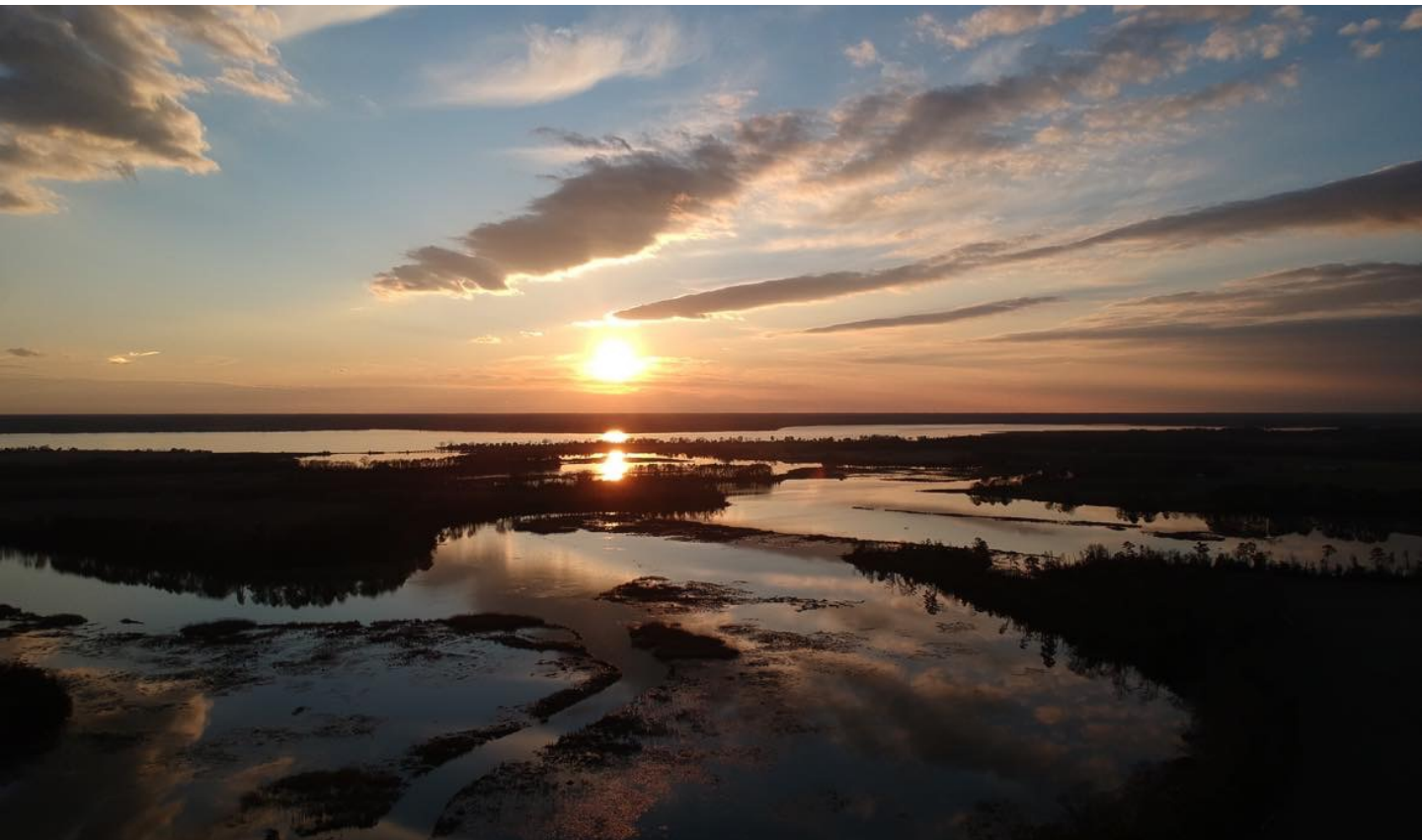


Regional Hazard Mitigation Plan

2023 Update



APPROVED 3/30/23 - EXPIRES 3/29/28



Prepared By:





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Section 2 Introduction

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 - 2.4.3 Actions
- 2.5 Planning Process
- 2.6 Adoption and Approval
- 2.7 Implementation
- 2.8 Monitoring and Updating the Plan
- 2.9 Plan Point of Contact

2.1 PURPOSE

Hazard mitigation is sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. A hazard mitigation plan states the aspirations and specific actions a community intends to follow to reduce vulnerability and exposure to future hazard events. A systematic process centered on the participation of citizens, businesses, public officials, and other community stakeholders to formulate these plans

A multi-jurisdictional hazard mitigation plan is the physical representation of a group of local jurisdictions' commitment to reducing risks from natural hazards. Local officials can refer to the Plan in their day-to-day activities and decisions regarding land use and planning, regulation and ordinance creation and enforcement, granting permits, capital improvement investments, and other community initiatives. Additionally, multi-jurisdictional hazard mitigation plans can serve as the basis for states to prioritize future grant funding as it becomes available.

This Plan meets the requirements for a local hazard mitigation plan under regulations within 44 CFR 201.6, published by the Federal Emergency Management Agency (FEMA) in September 2009.

This Plan update allows jurisdictions within the Northern Neck Planning District Commission (NNPDC) to obtain all disaster assistance, including all categories of Public Assistance, Individual Assistance, and Hazard Mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93288, as amended. In addition, future enhancements of the State All-Hazard Mitigation Plan will allow the State to obtain more significant funding for hazard mitigation planning and projects (20 percent of Federal Stafford Act disaster expenditures versus 7.5 percent for a standard state



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plan). It also keeps the State eligible for the annually funded Building Resilient Infrastructure and Communities (BRIC) Program and the Flood Mitigation Assistance Program.

Without this Plan, all eligible local jurisdictions would be ineligible to receive various disaster recovery programs. Including the Public Assistance Program to repair or replace damaged public facilities and the Fire Management Assistance Program to help the State and communities recover from the costs of major disasters. In contrast, the State and local communities would remain eligible for certain emergency assistance and Human Services programs available through the Stafford Act.

The Northern Neck Regional Hazard Mitigation Plan 2023 Update will continue to be a valuable tool for all community stakeholders by increasing public awareness about local hazards and risks and providing information about options and resources available to reduce those risks. Educating the public about potential dangers will help each jurisdiction protect itself against the effects of future hazards and will enable informed decision-making regarding where to live, purchase property, or locate a business.

The 2017 plan was updated in 2023 by the Northern Neck Planning District Commission. The 2023 version of the Plan includes the most current population and demographics, all mitigation strategies, goals, and objectives, and a review and update of most maps.

2.2 Organization of the Plan

The Plans organization parallels the structure provided in 44 CFR 201.6. It has ten sections, appendices containing mitigation assessment annexes., supporting documentation, and adoption resolutions. In addition, there are references to the CFR throughout the Plan. Where possible, these provide specific section and subsection notations to aid the review process. The plan organization is as follows:

- Section 1: Table of Contents
- Section 2: Introduction
- Section 3: Community Profile
- Section 4: Adoption and Approval
- Section 5: Planning Process
- Section 6: Hazard Identification, Profiling, and Ranking
- Section 7: Risk Assessment
- Section 8: Capability Assessment
- Section 9: Mitigation and Action Plan
- Section 10: Plan Monitoring and Maintenance
- Appendices

There are references to 44 CFR throughout the Plan. The Plan also includes references to the FEMA crosswalk document, which reviews mitigation plans.

2.3 HAZARDS AND RISK ASSESSMENT

2.3.1 HAZARDS

The Hazard Identification and Risk Assessment (HIRA) provides a systematic and objective approach to assessing hazards and their associated risks that provides an objective measure of an identified threat and leads to the ability to mitigate the risk of a hazard. The HIRA assists by providing a tool that jurisdictions can use to assess risk based on potential impacts on a community and the frequency of an event.

Systematic risk assessments can shift the focus of programs from being solely reactive to being proactive. A proactive approach to emergency management leads to more disaster-resilient communities.



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The HIRA is a crucial component of a hazard mitigation plan because it provides a solid fact base on which to base mitigation goals and strategies. The HIRA consists of three components:

1. Identification of hazards that could affect the Northern Neck Region
2. Profiling hazard events and determining what areas and community assets are the most vulnerable to damage from these hazards
3. Estimation of losses and prioritization of potential risks to the community

The Northern Neck Hazard Mitigation Working Group (NNHMMWG) re-evaluated the identified hazards during the planning process to determine the threats with the most significant impacts. However, the NNHMMWG did not address specific hazards due to the infrequency of occurrences and their limited impact. Sections 6 and 7 of this Plan include detailed descriptions of the process used to assess and prioritize the Northern Neck Region's risks from natural hazards and quantitative risk assessments for the region. Ten hazards were initially identified in the 2017 Plan, but the NNHMMWG has specified and included 3 (three) additional hazards in this update. The current list of threats in priority order are:

- Tornado
- Severe Weather
- Coastal Flooding
- Riverine Flooding
- Wildfire
- Winter Storm
- Hurricane/Tropical storm
- Coastal Erosion
- *Pluvial Flooding*
- *Landslide*
- Drought
- *Heatwave*
- Earthquake

Note: Hazards in Italics are additions to this plan update

For each of these hazards, the profiles in Section 6 include:

- Description
- Geographical Extent
- Severity
- Impact on Life and Property
- Occurrence (probability)

2.3.2 Risks

Calculating risk is a numerical indication of potential future damages and is a FEMA requirement. Although the range of events from a tornado to earthquake all have some potential to affect the Northern Neck Region: tornado, severe weather, wildfire, and coastal and riverine flooding are the most significant countywide hazards, based on the criteria and experience.

2.4 HAZARD MITIGATION GOALS, OBJECTIVES, AND ACTIONS

Section 9 of this Plan describes the Northern Neck Region's priorities for mitigation actions. The section divides the actions by priority, and describes the funding required, sources of funding, the level of support,



Northern Neck Regional Hazard Mitigation Plan Section 2: Introduction

and the timing of the action. The section also includes the Northern Neck Region's hazard mitigation goals and objectives.

2.4.1 HAZARD MITIGATION GOALS

The Northern Neck Region Hazard Mitigation Steering Committee and Working Group members used the results of the Hazard Identification and Risk Assessment (HIRA) and the Capability Assessment to assess the stated goals to inform updated strategies, actions, and projects for the region and their jurisdictions. The priorities differ somewhat from jurisdiction to jurisdiction. Each jurisdiction's priorities were developed based on historical damages, existing exposure to risk, community goals, and weaknesses identified in the Capability Assessment.

The Hazard Mitigation Steering Committee supported updating the goals, objectives, and mitigation actions. The mitigation actions provide direction and focus on addressing or solving local mitigation issues and problems effectively. The Northern Neck Regional Hazard Mitigation goals are:

Goal 1: Promote sustainable development utilizing alternative pathways that encompass proactive adaptations to mitigate against the risks posed by natural hazards, anticipate vulnerabilities, and strengthen regional resiliency.

Goal 2: Monitor the impacts of climate change utilizing multiple sources of scientific expertise, historical data, and technological advances to expand problem-solving options and mechanisms that address the threat of natural hazards to the Northern Neck Region.

Goal 3: Pursue opportunities to increase the resiliency of critical infrastructure through ongoing capabilities assessments, known hazard monitoring, and developing comprehensive strategies in the communities.

Goal 4: Enhance the capabilities of local government to address natural hazards to enhance the whole community for increased resilience.

Goal 5: Coordinate education on disaster preparedness by providing knowledge and teaching skills to citizens and visitors, focusing on vulnerable people, to mitigate the risk of casualties.

Goal 6: Encourage education and assist communities in developing and enforcing solid floodplain management programs and participation and compliance with the National Flood Insurance Program (NFIP), utilizing available resources and tools to identify the floodplains and risk areas.

During jurisdictional interviews, the Working Group reviewed the objectives and strategies from the previous plan during Steering Committee and Working Group Meetings and within individual localities. Events, lessons learned, and revised goals were considered during these conversations.

2.4.2 OBJECTIVES

Objectives are well-defined intermediate points in the process of achieving goals. (*Objectives* are generally coterminous with *strategies*.) The Northern Neck's Regional mitigation planning objectives include:

- Pursuing the implementation of the high-priority, low/no-cost recommended actions.
- Keeping the concept of mitigation at the forefront of community decision-making by identifying and stressing the recommendations of the Hazard Mitigation Plan when other community goals, plans, and activities are discussed and decided.
- Maintaining constant monitoring of multi-objective, cost-share opportunities to assist the participating communities in implementing the recommended actions of this plan for which no current regular funding or support exists.



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- Incorporate hazard risk information, and prioritize mitigation actions into appropriate local initiatives and programs through collaborative interaction between all related community departments and staff.
- Evaluating and assessing regional mitigation plan goals and local jurisdiction action effectiveness to reduce hazard risk exposure.

2.4.3 ACTIONS

Actions are detailed and specific strategies, actions, and projects that help support regional natural hazard resilience and mitigation goal achievement. They are highly focused, precise, and measurable. The Northern Neck's Regional mitigation actions include, but are not limited to:

- Installation of check valves in stormwater runoff systems
- Community outreach programs
- Structural retrofits of flood-prone critical infrastructure
- Storm sewer infrastructure improvements
- Engineering studies to improve drainage problems
- Generator installation for critical infrastructure
- Integration of Greenspace, wherever applicable
- Creating public education opportunities
- Acquisition of flood prone properties (least likely scenario in the region)

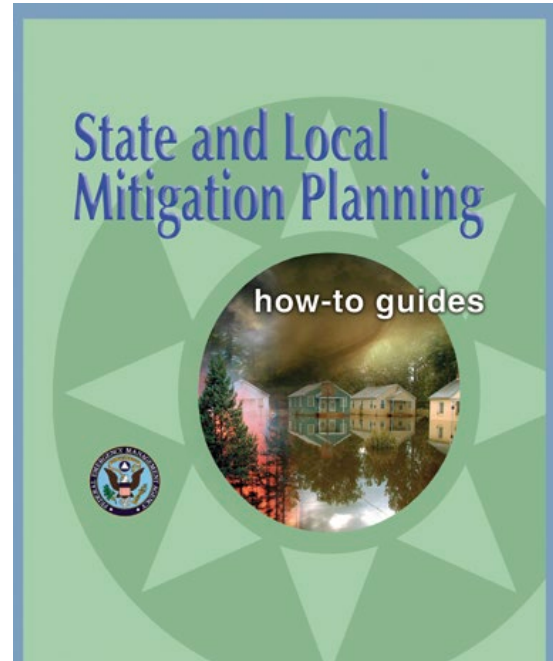
The above list illustrates overall action items rather than an exhaustive list. Please refer to Section 9.3.3 for more information on jurisdictional-specific mitigation actions.

2.5 PLANNING PROCESS

This Plan update is the product of the efforts of a cross-section of people from Lancaster, Richmond, Northumberland, and Westmoreland Counties, federal, state, and local jurisdictions, and other interested stakeholders. This effort builds on several mitigation planning initiatives dating back to 2003. The Executive Director, the staff from the Northern Neck Planning District Commission (NNPDC), Virginia Department of Emergency Management (VDEM Region 5), and Federal Emergency Management Agency (FEMA) Region 3, have provided technical expertise, including a review of previous hazard mitigation planning initiatives, development of mitigation strategies, and the strategy implementation plan.

The Plan update was prepared following the process established in the State and Local Mitigation Plan Development Guides produced by the Federal Emergency Management Agency (FEMA) and 44 CFR 201.6 Local Mitigation Plan.

The process includes four basic steps:





Northern Neck Regional Hazard Mitigation Plan Section 2: Introduction

Step 1 Organize Resources. Organizing resources is in Section 5 (Planning Process). The section details the jurisdictions involved, the processes used to establish leadership and advisory groups, and public and other outreach and involvement efforts.

Step 2 Assess Risks. The risk assessment was completed with the assistance of Olson Group consultants and approved by the NNHMMWG. The Risk Assessment is in Section 7 of the Plan, and a separate Hazard Identification is in Section 6.

Step 3 Develop a mitigation plan. Development of the Mitigation Plan is in Section 5 (Planning Process) and Section 9 (Mitigation Action Plan). Section 5 includes details about who was involved, the processes used, and the products developed. Section 9 provides specific information about identifying and developing mitigation goals, objectives, and actions based on Section 7 (Risk Assessment) and Section 8 (Capability Assessment).

Step 4 Implement the Plan and monitor progress. Implementing the Plan is described in the Mitigation Action Plan in Section 9, which includes details about who is responsible for implementing specific strategies and actions. In Section 10, the Plan Monitoring and Maintenance section describes long-term implementation through periodic updates and reviews.

Once the Plan update is promulgated by the NNPDC and approved by FEMA, the Committee will function as an advisor to the State Hazard Mitigation Officer on hazard mitigation efforts, including future reviews and revisions.

2.6 ADOPTION AND APPROVAL

The Northern Neck Planning District Commission, with the endorsement of the Northern Neck Regional Steering Committee was responsible for recommending plan approval to the 10 jurisdictions within the Northern Neck Region. The Plan was submitted to VDEM and then FEMA Region III for review. FEMA reviewed and approved the Plan pending adoption on 3/30/2023. Subsequently, the participating jurisdictions adopted the Plan, submitted their adoption resolutions to FEMA, and received their own approval notifications.

The following 10 jurisdictions participated in the Plan by taking an active part in the planning process, identifying mitigation actions, and will adopt the Plan:

- Lancaster County
- Town of Irvington
- Town of Kilmarnock
- Town of White Stone
- Northumberland County
- Richmond County
- Town of Warsaw
- Westmoreland County
- Town of Colonial Beach
- Town of Montross



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2.7 IMPLEMENTATION

The implementation process is described as part of the specific actions in the Mitigation Action Plan in Section 9.

2.8 MONITORING AND UPDATING THE PLAN

Section 10 (Plan Monitoring and Maintenance) describes the schedule and procedures for ensuring that the Plan stays current. The section identifies when the Plan must be updated, who is responsible for monitoring the Plan, and ensuring that the update procedures are implemented. This section provides a combination of cyclical dates (oriented toward FEMA requirements) and triggering events that will initiate amendments and updates to the Plan.

2.9 PLAN POINT OF CONTACT

The NNPDC Executive Director is responsible for monitoring the Plan and initiating the cyclical update process. The point of contact is:

Jerry W. Davis, AICP
Executive Director
Northern Neck Planning District Commission
PO Box 1600
Warsaw VA 22572
Phone: 804-333-1900



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Northern Neck Regional Hazard Mitigation Plan

Section 3: Community Profile

Section 3

Community Profile

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3.1 Introduction

The recommendations in the Northern Neck Regional Hazard Mitigation Plan are based on identification of past and potential problems due to natural and man-made hazards. As part of the process of identifying potential problems, it is useful to understand the physical characteristics of the Northern Neck Region.



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3.2 Geography, Climate, and Population of Northern Neck Region

3.2.1 Geography

The Northern Neck Planning District Commission (NNPDC) encompasses four counties and six towns in the eastern part of Virginia:

Counties:

- Lancaster
- Northumberland
- Richmond
- Westmoreland

Towns:

- Town of Colonial Beach
- Town of Irvington
- Town of Kilmarnock
- Town of Montross
- Town of Warsaw
- Town of White Stone

The Potomac River binds the Northern Neck Region north and east, the Chesapeake Bay east, and the Rappahannock River south and west. In total, the planning area encompasses approximately 745 square miles. Lancaster County is the smallest county in the Northern Neck Region, with 133 square miles, based on the total land mass. Westmoreland County is the largest at 229 square miles. Northumberland and Richmond Counties are comparable at 192 and 191 square miles, respectively.

The four counties share more than 1,110 miles of shoreline. Figure 3-1: shows the Northern Neck Planning District. Nearby localities to the south include Caroline County, Essex County, and Middlesex County. The Northern Neck Region is approximately 65 miles northeast of the City of Richmond, the State capital, and 120 miles southeast of Washington, D.C. The northern border is the Potomac River and the State of Maryland.



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Figure 3-1: The Northern Neck Planning District



Source: Northern Neck Soil & Water Conservation District <https://www.nnsacd.org/images/NNmap.jpg>

Lancaster County

Lancaster County covers approximately 135 square miles or about 86,267 acres of land. Lancaster County lies in Virginia's coastal plain and is bound on the east by the Chesapeake Bay and to the south and west by the Rappahannock River. Both water bodies are major contributors to the county's 180 miles of shoreline. The terrain is generally flat with the highest elevations around 100 feet above sea level. The county is rural in nature with limited public infrastructure. Due to limited public water supply and wastewater treatment infrastructure, Lancaster County usually requires on-site sewage facilities for the disposal of waste and individual or community wells for domestic water supplies. In addition, a wide variety of environmentally sensitive areas in the county include steep slopes, floodplains, prime agricultural lands, wetlands, and soils unsuitable for septic systems.

Roughly 65% of Lancaster County's land is limited in some form. Specific physical limitations causing concern include:

- the suitability of soils for septic systems,
- the loss of prime agricultural farmlands to development, and



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- the presence and location of shrink-swell soils.

The continuing loss of farmland to other uses is of great concern. For example, farmlands provide acres of the previous land surface that act as recharge areas for groundwater aquifers and are particularly important to Lancaster County, which depends entirely on groundwater aquifers for its drinking water supply.

Lancaster County is known for its tourist and recreational attractions. Historic sites, buildings, and marinas attract visitors throughout the year. The retiree population is increasing while younger generations are leaving the area.

Town of Irvington

The Town of Irvington is in Lancaster County, located along the shoreline of Carter's Creek, and is approximately 1.8 square miles. The town has over eight miles of shoreline and encompasses a healthy amount of water related business and industry, additionally there are many attractions that draw tourists to the historic town. In 2019 the town received a potential economic boost in the form of the new Compass Entertainment Complex. Construction on the complex began in 2019 and opened in September 2020.

The Town provides water service to residents. However, the majority septic and water services remain via private on-site management. The Tides Inn and the Tides Lodge both maintain their own wastewater treatment facilities.

Town of Kilmarnock

The Town of Kilmarnock is the largest incorporated town in Lancaster County. The town is unique in geography as its borders reach into both Lancaster and Northumberland Counties presenting a of approximately 2 (two) square miles. The town hosts a prominent seafood and agriculture economy and presents a popular tourism market. The town has initiated a grant program to assist business owners with façade improvements as part of town revitalization projects and economic development planning.

Sewage and water are provided by the Town for most properties. Sandy and loamy soils present runoff issues and vegetation growth with elevation above sea level ranging widely.

The town is home to the Bon Secours Rappahannock General Hospital, a satellite campus of the Rappahannock Community College, and Town Centre Park. Town Centre Park presents 9 acres of recreation that utilizes resilient mitigation practices such as underground utility lines. The town's commitment to green infrastructure is apparent in the park with actions such as vegetation being planted to assist with runoff.

Town of White Stone

The Town of White Stone, located in Lancaster County, is laced with history. Famously located in the town is the Robert O. Norris bridge that spans two miles across the Rappahannock River. The town measures approximately one square mile with the majority being land, and an elevation above sea level of 40-50 feet. Seafood and agriculture dominate the economy and provide the town's businesses such as restaurants and markets with supplies. The town's comprehensive plan states that it is identified in two ways, R-1 for residential and C-1 for commercial and states the following in reference to its R-1 district: "This district is composed of certain quiet, low-density residential areas plus certain open areas where similar residential development appears likely to occur. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage a suitable environment for family life where there are children, and to prohibit all activities of a commercial nature."



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The Town just executed Phase 1 for a new wastewater treatment plant. The new plant was successfully put into operation on September 22, 2022. The first phase of the project included 175 hook-ups. Recent town upgrades include a business district revitalization project and the White Stone Neighborhood Improvement Project, both of which contribute to the operability of the town and incorporate resilient mitigation measures for the Town of White Stone.

Northumberland County

According to the U.S. Census, the Northumberland County comprises 286 square miles. The Rappahannock River binds Northumberland County to the south, the Potomac River to the north, and the Chesapeake Bay to the east. Northumberland County has an agricultural landscape with significant forestry where farming is dominant. Residential development is concentrated along roads and the waterfront. Manufactured homes are scattered throughout the county but, like other types of residential development, are found primarily along roads, with marinas and industrial construction along the waterfront. Northumberland County is often referred to as “the Mother County of the Northern Neck.”

Elevations in the county vary widely from approximately 5 feet in coastal areas such as Reedville to around 130-140 feet in the most inland landscapes. County water and sewage is serviced in some areas by the Callao and Reedville wastewater treatment plants. Some areas remain dependent on private on-site management systems.

The Village of Callao began a quest to revitalize the area in 2015 noting the need for improvements to the business district, roads, and integration of resilient infrastructure practices in public areas. In 2021 grants funds were awarded to the County and bids were sought for improvements to the Callao and Reedville wastewater treatment facilities.

Richmond County

Richmond County comprises a land area of approximately 192 square miles and 24 square miles of water equaling 216 square miles total. The county is bordered by Westmoreland County to the north, Northumberland County to the east, and the Rappahannock River from west to south. Agricultural land use dominates the landscape of primarily rural Richmond County. Most of the county's land area is agriculture and forestry in nature. Forests cover approximately 59% of the county and a large portion is protected in conservation, with agriculture remaining evident in most of the residual land areas. Six Thousand acres of the Rappahannock River Valley National Wildlife Refuge are in Richmond County. The county boasts some of the highest elevations in the Northern Neck Region with most land elevations reported over 100 feet.

Richmond County manages several solid waste facilities, and the Town of Warsaw maintains a wastewater treatment facility and town water and sewage services. The county widely remains dependent on private on-site management systems such as wells and septic.

Richmond County is steeped with historical significance and was founded in 1692. The county sites in their comprehensive plan the importance of preserving the rurality of the community while working towards technological expansions. Population and occupancy varies widely in Richmond County including fulltime residents of increasing age groups, secondary homes, an Amish community, and a tourism base. Surveys identified the need for more non-motor vehicle transportation paths. The County is currently working through VDOT grants create a recreational trail network that will ultimately connect several main focal points throughout Warsaw.



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Town of Warsaw

The Town of Warsaw, located in Richmond County identifies as “the Heart of Virginia’s Northern Neck” and is comprised of approximately three square miles of which all is land. The town’s elevation is significant within the Northern Neck Region as it is reported as approximately 130 feet. The town’s demographics presents with approximately 29% of the population being of or close to retirement age. Surveys performed by the County presented the need for more non-motor vehicle paths such as walking and biking trails. Warsaw is currently benefiting from that through the County’s development projects’ with VDOT, creating a recreational trail network that intended to connect several main focal points throughout Warsaw.

Warsaw is enriched with historic sites such as Menokin and Sabine Hall and hosts critical facilities that include the Northern Neck Regional Jail and the Warsaw Sewage Plant. Water and sewage services are maintained by the Warsaw Public Works Department.

The town strives to maintain the local history and community awareness. Tourist attractions in the area include historic sites and local shops, as well as the local park, access to the Rappahannock River Valley National Wildlife Refuge, and camping at Naylor’s Mill Campground.

Westmoreland County

Westmoreland County covers 253 square miles, of which only 24 square miles is water. The county is bordered by the Potomac River and Maryland to the north, Northumberland County to the southeast, the Rappahannock River and Richmond County to the south and King George County to the northwest. Westmoreland County is a rural area featuring numerous waterfront communities. Most of the county is forestland. Residences and businesses are distributed throughout the county but are often clustered near the Towns of Colonial Beach and Montross, or in one of the numerous small communities. There is also an unusually high percentage of seasonal homes used recreationally. Residential subdivisions are mostly located along the county’s creeks, bays, or rivers.

Municipal water service is available to various areas in Westmoreland County including the Town of Colonial Beach and the Town of Montross, and wastewater services provided by Westmoreland County serve the Town of Montross and the corridor that runs south along Route 3 to Templeman’s Crossroads. Westmoreland County also attends to the Coles Point and Washington District areas with public wastewater services. The Town of Colonial Beach operates a wastewater treatment plant for the town. Outside of the areas mentioned above, the remainder of properties are managed by private on-site management systems. The Westmoreland County Solar Project is a ground-mounted solar project which is spread over an area of 161 acres and was initiated by Savion LLC in 2021. The project currently is active and sells produced energy to Dominion Power.

The county contains the Westmoreland State Park and Voorhees Nature Preserve. The area is steeped in historic events and figures pertinent to the shaping of the United States. The economy in Westmoreland County is based largely around agriculture and tourism.

Town of Colonial Beach

The Town of Colonial Beach, located in Westmoreland County, located along the Potomac River. The town measures approximately 2.5 square miles of which 0.2 square miles is water and the elevation averages approximately ten feet above sea level. The town is populated relatively evenly across age groups and draws a significant tourist following yearly.



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Colonial Beach provides water and sewage services and has entered multiple improvement projects in recent years. Projects include living shoreline initiatives, water and sewage improvements, the Central District Drainage project, and is currently seeking funding to address a significant erosion issue at North Beach. The town utilizes green infrastructure practices when planning improvements to increase their resiliency.

Colonial Beach boasts a significant tourism market utilizing the history, natural resources, and unique destination to draw visitors. They are working to continue their revitalization project and in 2022 managed a project in which building inventory records were recorded for the town.

Town of Montross

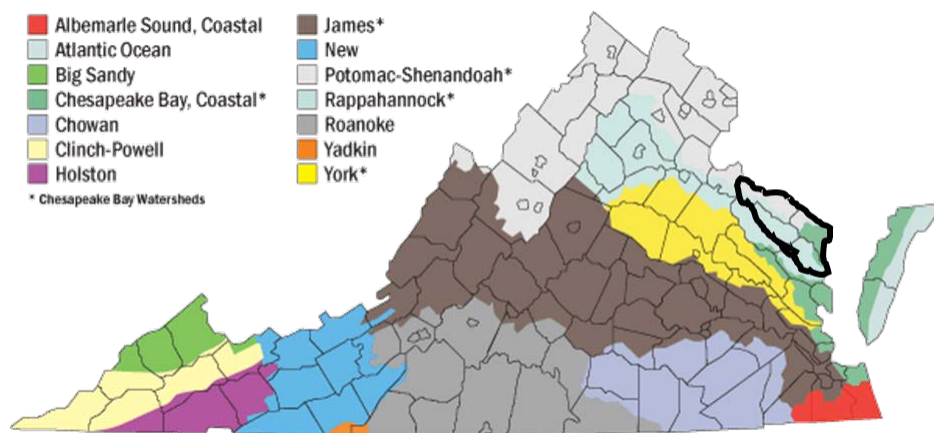
The Town of Montross is the county seat in Westmoreland County with a small population of approximately 500 during the 2020 Census. The town is all land measuring one square mile with an elevation well above 100 feet. Montross encompasses access to the nearby Westmoreland State Park, which provides a nature rich environment for residents and visitors. Municipal water access is provided to residents and businesses of the town as well as some properties just outside of town limits.

Montross underwent a significant revitalization project in the last decade that brought improvements to roadways, drainage, structures, and additional measures such as beautiful public murals, landscaping, and streetlights.

3.2.2 Hydrology

The Northern Neck Region lies within three major watersheds: the Potomac, the Rappahannock, and the Chesapeake Bay Coastal. Numerous creeks traverse the Northern Neck Region, and multiple inlets and coves mark the shoreline. Figure 3-2: Virginia's Major Watersheds, illustrates the significant watersheds of Virginia, emphasizing the Northern Neck Region in a bold black outline.

Figure 3-2. Virginia's Major Watersheds



Source: The Virginia Department of Conservation and Recreation

The Potomac Watershed comprises about 20% of the Chesapeake Bay watershed and is a major factor in the bay's restoration. The Potomac Watershed spans 5,702 square miles, is the third largest in Virginia, and is fed mainly by the Shenandoah, South Branch Potomac, Monocacy, Anacostia Rivers and the Conococheague Creek. Major uses of water in this area are for public and domestic water supply, power plant cooling, industrial use, and agriculture. About 600 million gallons per day (mgd) is used for the water



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supply, of which 500 mgd is used for the Washington area. About 1.6 billion gallons, most of which is returned to streams, is used daily for power plant cooling and industrial use. Population increases in the Washington area increases the strain on the supply of drinking water, leading to issues related to water quality, legacy pollution, emerging contaminants, and reliability and safety of drinking water supplies.

The Rappahannock Watershed is fed primarily by the Rappahannock River, Rapidan River, and Hazel River to the west of the planning district commission. Most of the Northern Neck Region falls within the bounds of this watershed.

The Rappahannock Watershed covers about 2,715 square miles and supports a variety of land uses: primarily fishing with manufacturing, light industrial, and retail applications in the Northern Neck Region. According to U.S. Geological Survey data, the Rappahannock Watershed (above the fall line) has the highest yield (load/unit area) of total nitrogen, total phosphorous, and total suspended solids of all the Chesapeake Bay tributary basins in Virginia, which contributes to localized dead zones (little or no oxygen) closer to the mouth of the Rappahannock each summer due to excess nutrient pollution. In addition, according to the Virginia Marine Resources Commission, commercial fish landings for shad and oysters in this area of the Rappahannock have declined precipitously since the early 1970s.

The Chesapeake Bay Coastal Watershed comprises the Chesapeake Bay and is 2,577 square miles, though only a tiny portion of the Northern Neck Region falls within it. The Great Wicomico and Corrotoman Rivers flow through the watershed. In addition, the Chesapeake Bay Coastal and the Potomac and the Rappahannock watersheds are part of the larger Chesapeake Bay Watershed. The Chesapeake Bay is the largest estuary in North America and the third largest in the world. More than 150 major rivers and streams flow into the bay's 64,299 square mile drainage basin, which covers six states (New York, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia) and all of Washington, D.C. The bay is approximately 200 miles long from its northern headwaters in Havre de Grace, Maryland, to its outlet in the Atlantic Ocean by Virginia Beach, Virginia. The bay and its tidal tributaries have 11,684 miles of shoreline—more than the entire U.S. west coast. Approximately eight million acres of land in the Bay watershed are protected from development.

Since the early twentieth century, the Chesapeake Bay has experienced severe environmental degradation. Problems include:

- significant reductions in seagrass,
- reduced amounts of finfish and shellfish (especially oysters and crabs),
- seasonal depletions in dissolved oxygen, and
- increases in sedimentation.

Environmental concerns were voiced in the 1970s over the damage to critical habitats and the decline in water quality. Species in bay waters were being negatively affected, resulting in threats to commercial and recreational activities. Most marine scientists believe these changes are related to ecological stress due to increased human activities. Causes include deforestation, agriculture (including fertilizers), urbanization, pollution, and sewage. Between 1950 and 2019, there was an observed 119% increase in the watershed's population. In 2020, the Chesapeake Bay Program estimated that 18.4 million people lived in the Chesapeake Bay Watershed, a 0.23% increase from 2019. Experts predict the watershed's population will pass 22 million by 2050. (The Chesapeake Bay Program, <https://www.chesapeakebay.net/state/population>)



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3.2.3 Physiography

The Northern Neck Planning District is part of the greater Atlantic Coastal Plain, a landscape characterized by gently rolling hills and valleys but also can be locally quite rugged where short, high-gradient streams have incised steep ravine systems. The Northern Neck Region falls within two sub-provinces of Virginia's Coastal Plain. Low slopes characterize the upland sub-province and gentle drainage divides. Steep slopes develop in areas dissected by streams and are also present where the upland meets the Potomac and Rappahannock Rivers. Elevations in the upland sub-province ranges from 60 to 250 feet. The other sub-province is the lowland sub-province, which is the flat, low-relief region along major rivers and near the Chesapeake Bay. Elevations in the lowland sub-province ranges from 0 to 60 feet. The fall line, which delineates the division between Coastal Plain and Piedmont, lies west of the Northern Neck Region.

3.2.4 Climate

The Northern Neck Region lies within the Atlantic Coastal Plain, with flat topography and sandy or muddy soil. This region has a humid subtropical climate, with hot summers and a short, mild, to cool winter. This humid subtropical climate is influenced by the Chesapeake Bay and the Atlantic Ocean, which moderate the weather but do not prevent ice formation almost every winter on the bay's northern tributaries. Mountains to the west produce blocking and steering effects on storms and air masses from the Great Lakes. The open water bodies that border the Northern Neck Region provide a buffer to atmospheric changes and allow for breezes that offset humidity.

Average high temperatures in the Northern Neck Region are about 76.1° F in the summer and 39.7° F in the winter. Precipitation is high and subject to seasonal influences, particularly along the coast. The average annual rainfall is approximately 45.19 inches, and the average annual snowfall is 11.5 inches.

3.2.5 Population

The total population for the Northern Neck Region is listed as 50,158 in 2020 using the newest population estimates from the U.S. Census Bureau's 2020 American Community Survey (Table 3-1: Population Statistics for the Northern Neck Region), which is a 1.2% increase in the total population since 2016. Two of the four counties experienced negative growth rates. Population projections for the Northern Neck Region are consistent with the U.S. Census population percent change from 2016 to 2020. Lancaster and Northumberland counties are projected to experience population decreases through 2050, while Richmond and Westmoreland counties are projected to experience population growth (Table 3-2: Population Projections for Northern Neck Region, 2030-2050). Projections predict that the population across the Northern Neck Region will remain stable.

Table 3-1: Population Statistics for the Northern Neck Region

Jurisdiction	Estimated Population, 2020	Percent Change in Population 2016-2020
Lancaster	10,919	-0.49%
Northumberland	11,839	-3.2%
Richmond	8,923	1.7%
Westmoreland	18,477	4.9%
NNPDC (total)	50,158	1.2%

Source: 2020 American Community Survey (ACS), 2020 Decennial Census



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Table 3-2: Population Projections for the Northern Neck Region, 2030-2050.

Jurisdiction	2030	2040	2050
Lancaster	10,297	9,826	9,502
Northumberland	11,185	10,813	10,603
Richmond	8,469	8,400	8,457
Westmoreland	19,220	19,804	20,683
NNPDC (total)	49,171	48,843	49,245

Source: University of Virginia Weldon Cooper Center, Demographics Research Group. (2022). Virginia Population Projections. Retrieved from: <https://demographics.coopercenter.org/virginia-population-projections>

3.2.6 Race and Gender

Nearly the entire population (97.6%) of the Northern Neck Region reports being a single race according to U.S. Census Bureau's 2020 Population Estimates Program. The region's average population by race is 69.4% White alone, 27.0% Black or African American alone, and 0.8% Asian alone (Table 3-3: Racial Demographics of the Northern Neck Region). An average of 0.4% of the NNPDC population reported being other races alone and 2.3% reported being two or more races.

Table 3-3: Racial Demographics of the Northern Neck Region.

Jurisdiction	White Alone	African American Alone	Asian Alone	Other Races Alone	Two or More Races
Lancaster	69.3%	28.2%	0.9%	0.3%	1.4%
Northumberland	72.4%	24.8%	0.6%	0.4%	1.8%
Richmond	66.2%	30.0%	0.7%	0.7%	2.5%
Westmoreland	69.7%	25.0%	0.9%	0.1%	3.3%
NNPDC (average)	69.4%	27.0%	0.8%	0.4%	2.3%

Source: 2020 U.S. Census Bureau Population Estimates Program

In the region, there are slightly more males than females, with male persons accounting for 50.9% of the population and female persons make up the remaining 49.1% of the population. Richmond County has the largest difference in percentage of population that are females versus males, likely due to the presence of a correctional center in Haynesville. See Table 3-4: Gender Statistics for the Northern Neck Region.

Table 3-4: Gender Statistics for the Northern Neck Region.

Jurisdiction	Female	Male
Lancaster	52.0%	48.0%
Northumberland	50.7%	49.3%
Richmond	42.9%	57.1%
Westmoreland	50.6%	49.4%
NNPDC (average)	49.1%	50.9%

Source: 2020 U.S. Census Bureau Population Estimates



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3.2.7 Language

About 3.6% of residents in the Northern Neck Region were foreign-born and 5.0% of persons age five and older speak a language other than English at home. See Table 3-5 Language Statistics for the Northern Neck Region. These statistics indicate there may be a portion of the region that may require special consideration when developing hazard reduction and outreach strategies for the community.

Table 3-5: Language Statistics for the Northern Neck Region

Jurisdiction	Foreign born persons, percent, 2016-2020	Language other than English spoken at home, percent of persons aged 5 years+, 2016-2020
Lancaster	4.5%	3.9%
Northumberland	0.8%	3.2%
Richmond	4.4%	8.9%
Westmoreland	4.6%	3.9%
NNPDC (average)	3.60%	5.0%

Source: 2020 American Community Survey (ACS) 5-Year Estimates

3.2.8 Age

Age can be used to identify certain groups of the population that have heightened risk to certain hazards. The 2020 U.S. Census Bureau's Population Estimates Program data shows that about 5.2% of the population in the Northern Neck Region is under the age of five and approximately 16.5% is under the age of 18 as illustrated in Table 3-6: Age Statistics for the Northern Neck Region. The regional age distribution is less than the Virginia total of 5.7% under the age of five and 21.8% under the age of eighteen. Additionally, the population that is 65 and older (30.2%) is double that of the Commonwealth's 16.3%.

Table 3-6: Age Statistics for the Northern Neck Region.

Jurisdiction	Persons under 5 years	Persons under 18 years	Persons between 18 and 65 years	Persons 65 years and over
Lancaster	3.7%	15.7%	43.9%	36.7%
Northumberland	3.8%	14.6%	45.1%	36.5%
Richmond	4.2%	16.9%	57.9%	21.0%
Westmoreland	5.0%	18.7%	49.9	26.4%
NNPDC (average)	5.2%	16.50%	49.2%	30.2%

Source: 2020 U.S. Census Bureau Population Estimates Program

The counties of the Northern Neck Region are recognized as popular retirement communities. Lancaster and Richmond Counties have seen a trend toward an aging population of long-term residents and newly relocated retirees. New residents are attracted to the region's proximity to water, good land and housing prices, low taxes, and rural character. As a result, there has been an increased demand for residential development, recreational opportunities, and medical services for senior citizens. During the recent recession, the Northern Neck Region had abundant listed residential properties. Consideration of the needs of the younger and older generations should influence the development of public awareness mitigation strategies.



