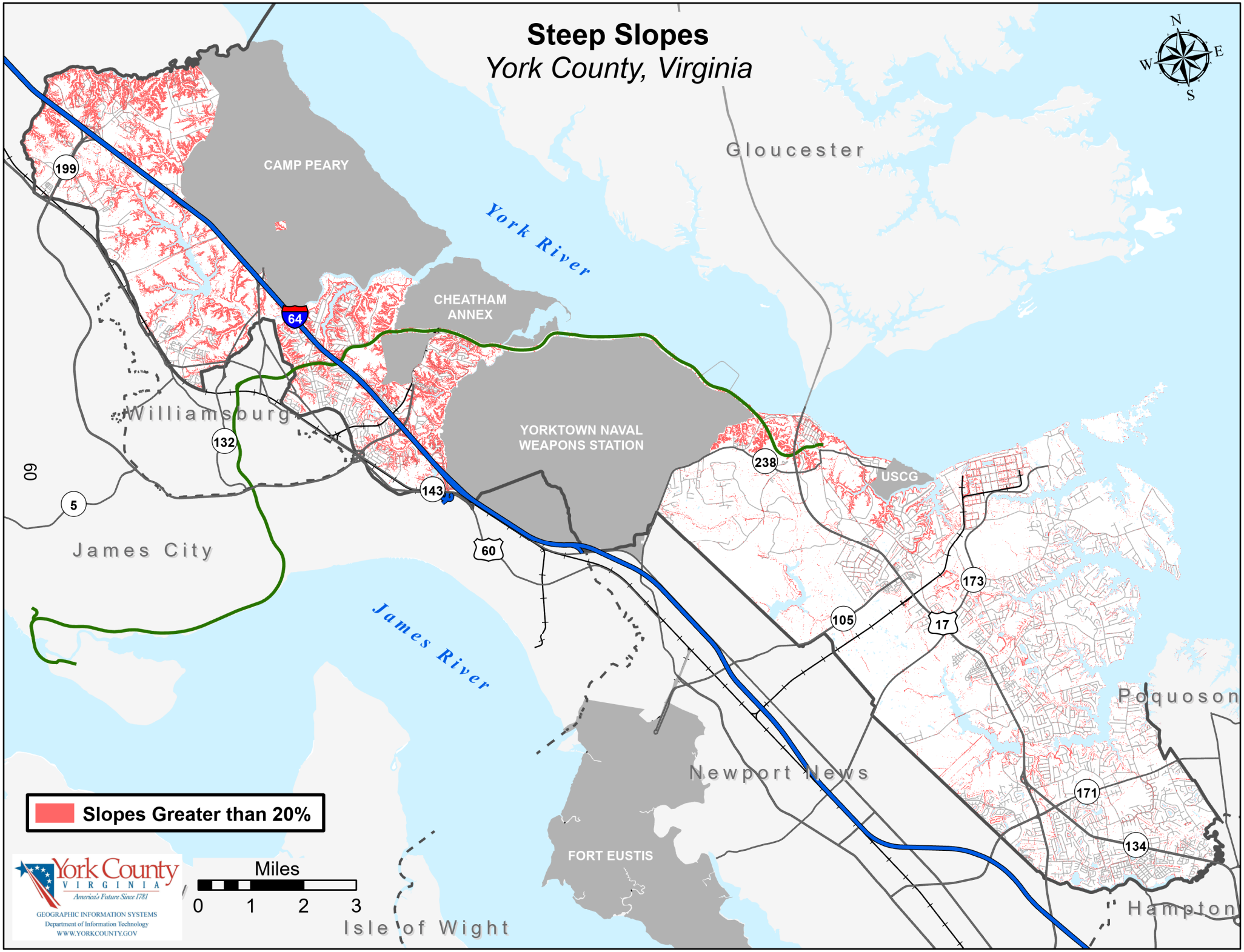
Tabb Library, the York-Poquoson Courthouse, the Riverwalk Landing parking garage, and New Quarter Park. In addition, the County's Real Estate Assessment Office recently added a fuel-efficient plug-in electric vehicle to its fleet. This 2017 Chevy Volt is a hybrid vehicle that achieves 50 miles per gallon (MPG), on average, when utilizing the internal combustion engine.

The County also promotes air quality through the federal Congestion Mitigation and Air Quality (CMAQ) program, which provides funding for transportation projects and programs that help improve air quality and reduce traffic congestion. Discussed in detail in the Transportation element of this Plan, the CMAQ program is intended to promote transportation strategies that reduce vehicle emissions. The types of projects eligible for CMAQ funds include HOV (High Occupancy Vehicle) lanes, intersection and signal system improvements, bus and passenger rail projects, and bicycle and pedestrian improvements. Over the years, the County has successfully applied for CMAQ funding for various bike path and intersection projects. Most recently, the County received CMAQ funding for a ten-foot (10') wide shared use path on the north side of Victory Boulevard between Big Bethel Road and East Yorktown Road.

LAND

Topography

The topography of land in York County varies from generally low, flat land with high water tables in the lower County to rolling terrain with well-drained soils in the northern reaches at elevations in excess of 120 feet above mean sea level in the Lightfoot and Skimino areas. The Steep Slopes map shows those areas in the County with slopes greater than 20%, which are subject to potential erosion if not adequately protected during the course of any development activity. Construction of roads, driveways, structures, and other land disturbing activities in these areas is not permitted unless no other practical option exists. New construction on existing slopes in excess of 30% is generally prohibited except in certain unusual circumstances. In addition, the County's Zoning Ordinance limits the ability of developers and builders to count naturally occurring (i.e., pre-development) slopes as developable area when calculating the number of lots that can be subdivided out of a single parcel of land. For slopes greater than 20% but less than 30%, only 75% can be included in calculations of net developable density, and only 50% can be included to meet minimum lot size requirements. For slopes 30% or greater, only 50% can be counted toward developable density and 25% toward meeting minimum lot size requirements. Similarly, the Zoning Ordinance excludes low-lying areas with an elevation of four feet (4') or less above Mean Sea Level (MSL) from the computation of both the maximum allowable density and the minimum lot size. As shown on the Low Elevation map, these low-lying areas are mostly located in the York Point, Bay Tree Beach, Dandy, and Dare areas and along various creeks.


Steep Slopes
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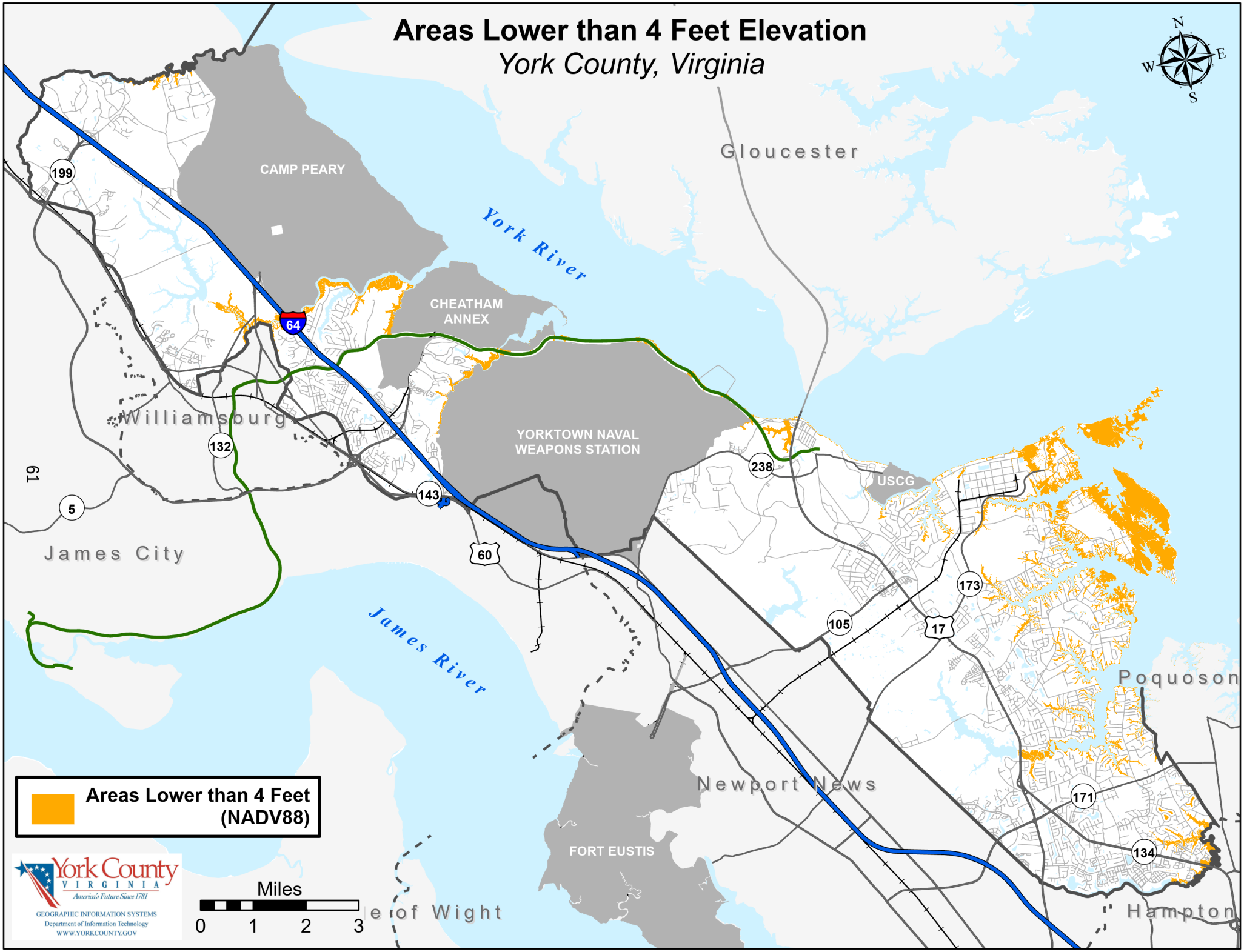
Areas Lower than 4 Feet Elevation
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Areas Lower than 4 Feet (NADV88)
York County VIRGINIA America's Future Since 1781
GEOGRAPHIC INFORMATION SYSTEMS
Department of Information Technology
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Soils

There are six main soil categories in the County as defined by the Virginia Soils Conservation Service.[1] The different soils types dictate limitations on construction techniques required for successful development in each area. Several of these soil types are classified as conducive to agricultural use and can be found in various sections of the County. For economic reasons, however, farming of land is often an interim use until the property owner decides to sell it for development. The County seeks to promote the preservation of farmland through the Land Use Program, as enabled by Section 58.1-3231 of the Code of Virginia. First adopted by the Board of Supervisors in 1979 and enacted in 1980, the Land Use Program provides tax relief for qualifying lands dedicated to agricultural or horticultural use by allowing such lands to be assessed on the basis of their use value rather than their market value. Section 58.1-3230 of the Code of Virginia defines "agricultural use" as “the bona fide production for sale of plants and animals, or products made from such plants and animals” and "horticultural use" as “the bona fide production for sale of fruits of all kinds, including grapes, nuts, and berries; vegetables; nursery and floral products; and plants or products directly produced from fruits, vegetables, nursery and floral products, or plants.” As of 2022, there were twelve individual property owners with a combined total of seventeen parcels participating in the Land Use Program. The total area of these parcels is 368 acres, 225 of which qualified for a reduced assessment.

A significant portion of the County has a high water table, which is defined as being within 2½ feet of the ground elevation. In addition, much of this land with a high water table has been classified as hydric, which means that it stays saturated for enough time during the growing season to develop anaerobic conditions. This soil characteristic is significant in making wetland determinations.

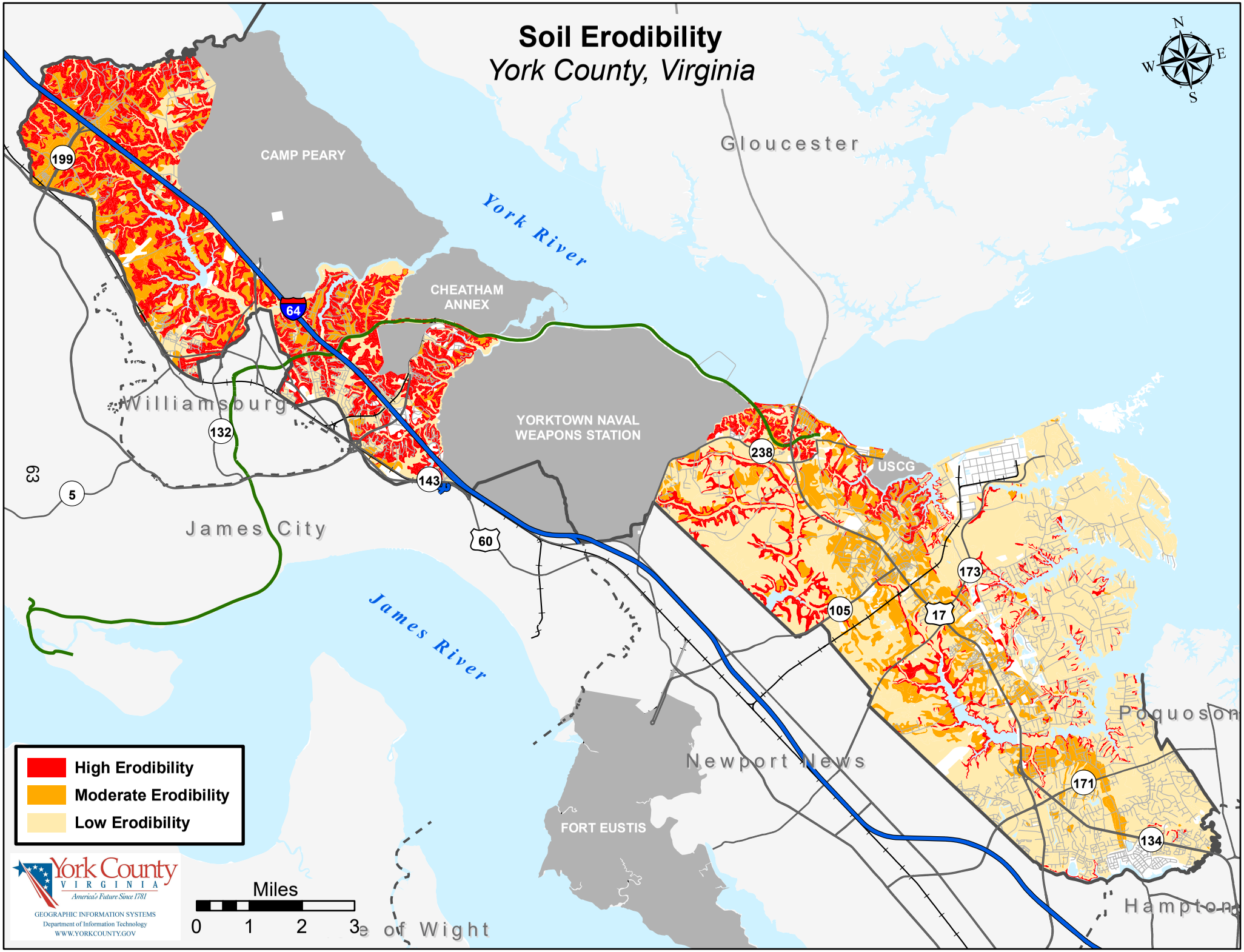
Most of the County is generally characterized by soils with severe limitations for septic systems. The suitability of soils for supporting a properly functioning septic system is based on a variety of factors including topographic relief, susceptibility to severe wetness, flooding potential, percolation (permeability) rate, and filtering characteristics. System failures have been reported by the Virginia Department Health (VDH) in various areas of the County, but that does not necessarily mean that septic systems will not function properly in those areas. For site-specific conditions, on-site surveys and samples must be obtained. The combined characteristics of a high water table, slope, permeability, and flood potential make the proper functioning of septic tanks difficult in the lower County. Periodically the VDH conducts Shoreline Sanitary Surveys of the County and, where on-site deficiencies are identified, the property owner is notified of the violation. Follow-up inspections are conducted by the VDH to ensure that corrections are made to the system.

Because of the County’s topography and its many peninsulas, alternative sanitary sewer systems, such as vacuum systems, have been used in some of the County-funded sewer extension projects and are performing successfully. The use of grinder pumps can also be a cost-effective solution in specific applications where gravity or vacuum systems are not economically or technically feasible. A grinder pump is a compact lift station with pump(s), storage capacity, and piping, valves and other mechanical and electrical equipment which grinds or reduces the particle size of wastewater solids and conveys the product from its source to a gravity sanitary sewage collection system or a sanitary sewer force main.

Erosion and Sedimentation Control

Erosion and the subsequent loss of soil often accompany development that has not been adequately designed for controlling sediment loss. Because sediments also pick up phosphorus and nitrogen, erosion and sediment control results in a reduction of nutrients to the receiving waters. The County’s Erosion and Sediment (E&S) Control Ordinance, first adopted in 1991, requires that all land disturbances

[1] United States Department of Agriculture, Soil Conservation Service (Natural Resources Conservation Service), *Soil Survey of James City and York Counties and the City of Williamsburg Virginia*, April 1985.


Soil Erodibility
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YORKTOWN NAVAL WEAPONS STATION
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Low Erodibility
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greater than 2,500 square feet, including single-family detached homes, meet state standards relative to the installation of control systems such as silt fences, straw bales, sediment basins, and check dams to control soil loss.

The EPA, through the Virginia Department of Environmental Quality (DEQ), requires construction projects over an acre to obtain a Virginia Stormwater Management Program (VSMP) permit for discharges associated with construction. This is in addition to the state and local requirements.