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3.2.9 Education

Data from the U.S. Census Bureau's 2020 Population Estimates Program approximate that about 86.5% of residents in the Northern Neck Region graduated from high school, and 25.7% hold bachelor's degrees or higher. Education levels are lower than Virginia averages (90.3% graduated from high school and 39.5% with bachelor's degrees or higher). Lancaster County has a higher education rate closer to the state average (33.5%). See Table 3-7: Education Statistics for the Northern Neck Region. Education levels and the population characteristics described in the previous paragraphs should influence mitigation and emergency management public outreach program development. The content and delivery of public outreach programs should be consistent with the audiences' needs and ability to understand complex information.

Table 3-7: Education Statistics for the Northern Neck Region

Statistics	High school graduate or higher, percent of persons aged 25 years+	Bachelor's degree or higher, percent of persons aged 25 years+
Lancaster	90.2%	33.9%
Northumberland	92.1%	32.6%
Richmond	80.1%	18.1%
Westmoreland	83.8%	18.30%
NNPDC (average)	90.3%	39.5%

Source: 2020 U.S. Census Bureau Population Estimates Program

3.2.10 Income

As of 2020, the median household income in the Northern Neck Region was approximately \$56,565, 29.8% lower than the state average of \$76,398, according to the U.S. Census Bureau. About 12.9% of residents within the region live below the poverty line. This rate is higher than the national rate of 11.6% in 2020 and higher than the state rate of 9.2%. Lancaster County has a higher median household income and per capita income than the other counties in the Northern Neck Region. Overall, the income statistics summarized in Table 3-8: Income Statistics for Northern Neck Region indicate that a significant portion of the population in the region may not have the resources available to undertake mitigation projects that require self-funding.

Table 3-8 Income Statistics for the Northern Neck Region.

Jurisdiction	Median household income (in 2020 dollars), 2016-2020	Per capita income in past 12 months (in 2020 dollars), 2016-2020	Persons in poverty, percent
Lancaster	\$59,736	\$48,280	10.3%
Northumberland	\$59,437	\$38,679	12.3%
Richmond	\$53,298	\$24,400	16.0%
Westmoreland	\$53,790	\$33,754	12.9%
NNPDC (average)	\$56,565	\$36,278	12.9%

Source: 2020 U.S. Census Bureau Population Estimates Program

3.2.11 Housing

As of July 1, 2021, there were an estimated 31,653 housing units in the Northern Neck Region according to the U.S. Census Bureau (Table 3-9: Housing Statistics for Northern Neck Region). Westmoreland County



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has the most housing units and Richmond County has the least. Only 4.7% of the housing units in the region are multi-unit structures. Lancaster County has the most multi-unit structures (560 units) while Richmond County has the highest percentage in the region with 7.8% (308 units).

About 77% of residents own their homes. Northumberland County has the highest homeownership rate of 83.70% while Richmond County has the lowest at 74.40%. All the homeownership rates are significantly higher than the national average of 63.90% or the state average of 66.20%. When considering mitigation options, special attention should be given to the difference in capabilities between owners and renters. As previously stated, it is a “buyer’s market” within the Northern Neck Region with many residential properties currently listed for sale. Many of these are “second” homes used as vacation or weekend homes by out-of-area owners from Northern Virginia or the Richmond Metropolitan area. A surge of homes was listed for sale during the recession during the past decade with many remaining on the market.

Table 3-9: Housing Statistics for the Northern Neck Region.

Jurisdiction	Housing units as of July 1, 2021	Owner-occupied housing unit rate	Median value of owner-occupied housing units
Lancaster	7,464	75.8%	\$236,500
Northumberland	8,993	89.4%	\$270,900
Richmond	3,952	64.2%	\$193,700
Westmoreland	11,244	73.9%	\$201,000
NNPDC	31,653	75.8%	\$225,525

Source: 2020 U.S. Census Bureau Population Estimates

3.2.12 Business and Labor

Most Northern Neck Region’s jurisdictions face unemployment and underemployment challenges. The decline in traditional industries and the growth in retirement and second-home development are changing the employment landscape. The area’s unemployment rates remain like the U.S. rates but higher than Virginia’s average (Table 3-10: Northern Neck Regional Unemployment Rates). The Virginia Employment Commission (VEC) projects that employment for the regional jurisdictions will increase by about 9.25% by 2024. It is worth noting that the United States and the Commonwealth of Virginia declared a state of emergency for the COVID-19 pandemic which contributed immensely to the steep increases in 2020, which carried into 2021.

Table 3-10: Northern Neck Regional Unemployment Rates.

Year	NNPDC	Virginia	United States
2013	7.00%	5.70%	7.40%
2014	6.70%	5.20%	6.20%
2015	5.70%	4.50%	5.30%
2016	4.90%	4.00%	4.90%
2017	4.60%	3.75%	4.35%
2018	3.90%	3.0%	3.90%
2019	3.70%	2.8%	3.70%
2020	6.10%	6.2%	8.10%
2021	4.60%	3.9%	5.40%

Source: Virginia Employment Commission, Economic Information & Analytics, Local Area Unemployment Statistics.



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The rural nature of the communities in the Northern Neck Region is reflected in the top nine employment sectors summarized in Table 3-11: Top Nine Employment Sectors in the Northern Neck Region.

Table 3-11: Top Nine (9) Employment Sectors in the Northern Neck Region.

Industry	Employment
Local Government	2,059
Health Care and Social Assistance	1,607
Manufacturing	1,191
Accommodation and Food Service	907
Construction	817
State Government	672
Retail Trade	541
Other Services (except Public Administration)	512
Professional, Scientific, and Technical Services	415

Source: Virginia Employment Commission, Economic Information & Analytics, Community Profile – Northern Neck PDC – Update 09/07/2022

According to profiles developed by the Virginia Economic Development Partnership, major employers in the Northern Neck Region are listed by county below.

Lancaster County:

- Rappahannock General Hospital
- Lancaster County School Board
- Rappahannock Westminster Canterbury
- Walmart
- Tides Inn

Northumberland County:

- Northumberland County School Board
- Omega Protein
- Manufacturing Techniques Inc.
- County of Northumberland
- Carry On Trailer Corporation

Richmond County:

- Haynesville Correctional Institute
- Richmond County School Board
- Rappahannock Community College
- Riverside Regional Medical Center
- County of Richmond

Westmoreland County:

- Westmoreland County School Board
- Carry On Trailer Corporation
- County of Westmoreland
- Bevans Oyster Company
- Town of Colonial Beach Schools

Northern Neck Region:



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- Westmoreland County School Board
- Haynesville Correctional Institute
- Rappahannock General Hospital
- Lancaster County School Board

3.2.13 Agriculture

Agriculture is a significant economic sector in the Northern Neck Region. Total agricultural sales exceed \$99 million annually, with most of the revenue from the sales of crops, including those from nurseries, greenhouses, and vineyards. Major crops in the region include soybeans, corn, and wheat.

According to the 2010 U.S. Census, employment in Lancaster County related to farming, fishing, and forestry declined over 72% between 1990 and 2010 (253 jobs to 69 jobs). Table 3-12: Northern Neck Regional Agriculture summarizes agriculture in the Northern Neck Region based on 2017 Agricultural Census statistics.

Table 3-12: Northern Neck Regional Agriculture

Jurisdiction	Land in Farms (acres)	Total Value of Agricultural Products Sold	Total Value of Crops, including nursery and greenhouse crops	Total Value of livestock, poultry, and their products
Lancaster	16,238	\$5,550,000	\$5,101,000	\$450,000
Northumberland	43,480	\$20,052,000	\$17,212,000	\$2,840,000
Richmond	31,952	\$16,814,000	\$16,024,000	\$790,000
Westmoreland	52,619	\$57,092,000	(D)*	(D)*
NNPDC	144,282	99,508,000	**	**

Source: 2017 U.S. Census of Agriculture * USCA report withheld figures to avoid disclosing data for individual farms. **Totals unavailable secondary to (D) figures.

3.2.14 Transportation

The Northern Neck is a peninsula bound by two rivers and the Chesapeake Bay. As a result, transportation options are somewhat more limited than in surrounding counties.

US-360 is the main east-west route, while State Route-3 (SR-3) is the major north-south route in the Northern Neck Region. No interstate serves the Northern Neck Region directly, though Interstate 95, the central north-to-south road on the East Coast, is easily accessible via SR-3 (about 30 miles from the northernmost point in Westmoreland County). Likewise, US-17 is accessible via US-360 (across the Rappahannock River over Downing Bridge).

The closest commercial airports are in Richmond and Newport News (both approximately 55 miles away from the Northern Neck Region). Two general aviation facilities, Tappahannock Municipal Airport and Hummel Field, also serve the region. There is no rail service to the Northern Neck Region.

The Potomac, Rappahannock Rivers, and the Chesapeake Bay are all navigated by medium to large ships. However, the nearest major commercial ports are in Richmond and Norfolk, Virginia. Several grain barge facilities in the Northern Neck Region are used to transport agricultural products. In addition, many local marinas provide docking for pleasure craft along the shorelines of the Northern Neck jurisdictions.



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A bridge on SR-3 crosses the Rappahannock River between White Stone in Lancaster County and Grey's Point in Middlesex County, with an additional bridge on US-360 spans the Rappahannock River at Richmond County and Tappahannock in Essex County. Seasonal (summer) passenger ferries run to Tangier Island. In addition, VDOT operates two ferries in the Northern Neck Region, one at Sunnybank in Northumberland County and the other at Merry Point in Lancaster County.

3.2.15 Infrastructure

3.2.15.1 Electricity

The Northern Neck Region is served by two electricity providers: Dominion Virginia Power and the Northern Neck Electric Cooperative (Touchstone Energy Cooperatives). The Virginia Electric & Power Company operates a Petroleum Power Plant in the Town of Warsaw, Richmond County. Dominion Energy, Inc operates the Montross Solar Power Plant just outside of the Town of Montross, located in Westmoreland County.

Northumberland County's Middle/High School was the first of its kind at the time to have a wind turbine installed on February 11, 2011. The turbine is primarily used as an educational tool, allowing the students to learn through hands-on and interactive curricula, and sponsored by the "Wind for Schools" initiative through the U.S. Department of Energy.

3.2.15.2 Heating and Gas

Quarles Propane & Heat in Burgess, NWP Energy in Kilmarnock, and Frederick Northup, Inc in Warsaw serve the Northern Neck Region area's heating and fuel needs.

3.2.15.3 Telephone

The primary telephone service provider for the Northern Neck Region is Verizon.

3.2.15.4 Public Water and Wastewater

Public water systems serve residents and businesses within the towns of Colonial Beach, Kilmarnock, Montross, and Warsaw. Wastewater treatment is available in the towns of Colonial Beach, Montross, Kilmarnock, and Warsaw. The Reedville Sanitary District and Montross-Westmoreland Sewer Authority provide wastewater services. Westmoreland County also serves Machado Neck, Coles Point, and Washington District areas with public wastewater services. Additionally, the Town of White Stone is in the process of constructing a wastewater treatment plant.

Private wells and onsite sewage systems serve the remainder of the Northern Neck Region. However, according to the 2016 Northumberland County Comprehensive Plan (currently undergoing an update), there is a high concentration of soils of poor quality for septic tanks located in the low-lying areas seaward of the Suffolk Scarp, in addition to other upland regions located along stream beds and banks. This poor soil quality challenges future development in this region.

3.2.15.5 Television

Cable television is available in the region through DirecTV, Dish TV, Breezeline, and Verizon Fios.

3.2.15.6 Internet

Internet access varies throughout the Northern Neck Region. Service providers include Breezeline (cable internet), Verizon (DSL), Brightspeed (fixed wireless), and HughesNet (satellite internet). In addition, in



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2022, a public private partnership between All Points Broadband and the Northern Neck Planning District Commission—including the participation of Dominion Energy and the Northern Neck Electric Cooperative (NNEC)---began construction of Phase 1 of a new fiber network. Phase 2 will overlap Phase 1, with all work scheduled to be completed by the end of 2023. The result will be high-speed, wired Internet connectivity available to every household and business that does not currently have wired service in King George, Lancaster, Northumberland, Richmond, and Westmoreland Counties. Funding for the project was provided by private investments from Dominion Energy, All Points Broadband, and NNEC, plus public investment from all participating Counties, in addition to grants from the Virginia Telecommunication Initiative and the American Rescue Plan Act. Once the project is completed at the end of 2023, Virginia's Northern Neck peninsula will be the first rural region in the country with universal broadband coverage via wired services.

3.3 Disadvantaged Communities

It is essential to determine if any jurisdiction within the region would qualify as a Disadvantaged Community, formerly known as a special consideration community. Disadvantaged Communities are often eligible for grants for hazard mitigation and other community improvements on a preferential basis or with less stringent requirements for the non-federal, local share of grants. The Federal government defines a Disadvantaged Community as one with 3,000 or fewer individuals in a rural community and not within the corporate boundaries of a larger jurisdiction. In addition, to be categorized as a Disadvantaged Community, a jurisdiction must be economically disadvantaged, with residents having an average per capita annual income not exceeding 80% of the national per capita income based on the best available data. Further, Disadvantaged Communities must have a local unemployment rate that exceeds—by one percentage point or more—the most recently reported average national unemployment rate.

Currently, none of the jurisdictions in the Northern Neck Region meet all the above the criteria and are therefore not considered Disadvantaged Communities.



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Section 4 Adoption and Approval

Contents of this Section

- 4.1 44 CFR Requirement for Adoption and Approval
- 4.2 Authority
 - 4.2.1 Planning
- 4.3 Adoption and Approval Procedure
- 4.4 Adoption Resolutions
- 4.5 Approval Letters

4.1 44 CFR Requirement for Adoption and Approval

Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.*

Requirement §201.6(a)(3): *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.*

4.2 Authority

Article VII. The Constitution of Virginia – Article VII. Local Government, gives authority to and defines the organization of communities, powers, duties, structure of governing bodies, procedures, and property use. Local governments in Virginia, including those in the Northern Neck Region, have a wide range of tools for implementing mitigation programs, policies, and actions. A hazard mitigation program can use any or all the four broad types of government powers granted by the Commonwealth of Virginia, which are (a) regulation, (b) acquisition, (c) taxation, and (d) spending. The scope of this local authority is subject to constraints. However, all of Virginia’s political subdivisions must not act without proper delegation from the Commonwealth. Therefore, all power is vested in the Commonwealth and can only be exercised by local governments to the extent it is delegated (per Dillon’s Rule).

Under the 1968 Virginia Area Development Act and modified by the Regional Cooperation Act, 21 Planning District Commissions were formed within the Commonwealth. Beginning in 2003, the Commonwealth of Virginia encouraged these twenty-one planning districts to lead the development of local hazard mitigation plans. These plans, which are required by the Disaster Mitigation Act of 2000 (DMA 2000), help local governments determine risks and vulnerabilities and identify projects to reduce these risks.

The communities of the Northern Neck Region have established a Local Emergency Planning Committee (LEPC) to address local emergency management issues. Resolution by the counties appoint members to the LEPC. The mission of this committee was closely aligned with the needs of a Mitigation Advisory



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Committee. The Northern Neck Planning District Commission decided to utilize the existing LEPC as its Mitigation Advisory Committee. Representatives included:

- County administrators.
- Planning directors.
- Emergency services staff.
- School board officials.
- Local non-profits.
- State agencies such as the Virginia Department of Transportation.

4.2.1 Planning

According to State statutes, local governments in Virginia may create or designate a planning agency. The planning agency may perform several duties, including:

- Make studies of the area.
- Determine objectives.
- Prepare and adopt plans for achieving those objectives.
- Develop and recommend policies, ordinances, and administrative means to implement plans.
- Perform other related duties.

The requirement illustrates the importance of the planning powers of local governments that zoning regulations be made per a comprehensive plan. While the ordinance itself may provide evidence that zoning is being conducted "per a plan," a separate planning document ensures that the government is developing regulations and ordinances that are consistent with the community's overall goals.

Each county in the Northern Neck Region and the Town of Colonial Beach have dedicated planning staff, zoning regulations, and comprehensive plans. Town managers, with county assistance, perform planning and floodplain management functions. In addition, the towns in the study area all have planning commissions that meet regularly, receiving support as necessary from county planning departments.

4.3 Adoption and Approval Procedure

Upon the Federal Emergency Management Agency (FEMA) Region III determination that the Northern Neck Regional Hazard Mitigation Plan (the Plan) was "approvable pending adoption," the Northern Neck Planning District Commission, Steering Committee, and Working Group will meet and recommended that the participating jurisdictions should adopt the Plan. Accordingly, the Plan will be submitted to the appropriate entity for each participating jurisdiction for review and adoption. The resulting Adoption Resolutions will then be forwarded to FEMA Region III for approval and the appropriate documentation will be added to the Plan appendices F: Adoption Resolutions and G: Approval Letters. FEMA will subsequently issue formal approval letters to the Virginia Department of Emergency Management (VDEM) for each participating jurisdiction that adopted the Plan. VDEM, in turn, will give approval letters to the approved jurisdictions.

4.4 Adoption Resolutions

Appendix F contains the signed Adoption Resolutions for the participating jurisdictions.

4.5 Approval Letters

Appendix G contains the formal Approval Letters from FEMA Region III for the participating jurisdictions.



Section 5 Planning Process

Contents of this Section

- 5.1 44 CFR Requirement for the Planning Process
- 5.2 Description of the Planning Process
 - 5.2.1 How the Plan was Prepared (Overview)
 - 5.2.2 Step 1: Organize Resources
 - 5.2.3 Step 2: Assess Risks
 - 5.2.4 Step 3: Update the Mitigation Plan
 - 5.2.5 Step 4: Implement the Plan and Monitor Progress
- 5.3 Involvement by the Public and Other Interested Parties
- 5.4 Review and Incorporation of Plans, Studies, Reports, and Other Information

5.1 44 CFR Requirements for the Planning Process

Requirement §201.6(c) (1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval*
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process; and*
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

5.2 Description of the Planning Process

5.2.1 How the Plan was Prepared (Overview)

The Northern Neck Regional Hazard Mitigation Plan (the Plan) was updated in accordance with the process established in the State and Local Mitigation Planning How-to Guides (FEMA Publication Series 386) produced by the Federal Emergency Management Agency (FEMA), and the requirements of 44 CFR part 201.6. The process established in the FEMA 386 guides includes four basic steps.

- Step 1: Organize resources
- Step 2: Assess risks
- Step 3: Update the 2017 mitigation plan
- Step 4: Implement the plan and monitor progress



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5.2.2 Step 1: Organize Resources

The Northern Neck Regional Planning District Commission (NNPDC) was the lead agency to update the 2017 Northern Neck Regional Hazard Mitigation Plan. At the beginning of the process, a consultant firm, The Olson Group, LTD (OGL), was hired to provide technical support to the NNPDC and participating jurisdictions. In addition, several individuals and organizations worked together to update the Plan. These participants were organized into two different committees, the:

- Northern Neck Region Hazard Mitigation Steering Committee
- Northern Neck Region Hazard Mitigation Working Group Committee

The Northern Neck Region Hazard Mitigation Steering Committee (HMSC) was comprised principally of Planning District Commission personnel, selected county agency representatives, elected local representatives, and private concerned parties. This committee was formed to provide focus and leadership on behalf of all participating jurisdictions in the update of this Plan. HMSC meetings were regularly attended by other key county agency staff, including representatives from departments of planning, public works, and additional emergency management staff, in addition to Virginia Department of Emergency Management (VDEM) staff. The HMSC met at scheduled meetings as recorded, during the update process to receive progress reports from the consultant, review, and comment upon draft documents and procedures, implement relevant tasking, and coordinate efforts within their communities or organizations.

The Northern Neck Region Hazard Mitigation Working Group Committee (HMWG) comprises the county and local jurisdiction representatives in the Northern Neck Regional Planning District. The majority of the HMWG membership has regular interaction with the NNPDC. In addition, the HMWG comprises representatives from each participating jurisdiction's OEM, other governmental representatives, related agencies within the counties, and public entities that wish to participate in the update effort. The duties and responsibilities of the HMWG consisted of representing their communities' interests, serving as the point of contact between their communities and the HMSC, and completing necessary planning tasks, including data collection, identification of local mitigation actions, and reviewing the plan products of the HMSC.

With input and consensus from the HMWG, the HMSC identified the 13 most significant countywide hazards for a risk assessment to be completed. Table 5-1: Northern Neck Region Hazard Mitigation Steering Committee shows the primary membership of the HMSC.

Table 5-1: Northern Neck Regional Hazard Mitigation Steering Committee (HMSC) Members

Name	Organization
Jerry W Davis, AICP Executive Director	Northern Neck Region Planning District Commission
John Bateman, Regional Planner	Northern Neck Region Planning District Commission
Alex Eguiguren, Project Manager	Northern Neck Region Planning District Commission

Table 5-2: Northern Neck Region Hazard Mitigation Working Group (HMWG) Members lists the membership of the Northern Neck Region HMWG.



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Table 5-2: Northern Neck Regional Hazard Mitigation Working Group (HMWG) Members

Name	Organization
Jerry W Davis, AICP Executive Director	Northern Neck Planning District Commission
John Bateman, Senior Regional Planner	Northern Neck Planning District Commission
Alex Eguiguren, Project Manager	Northern Neck Planning District Commission
Luttrell Tadlock, County Administrator	Northumberland County
Drew Bayse, Asst. County Administrator	Northumberland County
Wes Packett, Director of Emergency Services	Northumberland County
Phillip Marston, Zoning Administrator	Northumberland County
R. Morgan Quicke, County Administrator	Richmond County
Mitch Paulette, Chief, Department of Emergency Services	Richmond County
Hope Mothershead, Planning and Zoning Administrator	Richmond County
Norm Risavi, County Administrator	Westmoreland County
Philip Marsten, Zoning Administrator	Westmoreland County
Bill Cease, Director of Emergency Management and Technology	Westmoreland County
Beth McDowell, Director of Planning and Community Development	Westmoreland County
Darrin Lee, Assistant Planning Director	Westmoreland County
Olivia Hall, Environmental Codes Compliance Officer	Lancaster County
Don Gill, County Administrator	Lancaster County
Matthew Smith, Chief of Emergency Services	Lancaster County
Jim Canter, Building Official	Lancaster County
Bill Farrell, Director of Planning and Land Use	Lancaster County
Marshall Sebra, Planning-Zoning Director	Town of Kilmarnock
Susan Cockrell, Town Manager	Town of Kilmarnock
Julie Harris, Mayor	Town of Irvington
Laurel Taylor, Town Clerk	Town of Irvington
Patrick Frere, Town Manager	Town of White Stone
Melinda George, Town Clerk	Town of White Stone
India Adams-Jacobs, Town Manager	Town of Colonial Beach
J.C. LaRiviere, Grants Writer	Town of Colonial Beach
Matthew Smith, GIS/Asset Manager	Town of Colonial Beach



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Name	Organization
Joseph Quesenberry, Town Manager	Town of Warsaw
Melissa Coates, Director of Planning and Community Development	Town of Warsaw
Patricia Lewis, Town Manager	Town of Montross
Matt Dalon, Program Manager, Virginia Coastal Resilience Master Plan	Virginia Department of Conservation and Recreation
Lydia Bienlien, Sea Grant Commonwealth Coastal & Marine Policy Fellow – Dam Safety and Floodplain Management	Virginia Department of Conservation and Recreation
Stacey Farinholt, Program Admin Specialist – Dam Safety and Floodplain Management	Virginia Department of Conservation and Recreation
Mark Killgore, Lead Dam Safety Engineer	Virginia Department of Conservation and Recreation
Angela Davis, Floodplain Program Planner	Virginia Department of Conservation and Recreation
Chris Bruce, All Hazards Planner	VDEM, Region 5 Representative
Shannon Burke, Mitigation Planner	FEMA, Region 3 Representative
Michele Zucker, Supervisory Community Planner	FEMA, Region 3 Representative
Shannon Hutton, Geographer	Old Dominion University
Montrose Gray, Assistant Director of the Coastal Policy Center	William & Mary University

5.2.2.1 Meeting Schedule

There were several meetings conducted during the update of the Plan per Table 5-3: Committee Meeting Schedule. The meetings focused primarily on the review of work-in-progress for the update of the Plan. However, in some cases, the meetings were essentially working sessions for the current needs of the update such as verification of hazard priorities, processes validation and draft documents review.

Table 5-3: Committee Meeting Schedule

Date	Meeting	Attendees
June 23, 2022	Introductory Meeting	NNPDC, FEMA, VDEM, OGL
July 15, 2022	HM Steering Committee Meeting	HMSC, OGL
July 29, 2022	HM Working Group Meeting	HMWG, OGL
August 12, 2022	HM Working Group Meeting & Public Input Meeting	HMWG, OGL
September 9, 2022	HM Working Group Meeting & Public Input Meeting	HMWG, OGL
September 19, 2022	Northumberland County Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 20, 2022	Richmond County Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 20, 2022	Westmoreland County Jurisdictional Interview	Locality representatives, J. Bateman, OGL



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Date	Meeting	Attendees
June 23, 2022	Introductory Meeting	NNPDC, FEMA, VDEM, OGL
September 20, 2022	Lancaster County Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 21, 2022	Town of Montross Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 22, 2022	Town of Irvington Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 22, 2022	Town of Warsaw Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 22, 2022	Town of Colonial Beach Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 22, 2022	Town of Kilmarnock Jurisdictional Interview	Locality representatives, J. Bateman, OGL
September 23, 2022	HM Steering Committee, HM Working Group Meeting	HMSC, HMWGC, OGL
October 7, 2022	HM Working Group Meeting & Public Input Meeting	HMWGC, OGL
October 7, 2022	Town of White Stone Jurisdictional Interview	Locality representatives, J. Bateman, OGL
November 16, 2022	HM Steering Committee Meeting	HMSC, OGL
February 3, 2023	HM Steering Committee Meeting	HMSC, OGL, VDEM
February 3, 2023	HHPD Information Meeting	HMSC, OGL, VDEM, DCR

Appendix C.1 contains documentation for these meetings including agendas, attendance rosters, presentation materials, and meeting notes where appropriate.

5.2.3 Step 2: Assess Risks

Under general mitigation planning practices and the process FEMA established in FEMA Local Mitigation Planning Handbook and FEMA Local Mitigation Planning Policy Guide, the risk assessment forms the basis for this Plan by quantifying and rationalizing information about how natural and human-caused hazards affect the Northern Neck Region and its participating jurisdictions.

The processes used to complete the hazard identification and risk assessment update and the results of these activities are described in Sections 6, 7, Appendices D and E. The assessment determined several aspects of the risks of hazards faced by the region and the participating jurisdictions:

- The natural hazards that are most likely to affect the region
- How often hazards are expected to impact the region
- The expected severity of the hazards
- Which areas of the region are likely to be affected by hazards
- How the regions assets, operations, people, and infrastructure may be impacted by hazards
- How private and commercial assets, operations, infrastructure may be impacted by hazards
- The expected future losses if the risk is not mitigated

The HMSC first verified the already identified hazards and added three additional to be assessed, with the potential to impact the region. Next, using a rating system called the Calculated Priority Risk Index (CPRI), explained in Section 6, the HMSC reassessed the region-wide hazards considered the most relevant for



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this planning process. The results of this selection process were discussed and validated by the HMSC. These hazards are described in the Plan's Hazard Identification, Profiling, and Ranking portion (Section 6).

As a result, the HMSC and HMWG were able to make qualitative determinations that allowed further refinement of the focus of this plan update to thirteen hazards: tornado, severe weather, coastal flooding, riverine flooding, wildfire, winter storm, hurricane/tropical storm, coastal erosion, pluvial flooding, landslide, drought, heatwave, and earthquake. The HMSC considers these to represent the most predominant risks to the region. The results of this secondary selection process were also discussed and validated by the HMWG.

For each of these hazards, the consultants performed detailed risk assessments, i.e., calculations of future expected damages, expressed in dollars where appropriate. The risk assessment results were also made available to the public during the public presentations (The entire process and results of this work are presented in the Risk Assessment portion of this Plan (Section 7).

5.2.4 Step 3: Update the Mitigation Plan

The Plan has a developed series of goals and objectives directly linked to updated risk assessment results. An updated capability assessment was also conducted to help determine the capacity of the region and the participating jurisdictions to implement hazard mitigation projects. In addition, the HMSC and the consultant worked individually with the participating jurisdictions to identify potential problems and mitigation solutions to be included in the updated Mitigation Action Plan. The Mitigation Action Plan was reviewed and validated by the HMSC and HMWG. The results of these efforts are detailed in Sections 8 and 9.

5.2.5 Step 4: Implement the Plan and Monitor Progress

Finally, the HMSC identified a process for on-going monitoring and revisions to the Plan over the next five years. Section 10 details the resulting monitoring, evaluation, and plan update procedures. This step was also reviewed and validated by the HMWG.

5.3 Involvement by the Public and Other Interested Parties

During the update of this Plan, the public was involved by requesting their participation in public presentations/meetings, providing drafts of the Plan for review, and inviting comments on the contents of the Plan. For each meeting, the public and interested parties were notified of the meetings via public notice in area newspapers, notice on the NNPDC website, and emails to interested groups. It is to be noted that while the public was invited via website announcement and open public meeting notice as required, no comments were provided by the public for incorporation into the plan and no participants from the public attended any of the Public Input meetings. The public outreach, meeting attendance lists, public presentations and meetings are detailed in Table 5-4: Public Involvement. In addition, continued outreach by the NNPDC and jurisdictional staff, including public education and work with stakeholders and other interested parties between now and the next five-year Plan update, will be included as part of the Mitigation Action Plan in Section 9.

Table 5-4: Public Involvement

Date	Type of Involvement	Meeting Location
July 2022 – updated throughout planning process	Website with hazard mitigation and Plan development information posted	https://www.northernneck.us/regional-northern-neck-hazard-mitigation-plan/



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Date	Type of Involvement	Meeting Location
August 12, 2022	Public meeting with presentation and open discussion	Microsoft TEAMS Virtual Online Meeting
September 9, 2022	Public meeting with presentation and open discussion	Microsoft TEAMS Virtual Online Meeting
October 7, 2022	Public meeting with presentation and open discussion	Microsoft TEAMS Virtual Online Meeting
September 19, 2022	Press release regarding hazard mitigation and Plan development issued	Issued to Northern Neck News and The Rappahannock Record
September 29, 2022	Press release regarding hazard mitigation and Plan development issued	Rappahannock Record
November 2, 2022	Plan posted to website for public comment	https://www.northernneck.us/regional-northern-neck-hazard-mitigation-plan/
December 15, 2022	Second draft forwarded to Working Group members via email.	Not Applicable
February 6, 2023	Final Draft Plan distributed to surrounding communities and agencies for viewing.	Via email and NNPDC website

As part of the development of the Plan, Floodplain Administrators were engaged in Plan update and review in many jurisdictions. Involvement of Floodplain Administrators in the Northern Neck Region is shown in Table 5-5: Northern Neck Regional Floodplain Administrator Involvement. Additional outreach to Floodplain Administrators should result in enhanced participation in the next Plan update.

Table 5-5: Northern Neck Regional Floodplain Administrator Involvement

Jurisdiction	Floodplain Administrator Name	Method of Involvement in Plan
Lancaster County	Don Gill	Active Working Group Member
Town of Irvington	Justin Nelson	Participated in the Town of Irvington's jurisdictional interview and mitigation actions update.
Town of Kilmarnock	Marshall Sebra	Active Working Group Member Participated in the Town of Kilmarnock's jurisdictional interview and mitigation actions update.
Town of White Stone	Patrick Frere	Active Working Group Member Participated in the Town of White Stone's jurisdictional interview and mitigation actions update.
Northumberland County	Phillip Marsten	Active Working Group Member Participated in Northumberland County's jurisdictional interview and mitigation actions update.
Richmond County	Hope Mothershead	Active Working Group Member



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Section 5: Planning Process

Jurisdiction	Floodplain Administrator Name	Method of Involvement in Plan
Lancaster County	Don Gill	Active Working Group Member Participated in Richmond County's jurisdictional interview and mitigation actions update.
Town of Warsaw	Joseph Quesenberry	Active Working Group Member Participated in the Town of Warsaw's jurisdictional interview and mitigation actions update.
Westmoreland County	Beth McDowell	Active Working Group Member Participated in Westmoreland County's jurisdictional interview and mitigation actions update.
Town of Colonial Beach	India Adams-Jacobs Kaylin DeBernard (secondary)	Participated in the Town of Colonial Beach's jurisdictional interview and mitigation actions update.
Town of Montross	Patricia Lewis	Active Working Group Member Participated in the Town of Montross's jurisdictional interview and mitigation actions update.

Copies of the plan were made available to the Northern Neck Region's neighbors, the George Washington Regional Commission, and the Middle Peninsula Planning District Commission for their review and input. In addition, the plan was shared with the Rappahannock Community College, the College of William & Mary, and Old Dominion University.

Minutes of meetings with associated attendee lists, and copies of relevant correspondence are included in Appendix C.

Beyond this, email, and phone solicitations for involvement by potential stakeholders and interested parties, including non-profits, area utilities, school boards, significant employers, and others, were conducted during Plan development and reviews.

Relevant correspondence is contained in Appendix C3. Response to this outreach was sparse, but outreach by the NNPDC, including public education and work with stakeholders and other interested parties between now and the next five-year Plan update, should improve such involvement during the Plan update.

5.4 Review and Incorporation of Plans, Studies, Reports, and Other Information

The Northern Neck Regional Hazard Mitigation Plan 2023 Update incorporates information from multiple other plans, studies, and reports. Information about how these plans and studies were incorporated into the plan update is found in Sections 7, 8, and 9. These sections are where relevant and specific data sources are provided. Complete reference information is provided in Appendix B: Sources. The progress of plan implementation, including the monitoring schedule, evaluation of progress, success, lessons learned, and updates, are included in Section 8: Capability Assessment and Section 10: Plan Monitoring and Maintenance.



Section 6

Hazard Identification, Profiling, and Ranking

Contents of this Section

- 6.1 44 CFR Requirement for Hazard Identification and Profiling
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- 6.3 Overview of Type and Location of Hazards That Can Affect the Northern Neck Region
 - 6.3.1 Tornadoes
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 - 6.3.5 Wildfires
 - 6.3.6 Winter Storm
 - 6.3.7 Hurricane/Tropical Storm
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 - 6.3.12 Heatwave
 - 6.3.13 Earthquake
- 6.4 Identifying Hazards of Concern
- 6.5 High Hazard Potential Dams
 - 6.5.1 Risks of High Hazard Probability Dams in the Northern Neck
 - 6.5.2 Previous Occurrences of Dam Failures
 - 6.5.3 Probability of Future Risks and Failures
- 6.6 Summary
 - 6.6.1 Summary Description of the Region's Vulnerability to Hazards

6.1 44 CFR Requirement for Hazard Identification and Profiling

Requirement §201.6(c)(2)(i): The risk assessment shall include a description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

6.2 Hazard Identification

The Hazard Vulnerability Analysis aims to provide an overview of how various natural hazards impact Virginia's Northern Neck Region.



Northern Neck Regional Hazard Mitigation Plan Section 6: Hazard Identification, Profiling, and Ranking

The Hazard Identification and Risk Assessment (HIRA) assesses all natural hazards deemed a threat through previous Hazard Identification Risk Assessments and the qualitative priorities of the Local Emergency Planning Committee (LEPC), which serves as the plan update's Working Group Committee. The analysis presented in Section 7 uses an all-hazards identification, classification, and vulnerability indexing process to ensure hazard analysis is comprehensive and as qualitative as possible based on all available data sources. The HIRA provides information to allow the planning district commission and its communities to understand local hazards and the risks they pose to people, property, and infrastructure so that mitigation goals, strategies, actions, and projects to reduce risk exposure to dangers will make the Northern Neck Region more resilient.

For the HIRA, a natural hazard is a physical event or condition that can cause fatalities, injuries, property and infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Identifying the risk and vulnerability of a community is critical when determining how to allocate finite resources to carry out feasible and appropriate mitigation actions. The hazard analysis involves identifying all the hazards that potentially threaten the Northern Neck Region and then analyzing them to determine the degree of threat posed by each hazard and hazard vulnerability. Addressing risk and vulnerability through hazard mitigation measures will reduce societal, economic, and environmental exposure to natural hazard impacts.

The Northern Neck Region is exposed to many natural hazards affecting people and property. The following hazard categories were reviewed during the 2023 plan update process, where the Working Group agreed that the 2017 plan hazards were still relevant with the addition of landslide, heat wave, and pluvial flooding:

- Tornado
- Severe Weather (high winds, hail, lightning)
- Coastal Flooding
- Riverine Flooding
- Wildfires
- Winter Storm
- Hurricane/Tropical Storm
- Coastal Erosion
- Pluvial Flooding
- Landslide
- Drought
- Heatwave
- Earthquake

The impact of each natural hazard is presented in each respective hazard section. Coastal Erosion is excluded from Table 6-1 as available data is insufficient to report to parameters.



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Section 6: Hazard Identification, Profiling, and Ranking

Table 6-1: Hazard Events for Northern Neck Regional Counties (date range as noted)

Hazards	Reported Events	Property Damage	Crop Damage	Deaths	Injuries
Lancaster	143			0	3
Tornado	9 (1975-2022)	\$6.58 million	\$0.00	0	0
Severe Weather (hail, lightning, severe wind)	64 (1955-2022)	\$3.55 million	\$0.00	0	3
Coastal Flooding	14 (1996-2022)	\$1.87 million	\$0.00	0	0
Riverine Flooding	5 (1996-2022)	\$112,000***	\$0.00	0	0
Wildfire	52 (2009-2022)	\$1000**	66.3 acres	0	0
Winter Storms	34 (1996-2022)	\$40,000	\$0.00	0	0
Hurricanes/Tropical Storms	7 (1996-2022)	\$722,000	\$503,000	0	0
Pluvial Flooding	10 (1996-2022)	Not available	Not available	0	0
Landslide	0* (2010-2019)	\$0.00	\$0.00	0	0
Drought	3 (1996-2022)	\$0.00	\$3.88 million	0	0
Heat Wave	3 (1996-2022)	\$0.00	\$0.00	0	0
Earthquake	3** (1950-2022)	\$0.00	\$0.00	0	0
Northumberland	164			0	9
Tornado	8 (1969-2022)	\$1.56 million	\$0.00	0	9
Severe Weather (hail, lightning, strong wind)	68 (1976-2022)	\$18,262,979.95	\$0.00	0	0
Coastal Flooding	14 (1996-2022)	\$20.63 million	\$0.00	0	0
Riverine Flooding	8 (1996-2022)	\$112,000***\$0.00	\$0.00	0	0
Wildfire	38 (2009-2022)	\$3,100	120 acres	0	0
Winter Storms	43 (1996-2022)	\$40,000	\$0.00	0	0
Hurricanes/Tropical Storms	7 (1996-2022)	\$917,000	\$1.15 million	0	0



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Hazards	Reported Events	Property Damage	Crop Damage	Deaths	Injuries
Pluvial Flooding	10 (1996-2022)	Not available	Not available	0	0
Landslide	0* (2010-2019)	\$0.00	\$0,00	0	0
Drought	2 (1996-2022)	\$0.00	\$3 million	0	0
Heat Wave	3 (1996-2022)	\$0.00	\$0.00	0	0
Earthquake	1** (1950-2022)	\$0.00	\$0.00	0	0
Richmond	199			0	5
Tornado	8 (1996-2022)	\$3.4 million	\$0.00	0	2
Severe Weather (hail, lighting, strong wind)	102 (1958-2022)	\$335,000	\$5,000	0	3
Coastal Flooding	3 (1996-2022)	\$1.8 million	\$0.00	0	0
Riverine Flooding	17* (1996-2022)	\$492,000***	\$0,00***	0	0
Wildfire	18 (2009-2022)	\$63,000	25.3 acres	0	0
Winter Storms	48 (1996-2022)	\$95,000	\$0.00	0	0
Hurricanes/Tropical Storms	2 (1996-2022)	\$129, 000	\$812,000	0	0
Pluvial Flooding	13 (1996-2022)	\$664,000	\$200,000	0	0
Landslide	0* (2010-2019)	\$0.00	\$0.00	0	0
Drought	2 (1966-2022)	\$0.00	\$2 million	0	0
Heat Wave	3 (1996-2022)	\$0.00	\$0.00	0	0
Earthquake	1** (1950-2022)	\$0.00	\$0.00	0	0
Westmoreland	179			0	0
Tornado	36 (1950-2022)	\$12.73 million	\$78, 000	0	16
Severe Weather (thunderstorm, hail, lighting, and winds)	211 (1955-2022)	\$19.46 million	\$5,000	0	6
Coastal Flooding	5 (1996-2022)	\$220,000	\$0.00	0	0



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Hazards	Reported Events	Property Damage	Crop Damage	Deaths	Injuries
Riverine Flooding	12* (1996-2019)	\$101,000***	\$0.00***	0	0
Wildfire	33 (2009-2022)	\$0	75 acres	0	0
Winter Storms	48 (1996-2022)	\$85,000	\$0.00	0	0
Hurricanes/Tropical Storms	4 (1996-2022)	\$515,000	\$950,000	0	0
Pluvial Flooding	10 (1996-2022)	\$195,000	\$55,000	0	0
Landslide	1 (2010-2019)	\$0.00	\$0.00	0	0
Drought	2 (1996-2022)	\$0.00	\$5 million	0	0
Heat Wave	3 (1996-2022)	\$0.00	\$0.00	0	0
Earthquake	1* (1950-2022)	\$0.00	\$0.00	0	0

Source: NOAA NCEI Storm Events Database; *FEMA National Risk Index; **VDOF Fire Incident Database ***HAZUS

Table 6-2: Total Unique Hazard Events in the Northern Neck Region (as of June 30, 2022)

Hazard	Total Unique Events
Tornado	36
Severe Weather	211
Coastal Flooding	18
Riverine Flooding	17*
Wildfire	141
Winter Storm	53
Hurricane/Tropical Storm	8
Coastal Erosion	Not available
Pluvial Flooding	22
Landslide	1
Drought	3
Heatwave	3
Earthquake	1
Total	497

Source: NOAA NCEI Storm Events Database; *FEMA National Risk Index. **USGS Earthquake Database ***HAZUS

This table only summarizes the events found in sources such as the NCEI Database, NRI, HAZUS, VDOF, and USGS. These estimates underrepresent the actual damages since some hazard losses go unreported



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or are challenging to quantify accurately; this is especially true with crop damage. Therefore, other best-available national and local data sets were utilized in some hazard sections to quantify losses.