The Colonial Soil and Water Conservation District (CSWCD) is a political subdivision of the Commonwealth that serves as a local resource to York County as well as Charles City, James City, and New Kent Counties, and the City of Williamsburg. Two York County citizens serve on the District's Board of Directors and a third serves as an Associate Director. The District area covers approximately 660 square miles with a total population of over 175,000 residents. The mission of the CSWCD is to support improved and sustainable stewardship of natural resources through programs, technical guidance, outreach, education, and financial assistance. Services include the following:

- District staff provides technical assistance to agricultural producers seeking to increase conservation efforts in their operations and administers financial cost-share programs that can offset some of the costs of eligible conservation practices. Agricultural conservation practices can help increase crop yield, improve soil health and prevent erosion, reduce fertilizer and nutrient inputs, and reduce the risk of water quality degradation.

- District staff provides technical assistance and advice to property owners for determining what types of conservation practices are best suited for their property. Most conservation efforts in residential and suburban communities focus on managing stormwater runoff and preventing soil erosion.

- The CSWCD offers numerous educational programs and student opportunities.

The CSWCD participates in the Virginia Conservation Assistance Program (VCAP). Over the years, many York County residents have benefitted from the VCAP, which is an urban cost-share program that provides financial incentives and technical and educational assistance to property owners installing eligible Best Management Practices (BMP's) in Virginia's Chesapeake Bay Watershed. Through this program, thirteen projects have been implemented – including living shorelines (a shoreline management practice that incorporates vegetation and/or other soft elements alone or in combination with harder shoreline structures such as oyster reefs or rock sills for added stability), permeable pavement (alternative paving surfaces that allow stormwater runoff to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated), and rain gardens (shallow landscaped depressions that incorporate many pollutant removal mechanisms including temporarily ponding stormwater runoff above a mulch layer that encourage the rain water to infiltrate into the underlying native soil within 48 hours) – at a total cost of $271,566, with the property owners paying a combined total of $129,535, or slightly less than half.

Stormwater Management

Stormwater runoff is overland flow from precipitation that, if not properly managed, can cause erosion and flooding as well as pollute surface waters with contaminants such as automobile oil, grease, metals, sediment, animal waste, and fertilizers that can accumulate as stormwater flows across parking lots, lawns, and construction sites. Since the 1980s, York County has required land development and land conversion activities to maintain the post-development stormwater runoff characteristics, as nearly as practicable, to the pre-development runoff characteristics in order to reduce flooding, siltation, stream bank erosion, and property damage. All construction in the County is required to be designed to control stormwater quantity and quality through Best Management Practices (BMPs) designed for the site.

Although commonly thought of as stormwater retention or detention ponds, the term "BMP," as defined in the Virginia Administrative Code, encompasses both structural *and* nonstructural practices that are designed to prevent or reduce the pollution of surface waters and groundwater systems. The owner must also execute an agreement to guarantee maintenance of the BMP's post-construction.

The EPA enacted the National Pollution Discharge Elimination System (NPDES) Phase II program in 1999. This requires that stormwater be regulated in urbanized areas of Small Municipal Separate Storm Sewer Systems (MS4) to make sure there are no unauthorized discharges. Unauthorized or illicit discharges include any discharge to the storm sewer system that is not composed entirely of stormwater, with some exceptions that are specifically listed in the County's Stormwater Management Ordinance (for example, water line flushing, landscape irrigation, lawn watering, and public safety activities). The purpose of these regulations is to address non-point source discharges such as stormwater that contribute to the sediment and nutrient loadings in estuaries, rivers, and the Chesapeake Bay. The state program for this is the Virginia Stormwater Management Program (VSMP), which requires that the County's stormwater management program meet the following six minimum measures:

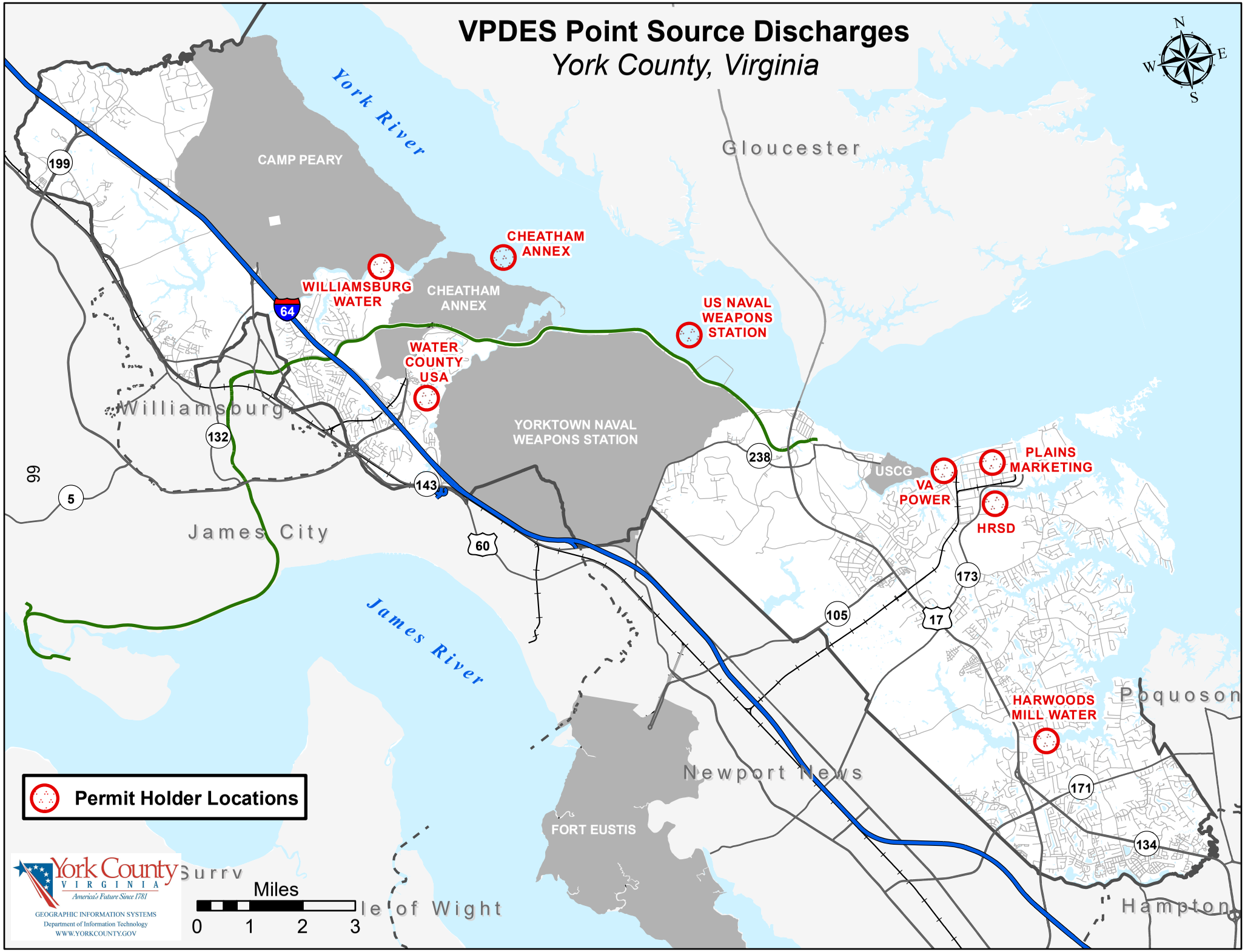
- Public education and outreach on stormwater impacts
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site stormwater runoff control
- Post-construction stormwater management in new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations

York County was first granted a stormwater discharge permit to comply with this program in 2003. The permit must be renewed every five years. Reports are submitted annually to show that the County is meeting the permit requirements through the control measures. Water quality treatment to deal with Total Maximum Daily Loads, which are discussed later, is also incorporated in the permit requirements.

Non-point source pollution from fertilized lawns and impervious areas is addressed by the Stormwater Management Ordinance requirement to enforce water quality measures. In addition, non-point source pollution from areas without BMPs is being reduced through implementation of capital projects to make improvements to the storm sewer system, construct BMPs, and perform stream restoration. The following projects are either underway or planned to take place between FY 2024 and FY 2029:

PLANNED STORMWATER MANAGEMENT PROJECTS CAPITAL IMPROVEMENTS PROGRAM, FY24-FY29	
Project Name	**Funding**
• Wormley Creek Headwaters Edgehill Replacements	$320,000
• Marlbank Cove Ravine Stream Restoration	$1,200,000
• Queens Lake Dam and Ravines	$1,700,000
• Middlewood Lane Ditch Restoration	$700,00
• Brightwood Stream Restoration	$1,200,000
• Panther Paw Stream Restoration	$500,000
• Route 134 to Bayberry Lane Drainage Improvements	$1,200,000
• Goodwin Neck/Rosewood BMP Retrofit	$500,000
• Celestial Way Stream Restoration	$1,250,000
• In-House Stormwater Construction/Maintenance Projects	$3,000,000
• Lining Storm Sewer Pipes	$500,000
• Shoreline Restorations and Breakwaters	$200,000
• Park Circle Stream Restoration	$200,000

Table 1


VPDES Point Source Discharges
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CHEATHAM ANNEX
WILLIAMSBURG WATER
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CHEATHAM ANNEX
US NAVAL WEAPONS STATION
WATER COUNTY USA
Williamsburg
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YORKTOWN NAVAL WEAPONS STATION
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PLAINS MARKETING
VA POWER
HRSD
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James City
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HARWOODS MILL WATER
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Newport News
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FORT EUSTIS
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Streambank Erosion

There are streams and ditches in the County showing evidence of deterioration and erosion. Some of the streambank erosion is due to natural causes; however, some is due to upstream development and ditch maintenance. Many of these streams have been identified for stream restoration projects in the County's Six-Year CIP (see **Table 1**). The trend in the County is to favor streambank restoration and bioengineering over the conventional piping and bank hardening solutions.

Natural factors that contribute to streambank erosion are steep slopes and highly erodible soils. York County limits stormwater runoff from development sites to pre-development rates through the strict application of the Stormwater Management and E&S Control Ordinances, which require that properties and waterways downstream of development be protected from sediment deposition, erosion, and damage caused by increases of volume, velocity, and peak flow rates of stormwater runoff for certain storm events. Inevitably, however, the volume and duration of stormwater runoff are increased with increased amounts of impervious area unless drainage systems are properly designed. The Erosion and Sediment Control Ordinance requires development plans to include drainage calculations proving downstream adequacy of the channel. When possible, stream banks will be restored to a natural state using bioengineering options with contiguous floodways. Piping is considered a measure of last resort. In this manner, stormwater management, erosion control, non-point source pollutant, and habitat creation goals will be achieved. The reduction and minimization of impervious surfaces is a major issue, especially with regard to streambank erosion. Low-Impact Development and conservation design, as methods of retaining pre-development site hydrology, are extremely valuable tools that can reduce streambank erosion and protect water quality.

WATER

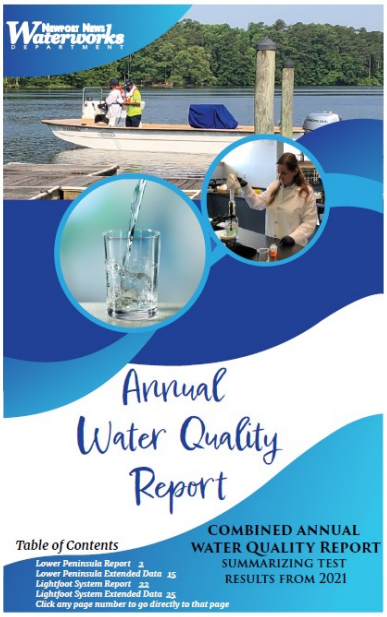
The quality of our water – not just for drinking and bathing but also for its recreational, aesthetic, and economic benefits – is essential to our quality of life. The regulation of surface water and groundwater involves a variety of federal, state, and local programs. Regulations are directed mainly at three targets: point sources such as end-of-pipe discharges and underground storage tanks; nonpoint sources such as stormwater runoff (discussed previously); and wetlands, both tidal and nontidal. Coastal wetlands absorb nutrients that drain from the uplands, which is an important filtering process to improve water quality. All of these sources affect the quality of water in the Chesapeake Bay, the York River, and their tributaries. Protection of water systems in Virginia is the responsibility of the State Water Control Board and its regulatory agency, the DEQ, and to some extent the State Board of Health. Some specific issues relating to these systems are discussed below.

York County is served by several water purveyors, both public and private. Most properties in the County are served by Newport News Waterworks (NNWW), which provides water to almost the entire lower County and most of the upper County. The City of Williamsburg provides water to Bypass and Waller Mill Roads, lower Mooretown Road, the Merrimac Trail/Second Street corridor, and Middletowne Farms, while the James City Service Authority (JCSA), whose primary water source is groundwater, serves a small number of properties in the upper County. A private water company, Aqua Virginia, operates water systems that serve a combined total of slightly more than 1,300 properties in the upper County subdivisions of Carver Gardens, Charleston Heights, Nelson Circle, Nelson Park, Queens Lake, and York Terrace. Aqua Virginia purchases its water from NNWW.

Surface Water

Surface water impoundments, all of them owned by other jurisdictions but located entirely or partially in the County, are the major source of drinking water in York County. They are the Harwood's Mill and Lee Hall Reservoirs, which are owned and operated by the City of Newport News, and the City of

Williamsburg's Waller Mill Reservoir. There are also two former reservoirs, Jones Pond and Big Bethel Reservoir, which formerly provided drinking water to Cheatham Annex and Langley Air Force Base respectively but are no longer active.



In order to ensure that water is safe to drink, the VDH and the EPA have set limits on the amounts of certain substances in water provided by water systems that serve the public. Community water suppliers are required to treat and test their water and provide the testing results to their customers in an annual water quality report, also known as a Consumer Confidence Report. According to the most recent (2021) reports prepared by NNWW, the Williamsburg Department of Public Works and Utilities, and the JCSA, all three water systems are in compliance with all VDH and EPA regulations. Aqua Virginia is subject to the same testing and reporting requirements, and none of these systems have any reported violations of state or federal drinking water standards.

Because the quality of surface water is directly related to land use, York County established the Watershed Management and Protection Area (WMP) overlay zoning district in 1985. The provisions of the WMP overlay district are intended to ensure the protection of watersheds surrounding current and potential public water supply reservoirs. The regulations seek to prevent the degradation of reservoirs from the operation or accidental malfunctioning of the use of land within the drainage area of water sources. The WMP provisions require that a 200-foot vegetated buffer be maintained from the edge of any reservoir or tributary stream. They also prohibit certain uses, such as feedlots, septic drainfields, and landfills, within 500 feet of the 200-foot buffer. In addition, the regulations require that any plan of development for property located within the WMP overlay district be accompanied by an impact study addressing water quality to ensure that the rate of surface water runoff from the site does not exceed pre-development conditions and that the quality of such runoff will not be less than pre-development conditions. The WMP provisions also apply to Jones Pond and Big Bethel Reservoir, even though they are no longer used as drinking water reservoirs.

Groundwater

Groundwater is directly related to surface water and is itself an important drinking water source. It is contained in the saturated pore spaces of sediments beneath the surface of the Earth. The underwater formations that yield water to wells are called *aquifers*. They store, disperse, and transmit water. Groundwater is generally replenished by precipitation on the land surface or downward seepage of water through overlying beds. The amount of water an aquifer contains depends on the porosity and permeability of the surrounding soils. Porosity refers to the amount of open space (voids) between the sands, silt, and gravel. Permeability is the ability of the soil to transmit water through the aquifer material. Sandy and gravelly soils can hold large amounts of water because there are larger and more connected spaces between the particles, whereas clay soils have small spaces that are not connected, making water passage difficult.

The groundwater flow system in the Virginia Coastal Plain is a multi-aquifer system generally flowing from west to east. Studies have identified at least seven major aquifers – three of them shallow and four deep – in York County. There are six hydro-geologic units comprising the shallow aquifer system, including three aquifers and three confining layers. The Columbia aquifer is the County's uppermost and is unconfined, its upper limit being the seasonally variable water table and its depth being at least five feet (5'). It is not the aquifer of choice for potable water because of its relatively low yields, poor water

quality, and susceptibility to contamination. There are some very shallow wells in the County still being used for potable water in older neighborhoods.

Deep aquifers include the Chickahominy-Piney Point aquifer and the Aquia Aquifer, which is not utilized much in eastern Virginia because the deposits are fine-grained and commonly contain a limy mud matrix and thin limestone beds. Deeper still are the Potomac Aquifers, which are capable of producing large quantities of good water suitable for most uses and supplies most major agricultural, commercial, domestic, industrial, and public water supply wells.

Newport News Waterworks operates three former York County production wells that serve various residential communities and commercial sites in the Banbury-Skimino-Lightfoot area of the upper County. The installation of the Lightfoot wells was approved by the State Water Control Board (SWCB) subsequent to computer modeling that indicated a minimal one-time draw-down of the water table would occur with the wells operating at approved production levels. These wells provide an average of 360,000 GPD (gallons per day) to Newport News Waterworks' Lightfoot system customers. Like the surface water provided by NNWW to York County customers, the drinking water provided by these wells is thoroughly tested and meets all state and federal standards.

The overall natural quality of the groundwater on the Peninsula is high. Large-scale human-induced contamination of the region's aquifers is not a problem. The major potential threats to groundwater quality are inefficient septic systems; leaking underground storage tanks; spills and improper disposal of hazardous material; leaking surface water impoundments; leaking landfills; improper application of pesticides and fertilizer; and saltwater intrusion. The most vulnerable aquifer in the County is the Columbia since it is shallow and unconfined. Deeper aquifers can be contaminated from downward migration, and the health and economic impacts on a community can be high. It is imperative, therefore, that groundwater be protected.

Although public water hook-up in the County is mandatory only in certain situations, the number of private wells used for potable water has decreased over time with the increased availability of public water. All *new* construction must be connected to public water if it is available, and as County-funded capital improvement projects continue to bring public water to existing neighborhoods, more residents are voluntarily abandoning private wells in favor of the public water system. The largest concentration of private wells in the County is in areas of Skimino and Lightfoot where public water is not available, including Schenck Estate (73 lots), Old Quaker Estates (99 lots), Skimino Landing Estates (115 lots), and properties along Barlow Road, Skimino Road, and Fenton Mill Road. Many years ago, lots without public utilities could be as small as 15,000 square feet. Under current zoning regulations, however, the minimum lot size for parcels without public water is one acre if public sewer available and two acres if public sewer is not available, except in the Resource Conservation (RC) zoning district, where the minimum lot size is five acres.

One potential threat to groundwater is contamination from leaking underground storage tanks. The DEQ's Underground Storage Tank (UST) Program works to prevent, monitor and clean up petroleum releases from storage tanks. Tank owners are required to register their regulated USTs with the DEQ. They are also required to operate and maintain their USTs to prevent releases and detect them quickly when they occur. The DEQ conducts over 1,500 facility inspections each year to ensure that tank owners and operators are maintaining their USTs properly. There are currently eight open cases of leaking underground storage tanks in the County that are being monitored and regulated by the DEQ through the LUST (Leaking Underground Storage Tank) program. One of these cases is located on the former Western Refining property on Goodwin Neck Road, one at the Naval Weapons Station, and the rest on residential properties with home heating oil tanks. Although inclusion on this list does not necessarily mean there is an active leak, it does mean that steps required to clean up the site are underway.

Hampton Roads is part of the Eastern Virginia Groundwater Management Area (EVGMA). As defined in the Code of Virginia, a groundwater management area is "a geographically defined groundwater area in which the [SWCB] has deemed the levels, supply or quality of groundwater to be adverse to public welfare, health and safety." First established in 2015 and then reestablished in 2020, the Eastern Virginia Groundwater Management Advisory Committee serves as an advisory committee to assist the State Water Commission and DEQ in the management of groundwater in the EVGMA. Committee members, who are appointed by the Director of the DEQ include representatives from: industrial and municipal water users; public and private water providers; developers and representatives from the economic development community; representatives of agricultural, conservation, and environmental organizations; state and federal agency officials; and university faculty and citizens with expertise in water resources-related issues.

Anyone pumping more than 300,000 gallons per month within the EVGMA is required to have a groundwater withdrawal permit through the Virginia Department of Environmental Quality (DEQ). Permit holders are required to create a groundwater mitigation program, where they are responsible for any adverse effects their pumping has on groundwater levels outside of their property lines. The regional groundwater mitigation program for Hampton Roads was created by the HRPDC to streamline the mitigation process for Hampton Roads citizens. Under this program, any homeowner or business who experiences a decline in their well water levels can seek financial mitigation from the localities and businesses with large groundwater permits that might have created the decline in well water levels.

In recent years, the rate of aquifer recharge in the EVGMA has generally not kept up with demand, resulting in declining water levels. This can increase the rate of land subsidence, which can lead to a loss of aquifer storage and increased saltwater intrusion. To address this issue, the Virginia Coastal Plain Groundwater Initiative (VCPGWI) was developed. As part of this initiative, the DEQ negotiated significant reductions in permitted withdrawal limits with the largest groundwater users in the EVGMA, which accounted for a combined total of about 80% of all permitted groundwater withdrawals in the EVGMA.[2] Another initiative that shows promise is the Hampton Roads Sanitation District's (HRSD) SWIFT initiative. SWIFT – Sustainable Water Initiative for Tomorrow – is an innovative water treatment initiative that will take highly treated wastewater through additional advanced water treatment to produce drinking quality water that will then be treated to match the existing groundwater chemistry and added to the Potomac Aquifer, which is the primary source of groundwater in eastern Virginia.

The VDH periodically conducts Shoreline Sanitary Surveys to identify and evaluate sources of pollution that have the potential to contaminate shellfish. The focus is on surface water pollution, but some of the information is also pertinent to an evaluation of groundwater conditions, especially those relating to shallow unconfined aquifers.

The County requires septic tank owners to have their systems pumped out every five years. This program assists in the proper functioning of on-site wastewater systems and thereby protects the groundwater and surface water. In addition, in the 1990s the County initiated an aggressive program to extend sanitary sewer to low-lying areas and other areas with failing systems which is based on a priority system driven by environmental and public health needs. Connection to public sanitary sewer in the County is mandatory wherever it is available.

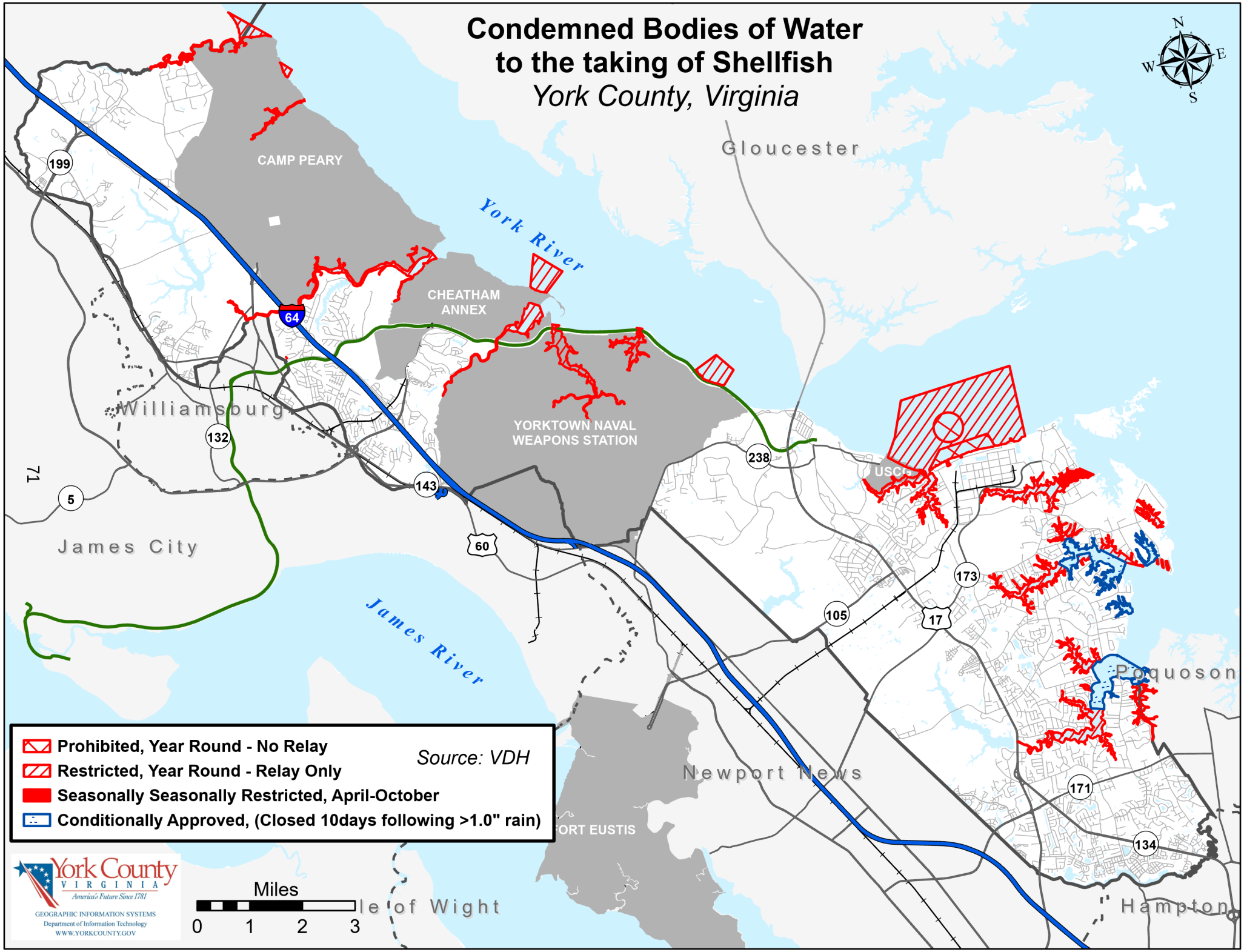
Brackish Water

The water quality of the York River and its estuaries located in York County is acceptable for full body contact. The tidal areas in the County are eligible for shellfish cultivation and growth. However, the VDH Division of Shellfish Safety has either permanently or seasonally closed some portions of shellfish

[2] Virginia Department of Environmental Quality, *Virginia State Water Resources Plan: A Report of Virginia's Water Resources* (January 2022), p. 110.

Condemned Bodies of Water to the taking of Shellfish

York County, Virginia



growing areas in Virginia because of the presence of either marinas, wastewater treatment facility discharges, or other seasonal activities affecting water quality. In York County, the following bodies of water, or portions thereof, are subject to harvesting restrictions or, in a few cases, prohibitions as depicted on the Condemned Bodies of Water map:

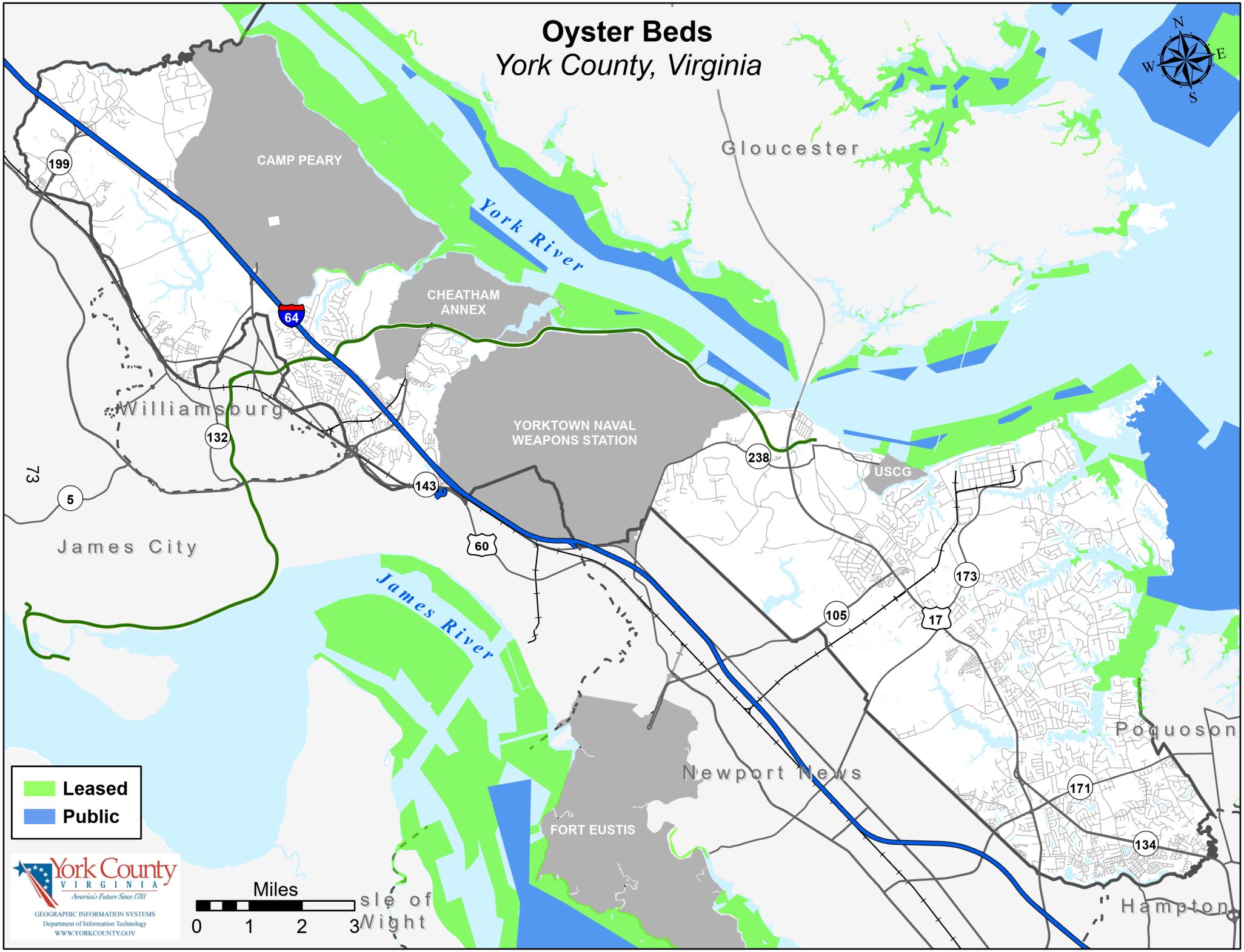
- Skimino and Carter Creeks
- Queen, King, Felgates Creeks and tributaries
- Indian Field Creek and vicinity
- Wormley Creek, Yorktown Refinery and vicinity
- Back Creek and tributaries
- Poquoson River and tributaries
- Back River and tributaries

There are more than 5,000 acres of leased oyster beds in the waters of York County. In addition to its economic benefits, oyster aquaculture benefits the aquatic environment by filtering nutrients and enhancing water clarity. A single adult oyster can filter up to fifty gallons of water per day when water temperatures are above 50 degrees Fahrenheit.[3] For these reasons, the VMRC strongly encourages the gardening and farming of oysters and clams. York County works cooperatively with state and federal regulators to address and encourage fisheries, backyard oyster gardening, and commercial aquaculture in appropriate areas. The County permits aquaculture as a matter of right as a principal use in the Resource Conservation, Water-oriented Commercial/Industrial, Limited Industrial, and General Industrial zoning districts. In addition, riparian shellfish harvesting is permitted as an accessory use in conjunction with residential uses as a matter of right in all zoning districts.

York County is home to many commercial and recreational fisheries that contribute to the local economy. Skimino Creek is a valuable nursery ground for white perch and striped bass. Queen Creek Marsh, which is the largest marsh creek wetland system in the County, is considered a major fish nursery. King and Felgate's Creeks are considered nursery areas for striped bass, white perch, and other species as are the fringing marshes of Indian Creek. Many of these creeks are located at least partly on military installations. Remaining lands adjacent to these creeks that are subject to development are subject to water quality requirements for stormwater runoff and the vegetated buffer requirements of the Chesapeake Bay Preservation Act. Studies also have shown that fish populations that spawn in freshwater creeks and migrate to the ocean are highly susceptible to the effects of urbanization, such as flow changes and pollution. Therefore, proper attention should be given to upland and waterfront development in these areas. Requests for dredging or filling in the wetlands and waterways adjacent to fish nursery areas should be discouraged.

According to VIMS, there are submerged aquatic vegetation (SAV) beds in certain sections of the York River in York County as shown on the SAV map. SAV, also referred to as underwater grasses or baygrasses, are underwater flowering plants that play an important role in the health of the Chesapeake Bay and other coastal waters. SAV beds of underwater grasses serve as a nursery habitat, providing food and refuge for blue crabs, young striped bass, bay scallops, waterfowl, and many other aquatic species.

[3] Virginia Coastal Zone Management Program, *Virginia Oyster Gardening Guide*, page 13.


Oyster Beds
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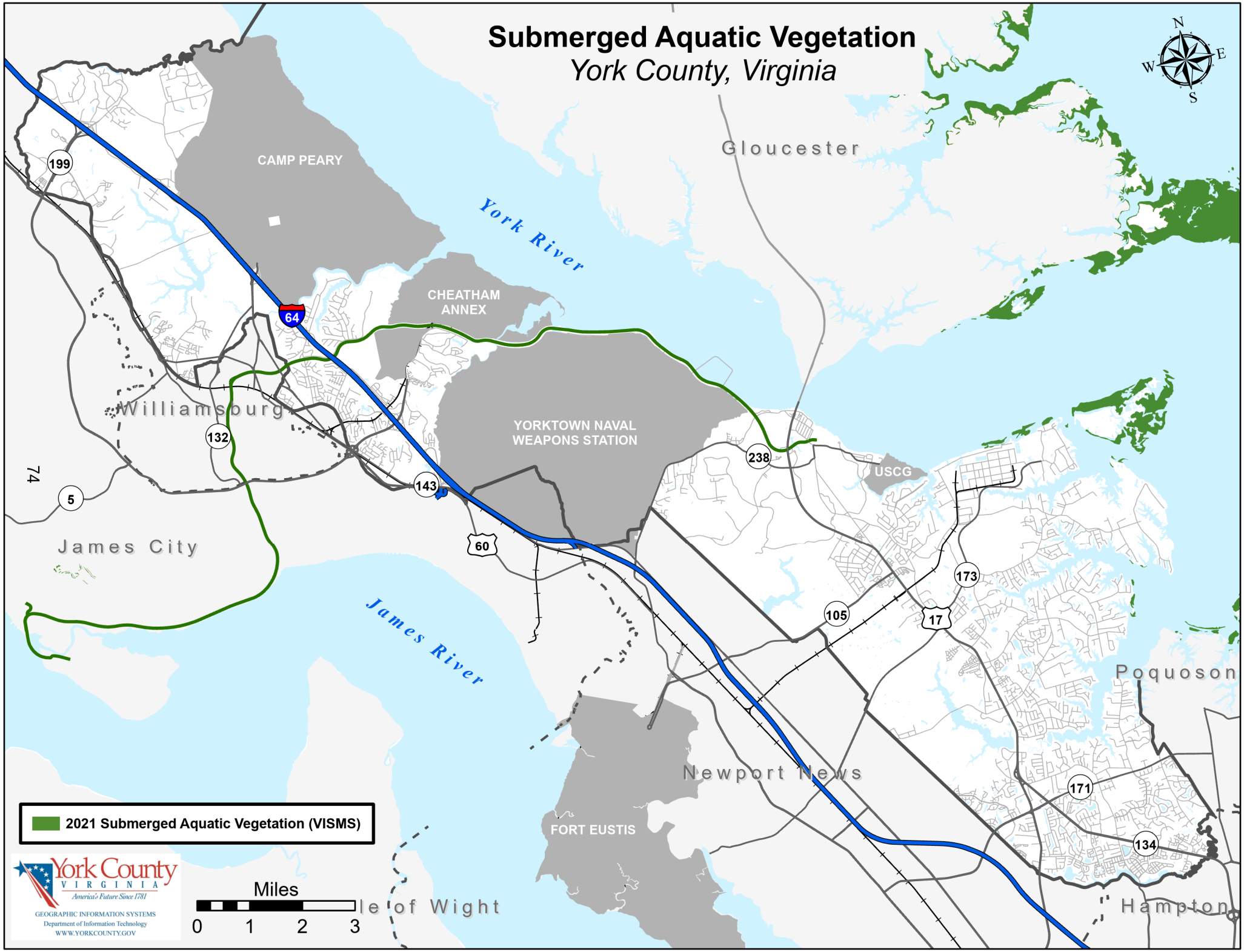
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2021 Submerged Aquatic Vegetation (VISMS)
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America's Future Since 1781
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Underwater grasses improve water quality by taking up nutrients, reducing shoreline erosion, trapping particles, stabilizing sediments, and adding oxygen to the water. York County recognizes SAV beds as critical living resources. Certain types of land activities can contribute excessive pollutants into adjacent waterways, degrade water quality, and thereby affect SAV habitats. The intensity of land use and the density of piers can affect the amount of boat traffic along waterways with SAV. Shoreline erosion control structures, especially bulkheads and revetments, can also negatively affect SAV beds.