6.2.1 Presidential Disaster Declarations

The Federal Emergency Management Agency (FEMA) maintains the National Disaster Declarations Summary dataset. The first disaster declared in the national dataset was in 1953 and was supplemented with the Robert T. Stafford Disaster Recovery Act and related Department of Homeland Security regulations. For an event to be declared a disaster by FEMA, the Governor of Virginia must declare a state of emergency and then formally demonstrate to the President that Commonwealth and local government resources to support disaster recovery are exhausted, necessitating Federal assistance. Table 6-3 shows the FEMA Disaster Declarations Summary for events declared within the Northern Neck Region from 1953 to June 30, 2022. Eighteen significant disaster declarations have been since 1969, and eight emergency declarations since 1993, totaling 26. In addition, six emergency declarations have been made since the update in 2017.

Table 6-3: FEMA Declared Disasters for the Northern Neck Region (1953-June 30, 2022)

Disaster Number	Disaster Type	Incident Type	Incident Begin Date	Programs Declared			
				IH	IA	PA	HM
274	Major Disaster	Hurricane	8/23/1969	No	Yes	Yes	Yes
339	Major Disaster	Flood	6/23/1972	No	Yes	Yes	Yes
525	Major Disaster	Freezing	1/26/1977	No	Yes	No	No
3046	Emergency	Drought	7/23/1977	No	No	Yes	Yes
755	Major Disaster	Flood	11/9/1985	No	Yes	Yes	Yes
3112	Emergency	Snow	3/13/1993	No	No	Yes	Yes
1014	Major Disaster	Snow	2/8/1994	No	No	Yes	Yes
1086	Major Disaster	Snow	1/6/1996	No	No	Yes	Yes
1135	Major Disaster	Hurricane	9/5/1996	No	Yes	Yes	Yes
1293	Major Disaster	Hurricane	9/13/1999	No	Yes	Yes	Yes
3147	Emergency	Hurricane	9/13/1999	No	No	Yes	No
1318	Major Disaster	Severe Storm(s)	1/25/2000	No	No	Yes	Yes
1491	Major Disaster	Hurricane	9/18/2003	Yes	Yes	Yes	Yes
3240	Emergency	Hurricane	8/29/2005	No	No	Yes	No
1661	Major Disaster	Severe Storm(s)	8/29/2006	No	No	Yes	Yes
4024	Major Disaster	Hurricane	8/26/2011	No	No	Yes	Yes
3329	Emergency	Hurricane	8/26/2011	No	No	Yes	No
4045	Major Disaster	Severe Storm(s)	9/8/2011	No	No	Yes	Yes
4092	Major Disaster	Hurricane	10/26/2012	Yes	No	Yes	Yes
3359	Emergency	Hurricane	10/26/2012	No	No	Yes	No
4401	Major Disaster	Hurricane	09/08/2018	No	No	Yes	Yes
3403	Emergency	Hurricane	09/13/2018	No	No	Yes	Yes
4411	Major Disaster	Hurricane	10/09/2018	No	No	Yes	No
3448	Emergency	Pandemic	01/20/2020	No	No	Yes	No
4512	Major Disaster	Pandemic	01/20/2020	No	Yes	Yes	Yes
4602	Major Disaster	Winter Storms	02/11/2021	No	No	Yes	Yes

FEMA Disaster Declarations Summary – Open Government Dataset. <https://www.fema.gov/openfema-data-page/disaster-declarations-summaries-v1>



6.3 Overview of the Type and Location of Hazards that can affect the Northern Neck Region

6.3.1 Tornadoes

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The rotating column of air often resembles a funnel-shaped cloud. Winds are typically less than 100 mph, with the most violent tornado wind speeds exceeding 250 mph. The widths of most Virginia tornadoes are generally several yards across, but the path length can vary from a few hundred yards to dozens of miles long. A tornado moves at speeds between 30 and 125 miles per hour (mph) and can generate winds that reach 300 mph.

6.3.1.1 Type and Location

The total number may be higher as incidents may occur over areas with sparse populations or may not cause any property damage. The Tornado season is typically March through August; however, tornadoes can occur in any month.

In Virginia, peak tornado activity is in July since hot, humid conditions stimulate tornado growth. Strong tornadoes may be produced by thunderstorms and are often associated with the passage of hurricanes. Tornadoes may occur in any location across the Northern Neck Region, as seen in the figure below.

In the United States, tornadoes have been classified on the Fujita Scale, assigning numeric scores from zero to five (or higher) based on the severity of observed damages. The traditional Fujita scale, introduced in 1971, was used to rate the intensity of tornadoes after that and was also applied to previously documented tornadoes. The scale assigns numerical values for wind speeds inside the tornado according to the type of damage and degree.







Most tornadoes are F0 and F1, resulting in widespread minor damage. Low-intensity tornadoes will cause localized transportation route disruption due to the amount of debris, and utilities can also be out of service for several days due to downed power and phone lines. A tornado's intense power can destroy buildings, primarily manufactured homes, down power lines, and cause significant agricultural damage.

In February 2007, an "enhanced" Fujita scale was implemented with somewhat lower wind speeds at the higher F-numbers and more thoroughly refined structural damage indicator definitions. In addition, it was developed to align tornado wind speeds with associated damages with better accuracy. Figure 6-1 demonstrates the "EF" tornado scale presented by the National Weather Service (NWS).



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Figure 6-1: EF Rating Scale

EF Rating	Wind Speeds	Expected Damage	
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.	
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.	
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.	
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.	
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.	
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.	

Fujita scale	Wind speeds (3-s gust)		Enhanced Fujita scale	Wind speeds (3-s gust)	
	m s ⁻¹	mph		m s ⁻¹	mph
F0	20-35	45-78	EF0	29-38	65-85
F1	36-52	79-117	EF1	38-49	86-110
F2	53-72	118-161	EF2	50-60	111-135
F3	73-93	162-209	EF3	61-74	136-165
F4	94-117	210-261	EF4	74-89	166-200
F5	118-142	262-317	EF5	>89	>200

Source: <https://www.weather.gov/images/cae/EF-Ratings.jpg>

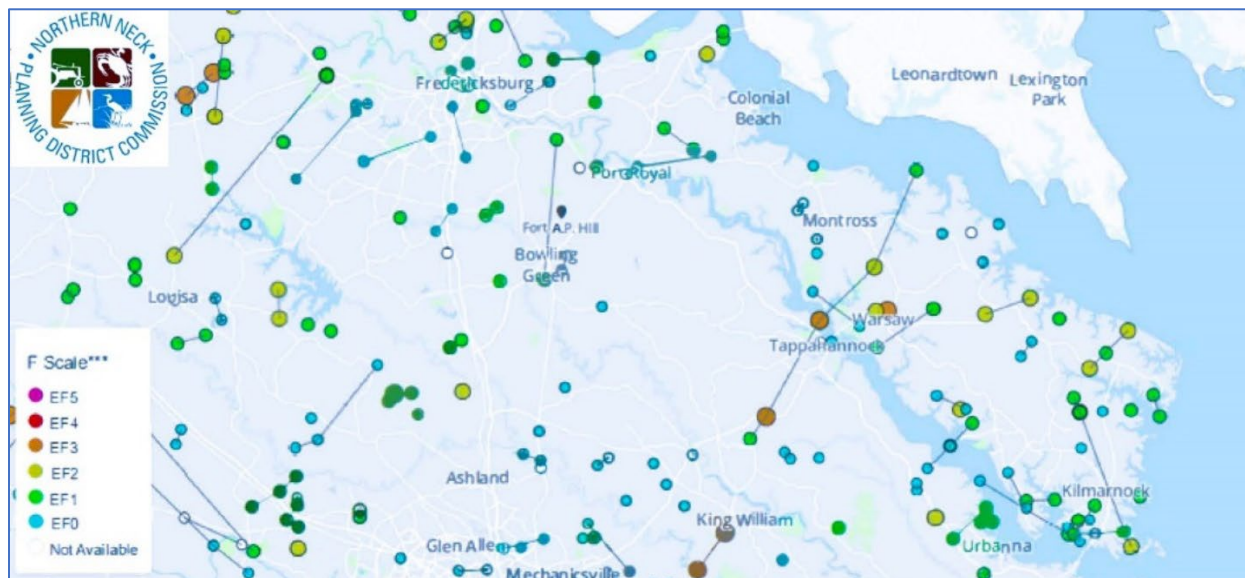
6.3.1.2 – Previous Occurrences

According to the NCEI storm events database, there have been 36 recorded tornado events since 1950, which includes two funnel clouds and two waterspouts. These tornado events have resulted in a total of \$12.73 million in property damage and \$78, 000 in crop damage. Figure 6-2 shows the location of historic tornado tracks and touch downs in the Northern Neck Region. Table 6-4 lists the most significant of these events along with recent events not recorded by the NCEI database.



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Figure 6-2: Tornadoes in the Northern Neck Region 1950-2022



Source: NOAA and News Leader: Tornado Archive: <https://data.newsleader.com/tornado-archive/>



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Table 6-4: Previous Occurrences of Tornado Events

Event Date	Hazard History
May 10, 1990	Lancaster County. This tornado traveled in an east-northeast direction from two miles southwest of White Stone and ended about two miles east-northeast of White Stone. The path was just over four miles long, and it was intermittent. The most significant damage occurred in the center of White Stone. In addition to considerable tree damage, three buildings were heavily damaged, five stores lost plate-glass windows, and trees destroyed a mobile home.
August 06, 1993	White Stone. At 1515 EDT, a tornado moved northeast through White Stone. Trees were broken and knocked down damaging homes.
June 24, 1996	Westmoreland County. A brief tornado touched down at Westmoreland State Park. Numerous trees and power lines were downed throughout the park. In addition, the roofs of three cabins were damaged by downed trees. One cabin suffered the most damage as a large tree trunk crashed through the roof, damaging the rafters and inside walls of the kitchen and bedroom.
September 10, 1997	Northumberland County. Tornado damage occurred from Burgess to Oyster Cove. The most significant damage was found in the Edwardsville area, where nearly 20 mobile homes were severely damaged or destroyed. Numerous trees were downed or suffered damage. Nine, mostly minor, injuries were reported.
	Westmoreland County. The same storm which produced the Edwardsville storm produced a second weaker tornado in Hague. One house sustained minor damage, and numerous trees were sheared off or uprooted.
September 10, 1997	Northumberland County. A tornado damaged five homes, with a large porch on one house and a garage/breezeway on another home destroyed. Damage to 2 other homes was primarily incidental and caused by flying debris. The fifth home sustained siding and substantial roof damage. Several boats were damaged/overturned at a local marina. One rowboat near the initial damage area was lifted and tossed 300-400 yards from its tied-down position. Two cars were damaged, one severely. Several trees were severely damaged; one tree was uprooted by an airborne boat. There were no injuries or fatalities. Property damage totaled about \$150,000.
May 25, 2004	Lancaster County. A waterspout formed over Carters Creek and came ashore at Irvington Marina as a tornado. A boat house was blown over and numerous boats damaged. Several cars were also damaged.



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Event Date	Hazard History
February 24, 2016	Lancaster County. The tornado, which began as an EF0 in Middlesex County, intensified briefly to an EF1 in the Norwood Church Road area near Flagstaff Road in Lancaster County. In this area, a brick wall on a garage was flattened, the roof was ripped off a house, and an outbuilding was destroyed. Numerous large trees were snapped, including two-foot diameter pine trees. The tornado continued north and northeast for a short distance before lifting.
	Richmond County. Tornado crossed the Rappahannock River from Essex County into Richmond County. The tornado struck Naylor's Beach as an EF2 tornado removing significant portions of the upper floor of one two story home and destroying several other smaller homes. At this point, the tornado was 300 yards wide with winds around 120 mph. The tornado then crossed Newland Road, weakening slightly to low end EF1 with winds around 90 mph and continuing to Tallent Town Road and Piney Grove Road. The tornado then tracked into Westmoreland County. The tornado caused over \$3.3 million in property damage.
February 24, 2016 (continued)	Westmoreland County. The tornado was re-intensified as it moved from Richmond County into Westmoreland County, crossing Kings Highway (Route 3) west of Nomini Grove as a high EF1 tornado. Tornadoic winds increased to 100 mph, severely damaging two homes, and destroying a mobile home along Kings Highway. It continued to Cople Highway near Mount Holly, severely damaging numerous homes. After crossing Nomini Creek, the tornado struck Bushfield Road damaging several homes. The tornado then continued northeast along Mount Holly Road uprooting and snapping trees before moving into the Potomac River toward Maryland. Reported property damages totaled over \$900,000 in Westmoreland County and over \$78,000 in crop damage.
April 6, 2017	Town of Irvington. On April 6, 2017 an enhanced risk for severe weather was issued for parts of the Mid-Atlantic region. An EF1 touched down in the Town of Irvington in Lancaster County. Some windows were blown out at the local hospital, forcing the hospital to operate on emergency power for a of couple hours. Homes in the town had their roofing material, gutters or awnings, and siding material damaged. Numerous trees were snapped or uprooted.
May 5, 2017	Town of Colonial Beach. Tornado watches, warnings, and straight-line winds. EF-1 tornado near Dahlgren in King George County. Colonial Beach in Westmoreland County experienced more than \$8 Million in damages to residential and commercial property from this system. More than 150 residences were affected, mostly due to damage from downed trees and debris.



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Event Date	Hazard History
August 04, 2020	Lancaster County. An EF-2 tornado traveled 14.21 miles after touching down while the region was suffering the effects of Tropical Storm Isaias. Trees were downed or uprooted, structural damages to homes and buildings, and 5 injuries occurred. \$3 million in damages was reported in Lancaster County. *Tropical Storm Isaias spawned 7 tornadoes Region 5 on August 4, 2020.
	Browns Store, Northumberland County. Numerous trees were downed or broken as the remainder of the EF-2 tornado from Lancaster County tracked through Northumberland as an EF-1 causing approximately \$5,000 in damages.
	Fleeton, Northumberland County. An EF-1 tornado (separate from the EF-2 starting in Lancaster County above) moved onshore from the Chesapeake Bay damaging several homes, breaking uprooting trees, and causing further structural damages. \$626,000 in damages were reported.

6.3.2 – Severe Weather

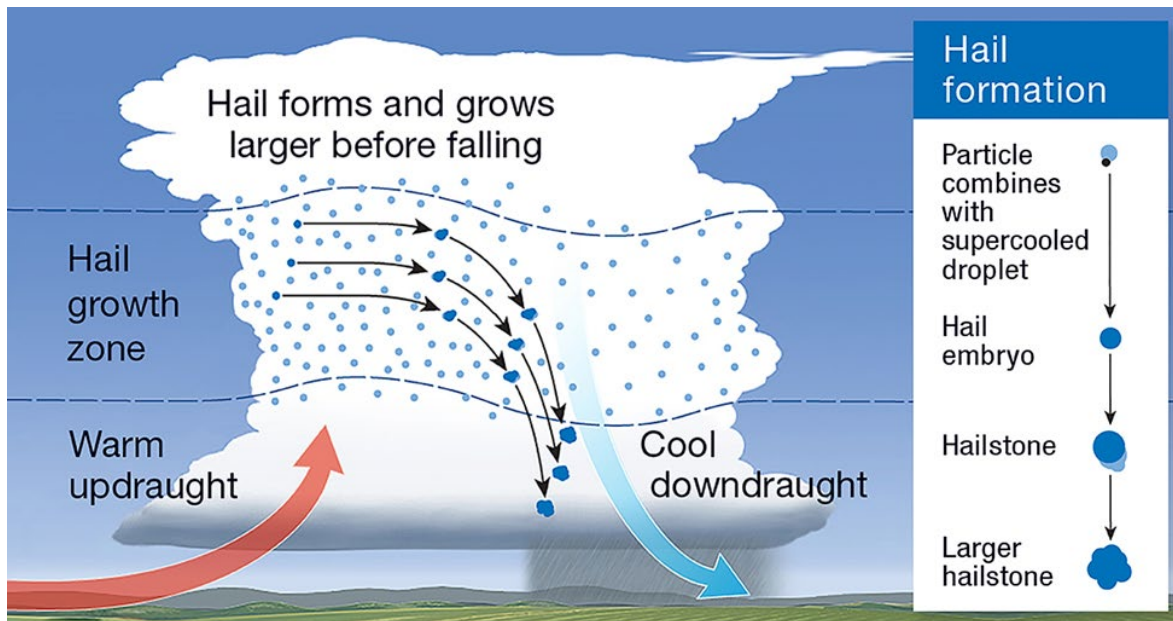
For the hazard mitigation plan update, severe weather includes thunderstorms, extreme wind, lightning, and hail. The National Weather Service (NWS) defines a thunderstorm as a localized storm produced by a cumulonimbus cloud and accompanied by lightning and thunder. Thunderstorms are typically the result of warm, moist air that is pushed upwards into the atmosphere, where it cools and forms cumulonimbus clouds. As the air continues to cool, it starts to form water droplets or ice, rain or hail. As these droplets or ice begin to fall, they may collide and combine many times into larger forms before reaching the earth's surface. These severe storms are associated with the presence of strong winds, thunder, and lightning. It is also possible to experience a thunderstorm with no precipitation, which can cause wildfires.

Thunderstorms can form in any geographic region and sometimes cause other natural phenomena such as downburst winds, heavy rain, flash floods, large hailstones, tornadoes, and waterspouts.

Hail is precipitation in the form of ice pellets larger than five mm that forms in thunderstorms between currents of rising air (updrafts) and currents of descending air (downdrafts), as shown in Figure 6-3. These events typically occur in late spring and early summer. As defined by the NWS, one criterion for severe thunderstorms is hail that is one inch in diameter (quarter-size) or larger.

The NWS defines lightning as a visible electrical discharge (i.e., lightning bolt) produced by a thunderstorm. The release may occur within or between clouds, the cloud and air, a cloud, and the ground, or between the earth and a cloud. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air cause thunder.

Figure 6-3: Hail Formation Process



Source: National Weather Service: <https://www.weather.gov>

6.3.2.1 – Type and Location

All areas within the Northern Neck Region are assumed to be equally at risk of the damaging effects of a thunderstorm that causes high wind, lightning, or hail. Therefore, all regional assets should be considered vulnerable to these hazards, and precautions should be taken to protect them.



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Using the NWS definition for a severe thunderstorm, dime-sized hail is considered a minimum hazard, and quarter-sized hail is regarded as a major hazard. Quarter-sized hail can cause significant damage to crop and livestock, as well as property such as automobiles, aircraft, and roofs. Although rare, large hailstones may even cause injury or death. However, the amount of cover obtained during a hailstorm can significantly reduce the risk to human health during these events.

While there is no established index for lightning, a lightning strike is of minimum severity when it has limited impacts on infrastructure (ex., tree limbs) and significant severity when it causes extensive damage (ex., loss of life, fire, structural damage). The potential damages resulting from lightning strikes are primary injury, loss of life, power outages, business interruption, fire, and minor structural damage. A false sense of security often leads people to believe they are safe from a lightning strike because it may not appear near their location. However, lightning can strike ten miles away from a rain column, putting people still in clear weather at risk.

High wind events can occur for various reasons: low or high-pressure systems, isolated thunderstorms, tropical cyclones, and nor'easters. Using the NWS severe wind categories listed above, sustained non-convective winds of 40 mph or more significant lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration, on a widespread or localized basis are considered a minimum severity event. A significant severe event would be wind events greater than 58 mph or a wind event resulting in death, injury, or consequential damage.

6.3.2.2 – Previous Occurrences

There have been 211 Severe Weather events occurring since 1955, 182 significant wind events, five lightning strikes, and 53 hail events. Some events occurred individually, but most were storms that ensconced multiple hazards. Based on the NCEI Storm Events Database, the most significant severe weather events in the Northern Neck Region are extracted and summarized in Table 6-5. Notable events include any event that caused a death or injury (direct or indirect) and the top costly events in terms of property damage. No natural deaths or indirect injuries were reported. The likelihood and potential severity of thunderstorm wind, lightning, and hail events can be assessed by reviewing the number and severity of thunderstorm events in the period of history available for the Northern Neck Region. Table 6-6 shows the distribution of events by recorded wind speed in knots and the distribution of hail events by recorded hail size in localities across the region.



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Table 6-5: High Wind Events the Northern Neck Region

Location	Event Date	Event Type	Magnitude	Injuries	Deaths	Property Damage
Northumberland	09/01/2006	High Wind	37	0	0	\$15,000,000
Lancaster	07/12/2009	Thunderstorm Wind	52	0	0	\$1,000,000
Lancaster	07/12/2009	Thunderstorm Wind	52	0	0	\$1,000,000
Lancaster	07/12/2009	Thunderstorm Wind	50	0	0	\$1,000,000
Lancaster	09/01/2006	High Wind	35	0	0	\$200,000
Lancaster	07/16/2000	Lightning	Unavailable	0	0	\$50,000
Lancaster	08/06/2000	Lightning	Unavailable	0	0	\$50,000
Westmoreland	04/21/2017	Thunderstorm Wind & Hail	50	0	0	\$45,000
Richmond	06/22/2022	Thunderstorm Wind	50	0	0	\$32,000
Richmond	03/02/2018	High Wind	55	3	0	\$30,000
Lancaster	04/06/2017	Thunderstorm Wind	65	0	0	\$27,000
Lancaster	05/04/2021	Thunderstorm Wind	65	0	0	\$25,000
Northumberland	06/02/2022	Thunderstorm Wind	50	0	0	\$13,000
Richmond	6/13/2013	Thunderstorm Wind	52	0	1	\$5,000
Lancaster	5/2/1989	Thunderstorm Wind	100	3	0	\$0

Source: NOAA NCEI Storm Events Database

Table 6-6: Frequency of Winds and Hail in Severe Weather Events

Wind Speed	No Record	0-30kts	31-40kts	41-50kts	51-60kts	61-70kts	71-80kts	81-100kts	Total
# Of Events	20	24	2	114	14	6	1	1	182
Hail Size	0.5 inch	0.75 inch	0.88 inch	1 inch	1.25 inch	1.5 inch	1.75 inch	2 inches	Total
# Of Events	0	15	7	18	1	3	6	3	53

Source: NOAA NCEI Storm Events Database

6.3.3 – Coastal Flooding

Coastal flooding is the inundation of land areas along the coasts of oceans, bays, estuaries, and coastal rivers by seawater greater than regular tide action. Coastal floods are caused by extreme sea levels, which arise from four main factors: waves, astronomical tides, storm surges, and relative mean sea levels. This advancing surge combines with normal tides to create a storm tide that can increase the mean water level



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by 15 feet or more. Severe storm surge is also frequently associated with coastal-influenced storm systems, such as nor'easters and hurricanes that impact the Northern Neck Region.

A nor'easter is a low synoptic-scale cyclone that can form during the fall, winter, or early spring and produces heavy snow, high wind, and rain. The term "nor'easter" refers to the direction of the system's counterclockwise winds, which usually manifests as an offshore air mass rotating counterclockwise northeast-to-southwest over the northwest quadrant of the cyclone or storm system. According to the National Weather Service, the U.S. East Coast provides an ideal breeding ground for nor'easters.

6.3.3.1 – Type and Location

The entirety of the Northern Neck Region is susceptible to the damaging effects of coastal flooding due to its location adjacent to the Chesapeake Bay and near the Atlantic Ocean. In addition, its low-lying coastal areas near the shore, sounds, and estuaries are particularly exposed to the threat of flooding from storm surges and wind-drive waves associated with coastal storms.

Storm surge heights, wind speed, fetch length, pressure, and associated waves depend on the configuration of the continental shelf (narrow or wide) and the measurement of the water depth (bathymetry). These, as well as other factors, can impact storm surge height and wave height. For example, a narrow shelf that drops steeply from the shoreline and produces deep water near the coastline tends to have a lower surge but higher and more powerful storm waves.

6.3.3.2 – Changing Flood Risk

The *North Atlantic Coast Comprehensive Study* was conducted by the U.S. Army Corps of Engineers. The results were published in a report detailing the two-year study to address coastal storm and flood risk to vulnerable populations, property, ecosystems, and infrastructure affected by Hurricane Sandy in the United States North Atlantic region. This study is designed to help communities better understand how climate change is changing and provide tools to help communities better prepare for future flood risk. The study builds on lessons learned from Hurricane Sandy and attempts to provide the latest scientific information for state, local, and tribal planners. The Northern Neck Region communities are a part of the study area, and the study's results should be consulted when developing climate change adaptation measures based on future flood risk.

The Future Sea Level and Recurrent Flooding Risk Report for Coastal Virginia, produced by the Commonwealth Center for Recurrent Flooding Resiliency, presented the conclusion that sea level rise will significantly impact the Northern Neck Region by 2040. In addition, the Commonwealth of Virginia released the Coastal Resilience Master Plan (CRMP) which is set to assist with identifying, adapting, and protecting the coastal areas. The Technical Study within the CRMP examines nine coastal flood events presenting varying magnitudes that can be compared over time horizons: 2020, 2040, 2060, and 2080, with 2020 acting as the baseline representation of conditions. Literature from the CRMP states "Understanding these potential impacts is critical to selecting resilience projects which will minimize potential damage or disruption to a region's way of life."

6.3.3.2 – Previous Occurrences

The NCEI storm events database contains reports of many coastal flood events in the Northern Neck Region area, totaling millions of dollars in reported property damage. These events are primarily the result of storm surges associated with events such as coastal storms, nor'easters, and tropical cyclones. Table 6-7 lists the notable coastal flood events that have affected the Northern Neck Region. The general description applies to the entire region when no community-specific description is given.



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Table 6-7: Notable Coastal Flooding Events in the Northern Neck Region

Event Date	Hazard History
January 27 – 28, 1998	A nor'easter battered eastern Virginia on Tuesday, January 27 th , 1998 and Wednesday, January 28 th , 1998. The slow movement of the storm combined with the highest astronomical tides of the month resulted in an extended period of gale to storm force onshore winds which drove tides to 6.44 feet above Mean Lower Low Water (MLLW) at Sewell's Point in Norfolk. Locally moderate coastal flooding was reported across the Middle Peninsula and Northern Neck Region areas.
February 4 – 6, 1998	A nor'easter battered eastern Virginia from Tuesday, February 3 rd , 1998, through Thursday, February 5 th , 1998. The slow movement of the storm resulted in an extended period of gale to storm force onshore winds which drove tides to 7.0 feet above Mean Lower Low Water (MLLW) at Sewells Point in Norfolk.
September 1, 2006	Tides of 4 to 5 feet above normal, combined with 6-to-8-foot waves caused significant damage to homes, piers, bulkheads, boats, and marinas across portions of the Virginia's Northern Neck Region and Eastern Shore. Some of the most significant damage occurred in the Lewissetta area of Northumberland County. More than \$21 million in damage was reported in the Northern Neck Region from this event.
November 12 – 14, 2009	An intense Nor'easter produced moderate to severe coastal flooding across much of eastern and southeast Virginia and the Virginia Eastern Shore. Several streets, homes and businesses were flooded in low lying areas that are close to or directly exposed to the Chesapeake Bay. There were also damaged piers, bulkheads, and groins.
October 28 – 29, 2012	Superstorm Sandy moved northward well off the Mid-Atlantic Coast then northwest into extreme southern New Jersey produced very strong northeast winds followed by very strong west or northwest winds. Very strong winds caused moderate to severe coastal flooding across portions of eastern and southeast Virginia. Water levels reached 2.0 feet to 3.5 feet above normal adjacent to the Chesapeake Bay and Rappahannock River resulting in moderate to severe coastal flooding. Reported property damages totaled more than \$600,000 in the Northern Neck Region.
October 2– 5, 2015	A combination of Hurricane Joaquin near the Bahamas and intense high pressure over New England produced solid onshore winds over the Mid-Atlantic. The strength and duration of the onshore winds had moderate coastal flooding along the Atlantic Coast and the Chesapeake Bay. A tidal departure of 2 to 3 feet resulted in moderate flooding along the Rappahannock River, Potomac River, and the Chesapeake Bay. Several roads were closed, and several homes and other buildings sustained flood-related damage. Hundreds of residents were evacuated from low-lying Lancaster County in Virginia's Northern Neck Region. Reported property damages exceeded \$1 million.



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Event Date	Hazard History
September 30, 2016	Prolonged east-to-northeast winds produced minor to moderate coastal flooding in parts of the Chesapeake Bay region. Water levels reached average flood levels in the Northern Neck Region. Tides 2 feet above regular caused moderate flooding near the Potomac River and areas adjacent to the Chesapeake Bay. Water levels reached nearly 3.7 feet MLLW at Lewisetta, VA. No damage was reported in the Northern Neck Region.
October 12, 2019	The combination of low pressure from the New Jersey coast and intense high pressure over southeast Canada resulted in persistent north or northeast winds over the Chesapeake Bay. These constant north or northeast winds and high waves allowed water levels to rise throughout the bay. Continuous north or northeast winds and high tides produced tidal anomalies between 2.0 and 3.0 feet over the middle of the Chesapeake Bay, which caused moderate to major coastal flooding over portions of Lancaster County. Windmill Point reached 4.07 feet MLLW on October 12 th , 2019. No damages were reported.
April 04, 2020	Minor tidal flooding occurred over portions of Northumberland County along the Potomac River. Lewis Jetta reached 3.52 feet MLLW.
October 10, 2021	The combination of King Tides and high pressure over the Canadian Maritimes and low pressure just off the North Carolina coast produced east-northeast winds which caused minor to moderate (tidal) coastal flooding over portions of Lancaster and Northumberland Counties adjacent to the Chesapeake Bay. Windmill Point reached 3.51 feet MLLW at 230 pm on Sunday, October 10 th , 2021.
October 28, 2021	Low solid pressure tracked from the Middle Mississippi Valley east northeast toward the Northeast United States from Thursday, October 28 th , 2021, into Saturday, October 30 th , 2021. This system produced powerful east-southeast winds and strong south-to-southwest winds throughout the period, which caused moderate to major (tidal) coastal flooding across portions of Northumberland and Lancaster Counties. Lewis Jetta reached 4.78 feet MLLW at 900 pm on Friday, October 29 th , 2021.
January 03, 2022	A combination of higher astronomical tides and deepening surface low pressure tracking across North Carolina, then northeast out to sea, produced strong northeast or north winds which caused moderate (tidal) coastal flooding over portions of Lancaster County adjacent to the Chesapeake Bay. Windmill Point reached 3.78 feet MLLW at 1100 am on Monday, January 3 rd , 2022.
May 10, 2022	A combination of high surface pressure centered over the Canadian Maritimes and surface low pressure spinning off the Mid-Atlantic Coast resulted in strong northeast or north winds which caused minor to moderate (tidal) coastal flooding over portions of Lancaster County adjacent to the Chesapeake Bay. Windmill Point reached 3.93 feet MLLW. Lewis Jetta reached 3.93 feet MLLW.



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6.3.4 – Riverine Flooding

Riverine flooding occurs when a channel, such as a stream or a river, receives more water than it can hold, and the excess water overflows the channel banks flooding the surrounding area. Heavy rain and large amounts of snow melt can cause riverine flooding. In the Northern Neck Region, coastal influenced storms such as nor'easters, tropical storms, and hurricanes have been known to cause severe riverine flooding due to high rainfall rates and coastal storm surge that causes water to become trapped in the tributaries of the Chesapeake Bay.

6.3.4.1 – Type and Location

The Northern Neck Region is boarded by the Potomac River, the Rappahannock River, and the Chesapeake Bay. The proximity of multiple large rivers to this region puts it at high risk of experiencing riverine flooding. The floodplain delineates areas of risk, an area typically adjacent to rivers, streams, and shorelines that experiences periodic flooding that is expected to occur based on established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or more significant flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to inundate the area. Flood frequencies such as the 100-year flood are determined by plotting a graph of the size of all known torrents for a place and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence at any time, expressed as a percentage of the probability of flooding each year. For example, a 100-year flood has a one percent chance of occurring in any given year. The 500-year flood zone has a 0.2 percent chance of occurrence in any given year. Flood Insurance Rate Maps (FIRMs) are developed as part of a FEMA Flood Insurance Study (FIS) to delineate the areas at risk of being flooded during a one percent chance or 100-year flood event. The one percent chance floodplains are called the Special Flood Hazard Area (SFHA).



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Figure 6-4: FEMA Flood Zones in the Northern Neck Region



Source: HAZUS

6.3.4.2 – Previous Occurrences

According to the NRI Community Risk Report and NCEI database, 17 riverine flood events have been recorded in the Northern Neck Region since 1996. Table 6-8 lists the most significant of these events. While tropical storms or hurricanes caused these events, the specific events reported resulted from heavy rainfall associated with the storm, not flooding caused by the storm surge, which will be addressed in subsequent sections.



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Table 6-8: Previous Occurrences of Flooding Events in the Northern Neck Region

Event Date	Hazard History
September 16, 1999	Heavy rain from Hurricane Floyd produced widespread flooding and flash flooding across central and eastern Virginia. The flooding was a 500-year flood of record. Richmond and Westmoreland's counties reported property damages totaling \$850,000 and crop damages of about \$255,000.
August 27, 2011	Heavy rains associated with Hurricane Irene produced widespread low-land flooding across much of the Northern Neck Region, including washed-out or closed roadways. Storm total rainfall generally ranged from six to eleven inches. Lottsburg reported 8.67 inches of rain. Newland said 10.50 inches of rain. Montross reported 7.20 inches of rain.
September 08, 2011	The combination of the remnants from Tropical Storm Lee and a frontal boundary draped over the region caused heavy rain, which produced flash flooding across portions of central and eastern Virginia. In Westmoreland, many streets were closed by VDOT and the Fire Department. As a result, many homes were flooded on Washington and Irving Streets. Flooding was also reported on Monticello Road.
October 29, 2012	Superstorm Sandy, which moved northward well off the Mid-Atlantic coast, produced heavy rain, which caused flooding across much of eastern and southeast Virginia. Numerous roads were closed due to flooding. Total rainfall ranged from three to ten inches across the Northern Neck Region. Total rainfall of 9.90 inches was reported at Reedville. Total rainfall of 6.77 inches was reported at Lottsburg.
July 28, 2017	Scattered thunderstorms in advance of and along a frontal boundary produced heavy rain and flash flooding across central and eastern Virginia portions. Portions of Route 202 in Callao were flooded. A rainfall total of 7.15 inches was measured at Lottsburg.
May 17-22, 2018	Multiple occurrences of showers and thunderstorms associated with areas of low pressure along a frontal boundary produced heavy rain, causing flash flooding, standing water, and pluvial flooding. As a result, northern Neck Region communities suffered flooding and road closures over a week due to heavy rainfall and ground saturation.
June 22, 2018	Scattered thunderstorms along a frontal boundary produced heavy rain, which caused flash flooding across portions of central Virginia. Mobile home development in Wellford (Richmond County) suffered flooding that invaded homes.



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Event Date	Hazard History
October 11, 2018	Tropical Cyclone Michael tracked from South Carolina up the Atlantic coast producing heavy rain and flash flooding. Rainfall totals reported across the Northern Neck Region included: 8.3 inches at Kennard, 7.1 inches at Kinsale, 4.8 inches at Mt Holly, 6.5 inches at Mollusk, 7.9 inches at Howland, and 7.1 inches at Lottsburg. Roads across the region remained closed, washed out, or impassable over 2-3 days.
June 11, 2021	Scattered thunderstorms along a frontal boundary produced heavy rain, which caused flash flooding across portions of central and eastern Virginia. Flood waters on Cat Point Creek in Newland resulted in the dam failure of Chandlers Mill Pond – a water rescue was necessary because of the dam failure. In addition, portions of Route 3 and other major roads were closed due to water. Rainfall totals ranged from 4-10 inches across the region.



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6.3.5 – Wildfire

A wildfire is an undesirable fire occurring in a forest, brushland, marsh, coastal vegetative areas, or wooded development that is a severe and growing hazard over much of the United States. Fires ignited by natural causes such as lightning or a controlled burn process are part of the wildfire cycle and an essential contributor to forest health.

Wildfires are uncontrolled fires spreading through vegetative fuels, exposing and possibly consuming structures for areas more significant than one acre. Wildfires may create additional environmental concerns after extinguishing, such as increased erosion and water quality in stormwater runoff. Three main factors influence wildfire behavior – topography, fuel, and weather. Other hazards can contribute to the potential for wildfires or influence wildfire behavior. For example, high winds can blow down power lines, and lightning can spark fires. Drought conditions also increase wildfire potential by decreasing fuel moisture. Warm winters, hot, dry summers, severe drought, insect and disease infestations, years of fire suppression, and growth in the wildland-urban interface (WUI) continue to increase wildfire risk and the potential for catastrophic wildland fires. Forest insect epidemics and forest parasites contribute to wildfire potential by increasing fuel loading.

Humans cause nearly 85% of wildland fires in the United States. Human-caused fires result from campfires left unattended, debris burning, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson. (*Source: National Park Service (NPS): Wildfire Causes and Evaluations*).

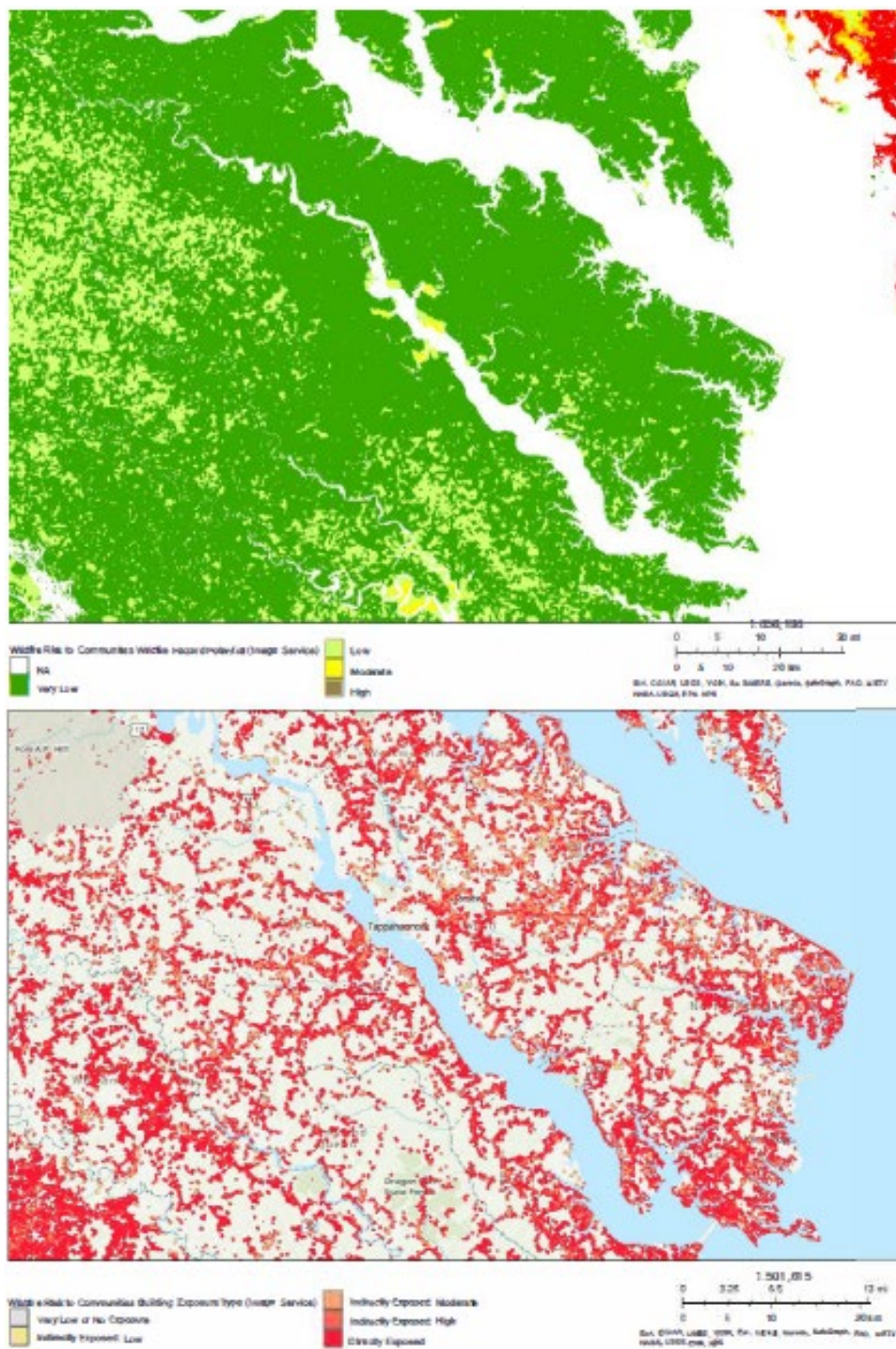
6.3.5.1 – Type and Location

WUI refers to the zone of transition between unoccupied land and human development. It is the line, area, or location where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfires. (*WUI: Desk Reference Guide*)

Wildland fires have recently grown in prominence across the United States, and the risk is not missed in the Northern Neck Regions. Although there are not many records of significant wildland fires in the Northern Neck Region, wildland fires have affected Region 5, such as the Great Dismal Swamp Fire in 2011, and in February of 2022, nearby Virginia Beach battled multiple wildfires in the Back Bay National Wildlife Refuge.

The Northern Neck Region has a significant means of fuel and conditions that could feed wildfires, and limited first responders, distance, and water access contribute to the possibility of wildfires growing and decreasing the chances of controlling the fire quickly. In the summer seasons, precipitation is often scarce, and coastal vegetation, farmland, debris, and woodland are dry with decreases in the water supply that depend on rainwater to replenish the reservoirs.

Figure 6-5: Wildfire Risk to Communities and Buildings



Source: Wildfire Risk Map Layer <https://www.arcgis.com/apps/mapviewer/index.html>



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6.3.5.2 – Previous Occurrences

According to the Virginia Department of Forestry 2009-2022 statistics, there are 141 incidents reported in the Northern Neck Region. Table 6-9 presents statistics for wildfires from 2009-2022 provided by the Virginia Department of Forestry (VDOF). Figure 6-6 shows wildfires recorded from the VDOF database for the region during 2002-2021.

Table 6-9: Wildfire Statistics in the Northern Neck Region

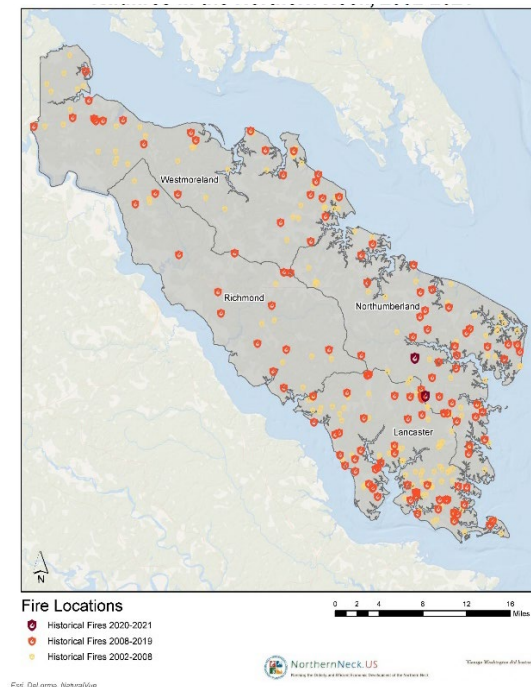
Jurisdiction Data	Lancaster	Northumberland	Richmond	Westmoreland	Northern Neck Region
Total Wildfires	52	38	18	33	141
Total Acres Burned	66.3	120	25.3	75	286.6
Homes Damaged/Destroyed	0/0	0/0	1/0	0/0	1/0
Homes Damaged/Destroyed Value	\$0	\$0	\$58,000	\$0	\$58,000
Buildings Damaged/Destroyed	1/0	3/1	1/2	0/0	5/3
Buildings Damaged/Destroyed Value	\$1,000	\$3,100	\$5,000	\$0	\$9,100
Other Items Damaged/Destroyed	21	42	1	18	82
Other Items Damaged/Destroyed Value	\$225,400	\$508,000	\$40,000	\$11,700	\$857,100

Source: Virginia Department of Forestry Fire provided data



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Figure 6-6: Northern Neck Regional Wildfires and Risks to the Community 2002-2021



Source: VDOF database

6.3.6 – Winter Weather

Winter storms are events in which varieties of precipitation are formed that only occur at low temperatures, such as snow or sleet, or a rainstorm where ground temperatures are low enough to form ice (i.e., freezing rain). The following are the National Weather Service's descriptions of various components of a winter storm:

- **Heavy snowfall.** The accumulation of six or more inches of snow in 12 hours or eight inches in 24 hours.
- **Blizzard.** Sustained wind speeds over 35 mph accompanied by heavy snowfall or large amounts of blowing or drifting snow for more than three hours.
- **Freezing rain.** Precipitation falls as a liquid but freezes on contact with roads, trees, power lines, and other surface structures below 32 degrees F, forming a dangerous ice laze.
- **Ice storm.** A type of winter storm characterized by freezing rain results in a dangerous coating of ice on trees, power lines, and road surfaces.
- **Sleet.** Solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of primarily melted snowflakes. Sleet does not cling to surfaces.
- **Wind chill.** A calculated temperature index that describes the combined effect of wind and low air temperatures on exposed skin.

Winter storms usually form along a stationary front. An area of lower pressure develops along the front as the atmosphere tries to even out the pressure difference. This pressure difference creates wind that blows from high to low pressure to move enough air to even out the pressure difference. As the air moves toward the low-pressure area, it has nowhere to go but up into the colder regions of the atmosphere, which causes



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water vapor in the air to condense and fall as snow. To the south, if the temperatures are warm enough, it can fall as heavy rain in thunderstorms.

6.3.6.1 – Type and Location

Winter storms derive energy when two air masses of substantially different temperatures and moisture levels meet. In Northeastern Virginia, winter storms usually form when an air mass of cold, dry Canadian air moves south and interacts with a warm, moist air mass moving north from the Gulf of Mexico. The point where these two air masses meet is called a front. If cold air advances and pushes away the warm air, it forms a cold front. When warm air advances, it rides up over the denser, cold air mass to create a warm front. If neither air mass advances, it forms a stationary front.

In the temperate eastern Virginia climate, winter storms infrequently occur during late fall or spring but are contained mainly in the winter season, particularly between January and early March. Winter storms can include heavy snow, freezing rain, and high winds that completely disrupt communities' transportation networks, cause power outages, close schools, and hamper communication.

6.3.6.2 – Previous Occurrences

According to the NCEI Storm Events Database, there have been 53 recorded winter storm events across the Northern Neck Region counties since 1996, including the following types of events: Blizzards, heavy snow, ice storm, and winter storm.

These severe winter weather events have resulted in \$260,000 in property damage. In addition, the Northern Neck Region has had five major disaster declarations and two emergency declarations related to winter storm weather. Table 6-10 identifies some of the most significant of these events.

Table 6-10: Previous Occurrences of Winter Storm Events in the Northern Neck Region

Event Date	Hazard History
January 26, 1987	A record 17.0 inches of snow fell 24 hours on January 26, 1987, in Richmond County.
March 13, 1993	The "Blizzard of '93", also known as the "Superstorm '93" and the first coined "Storm of the Century" during the 90s, was an incredibly intense nor'easter that impacted the entire East Coast of the U.S. An emergency declaration was made for the Northern Neck Regional jurisdictions.
January 6, 1996	The blizzard of 1996 was a strong winter storm that impacted the eastern United States, especially the metropolitan areas of Washington, DC, Philadelphia, New York City, and Boston. Three-day snowfall totals ranged from 10-20 inches in the Northern Neck Regional area. As a result, a presidential disaster was declared that included Northern Neck Regional jurisdictions.
December 23, 1998	A significant ice storm affected central and eastern Virginia from Wednesday, December 23, into Friday, December 25, including all four counties in the Northern Neck Region. A prolonged period of freezing rain and some sleet resulted in ice accumulations of one-half inch /0.50/ to one inch /1.00/ in many locations. The heavy ice accumulations on trees and power lines caused widespread power outages across the region. Approximately 400,000 customers were without power during the maximum outage period, Christmas Eve day. Some customers were without power for about ten days.



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Event Date	Hazard History
	Many accidents occurred due to slippery road conditions, especially bridges and overpasses. Secondary roads were impassable due to fallen tree limbs and, in a few cases, whole trees.
January 25, 2000	A significant winter storm dumped more than one foot of snow across much of central and eastern Virginia, with isolated amounts of up to 19 inches reported. There was also significant blowing and drifting of snow as winds gusted over 30 mph during the storm. The Richmond International Airport was closed during this storm. A frigid air mass built into the region after the storm, preserving the snowpack for over a week in many areas. Snow totals in the Northern Neck Region included: Richmond County 11 to 12 inches, Westmoreland County 12 to 13 inches, and Northumberland County 12 inches.
January 30, 2000	An ice storm affected a large portion of central and eastern Virginia with ice accumulations of up to one-half inch. Freezing rain mixed with sleet and snow spread over the area during the morning hours. Freezing rain then mixed with rain during the afternoon and evening along the eastern counties of Richmond, and Westmoreland Counties. More than \$30,000 in property damage was reported.
April 7, 2007	Low pressure developed over southern Virginia and deepened as it moved offshore. A band of moderate to heavy snow fell over portions of eastern Virginia as the storm strengthened off the Atlantic seaboard. Heavy snow in Richmond, Northumberland, and Lancaster Counties.
January 30, 2010	Low pressure moving off the coastal Carolinas produced between five and fifteen inches of snow across central and eastern Virginia from Friday night, January 29th, into Saturday night, January 30th. Snowfall amounts reported in the Northern Neck Regional jurisdictions ranged from as low as seven inches to thirteen inches of snow reported in Richmond County.
February 5, 2010	Low pressure moving off the coastal Carolinas produced between four and twelve inches of snow across central and eastern Virginia from Friday afternoon, February 5th, through Saturday afternoon, February 6th. In the Northern Neck Region, some of the heaviest snow fell in Newland, Richmond County, with 11 inches.
January 22, 2016	Intense low pressure moving from the Southeast United States northeast and off the Mid-Atlantic Coast produced between five and thirteen inches of snow and strong winds across the Virginia Northern Neck Region and south-central Virginia. Heathsville reported 11 inches of snow.
January 7, 2017	Low-pressure tracking northeast off the Southeast and Mid-Atlantic Coasts produced heavy snow and strong winds across eastern Virginia. In Northumberland and Lancaster Counties, snowfall totals were generally between 8 inches and 12 inches. Strong north winds affected the area, producing some blowing snow and reduced visibility. Heathsville and Brook Vale reported 12 inches of snow.



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Event Date	Hazard History
February 11, 2021	Colder air at the surface filtering in from the north, combined with weak low-pressure areas tracking across the Carolinas, produced snowfall totals between three and six inches across central Virginia, the Virginia Northern Neck Region, and the Virginia Eastern Shore. Snowfall across the Northern Neck Region equaled 3-5 inches causing travel issues and some power outages.

6.3.7 Hurricane/Tropical Storms

The NOAA's National Hurricane Center defines a tropical cyclone as a warm-core non-frontal synoptic-scale cyclone originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. In addition, tropical cyclones are defined by atmospheric and hydrologic characteristics such as severe winds, storm surge flooding, high waves, coastal erosion, extreme rainfall, thunderstorms, lightning, and, in some cases, tornadoes. Tropical cyclones that impact the east coast of the United States originate in the Atlantic basin, which includes the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

Depending on strength, tropical cyclones are classified as hurricanes or tropical storms. The Saffir-Simpson Hurricane Wind Scale (Figure 6-7) uses wind speed, central pressure, and damage potential to create storm classifications. This scale is the standard describing an event's disaster potential. The scale uses a 1 to 5 categorization based on the hurricane's intensity at the indicated time. The scale provides examples of damage and impacts in the United States associated with winds of the indicated intensity. In general, damage rises by about a factor of four for every category increase.

Figure 6-7: Saffir-Simpson Hurricane Wind Scale

Category	Sustained Wind Speed	Impacts due to Wind
5	157 mph or higher 137 kt or higher 252 km/h or higher	Catastrophic Impacts: High percentage of homes will suffer severe damage or destruction, due to breached openings, roof failure, and wind-driven rain. Fallen trees and power lines will isolate neighborhoods. Disruption to utilities may last weeks or months.
4	130-156 mph 113-136 kt 209-251 km/h	Catastrophic Impacts: Homes will suffer severe damage to roof structure, exterior walls, and windows. Wind-driven rain may cause interior damage. Numerous trees will be snapped and uprooted. Disruption to utilities may last weeks.
3	111-129 mph 96-112 kt 178-208 km/h	Devastating Impacts: Homes will incur major damage to exterior walls, roof shingles and decking. Snapped trees and downed power lines will block numerous roads. Disruption to utilities may last days to weeks.
2	96-110 mph 83-95 kt 154-177 km/h	Extensive Impacts: Many homes will incur damage to siding, roof shingles and decking. Many trees will be snapped, uprooted, and block some roads. Power outages expected for several days.
1	74-95 mph 64-82 kt 119-153 km/h	Homes could have damage to shingles, vinyl siding, and gutters. Trees may lose major branches; smaller trees may uproot. Power loss could last days.
Tropical Storm	39-73 mph 35-63 kt 63-118 km/h	Damage to some trees and power lines. Power loss in some areas. Outdoor items may become airborne and dangerous.

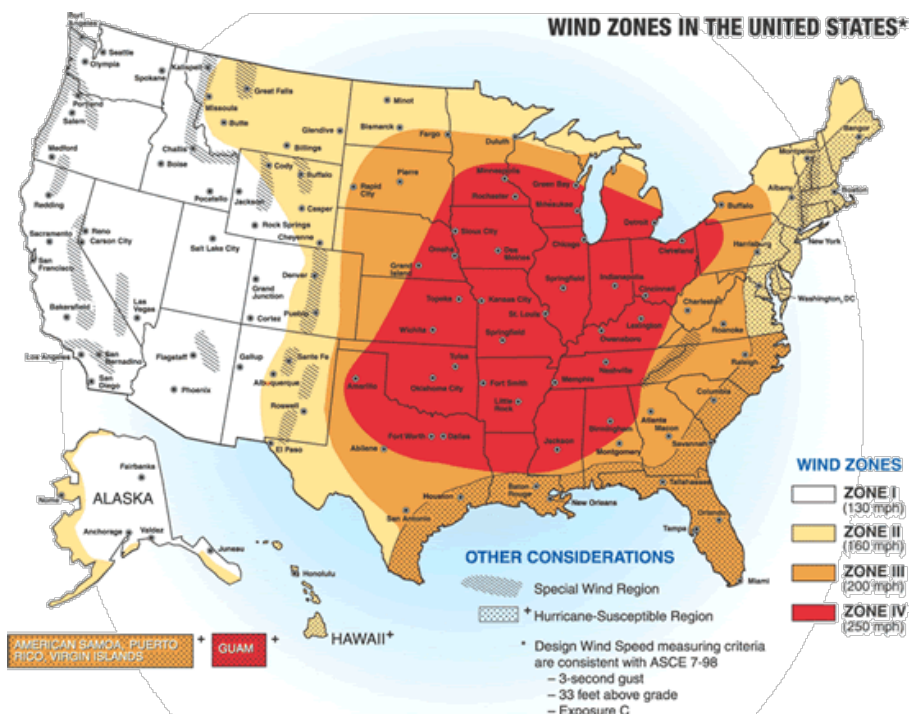
Source: NOAA NHC: <https://www.nhc.noaa.gov/>

6.3.7.1 – Location and Extent

All areas within the Northern Neck Region are equally at risk of being affected by a hurricane, but storm damage depends on factors such as the specific storm track, tides, and temperatures. The hurricanes that affect Virginia typically form in the Atlantic or Gulf of Mexico during the months of June through November. These storms form from low-pressure solid systems originating in the tropics, which cause the updraft of warm ocean water. Typically, these systems damage solid winds and high seas that can cause flooding and shoreline erosion. A storm in the Atlantic is defined as a hurricane when the maximum sustained winds reach 74 miles per hour. Below this level is defined as either a tropical storm or a tropical depression.

A hurricane or storm track is the line that delineates the path of the eye of a hurricane or tropical storm. The average diameter of hurricane-force winds is 100 miles, with tropical-storm-force winds extending out 300 – 400 miles. Figure 6-8 shows the distribution of the four wind zones in the United States that reflect the number and strength of extreme windstorms. For example, the Northern Neck Region is in a “Hurricane-Susceptible Region” of Zone II, where damaging wind speeds of up to 160 mph can be experienced. Buildings should be built to withstand this level of wind event.

Figure 6-8: National Wind Zones



Source: National Institute of Standards and Technology: <https://www.nist.gov/image/windzonemap.jpg>

Storm surge flooding can push inland, and riverine flooding associated with heavy inland rains can be extensive. High winds are associated with hurricanes, with two significant effects: widespread debris due to downed and damaged trees and building debris; and power outages. The Northern Neck Region is especially vulnerable to hurricanes and their impacts. A tropical cyclone or hurricane has the potential to affect the entire region demonstrated by many past tropical depressions, tropical storms, and hurricanes. As a storm moves into more shallow waters, wave heights may lessen, but water levels rise, bulging up on



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the storm's front right quadrant in the "storm surge." that is the deadliest part of a hurricane. Storm surges and wind-driven waves can devastate a coastline.

6.3.7.2 – Previous Occurrences

According to the NCEI database, the only storms that have impacted the Northern Neck Region at hurricane strength: were Hurricanes Fran, Floyd, and Isabel. While these storms did not directly track over the Northern Neck Region, damages were reported in the area due to coastal flooding and high wind associated with the storms because of their relatively high strength in their northeastern quadrant. Tropical storms most often impact the region as the remnants of a hurricane moving up the east coast, and these storms frequently bring significant risks and damages. Table 6-11 summarizes the hurricanes and tropical storms to impact the Northern Neck Region since 1996.



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Table 6-11: Previous Occurrences of Hurricanes in the Northern Neck Region

Event Date	Hazard History
September 5, 1996	Hurricane Fran was a Category 3 hurricane that struck Virginia and North Carolina in September 1996. In Virginia, winds between 39 and 73 mph lashed the Chesapeake Bay and increased water levels in the Potomac River around the nation's capital. There was severe damage to power lines that left 415,000 households in Virginia without electricity, making it the most significant storm-related power outage in history until Hurricane Isabel in 2003. Along the Rappahannock River, a storm surge of 5 feet damaged or sank several small boats and damaged wharves and bulkheads. In addition, an F1 tornado touched down in Lancaster County in the Northern Neck Region, producing winds up to 90 mph that caused \$2.5 million in residential damage to 45 structures and \$200,000 in commercial damage.
September 15, 1999	Hurricane Floyd was a Category 1 hurricane as it entered Virginia on September 15, 1999. For the Northern Neck Region area, Hurricane Floyd brought heavy rainfall due to a stalled frontal boundary. The downpour led to overflowing rivers in the Chowan River Basin, some exceeding 500-year flood levels. Northumberland and Lancaster counties reported \$1.1 million in property damage and \$147,000 in crop damage due to this storm.
September 18, 2003	Hurricane Isabel was a Category 1 hurricane crossing the Virginia Beach area. Sustained tropical storm force winds with frequent gusts to hurricane force occurred over Eastern Virginia, along and near the Chesapeake Bay and Atlantic coastal waters. While Hurricane Isabel ultimately made landfall in Ocracoke Island, NC, and tracked inland west of Richmond, Virginia, the high winds, and storm surge greatly affected the Northern Neck Region. For example, the storm surge at Colonial Beach in Westmoreland County reached 6.5 feet. The storm caused widespread power outages, downed numerous trees, and eroded beaches throughout the Northern Neck Region. In addition, Westmoreland County reported about \$450,000 in crop damage because of the storm.
September 1, 2006	The remnants of Tropical Storm Ernesto interacted with extremely high pressure over New England to generate strong winds, heavy rainfall, and storm surge-related tidal flooding and damage. Five to 8 inches of rainfall were typical across central and eastern Virginia. This rainfall caused flooding in many areas, although no substantial river flooding resulted from the heavy rain. Wind gusts of 60 to 70 mph occurred on the Eastern Shore of Virginia and areas adjacent to the Chesapeake Bay from Yorktown northward. Tides were exceptionally high from communities adjacent to the York River, northward through the Rappahannock River, to tidal portions of the Potomac River. Tides 4 to 5 feet above average, combined with 6-to-8-foot waves, caused significant damage to homes, piers, bulkheads, boats, and marinas across portions of the Peninsula and Middle Peninsula near the Chesapeake Bay and adjacent tributaries. At some locations on the Middle Peninsula, Northern Neck Region, and Eastern Shore, the tidal flooding and damage rivaled that from Hurricane Isabel in 2003. Power outages were widespread across



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Event Date	Hazard History
	Virginia's Northern Neck Region and Middle Peninsula. Reported property damages in Northumberland County were over \$23 million (2017\$).
August 27, 2011	Hurricane Irene affected the Mid-Atlantic Region by bringing strong winds, storm surge flooding, and up to 12 inches of rain across eastern North Carolina, central and eastern Virginia, and the DELMARVA peninsula. Although Irene passed east of the Mid-Atlantic coast, the most substantial wind damage occurred in a swath from Caroline and Westmoreland counties (Northern Neck Region) southward into the Richmond metropolitan area, then southeastward into Surry, Sussex, James City, and Southampton counties. Winds estimated between 70 and 80 mph downed many trees, blocked roads, and caused widespread power outages. In addition, the Richmond Times-Dispatch reported widespread downed trees, standing water, and minor damage to homes.
October 28, 2012	Hurricane Sandy was the deadliest and most destructive hurricane of the 2012 Atlantic hurricane season and the second-costliest hurricane in United States history. On October 26, Governor of Virginia Bob McDonnell declared a state of emergency. Moderate to severe flooding occurred along the coast and the Rappahannock River in the Northern Neck Region.
September 02, 2016	Hurricane Hermine tracked up the east coast from the Caribbean, leaving large amounts of rainfall, deaths and injuries, wind damage, and flooding. The Northern Neck Region suffered minor damages compared to other storms. Periods of heavy rain, beach erosion, and high tides were notable.
October 8, 2016	Hurricane Matthew was a powerful and devastating tropical cyclone that became the first Category 5 Atlantic hurricane since Hurricane Felix in 2007. While the damage was primarily confined to the coast in Florida and Georgia, torrential rains spread inland in the Carolinas and Virginia, causing widespread flooding. Impacts to the Northern Neck Region were localized.
August 04, 2020	Hurricane Isaias tracked north just inland of the central Atlantic coast of Virginia as a tropical storm producing tropical storm force winds, significant structural damages, coastal damages, and \$250k in the Northern Neck Region localities. In addition, region 5 in Virginia reported \$2.8 million in damages.
July 08, 2021	Hurricane Elsa was not a significantly costly storm for localities in the Northern Neck Region. It tracked north inland of the central Atlantic coast producing tropical storm force winds causing damage, downing trees, and power lines, and causing power outages. In addition, minor structural damage was reported in the region.



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6.3.8 – Coastal Erosion

Coastal erosion is the landward displacement of the shoreline caused by the forces of waves and currents. Sea level rise, land subsidence, and increasing rates of shoreline development intensify tidal erosion, causing property loss and water quality degradation. As a result, coastal erosion significantly impacts water quality and natural resources. According to the Virginia Department of Conservation and Recreation's Shoreline Advisory Service, there is a state of constant change in the shorelines, and some shorelines in Virginia have historical erosion rates of up to 30 feet per year. (Source: <https://www.dcr.virginia.gov/soil-and-water/seas>).

Coastal erosion poses an increasingly severe threat to the region's local governments since each county features significant shoreline areas encompassing a large percentage of each community's higher-value residential building stock. In addition, coastal erosion is wearing away the land exacerbating the removal of beach or dune sediments. Wind and fast-moving motor craft can also cause coastal erosion, initiating temporary or long-term loss of deposits and rocks and redistributing coastal sediments. These processes often result in shoreline loss due to erosion in one location balanced by nearby accretion.

6.3.8.1 – Type and Location

Coastal erosion impacts the jurisdictions in the Northern Neck Region in varying degrees. The two driving forces of coastal erosion in the Northern Neck Region are the slow rise in sea level that started about 15,000 years ago that has flooded the coastal plain watersheds and wave action from hurricanes and nor'easters¹. As the shorelines recede and erode, the bank material creates sandy beaches and is carried offshore to make sand bars.

Erosion rates and potential impacts are highly localized. Four principal factors determine coastal erosion rates: storm frequency; storm type and direction; resulting wind, tides, current, and waves; and storm intensity and duration. Other forces which cause increased levels of stormwater runoff and coastal erosion are:

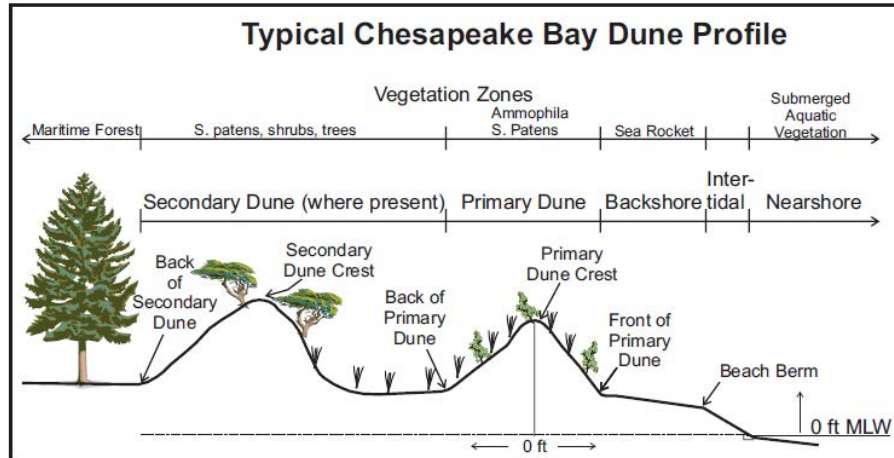
- human activity
- grading
- upland runoff
- vegetation removal

The beaches and dune system along the Chesapeake Bay are protected by the Coastal Primary Sand Dune Protection Act of 1980². Research by Hardaway *et al.* (2001) located, classified, and counted the dune systems within the eight localities listed in the Act, including Northumberland and Lancaster Counties. Subsequently, the Northumberland County Dune Inventory was created by Hardaway *et al.* in 2003 to detail the location and nature of the primary jurisdictional dunes along the Northumberland County Chesapeake Bay shoreline. Figure 6-9 outlines a typical Chesapeake Bay dune profile.

¹The General Assembly of Virginia enacted the Coastal Primary Sand Dune Protection Act (the Dune Act) in 1980.

² The Dune Act was initially codified in § 62.1-13.21 to -13.28. The Dune Act is now recodified as Coastal Primary Sand Dunes and Beaches in § 28.2-1400 to -1420.

Figure 6-9: Typical profile of a Chesapeake Bay Dune System



Source: Virginia Institute of Marine Science, Chesapeake Bay Shoreline Evolution Reports

Updated shoreline evolution studies were completed for Northumberland (August 2014), Lancaster (March 2012), Richmond (September 2011), and Westmoreland (September 2012) Counties by the Virginia Institute of Marine Science (VIMS) in conjunction with The College of William & Mary, which presents how these dune profiles have evolved since 1937 using aerial imagery. The localized effect of land subsidence and flood heights can vary by several feet over the tidal areas, given basin shape, wind direction, and tide state.

6.3.8.2 – Previous Occurrences

There is no single continuous record of coastal erosion events for the Northern Neck Region, and coastal erosion is a constant and pervasive issue that could cost the Northern Neck Region billions in future property damages. The Northern Neck Region includes more than 1,000 miles of shoreline, including beaches, marinas, and historic towns with valuable waterfront property. Shoreline erosion is greatly influenced by coastal storms, sea-level rise, tidal patterns, and stormwater runoff.

Stormwater runoff rate and volume increase with the amount of solid impermeable surfaces located near the shoreline that prevent water from soaking into the ground. High water levels during a storm often result in shoreline erosion and can affect the performance of erosion control efforts such as living shoreline efforts.

A noteworthy example of erosion from storm events:

- Hull Springs Farm, Lower Machodoc Creek, Westmoreland County
 - Due to Tropical Storm Ernesto in 2006, the base of the bank was significantly impacted, and the nature of the long-term erosion was dramatically revealed. The wave action cut bank scarp generated from the storm was 6 ft high and eroded 1 to 2 ft in some areas.

6.3.9 – Pluvial Flooding

Pluvial flooding occurs when the ground is saturated with water and falling rain has nowhere to go. Large amounts of rainfall in short periods leave the water with nowhere to go if the ground is already saturated or if there has been a prolonged period without precipitation, and the ground will not readily soak up liquids at a rapid pace resulting in poor stormwater runoff and can cause flash flooding, roadway inundation, and dangerous road conditions.



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6.3.9.1 – Type and Location

The landscape and location of the communities in the Northern Neck Region increase flooding risks in general. The risks of excessive rainfall from coastal storms and severe weather events further increases the risk of pluvial flooding.

6.3.9.2 – Previous Occurrences

Table 6-12: Previous Pluvial Flooding Events in the Northern Neck Region

Date	Description
September 05, 2006	High water was reported on several roads across the county, including State Routes 202 and 3. SR 202 was reported to have water and soil spill over the road due to an erosion.
July 28, 2017	Scattered thunderstorms in advance of and along a frontal boundary produced heavy rain and flash flooding across portions of central and eastern Virginia. Portions of Route 202 were flooded.
September 09, 2018	Scattered showers and thunderstorms along a stationary boundary produced heavy rain which caused flash flooding across portions of the Virginia Northern Neck Region. Several roads were flooded over portions of eastern Lancaster County, especially around the Town of Kilmarnock. Radar estimates indicated that up to three inches of rain had fallen in the area. Portions of Route 354 was reported under water.
June 11, 2021	Scattered thunderstorms along a frontal boundary produced heavy rain which caused flash flooding across portions of central and eastern Virginia. Route 354 (River Road) was flooded near Belle Isle Road in Lancaster. In Northumberland, Route 202 (Hampton Hall Road) was closed at Callao due to vehicles stranded in flood waters. Valley Drive was flooded. Vehicles were stranded and a water rescue occurred from a vehicle in about 3 feet of water. In Richmond County, roads were flooded from Warsaw to Oldhams, many roads were closed due to flooding, a water rescue occurred on Peach Grove Road due to flood waters on Cat Point Creek resulting from the dam failure of Chandlers Millpond. Westmoreland was faced with multiple road closures due to flooding, including several main routes into towns.

6.3.10 – Landslide

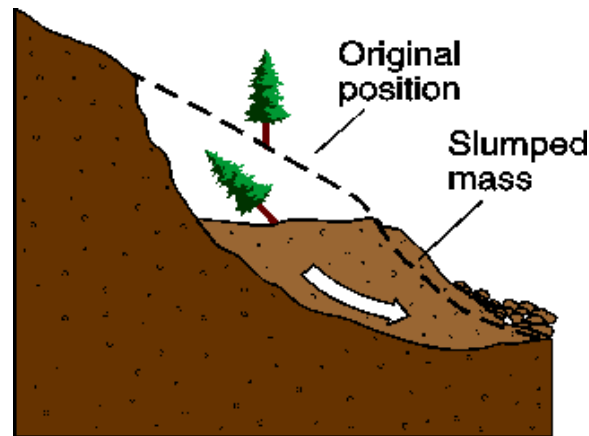
The USGS defines landslide as the movement of a mass of rock, debris, or earth down a slope and the term incorporates five modes of slope movement: falls, topples, slides, spreads, and flows. Landslide is not an everyday event. The type of geologic material involved can determine further the type of landslide that may occur in an area such as rock falls and debris flows. Debris flows would be the most direct of concerns in the Northern Neck jurisdictions. One event is recorded in the NCEI, and the NRI has not recorded any since 1996. Nevertheless, there is concern among the Region that some of the inland river areas have a risk for landslide events, and the NRI notes Landslide as a “Relatively Moderate or Low” Risk



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with an Index Score of 19.64 in Lancaster, 15.92 in Northumberland, 17.78 in Richmond, and 15.74 in Westmoreland. Figure 6-10 demonstrates a before and after example of a landslide.

Figure 6-10 Landslides



Source: BC Ministry of Energy, Mines and Petroleum Resources

6.3.10.1 – Type and Location

One of the most significant areas of concern for this hazard include the cliffs in Westmoreland State Park. The displacement of soil during heavy rainfall may cause collapse of the cliffs.

6.3.10.2 – Previous Occurrences

There is a previously reported collapse of a portion of the Nomini Cliffs in Westmoreland County as can be seen in Figure 6-11 below.

Figure 6-11: Nomini Cliffs Landslide



Source: 2017 Northern Neck Regional HMP

Additionally, in 2018, Richmond County faced a landslide that presented the County and region with firsthand experience of the consequences of improperly clearing lands without sediment and erosion control, and proper stormwater management practices. In 2017, 13 acres of forested land was cleared by developers without proper permits or inspections. The land is directly adjacent to the Fones Cliffs in Richmond County, and that as well as surrounding lands are preserved under environmental protections for historical purposes and the high number of American Bald Eagles that nest along the cliffs. On May 24,



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2018, during heavy rains a portion of the Fones Cliffs, collapsed into the Rappahannock River. The resulting landslide can be seen in Figure 6-12 below, and shows the disturbance of a large amount of dirt, stone, silt, and trees.

Richmond County had placed a stop work order on the developers, citing the lack of permits, prior to the event, and the Department of Environmental Quality had issued citations. It should be noted that the local and State agencies did intervene, but the damage that the developers had caused prior to their knowledge and intervention was detrimental. The Virginia Department of Environmental Quality and the State Water Control Board eventually filed a lawsuit against the developer for repeat environmental violations after DEQ referred the case to the Virginia Attorney General's office.

This event is a prime example of the need for mitigation integration and enforcement of zoning and floodplain practices as well as pursuing education in stormwater management practices.

Figure 6-12: Fones Cliffs Landslide May 24, 2018



Source: Friends of the Rappahannock <https://riverfriends.org/landslide-at-fones-cliff-caused-by-inadequate-controls/>

6.3.11 – Drought

A drought is when an unusual scarcity of rain causes a severe hydrological imbalance in which water supply reservoirs empty, water wells dry up, and crop damage ensues. A prolonged period of drought may or may not accompany periods of extreme heat. Drought is a complex physical and social process that can vary nationally. Unlike floods, droughts are not a specific event and typically do not have a well-defined start or end date.

- A drought can last for months or years or may be declared after as few as 15 days. Droughts are classified based on meteorological, agricultural, hydrological, and socio-economic effects:
- A meteorological drought is an extended period (six or more months) with precipitation of less than 75% of normal. Meteorological drought usually precedes other types of droughts.
- Arid conditions characterize agricultural droughts during the growing season. A traditional agricultural drought is caused by an extended period of below-average precipitation.
- Hydrological drought occurs when water reserves available in aquifers, lakes, and reservoirs fall below the statistical average. Hydrological drought tends to emerge more slowly because it involves stored water that is used but not replenished.



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- Socio-economic droughts result from water shortages that limit the ability to supply water-dependent products in the marketplace.

6.3.11.1 – Type and Location

Agricultural droughts are the most common form of drought in the Northern Neck Region and pose the greatest threat to the region's agricultural operations. High summer temperatures can exacerbate the severity of a drought. When soils are wet, a significant portion of the sun's energy goes toward the evaporation of the ground moisture. However, when drought conditions eliminate soil moisture, the sun's energy heats the ground surface, and temperatures can soar, further drying the soil. Figure 6-12 summarizes the levels of drought severity and their possible impacts on a community.

Figure 6-13: Drought Severity Classification and Possible Impacts

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: <ul style="list-style-type: none">• short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none">• some lingering water deficits• pastures or crops not fully recovered
D1	Moderate Drought	<ul style="list-style-type: none">• Some damage to crops, pastures• Streams, reservoirs, or wells low, some water shortages developing or imminent• Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none">• Crop or pasture losses likely• Water shortages common• Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none">• Major crop/pasture losses• Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none">• Exceptional and widespread crop/pasture losses• Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: United States Drought Monitor

The Drought Monitoring Task Force (DMTF) is a Commonwealth of Virginia interagency group of technical representatives from state and federal agencies responsible for monitoring natural resource conditions and the effects of drought on people, businesses, and natural resources. When activated, the Drought Task Force meets to assess conditions and make recommendations regarding drought status. The Task Force periodically releases Drought Status Reports summarizing drought conditions in the Commonwealth. Through the DMTF, the group can make recommendations for declaring four Drought Stages based on how the measured groundwater levels compare to historical levels: Normal, Watch, Warning, and Emergency. Each Drought Stage involves a list of response activities generally initiated when a specific Drought Stage declaration is made³.

Table 6-13 summarizes the 2017 US Census of Agriculture information by county in the Northern Neck Region. As of 2017, a total of 401 farms produces more than \$77 million in regional agricultural production annually.

³ National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center, [Climate at a Glance](#)



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The 2022 US Census of Agriculture was ongoing during the 2023 plan update; therefore, 2017 data was used (the most current information available).

Table 6-13: 2017 U.S. Census of Agriculture General Information by County

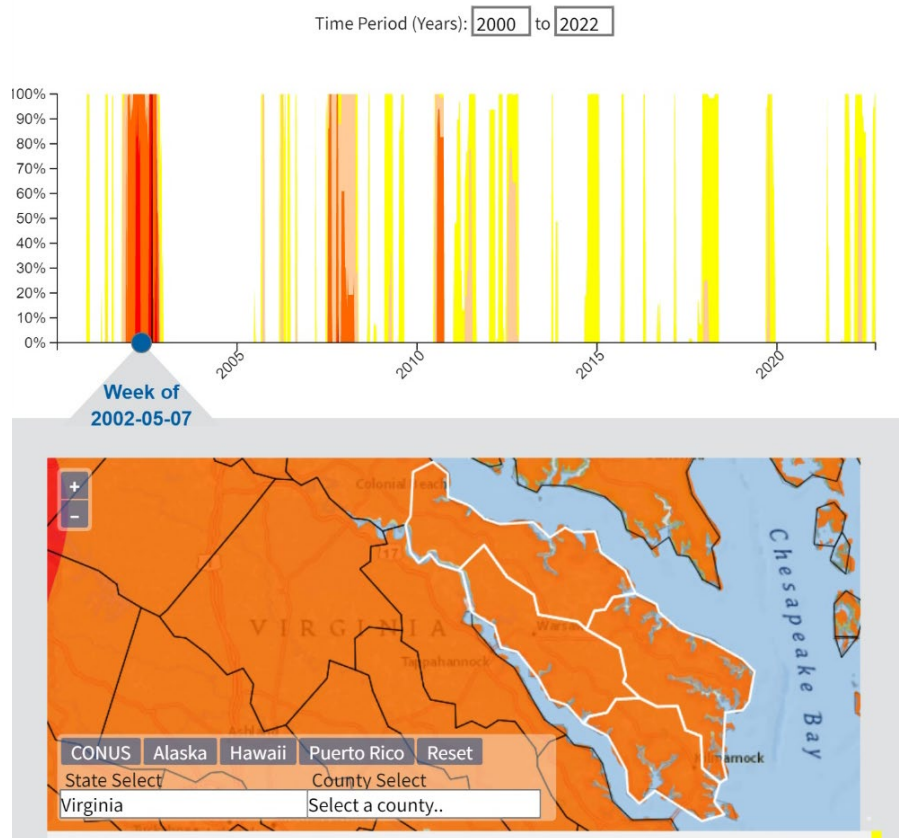
Jurisdiction	Number of Farms	Land in Farms (Acres)	Average Size of Farm (Acres)	Market Value of Products	Average Value Per Farm
Lancaster	80	16,238	203	\$5,555,000	\$860,073
Northumberland	134	43,480	324	\$20,052,000	\$975,400
Richmond	98	31,952	326	\$16,814,000	\$1,289,515
Westmoreland	183	52,619	288	\$57,092,000	\$1,073,155
NNPDC	495	144,289	285.25	\$99,513,000	\$1,049,536

Source: 2017 U.S. Census of Agriculture

6.3.11.2 – Previous Occurrences

Historically, Virginia droughts have tracked somewhat consistently with precipitation levels, whether a limited drought or a longer-term agricultural drought. The Northern Neck Region last saw a severe (D-2) drought in August of 2010, this affected the entire region and surrounding areas.

Figure 6-14: Historical Drought Conditions in the Northern Neck Region 2000-2022



Source: U.S. Drought Monitor: <https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx>



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According to the NCEI database, three recorded droughts between 1996-1998 have affected all the Northern Neck Regional jurisdictions. Table 6-14 lists the most significant droughts that impacted the Northern Neck Region, which occurred several decades ago. No further occurrences are recorded in the NCEI database. Figure 6-13 above, illustrates periods of drought in the Northern Neck Region from 2000 to June 30, 2022. A drought is a cyclical event dependent upon precipitation amounts, humidity, and temperatures.

Table 6-14: Previous Occurrences of Drought Events in the Northern Neck Region

Event Date	Hazard History
September 1, 1997	A very dry period from May through September resulted in drought-like conditions across much of central and eastern Virginia. Of the four Northern Neck Region's counties, Lancaster reported \$1,880,000 in crop damages because of this drought.
October 1, 1998	A very dry period from July through October resulted in drought-like conditions across much of the eastern piedmont and Northern Neck Region of Virginia. The four Northern Neck Regional counties reported a total of \$8 million in crop damage because of this drought.
November 1, 1998	Drought-like conditions continued to affect much of the eastern Piedmont and Northern Neck Region through November. This was the fifth month in a row that drought conditions were seen across Northern Virginia. Persistent high pressure over the Southeast U.S. forced rain producing low pressure systems to steer north of the region. There was an additional \$4 million in reported crop damage in the Northern Neck Region. This was the first year the USDA Farm Service Agency had to make direct payments for grazing losses. The extended drought damaged root systems of grass and was expected to influence the 1999 hay crop. The drought also contributed to a high frequency of forest and brush fires.
August 10, 2010	Westmoreland and Northumberland seek emergency declarations from the Governor for drought conditions that had been affecting the area since April of 2010. The drought lasted well into the fall and USDA declared a disaster in 59 counties across the Commonwealth, including Lancaster, Northumberland, Westmoreland, and Richmond on November 4, 2010.
October 10, 2019	A drought watch advisory was issued across VA by the Department of Environmental Quality after a prolonged period of heat and lack of precipitation that started in July of 2019. Northern Neck Region localities issued prolonged burn bans and Fall/winter crop planting was delayed due to severely low subsoil moisture. Livestock farmers were forced to begin feeding hay earlier in the season due to poor grazing fields in Westmoreland and Richmond. The soil in Lancaster County was too dry to plant wheat and the corn crops suffered decreasing some farmer's incomes 30-40%. Soybean crops suffered a 14% loss as well.