The federal Clean Water Act, enacted in 1972, is intended to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." To achieve this goal, the initial Act considered point source discharges, which are regulated through Virginia Pollution Discharge Elimination System (VPDES) permits issued by the DEQ. The Clean Water Act prohibits the discharge of a pollutant into state waters without a VPDES permit. The DEQ issues individual permits to both municipal and industrial facilities. Permit requirements, special conditions, effluent limitations, and monitoring requirements are determined for each facility on a site-specific basis in order to meet applicable water quality standards. Permits have been issued for the following facilities in York County:

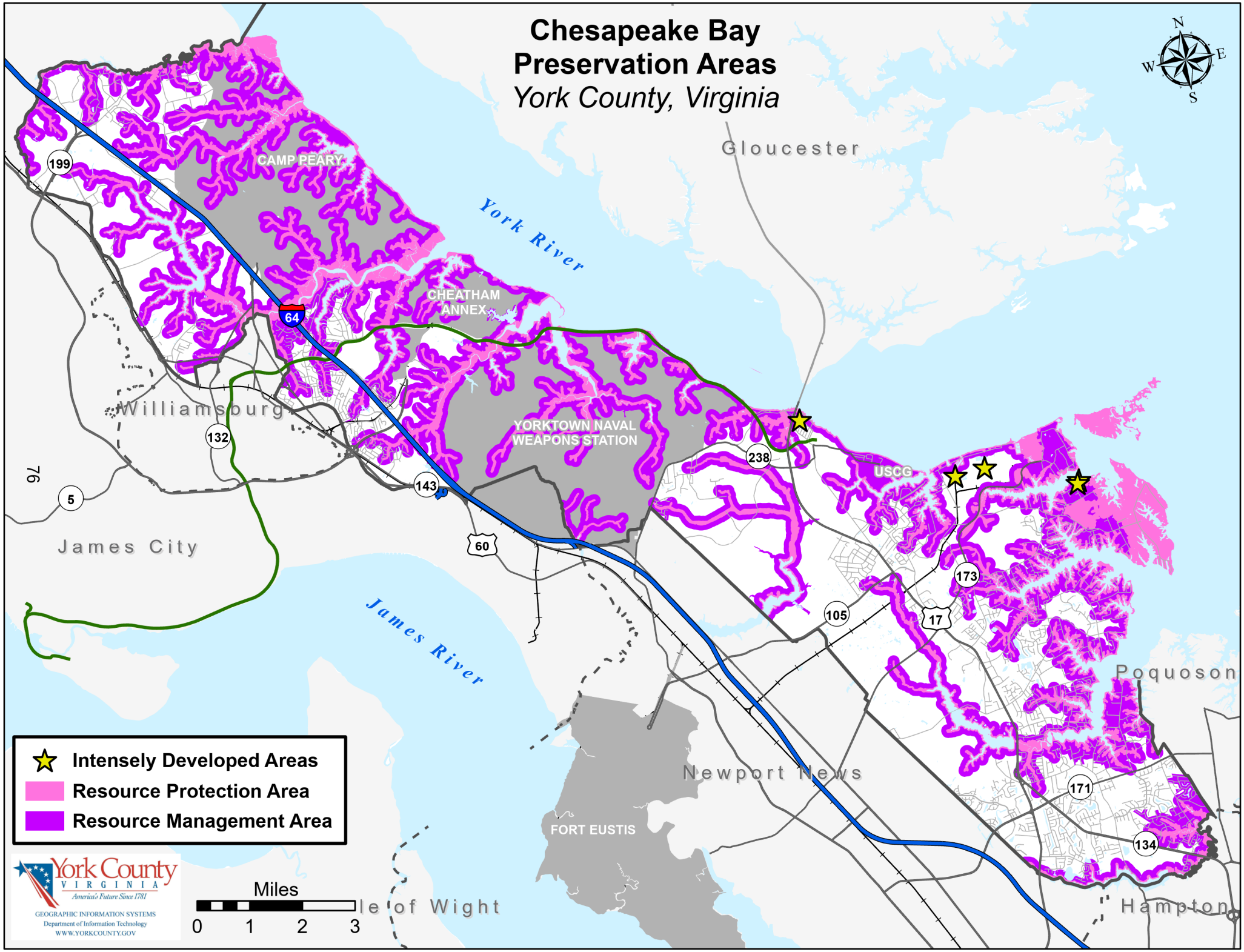
- HRSD York River Sewage Treatment Plant
- Newport News Waterworks Harwoods Mill Water Treatment Plant
- Plains Marketing LP Yorktown
- Water Country USA
- Dominion Energy Yorktown Power Station
- City of Williamsburg Water Filtration Plant

In 1987 the Clean Water Act was amended to include non-point sources (i.e., pollution from indirect sources such as stormwater runoff). Non-point source pollution in the lower York River basin comes from several sources, including residential, urban, and/or agricultural runoff, failing/inadequate septic systems, natural conditions and drainage and boat pollution from the surrounding public and private boat slips. The loss of protective vegetation and the increase in impervious surfaces (buildings, roads, and parking lots) increases the amount of stormwater runoff and also the levels of pollution and nutrients. In addition to sediment and nutrients, toxins are discharged, adding to the overall stress on the finfish and shellfish population.

Chesapeake Bay Preservation Act

In an effort to counteract the widespread degradation of the Chesapeake Bay, the Virginia General Assembly adopted the Chesapeake Bay Preservation Act (CBPA) in 1988. The purpose of the CBPA, which is a critical element of Virginia's non-point pollution source management program, is to protect and improve water quality in the Chesapeake Bay through the implementation of land use management practices. Though adopted by the General Assembly, responsibility for implementing the provisions of the Bay Act falls on local governments since the regulation of land use and development has traditionally been a function of local government.

York County incorporated the initial CBPA regulations into its Zoning Ordinance in 1990, revised them in 2004, and created a stand-alone Chesapeake Bay Preservation Area Ordinance in 2005 (Chapter 23.2 of the County Code). Certain areas of the County are designated as Chesapeake Bay Preservation Areas, which include a Resource Protection Area (RPA), a Resource Management Area (RMA), and Intensely Developed Areas (IDA). The RPA includes perennial bodies of water, tidal wetlands, adjacent non-tidal wetlands, tidal shores, and a 100'-wide vegetated buffer adjacent to and landward of these areas. The RMA abuts and is 500 feet landward of the RPA or to the extent of the 100-year floodplain, whichever is greater. The IDA is an overlay that encompasses designated areas with a significant amount of impervious surface. This classification warrants utilizing these already built areas to their highest and best use prior to converting undeveloped property. Areas that have been designated as IDAs by the


Chesapeake Bay
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YORKTOWN NAVAL WEAPONS STATION
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Intensely Developed Areas
Resource Protection Area
Resource Management Area
York County
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Board of Supervisors include the Yorktown village, Plains All-American, the Yorktown Power Station, Seaford Scallop, and Wells Ice and Cold Storage.

Standards for development in Chesapeake Bay Preservation Areas are designed to accomplish the following goals:

- Protect existing high-quality state waters,
- Restore all other state waters to a condition or quality that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them,
- Safeguard the clean waters of the Commonwealth from pollution,
- Prevent any increase in pollution,
- Reduce existing pollution, and
- Promote resource conservation in order to provide for the health, safety, and welfare of the present and future citizens of the County.

Special development standards are applied to Chesapeake Bay Preservation Areas to ensure that new development will not result in degradation of the Bay. The cornerstone of the Bay Act is the requirement for a 100-foot vegetated buffer from the edge of tidal shores, tidal and connected non-tidal wetlands, and perennial streams. For all development, the regulations require a site-specific in-field Natural Resources Inventory to locate unmapped perennial streams, wetlands, and other areas upon which a buffer is required. Requests for exceptions to the Chesapeake Bay regulations are considered by the York County Chesapeake Bay Board (CBB), which is a regulatory board of citizens appointed by the Board of Supervisors and charged with granting or denying requests to allow development in the RPA buffer. In evaluating such requests, the CBB, whose mission is "to protect and improve the water quality of the Chesapeake Bay and its tributaries by minimizing the impact of human activity on the waters within Chesapeake Bay Preservation Areas," seeks to balance the needs of the property owner with the protection of the RPA.

Total Maximum Daily Load (TMDL)

A TMDL (Total Maximum Daily Load) is the calculation of the maximum amount of a pollutant allowed to enter a waterbody to ensure that the waterbody will meet water quality standards for that particular pollutant. TMDL limits are established by the EPA for discharges to waters of the United States for various pollutants based on sampling and model scenarios from land use. These are established as part of the Clean Water Act and are assigned to waters impaired by pathogens, nutrients, sediments and metals. TMDLs are assigned by watersheds. York County drains to the York River, James River, and Coastal Basin/Chesapeake Bay watersheds. Within those watersheds are sub-watersheds that are smaller rivers or creeks, such as the Poquoson River to the Bay, Queen Creek to the York, and Baptist Run to the James. Pathogen or bacteria TMDLs have been assigned to the Poquoson and Back Rivers, and to Felgate's Creek, King Creek, Queen Creek, and Skimino Creek. The bacteria are in the form of fecal coliform from human waste (from septic tanks and sewage leaks and spills) and animal waste (from pets, agriculture, and wildlife).

In 2010 the EPA established TMDL limits on the entire Chesapeake Bay Watershed for those portions of Virginia, Maryland, Pennsylvania, New York, Delaware, West Virginia, and Washington D.C. that drain to the Bay. This required the six states and the District of Columbia to prepare Watershed Implementation Plans (WIPs) to address how the pollutants would be reduced in accordance with specific numerical goals. This is partly because the original Bay Act only addressed new development in the preservation areas. The states and localities are now required to address pollutants from areas developed prior to the act or not treated for water quality before 2009. Meeting these pollution reduction goals will require water quality retrofits.

Reductions from point sources such as treatment plants and industrial sites as well as non-point source pollution from stormwater, agriculture, and septic systems are all expected to help meet these pollution reduction goals. The main sources in the County have been and continue to be addressed through capital improvement projects to bring public sanitary sewer to developed areas currently served by septic systems and to implement stormwater improvement retrofit and stream restoration projects. There are three sewer extension projects in the adopted Capital Improvements Program (CIP) for FY 2023 through FY 2028 that will provide public sewer to a combined total of approximately 215 properties currently served by on-site septic tanks at an estimated total cost of $12 million:

- Schenck Estate Area – 75 properties
- Big Bethel Road Area – 60 properties
- Whites Road/Faulkner Road Area – 80 properties

In addition, there are twelve stream restoration and other stormwater improvement projects in the adopted CIP, with a combined cost of $12,200,000, which are listed in the Stormwater Management section of the Environment element.

Furthermore, the VDH's adoption of stringent separation requirements between groundwater and drainfields will also help lower the bacteria counts and improve water quality. Alternative on-site sewage disposal systems approved by the VDH and permitted by the revised Chesapeake Bay regulations may also be used to replace failing septic systems.

Docks and Piers

There are approximately 1,200 docks and piers in the County, most of them in the lower County along protected creeks and coves. Potential environmental impacts of small private piers include shading, displacement of aquatic life, increased turbidity, temporary impacts from construction, and impacts relating to motorized boat use. While the individual impact of a single dock may be relatively small, the cumulative impacts of multiple docks and piers can be significant.


Seaford Yacht Club on Back Creek

York County operates public boat launching facilities at Back Creek Park, the Old Wormley Creek Landing, Riverwalk Landing, and the Rodgers A. Smith Landing, as well as a canoe/kayak launch site at New Quarter Park. Additional public access sites are increasingly difficult to find, but there may be future opportunities for the County to pursue the acquisition of available surplus government lands that would enhance public access, or even to consider the acquisition of private property. These are discussed in detail in the Public Facilities element of this Plan, but it is important to note that the environmental impacts of additional access should be considered in the siting and design of any new facilities. Future public access points, both public and private, must be sited and developed in accordance with guidelines issued by the VMRC. In the past twenty years, the County has improved public access to the water through the Yorktown Revitalization project, including the Riverwalk (a pedestrian facility along Yorktown Beach) and replacement of a public wharf and pier with two deep-water piers. The piers accommodate deeper draft and large vessels, such as tall ships and dinner cruise boats. Facilities are also provided for the docking of small pleasure boats for day-trippers and an observation deck for pedestrians. The revitalization project also included beach stabilization, plantings

and nourishment as well as the retrofitting of stormwater facilities to reduce pollutant-loading from the contributing upstream development.

Wetlands, Dunes, and Beaches

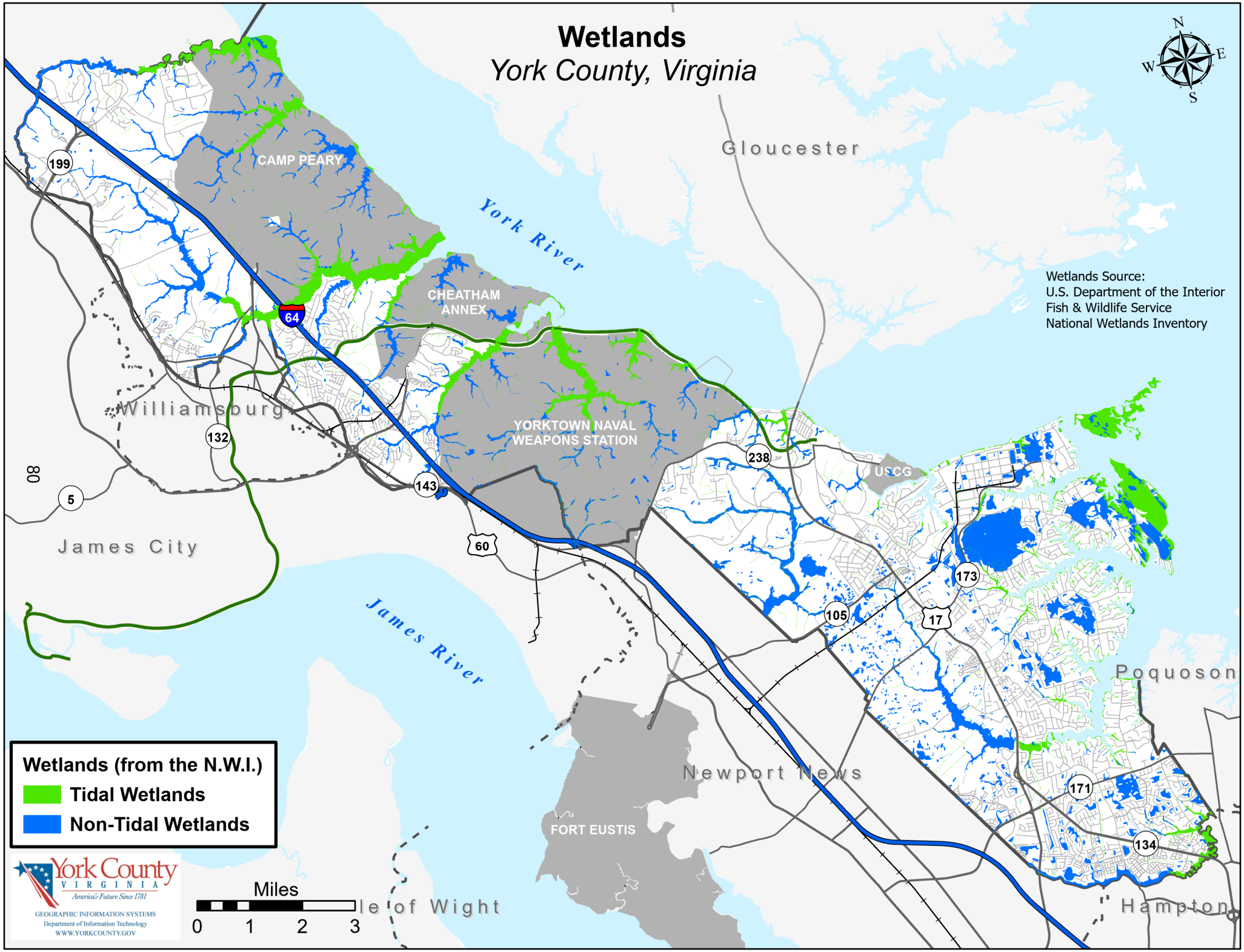
Wetlands are commonly associated with swamps and marshes. Although most often considered to be located in tidal areas, they are also found along the floodplain, in waterways of various types, and in sheltered areas along inter-tidal coasts. Non-tidal wetlands can occur wherever there is, for at least a portion of the growing season, sufficient water to support hydrophytic plants and hydric soils. Wetlands are a unique and important ecosystem performing valuable functions.

The general areas of tidal and non-tidal wetlands in York County are shown on the National Wetlands Inventory Map. This data is derived from the mapping provided by the U.S. Fish and Wildlife Service, which developed the National Wetlands Inventory (NWI) maps and wetlands classification system. The NWI wetlands boundaries are derived from aerial photography and are, by necessity, broad brush boundaries. Delineation by a wetlands scientist and verification by the Army Corps of Engineers is necessary to determine with certainty whether or not wetlands exist on a property. Many of the County's wetlands, including the Grafton Ponds and the Goodwin Islands, are considered to be unique environmental features and are described by the Virginia Department of Conservation and Recreation in the *Natural Areas Inventory of the Lower Peninsula of Virginia*. The Grafton Ponds are non-tidal isolated freshwater wetlands located mostly on property owned by the City of Newport News, which manages the area as a part of its water supply network. The Goodwin Islands, which are owned by the College of William & Mary and managed as a Natural Estuarine Research Reserve, comprise the County's largest tidal wetland community. They are described by VIMS as a 777-acre archipelago of salt-marsh islands surrounded by inter-tidal flats, extensive submerged aquatic vegetation (SAV) beds, a single constructed oyster reef and shallow open estuarine waters.

Management of tidal and non-tidal wetlands in York County involves federal, state, and local regulatory entities. For any work occurring in a wetland area, a Joint Permit Application (JPA) must be submitted to the VMRC for distribution to the York County staff and Wetlands Board, the DEQ, the U.S. Army Corps of Engineers, and other regulatory agencies.

The goal of the Virginia wetlands program is to achieve "no net loss" of wetlands acreage and function. Furthermore, in order to ensure that non-tidal wetlands regulations are enforced, the Zoning and Subdivision Ordinances require notification of regulatory agencies if wetlands exist or are thought to exist on a site on which development is proposed.

The York County Wetlands Board enforces the County's tidal Wetlands Ordinance and has jurisdiction from mean low water to 1½ times the tide range. Requests for shoreline erosion control measures to protect actively eroding shorelines are typical of the projects reviewed by the Wetlands Board. York County recognizes the scientific research, which indicates that conventional shoreline erosion control structures like bulkheads and riprap limit the ability of the coastal ecosystem to perform many of the essential environmental functions. Wetlands are drowning in place as sea level rises and barriers to inland migration have been created by the construction of bulkheads and revetments. The continued armoring of shorelines will threaten the long-term sustainability of coastal ecosystems under current and projected sea level rise. As an alternative to bulkheads and revetments, the Wetlands Board has been promoting "living shorelines" since the 1980s. Living shoreline projects used to consist of planting wetlands vegetation to provide natural shoreline erosion control. Today, a wide range of living shorelines options – ranging from plantings and coir logs to the use of rock sills and breakwaters in combination with beach nourishment – are available to address various energy settings and erosion problems. Living shoreline projects minimize the impact on the natural ecosystem and on wetlands. The Wetlands Board requires that any impacts on vegetated tidal wetlands be avoided if at all possible in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Wetlands Source:
U.S. Department of the Interior
Fish & Wildlife Service
National Wetlands Inventory
Wetlands (from the N.W.I.)
Tidal Wetlands
Non-Tidal Wetlands
York County
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America's Future Since 1781
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accordance with Virginia's "no net loss" policy. Any unavoidable impacts on tidal wetlands require mitigation to meet the "no net loss" of wetlands goal.

There are beaches and remnant dunes in the County, mostly along Bay Tree Beach, York Point, and the York River shoreline. The General Assembly passed the Coastal Primary Sand Dune Protection Act (The Dune Act) in 1980, which authorized nine cities, counties, and towns in the Tidewater area to adopt coastal primary sand dune ordinances. In 2008, the General Assembly extended this authorization to all Tidewater localities, including York County and the rest of Hampton Roads. The County has not adopted the ordinance, so anyone proposing a project affecting a beach or dune must apply to the VMRC for a permit.

COASTAL RESILIENCY

York County is a coastal community that has been shaped by and is dependent on its surrounding bodies of water. The York River and the Chesapeake Bay have served as vital resources for the County since its founding, supporting the local economy, tourism, history, recreation, and ecosystems. The numerous benefits of being a coastal community do, however, come with a set of challenges. Given the largely flat and low-lying coastal topography throughout the region, complications from severe storms, flooding, and shoreline erosion have long adversely affected the County and Hampton Roads. The threat of these coastal challenges is expected to grow as a result of projected relative sea level rise (SLR), more intense severe storms, and changing precipitation patterns. SLR also introduces the problem of significant loss of land and property to open water gradually over the next 80 years.

Sea Level Rise

The Hampton Roads region has the fastest rising sea levels on the east coast and nationwide is second only to New Orleans, Louisiana.[4] This is attributable to relative SLR, which accounts for additional factors beyond global SLR. Global SLR is the overall increase in the quantity or volume of water in the oceans, which is caused primarily by glacier melt. Land subsidence from sediment compaction and the extraction of subsurface liquids, such as water, is also contributing to SLR in Hampton Roads. Lastly, changes in oceanic circulation are also causing relatively higher sea levels in the area. The Gulf Stream is slowing down as the entrance of freshwater into the ocean creates an imbalance, allowing more water to remain in the Mid-Atlantic.

Monthly average sea level data compiled by NOAA from the tide gauge at the U.S. Coast Guard Training Center between 1950 and 2020 is depicted in **Figure 1** below. As the figure shows, the sea level in Yorktown has been rising at an average rate of 4.9 millimeters per year, which is equivalent to an increase of 1.61 feet over a 100-year period.[5]

[4] Tompkins, C. F., & DeConcini, C. (2014, June 24). *Sea-Level Rise and its Impact on Virginia*.

[5] Hampton Roads Hazard Mitigation Plan, June 2022

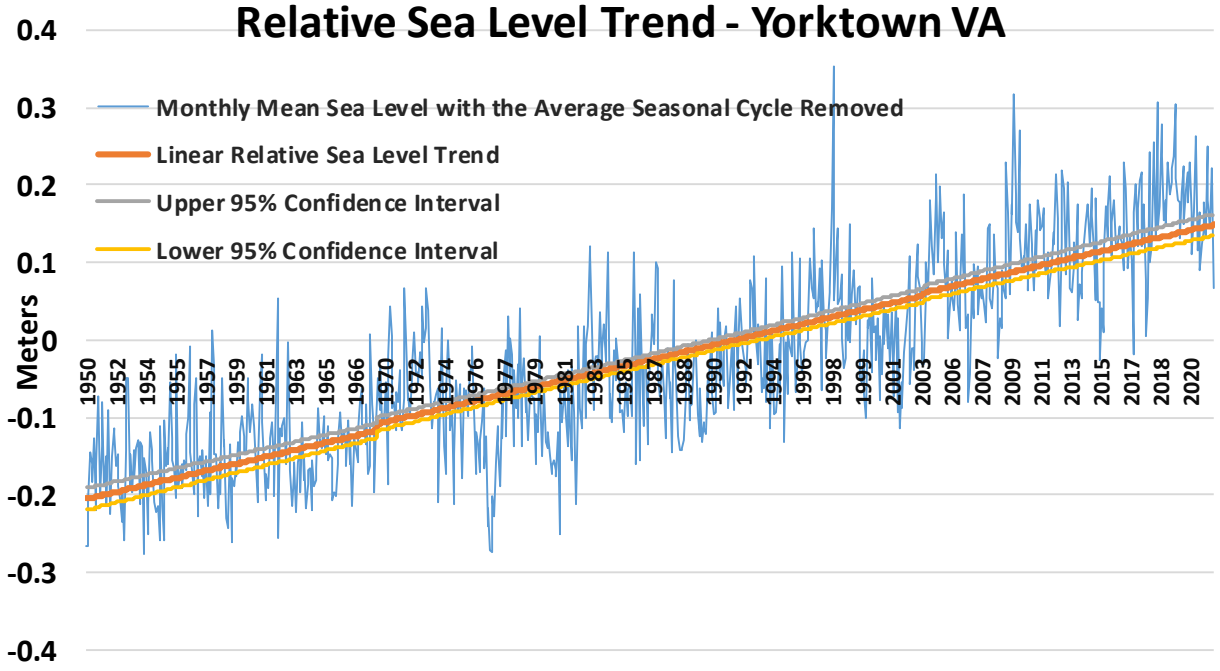


Figure 1

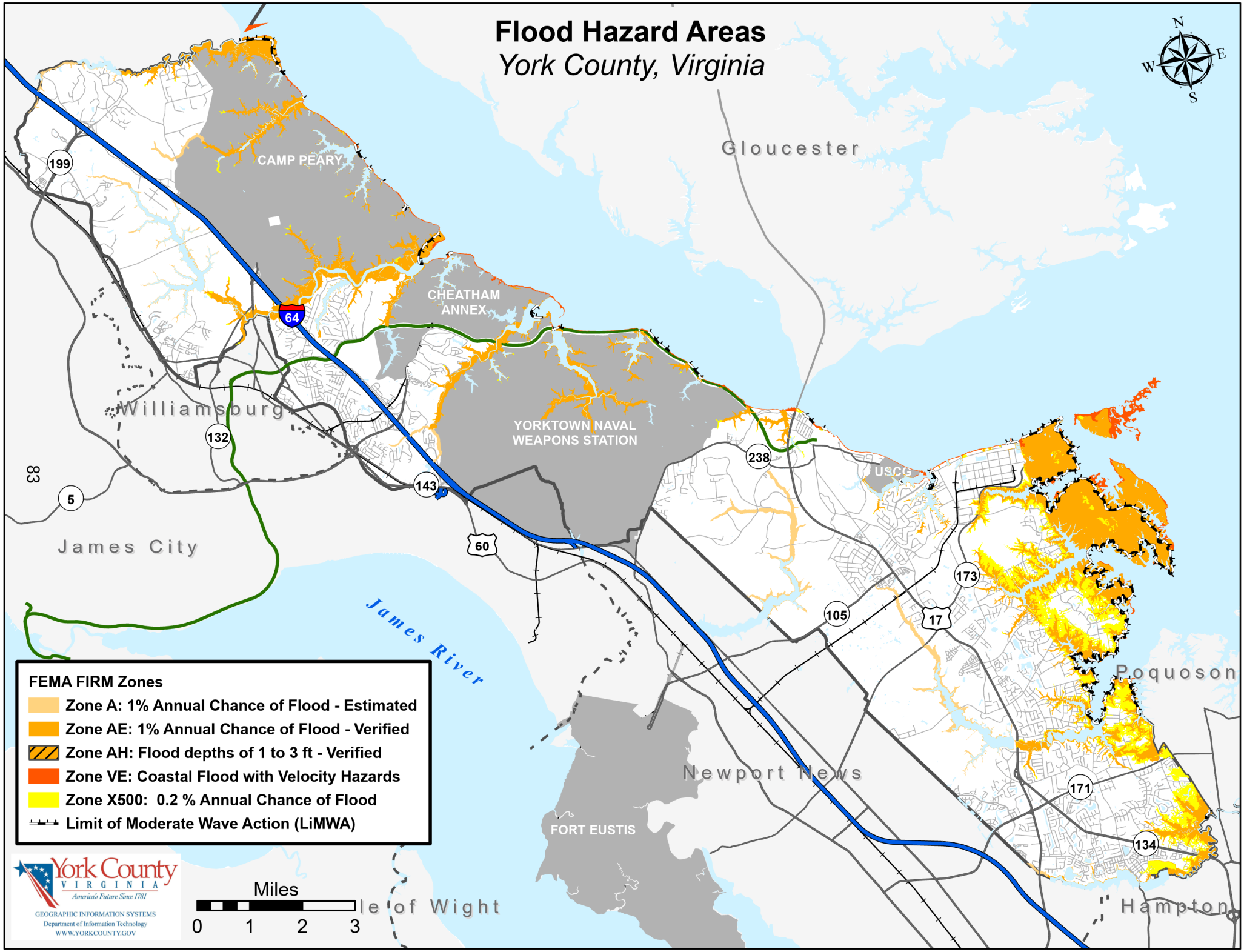
In response to these growing threats to coastal communities, the General Assembly amended the Code of Virginia in 2015 to require localities in the Hampton Roads region to incorporate strategies to combat projected SLR and recurrent flooding into their comprehensive plans. In addition, in 2018 then-Governor Northam issued Executive Order 24, which, among other things, designated a Chief Resilience Officer for the Commonwealth, directed the creation of the Virginia Coastal Resilience Master Plan (VCRMP), and provided for state assistance and guidance to coastal localities. In addition, the Hampton Roads Planning District Commission (HRPDC), the Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers (USACE), Virginia Institute of Marine Science (VIMS), and many other federal, state, and private organizations continue to research and provide guidance and resources.

Flooding

York County has many near-shore areas characterized by low and relatively flat terrain that are highly vulnerable to coastal flooding. Throughout the County, many areas already experience flooding, and the potential hazard from flooding will grow gradually as the sea level rises. "As sea levels rise, flood hazards will worsen in two important ways: floodplains will expand while floodwaters deepen. As a result, the types of coastal flood impacts that may be considered 'rare' and 'extreme' today will become more frequent in the future. Similarly, normally dry land will be inundated permanently and effectively 'lost' if no mitigating actions are taken and ecosystems, like marshes and wetlands, are unable to migrate."[6]

York County participates in the National Flood Insurance Program (NFIP), which enables property owners to obtain flood insurance through the private insurance industry. Communities participating in the NFIP have established plans and adopted regulations to lessen potential losses from flood damage. These NFIP regulations apply to those portions of a locality that are within the 100-year floodplain,

[6] *Virginia Coastal Resilience Master Plan*, Phase One, December 2021, p. 57


Flood Hazard Areas
York County, Virginia
N
W
E
S
CAMP PEARY
CHEATHAM ANNEX
YORKTOWN NAVAL WEAPONS STATION
USCG
FORT EUSTIS
Gloucester
Williamsburg
James City
Newport News
Poquoson
Hampton
Isle of Wight
James River
199
64
132
143
60
238
105
173
17
171
134
5
83
FEMA FIRM Zones
Zone A: 1% Annual Chance of Flood - Estimated
Zone AE: 1% Annual Chance of Flood - Verified
Zone AH: Flood depths of 1 to 3 ft - Verified
Zone VE: Coastal Flood with Velocity Hazards
Zone X500: 0.2 % Annual Chance of Flood
Limit of Moderate Wave Action (LiMWA)
York County
VIRGINIA
America's Future Since 1781
GEOGRAPHIC INFORMATION SYSTEMS
Department of Information Technology
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Miles
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which are those areas subject to inundation by the 100-Year Flood (a flood level with at least a 1% chance of being equaled or exceeded in any year). The Flood Hazard Areas map shows those areas of the County identified by FEMA as being located in a flood hazard area. It is broken down into flood zone areas based on the degree of risk. FEMA recently updated the National Flood Insurance Program's (NFIP) risk rating methodology through the implementation of a new pricing methodology called Risk Rating 2.0. The methodology leverages industry best practices and cutting-edge technology to enable FEMA to deliver rates that are sound, equitable, and easier to understand, and that better reflect a property's flood risk. As of 2022, Risk Rating 2.0 has been fully implemented.

In an effort to reduce losses from flooding, York County participates in the FEMA Community Rating System (CRS), which is an NFIP program that provides incentives for participating communities to undertake activities that reduce flood hazard risk. The CRS grants property owners a reduction in their flood insurance premiums in recognition of various flood mitigation efforts made by the locality. The system awards points for different actions taken by the locality; reaching higher point thresholds corresponds to a lowering class designation. Classes range from 10 to 1, with Class 1 requiring a minimum of 4,500 points and providing a 45% discount. York County, which is one of 27 Virginia communities participating in the CRS, is currently a Class 7 locality, which provides a 15% discount.

York County regulates development in flood hazard areas through the Floodplain Management Area (FMA) overlay district provisions set forth in Section 24.1-373 of the Zoning Ordinance. The standards for new and substantially improved residential structures use the three-foot (3') freeboard requirement for construction in flood-prone areas. In other words, the elevation of the lowest floor of the structure, including basements, must be constructed three feet (3') above the base flood elevation, which is the water level that would be reached in the event of a 100-year flood. Non-residential structures must either have the lowest floor elevated or be designed to be watertight.

Flooding is at its most extreme when it occurs as storm surge. Storm surge, as defined by NOAA is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. It is produced by water being pushed toward the shore by the force of the winds moving cyclonically around the storm. Storm surge is also known as an extreme sea level (ESL) event that is temporary and is projected differently than long-term SLR, although many of the affected areas are the same. A County analysis found that a six-foot (6') storm surge, probable to occur in a low-category hurricane, would flood over 1,700 homes, 32 miles of roadway, and approximately 4,000 acres. Projected SLR and stronger severe storms heighten the risk of devastating storm surge in the County.

Shoreline Erosion

Coastal ecosystems reside at the interface between the land and water, and are naturally very complex. They perform a vast array of functions by way of shoreline stabilization, improved water quality, and habitat for fish – all of which yield direct and indirect benefits to humans.

York County has a diverse shoreline that consists of both sheltered fine and coarse sand beaches, exposed and sheltered tidal flats, fringing intertidal and supratidal marshes, and other freshwater marshes and swamps. Shoreline erosion is a naturally occurring process that affects all aspects of the County shoreline to varying degrees. Coastal erosion occurs when forces, such as storms, tides, and SLR cause the boundary between land and water to move inland. Excessive erosion often contributes to the sedimentation and pollution of streams, rivers, and the Chesapeake Bay, resulting in the loss of wildlife habitat and reduced water quality, and when severe, threatening property. The process of erosion and shoreline retreat can be accelerated by stormwater runoff and SLR.

York County encompasses approximately 235 miles of tidal shoreline. The upper County drains via a system of streams and rivers to the southern reach of the York River. This area is characterized by rolling terrain with well-drained soils and elevations up to one hundred feet (100') or more above Mean Sea

Level. The lower County, where most of the topography is characterized by low flat lands, drains via a system of creeks and rivers to the Chesapeake Bay.

The impacts of natural and human activities on the shoreline can be measured by erosion rates, which are used to determine the most appropriate method to address erosion. In York County, the western shore of the Chesapeake Bay presents a unique challenge. The two areas with severe erosion are the Bay Tree Beach/York Point area and the Waterview Road area (west of the entrance to the Thorofare), both of which historically experience moderate to severe erosion rates of up to 3.5 feet per year. Although there is residential and industrial development along both of these shorelines, the erosion does not appear to be associated with the development. The erosion is due in large part to wave action associated with the physical alignment of the shore and prevailing storms.