Source: NCEI Storm Events Database, FEMA ArcGIS Mapping US Drought Intensity Layer



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6.3.12 - Heatwave

The NCEI is the utilized source that provided dates of heatwave events and does not present records of a heatwave since 2017, however it shows three events from 1996-2012. The NRI notes nine occurrences between 2005-2017 but specific dates for those events are not available. Data to date is only located for the three within the NCEI, as stated below. The NRI estimates that the Northern Neck Region communities can expect to suffer one heat wave per year (0.7/year). Much of the risk in heat waves is to the population, primarily vulnerable populations, and persons with functional access needs. The climate and coastal location of the region contribute to high humidity that will increase the effects of high heat indexes, raising the hazards associated with heat waves.

6.3.12.1 – Type and Location

A heat wave and heat-related events would most likely affect the entirety of the region. Heat-related events could be one day of extreme heat expanding to multiple days. Such events can cause schools and facilities without adequate air conditioning to close, leaving citizens without means to cool their homes and needing assistance such as a cooling shelter.

6.3.12.2 – Previous Occurrences

There are 3 noted heatwave incidents in the NCEI database as noted in Table 6-15 below.

Table 6-15: Historical Heatwave Events in the Northern Neck Region

Date	Details
05/18/1996	An early-season four-day heat wave produced record or near record high temperatures across central and eastern Virginia. High temperatures were in the 80s and low 90s across the region on May 18. Then, on May 19, May 20, and May 21, high temperatures were in the 90s throughout the area. May 20 was the hottest of the four days as readings climbed into the mid to upper 90s. Also, Norfolk international airport set a record with 98 degrees and Farmville (co-op observer station) set a record with 96 degrees. Unfortunately, though, the heat wave was responsible for numerous reports of heat exhaustion and forced many non-air-conditioned schools to close or have early dismissals.
07/21/2011	An extended period of excessive heat and humidity occurred across most of central and eastern Virginia from July 21st to July 23rd. High temperatures ranged from 96 to 103 degrees during the afternoons, with heat index values ranging from 110 to 119. Overnight lows only fell into the lower 70s to lower 80s.
07/05/2012	High Pressure centered just to the west of the Middle Atlantic Region produced hot and humid weather over central and eastern Virginia from July 5th through July 8th. High temperatures ranged from the mid-90s to lower 100s, and low temperatures ranged from the mid-70s to lower 80s across the area.

Source: NCEI Storm Events Database

Though there are limited records of heatwave events mitigation and planning efforts should remain vigilant as climate patterns evolve and the risk of heatwaves and its effects on the communities grows. A data gap



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was noted during the hazard assessment and HMWG members took note of the need to record additional data in the face of incidents such as heatwave that are often not reported upon outside of individual jurisdictions.

6.3.13 – Earthquake

The earth's surface is covered by solid rock approximately 50 miles thick, referred to as the lithosphere. The lithosphere comprises the earth's crust, which ranges in size from about 22 miles thick for continents to about five miles thick for the oceans, and the upper mantle, which is composed of solidified magma. This lithosphere "floats" above a thick layer of molten rock known as the lower mantle. The lithosphere is divided into large and small sections that geologists call plates. Earthquakes occur when those geologic plates slide against each other, resulting from the sudden release of energy that creates seismic waves. Most movements between plates are minimal, generating tiny earthquakes that people cannot sense. However, other less frequent activities between plates can be quite large, generating powerful earthquakes that can shake the ground surface and cause widespread damage. Earthquakes can be violent enough to destroy whole cities.

The term "earthquake" is used to describe any seismic event, whether natural or caused by humans, that generates seismic waves. Earthquakes are caused mainly by the rupture of geological faults and other events such as volcanic activity, landslides, mine blasts, and nuclear tests. An earthquake's point of initial break is called its focus or hypocenter. The epicenter is the point at ground level directly above the hypocenter.

Most earthquakes occur at weak points in the earth's crust along surfaces where two or more geologic plates meet, called faults. Significant faults within the earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Therefore, the location of faults can indicate where future earthquakes are likely to occur. Some of the more active earthquake faults in the United States include the San Andreas Fault in California and the New Madrid Fault in the Midwest.

6.3.13.1 – Type and Location

Earthquakes in the United States occur most frequently along the West Coast, where both convergent and transform plate boundaries are present. However, earthquakes also occur along the East Coast of the United States, but the mechanisms causing these earthquakes are not well understood, as these occur within the plate rather than at plate boundaries.

According to the USGS *"Science of Earthquakes"*, scientists have tried many ways of predicting earthquakes, but none have been successful. On any fault, scientists know there will be another earthquake sometime in the future, but they have no way of telling when it will happen.



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Figure 6-15: Mercalli Scale

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: United States Geological Survey: <https://www.usgs.gov/products/data>

Figure 6-16: Intensity vs Magnitude

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC. (%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL. (cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: United States Geological Survey: <https://www.usgs.gov/products/data>

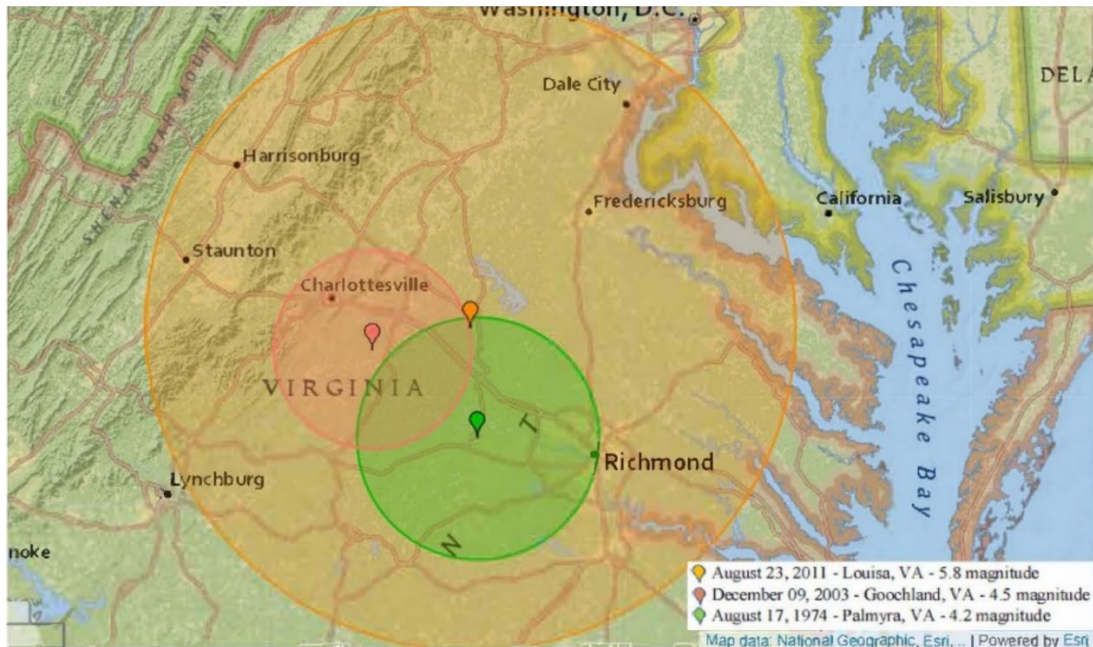


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6.3.13.2 – Previous Occurrences

Since 1900, there has been no record of an earthquake having its epicenter within the boundaries of the Northern Neck Region. The earthquake on August 23, 2011, with an epicenter in Louisa County, Virginia, resulted in a Federal Disaster Declaration in nine jurisdictions and was felt as far north as Vermont. Due to the orientation of the fault, this earthquake was minimally felt in the Northern Neck Region. Figure 6-16 shows the location of past earthquakes in the Commonwealth relative to the Northern Neck Region.

Figure 6-17: Historical Earthquakes



Source: Virginia Tech Seismological Observatory

6.4 Identifying Hazards of Concern

The table on the following pages lists the hazards, describes the rationale for identifying (or not identifying) hazards as significant, shows sources of information that were consulted for the determination.

It also indicates the hazards identified by NNPDC for a detailed risk assessment.

Table 6-16: Northern Neck Regional Hazard Identification

Hazard	Identified Natural Hazard?	Rationale	Sources	Detailed Risk Assessment?
Tornado	Yes	Widespread impacts, history of occurrences in the county, significant damages Increasing frequency.	NCEI; HAZUS; NRI:	Yes



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Hazard	Identified Natural Hazard?	Rationale	Sources	Detailed Risk Assessment?
Severe Weather (Thunderstorms, Hail, High winds, Lighting)	Yes	Severe sudden storms often increase in severity with little to no warning. The proximity to several bodies of water increases the risk of flash flooding and the outdoor recreation in the area increase the risk for lightning strike casualties. High winds pose a greater risk to utility interruptions, debris, and downed trees.	NCEI; HAZUS; NRI	Yes
Wildfire	Yes	Relatively low annual probability for a significant size event, but potential for substantial consequences	VDOF, USGS	Yes
Coastal Flooding	Yes	The entire region is surrounded by the Chesapeake Bay and its tributaries. An abnormally high tide causes inundation of some areas without other hazards increasing the water levels. Coastal storms, rising sea level, and climate change all increase the damage potential. Damage estimates are substantial in flooding events.	NCEI; HAZUS; NRI; USGS; VA Coastal Resilience Master Plan	Yes
Riverine Flooding	Yes	High annual probability with impacts potentially severe in site specific areas. Severe thunderstorms cause pluvial flooding issues. Coastal storms cause water trapping increasing flood levels and prolonging the period.	NCEI HAZUS; NRI;	Yes
Winter Weather	Yes	High annual probability, widespread impacts, but losses generally limited except in most extreme events.	NCEI; NRI;	Yes



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Hazard	Identified Natural Hazard?	Rationale	Sources	Detailed Risk Assessment?
Hurricane/Tropical Storm	Yes	High annual probability, widespread impacts, losses are great when affected by a storm of this nature.	NCEI; HAZUS, NRI;	Yes
Coastal Erosion	Yes	Low to moderate annual probability with impacts relatively substantial over time. Coastal erosion increases in conjunction with other coastal events such as hurricanes and Nor'easters.	NCEI; Virginia Coastal Resiliency Master Plan; CCRFR;	Yes
Drought	Yes	High annual probability, but impacts generally limited	NCEI; NRI;	Yes
Pluvial Flooding	Yes	Moderate to high annual probability, Impacts significant in areas with poor drainage or proximity to bodies of water. Flash flooding risk increases risk of casualties.	NCEI; NRI;	Yes
Landslide	Yes	Low Probability but noteworthy due to certain landscape aspects.	NRI	Yes
Drought	Yes	High annual probability, with high agricultural risk, but impacts are generally limited.	NCEI; USDA; NRI;	Yes
Heatwave	Yes	Relatively high annual probability, but impacts are limited	NCEI; NRI;	Yes
Earthquake	Yes	Low probability, low risk of effects.	NCEI; USGS; HAZUS	Yes

Note: See Appendix B (Section 6) for a complete listing of all sources.

6.5 High Hazard Potential Dams

6.5.1 Risks of High Hazard Probability Dams in the Northern Neck Region

Dams are manufactured structures that serve a variety of uses such as flood protection, power production, agriculture, water supply, and forming recreational areas. They are typically constructed of earth, rock, or concrete and come in all shapes and sizes. The Commonwealth of Virginia's Hazard Mitigation Plan of March 2018, Chapter 3.11 "Flooding Due to Impoundment Failure" reports dam failure as the uncontrolled release of impounded water or sludge resulting in downstream flooding causing secondary impacts threatening lives and property. Dams can fail because water heights or flows are above the capacity the structure was designed for (including flooding) or because the structure failed in some way. Structures fail for many reasons, including lack of maintenance, erosion, seismic events, insufficient design, development



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or alteration of the floodplain, or improper construction. Concrete/masonry dams usually fail from the loss of a section or undermining, while the primary causes of earthen dam failure are overtopping, piping failure, and foundation failure. In addition, concrete or masonry dams tend to fail suddenly, while earthen dams usually take longer. Human factors must also be considered in this portion of the risk assessment as negligent operation and acts of terrorism are risk factors to be taken seriously.

A levee or floodwall is defined as a “man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to reduce the risk from temporary flooding.” Levees that meet protection standards to a minimum of the 100-year annual flood chance may be eligible for accreditation by FEMA. With accreditation, the area around the levee shown on a FIRM map will be re-zoned as “moderate” risk instead of “high” risk. There is not an accredited levee in the Northern Neck Region.

Dam Hazard Potential Classifications

The Virginia Department of Conservation and Recreation maintains the Division of Dam Safety and Floodplain Management (DSFPM). The Northern Neck PDC and jurisdictions strive to maintain an open working relationship with DCR to ensure that dams located within the region are mitigated to decrease the threat of future life-threatening incidents.

Dam safety inspections and monitoring have become essential tools in evaluating dam failure risk, ensuring proper maintenance, and prioritizing actions. The ranking of assessments is often based on a classification system according to the potential impact a dam failure or mis operation would have on nearby populations and property. Virginia and FEMA utilize a Hazard Potential Classification System for dams that categorize them as Low, Significant, or High. Table 6-17 presents the dam classification system in Virginia, with the inspection guidelines that DCR and the Dam Safety Program utilizes.

Table 6-17: Dam Classification System in Virginia

Hazard Potential	Description	Inspection
High (Class I)	Failure will cause probable loss of life or serious economic damage (to buildings, facilities, major roadways, etc.)	Annual, with inspection by a professional engineer every 2 years.
Significant (Class II)	Failure may cause loss of human life or appreciable economic damage (to buildings, secondary roadways, etc.)	Annual, with inspection by a professional engineer every 3 years.
Low (Class III)	Failure would result in no expected loss of human life, and cause no more than minimal economic damage.	Annual, with inspection by a professional engineer every 6 years.

Source: The Commonwealth of Virginia Hazard Mitigation Plan, March 2018: Table 3.11-1

Owners of dams classified based on Table 6-17 are required to obtain assessment by a licensed professional and an Emergency Actions Plan, in addition to applying for an Operation and Maintenance Certificate through DCR. The emergency actions plan must be filed with the local administrative agency and VDEM. Table 6-18 identifies the list of dams, and pertinent available information, present in the Northern Neck Region.



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Table 6-18: Dams in the Northern Neck Region

Dam & (Other Name)	ID #	Hazard Classification	Location	Owner	Dam Type
Twin Branch Milldam (Davis Millpond)	103001	Unknown	Lancaster County	F. Martin, T. Little, Vernon Grammar	Earth
Lancaster Roller Mill Dam	103002	Unknown	Lancaster County	Not listed	Earth
Stevens Dam	103003	Unknown	Lancaster County	Not Listed	Earth
Golden Eagle Dam (Stevens or Stephens Dam)	103004	LOW	Lancaster County	Not Listed	Earth
Balls Millpond Dam	103005	Unknown	Lancaster County	Not Listed	Earth
Marsh Dam	103006	Unknown	Lancaster County, Richmond County	Not Listed	Earth
Blackmore Millpond Dam (Blakemore Millpond Dam)	103007	Unknown	Lancaster County	Not Listed	Earth
Chinns Dam	159001	Unknown	Lancaster County, Richmond County	Not Listed	Earth
Lancaster County Dam #1	103008	Unknown	Lancaster County	Not Listed	Not listed
Lancaster County Dam #2	103009	Unknown	Lancaster County	Not Listed	Not Listed
Lancaster County Dam #3	103010	HIGH	Lancaster County	Janet Sowder	Not Listed
Fisher Quarry Dam	103011	Unknown	Lancaster County	Theodore Fishers and Sons	Earth
Falling Mill Dam	133001	Unknown	Northumberland County	Not Listed	Earth
Clarks Mill Dam	133002	Unknown	Northumberland County	Not Listed	Earth
Sydners Millpond Dam	133003	Unknown	Northumberland County	Not Listed	Earth
Hale Dam	133004	Unknown	Northumberland County	Not Listed	Earth
Courtney Millpond Dam (Kissinger Road Dam)	133005	Unknown	Northumberland County	Not Listed	Earth
Hurst Dam	133006	Unknown	Northumberland County	Not Listed	Earth
Private Road Dam (Bogey Neck)	133007	Unknown	Northumberland County	Not Listed	Earth
Snowden Park Dam	133008	Unknown	Northumberland County	Not Listed	Earth
Headleys Mill Pond Dam	133009	Unknown	Northumberland County	Not Listed	Earth
Gardy Millpond	193008	LOW	Northumberland County, Westmoreland County	Virginia Department of Wildlife Resources	Earth
Northumberland County Dam #1 (133dd004)	133010	Unknown	Northumberland County	Not Listed	Not Listed



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Flyway Lake Dam (Northumberland County Dam #1)	133011	Unknown	Northumberland County	Mallard Bay Property Association	Not Listed
Eagle Lake Dam (Mallard Bay Dam)	133012	Unknown	Northumberland County	Mallard Bay Property Association	Earth
Tipers Creek Pond	133013	Unknown	Northumberland County	Not Listed	Earth
Mount Airy Dam	159003	Unknown	Richmond County	Not Listed	Earth
Garland Millpond Dam	159002	SIGNIFICANT	Richmond County	Not Listed	Earth
Huggins Dam 2 (159dd002)	159011	Unknown	Richmond County	H.T. Huggins	Not Listed
Deland Dam	159004	Unknown	Richmond County	Not Listed	Earth
CBM Dam (159dd005)	159013	Unknown	Richmond County	CBM Investment, Inc.	Not Listed
Huggins Dam (159dd001)	159010	Unknown	Richmond County	H.T. Huggins	Not Listed
Lanier-Davis Dam	159007	Unknown	Richmond County	Not Listed	Earth
France Dam (159dd006)	159014	Unknown	Richmond County	Not Listed	Earth
Connellee Dam	159009	SIGNIFICANT	Richmond County	Trustees of Robert H. and Elsie Gruver	Earth
Marshall Dam	159005	Unknown	Richmond County	Not Listed	Earth
Huggins Dam 3 (159dd003)	159012	Unknown	Richmond County	H.T. Huggins	Not Listed
Omohundra Millpond Dam	159006	Unknown	Richmond County, Westmoreland County	Not Listed	Earth
Hogans Mill Dam	159008	Unknown	Richmond County, Westmoreland County	Not Listed	Earth
Morris Dam (Potomac Mills Pond Dam)	193001	Unknown	Westmoreland County	Not Listed	Earth
Latanes Dam	193002	Unknown	Westmoreland County	Not Listed	Earth
Flemmer Dam	193003	Unknown	Westmoreland County	Not Listed	Earth
Lake Independence Dam	193004	SIGNIFICANT	Westmoreland County	Not Listed	Earth
Horners Dam	193005	Unknown	Westmoreland County	Edward and Jeanne Mella	Earth
Placid Lake Dam	193006	LOW	Westmoreland County	Placid Bay Civic Association & Westmoreland County	Earth
Thomas Branch Dam	193007	Unknown	Westmoreland County	Walter Hendricks	Earth
Marshall Creek Dam	193009	Unknown	Westmoreland County	Not Listed	Earth
Newtons Dam	193010	Unknown	Westmoreland County	Not Listed	Earth



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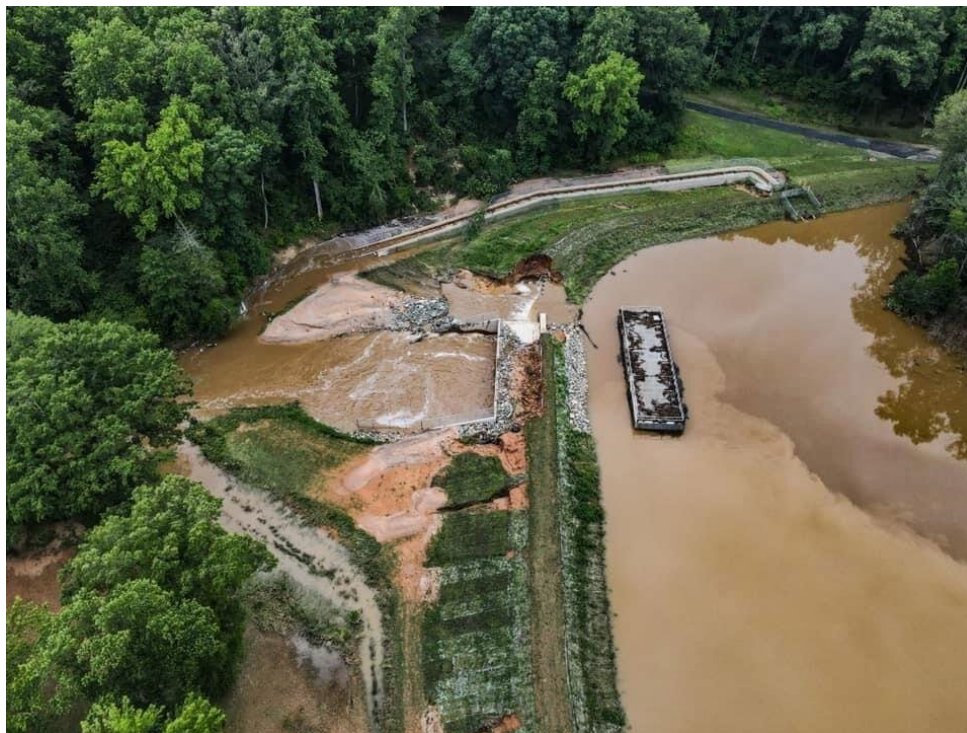
Chandler's Mill Dam	193011	HIGH	Westmoreland County	Private/Virginia Department of Wildlife Resources	Earth
Travis Dam	193012	Unknown	Westmoreland County	Not Listed	Earth
Weavers Dam	193013	Unknown	Westmoreland County	Not Listed	Earth
Red Oak Dam (Red Oak Nursery Dam)	193014	SIGNIFICANT	Westmoreland County	J. Clifford Hutt	Earth
Westmoreland County Dam #1 (193dd004)	193015	Unknown	Westmoreland County	Not Listed	Not Listed
Westmoreland County Dam #2 (193dd041)	193016	Unknown	Westmoreland County	Not Listed	Not Listed
Westmoreland County Dam #3 (193dd054)	193017	Unknown	Westmoreland County	Not Listed	Not Listed
Westmoreland County Dam #4 (193dd056)	193018	Unknown	Westmoreland County	Not Listed	Not Listed
Westmoreland County Dam #5 (193dd057)	193019	Unknown	Westmoreland County	Not Listed	Not Listed
Erica Road Dam	193020	Unknown	Westmoreland County	Belvoir Farm, Inc	Earth

Source: Data provided by the Virginia Department of Conservation and Recreation, Dam Safety Program

6.5.2 Previous Occurrences of Dam Failures

There have been three recent dam failure events in the Northern Neck Region, all of them at the Chandler's Mill Dam in Westmoreland County which is located near the entrance to the Town of Montross. The dam faced a failure in 2015 after a severe storm destabilized the dam. The dam was then rebuilt with completion in August of 2020. On November 12, 2020, the dam did not face physical failure, but the falling rains caused water to overtop the embankments and subsequently flooding and closing Route 3. Repairs from the 2020 event had not yet been completed in June of 2021 when up to ten inches of rain fell across the Northern Neck Region in a 200-year storm event. The dam pond was empty, and outflows open at the start of the event, but the pond filled extremely fast, and water overtopped Route 3/Kings Highway at the lake crossing. The resulting water caused flash flooding and necessitated water rescue; Route 3 and Peach Grove Road was also closed in the face of potential instabilities.

Figure 6-18: Dam Failure at Chandlers Mill Dam



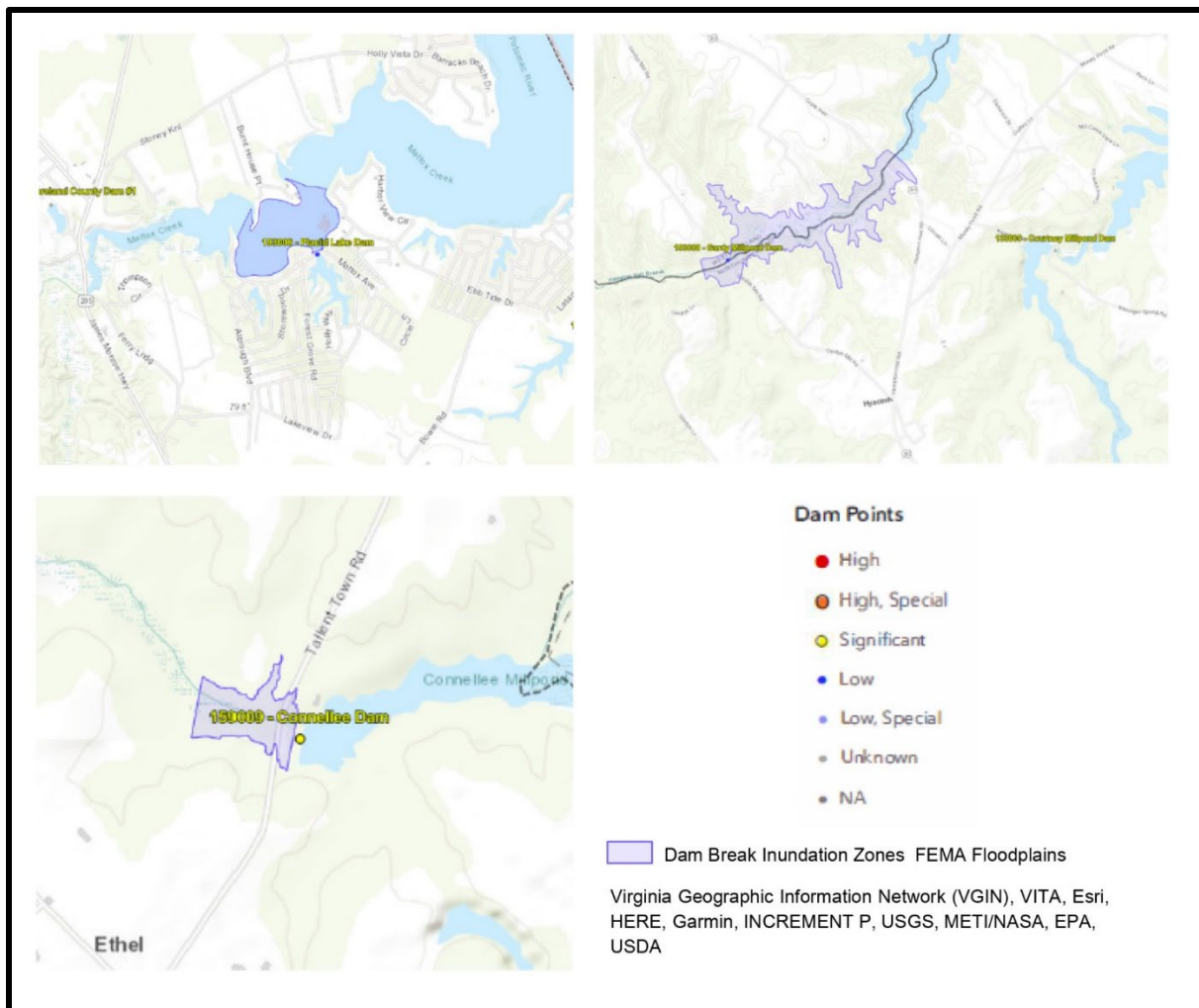
Source: News on the Neck

6.5.3 Probability of Future Risks and Failures

As shown in Table 6-18 there are a considerable number of dams in the Northern Neck Region, the classification of the majority of those is currently “unknown.” Virginia’s DSFPM is in the process of developing modified dam break inundation studies and emergency action plans for dams that currently do not have a regulatory classification. The critical information provided from those actions will allow local, regional, and state agencies greater planning abilities against unclassified dams. *FEMA Rehabilitation of High Hazard Potential Dams: Grant Program Guidance June 2020: Section 5.8.1.3* identifies three types of dam risks:

- Incremental – The risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or mis operation, where the consequences considered are over and above those that would occur without dam breach.
- The risk in the reservoir pool area and affected downstream floodplain due to ‘normal’ dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or ‘overtopping of the dam without breaching’ scenarios.
- The risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as “risk remaining at any time” (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.

Figure 6-19: Dam Break Inundation Zones in FEMA Floodplains



Source: Virginia DCR VGIN Dam Break Inundation Zone Layer

Currently, available information is insufficient to conduct a thorough analysis of the HHPD inventory in the Northern Neck Region relative to incremental, non-breach, and residual risk. Participating jurisdictions and the Northern Neck PDC acknowledge the definitions of the risks as identified by FEMA and have integrated mitigation goals and actions into this Plan that will encourage growth and advancements to HHPD mitigation planning. Actions that will reduce long-term vulnerabilities are addressed in Section 9, Table 9-3, Actions 7 & 8. Action 7 addresses education and initiating planning processes, while Action 8 provides technical assistance from the PDC to jurisdictions to manage HHPD mitigation projects. Both actions are new to the Plan in 2023 and align with guidance from the *Fiscal Year 2021 Rehabilitation of High Hazard Potential Dams – Notice of Funding Opportunity (NOFO)*. The 2023 plan does not include advanced statistics of occurrence or probabilities due to the current lack of information. The HHPD section of the plan has been written with the best available information at the time that the update was performed. This will be monitored with the annual reviews during plan maintenance and updates will be applied as seen fit and under the guidance of Virginia DSFPM.



Northern Neck Regional Hazard Mitigation Plan Section 6: Hazard Identification, Profiling, and Ranking

6.6 Summary

As indicated in the above table, 13 natural hazards were identified as hazards of concern. As the regulations state, all these identified hazards must be profiled, their vulnerability assessed, and mitigation actions developed for them:

- Tornado
- Severe Weather Events
- Coastal Flooding
- Riverine Flooding
- Wildfire
- Winter Storm
- Hurricane/Tropical Storm
- Coastal Erosion
- Pluvial Flooding
- Landslide
- Drought
- Heatwave
- Earthquake

6.6.1 Summary Description of the County's Vulnerability to Hazards

The DMA 2000 legislation and related FEMA planning guidance require mitigation plans to discuss community vulnerability to natural hazards. Vulnerability is generally defined as the damage (including direct damage and loss of function) that occurs when various risks impact a structure, operation, or population. For example, vulnerability can be expressed as the percent damage to a building when it is flooded or the number of days a government office will be shut down after a windstorm, assuming sufficient detailed data is available to support the calculations.

Because this Plan includes multiple jurisdictions and the available data is not very detailed, it is not practical to complete vulnerability assessments on the many individual assets, operations, and populations in respective jurisdictions.

However, it is appropriate for participating jurisdictions embark on a program to address these data deficiencies over the next five years in anticipation of the following Plan update. In addition, it is possible to make general observations based on the hazard identifications and risk assessments that are the subjects of Sections 6 and 7 of this Plan.

As illustrated in Section 6 (Hazard Identification), the communities in the Northern Neck Region are subject to numerous natural hazards, human-caused, although in some cases, the hazards have rarely impacted the area, or their effects have been relatively minor. Although relatively localized, flooding, and severe storms are the most frequent and damaging natural hazards, as with many parts of the mid-Atlantic. However, it is crucial to recognize that several other hazards present significant risks (i.e., the potential for future losses) to the communities, even though they have occurred infrequently or have not caused much damage. Not all hazards carry the same weight risk. All hazards have some risk. The Northern Neck Planning District Commission and the Working Group Members strive to seek out proactive strategies.



Northern Neck Regional Hazard Mitigation Plan Section 7: Risk Assessment

Section 7 Risk Assessment

Contents of this Section

- 7.1 44 CFR Requirement for Risk Assessments
- 7.2 Overview and Analysis of the Northern Neck Region's Vulnerability to Hazards
- 7.3 Estimate of Potential Losses (Risk Assessment)
 - 7.3.1 Tornado Risk in the Northern Neck Region
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 - 7.3.3 Coastal Flooding Risk in the Northern Neck Region
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 - 7.3.5 FEMA Flood Zones in the Northern Neck Region
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 - 7.3.10 Coastal Erosion Risk in the Northern Neck Region
 - 7.3.11 Pluvial Flooding Risk in the Northern Neck Region
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 - 7.3.13 Drought Risk in the Northern Neck Region
 - 7.3.14 Heatwave Risk in the Northern Neck Region
 - 7.3.15 Earthquake Risk in the Northern Neck Region
- 7.4 Northern Neck Region's Critical Facilities Risk Assessment
- 7.5 Northern Neck Region's Future Development Trends
- 7.6 Summary of Risk Assessment

7.1 44 CFR Requirement for Risk Assessments

Requirement §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

Requirement §201.6(c)(2)(ii): *The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

Requirement §201.6(c)(2)(ii): *The risk assessment must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

Requirement §201.6(c)(2)(ii)(A): *The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.*



Northern Neck Regional Hazard Mitigation Plan Section 7: Risk Assessment

Requirement §201.6(c)(2)(ii)(B): [The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

7.2 Overview and Analysis of the Northern Neck Region's Vulnerability to Hazards

The hazard identification and risk assessment aim to provide a factual basis for developing mitigation strategies by prioritizing areas most threatened and vulnerable to natural hazards.

Multiple resources were used in obtaining a comprehensive dataset while assessing hazards for the Northern Neck Regional jurisdictions during the 2023 HMP hazard assessment review. Primary databases include the National Weather Service/National Oceanic and Atmospheric Administration's Storm Database at the National Center for Environmental Control (NCEI). NCEI provided the primary historical base data for most natural hazards. In addition, tools such as the National Risk Database, USGS Earthquake database, ArcGIS layers, and HAZUS were utilized to gather the best available data to encourage informed decision-making.

Hazards were ranked utilizing the Calculated Priority Risk Index (CPRI). The figures below, Figure 7-1: Calculated Priority Risk Index and Figure 7-1: CPRI Categories and Risk Levels, demonstrate the ranking process performed using the CPRI formula and present the CPRI categories and risk levels.

Figure 7-1: Calculated Priority Risk Index

NNPDC 2022-2023 HMP Update Hazard Ranking Process

Calculated Priority Risk Index CPRI

The Calculated Priority Risk Index (CPRI) combines user input and a mathematic equation to establish a ranking for each hazard.

There are four main criteria within the CPRI; *Probability*, *Magnitude/Severity*, *Warning Time*, and *Duration*. Each of these criteria are sub divided to further define and access the potential impact of the hazard.

These choices each represent a value from 0 to 4. Zero is the default value or the value utilized when an option is not assigned.

The CPRI is calculated based on the four selections with the following weightings for each criterion:

- Probability (P) = 45%
- Magnitude/Severity (M) = 30%
- Warning Time = 15%
- Duration (D) = 10%

Example:

$$.45(P) + .30(M) + .15(W) + .10(D) = \text{CPRI \#}$$

The CPRI is subjective based on user selection of the criteria. The CPRI may be amended to reflect decisions by the Working Group.



Northern Neck Regional Hazard Mitigation Plan Section 7: Risk Assessment

Figure 7-2: CPRI Categories and Risk Levels

CPRI Category	Level ID	Degree of Risk Description	Index Value	Assigned Weighting Factor
Probability	Unlikely	<ul style="list-style-type: none"> Rare with no documented history of occurrences or events. Annual probability of less than 0.01. 	1	45%
	Possibly	<ul style="list-style-type: none"> Infrequent occurrences with at least 1 documented or anecdotal historic event. Annual probability that is between 0.1 and 0.01. 	2	
	Likely	<ul style="list-style-type: none"> Frequent occurrences with at least 2 or more documented historic events. Annual probability that is between 1 and 0.1. 	3	
	Highly Likely	<ul style="list-style-type: none"> Common events with a well-documented history of occurrence. Annual probability that is greater than 1. 	4	
Magnitude /Severity	Negligible	<ul style="list-style-type: none"> Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries / illnesses are treatable with first aid with no deaths. Negligible quality of life lost. Shut down of critical facilities for less than 24 hrs. 	1	30%
	Limited	<ul style="list-style-type: none"> Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries / illnesses do not result in permanent disability with no deaths. Moderate quality of life lost. Shut down of critical facilities for more than 1 day and less than 1 week. 	2	
	Critical	<ul style="list-style-type: none"> Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries / illnesses result in permanent disability and at least 1 death. Shut down of critical facilities for more than 1 week and less than 1 month. 	3	
	Catastrophic	<ul style="list-style-type: none"> Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). Injuries / illnesses result in permanent disability and multiple deaths. Shut down of critical facilities for more than 1 month. 	4	
Warning Time	Less than 6 hrs.	Self-explanatory	4	15%
	6 to 12 hrs.	Self-explanatory	3	
	12 to 24 hrs.	Self-explanatory	2	
	More than 24 hrs.	Self-explanatory	1	
Duration	Less than 6 hrs.	Self-explanatory	1	10%
	Less than 24 hrs.	Self-explanatory	2	
	Less than 1 week	Self-explanatory	3	
	More than 1 week	Self-explanatory	4	

7.3 Estimate of Potential Losses (Risk Assessment)

This section describes the risks to the Northern Neck Region, including its citizens, residential, government, and commercial assets, from the named hazards determined by the Northern Neck Regional Hazard Mitigation Steering Committee. As noted above, the term risk is an expression of expected future monetary losses that result from the impacts of natural hazards.

This subsection of the Plan provides estimates of future losses. Each loss calculation is based on the best available data, but they must be considered estimates because highly detailed engineering was not performed as part of this planning process.

7.3.1 Tornado Risk in the Northern Neck Region

As demonstrated in Section 6, tornadoes present an increasing risk to the communities in the region, noting an increase in frequency and, as a result, damages, and loss. Tornadoes present a significant threat to life.

7.3.1.1 Vulnerabilities

Table 7-1 demonstrates the estimated annualized damages for tornado events in the Northern Neck Region. The NCEI and NRI note an alarming increase in tornadic events and risk to property and life. It should be noted that tornado and high wind event frequencies have increased substantially in the last 20 years. In addition, increases in vulnerable populations and a decline in property upkeep contribute to the losses and level of damages incurred by tornadoes.

Table 7-1: Estimated Annualized Events

Tornadoes	Annualized Events	Annualized Property Damages	Annualized Crop Damages	Annualized Total Damages	Deaths	Injuries
Lancaster	1	\$65,781	\$108	\$136,432	0.0	0.4
Northumberland	1	\$106,726	\$366	\$188,467	0.0	0.4
Richmond	1	\$51,601	\$356	\$117,815	0.0	0.4
Westmoreland	1	\$102,364	\$0	\$184,576	0.0	0.4



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A structure's tornado vulnerability is the same as other extreme wind events, which are based on building construction and standards. Other factors, such as location, condition, and maintenance of trees, also play a significant role in determining vulnerability. A tornado will cause severe damage or destruction to any structure in its path. Clusters of mobile homes are more vulnerable to tornadoes. Proper anchoring can reduce damage exposure, but not entirely, as these structures are extremely vulnerable to damage from downed trees and a tornado's effect on the structure of the manufactured home itself.

Human vulnerability is based on the availability, reception, and understanding of early warnings of tornadoes, such as warnings issued by the NWS and access to safe, substantial indoor shelters. Once warned of an impending tornado hazard, seeking shelter indoors on the lowest floor of a substantial building away from windows is recommended as the best protection. All populations and communities are at risk for tornado damages as there is little to no warning generally, structures in the region are generally not built with basements to move to, and the elevated number of aging populations will have difficulty moving themselves to a protected area. Agriculture and aquaculture facilities are at a particularly high risk for harvest and equipment loss.

Electrical utilities and communications infrastructure are also vulnerable to tornadoes. For example, damage to power lines or communication towers can cause power and communication outages for residents, businesses, and critical facilities. In addition to lost revenues, downed power lines threaten personal safety. Further, downed wires and lightning strikes have been known to spark fires.

Table 7-2: CPRI Tornado Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.35	0.9	0.9	0.1	3.25	Significant

7.3.1.2 Effects of Climate Change and Tornadoes

As demonstrated in the historical data presented, the occurrence of tornadoes in the Northern Neck communities has increased significantly over the last 20 years. Tornadoes are most often spawned by severe thunderstorms and considering the frequency of severe thunderstorms and coastal systems, the risk of additional tornados is considered significant. According to the Center for Climate and Energy Solutions, conditions that produce the most severe thunderstorms from which tornadoes may form are more likely as the world warms. Climate change may also cause a shift in the seasonality of severe thunderstorms and the regions that are most likely to be hit. The jurisdictions of the Northern Neck Region recognize the increasing risk and the need for education and awareness in the communities.

7.3.2 Severe Weather Risks in the Northern Neck Region

Severe weather includes thunderstorms, severe wind, lightning, and hail events outside of tropical storm systems.

The chance of future occurrences of high wind, hail, and lightning in the Northern Neck Region is high: and an average of seven events per year is expected based on data collected from the NCEI and NRI reports. In addition, hail may be expected once every 1-2 years on average and strong winds may be expected as frequently as all severe weather events, including thunderstorms, winter storms, and coastal storm events.



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7.3.2.1 Vulnerabilities

Table 7-3 shows the annualized damages for severe weather events in the Northern Neck Region. The NCEI Storm Events data were annualized by dividing the number of severe weather events by the record length. The annualized values should only be used to estimate what can be expected each year. An individual county can expect to experience between one to two severe weather events annually using historical records. Therefore, the NNPDC can expect to see between five and six events annually. Annual total damages from these events for each county were estimated to be between \$89,000 and \$140,000. However, it is possible that actual annual damages in some counties could be higher due to unreported damages. There is a single reported injury though it should be considered that not all injuries would be reported. No casualties have been reported per the data utilized.

Communities in the Northern Neck Region have seen a steep increase in the severity of thunderstorms and severe weather that is not directly related to hurricanes or tropical systems. These storms are a very high concern for planning and response personnel as the best protection for these storms is community education and mitigation actions such as stormwater drainage and erosion prevention. Properties and citizens who live along the coast are open to high winds and flooding, and properties with debris and trees risk injury from projectiles. Access and functional needs populations will be at a higher risk during these events as they may lose power for medical devices or be unable to call for help or escape on their own from a dangerous situation.

Table 7-3: Estimated Annualized Loss in the Northern Neck Region

Severe Weather	Annualized Events	Annualized Property Damages	Annualized Agriculture Value	Annualized Total Damage	Deaths	Injuries
Lancaster	7	\$53,083	\$3,013	\$89,529	0	0.11
Northumberland	7	\$71,733	\$11,195	\$139,544	0	0.11
Richmond	7	\$16,738	\$1,717	\$103,046	0	0.11
Westmoreland	7	\$32,030	\$0	\$91,409	0	0.11

The priority hazard ranking process for the 2023 hazard risk assessment determined severe weather events to be a “significant” hazard to the Northern Neck Region’s communities. Severe weather events within the region pose greater risks as the events are often associated with more severe effects, bringing additional hazards such as tornadoes, high levels of rainfall, and pluvial flooding.

Table 7-4: CPRI Severe Weather Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.6	0.3	0.20	2.9	Significant

7.3.2.2 Effects of Climate Change and Severe Weather Events

Many severe weather events have affected the communities of the Northern Neck Region, some have even caused damage that exceeded that of coastal storms. According to the EPA, rising global average temperature is associated with widespread changes in weather patterns. Studies indicate that extreme weather events such as heat waves and large storms are likely to become more frequent or more intense.



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7.3.3 Coastal Flooding Risk in the Northern Neck Region

The extensive coastal areas of the Northern Neck Region are considered equally at risk of experiencing the damaging effects of future coastal flooding events. Inland areas where waves and currents aren't as prominent of a threat, many of those areas still have rivers where coastal tides and water trapping may influence levels during storms. The coastal storms, coastal erosion, sea level rise, and increasing tidal volumes present growing concerns and risks for the communities. Table 7-5 displays the annualized damages for coastal flooding in the Northern Neck Region. The NCEI Storm Events database and the National Risk Index Community Risk Report were utilized for the data in Table 7-5. The NNPDC can expect an average of four coastal flooding events per year.

Damages from these events for each county were between \$107,000 and \$1,959,692. It is important to note that the losses and casualties noted here may be lower than actual as not all may have been reported.

Table 7-5: Expected Annual Loss from Coastal Flooding

Coastal Flooding	Annualized Events	Annualized Property Damages	Annualized Agriculture Value	Annualized Total Damage	Deaths	Injuries
Lancaster	4.4	\$1,542,957	\$0	\$1,548,667	0	0
Northumberland	4.4	\$1,959,692	\$0	\$1,965,226	0	0
Richmond	4.4	\$331,574	\$0	\$333,574	0	0
Westmoreland	4.4	\$103,906	\$0	\$107,930	0	0

Comparatively, in the Virginia Coastal Resilience Master Plan the loss statistics are higher as noted below. Datasets vary widely and Table 7-5 is based on the NRI which compares data nationally, where the Virginia CRMP notes recent research and a localized approach to present a specific picture. The annual average loss data for each locality is noted below:

- Lancaster: \$2 million at year 2020
- Northumberland: \$10.5 million at year 2020
- Richmond: \$2 million at year 2020
- Westmoreland: \$5 million at 2020

7.3.3.1 Vulnerabilities

The low-lying coastal areas of the Northern Neck Region are most vulnerable to the damaging effects of storm surges due to nor'easters and Hurricanes and above-average tidal flooding. Non-elevated structures built before the 1980s, when National Flood Insurance Program (NFIP) building standards were adopted, are especially vulnerable to damage. Storm surge has the potential to cause damage to foundations of structures, damage contents, cut off utilities such as power, damage infrastructures such as bridges and roads, and cause extensive beach erosion. Coastal erosion will be addressed as a separate hazard in Section 7.3.8. Many of the same vulnerabilities and impacts to people and property described in the riverine flooding section also apply to coastal flooding.

The priority hazard ranking process for the 2023 hazard risk assessment identified that coastal flooding remains a significant threat to the Northern Neck Region. Coastal flood events within the region are increasing in frequency; from 1998 to 2010, four events were recorded (33%), whereas from 2011 to June



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30, 2022, nine events were recorded (78%). Coastal storm events have a high range of impacts with the potential for millions of dollars in damages to property and a significant risk of casualties. Table 7-6 outlines the hazard ranking for each of the hazard priority criteria related to coastal flooding.

Flooding most often damages property and land mass. Flash flooding presents a high risk to life especially when waters are rising quickly. Generally coastal residents are advised to evacuate when coastal flooding is forecasted. Populations that choose not to evacuate, citizens who are incapable of doing so on their own, and other institutions such as medical or assisted living facilities pose a challenge to emergency management staff. Northumberland, Westmoreland, and Lancaster face the highest risk with the large coastal borders they serve.

Table 7-6: CPRI Coastal Flooding Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.6	0.15	0.3	2.85	Significant

7.3.3.2 Effects of Climate Change and Coastal Flooding

The Impact of Climate Change on Virginia's Coastal Areas states "For Virginians living on the coast, the immediate consequences will be rising sea levels, more intense and frequent storms, and warmer and more variable local temperatures. These primary drivers translate into recurrent flooding, saltwater intrusion into drinking water, inundation of septic systems, and threats to public health, among other issues." This speaks to the risks that coastal communities in the Northern Neck are facing in the future as sea-level rises. Jurisdictions are utilizing multiple sources of guidance and resources to mitigate shoreline erosion. Green spaces, living shorelines, and restrictions to development in the SFHA are at the forefront of mitigation actions.

7.3.4 Riverine Flooding Risk in the Northern Neck Region

The Northern Neck Region is bordered by the Potomac River, the Rappahannock River, and the Chesapeake Bay. The proximity of multiple large rivers to this region puts it at high risk of experiencing riverine flooding. In addition, annual rainfall amounts in the region have increased by 3" since the 2017 update, according to data from the NCEI database. The increased rainfall amount and the frequency of severe storms will continue to increase the risk of riverine flooding in the region.

Riverine and flash floods have the potential to pick up chemicals, sewage, and toxins from roads, factories, and farms; therefore, any property affected by a flood may be contaminated with hazardous materials and present a health and safety risk to residents. Debris from vegetation and structures may also become hazardous after a flood. In addition, floods may threaten water supplies and quality, creating health issues like mold. Damages from stormwater runoff events also include wall damage due to "wicking," mildew damage, damages to building contents, minor foundation damage, damage to water distribution systems, and potable water contamination. Public-related costs include debris clearance; equipment, material, and labor expenses related to emergency response; and building or facility repair or replacement (county parks, utilities, communications, buildings, vehicles, etc.).



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Table 7-7: Expected Annual Loss from Riverine Flooding

Coastal Flooding	Annualized Events	Annualized Property Damages	Annualized Agriculture Value	Annualized Total Damage	Deaths	Injuries
Lancaster	0.3	\$379,069	\$83	\$389,830	0	0
Northumberland	0.3	\$349,149	\$200	\$351,081	0	0
Richmond	0.7	\$40,061	\$1243	\$47,362	0	0
Westmoreland	0.5	\$12,681	\$0	\$30,411	0	0

7.3.4.1 Vulnerabilities

Development, or the presence of people and property in hazardous areas, is critical in determining vulnerability to flooding. In addition, riverine flooding often occurs as a flash flood with little warning and evacuation time, increasing the chance of casualties. Additional factors that contribute to flood vulnerability range from specific characteristics of the floodplain to characteristics of the structures located within the floodplain and are further explained in the FEMA Flood Zones section below.

The priority hazard ranking process for the 2023 hazard risk assessment determined riverine flooding as a “significant” hazard in the Northern Neck Region. Flood events in the region vary with the type of event. For example, riverine flooding can occur with severe weather, such as thunderstorms with high rainfall amounts in short periods with little to no warning, and a coastal storm that can cause water trapping. The unpredictability of flooding mandates vigilance in mitigation activities.

Table 7-8: CPRI Riverine Flooding Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.6	0.15	0.20	2.75	Significant

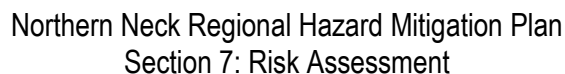
7.3.4.2 Effects of Climate Change and Riverine Flooding

Climate change may cause river floods to occur more often and be more significant than they used to be. The EPA notes that “as warmer temperatures cause more water to evaporate from the land and oceans, changes in the size and frequency of heavy precipitation events may in turn affect the size and frequency of river flooding.” River flooding can cause significant losses in some communities in the Northern Neck and the communities continue to mitigate against the risks.

7.3.5 FEMA Flood Zones in the Northern Neck Region

Additional factors that contribute to flood vulnerability range from specific characteristics of the floodplain to characteristics of the structures located within the floodplain. Those factors include:

- *Flood depth:* The greater the depth of flooding, the higher the potential for significant damages.
- *Flood duration:* The longer duration of time that floodwaters are in contact with building components the greater the potential for damage. Floodwaters may linger because of the low relief of the area, but the degree varies.



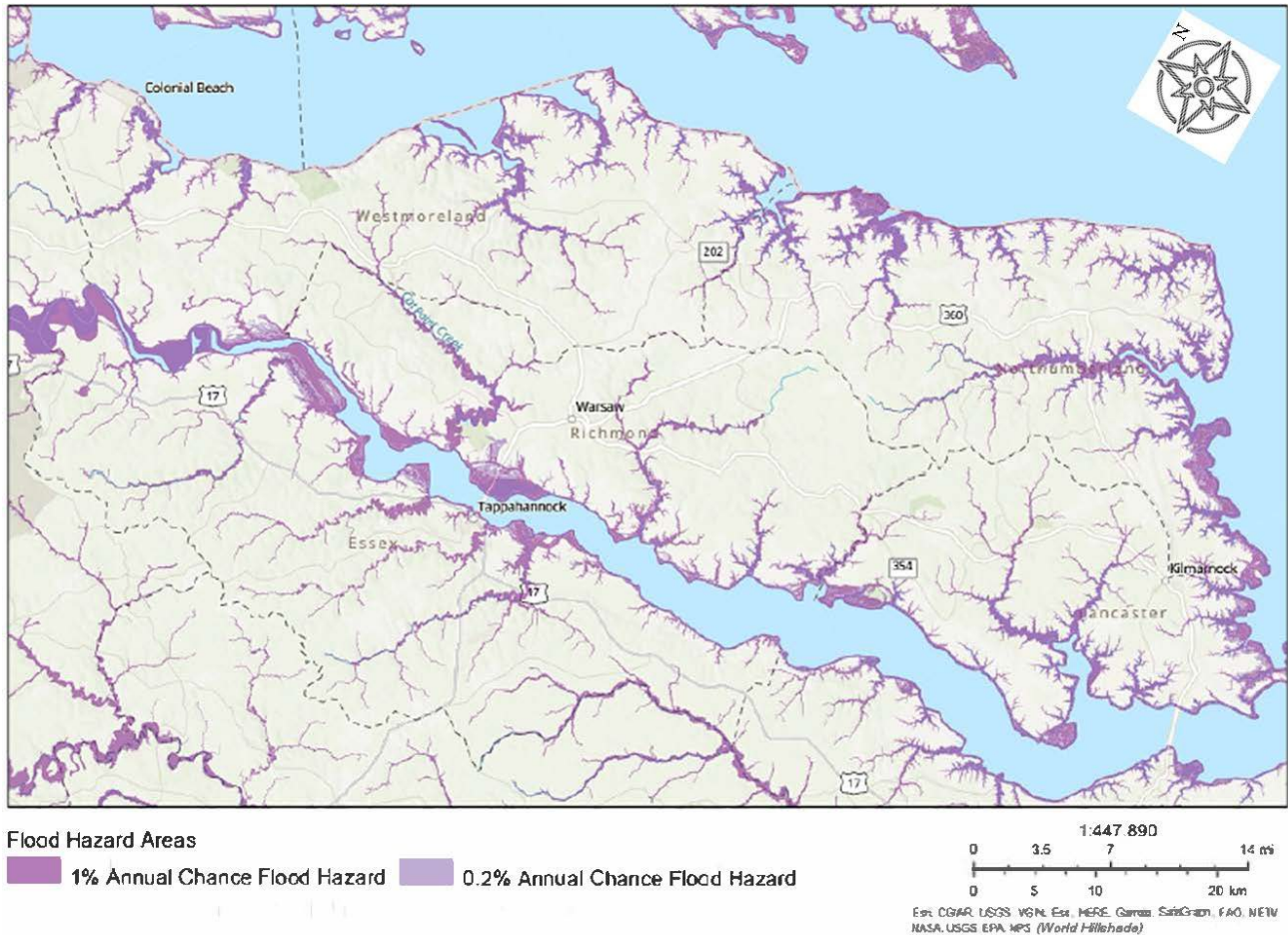
- ### Figure 7-3 Lancaster County Flood Map





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Figure 7-7 Flood Zones in the Northern Neck Region



Source: USGS ArcGIS Flood Hazard Areas Layer

FEMA's HAZUS Tool and FEMA ArcGIS layers were utilized to assist in flood modeling and data collection. The flood data was run at Level 1. A Level 1 analysis run based primarily on data within the HAZUS software, such as census reports, regional building footprints, and property value calculations. Figures 7-3: Flood Zones in the Northern Neck Region, 7-4: 100-year and 500-year Flood Risk in the Northern Neck Region and Table 7-8: Threat Exposure in the Flood Zone for the Northern Neck Region in this section will demonstrate the flood zone's estimated losses and total exposure.

Flood hazard areas identified on a Flood Insurance Rate Map (FIRM) are identified as a Special Flood Hazard Area (SFHA). SFHAs are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood, and the 0.2-percent-annual-chance is referred to as a 500-year flood.



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Figure 7-8: 100-year and 500-year Flood Risk in the Northern Neck Region

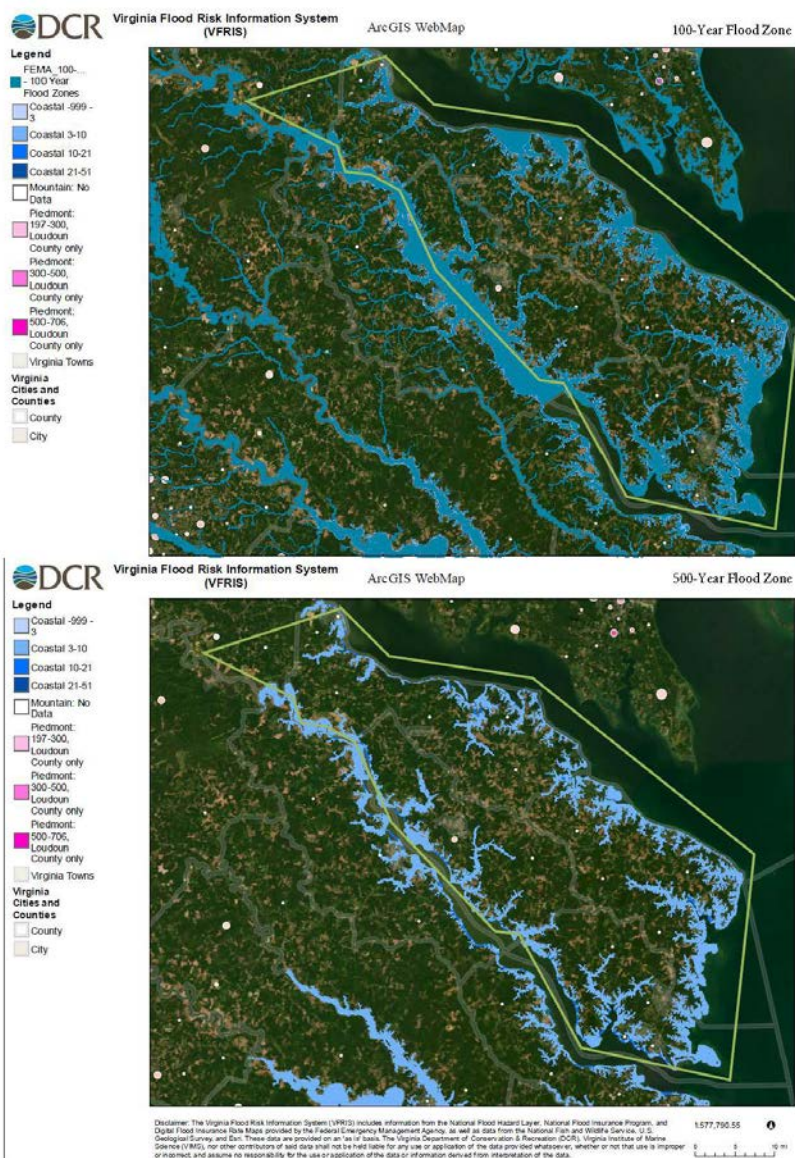


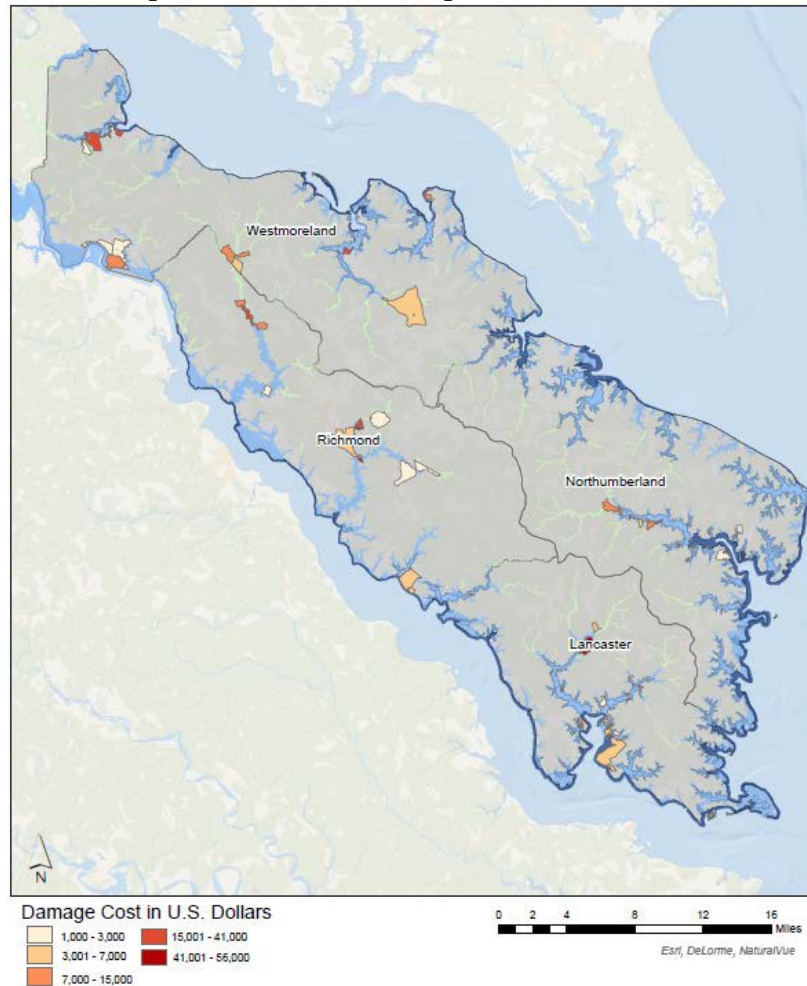
Table 7-9: Threat Exposure in the Flood Zone for the Northern Neck Region

County	Jurisdictions	100 Year Exposure	500 Year Exposure
Lancaster	County Total	\$131,000,000	\$176,000,000
Northumberland	County Total	\$98,800,000	\$113,000,000
Richmond	County Total	\$16,000,000	\$21,000,000
Westmoreland	County Total	\$101,000,000	\$115,000,000
Total	Northern Neck Region	\$346,800,000	\$425,000,000



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Figure 7-9: Estimated Damage Cost in Flood Zones



Source: HAZUS

7.3.6 FEMA National Flood Insurance Program Participation

The National Flood Insurance Program (NFIP) is a federal program that enables property owners in participating communities to purchase insurance for flood losses. For a community to participate in the NFIP, they must adopt FEMA's flood risk maps, the flood Insurance Study, and floodplain management regulations that reduce future flood damages.

Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damages to buildings and their contents caused by floods. Nationally, flood damage is reduced by nearly \$1 billion annually through community implementation of sound floodplain management requirements and property owners purchasing flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80% less damage annually than those which predate floodplain management regulations or are not built within compliance.

In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the nation's floodplains. Mapping flood hazards creates broad-



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based awareness of these hazards and provides the data needed for floodplain management programs and to actuarially rate new construction for flood insurance.

Floodplain management regulations are the cornerstone of NFIP participation. Communities participating in the NFIP must adopt and enforce floodplain management regulations. These regulations apply to all types of floodplain development and ensure that development activities will not cause an increase in future flood damage. Buildings are required to be elevated at or above the Base Flood Elevation, which is the predicted level of the one-percent flood.

Communities participating in the NFIP must adopt and enforce the minimum federal NFIP floodplain management regulations. These regulations apply to all types of floodplain development and ensure that development activities will not cause an increase in future flood damage. Buildings are required to be reasonably safe from flooding, which usually requires the finished floor elevation at or above the site's Base Flood Elevation (BFE). The BFE is determined based on modeling and mapping detailed in the community's Flood Insurance Study (FIS).

The FIS and its corresponding Flood Insurance Rate Maps (FIRMs) provide information on flood risk areas per NFIP standards. FIRMs identify areas with a one-percent annual chance of flooding and those with a 0.2%-annual chance of flooding. When new structures are built or existing structures are improved at more than 50 percent of their market value, they must adhere to floodplain management regulations. If the structure is financed through a federally insured loan, there is a mandatory flood insurance purchase requirement. Many mortgage lenders in high-hazard areas now require flood insurance even for structures outside the regulated floodplain. Ensuring high-risk structures are one method the NFIP uses to offset the escalating costs of flood disasters.

The Towns of Irvington, Kilmarnock, White Stone, and Colonial Beach, as well as the unincorporated parts of Lancaster, Northumberland, Richmond, and Westmoreland Counties, participate in the NFIP but do not participate in the Community Rating System. In addition, the Town of Montross in Westmoreland County and the Town of Warsaw in Richmond County do not participate in the NFIP. NFIP participation and each county and town's current effective map dates are listed in Table 7-10. The Reg-Emer Date is the date the community first joined the NFIP. All jurisdictions listed below participate in the "Regular" Program.

Table 7-10: Northern Neck Regional Jurisdictions NFIP Participation Dates

County	Jurisdiction	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Reg-Emer Date
Lancaster	Irvington, Town of	10/18/1974	08/04/1987	07/06/2022	08/04/1987
	Kilmarnock, Town of	N/A	09/17/2010	07/05/2022	09/17/2010
	Unincorporated County	01/24/1975	03/04/1988	07/05/2022	03/04/1988
	White Stone, Town of	08/30/1974	09/24/1984	11/17/2020	09/24/1984
Northumberland	Unincorporated County	12/13/1974	07/04/1987	12/30/2021	07/04/1989
Richmond	Unincorporated County	04/11/1975	03/16/1989	07/26/2022	03/16/1989
Westmoreland	Colonial Beach, Town of	08/09/1974	09/18/1974	05/17/2022	09/18/1987
	Unincorporated County	07/18/1975	09/18/1987	05/17/2022	09/18/1987

Source: FEMA. NFIP – Data & Analytics: <https://nfipservices.floodsmart.gov/reports-flood-insurance-data>



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Table 7-11 shows the total policies in force in the Northern Neck Region, 1,942 policies, and their associated insurance value and premiums. Table 7-12 summarizes the NFIP policy and claim statistics for the counties and towns within the Northern Neck Region Planning District Commission.

Reported losses include all flooding events. It should be emphasized that these numbers include only those losses to structures insured through the NFIP and losses in which claims were sought and received, except for those labeled as Closed Without Payment (CWOP). It is likely that there are additional instances of flood losses in the counties and towns that were uninsured, denied claims payment, or not reported.

Table 7-11: NFIP Policies in Force in the Northern Neck Region

County	Jurisdiction	Policies In-Force	Insurance In-Force Whole \$	Written Premium In-Force
Lancaster	Irvington, Town of	6	\$1,762,600	\$7,746
	Kilmarnock, Town of	1	\$350,000	\$519
	Unincorporated County	521	\$151,332,500	\$406,797
	White Stone, Town of	2	\$700,000	\$1,101
Northumberland	Unincorporated County	638	\$199,970,000	\$463,266
Richmond	Unincorporated County	64	\$278,714	\$62,721
Westmoreland	Colonial Beach, Town of	191	\$52,827,400	\$137,484
	Unincorporated County	256	\$80,438,000	\$258,536
Total	Northern Neck Region	1679	\$487,659,214	\$1,338,260

Table 7-12: Repetitive and Severe Repetitive Loss Properties in the Northern Neck Region

Jurisdiction	RLP	RLP NFIP Insured	RLP Not NFIP Insured	RLP SDF	Severe RLP	SRLP NFIP Insured	SRLP Not NFIP Insured	SRLP SDF	Residential	Commercial	Institutional	Unknown Use
Lancaster	68	27	40	1	3	0	2	1	64	0	0	7
Northumberland	72	31	34	7	9	2	1	6	79	1	0	1
Richmond	10	7	3	0	1	1	0	0	10	0	0	0
Westmoreland	40	19	21	0	2	2	0	0	36	0	0	7
Northern Neck Region	190	84	98	8	15	5	3	7	189	1	0	15



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Table 7-13: NFIP Claims as of September 2022

County	Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
Lancaster	Irvington, Town of	14	12	0	2	\$268,192
	Kilmarnock, Town of	1	1	0	0	\$12,259
	Unincorporated County	367	287	1	79	\$5,462,158
	White Stone, Town of	11	5	0	6	\$63,849
Northumberland	Unincorporated County	381	279	0	102	\$6,788,171
Richmond	Unincorporated County	53	50	0	3	\$1,274,479
Westmoreland	Colonial Beach, Town of	87	73	0	14	\$3,622,592
	Unincorporated County	140	97	0	43	\$2,817,324
Total	Northern Neck Region	1,054	804	1	249	\$20,309,024

Source: FEMA NFIP Provided by FEMA September 202227.3.6.1 FEMA Repetitive Loss and Severe Repetitive Loss Properties

The NFIP defines Repetitive Loss as two or more claims of at least \$1000 over a ten-year rolling period. This is the data that appears in this plan. The Hazard Mitigation Assistance program defines Repetitive Loss as having incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and, at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

Identifying RL and SRL properties is an important element in conducting a local flood risk assessment. The inherent characteristics of properties with multiple flood losses strongly suggest that they are at a high risk of future flood losses. RL and SRL properties are also important to the NFIP since structures that flood frequently put a strain on NFIP funds. A primary goal of FEMA is to reduce the number of structures that meet these criteria, whether through elevation, acquisition, relocation, or a flood control project that lessens the potential for future losses. Since FEMA's database tracks RL and SRL properties on a rolling ten-year basis, the number of properties fluctuates based on flooding events.

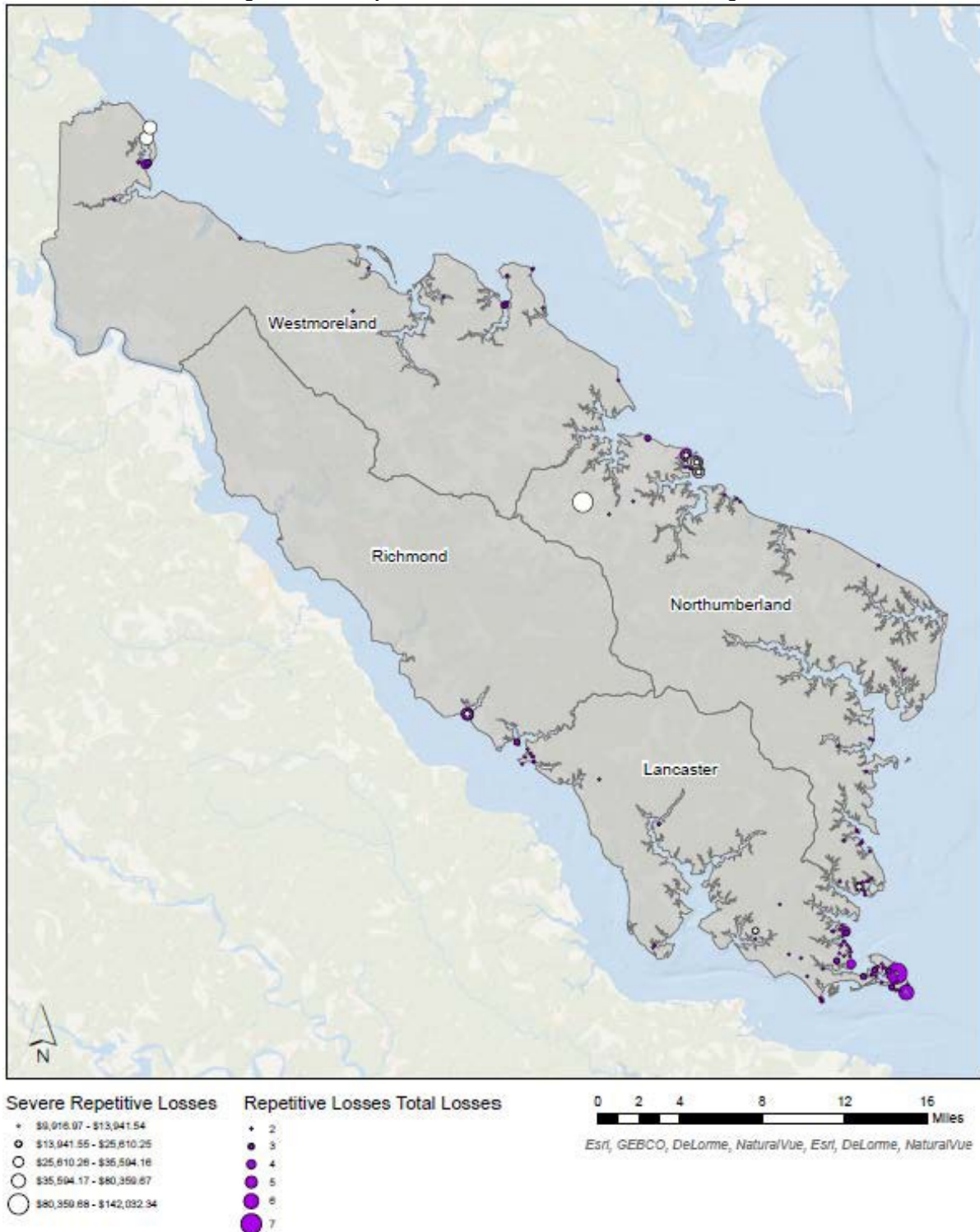
Using the redacted data provided by FEMA, the Northern Neck Region has 190 (one hundred and ninety) repetitive loss properties and 15 severe repetitive loss properties. The current RL and SRL list may not represent all properties that have been previously affected or could be affected by future flooding.

Figure 7-6 below shows the general location of RL and SRL properties within the Northern Neck Region.



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Figure 7-10: Repetitive Loss in the Northern Neck Region



Source: HAZUS, ArcGIS, and FEMA Repetitive Loss Report



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7.3.6.1 Floodplain Management

Statutes of the Commonwealth of Virginia provide cities and counties with land use authority. Floodwater control is empowered through §15.2-2223 and §15.2-2280 of the Code of the Commonwealth of Virginia. Each Northern Neck Regional jurisdiction with land use authority has adopted a local floodplain ordinance as a requirement of participation in the NFIP.

7.3.7 Wildfire Risk

Wildfires can have disastrous consequences causing damage to residences, commercial buildings, timber, agricultural areas, and natural resources. Economic consequences include the cost of suppression, reduced property values, lost sales and business revenues, reduced tourism, and increased water treatment costs. Resources threatened include communities, homes, gas transmission lines, electrical facilities and lines, timber, watershed and recreation areas, and wildlife. In addition, wildfires may create additional environmental concerns after they are extinguished, such as increased erosion and water quality concerns in stormwater runoff.

Timber loss and environmental damage frequently result from wildfires. Wildfire poses a significant threat to nearby buildings and populations. Forest damage from thunderstorms may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities, thereby creating heavy fire load and making suppression and response more difficult. While the risk is apparent with many second homes located in wooded areas, wildfire size remains small even with limited volunteer fire departments. The lack of drought during the past two decades has greatly helped reduce wildfire occurrence and limit size that would exceed local resources. Table 7-13 presents loss data provided by the National Risk Assessment (NRI) tool.

Table 7-14: Estimated Annualized Loss from Wildfires

Wildfires	Chance of yearly Occurrence per NRI	Expected Annual Property Loss Values	Expected Annual Total Loss Values	Estimated Injuries	Estimated Deaths
Lancaster	0.03%	\$1,901	\$2,030	0	0
Northumberland	0.03%	\$15,601	\$16,456	0	0
Richmond	0.03%	\$926	\$1,036	0	0
Westmoreland	0.03%	\$4,707	\$4,760	0	0

7.3.7.1 Vulnerabilities

The Northern Neck Region has a significant means of fuel and conditions that could feed wildfires. In addition, the area is limited by low numbers of first responders, distance, and water access, all of which contribute to the possibility of wildfires growing and decreasing the chances of controlling the fire quickly. In the summer seasons, precipitation is often scarce, and coastal vegetation, farmland, debris, and woodland are dry with decreases in the water supply that depend on rainwater to replenish the reservoirs. Both the coastal areas with vegetation and open farm/wooded areas in all jurisdictions in the region are at risk for wildfires. This risk is increased during a drought and places all populations and wildlife at risk. That risk of injury or death is increased for civilians with limited mobility.

The probability of wildfires in the future is relatively unpredictable; still, if information is studied, such as that provided by the National Park Service publication *"Wildfire Causes and Evaluations" March 8, 2022*, then it



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can be assessed that through the increase in human carelessness, the increase in severe weather events (high winds and lightning), and in some cases poorly maintained or hard to maintain areas of high debris. Agencies such as the Virginia Department of Forestry, DEQ, and the National Weather Service gather statistics, monitor conditions, and issue watches, warnings, and burn bans.

The priority hazard ranking process for the 2023 hazard risk assessment determined wildfires to be a “moderate” hazard in the Northern Neck Region. Data utilized for the ranking included Virginia Department of Forestry records and the NRI. The risks to the community in the event of a large fire incident are significant. The occurrence of a large-scale event is infrequent. Therefore, the frequency of wildfires reported to the VDOF encourages mitigation actions based on numbers. It is to be considered that most of the events reported in this plan are small events that did not exceed 10 acres nor exceed the local resources.

Wildfire ranks moderate for having a warning time of fewer than 24 hours before an event. Table 7-14 outlines the hazard rankings related to wildfires.

Table 7-15: CPRI Wildfire Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.3	0.6	0.1	2.8	Moderate

7.3.7.1 Effects of Climate Change and Wildfires

Wildfire events of significant size are infrequent in the Northern Neck Region however, the risk is elevated as noted in the CPRI scoring. The risks of wildfires to the Northern Neck Region lies in the amount of potential fuel and limited resources. According to NOAA’ Wildfire Climate Connection “Research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons. Increases in temperatures and the thirst of the atmosphere due to human--caused climate change to have increased aridity of forest fuels during the fire season.”

7.3.8 Winter Storm Risks in the Northern Neck Region

Based on the NCEI historical records of winter storm activity in the Northern Neck Region, it is estimated that the region will experience two significant winter weather events per year. This includes blizzards, heavy snow, ice storms, and winter storms. While this data includes weaknesses discussed previously, it is reasonable to conclude that severe winter weather events will likely continue to occur regularly in the region and should be properly mitigated.

Table 7-15 illustrates the annualized damages for winter storm events in the Northern Neck Region. Data from the NCEI database and NRI community reports were utilized to create an annualized estimate of the risks associated with winter weather events in the Northern Neck Region. There are no reported injuries or deaths reported in the NCEI database. It must be considered that in winter storms, there are motor vehicle accidents that occur when citizens attempt to travel on unsafe roads, and these injuries and property damages may not be reported as part of the event losses and casualties.



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Table 7-16: Estimated Annual Loss Values from Winter Storm Events

Winter Storms	Annualized Events	Annualized Property Damages	Annualized Crop Damages	Annualized Total Damages	Deaths	Injuries
Lancaster	2	\$312	\$1	\$2030	0	0
Northumberland	2	\$327	\$3	\$5,386	0	0
Richmond	2	\$188	\$3	\$4,247	0	0
Westmoreland	2	\$542	\$0	\$11,982	0	0

7.3.8.1 Vulnerabilities

All critical facilities in the Northern Neck Region are considered vulnerable to the effects of severe winter storms due to the potential disruption of services and transportation systems and possible structural failure due to heavy snow loads. The level of vulnerability of a building depends on the age of the building (and the building codes in effect at the time of construction), construction type, and the structure's condition. In addition, FEMA Risk Management has published a Snow Load Safety Guide¹. The guide states:

Most buildings are not at risk of snow-induced failure. Attempting to remove snow from a roof is more hazardous than beneficial, posing a risk to both personnel and the roofing structure. However, more than building design conditions, snow accumulation can result in more than a temporary loss of electrical power and inaccessible roads. Buildings may be vulnerable to structural failure and possible collapse if basic preventative steps are not taken in advance of a snow event. Knowledge of the building roof framing system and proper preparation before a snow event is instrumental in reducing risk to the structure.

According to the FEMA Snow Load Safety Guide, it is certain that certain roof types and materials are more susceptible to snow-induced collapse. Buildings vulnerable to increased snow accumulation and unbalanced loads include:

- Gable/multi-span gable roof
- Mono-slope roof
- Flat or low-slope roof with or without roof drains
- Stepped roof
- Saw-tooth roof

Even small ice accumulations can cause a significant hazard, especially on power lines and trees. An ice storm occurs when freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small ice accumulations may cause extreme hazards to motorists and pedestrians. Extended power outages from ice storms would require residents to look for supplemental heat sources; improper use of these sources could result in house fires. Injuries could result from slipping on ice if residents, especially the elderly, were to leave their homes.

The priority hazard ranking process for the 2023 hazard risk assessment determined winter storms to be a “moderate” hazard in Northern Neck Region. Winter storm-related events within the region are likely, with two significant events expected annually. Winter storms in the Northern Neck Region cause more

¹ FEMA Risk Management Series: Snow Load Safety Guide. FEMA P-957 January 2013.
https://www.fema.gov/sites/default/files/documents/fema957_snowload_guide.pdf



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problems with impacts on transportation networks and power outages. This leads to school, government, and business closings.

Table 7-17: CPRI Winter Storm Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.6	0.15	0.20	2.75	Moderate

7.3.8.1 Effects of Climate Change and Winter Storms

It appears as a contradiction that warming temperatures contributing to so many hazard events may also contribute to severe winter weather. However, a warmer planet is evaporating more water into the atmosphere. That additional moisture means increasing precipitation in the form of heavy snowfall if the temperatures are favorable. Winter storms do not frequently affect the region however, during significant events there are considerable factors that jurisdictions address in mitigation action planning. For example, a tropical storm occurring in August presents flooding and wind potential, however, a similar storm in January when temperatures fall below freezing adds additional risks such as citizens without heating sources and hazardous roadways.

7.3.9 Hurricane/Tropical Storm Risks in the Northern Neck Region

Hurricanes and tropical storms are events that can greatly impact large areas. Based on the NCEI historical records of hurricane activity in the Northern Neck Region, it is estimated that the area will experience one hurricane or tropical storm every three years. Virginia's hurricane season is June 1 through November 30, but the most intensive hurricanes usually occur during August and September.

Table 7-16 shows the annualized damages for hurricanes/tropical storms in the Northern Neck Region. The NCEI Storm Events data were annualized by dividing the total number of hurricane events by the length of the record. The annualized values should only be used to estimate what can be expected annually. Using historical records, individual counties can expect to experience one hurricane or tropical storm every three years. The region can expect to experience hurricanes and tropical storms at a similar frequency. Table 7-17 notes the expected annualized loss values from hurricanes and tropical storms with data provided by the NCEI database and NRI reports.

7-18: Expected Annualized Loss Values from Hurricanes/Tropical Storms

Hurricane/ Tropical Storm	Annualized Events	Annualized Property Damages	Annualized Agriculture Value	Annualized Total Damages	Deaths	Injuries
Lancaster	0.3	\$275,695	\$33,527	\$323,758	0	0
Northumberland	0.3	\$297,265	\$135,223	\$448,002	0	0
Richmond	0.3	\$12,825	\$69,144	\$93,864	0	0
Westmoreland	0.3	\$39,033	\$35,849	\$74,882	0	0



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7.3.9.1 Vulnerabilities

Historically hurricanes have affected the Northern Neck region the worst in flood zones. However, in recent years hurricanes have brought tornadoes and severe wind damages that are of increasing severity. All populations in all jurisdictions of the region are at risk. Specialized attention is focused on citizens with access and functional needs, mobility issues, and institutional facilities. Coastal flood zones are frequently ordered to evacuate to reduce loss of life. Lancaster and Northumberland have more coastal property and therefore face immediate effects the worst however, Westmoreland has a unique situation of the Nomini Cliffs where they have the concern of precipitation contributing to landslides. All jurisdictions have to face the effects of these storms considering the size of region and the unique location in the Chesapeake Bay.

The priority hazard ranking process for the 2023 hazard risk assessment ranked hurricane/tropical storms as a significant hazard risk. Hurricane events within the region are somewhat likely with less than one event annually. Secondary effects from influenced fronts or remnants pose an increasing risk. Tropical cyclone events have a “high” range of impacts in annualized property damages, and the potential exposure for hurricane events is “high” with more than \$1 million in potential damages. Hurricane is ranked low for having a warning time of at least two days before an event. Table 7-18 outlines the hazard ranking for each of the hazard priority criteria related to hurricane events.

Table 7-19: CPRI Hurricane/Tropical Storm Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.35	0.9	0.15	0.10	2.5	Moderate

7.3.9.1 Effects of Climate Change and Hurricane/Tropical Storms

In June of 2022 NOAA released A Force of Nature: Hurricanes in a Changing Climate in brief stating, “Due to global warming, global climate models predict hurricanes will likely cause more intense rainfall and have an increased coastal flood risk due to higher storm surge caused by rising seas. Additionally, the global frequency of storms may decrease or remain unchanged, but hurricanes that form are more likely to become intense. The incidence systems that impact the region at hurricane strength are minimal. Mitigation actions and planning remain at the forefront due to the risk factors and coastal location of the communities.