The rate of erosion in the remainder of the County and along the York River is slight to moderate. The shoreline at the mouth of the river is vulnerable to the high-energy waves generated by the dominant northeast storms. Along this shoreline are the Yorktown historic area and beach, where the County undertook a major beach nourishment and shoreline stabilization project as part of the Yorktown revitalization. In addition, the National Park Service has been pursuing projects to stabilize the shoreline along its property adjacent to the Colonial Parkway.


A living shoreline project in York County

Coastal ecosystems will also be significantly affected by SLR, and some traditional coastal erosion protection practices have further threatened these important ecosystems. Much of the land affected by SLR consists of wetlands, which filter and improve water quality, and serve as the first line of defense protecting against erosion and flooding. As the sea level rises wetlands are being submerged and lost to open water, while coastal development, bulkheads, and revetments prevent the ecosystems inland migration. Non-living shoreline defense and construction in vulnerable coastal areas threaten the long-term sustainability of coastal ecosystems under SLR projections.

The County seeks to protect shoreline property in a cost-effective manner that preserves and enhances shoreline resources, water quality, wetlands, and wildlife habitat. Both the Wetlands Board and the VMRC strongly favor *living shorelines* over riprap revetments and bulkheads. As described in the *Virginia Coastal Resilience Master Plan*, "Living shorelines are created through the strategic placement and management of plants, stone, sand fill, and organic structural materials that collectively stabilize shorelines, control erosion, and attenuate floodwaters, as well as provide recreation opportunities."[7] Maximizing the vegetated buffer in accordance with the provisions of the Chesapeake Bay Preservation Act reduces the need for structural controls that are only a temporary correction for erosion problems. Adaptive living shorelines, with local, site-appropriate mixes of natural and structural defenses are stabilization methods in some instances, justification must be provided to the VMRC documenting the reasons why a living shoreline is not an effective solution.

Future development and redevelopment should be directed away from receding and eroding shorelines to areas that can be developed without adversely affecting water quality and threatened coastal ecosystems. Strengthening storms, increasing flooding, and SLR will accelerate coastal erosion and retreat in the future. Preserving and developing natural and hybrid barriers will slow the rate of erosion

[7] *Virginia Coastal Resilience Master Plan*, p. 171.

and reduce flooding impacts experienced in the County, protecting people, homes, properties, and ecosystems.

Section 15.2-2223.2 of the Code of Virginia requires all localities in Tidewater[8] to include in their comprehensive plans guidance prepared by VIMS regarding coastal resource management and, more specifically, guidance for the appropriate selection of living shoreline management practices. This legislation established the policy in Virginia that living shorelines are the preferred alternative for stabilizing eroding shorelines. This guidance explicitly outlines where and what new shoreline best management practices should be considered where coastal modifications are necessary to reduce shoreline erosion and protect fragile coastal ecosystems. It applies a decision-tree method using a mapping database that will be updated from time to time, and a digital geographic information system model created by VIMS. The VIMS guidance and recommendations were first referenced in the 2013 Comprehensive Plan, *Charting the Course to 2035*, and are referenced herein.

PLANNING ISSUES FOR THE FUTURE

The next twenty years are expected to bring more than 4,000 new homes to the County, housing over 10,000 more residents. In addition, the HRTPO's 2040 *Long-Range Transportation Plan* predicts there will be another 78,000 vehicles on the Peninsula, almost 15,000 of them in York County.[9] This means more traffic and – at least in the short term – more vehicle emissions, more road lane mileage, and more impervious surface. If not properly managed and regulated, growth and development can stress the delicate balance between the natural environment and the built environment. The need for strict attention to environmental protection is heightened by the fact that much of the remaining vacant land in the County contains environmentally sensitive features such as wetlands, steep slopes, and streams that flow into the various creeks and waterways and ultimately to the York River, the Chesapeake Bay, and the reservoirs on which most County citizens rely for their drinking water.

As noted earlier, there are myriad federal and state agencies that promulgate and administer a variety of regulations to prevent degradation of the environment. However, local government also has a key role in protecting the environment through the regulation of the development and use of land. Not only is land an important natural resource in and of itself, but its development and use also have a significant effect on air and water quality.

Land development is governed by various chapters of the County Code – including the Zoning, Subdivision, Chesapeake Bay, Stormwater Management, and Erosion and Sediment Control Ordinances – that contain provisions to ensure the proper use, management, and protection of the vast amounts of sensitive and unique lands that contribute to the economy of the region, and the environmental quality of the County. The various environmental regulations, many of which are dictated by the state and federal governments, are intended not to prohibit development but to ensure that it is sensitive to the natural environment. Development and protection of the environment are not mutually exclusive goals. *Open space* or *cluster* subdivisions are a good example of a development technique that helps to preserve the intricate balance between the natural and built environment. In a cluster development, at least 40% of the gross land area is set aside and reserved as common open space for the use and enjoyment of the residents. This allows for better protection of environmentally sensitive areas by designating them as open space to be properly maintained by the homeowners' association rather than

[8] As defined in the state code, Tidewater includes the Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King and Queen, King George, King William, Lancaster, Mathews, Middlesex, New Kent, Northampton, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland, and York, and the Cities of Alexandria, Chesapeake, Colonial Heights, Fairfax, Falls Church, Fredericksburg, Hampton, Hopewell, Newport News, Norfolk, Petersburg, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach, and Williamsburg.

[9] Hampton Roads Transportation Planning Organization, *Hampton Roads 2040 Socioeconomic Forecast and TAZ Allocations*, October 2013

including them within platted residential lots. The York County Zoning Ordinance permits cluster subdivisions as a matter of right in all single-family residential zoning districts, and the vast majority of subdivisions in recent decades were developed utilizing this technique. Currently, a minimum of ten acres are required for a cluster subdivision; as the availability of larger tracts of land decreases, a reduction to five acres may be warranted to promote more open space preservation.

In addition to regulating private development, York County is proactively involved in protecting the natural environment through various types of capital improvement projects, and these efforts will need to continue in the years ahead in order to meet state, federal, and local environmental goals. For example, in order to achieve nutrient and sediment reductions that are needed to restore the Chesapeake Bay and its tidal tributaries, the County is obligated to meet established TMDL targets that are established by the EPA. The state's Watershed Implementation Plan (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. With the following five projects, which had a combined construction cost of $4 million, York County achieved – and, in fact, greatly exceeded – the mandated 5% reduction:

- Regional Stormwater Pond at the McReynolds Athletic Complex
- Edgehill South Stream Restoration
- Cook-Falcon Drainage Improvements, Phase 1
- Cook-Falcon Drainage Improvements, Phase 2
- Dare Elementary School Stream Restoration and Wetlands

These five projects achieved a total reduction of approximately 25%, leaving 20% in excess that will be applied to meeting the mandated Phase II reduction of 35%. In addition, the following projects, which are either completed or underway, will help the County to achieve the future reduction targets of 35% by July 1, 2023, and 60% by 2028.

- Siege Lane Stormwater Pond Retrofit
- Charles Brown Park Stream Restoration
- Poquoson River Headwaters Stream Restoration
- Greensprings Stream Restoration
- Goodwin Neck Road Stream Restoration
- Bypass Road Stream Restoration
- Victory Industrial Park/Route 17 Pond
- Marlbank Cove Ravine
- Queens Lake Ravines/Streams
- Middlewood Lane
- Panther Paw Stream Restoration

Another part of the County's pollutant reduction efforts for the Chesapeake Bay TMDL is the ongoing septic-to-sewer conversion program. For several decades the County has had an aggressive program for extending sanitary sewer to unserved areas, with the highest priority typically placed on areas of the County that have one or more of the following characteristics:

- Shallow aquifer system susceptible to contamination from septic systems,
- Close proximity to fresh water systems,
- Close proximity to the Chesapeake Bay or tributaries, and
- Low potential for new development.

Sewer extension projects are funded through several sources of revenue including the connection fees charged to the residents receiving service, connection fees charged to developers, and one-half of the revenue generated by the County meals tax. By targeting public sewer extensions toward

environmentally sensitive areas and reducing the overall number of individual septic systems in the County, this ongoing program is the most effective means of preventing septic system pollution. Between 2009 and 2020, County-funded sewer extension projects have eliminated more than 1,100 septic systems. Funding has been programmed over the next six years to extend sanitary sewer to the Schenck Estate area, the Big Bethel Road area, and the Whites Road-Faulkner Road area. These projects will extend sewer to approximately 215 homes at a total estimated cost of almost $13 million.

Planned sewer and stormwater improvement projects, together with carryover credits from the 2023 reductions in excess of 35% are expected to be sufficient to enable the County to achieve its 2028 TMDL goal of a 60% reduction. Whether or not additional TMDLs from the EPA will be forthcoming is unknown, but it is likely that additional projects will be needed in the future to restore the Chesapeake Bay and its tributaries. In addition to infrastructure improvements, technology offers another potential strategy through the HRSD's SWIFT initiative, which will inject highly treated wastewater into the aquifer. Since this wastewater would otherwise be discharged into the York, James, or Elizabeth Rivers, this process will help the Bay by significantly reducing the nutrients, such as nitrogen and phosphorus, that HRSD discharges to these waterways.

Using the purified water to recharge the aquifer will also help to create a sustainable source for groundwater replenishment and protect groundwater from contamination that can be caused by saltwater intrusion. This purified water will be treated to be compatible with the existing water in the aquifer to ensure seamless integration into the system and introduced by recharge wells drilled at seven HRSD treatment plant sites, including the York River Treatment Plant on Back Creek Road. Recharge wells store water for future use by placing it deep underground into formations below the shallow soil layer. This is important because the Potomac Aquifer is not recharging sufficiently to offset the current rate of groundwater withdrawals, and the demand for groundwater is projected to increase. According to the 2022 *Virginia State Water Resources Plan* prepared by DEQ, demand for groundwater in the Lower York Minor Basin, which includes almost all of York County, is projected to increase by 1.98 MGD (Million Gallons per Day), most of which – 1.31 MGD – is attributable to increases for Gloucester County's water treatment plant and JCSA's Central System (see **Figure 2**). A comparatively small proportion of the increased demand for groundwater – 0.03 MGD – will be driven by the Skimino-Banbury-Lightfoot well systems in upper York County.[10]

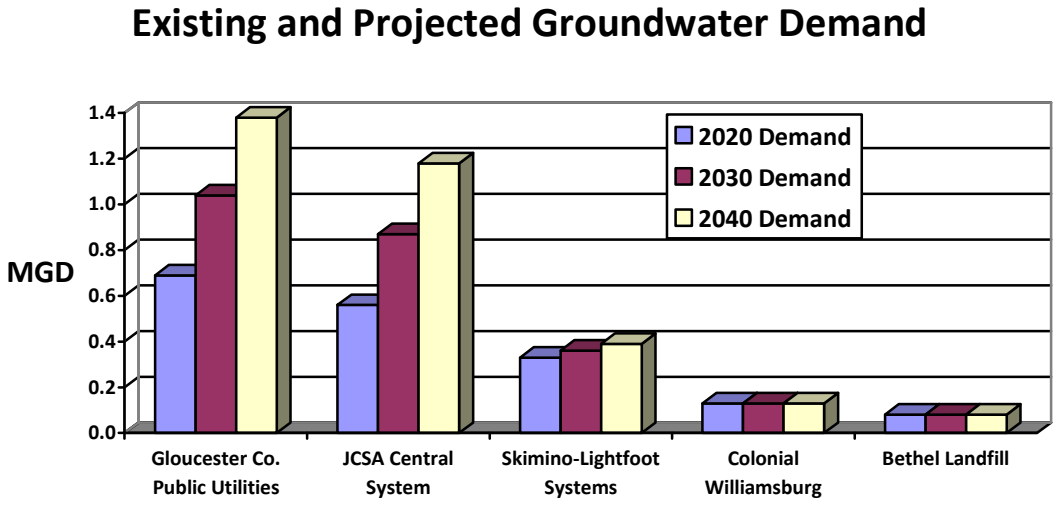


Figure 2

[10] Virginia Department of Environmental Quality, *Virginia State Water Resources Plan* (January 2022), pp. 511-512.

The *State Water Resources Plan* states, "The 2040 demand scenario indicates the projected increases in domestic groundwater demands, in combination with existing permitted demands, may result in continued decline in water levels in parts of the Coastal Plan Aquifer System" and that the "SWIFT project may be an important mitigation strategy in addressing the impact to the confined aquifer system in the Coastal Plain, but it must be complimented [sic] by other strategies. Individual localities with high groundwater demands will likely need to pursue alternatives such as surface water to meet their demands."[11]

Surface water accounts for approximately 80% of the water demand in the Lower York Minor Basin. The vast majority of York County water users rely on surface water, and the proportion has increased over the past few decades as a result of the County's program to extend public water to areas that rely on wells or private water systems. As with the sewer program, areas are prioritized on the basis of a point system utilizing the following criteria:

- Septic problems in the area,
- Fire protection concerns,
- Water quality or quantity problems, and
- Growth factor.

As shown in **Figure 3**, the DEQ projects that demand for surface water in the Lower York Minor Basin, will increase by roughly 27% – 5.2 MGD – between 2020 and 2040. The Newport News Waterworks Harwood's Mill treatment plant and the City of Williamsburg's Waller Mill treatment plant account for most of this demand (86.5%, or 4.5 MGD).

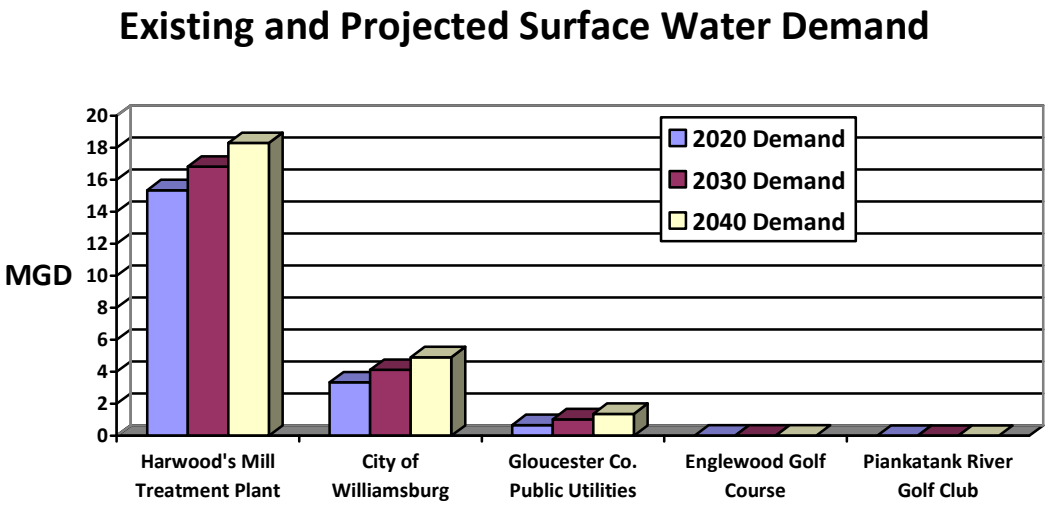


Figure 3

Population growth and economic development, which are the main drivers of water demand, will continue over the next twenty years but are not expected to overburden the region's water supply. In March 2021, the HRPDC updated its water supply plan for the Hampton Roads region. In its comparisons of water supply and demand forecasts through 2040, the HRPDC found that the entire region and all its sub-regions – the Peninsula, Southside, and Western Tidewater – "have supplies that exceed demand for the planning horizon" and that the "difference between supply and demand projections are adequate to address uncertainties in projections and climate change impacts. On the Peninsula, the

[11] Ibid, pp 94-95.

HRPDC projects that by 2040, water supply will exceed demand by 24.1 MGD (74.8 vs. 50.7 MGD); supply currently exceeds demand by 28.4 MGD (see **Figure 4**).[12]

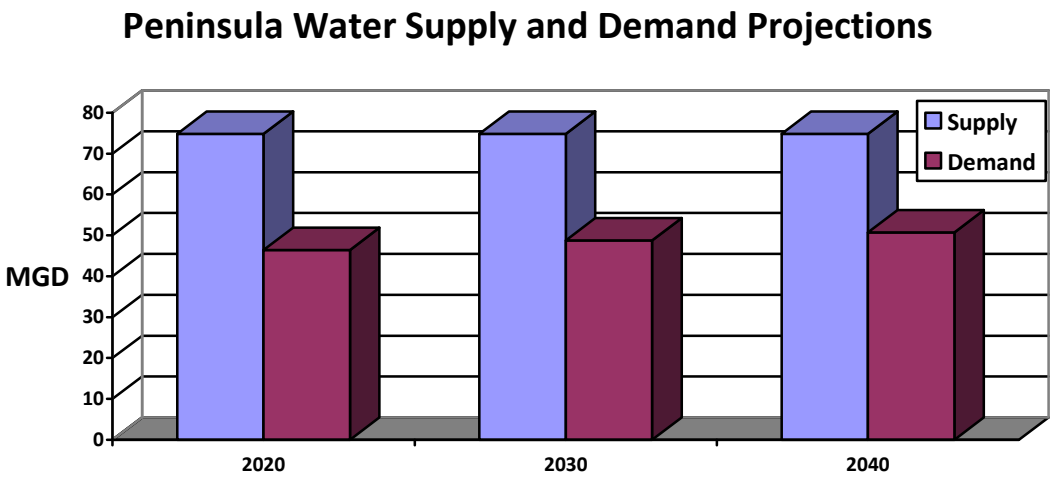


Figure 4

One of the major challenges that York County and all of Hampton Roads will face in the decades ahead is sea level rise. Based on the Comprehensive Plan citizen survey results, York County's citizens recognize the importance of this issue. The survey asked citizens to rate the importance of building or expanding various public facilities in the County on a scale of one (not at all important) to five (very important). "Infrastructure to mitigate recurrent flooding and sea level rise" was ranked second in overall importance (71%). Only schools received a higher ranking. Moreover, eleven percent of the respondents identified it as the highest public facility priority, behind schools and roads. Similarly, when this question was asked as part of the youth survey, 73% of the respondents identified flooding/sea level rise mitigation as a major priority – again, second only to schools.