7.3.10 Coastal Erosion Risks in the Northern Neck Region

Some of the assets most vulnerable to coastal erosion in the Northern Neck Region are infrastructures such as bridges and roads, personal property, public and private beaches, and the natural habitats of shorebirds and other wildlife. Severe storms such as hurricanes and nor’easters that impact the Northern Neck Region can exacerbate the coastal erosion due to the higher wave action and storm surge. Severe storms can reduce the size of beaches and destroy substantial dunes in a single event.

Shoreline protection installations, such as bulkheads and seawalls, can positively and negatively affect the surrounding area. For example, eroding sediment banks that once provided sand for beaches, spits, and offshore bars no longer have a supply of natural sand input. In addition, these now-protected shoreline segments will remain as hard points or headland features while adjacent unprotected properties will continue to erode, sometimes at an accelerated rate.



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By the year 2040, it is estimated the 492 buildings in the Northern Neck Regional communities will be lost to coastal erosion and sea level rise, according to the report “Future Sea Level and Recurrent Flooding Risk for Coastal Virginia” published in 2021 by the Commonwealth Center for Coastal Recurrent Flooding Resiliency. Table 7-19 demonstrates the effects that coastal erosion and rising sea levels may have on the Northern Neck Region in the future.

Table 7-20: The Potential Effects of Coastal Erosion on Assets in the Northern Neck Region

Asset	2040	2060	2080
Buildings	492	846	1425
Miles of roadway	6	24	45
Land area in square miles	22	29	37
Number of parcels	10,322	11,052	11,887

Source: “Future Sea Level and Recurrent Flooding Risk for Coastal Virginia” 2021 CCRFR

7.3.10.1 Vulnerabilities

The priority hazard ranking process for the 2023 hazard risk assessment determined coastal erosion to be a moderate hazard in the Northern Neck Region. Coastal erosion events can have a wide range of impacts; however, no recorded property damages were available to quantify that prior impact. Coastal erosion is a top priority in all 4 counties, and all are seeking means to reinforce coastal and waterway banks with means such as living shorelines. Erosion is a risk primarily to land but ultimately to population as the land disappears it decreases size and destabilizes the area. The more erosion that occurs the higher the flood risk will become. Damages have been ranked “significant” because damages are reported as caused by hurricanes, tropical cyclones, nor’easters, and other severe weather events. Table 7-20 outlines the hazard rankings for each hazard priority criterion related to coastal erosion. With ongoing climate change, sea level rise, and coastal erosion research, it is highly likely that the coastal erosion ranking will grow to ‘significant’ in the following plan update hazard risk assessment.

Table 7-21: CPRI Coastal Erosion Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.8	0.3	0.15	0.1	2.35	Moderate

7.3.10.1 Effects of Climate Change and Coastal Erosion

Coastal Erosion concerns are present in some portion of every County in the Northern Neck Region. Westmoreland has cliffs that are prone to collapse, and beaches and wetlands are frequently suffering damage and loss from storms that cause significant erosion events, such as Hurricane Sandy in 2012. NOAA’s Climate Resilience Toolkit for Coastal Erosion teaches “as global sea level rises, the action of waves at higher elevations increases the likelihood for extensive coastal erosion.” Communities in the region are working to integrate better ordinances, limit development in the SFHA, create more green spaces, and increase shoreline protection measures such as living shorelines and water runoff diversion techniques.



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7.3.11 Pluvial Flooding Risks in the Northern Neck Region

Development, climate change, and aging stormwater infrastructure increase flash floods and surface water runoff risks. Surface flooding can lead to catastrophic damage. The unique landscape and location of the Northern Neck Regional communities creates an increased risk to the entirety of the region. Data contained in this plan show increasing severe weather events, rainfall, and flash flooding throughout the region, resulting in an increased risk of casualties, property damage, and assets.

Pluvial flooding is only recently being tracked as a separate damage classification and therefore there is little data to show monetary damage estimates or casualties. Multiple instances demonstrated in Section 6 provide evidence of the hazards of pluvial flooding to the Northern Neck Region.

The risk for occurrence is one event every two years. Although this is most likely higher with all events not being reported and the increasing number/severity of severe weather hazards.

7.3.11.1 Vulnerabilities

Pluvial flooding is a newly assessed hazard to the 2023 HMP. Events of this nature are more recently being brought to the forefront and noted for the damages caused. The priority concern across all jurisdictions participating are areas of poor stormwater drainage. The proximity to the coast with poor drainage and a storm that may drop an unexpected amount of precipitation in a short amount of time, may leave towns such as Colonial Beach and Kilmarnock with too much water and nowhere for it to go. This can result in flash flooding invading homes, roadways, and businesses. It can also cause dams to overtop and/or fail.

Table 7-22: CPRI Pluvial Flooding Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
1.35	0.3	0.15	0.2	2.0	Moderate

7.3.12 Landslide Risks in the Northern Neck Region

Landslides are not a common event in the region. There has been one landslide event recorded in the NCEI, and the NRI does not record any since 1996. There is concern among some working group members and localities that portions of inland river areas contain risk for landslide events, and the Nomini cliffs near Westmoreland State Park have a history of and future risks for collapse secondary to coastal erosion and storm damage. The NRI notes landslide as a “Relatively Moderate or Low” risk with an Index Score of 19.64 in Lancaster, 15.92 in Northumberland, 17.78 in Richmond, and 15.74 in Westmoreland.

Table 7-23: Estimated Annualized Loss from Landslide in the Northern Neck Region

Landslide	Chance of yearly Occurrence per NRI	Expected Annual Property Loss Values	Expected Annual Total Loss Values	Estimated Injuries	Estimated Deaths
Lancaster	0	\$1,104	\$32,334	0	0
Northumberland	0	\$1,175	\$40,084	0	0
Richmond	0	\$1,826	\$48,868	0	0
Westmoreland	1	\$1,112	\$33,899	0	0



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7.3.12.1 Vulnerabilities

Landslide risk in the Northern Neck is relatively low in most jurisdictions. It is a concern in areas with slopes in the higher elevation areas of Westmoreland. Specifically, the areas in the State Park surrounding Nomini Cliffs where a collapse has occurred before. Although the HMWG does not see landslide as a significant risk for the majority of the region, it was felt that with the history and the NRI Index Scores that it should be placed in the hazard assessment for mitigation considerations.

Table 7-24: CPRI Landslide Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
0.9	0.3	0.6	0.1	1.9	Low

7.3.12.1 Effects of Climate Change and Landslides

Landslides are uncommon in the Northern Neck Region. However, the geography presents potential for events. Climate change data provided by NOAA shows that rainfall amounts are expected to increase in frequency and intensity. Concerns within these events include increased sediment movement in waterways and increasing erosion. All the factors contribute to the concern for landslide potential in the Northern Neck Region and the first step in the process of awareness and mitigation planning for landslides is to recognize the hazard in the Northern Neck Regional HMP 2022 update.

7.3.13 Drought Risks in the Northern Neck Region

Table 7-24 shows the annualized damages for drought events in the Northern Neck Region. Data for the droughts in the Northern Neck Region was drawn from multiple sources, including the NCEI, NRI Tool, USDA National Agricultural Statistics Service, and FEMA ArcGIS Mapping tool US Drought Intensity Layer. The events noted in Section 6 are major events with declaration-level damages and often occur over a prolonged period. The region often is affected by shorter droughts, periods of extreme heat, or shortages of water that go unreported to major agencies as they are dealt with internally in the community. Droughts are not a common occurrence (five major events since 1996) in the Northern Neck Region, as noted in Table 7-23. When there is a drought of noteworthiness, the losses are substantial in monetary measures as well as the survival of the agricultural community. The Annualized Events are from the major events listed in Section 6 occurring between 1996-2022. It should be considered that the NRI reports 91 drought events in Lancaster and Northumberland, and 122 events in Richmond between 2000-2017.

Table 7-25: Estimated Annualized Loss from Drought in the Northern Neck Region

Drought	Annualized Events	Annualized Property Damages	Annualized Agricultural Loss Values	Annualized Total Damages	Deaths	Injuries
Lancaster	0.2	\$0	\$215,814	\$215,814	0	0
Northumberland	0.2	\$0	\$130,003	\$130,003	0	0
Richmond	0.2	\$0	\$123,194	\$123,194	0	0
Westmoreland	0.2	\$0	\$339,126	\$339,126	0	0



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7.3.13.1 Vulnerabilities

A significant drought event brings economic, social, and environmental impacts to the entire region. One of the most significant economic effects of a drought is the agricultural impact, which includes the undernourishment of livestock and crop damage. Droughts severely impact farm income and can increase the cost of potable water if water supplies must be augmented. Even with the region being surrounded by water it does not decrease the risks of drought to citizens or land. Populations with limited access to move about are at the highest risk as they cannot leave their home for cooler areas when needed and may not be able to access safe drinking water. All jurisdictions in the Northern Neck Region are at a potentially even risk for effects from drought. Agriculture and Livestock farmers would/could suffer the worst losses without enough water to care for their crops and animals.

High summer temperatures can exacerbate the severity of a drought. When soils are wet, a significant portion of the sun's energy goes toward the evaporation of the ground moisture. Yet, when drought conditions eliminate soil moisture, the sun's energy heats the ground surface, and temperatures can soar, further drying the soil. The impact of excessive heat is most prevalent in urban areas, where urban heat-island effects prevent inner-city buildings from releasing heat built up during daylight hours. The secondary impacts of excessive heat severely strain the electrical power system.

Droughts also create conditions that enable the occurrence of other natural hazard events, such as wildfires and wind erosion. The likelihood of pluvial and flash flooding increases if a period of severe drought is followed by extreme precipitation. Low-flow conditions also decrease the quantity and pressure of water available to fight fires, while dry conditions increase the likelihood that fires will occur.

The priority hazard ranking process for the 2023 hazard risk assessment determined drought to be a moderate hazard in the Northern Neck Region. The warning time for drought allows for preparations; however, it is rarely possible to forecast the length of time that drought will last; therefore, the warning time is somewhat complicated. The significant loss to agriculture ranks drought as a significant hazard. Frequency ranking can depend on what level (D0-D4) the community records and how damages are recorded. The NRI guidance recommends a higher frequency rating than cumulative statistics gathered from other sources. Table 7-25 outlines the hazard ranking for each of the hazard priority criteria related to drought.

Table 7-26: CPRI Drought Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
0.9	0.3	0.15	0.1	1.45	Moderate

7.3.13.1 Effects of Climate Change and Drought

USGS states that "Climate change exacerbates droughts by making them more frequent, longer, and more severe." In this update of the Northern Neck HMP, drought remained on the lower end of the hazard risk list but the threat remains moderate. Drought is directly affected by precipitation amounts, specifically less precipitation contributes to worsening drought conditions. Communities are encouraging mitigation actions through education and awareness, and actions such as debris clearing and encouraging the removal of items such as dilapidated buildings that could be a fuel source.



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7.3.14 Heatwave Risks in the Northern Neck Region

Much of the risk from heatwaves is to the population, primarily vulnerable populations, and persons with functional access needs. The climate and coastal location of the region contribute to high humidity that will increase the effects of high heat indexes, further raising the hazards associated with heat waves.

Table 7-27: Estimated Annualized Losses from Heatwave in the Northern Neck Region

Heat Wave	# Of Events NCEI	Estimated Population Equivalence	Expected Annual Total Loss Values	Estimated Injuries	Estimated Deaths
Lancaster	3	\$23,339	\$23,346	0	0
Northumberland	3	\$25,263	\$25,290	0	0
Richmond	3	\$18,960	\$18,983	0	0
Westmoreland	3	\$30,740	\$30,740	0	0

When calculated with available data, heat waves are ranked as a “Low” priority. Likewise, probability, magnitude, and warning time favor the region with the lowest scores. Duration is an unknown factor as most events that present as heatwaves may present in short periods of time and then end, or they may “pulse” with a period of heat that decreases and then returns.

7.3.14.1 Vulnerabilities

Vulnerable populations across the region include wildlife, animals, access and functional needs persons, elderly, and children that can not move themselves into cooler areas. All jurisdictions in the Northern Neck Region have populations that would suffer during a heatwave. The higher humidity of the outlying water front areas would contribute to worsening the heat index with increased humidity. Heatwave and drought often accompany each other in the summer and subsequently increase the chance of wildfire.

Table 7-28: CPRI Heatwave Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
0.9	0.3	0.15	0.3	1.65	Low

7.3.14.1 Effects of Climate Change and Heatwave

The Center for Climate and Energy Solutions states that heatwaves are increasing in frequency. Additional statements note, “If greenhouse gas emissions are not significantly curtailed, daily high and low temperatures will increase by at least five degrees F in most areas by mid-century, rising to 10 degrees F by late century. The National Climate Assessment estimates 20-30 more days over 90 degrees F in most areas by mid-century. Facing these estimates, the jurisdictions in the region have included heatwave as a new hazard of consideration to ensure inclusion in mitigation actions and planning.



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7.3.15 Earthquake

Although earthquakes may occur infrequently, they can have devastating impacts that affect entire communities and regions. An earthquake's destructiveness depends on several factors, including the magnitude of the tremor, the direction of the fault, distance from the epicenter, regional geology, and the design characteristics of buildings and infrastructure. Moderate and even very large earthquakes are inevitable; consequently, buildings in these regions are seldom designed to deal with an earthquake threat; therefore, they are extremely vulnerable.

Earthquake intensity is generally greater on soft soils than on solid rock. Areas in the Northern Neck Region that contain alluvial soils are more at risk of destabilization occurring in the event of an earthquake. Other effects of a strong earthquake include landslides, fissuring, slumping at the ground surface, and even tsunamis. When the epicenter of a large earthquake is located offshore, the seabed may be displaced sufficiently to cause a tsunami. Tsunami waves can travel across the ocean at very high speeds, depending on the location and source of the seismic event.

Table 7-29: Estimated Annualized Loss from Earthquake in the Northern Neck Region

Earthquakes	Chance of yearly Occurrence per NRI	Expected Annual Property Loss Values	Expected Annual Total Loss Values	Estimated Injuries	Estimated Deaths
Lancaster	0.03%	\$14,133	\$14,518	0	0
Northumberland	0.03%	\$11,897	\$12,270	0	0
Richmond	0.03%	\$11,669	\$12,180	0	0
Westmoreland	0.03%	\$25,337	\$26,163	0	0

7.3.15.1 Vulnerabilities

If an earthquake were to effect the Northern Neck the vulnerable population would depend on the jurisdiction that it affected and how high the Richter reading is. The damages to buildings and infrastructure would be a primary concern. Earthquakes can trigger many other incidents such as tsunamis (not a hazard risk in the NN Region), dam failure, erosion, structural damages, and debris instability. The additional incidents that earthquakes can trigger increase the potential level of vulnerabilities.

The priority hazard ranking process for the 2023 hazard risk assessment determined earthquakes to be a limited hazard in the Northern Neck Region. As described in the profile above, earthquakes are unlikely events with no epicenters recorded in the Northern Neck Region. There are no recorded property damages secondary to earthquakes. The potential exposure for an earthquake event is "significant," with greater than \$1 million in potential damages. Due to the infrequency of events in this area, infrastructure could sustain considerable damage in a medium-strength earthquake. Earthquake is ranked high for having a warning time less than 24 hours before the event. Table 7-29 outlines the hazard rankings for each of the hazard priority criteria related to earthquakes.

Table 7-30: CPRI Earthquake Hazard Priority

Probability	Magnitude	Warning Time	Duration	Total Score	Threat
0.45	0.3	0.9	0.1	1.75	Low



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7.3.14.1 Effects of Climate Change and Earthquake

In the Northern Neck, earthquakes are a minimal risk with almost no historical data to show any major risk. However, Virginia has many fault lines that are inactive but that doesn't negate the responsibility of the jurisdictions to consider mitigation actions for earthquakes. The James River follows the Central Virginia Seismic Zone between Charlottesville and Richmond. To date earthquake occurrences are not predictable and an earthquake can occur at any time without warning.

7.4 Northern Neck Region's Critical Facilities

A critical facility is defined as a facility in the public or private sector that provides essential products and services to the public; is necessary to preserve the welfare and quality of life in the community; or fulfills important public safety, emergency response, and/or disaster recovery functions. Examples include public safety facilities (police, fire, and emergency medical services), cell towers, courthouses, medical facilities, utilities, transportation networks, and schools.

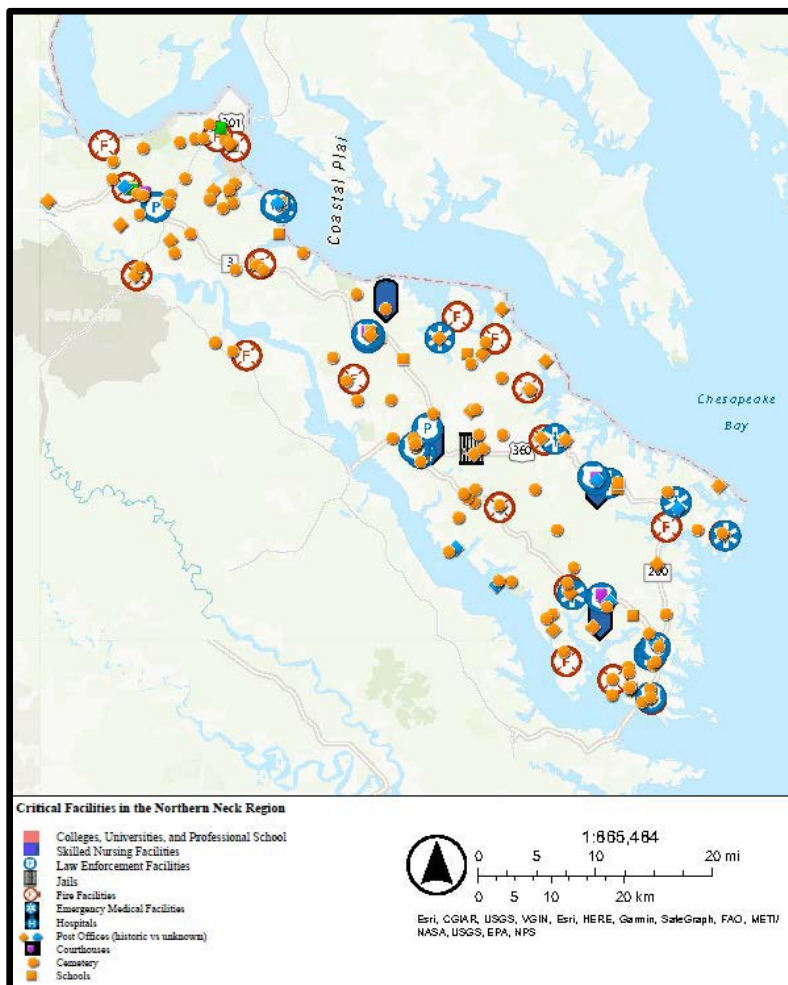
Table 7-30 summarizes the number of critical facilities by type in the Northern Neck Region, and Figure 7-7 maps their relative location.

7-31: Critical Facilities in the Northern Neck Region

Facility Type	Number of Facilities
Emergency Medical Services (EMS)	9
Emergency Operations Centers (EOC)	4
Fire	17
Government	4
Medical	20
Police	14
School	20
Utility	15
Total	124

Source: U.S. Geological Survey data pulled 10/03/2022

Figure 7-11: Critical Facilities in the Northern Neck Region



Source: <https://www.arcgis.com/apps/mapviewer/index.html?layers=f36207114ae94f3987e5f0423170f2a5>

7.5 Northern Neck Region's Future Development Trends

Administered by the Commonwealth of Virginia, the Bay Act Program comprehensively addresses the effects of land use planning and development on water quality. The Bay Act recognizes that local governments are primarily responsible for land use decisions. It expands their authority to manage water quality and establish a direct relationship between water quality protection and local land use decision-making. All participating communities have regulations limiting or prohibiting development in the SFHA, and all have plans to continue enforcing and expanding on those regulations.

7.6 Summary of Risk Assessment

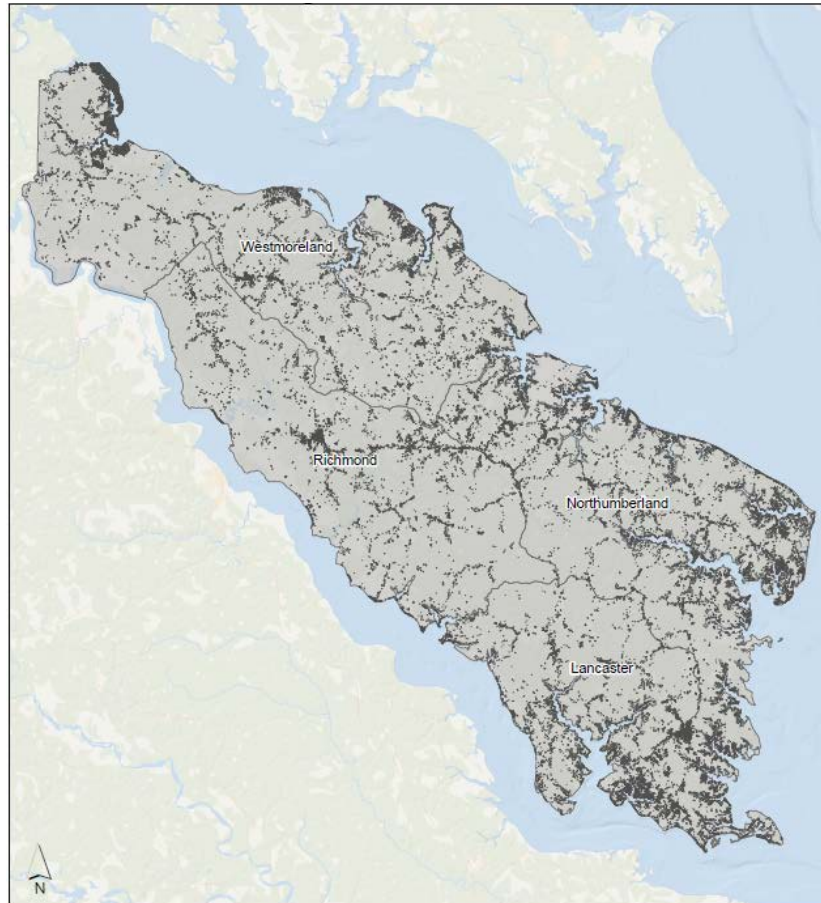
A variety of natural hazards have the potential to impact the Northern Neck Region. In addition to the potential for injury or loss of life and damage to property and crops, a hazardous event can disrupt utilities, communication, and transportation, impacting the well-being of people and communities. Since so many residents are second homeowners along the region's coastal shores, a full understanding of hazard potential, severity, and recovery after an event is a unique challenge to the area. It is important to point out that data limitations for some hazards prevented a complete analysis of past occurrences and potential



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future losses. Figure 7-8 presents the current building footprint for the communities in the Northern Neck Region.

Figure 7-12: Building Footprint in the Northern Neck Region



Source: HAZUS

The purpose of the hazard ranking is to categorize and prioritize all potential hazards for the Northern Neck Region based on risk. Combined with the asset inventory and quantitative vulnerability assessment, the summary hazard classifications allow for the prioritization of those high-hazard risks for mitigation purposes and, more specifically, the identification of hazard mitigation opportunities for the Northern Neck Region to consider as part of their proposed mitigation strategy. Hazards were ranked utilizing the CPRI process identified in Section 7.2. This index was then used to rank the hazards to give the community some sense of how the hazards ranked in comparison to the others. Table 7-31 provides a summary of the hazards, categories, scoring, and ultimate ranking.



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Table 7-32: Calculated Priority Ranking Index Summary

Hazard	Probability	Magnitude and/or Severity	Warning Time	Duration	CPRI Score	Hazard Ranking
Tornado	1.35	0.9	0.6	0.1	2.95	1
Severe Weather (High winds, hail, lightning)	1.8	0.6	0.3	0.2	2.9	2
Coastal Flooding	1.8	0.6	0.15	0.3	2.85	3
Riverine Flooding	1.8	0.6	0.15	0.2	2.75	4
Wildfire	1.8	0.3	0.6	0.1	2.8	5
Winter Storm	1.8	0.6	0.15	0.20	2.75	6
Hurricane/Tropical Storm	1.35	0.9	0.15	0.3	2.7	7
Coastal Erosion	1.8	0.3	0.15	0.2	2.45	8
Pluvial Flooding	1.35	0.3	0.15	0.2	2	9
Landslide	0.9	0.3	0.6	0.1	1.9	10
Drought	0.9	0.3	0.15	0.40	1.75	11
Heatwave	0.9	0.3	0.15	0.3	1.75	12
Earthquake	0.45	0.3	0.6	0.1	1.45	13

As described in the sections on hazard-specific estimated loss, there have been 352 storm events since the 1950 report across the Northern Neck Region, as recorded in the NOAA NCEI Storm Events database. This total accounts for any duplication in instances where the same storm event was reported in multiple counties in the NNPDC. Total damages, which are also reported on a county level, are not duplicative since each county only reports its local damages. Similarly, deaths and injuries are not duplicative. The NOAA NCEI Storm Events Database data were annualized using the total years of record for each hazard category. When the NCEI did not offer sufficient data, the NRI, VDOF, and HAZUS were utilized to provide the best available data. Table 7-32 summarizes the region's estimated annualized events and damages. This information is additionally presented by county in Table 7-33.

Table 7-33: Northern Neck Regional Annualized Hazard Events, Damages, Deaths, and Injuries

Hazard	Events	Property Damages	Crop Damage	Total Damage	Deaths	Injuries
Tornado	0.4	\$172,204	\$1,162	\$173,367	0	0.2
Severe Weather	3.2	\$360,170	\$105	\$360,275	0	0
Coastal Flooding	0.5	\$1,317,887	\$0	\$1,317,887	0	0
Riverine Flooding	0.5	\$56,339	\$16,922	\$73,261	0	0
Wildfire	141	\$5,161	\$65,930	\$71,091	0	0
Winter Storm	4.2	\$1,926	\$0	\$1,926	0	0
Hurricane/Tropical Storm	0.3	\$117,741	\$175,147	\$292,888	0	0
Coastal Erosion	**	TBD	TBD	TBD	0	0
Pluvial Flooding	0.5-2	TBD	TBD	TBD	0	0
Landslide	0.1	TBD	TBD	\$1.5 M	0	0
Drought	0.1	\$0	\$943,399	\$943,399	0	0



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Hazard	Events	Property Damages	Crop Damage	Total Damage	Deaths	Injuries
Heat Wave	0.7	\$0	\$0	\$30K	0	0
Earthquake	0.03	\$64,000	\$0	\$64,000	0	0

Table 7-34: Annualized Hazard Events by County in the Northern Neck Region

Hazard	Lancaster	Northumberland	Richmond	Westmoreland	NNPDC
Tornado	1	1	1	1	1
Severe Weather	7	7	7	7	7
Coastal Flooding	4.4	4.4	4.4	4.4	4.4
Riverine Flooding	0.3	0.3	0.7	0.5	0.45
Wildfire	6.7	4.5	1.3	3.8	4.1
Winter Storm	2	2	2	2	2
Hurricane/Tropical Storm	0.3	0.3	0.3	0.3	0.3
Coastal Erosion	n/a	n/a	n/a	n/a	n/a
Pluvial Flooding	4	4	1	7	4
Landslide	0	0	0	1	0.25
Drought	0.2	0.2	0.2	0.2	0.2
Heatwave	0.12	0.12	0.12	0.12	0.12
Earthquake	0.03	0.03	0.03	0.03	0.03



Northern Neck Regional Hazard Mitigation Plan Section 8: Capability Assessment

Section 8 Capability Assessment

Contents of this Section

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- 8.2 Methodology
- 8.3 Federal and State Regulations, Plans, and Funding Sources
- 8.4 Capability Assessment for the Northern Neck Region
- 8.5 Capability Assessment for Jurisdictions within the Northern Neck Region
 - 8.5.1 Relevant Ordinances and Policies
 - 8.5.2 Fiscal Capabilities
 - 8.5.3 Taxes
 - 8.5.4 Spending
 - 8.5.5 Technical, Administrative, and Regulatory Capacity
 - 8.5.6 The Chesapeake Bay Protection Regulations
- 8.6 Current and Completed Hazard Mitigation Programs and Projects
- 8.7 Summary and Conclusions

8.1 Overview and Purpose of Capability Assessment

Although not specifically required by Disaster Mitigation Act of 2000 or 44 CFR 201.6, a capability assessment adds context to a mitigation plan by providing an inventory of a Jurisdiction's programs and policies, and an analysis of its capacity to carry them out. These are essential for developing mitigation strategies and actions.

The capability assessment is a review of the Northern Neck Region's resources to identify, review, and analyze what the jurisdictions are currently doing to reduce losses, and to identify the framework that is in place for the implementation of new mitigation activities. This section of the Plan also facilitates efforts with the Virginia Department of Emergency Management (VDEM) and with federal agencies and resources. In addition, this assessment will be useful in gauging whether the current local organizational structures and inter-jurisdictional or county coordination mechanisms for hazard mitigation could be improved, and how.

This local capability is extremely important because the municipal officials know their own landscape best. Additionally, many of the most critical and effective hazard mitigation strategies and programs, including floodplain management, enforcement of building codes, and land-use planning, require a strong local role to achieve effective implementation.

State statutes require each Jurisdiction to assign an individual to be responsible for its local emergency management duties. The jurisdiction's emergency management coordinator is responsible for coordinating emergency response and recovery operations with local, regional, state, and federal officials.



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8.2 Methodology

This capability assessment results from research, interviews, and surveys. Relevant documents were reviewed related to hazard mitigation, including the Commonwealth of Virginia Hazard Mitigation Plan (2018), as well as state and federal sources related to funding, planning, and regulatory capability. For the participating jurisdictional capability assessments, a series of in-depth individual interviews provided key insights and information. These interviews were conducted during the month of September 2022. Table 8-1 notes the interview attendees.

Table 8-1: Jurisdiction Capabilities Assessment Interviews

Agency/Locality	Representatives
Northern Neck Planning District Commission	John Bateman
Lancaster County	Matthew Smith – Chief of Emergency Services Bill Farrell – Director of Planning and Land Use Jim Canter – Building Official Olivia Hall – Environmental Codes Compliance Officer
Town of Irvington	Julie Harris – Mayor Laurel Taylor – Town Clerk Justin Nelson – Zoning Administrator
Town of Kilmarnock	Marshall Sebra – Planning and Zoning Director
Town of White Stone	Patrick Frere – Town Manager
Northumberland County	Wes Packett – Director of Emergency Services Lutrell Tadlock – County Administrator Phillip Marston – Zoning Administrator
Richmond County	Hope Mothershead – Code Compliance Officer Mitch Paulette – Chief, Department of Emergency Services
Town of Warsaw	Melissa Coates – Director of Planning and Community Development Joseph Queensberry – Town Manager
Westmoreland County	Bill Cease – Director of Emergency Management and Technology Darrin Lee – Assistant Planning Director Beth McDowell – Director of Planning and Community Development
Town of Colonial Beach	J.C. Lariviere – Grants Writer India Adams-Jacobs – Town Manager Kaylynn DeBernard – Town Planner Darla Odom – Zoning Administrator Brooke Shamblin – Community Development Officer Matt Smith – GIS
Town of Montross	Patricia Lewis – Town Manager

To complete the capability assessment, interviews were held with each jurisdiction individually. In preparation for the interviews, packets were sent to each locality to review with previous capabilities and mitigation goals and actions from the 2017 plan. The interviews addressed the following subjects:

- Staff, personnel, and technical capability
- Knowledge of Federal Emergency Management Agency (FEMA) mitigation programs
- Current/ongoing mitigation efforts



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- Intra- and inter-governmental coordination
- Land use and regulation
- Floodplain management
- Building code inspection
- Capital improvement
- Land conservation programs

8.3 Federal and State Regulations, Plans, and Funding Sources

The responsibility to the public for effective hazard mitigation rests with the elected officials, which in the Northern Neck Region are the County Boards of Supervisors and the Town Councils. They enact the codes, regulations, and ordinances through the authorities granted them by the Commonwealth of Virginia under the Dillon Rule. Emergency management is directed through local emergency management or emergency services offices. County and town leaders direct local hazard mitigation efforts and work cooperatively as appropriate on regional initiatives through the Northern Neck Region Local Emergency Planning Committee or with specific counties to provide FEMA-VDEM Hazard Mitigation Assistance (HMA) grant project administration and management. Many related regional plans and programs are administered by the Northern Neck PDC that directly inform and benefit its local governments related to natural resources, economic development, climate change and sea level rise.

This plan fulfills the standard local mitigation planning requirements (44 CFR §201.4) of the Disaster Mitigation Act of 2000 (Public Law 106-390, signed into law October 10, 2000). The Disaster Mitigation Act 2000 mends the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, and reinforces the importance of mitigation planning, emphasizing planning for disasters before they occur. Section 322 of the Act specifically addresses mitigation planning at state and local levels. New requirements are identified that allow Hazard Mitigation Grant Program (HMGP) funds to be used for mitigation activities and projects for states and localities with Hazard Mitigation Plans approved by November 1, 2004.

Federal regulations such as the *Code of Federal Regulations, Title 44, Chapter 1, Part 201 (44 CFR Part 201)*, the *Sandy Recovery Improvement Act (SRIA) of 2013*, the *National Flood Insurance Act of 1968*, and the *Water Infrastructure Improvements for the Nation (WIIN) Act of 2016* outline regulations of compliance in proper hazard mitigation planning that opens the ability to apply for funding such as:

- Hazard Mitigation Grant Program
- Building Resilient Infrastructure and Communities
- Fire Management Assistance Grant Program
- Public Assistance Grant Program
- Rehabilitation of High Hazard Potential Dam Grant Program

8.4 Capability Assessment for the Northern Neck Region

The purpose of conducting the capability assessment is to assess methods that the Northern Neck Region's County and local governments, have available to implement successful mitigation programs. Through careful analysis, existing gaps, shortfalls, or weaknesses within existing governmental activities that could exacerbate a community's vulnerability were identified. The assessment also highlights the positive measures underway at the local level that will continue to be supported and enhanced through future mitigation efforts.

The Capability Assessment Matrix, found in Appendix D, serves as the foundation for designing an effective hazard mitigation strategy. It not only helps inform Plan goals to be both achievable but aspirational to



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reduce regional exposure to natural hazards. The 2017 Capability Assessment Matrix did not contain the assessment for all participating communities. The towns of Irvington, Kilmarnock, Montross, White Stone, and Warsaw were added to the Capabilities Matrix and now encompasses all participating jurisdictions. Table 8-3 below, presents the complete capabilities review of all jurisdictions participating in the 2023 Northern Neck Regional Hazard Mitigation Plan.

The Northern Neck PDC acts in an advisory role in many of the capability categories contained in this assessment. Therefore, the Northern Neck PDC does not staff technical positions such as civil engineers and building officials. The Northern Neck PDC employs planners and hazard mitigation personnel that assist in advisory roles in planning, mitigation programs, floodplain, and stormwater management protocols, and they manage a range of community programs assisting citizens and jurisdictions with mitigation and planning efforts, such as the Septic Pump Out Assistance Program. Many regional plans and programs are administered by the Northern Neck PDC that directly inform and benefit its local governments related to natural resources, economic development, climate change and sea level rise.

Northern Neck Region's local governments do not have dedicated mitigation funding project sources to manage and administer HMP grant-funded projects, so the Northern Neck PDC supports the administrative aspects of those project by facilitating the Hazard Mitigation Assistance grants process to assist with elevations of structures in the flood zones, specifically those of Repetitive Loss/Severe Repetitive Loss (RLP/SRLP) status. The Northern Neck PDC's website offers a central location to publicize information about a variety of different hazard mitigation and planning efforts throughout the region.

8.5 Capability Assessment for Jurisdictions within the Northern Neck Region

This portion of the Plan assesses the current capacity of the communities of the Northern Neck Planning District to mitigate the effects of the natural hazards identified in Section 6 of the plan. This assessment includes a comprehensive examination of the following local government capabilities:

- *Administrative Capability* – describes the forms of government in the region, including the departments that may be involved in hazard mitigation.
- *Technical Capability* – addresses the technical expertise of local government staff.
- *Fiscal Capability* – examines budgets and currently used funding mechanisms.
- *Relevant Ordinances and Policies* – examines existing plans and policies (e.g., emergency operations plan, comprehensive plan).
- *Regulatory Authority* – describes how jurisdictions in the region use the four broad government powers (i.e., regulation, acquisition, taxation, and spending) to influence hazard mitigation activities.

The complete capabilities assessment is compiled in Table 8-2 below for all participating jurisdictions.

8.5.1 Relevant Ordinances and Policies

This section provides guidance pertinent to the ordinances and policies that have the potential to affect and/or promote mitigation within the jurisdictions. Understanding which ordinances and policies affect mitigation is a helpful component to mitigation activities. Many of the ordinances and policies that most directly affect development in relation to hazards reside at the municipal level. These include zoning, floodplain management, and building code enforcement.

- **Comprehensive Plans** – All ten jurisdictions maintained a locality Comprehensive Plan
 - Lancaster, Northumberland, Richmond, Westmoreland, the Town of Colonial Beach have infused a hazard mitigation element into their comprehensive plan.



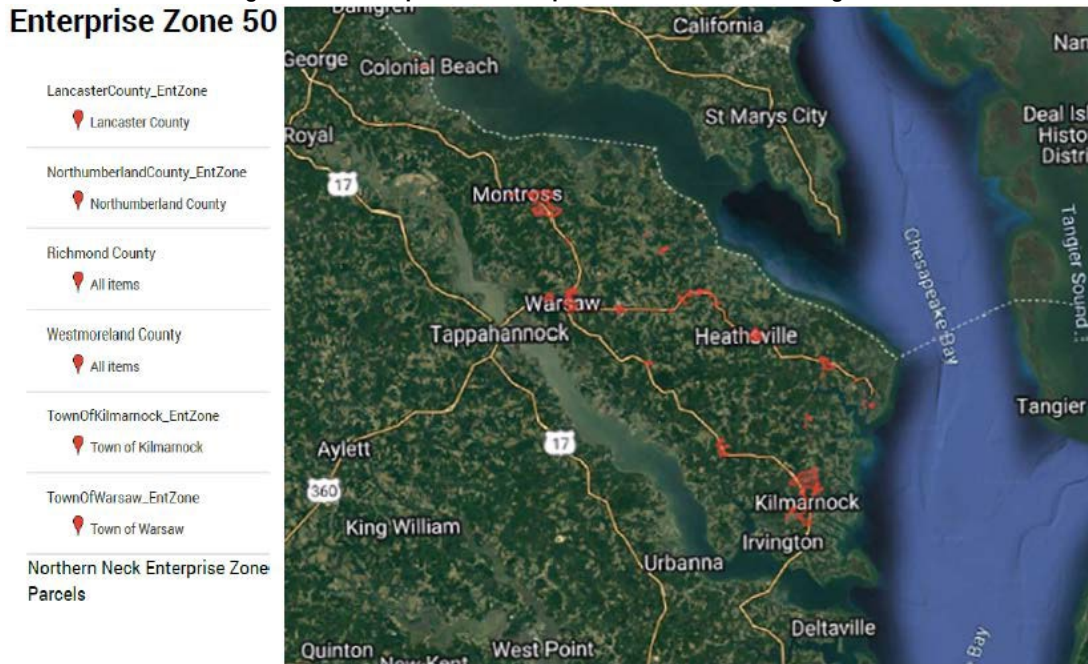
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- Richmond and Lancaster counties have updated their plans and are expecting to adopt prior to the completion of this plan (November 2022).
- The Towns of Irvington and Warsaw's plans are currently under revision.
- Enterprise Zones - Each of the jurisdictions have enterprise zones. Additionally, building priority areas of primary and secondary growth exist, with the design intent to better situate development in areas that are less susceptible to natural hazards. This will assist in decreasing damages and loss and increase the jurisdiction and regional resiliency capabilities. (Source: <https://www.northernneck.us/enterprise-zones/>).
 - New or expanding businesses located on an Enterprise Zone parcel may qualify for an Enterprise Zone incentive grant if the establishment or expansion of the business creates jobs or requires a real-property investment.
 - Established by the General Assembly in 1982, the Virginia Enterprise Zone Program is a partnership between the state and local governments to stimulate job creation and private investment within designated areas throughout Virginia. Currently, the Northern Neck region has over 11,000 acres designated as enterprise zones.
 - Enterprise Zones offer businesses a package of state and local incentives in the form of tax relief and grants, local regulatory flexibility, and local infrastructure development.
 - Regionally there is a monetary incentive for new and expanding businesses that create 25 new full-time jobs, invest \$250,000, and have an average annual wage that is at least 125% of the area average.
 - Lancaster County offers additional incentives including grants (not to exceed \$1,000) to businesses improving their property's façade, zero percent (0%) interest loans for micro-enterprise development and a tax credit for businesses rehabilitating property within the zone.
 - Richmond County offers additional incentives such as financial inducement for businesses creating at least 25 jobs, investing \$250,000 or above on industrially zoned properties in the Zone, and paying employees an average annual wage of at least 115 percent of the area average. Furthermore, a ten-year decreasing property tax exemption of the increase in assessed value of certain rehabilitation of commercial or industrial properties, is offered.
 - The Town of Kilmarnock offers businesses exemptions from zoning permit fees, water and sewer connection fees, business, professional and occupational licenses, auto decal fees, and subdivision permit fees at the Kilmarnock Business and Technology Park.
 - The Town of Warsaw offers incentive grants (up to \$1,000) to zone businesses making façade improvements and a three-year 50% tax credit (Town tax only) on the assessed value of a new building in the zone costing at least \$100,000.