VIMS projects that if sea levels were to rise at a steady rate, the City of Norfolk would experience an increase of approximately one foot (1.0') between 1992 and 2050. However, annual tide-gauge data indicates that the rate of sea level rise is, in fact, accelerating over time. Taking the rate of acceleration into account, VIMS projects an increase of approximately 1.5 feet between 1992 and 2050. Based on historical sea level trends and the VIMS projections, the Hampton Roads Planning District Commission (HRPDC) adopted a resolution in 2018 recommending that Hampton Roads localities consider adopting policies to incorporate SLR into their planning and engineering decisions. Specifically, the resolution recommends that such policies plan for 1.5 feet of SLR above current mean higher high water (MHHW) occurring in the range of near-term planning (2018-2050), 3.0 feet for mid-term planning (2050-2080), and 4.5 feet for long-term planning (2080-2100). According to NOAA, MHHW is the average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. HRPDC recommendations were confirmed with updated projections that were released by NOAA in 2022 and represent the best available science at this time (see **Figure 5**). The County should use the best available information and recommendations at the time of planning and policy decisions. Additional guidance and documents from state, federal, and private agencies are scheduled for future release and should be consulted for the most updated information.

[12] Hampton Roads Planning District Commission, *Updates to the Water Supply Plan* (March 2021), p. 9.

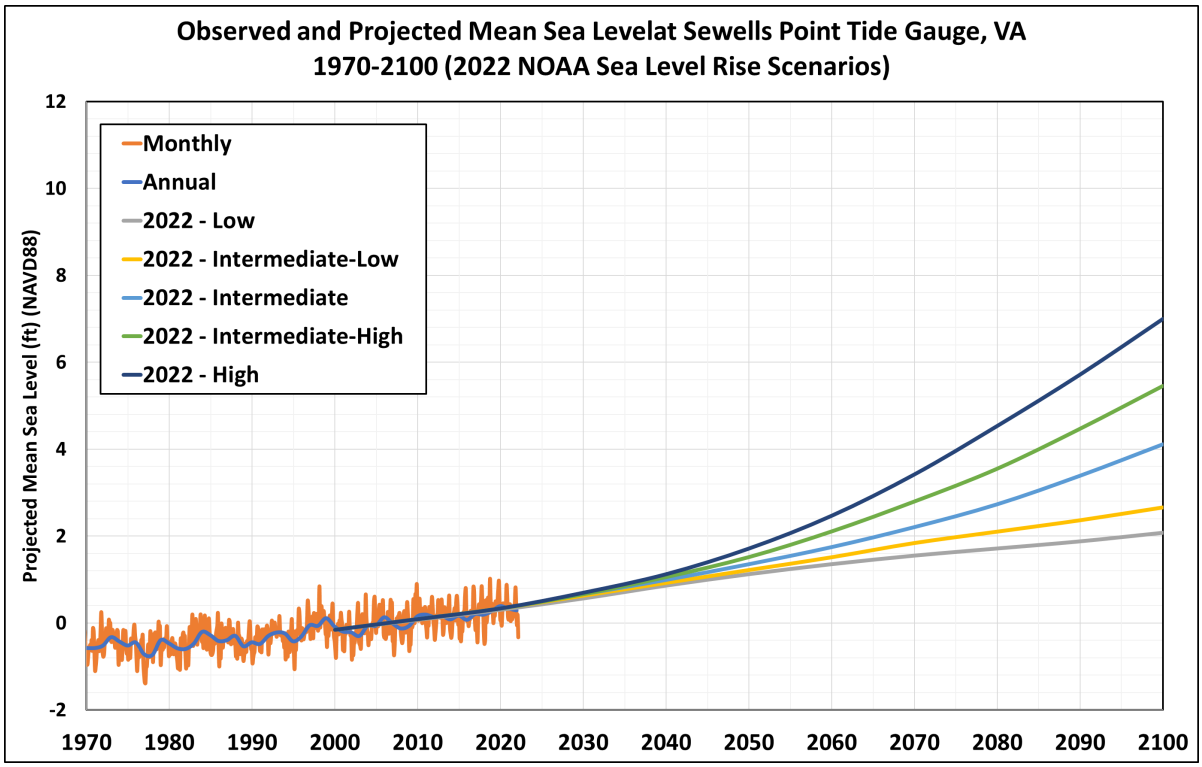


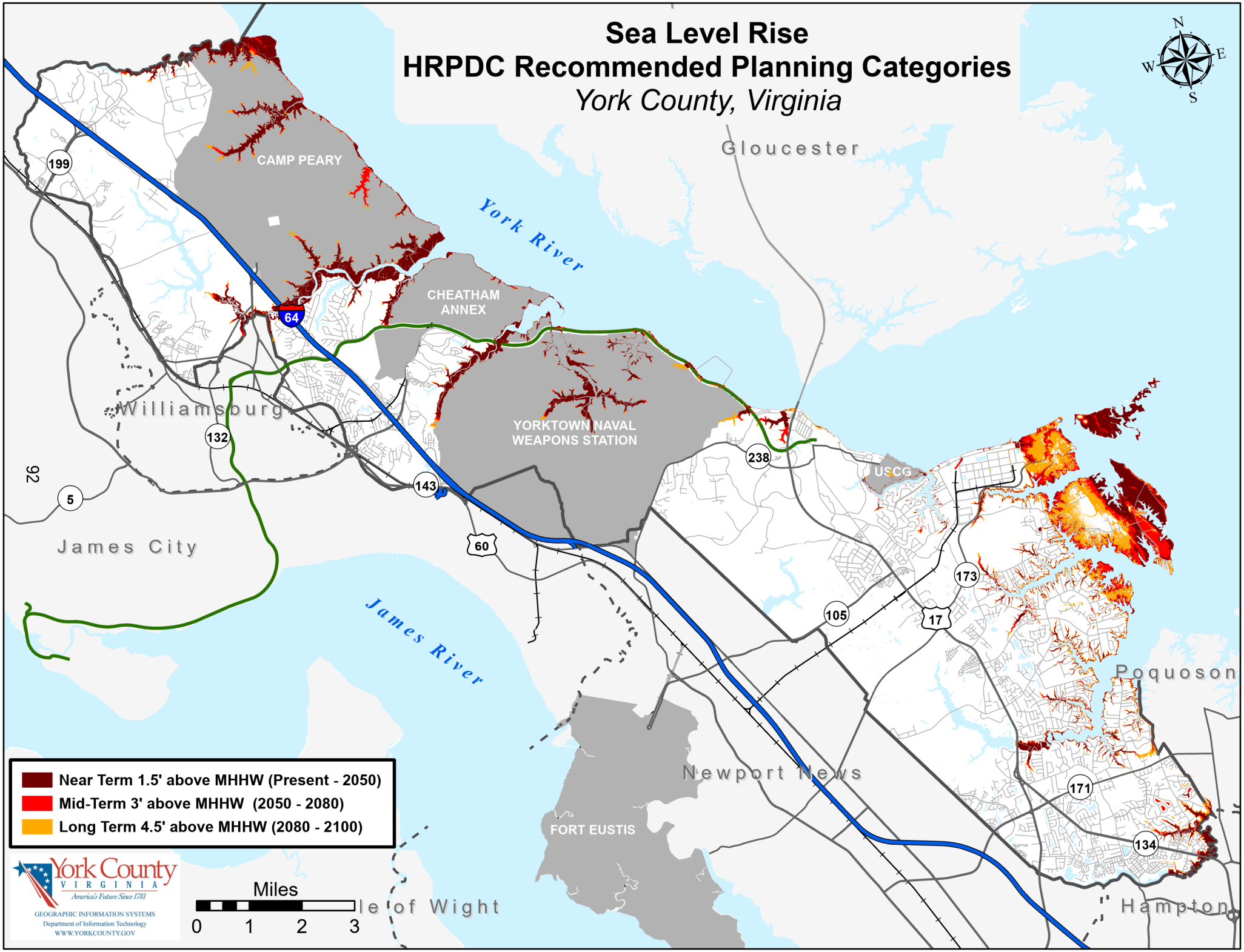
Figure 5

Assuming a 1.5-foot increase in sea level, approximately 32 homes and 0.63 miles of roadway spread across 1,000 acres in York County will be inundated by 2050. This amounts to a total estimated property value loss of $16.6 million and tax revenue loss of $132,360. In the long term, with an assumed sea level rise of 4.5 feet by 2100, roughly 1,200 homes and 18.3 miles of roadway spread across approximately 3,000 acres could potentially be inundated by SLR, accumulating to a property loss of over half a billion and a loss of approximately 4 million in tax revenue. These impacts are demonstrated in the table below. It is important to note that these estimates are based on the current real estate property tax rates and property values. Decreases in property values in affected areas will likely be gradual as either they become less desirable or are repeatedly flooded. Given this, dollar figures should only be used as a representation of SLR's financial impact on the County and not for any specific financial planning or policy actions.

ESTIMATED SEA LEVEL RISE IMPACTS ON PROPERTY AND ROADS (2020)					
Sea Level Rise Zone	**Acres**	**Homes**	**Total Property Value Loss**	**Total Property Tax Loss**	**Road Miles**
Near Term (1.5')	1,000	32	$16,649,000	$132,360	0.63
Medium Term (3.0')	2,000	394	$176,232,600	$1,400,000	5.80
Long Term (4.5')	3,000	1,174	$504,471,700	$4,010,550	18.30

Table 2

The impacts of sea level rise on shoreline retreat, flooding, and storm surge will be felt throughout the County but will not be distributed equally. The most vulnerable areas are low-lying coastal areas such as Seaford, Dandy, and Dare. However, other areas that are less directly vulnerable will also be affected since stormwater systems will back up as the shoreline moves inland. The maps below show SLR impact on various areas of the County using the HRPDC recommendations. These maps are the best informational tool the County has to inform proactive planning and policy decisions that address the most vulnerable areas.


Sea Level Rise
HRPDC Recommended Planning Categories
York County, Virginia
N
W
E
S
CAMP PEARY
CHEATHAM ANNEX
YORKTOWN NAVAL WEAPONS STATION
USCG
FORT EUSTIS
York River
James River
Gloucester
Williamsburg
James City
Newport News
Poquoson
Hampton
Isle of Wight
199
64
132
143
60
238
5
92
105
17
173
171
134
Near Term 1.5' above MHHW (Present - 2050)
Mid-Term 3' above MHHW (2050 - 2080)
Long Term 4.5' above MHHW (2080 - 2100)
York County
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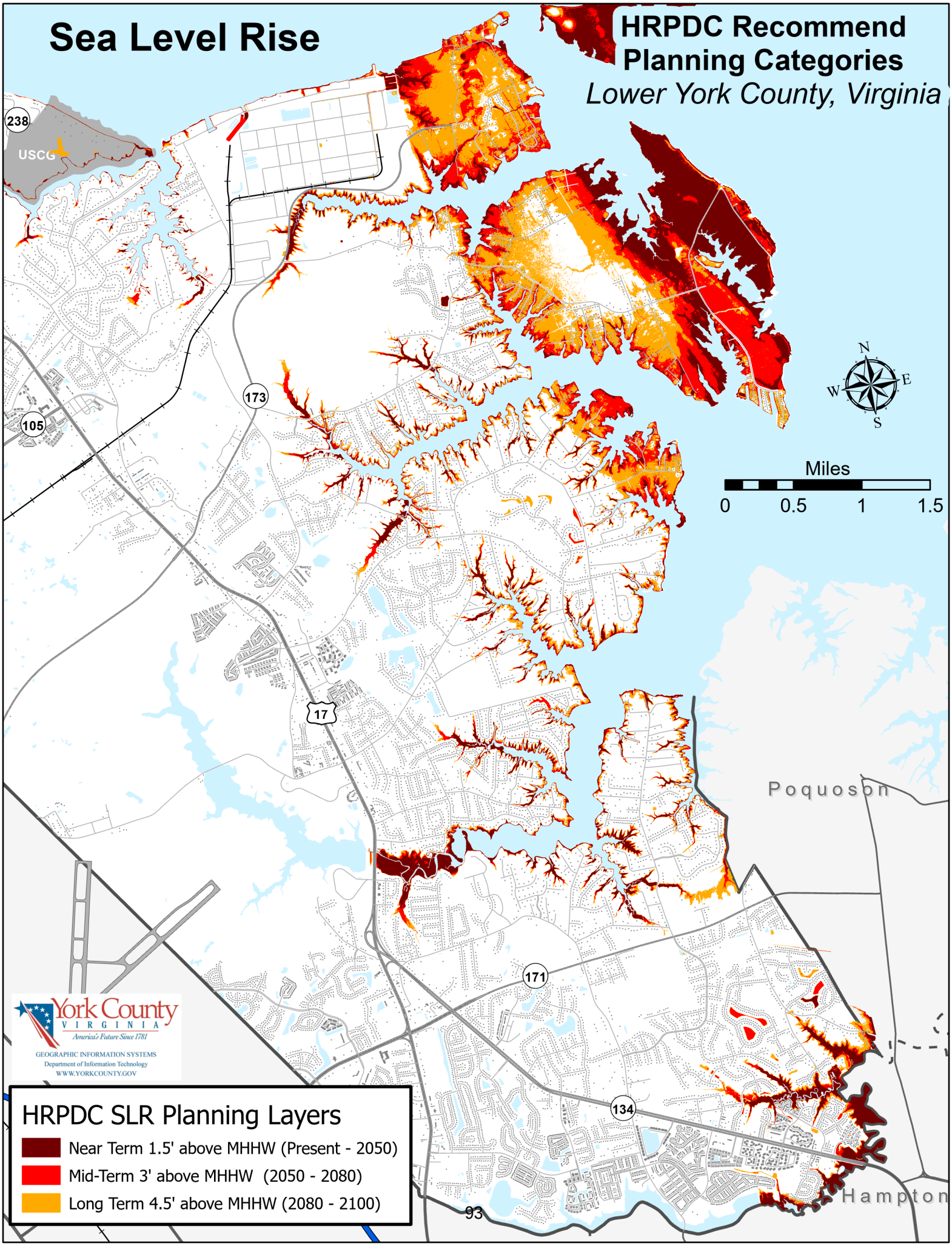
Sea Level Rise
HRPDC Recommend Planning Categories
Lower York County, Virginia
238
USCG
173
105
17
171
134
N
W
E
S
Miles
0
0.5
1
1.5
Poquoson
Hampton
York County
VIRGINIA
America's Future Since 1781
GEOGRAPHIC INFORMATION SYSTEMS
Department of Information Technology
WWW.YORKCOUNTY.GOV
HRPDC SLR Planning Layers
Near Term 1.5' above MHHW (Present - 2050)
Mid-Term 3' above MHHW (2050 - 2080)
Long Term 4.5' above MHHW (2080 - 2100)

The Virginia Coastal Resilience Master Plan, Phase 1 describes three general types of strategies for mitigating the effects of sea level rise and recurrent flooding: adaptation (restoration projects that allow natural infrastructure to withstand higher sea levels and site-level projects that enable existing structures to withstand flooding); protection (defensive engineered structures and systems designed to protect large areas from a wide variety of flood events but are often costly to design, construct, and maintain); and relocation (moving existing highly vulnerable assets to safer areas, facilitating migration of wetlands and other natural infrastructure systems, and restricting development in flood-prone areas).[13]

One example of an adaptation strategy in York County is a project that the County has initiated to elevate a portion of Seaford Road that is prone to recurrent flooding. This project, which will elevate an almost 1,600-foot segment of Seaford Road between Sadelia Drive and Rebecca Drive by one to three feet, is being funded through the VDOT Revenue Sharing program, with the County and VDOT each paying 50% of the cost, currently estimated at approximately $2 million. Construction is expected to begin in the 2027-28 fiscal year.

In recent years, the County completed another adaptation project to elevate several flood-prone houses in the County through the FEMA's Hazard Mitigation Grant Program (HMGP). The house elevations were managed by the County and funded mostly by FEMA (75%) and the state (20%), with the County contributing 5% of the funding. Administered in Virginia by the Department of Emergency Management (VDEM), the HMGP provides funding to state, local, tribal, and territory governments to help them rebuild in a way that either reduces or mitigates future disaster-related losses in their communities. Grant funding through HMGP is made available following a presidentially declared disaster, and eligible types of projects include the following:

- Retrofitting existing buildings to make them less susceptible to damage from natural hazards.
- Purchasing hazard-prone property to remove people and structures from harm's way.
- Utility and infrastructure retrofits to reduce the risk of failure caused by natural hazards.
- Drainage improvement projects to reduce the potential for flood damage.
- Using aquifer storage and recovery, floodplain and stream restoration, flood diversion and storage, or green infrastructure methods to reduce the impacts of flood and drought.

VDEM also administers the FEMA Flood Mitigation Assistance (FMA) grant program, which is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. Recipients are chosen based on eligibility and cost-effectiveness.

Other grant opportunities that are available for coastal resiliency include the Virginia Department Virginia Community Flood Preparedness Fund (CFPF), which is administered by the Virginia Department of Conservation and Recreation (DCR) and was established to provide support for regions and localities across the Commonwealth to reduce the impacts of flooding, including flooding driven by climate change. Eligible projects include development of resilience plans and studies; flood prevention and protection projects such as wetland restoration, floodplain restoration, living shorelines, and vegetated buffers; and property acquisition and relocation and the permanent conservation of lands identified as having flood resilience value. In addition, the General Assembly recently created the Resilient Virginia Revolving Fund as of July 1, 2022. The Fund, which will be managed by the Virginia Resources Authority (VRA) and the DCR will be used to make loans or grants to local governments to finance or refinance the cost of any resilience project. Loans and grants can also be made from the Fund to a local government that has developed a funding program to provide low-interest loans or grants to citizens for resilience

[13] *Virginia Coastal Resilience Mater Plan, Phase 1* (December 2021), p. 168.

projects. Although program guidelines have yet to be developed, the term "project" is defined in the statute to include the following:

- Home upgrades for resilience purposes, home buyouts necessary for the construction of mitigation or resilience projects, relocations, and buyout assistance for homes;
- Gap funding related to buyouts in order to move residents out of floodplain hazard areas and restore or enhance the natural flood mitigation capacity of functioning floodplains;
- Assistance to low- and moderate-income homeowners to help lower flood risk through structural and nonstructural mitigation projects, or other means;
- Loans and grants to persons for hazard mitigation and infrastructure improvement projects for resilience purposes; and
- Projects identified in the Virginia Flood Protection Master Plan or the Virginia Coastal Resilience Master Plan. The DCR will be developing program guidelines in the near future.

The most notable example of a protection strategy implemented in the County is the Yorktown Beach shoreline stabilization project, which was completed over several phases beginning in the mid-1990s as part of the Yorktown revitalization effort with the goal of protecting the Yorktown shoreline from serious erosion and damage from severe storm events. Improvements included the construction of stone breakwaters, beach nourishment, vegetative plantings, and drainage modifications.

In the category of relocation projects, the County in 2007 took steps to reduce the County's exposure to SLR and recurrent flooding by limiting new development in one of the most vulnerable areas of the County. Following the adoption of an updated Comprehensive Plan in 2005, the Board of Supervisors sponsored a series of amendments to the Zoning Map to bring it into conformance with the updated Comprehensive Plan. Among the areas under consideration for rezoning were portions of York Point, Bay Tree Beach, and eastern Seaford, which were proposed to be rezoned from Rural Residential (RR), with a maximum density of one dwelling unit per acre, to Resource Conservation (RC), which would allow a maximum density of one unit per five acres. While some affected property owners supported this effort, many were opposed. Ultimately, the scope of the proposed rezoning was scaled back, and 146 of the 261 parcels originally proposed for rezoning – and 91 of the proposed 288 acres – were rezoned.

Another strategy for addressing SLR that is not easily categorized is the SWIFT initiative. In addition to its other benefits – groundwater recharge and restoration of the Chesapeake Bay – the SWIFT initiative also offers a partial solution to SLR in Hampton Roads. As noted earlier, the depletion of water from the Potomac Aquifer, the primary source of groundwater in the region, is contributing to land subsidence, which in turn is contributing to SLR. By injecting purified water into the aquifer, SWIFT is expected to reduce the rate of land subsidence in the region.

Given the flat and low-lying coastal topography, the County has for many years been adversely affected by complications from severe storms, flooding, and shoreline erosion and retreat. These events are projected to get more intense in the future because of SLR and climate change. Fortunately, most of the strategies to protect against SLR, flooding, storm surge, and coastal erosion overlap one another. In working to mitigate the effects of SLR, the County will also be mitigating various other coastal threats that have long been experienced in the County. Preservation and expansion of natural areas on the coast, living shoreline defense projects, incorporating additional resiliency standards into new coastal

developments, and continually monitoring impacts and guidance will help to foster a long-term coastally resilient York County.

Growth and development affect the environment in ways not related to land or water. The HRPDC projects that the County's population growth will be accompanied by an additional 15,000 passenger cars and trucks in the next 25 years. Traffic growth has traditionally been associated with tailpipe emissions. Though Hampton Roads is currently in attainment (maintenance) of the 1997 eight-hour ozone National Ambient Air Quality Standard (NAAQS) and in attainment of all other applicable NAAQS, as traffic in Hampton Roads continues to grow, it will be increasingly important – to continue to receive federal transportation funds and, more importantly, to protect the quality of the air we breathe – for the County to work with the rest of the region to ensure that transportation plans are consistent with air quality goals. This will likely require a greater regional emphasis on transit, carpooling, and ride-sharing as well as bikeways, walkways, and roadway improvements designed to improve traffic flow and reduce vehicle delays. It should be noted, however, that with increasing numbers of electric and hybrid vehicles on our roads, this may become less of a concern in the decades ahead. It is worth noting that, according to the U.S. Bureau of Transportation Statistics, sales of electric, hybrid electric, and plug-in hybrid-electric vehicles have been on the rise since 2015 and experienced a dramatic 87.7% jump between 2020 and 2021, increasing from 763,000 to 1.4 million. This trend is likely to continue as EV technology evolves and charging infrastructure becomes more widely available. With this growth in electric vehicles will come a growing need for the County and other localities in the region and state to address the proper disposal of batteries that have reached the end of their useful life.

GOAL, OBJECTIVES, AND IMPLEMENTATION STRATEGIES

Goal: Establish and preserve a sustainable balance between York County's natural and built environment that contributes positively to the health and quality of life of current and future generations.

Objective 1: Preserve and protect environmentally sensitive areas and natural resources from the avoidable impacts of land use activities and development.

1. Review and update County development ordinances to ensure their continued effectiveness and consistency with state and federal mandates.

   Through strict enforcement of the Chesapeake Bay, Erosion and Sediment Control, Stormwater Management, Subdivision, and Zoning Ordinances, the County works to ensure that land development will not have adverse impacts on the natural environment. It is important that these ordinances be kept up to date so that they reflect current conditions and the latest guidance from state and federal regulatory agencies such as the EPA and the DEQ. For example, as stated in the *Hampton Roads Hazard Mitigation Plan*, it might become necessary at some point in the future to consider expanding the applicability of the Floodplain Management Area overlay districts of the Zoning Ordinance to areas outside the 100-year floodplain but subject to future flooding as a result of SLR. In addition, it is likely that the County will need to amend its Chesapeake Bay Ordinance to incorporate amendments to the Chesapeake Bay Regulations, which were released in draft form by the State Water Control Board in 2021, that would require local governments to add consideration of "coastal resilience and adaption to sea-level rise and climate change" to local Chesapeake Bay Preservation Area land use ordinances.

2. Utilize the resources of the Hampton Roads Planning District Commission in environmental planning and stewardship efforts.

   Part of the HRPDC's mission is to "Provide the local governments and citizens of Hampton Roads credible and timely planning, research and analysis on matters of mutual concern." The HRPDC is a

tremendous resource for information and technical assistance related to environmental planning, including issues related to the Chesapeake Bay, coastal resiliency, stormwater, and conservation. As one of its seventeen member localities, York County benefits greatly from its participation in the HRPDC.

Objective 2: Prevent the loss of life, injury, and property damage from natural hazards.

1. Use the *Hampton Roads Hazard Mitigation Plan* as a planning tool to guide policy decisions that will reduce the County's vulnerability to hazards.

   Updated in 2021-22, the *Hazard Mitigation Plan* sets forth a series of mitigation goals and objectives for the region as a whole. The over-arching goal is to "Increase community resiliency by reducing vulnerability to hazards." The plan, which was prepared with assistance and input from York County staff, also includes a series of recommended mitigation actions specific to York County that are incorporated into this Comprehensive Plan by reference. Implementation of these recommendations is critical to the success of this regional planning effort.

2. Participate in future updates to the *Hampton Roads Hazard Mitigation Plan*

   Communities are required to update their hazard mitigation plans every five years to determine whether there have been any significant changes that might necessitate changes in the types of mitigation actions proposed. However, hazard mitigation planning is an ongoing process, and it is important that County staff remain engaged and involved as members of the Hazard Mitigation Planning Working Group, which meets at least annually, and not just every five years when the Plan is updated.

3. Invest in public safety infrastructure, equipment, and manpower to ensure that the County is adequately prepared to respond to major storms and other hazardous events.

   Purchase of emergency backup power generators, fire and life safety apparatus and equipment, emergency communications infrastructure, etc. represent investments in the County's resiliency to hazards and in the health and safety of its residents. Adequate funding will need to be programmed through the Six-Year Capital Improvements Program (CIP) process to maintain and enhance the County's response capability.

4. Develop detour plans for roadways that are projected to be submerged by sea level rise and storm surge.

   In its analysis of the impacts of SLR on transportation infrastructure, the HRTPO recommends that local engineers and planners work with VDOT to develop detour plans for all roadways that are projected to be submerged for the three scenarios analyzed in the study. The Department of Fire and Life Safety and the Sheriff's Office should also be involved in this process. (This strategy is also included in the Transportation element of this Plan.)

Objective 3: Protect air quality for York County residents.

1. Expand the availability of electric vehicle (EV) charging stations throughout the County.

   As noted previously, the County has installed EV chargers at various public facilities around the County, and more are planned. The County should continue to incorporate EV chargers into new and existing public buildings and other facilities. In addition, the County should review its development ordinances to identify opportunities to require the installation of EV chargers in large-scale developments.

2. Increase the number of electric and hybrid vehicles in the County's fleet.

   Tailpipe emissions will be reduced and air quality improved over time as reliance on the internal combustion engine is reduced and electric and hybrid vehicles become more prevalent. However, partial conversion to electric and hybrid vehicles can play a role in improving air quality; however, it would by necessity have to take place on a gradual basis and only after a thorough evaluation of all the implications with regard to practicality, safety, maintenance, and availability of supporting infrastructure, as well as financial implications. For example, these vehicles typically involve a higher purchase cost that is eventually, over time, offset by lower operating costs.

3. Work with VDOT and the HRTPO to pursue funding for transportation improvements – such as intersection and signal system improvements, bikeways, walkways, transit, and Transportation Demand Management (TDM) – that reduce vehicle emissions.

   Although transportation funding is addressed in the Transportation element of this Plan, it bears repeating in the Environment element given the importance of reducing vehicle emissions in protecting air quality.

Objective 4: Prevent and reduce pollution of the Chesapeake Bay, the York River, and their tributaries.

1. Implement stormwater improvement projects to meet Total Maximum Daily Load targets established by the EPA.

   Through a variety of stream restoration and stormwater pond retrofit projects, the County has been able to achieve and even exceed federally mandated limits on pollutant loadings into impaired waterbodies. New, higher limits are expected in the future, which means these efforts will need to continue in order to protect and restore the health of state waters.

2. Expand the availability of sanitary sewer, particularly in impaired watersheds.

   The County's TMDL Action Plan states that septic systems are an important source to consider for human bacteria and the County is choosing to focus its efforts on the reduction of direct human source bacteria to surface waters. Septic systems are a potential source of poorly treated or untreated sewage into the storm sewer system and directly to receiving waters. Septic systems and piping can leak and/or allow stormwater to enter and displace sewage/septage into the ground where it can leak into a nearby storm sewer pipe, onto the ground where it is transported via overland flow, or into the groundwater where the pathogens may be transported to a surface receiving water. The County's ongoing "septic to sewer" conversion program will need to continue as part of pollutant reduction efforts for the Chesapeake Bay TMDL.

Objective 5: Protect the quality and quantity of drinking water in York County.

1. Invest in the extension of public water and sewer to unserved areas.

   Two of the recommendations of the Eastern Virginia Groundwater Management Area Advisory Committee for ensuring adequate groundwater resources are the development of alternative water sources, such as surface water, and the creation of incentives to encourage local governments and well owners to connect to public water when available.[14] The *2020 State Water Resources Plan* contains similar guidance. Through the *Utilities Strategic Capital Plan*, the County has made a significant public investment in improving the quality of our environment and the quality of life for

[14] Eastern Virginia Groundwater Management Advisory Committee, *Report to the Virginia Department of Environmental Quality and Virginia General Assembly*, July 2017, p. 9.

County residents. Continuation of this effort will help protect the sustainability of groundwater resources as residents move off of wells and onto the public water system. By eliminating private septic systems as sanitary sewer is extended to unserved areas, it will also protect the quality of drinking water since these private systems can be a source of groundwater and surface water contamination.

2. Ensure the protection of watersheds surrounding public water supply reservoirs.

   Through rigorous enforcement of the Watershed Management and Protection Area overlay district provisions of the Zoning Ordinance, including strict adherence to the watershed buffer requirements, the County will need to continue working to prevent the causes of degradation of the surface water supply.

Objective 6: Protect County residents, homes, businesses, infrastructure, and ecosystems from the impacts of sea level rise and coastal flooding.

1. Monitor SLR trends and projections to determine the need to amend policies, ordinances, and programs.

   SLR and climate impacts are being researched and projected based on a variety of fluctuating climate factors. The HRPDC, FEMA, NOAA, VIMS, the U.S. Army Corps of Engineers, and many other federal, state, and private organizations continue to research and provide guidance and resources on how to respond to SLR and a changing climate. The County should monitor guidance from these organizations and use the best available information and recommendations at the time of planning and policy decisions.

2. Utilize federal and state grant opportunities to leverage funds for mitigation and resiliency efforts.

   As noted, the state and federal governments make grant and loan funding available for a wide range of projects. For example, the County successfully applied for funding through the Hazard Mitigation Grant Program to elevate four houses in floor-prone areas. While the project, which was of fairly limited scope, required significant staff resources, the direct financial cost to the County was relatively low. The County should take advantage of all available funding opportunities for resilience projects, including but not limited to home upgrades, road elevation, property and conservation easement acquisition, living shorelines, and resilience planning.

3. Encourage the construction of living shoreline projects in coastal areas.

   Large, non-living mega-projects to protect the coastline from SLR and erosion are very expensive, damaging to local ecosystems, and do not address chronic flooding. Adaptive living shorelines, with local, site-appropriate mixes of natural and structural defenses are a more feasible and practical strategy. Education of the public about living shorelines and their multitude of benefits could further encourage their development in the County. While living and adaptive shorelines are less expensive than structural shoreline defense, they can be costly for property owners. The Virginia Soil and Water Conservation Districts' Virginia Conservation Assistance Program provides a reimbursement of 80% of total cost (up to a maximum payment of $30,000) for new living shoreline projects. Other cost-sharing opportunities have been available from federal, state, and private institutions and may become more prevalent as the threat to coastal areas grows. The County should monitor and promote these programs and opportunities.

4. Utilize low-density zoning and other methods to limit development in areas vulnerable to flooding and sea level rise.

Development in sensitive coastal areas would result in the loss of coastal forests, prevent the inward migration of wetlands and dunes, and put more people and homes at risk. Preserving the County's natural land cover will greatly reduce the impact of flooding and storm surge on the County. Land cover slows down floodwater, defends against erosion, filters and replenishes groundwater, and protects vital coastal ecosystems. The *Resilient Coastal Forests of Virginia* report highlighted the need for expanded riparian buffer zones to account for SLR to protect coastal forests and water quality. The Resource Conservation (RC) zoning district is the County's least intensive residential zoning classification, allowing a maximum density of one single-family detached home per five acres. RC zoning promotes conservation and protects environmentally sensitive areas from intensive development. Efforts to prevent development on vulnerable properties through the establishment of conservation easements should also be supported.

5. Utilize the Comprehensive Coastal Resource Management Guidance prepared by the Virginia Institute of Marine Science (VIMS) for shoreline management practices.

   VIMS has provided localities with a variety of resources and guidance to protect people, property, and coastal ecosystems. The County should continue to use the VIMS decision tree for the selection of appropriate shoreline erosion control practices for specific sites. The VIMS Center for Coastal Resource Management has provided additional guidance for shoreline management practices. The County should consider VIMS guidance and research in shoreline management and protection practices.

6. Improve the County's CRS rating from Class 7 to Class 6.

   Achieving Class 6 would benefit County property owners in flood hazard areas both by reducing their flood risk and by increasing their insurance premium discount from 15% to 20%.

7. Provide resilient public facilities and infrastructure.

   Public facilities must be able to serve the public in the future. By considering SLR, flooding, and other effects of a changing climate when planning public facilities, the County can set an example for resilient coastal development. In addition, the County should work with VDOT consider and implement adaptation strategies when planning, designing, constructing, or retrofitting transportation infrastructure. A specific example of this strategy is the County's planned project to elevate a portion of Seaford Road this is subject to flooding.

Objective 7: Enhance public awareness of the importance of coastal ecosystems, environmental conservation, and preservation.

1. Use public properties, such as parks and watershed areas, as living laboratories to educate citizens about environmental conservation and preservation with such activities as nature hikes and observations, environmental experiments, wetlands delineation activities, etc.

   With the help of grant funding, the County created the Wetlands Interpretive Sanctuary for Education (WISE) at Charles Brown Park. This half-mile trail borders approximately two acres of wetlands and is dedicated to educating citizens about wetland habitat. The County should explore the possibility of similar endeavors in other locations.

2. Develop materials, program, and activities to educate the general public about the growing threats of sea level rise, coastal flooding, storm surge, and coastal erosion.

   The Comprehensive Plan citizen survey results indicate that sea level rise is a major concern among the population; however, SLR is a complicated issue that will require further education as the

County becomes more involved in mitigation efforts. In Norfolk, Old Dominion University's "Blue Line Project" enlisted students, faculty, and citizen volunteers to use paint, flags, and chalk to mark projected future high tides. Also in the Hampton Roads region, the world's largest environmental survey, "Catch the King," successfully engaged citizen volunteers to aid in flood data collection throughout coastal Virginia. These are just a few examples of creative efforts that have been made to increase awareness and preparedness for threats facing coastal Virginia. The County should work to make the citizens aware of projected coastal threats and informed about how living shorelines, natural land cover, and flooding preparedness protect them and their property.

3. Participate in local and regional media campaigns and volunteer activities to promote environmental awareness.

   Public education and outreach are an important component of the County's TMDL Action Plan, which includes such activities as the FOG (Fats, Oils, and Grease) campaign, the "Scoop the Poop" campaign, and "Clean the Bay Day." In addition, the County's all-volunteer Beautification Committee, as part of its mission to "promote a cleaner, more attractive York County and increase awareness of environmental issues among York County citizens," is extremely active in a variety of programs and publicity campaigns on environmental issues. Another valuable resource is the York County-Poquoson office of the Virginia Cooperative Extension, which provides education to the citizens through programs in Agriculture and Natural Resources, Family and Consumer Sciences, 4-H Youth Development, and Community Viability.