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Figure 8-1: Enterprise Zone Map for the Northern Neck Region



Source: Northern Neck Planning District Commission <https://www.northernneck.us/enterprise-zones/>

- Floodplain Management Ordinances – All four counties maintain Floodplain Ordinances and comply with NFIP regulations by enforcing them.
 - The ten jurisdictions maintain ordinances that fulfill the principles of the Chesapeake Bay Preservation Area Designation and Management Regulations.
 - The Towns of Irvington, Kilmarnock, and Colonial Beach maintain their own floodplain ordinances
 - The Towns of White Stone, Warsaw, and Montross utilize their respective county's ordinance as applicable.
- Stormwater Management Plan – All four counties maintain Stormwater Management ordinances.
 - The Town of Warsaw maintains a Stormwater Management Plan
 - The Town of Colonial Beach applied for grant funding in November of 2021 to build a Stormwater Management Plan
 - The Towns of Irvington, Kilmarnock, White Stone, and Montross utilize their respective county's ordinance as applicable.
 - Stormwater management is regulated by the Department of Environmental Quality's Chesapeake Bay Preservation Program for all localities in addition to any local plans that may be adopted.
- Subdivision Regulations – All participating jurisdictions enforce a Subdivision Regulation except for the Town of Montross.
 - The Town of Montross utilizes their respective county's regulation.



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- Emergency Operations Plan – all four counties maintain a current Emergency Operations Plan (EOP)
 - The Towns of Warsaw and Colonial Beach maintain individual EOPs
 - The Towns of Irvington, Kilmarnock, White Stone, and Montross utilize their respective county's EOP.
- Erosion and Sediment Control Ordinance – all four counties maintain ordinances to address erosion and sediment control.
 - The 10 jurisdictions maintain and/or comply ordinances that fulfill the principles of the Chesapeake Bay Preservation Area Designation and Management Regulations.
 - All six towns utilize their county's respective ordinance as applicable.
- Continuity of Operations Plan – COOP is not a requirement for hazard mitigation. It is a beneficial planning document that is recommended to be integrated for cross planning purposes.
 - Northumberland County has a completed COOP that is going through the final adoption process at the time of time update. It is expected to be active by November 2022.
 - The County of Richmond adopted a new COOP in 2021.
 - The Town of Irvington maintains a COOP plan.

8.5.2 Fiscal Capabilities

For the Fiscal Year 2023 (FY23), the budgets of the participating jurisdictions range from about \$22 million (Richmond County) to \$51.3 million (Lancaster County) and smaller budgets for towns. Revenues which support local budgets come from property taxes, State and local sales taxes, local service fees, and through restricted intergovernmental contributions (federal and state pass through dollars). Mitigation projects have been funded through FEMA's post-disaster Hazard Mitigation Grant Program (HMGP). The Commonwealth of Virginia historically and presently provides 20 percent of the required non-federal project match, leaving only a required 5 percent local match, typically using in-kind services or property owner resources.

FY23 budgets provided by local jurisdiction representatives and published jurisdiction budgets are shown in Table 8-2, Northumberland County has created a development impact fee structure to supplement county income. Capital Improvement Plans (CIPs) and intergovernmental agreements are used by three of the four Northern Neck Region's counties.

Table 8-2: Fiscal Budget Information

Jurisdiction	Total FY23 Budget	Public Safety FY23 Budget
Lancaster	\$51.3 million	\$7 million
Northumberland	\$45.8 million	\$5.6 million
Richmond	\$37.2 million	\$3.7 million
Westmoreland	\$32.6 million	\$8.6 million
NNPDC	\$15.1 million	N/A



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Jurisdiction	Total FY23 Budget	Public Safety FY23 Budget
Town of Colonial Beach	\$8.8 million	\$1.9 million
Town of Irvington	\$425,000	\$30,000
Town of Kilmarnock	\$2.9 million	\$685,722
Town of Montross	\$316,541	\$23,250
Town of Warsaw	\$3.1 million	\$791,559
Town of White Stone	\$226,545	\$51,370

N/A – not applicable. *Source: FY23 Budgets for corresponding jurisdiction.*

8.5.3 Taxes

The power to levy taxes and special assessments is an important tool delegated to local governments by Virginia's law. The power of taxation extends beyond merely the collection of revenue and can have a profound impact on the pattern of development in the community. Communities have the power to set preferential tax rates for areas which are more suitable for development to discourage development in otherwise hazardous areas. Local units of government also have the authority to levy special assessments on property owners for all or part of the costs of acquiring, constructing, reconstructing, extending or otherwise building or improving flood protection works within a designated area. This can serve to increase the cost of building in such areas, thereby discouraging development. Localities in Virginia collect a 1% sales tax. In addition, all the counties in the Northern Neck PDC levy property taxes.

8.5.4 Spending

The fourth major power that has been delegated from the Virginia General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles can be made a routine element of all spending decisions made by local governments, including during adoption of annual budgets and the Capital Improvement Plan (CIP) for protection of critical facilities.

A CIP is a schedule for provision of town or county services over a specified period. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control growth in areas where the provision of on-site sewage disposal and water supply are unusually expensive. In addition to forming a timetable for provision of services, a local community can regulate the extension of and access to services. Participating jurisdictions that engage a CIP are presented in Table 8-3.

8.5.5 Technical, Administrative, and Regulatory Capacity

This section provides a review of the administrative and technical resources within the individual jurisdictions and assists with identifying any gaps, needs, available staff, use of available outside contractors, or other arrangements such as mutual aid agreements. The following resources and further associated items are presented in the Capabilities Matrix in Table 8-3, below.

8.5.5.1 Technical

Mitigation is multi-disciplinary. For a successful mitigation program, it is necessary to have a broad range of people involved who can inform and contribute to holistic mitigation programs through diverse backgrounds and experience. The Northern Neck Region's local governments do not have dedicated mitigation funding project sources to manage and administer HMP grant-funded projects, so the Northern Neck PDC supports the administrative aspects of those projects. The Northern Neck PDC's website offers a central location to



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publicize information about a variety of different hazard mitigation and planning efforts throughout the region. Emergency managers devote staff time and use existing web sites, social media and events like tornado awareness month and hurricane preparedness month as a platform for mitigation messaging. Strong preparedness and mitigation messages, techniques, and program links are provided on local websites to enable residents and businesses to create disaster preparedness plans and carry adequate flood insurance on at-risk properties and property contents.

- Hazard Mitigation Assignment – is Hazard Mitigation assigned to a specific department?
 - All four counties and the Town of Colonial Beach have done so.
 - The Towns of Irvington, Kilmarnock, White Stone, Warsaw, and Montross utilize their respective county's hazard mitigation efforts.
 - Hazard mitigation planning and actions is supported in all regions by the Northern Neck Planning District Commission.
- GIS Coordinator
 - All four counties and the Towns of Kilmarnock, Warsaw, and Colonial Beach employ GIS staff.
 - The Towns of Irvington, White Stone, and Montross utilize their respective county's GIS services or contract out as needed.
- Zoning Staff – All four counties report fulltime Zoning and Building Officials staffing.
 - All six towns report at least parttime Zoning staff.
 - All six towns report utilizing their respective county's Building Inspectors.
- Floodplain Management Staff – All participating jurisdictions report having a dedicated floodplain manager except the Town of Montross
 - The Town of Montross utilize their respective county's Floodplain Manager.

Overall, the participating jurisdictions have a well-rounded technical staffing capability. All jurisdictions report the need for higher staff volume. However, staffing and capability levels show improvement in the five years since the 2017 HMP plan update.

8.5.5.2 Administrative

The Northern Neck Region LEPC designates the following departments with specific responsibilities for hazard mitigation:

- Board of Supervisors, Town Councils and Local Government Administrators
 - The responsibility to the public for effective hazard mitigation rests with the elected officials, which in the Northern Neck Region are the different County Board of Supervisors and the Town Councils. They enact the codes, regulations, and ordinances through the authorities granted them by the Commonwealth of Virginia under the Dillon Rule.
 - The importance of this is high at this time with the increased unpredictable severe weather events, communities facing sea level rise and continued accelerating coastal erosion. The Region is taking steps to reverse the impact of the COVID-19 pandemic. The nation, State, and entire Northern Neck Region were immobilized during the shelter-in-place orders issued. Communities are facing the effects of economic losses, rising costs and supply chain issues.



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- Land use - Regulatory powers granted by the state to local governments are the most basic way a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of vulnerability of the community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, and to enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls. Each local community possesses great power to prevent unsuitable development in hazard-prone areas.
- Emergency Management
 - County and town emergency management operations are focused in two areas. First responders, which remain largely dependent on volunteers support immediate response to incidents such as building, brush and woodland fires, medical emergencies, accidents, and hazardous materials spills.
 - Emergency managers are responsible for the mitigation, preparedness, response, and recovery operations in relative to natural and man-made disaster events. Specifically, County Administrators and Town Managers, in their roles as Coordinator of Emergency Services, have designated management responsibility for the floodplain management and emergency management programs, often including hazard mitigation program, and assigns program operations to appropriate departments or staff.
- Department of Health
 - The Virginia Department of Health enforces ordinances related to safe handling and the emergency distribution of water and food and are responsible for the prevention or reduction of spreading disease.
 - The Northern Neck Region is served by the Three Rivers Health District. Employees support the ten-county region of the Northern Neck and Middle Peninsula. An emergency planner and epidemiologist are on District staff. Staffing levels have seen many changes since Virginia declared a state of emergency for the COVID-19 pandemic in March of 2020.
- Building/Planning/Zoning
 - Planning, zoning, and site inspections are conducted by staff or departments which have responsibility for administering and enforcing existing building codes and zoning ordinances.
 - Planning and code compliance staff also ensure that all new construction, repair and building additions or improvements comply with state and county building codes, zoning, and land-use regulations.
 - Local compliance with the Chesapeake Bay Preservation Act, erosion and sediment control regulations and stormwater management starts with proposed development plan review by local planners with additional technical and field inspection support provided by the Northern Neck Regional Soil and Water Conservation District. In addition, these departments support project review and code enforcement for hazard mitigation such as elevation of flood prone residential buildings and ensure that FEMA Elevation Certificates and Floodproofing Certificates are properly completed for applicable projects.



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- The County Building Official is licensed by the Commonwealth of Virginia and locally enforces the Virginia Uniform Statewide Building Code (VUSBC). This code includes implications for floodplain management. Local Planning or Community Development departments address land use planning and, in most cases, house the local floodplain management program enforcing the local floodplain management regulations.
- Law Enforcement
 - Each county has a Sheriff's Department which is primarily funded by the Commonwealth of Virginia Compensation Board. In most instances the county is providing additional budget funds to increase the coverage and abilities of their law enforcement agencies. Leaders of law enforcement agencies are included in hazard mitigation planning. All the jurisdictions in the regional planning area have enacted and enforce regulatory ordinances designed to promote the public health, safety, and general welfare of its citizenry.
 - The Towns of Kilmarnock, White Stone, Warsaw, and Colonial Beach maintain a local jurisdiction police department as well.
 - Sworn officers in all departments have the responsibility as essential personnel to respond in the face of a natural disaster.
 - Virginia's local governments have been granted broad regulatory powers in their jurisdictions. The statutes of the Commonwealth of Virginia bestow the general police power on local governments, allowing them to enact and enforce ordinances which define, prohibit, regulate, or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances). Since hazard mitigation can be included under the police power (as protection of public health, safety, and welfare), towns, cities, and counties may include requirements for hazard mitigation in local ordinances. Local governments also may use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition making people or property more vulnerable to any hazard.
- Public Safety (including EMS, fire department, and rescue squads)
 - Participating jurisdictions are facing this issue with the addition of paid staff employed by the local government. Emergency Medical Services (EMS) staff such as EMTs and Paramedics are hired to ensure ambulances can respond to 911 calls. The majority of fire service personnel remain volunteers with assistance from agencies such as VDEM which provides Regional HAZMAT Officers and teams that respond to assist as needed. The Virginia Department of Forestry staff aid response to brush, woodland, and wildfires.
 - Virginia has a statewide fire code. The code establishes statewide standards to safeguard life and property from the hazards of fire or explosion arising from the improper maintenance of life safety, and fire prevention and protection of materials, devices, systems, and structures. The Virginia State Fire Marshal's Office is charged with enforcement of the code statewide except in those localities that choose to enforce the code locally. Localities that choose to enforce the code locally must employ their own certified fire official.



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- **Public Works**
 - Departments have a role in hazard resiliency through oversight and maintenance of local infrastructure, some critical, which varies amongst Northern Neck Regional jurisdictions. While the responsibilities and infrastructure are varied, critical infrastructure includes wastewater treatment facilities, a few local water treatment systems, and several new local drainage systems.
 - Primary and secondary road maintenance is largely the responsibility of the Virginia Department of Transportation which coordinates closely with local emergency managers during and immediately after disaster events and storms to address road closures and detours, debris management and messaging. The Town of Colonial Beach owns all its town roads except for Colonial Ave and Washington Ave. Other departments may have responsibilities for programs that could complement hazard mitigation activities. For instance, parks and recreation departments may be responsible for open space programs. If demolition/acquisition projects are undertaken, coordination to manage created open space may include the parks and recreation staff.

8.5.5.3 Regulatory

Following a state or federal emergency and disaster declaration, VDEM coordinates recovery efforts with local governments through the LEPC, local emergency managers, and VDEM Regional Support teams. The following items are utilized in jurisdictions to assist with Hazard Mitigation and Emergency Management planning. Local governments in Virginia, including those in the Northern Neck Region, have a wide range of tools available to them for implementing mitigation programs, policies, and actions. A hazard mitigation program can use any of the four broad types of government powers granted by the State of Virginia, which are (a) regulation, (b) acquisition, (c) taxation, and (d) spending. The scope of this local authority is subject to constraints. All of Virginia's political subdivisions must not act without proper delegation from the state. All power is vested in the State and can only be exercised by local governments to the extent it is delegated (in accordance with Dillon's Rule).

- **Emergency Operations Plans**
 - The Northern Neck PDC Emergency Operations Plan was last updated in 2011. Counties in the Northern Neck Region are required to establish and maintain an Emergency Operations Plan for their locality. EOPs are to be updated every 4 years. This requirement is mandated under the following:
 - *The Code of Virginia Chapter 3.2 - Ch. 3.2 of the Code of Virginia establishes the State's Department of Emergency Management and provides the legal authority for the development and maintenance of the Commonwealth's emergency management program. Additionally, it defines the emergency powers, authorities, and responsibilities of the Governor and State Coordinator and requires that state and local governments be prepared for a variety of natural and human-caused hazards by developing, maintaining, and ensuring their ability to implement an emergency operations plan (EOPs).*
 - All four counties in the region along with the Towns of Warsaw and Colonial Beach have an EOP. The remaining Towns of Irvington, Kilmarnock, White Stone, and Montross act under their respective county's EOP.



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- Comprehensive Plans
 - A community's comprehensive plan provides the future vision for the community regarding growth and development. However, many of the plans include land use or environmental protection goals that could support future mitigation efforts. For example, limiting development in the floodplain (which is considered mitigation) may also help meet open space goals laid out in a comprehensive plan. Several comprehensive plans address mitigation, resiliency, and long-term community sustainability. These are new inclusions, and as communities continue to update their comprehensive plans it is anticipated that mitigation and resiliency issues will be more comprehensively addressed. Virginia comprehensive plans are usually updated on a five-year cycle.
 - For the most part, the region's comprehensive plans include strategies that address development in the floodplain or otherwise flood-prone areas. The comprehensive plans indicate that communities in the Northern Neck Region use zoning and subdivision regulations to retain the rural character of their areas while they preserve traditional livelihoods like agriculture, forestry, fishing, and aquaculture.
 - Lancaster County
 - Hazard mitigation concepts are found throughout the Lancaster County Comprehensive Plan.
 - The shoreline protection plan included in this document advocates for the use of vegetative methods as opposed to structural solutions such as rip- rap and groins on individual parcels. The plan also encourages a coordinated approach to shoreline protection suggesting that density credits and other innovative techniques could be used to encourage such actions. The Living Shorelines Initiative contributes to this cause.
 - The plan notes that a variety of growth tools may be appropriate for Lancaster County including performance standards, conservation easements, use valuation taxation, overlay zones, and open space provisions which prioritize flood control.
 - Town of Irvington
 - Irvington's comprehensive plan notes that it "is a community of choice for seasonal and weekend residents and extended renters". This lights a potential decrease in population growth and the plan notes that the town will need to grow and consider addition infrastructure to draw a fulltime population back to the town. In the opening remarks the town notes its dedication to preserving the natural environment and waterways and to encourage green space in the community.
 - Portions of Irvington present flooding issues while a majority of the town rises to 20-30 feet above sea level. The greatest concern mentioned is stormwater runoff in pluvial flooding events and coastal erosion issues along the shoreline. The town has only a few residences in the flood hazard zone.
 - There weren't many hazard mitigation actions noted in the comprehensive plan. It was stated during the jurisdiction interviews that the town is currently in the process of updating the comprehensive plan and will consider integrating an HMP element.



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- Town of Kilmarnock
 - Kilmarnock presents with a unique situation as it is in north Northumberland and Lancaster counties and the surrounding waterways are numerous. This location places the town on the shorelines of the Chesapeake Bay as well as exposed to the Potomac and Rappahannock Rivers. Kilmarnock contains designated Resource Protection Areas (RPAs). "The RPAs shall remain largely undeveloped according to the regulations in the town's zoning ordinance and the policies set forth in this Comprehensive Plan. RPA's include tidal wetlands, non-tidal wetlands that are connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, tidal shores, and a 100 ft vegetated buffer area that is located adjacent to and landward of water bodies with perennial flow as well as all the aforesaid components."
 - The goals include open hazard mitigation potential with protecting "the delicate balance and land use compatibility between existing/future land use development and the natural environment" and "Incorporate the preservation of natural environmental, historical, and cultural features of the community into planning and implementation of all public and private activities."
 - Kilmarnock estimates an above sea level ranging from 10-90 feet with several steep slope areas, the town's drainage moves into basins that eventually reach the Chesapeake Bay creating concern for runoff and pollution during high precipitation events.
- Town of White Stone
 - The Town of White Stone boasts significantly less coastal flood areas than other jurisdictions in the Northern Neck region. The town does suffer some significant flooding from pluvial type events. One of the primary goals in the Comprehensive Plan notes "Improve storm water drainage in Town in order to enhance public safety and to protect property values.", which they have made significant progress towards in working with VDOT to clear ditches and make roadway improvements throughout the troubled areas.
 - Despite having limited coastal properties in the town, their comprehensive plan indicates implemented zoning provisions that act to conserve "wooded buffer areas along stream banks and limit development adjacent to streams." White Stone has also adopted an "Erosion and Sediment Control Ordinance" under the guidance of Lancaster County, that is an element of the Chesapeake Bay Preservation Act.
 - The Comprehensive Plan does not currently contain a specific Hazard Mitigation section. The objectives and goal contain many mitigation activities that would address preservation, erosion, open space preservation, stormwater management and drainage, and green energy goals.
- Northumberland County
 - Northumberland County's plan includes a section on flood-prone areas and delineates numerous goals and strategies directed toward protection of life and property from floods. These strategies include public education, performance standards, enforcement of existing ordinances, and utility siting criteria. The plan also highlights that the current county regulations require that any building constructed within the floodplain have a finished floor elevation two feet above the base flood elevation.



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- Shoreline erosion remains a concern for Northumberland. The plan includes numerous strategies designed to protect shorelines. These include use of vegetation for shoreline protection and performance standards for structures that modify the shoreline. The plan also recognizes the need for coordinated or subdivision wide actions.
- Richmond County
 - Richmond County's Comprehensive Plan calls for accommodating future growth while maintaining the rural character of the county. The recommendations in the plan also recognize that growth cannot occur unchecked but should be guided away from environmentally sensitive areas such as floodplains. For instance, the plan calls for the use of cluster design techniques to allow for environmentally sensitive areas to remain undeveloped.
 - Shoreline erosion is featured in the Richmond County Comprehensive Plan. One recommendation calls for promoting the use of natural shoreline protection strategies. Vegetation and living protection measures were mentioned.
 - Recommendations include establishing setbacks in known erosion areas, the use of other natural features to protect the shoreline, enforcement of existing ordinances and facility siting requirements.
 - The plan also recommends that the county develop programs to encourage maintenance of existing properties. Hazard mitigation principles could be incorporated into such a program.
- Town of Warsaw
 - Warsaw's plan opens with the following purpose and scope "The Warsaw Comprehensive Plan is the policy document around which the Town endeavors to set a path for its future. The focus of the Plan is to establish a policy framework for the specific issues of land use and water quality protection. As such, this document represents the Town of Warsaw's recognition of its role in the protection of state waters and the Chesapeake Bay and its tributaries. The Plan is intended to carry out the goals of the Chesapeake Bay Preservation Act and has been developed in accordance with the Chesapeake Bay Preservation Area Designation and Management Regulations."
 - Warsaw's comprehensive plan primarily focuses on environmental protection measures, land use, and water quality preservation. Noting inadequate stormwater management resources despite the 140 ft above sea level elevation, the community targets concern for flooding, erosion and sedimentation, and pollutants entering the waterways. One of the mitigation actions mentioned is to minimize vegetation disturbance and decreased impermeable surface area that results in stormwater runoff.
- Westmoreland County
 - Flood is a primary concern in Westmoreland the comprehensive plan suggests that appropriate development practices, land use controls and protection of vulnerable shoreline and drainage should be improved to minimize the effects of flooding. One of the goals to address flooding is to "follow proper design practices including community retention ponds and other measures to improve flood-insurance ratings for the county."



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These recommendations were informed by the *Westmoreland County Shoreline Management Plan, 2013*, which was prepared for the county and the Virginia Coastal Zone Management Program by the Virginia Marine Institute of Marine Science, College of William and Mary.

- The comprehensive plan recommends a variety of studies to address shoreline erosion and storm water drainage. The future land use plan also includes a conservation designation that incorporates areas of the floodplain and calls for limited to no future development. The plan recommends that Westmoreland County pursue measures to facilitate entry into the Community Rating System.
- The County is willing to use easements to protect land. The plan was reaffirmed in 2022 and hazard mitigation, water quality, and coastal protection elements are incorporated. In addition, the plan addresses changing hazards in dam management.
- Town of Colonial Beach
 - The plan's opening statement shows its commitment to resiliency and preservation. They view the coastline, marshes, and waterways as an asset and a means to seek natural solutions to improve park and recreation facilities and create open community areas. The plan recognizes the mitigation action of protecting living shorelines with the preservation of the tidal marshes and vegetation.
 - One of the suggestions is that the "Town incorporate Low-Impact Development standards into the planning and permitting process."
 - Colonial Beach integrated the 2017 Northern Neck Regional HMP into their comprehensive plan, specifically, hazard identification and risk assessment, mitigation strategies, capabilities, plan implementation, and maintenance.
 - The Town will also use the Resilience Adaptation Feasibility Tool (RAFT) to help improve resilience to flooding and other coastal storm hazards while remaining economically and socially viable
- Town of Montross
 - The purpose and scope of the community's comprehensive plan states: "Land use, protection of natural resources, and transportation issues are the development categories that require the most informed decisions. This 2018 revision of the Town of Montross Comprehensive Plan aims to be a helpful analysis of these categories."
 - The plan cites Montross as a dry area above the wetlands and shorelines. Cited in the plan is how residential and commercial activities affect groundwater and stormwater runoff.
 - Agriculture is a high priority to Montross, and the priority is mitigating losses in disaster situations. "Agricultural uses are still active in some places throughout the Town and outskirts. Some parts of the Town remain forested, mostly within the ravines. In a sense, the region's most valuable natural resources are within the Chesapeake Bay and along its shorelines. The viability of those resources is fundamentally dependent upon the water quality of the Bay and its tributaries."



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- Goals included in the plan include minimizing land disturbance and vegetation on slopes, restricting land disturbance at development sites on or near steep slopes, and development of greenways within the Town and surrounding areas.

8.5.6 The Chesapeake Bay Protection Regulations

The Chesapeake Bay Preservation Act (Bay Act) was enacted by the Virginia General Assembly in 1988 as a critical element of Virginia's non-point source management program. The Bay Act program is designed to improve water quality in the Chesapeake Bay and other waters of the State by requiring the use of effective land management and land use planning.

Virginia designed the Bay Act to enhance water quality with continued reasonable development. The Chesapeake Bay Act balances state and local economic interests and water quality improvement by creating a unique cooperative partnership between State and Tidewater local governments to reduce and prevent nonpoint source pollution. Local governments retain the primary responsibility for land use decisions, expanding local government authority to manage water quality, and establishing a more specific relationship between water quality protection and local land use decision-making.

The Chesapeake Bay Act Program is the only program in Virginia State government that deals comprehensively with the relationships between water quality, and land use planning and development. It is also the only program that assists local governments with land use planning needs to meet water quality goals: the development of land use regulations, ordinances, and comprehensive plans.

Virginia is a signatory to the Chesapeake Bay Agreement, a unique regional partnership aimed at restoration of the Chesapeake Bay. Communities in certain parts of the state are required to implement local land use controls to minimize runoff and other adverse impacts to the water quality of the Bay. Each Northern Neck PDC jurisdiction is part of the Tidewater area and therefore required to enforce Bay Act provisions locally. The program's agricultural non-point source pollution reduction efforts have been led by the Northern Neck Regional Soil and Water Conservation District. Prevention of sediment, nutrient and other pollution from land development is directed through erosion and sediment control and stormwater management ordinances.

Upcoming changes that will affect the Northern Neck Region as this plan is adopted include:

- **Code of Virginia Article 2.5. Chesapeake Bay Preservation Act. § 62.1-44.15:72. Board to develop criteria. (H.)**
- "Effective July 1, 2023, requirements promulgated under this article directly related to compliance with onsite sewage system pump-outs shall be managed and enforced by the Department of Health in Accomack, Essex, Gloucester, King and Queen, King William, Lancaster, Mathews, Middlesex, Northampton, Northumberland, Richmond, and Westmoreland Counties, and the incorporated towns within those counties."



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Table 8-3: Capability Assessment

Programs and Capabilities	NNPDC	Lancaster County	Town of Irvington	Town of Kilmarnock	Town of White Stone	Northumberland County	Richmond County	Town of Warsaw	Westmoreland County	Town of Colonial Beach	Town of Montross
Comprehensive Plan		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
With Hazard Mitigation Element	Advisor	Y	N	N	N	Y	Y	N	Y	Y	N
Adoption		Nov. 2022****	Sept 2017****	April 2014	Oct. 2013	Nov. 2016	Nov. 2022	May 2013*	Dec. 2010	May 2017	Feb. 2018
With Coastal Protection Element		Y	N	N/A	N/A	Y	Y	N	Y	Y	N
Capital Improvement Plan	Advisor	Y	N	Y	Y	Y	Y	Y	Y	Y	N
Economic Development Plan	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Downtown Development/Re-Development Authority Plans	Advisor	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Enterprise Zones	Advisor	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Transportation Planning	VDOT/PD C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subdivision Regulations	N/A	Y	Y	Y	1	Y	Y	Y	Y	Y	1
Zoning Ordinance	N/A	Y	Y	Y	1	Y	Y	Y	Y	Y	1
Site Plan Review Procedures		Y	Y	Y	1	Y	Y	Y	Y	Y	1
Building Code (or ordinance) addresses flood	N/A	Y	1	1	1	Y	Y	1	Y	Y	1
Designated Building Official		Y	1	1	Y	Y	Y	1	Y	Y	1
Regular Inspection Protocols		Y	1	1	1	Y	Y	1	Y	Y	1
Civil Engineer Staff		N	1	5	N	N	5	N	N	N	N
GIS Coordinator		Y	1	Y	1	Y	Y	Y	Y	Y	1
Mitigation Projects											
Private Residential Elevations (self-financed)	N/A	Y	1	N/A	N/A	Y	Y	N/A	Y	Y	N/A
Resident and Community Outreach Inc. Ready.gov	Y	Y	1	1	1	Y	Y	N/A	Y	Y	1
Exclude critical infrastructure	N/A	Y	N	N/A	Y	Y	Y	N/A	Y	Y	N/A



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Programs and Capabilities	NNPDC	Lancaster County	Town of Irvington	Town of Kilmarnock	Town of White Stone	Northumberland County	Richmond County	Town of Warsaw	Westmoreland County	Town of Colonial Beach	Town of Montross
from SFHA											
Elevate Residences or Property Protection through HMA grants	Y	2	2	N/A	N/A	2	2	2	N/A	N/A	N/A
Grant Officials		Y	N	N	N	N	Y	N	Y	Y	N
Natural Systems Protection											1
Natural or Cultural Resources Inventory		Y	Y	Y	Y	Y	Y	N	Y	Y	1
Open Space		Y	Y	Y	Y	Y	Y	Y	Y	Y	1
Parks and Recreation		Y	Y	N	N	Y	Y	N	Y	Y	N
Living Shorelines Program	Y	Y	Y	N/A	N/A	Y	Y	N/A	Y	Y	N/A
Stormwater Management and Water Quality Programs											
Stormwater Management Plan		Y	1	1	1	Y	Y	Y	Y	Y	1
Total Daily Maximum Load (TMDL) Stream Segments**	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Watershed Improvement Plans***	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Erosion or Sediment Control Program	N/A										
Erosion and Sediment Control Ordinances		Y	1	1	1	Y	Y	1	Y	Y	1
Floodplain Management	N/A										
RAFT Card (Resilience Adaptation Feasibility Tool)		Y	N/A	Y	Y	Y	Y	Y	Y	Y	N/A
Floodplain Administrator		Y	Y	Y	Y	Y	Y	1	Y	Y	1
Participates in NFIP		Y	Y	Y	Y	Y	Y	1	Y	Y	1
Year Joined NFIP		03/04/1988	10/18/1974	09/17/2010	09/24/1984	7/4/1989	3/16/1989	N/A	9/18/1987	9/18/1987	N/A
Effective FIRM Date		07/05/2022	08/04/1987	07/05/2022	11/17/2020	12/30/2021	06/26/2022	N/A	05/17/2022	05/17/2022	N/A



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Programs and Capabilities	NNPDC	Lancaster County	Town of Irvington	Town of Kilmarnock	Town of White Stone	Northumberland County	Richmond County	Town of Warsaw	Westmoreland County	Town of Colonial Beach	Town of Montross
Additional Freeboard Requirements (inches)		18"	N/A	18"	N/A	24"	N/A	N/A	18"	36"	N/A
LiMWA standards in High Hazard Coastal Areas		Y	N	N/A	N/A	Y	N/A	N/A	Y	Y	N/A
Participates in CRS		N	N	N	N	N	N	N	N	N	N
Emergency Operations Management	LEPC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Emergency Operations Plan		Y	1	1	1	Y	Y	1	Y	Y	1
Local Government EOPs	VDEM advisor	Y	1	1	1	Y	Y	1	Y	Y	1
Continuity of Operations Plan	N	N	N****	N	N	N****	Y	N	N	N	N
Warning Sirens or warning alert systems		Y	1	Y	1	Y	Y	1	Y	Y	1
Evacuation Plans		Y	1	1	1	Y	Y	1	Y	1	1
Shelter and Family Re-Unification Plan		Y	1	1	1	Y	Y	1	Y	1	1
Special Needs Population Emergency Planning		Y	1	1	1	Y	Y	1	Y	1	1
Companion Animal Sheltering and Re-Unification Plan		Y	1	1	1	Y	Y	1	Y	1	1
Dedicated Emergency Management Website	Y	Y	1	1	1	Y	Y	1	Y	1	1
Education Programs	N/A	Y	N/A	Y	1	Y	Y	1	Y	Y	1
School Facility Emergency Operations Plans		Y	N/A	Y	N/A	Y	Y	1	Y	unknown	1
School Emergency Notification, Evacuation and Emergency Planning		Y	N/A	Y	N/A	Y	Y	1	Y	unknown	1
College Campus Plans		Y	N/A	Y	N/A	N/A	Y	1	N/A	N/A	N/A



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Programs and Capabilities	NNPDC	Lancaster County	Town of Irvington	Town of Kilmarnock	Town of White Stone	Northumberland County	Richmond County	Town of Warsaw	Westmoreland County	Town of Colonial Beach	Town of Montross
College/University Emergency Notification, Evacuation and Emergency Planning		Y	N/A	Y	N/A	N/A	Y	1	N/A	N/A	N/A
Tourism	3	Y	3	3	3	Y	Y	3	Y	Y & 3	3
Community Planner		Y	1	Y	Y	Y	Y	Y	Y	Y	1
Additional Capabilities						Debris Mgmt. Plan			Debris Mgmt. Plan		
<p>Note: Many functions for towns are performed by their respective county. Stormwater management is regulated by the Department of Environmental Quality's Chesapeake Bay Preservation Program for all localities in addition to any local plans that may be adopted.</p> <p>N/A - not applicable.</p> <p>1 – Assisted by county</p> <p>2 – Utilizes the NNPDC for assistance.</p> <p>3 – Utilizes the Northern Neck Regional Tourism Cooperative and/or River Realm</p> <p>4 – Utilizes the Northern Neck Regional Historic Preservation Society</p> <p>5 – Contracted as needed.</p> <p>*Currently under revision.</p> <p>**All stream segments in each county are a part of the Chesapeake Bay Total Daily Maximum Load (TMDL) monitoring area.</p> <p>***All stream segments part of the Chesapeake Bay WIP.</p> <p>**** Currently in progress. (Town of Irvington is in development.) (Northumberland County's COOP is complete and to be presented for adoption in January 2023) (Lancaster County's Comprehensive Plan is planned to be adopted in March 2023.)</p>											



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8.6 Current and Completed Hazard Mitigation Programs and Projects

Table 8-4 Hazard Mitigation Programs and Projects

Jurisdiction	Mitigation Action	Hazards Addressed
Lancaster	Considered and took steps towards the CRS Program. Attended CRS Workshop.	Property Protection Education and Community Outreach
Lancaster	Completed Private Demonstration Sites - Develop vegetative planting programs for public shoreline property to serve as a model for public education purposes.	Property Protection Public Education & Outreach
Lancaster	Initiated NOAA radio purchase for Sheriff's Office	Emergency Services
Lancaster	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or five acres; Identify measures to keep All new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage;	Property Protection Structural
Lancaster	Enforce the floodplain management ordinance by monitoring compliance and taking remedial action to correct violations by increasing staff to assist with accomplishing this goal.	Property Protection
White Stone	Initiated Phase 1 of a new sewage system for the town. Connections to citizens have begun.	Property Protection
White Stone	Initiated the development and implemented a ditch maintenance program consisting of routine inspections and subsequent debris removal	Property Protection Natural Resource Protection
Northumberland	Researched and updated FIRMS for accessory structures.	Property Protection
Northumberland	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres. Identify	Property Protection



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Jurisdiction	Mitigation Action	Hazards Addressed
	measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage;	
Northumberland	Initiated and continuing the adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or storage of chemicals in SFHA, prohibition or certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit any new residential or non-residential structures in the SFHA.	Structural Property Protection
Richmond	Sought and completed training for GIS staff and increased in house GIS capabilities.	Property Protection Prevention Emergency Services
Richmond	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following. Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or five acres: Identify measures to keep All new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage;	Property Protection Flooding
Warsaw	Initiated stormwater management measures – sidewalk and drainage project.	Property Protection
Westmoreland	Sought and attended training and system upgrades for GIS capabilities.	Property Protection Prevention Emergency Services
Westmoreland	Accomplish growth to enforce zoning and building codes to prevent construction within the floodplain	Structural Property Protection
Westmoreland	Evaluate the potential costs versus benefits of continuing the freeboard requirement for all new structures within the 100-year floodplain.	Structural



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Jurisdiction	Mitigation Action	Hazards Addressed
Westmoreland	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or five acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing or locating utilities, and service facilities to prevent water Damage.	Property Protection Structural
Westmoreland	Integrated elements of hazard mitigation into the county comprehensive plan.	Prevention Natural Resources Protection Property Protection
Colonial Beach	Evaluate exiting storm water system to determine if it is adequate for existing (or future) flood Hazards. Completed and writing plan.	Property Protection Structural Natural Resources Protection
Colonial Beach	Develop a detailed building inventory for all structures in the jurisdiction, which catalogues information such as value of the structure, contents, age, location (latitude and longitude), etc.	Structural Property Protection Emergency Services
Colonial Beach	Integrated hazard mitigation elements into the town's comprehensive plan and initiated integration into the resiliency plan.	Emergency Services Property Protection Natural Resources Protection
Colonial Beach	Investigate, develop, or enhance a regional public notification system utilizing Code Red.	Outreach & Education Emergency Services
Colonial Beach	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or five acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing or locating utilities, and service facilities to prevent water Damage.	Property Protection Structural
Colonial Beach	Enforce the floodplain management ordinance by monitoring compliance and taking remedial action	Property Protection



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Jurisdiction	Mitigation Action	Hazards Addressed
	to correct violations by increasing staff to assist with accomplishing this goal.	
Montross	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or five acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing or locating utilities, and service facilities to prevent water Damage as is applicable to the locality.	Property Protection Structural

8.7 Summary and Conclusions

In conclusion, there are several areas which may be further investigated to determine the relevance of developing hazard mitigation strategies to fill gaps or shortcomings. Particularly these areas include resources and coordination.

As noted, additional time and resources need to be devoted at the local level on hazard mitigation related activities. These activities include project identification, data gathering, and overall knowledge about FEMA grants. Furthermore, additional education and training for current staff regarding hazard mitigation, the resources available, and methods of using specified grant funding could assist the Northern Neck Region in reducing future risk. This knowledge would also assist in preparing better project applications that may be selected based on a competitive selection process. Increasing staff and resources would subsequently allow for greater coordination among all levels of government.

Jurisdictions and communities in the Northern Neck Region are still processing and recovering from the economically damaging COVID-19 pandemic that was declared a State of Emergency in Virginia in March 2020. At the time of this update the COVID-19 pandemic is ongoing, and jurisdictions will need to utilize lessons learned from this event to improve their respective locality plans.



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Northern Neck Regional Hazard Mitigation Plan Section 9: Mitigation Action Plan

Section 9 Mitigation Action Plan

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9.1 44 CFR Rule Requirement for the Mitigation Action Plan

Requirement §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.*

Requirement §201.6(c)(3)(i): *The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Requirement §201.6(c)(3)(ii): *The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Requirement: §201.6(c)(3)(iii): *The mitigation strategy section **shall** include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization **shall** include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting Federal Emergency Management Agency (FEMA) approval or credit of the plan.*



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9.2 Hazard Mitigation Goals

This section contains goals, objectives, and action items for the Northern Neck Regional Hazard Mitigation Plan. For the purposes of this Plan, the following definitions are accepted:

- **Goals** are general guidelines that explain what the county and participating municipalities want to achieve. Goals are expressed as broad policy statements representing desired long-term results.
- **Objectives** (or strategies) describe strategies to attain an identified goal. Objectives are more specific statements than goals; objectives are also usually measurable and can have a defined completion date.
- **Mitigation Actions** are the specific steps (projects, policies, and programs) that advance a given objective. They are highly focused, specific, and measurable.

The hazard identification and risk assessment in Sections 6 and 7 consisted of identifying the hazards that affect Northern Neck Region and the potential for damage to community assets that are vulnerable to the hazards. Section 8 identified the strengths and weaknesses of state and local capabilities. The goals and objectives described below, in Table 9-1 were established by the Northern Neck PDC's Hazard Mitigation Steering Committee and validated by the Northern Neck PDC's Hazard Mitigation Working Group members in response to these assessment results. Many of the actions described below apply to the counties and all participating communities.

The broad goals of the Northern Neck Regional Hazard Mitigation Plan are as follows:

Table 9-1: 2023-2027 Northern Neck Region Goals and Objectives

Goal #1	Promote sustainable development utilizing alternative pathways that encompass proactive adaptations to mitigate against the risks posed by natural hazards, anticipate vulnerabilities, and strengthen the regional resiliency.
Objective	Increase green infrastructure measures utilizing natural vegetation and soils, pervious pavements, buffer zones, and living shoreline programs reducing storm water runoff and improve the drainage of flood waters.
2017 Goal	Promote new development that avoids undue risks posed by natural hazards and is resilient to natural disasters.
Goal #2	Monitor the impacts of climate change utilizing multiple sources of scientific expertise, historical data, and technological advances to expand problem solving options and mechanisms that address the threat of natural hazards to the Northern Neck region.
Objective	Utilize the Coastal Resiliency Master Plan data and seek out new studies and educational opportunities. Guide jurisdictions in the integration of climate change and hazard mitigation into other policy and planning efforts, to include comprehensive plans, local resiliency plans, and mitigation project plans.



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2017 Goal	Address natural hazards and vulnerabilities that represent a threat to the community.
Goal #3	Pursue opportunities to increase the resiliency of critical infrastructure by means of ongoing capabilities assessments, known hazard monitoring, and development of inclusive strategies in the communities.
Objective	Employ lessons learned from participation in the RAFT Program and utilize the Resilience Action Checklists in prioritizing mitigation strategies and seeking sources to assist in implementation.
2017 Goal	Ensure that the appropriate infrastructure is in place and maintained to ensure continued functionality of all critical services necessary to protect the residents, property, and critical infrastructure of the Northern Neck Region.
Goal #4	Enhance the capabilities of local government to address natural hazards and the effect of natural hazards on infrastructure such as high hazard potential dams, to benefit the whole community for increased resilience.
Objective	Provide technical assistance to jurisdictions in locally led planning efforts. Emphasize a culture of preparedness through public engagement and educational opportunities, strengthening infrastructure and reinforcing existing structures, coding, and enforcement.
2017 Goal	Enhance the capabilities of local government to address natural hazards to enhance the whole community for increased resilience.
Goal #5	Coordinate activities and educational opportunities focusing on natural hazard awareness and disaster preparedness activities to edify populations in the Northern Neck Region. Provide knowledge, motivate, and teach skills to citizens and visitors, focusing on vulnerable populations, to mitigate the risk of casualties.
Objective	Expand upon current and create new public outreach activities. Research and study the benefits of creating a regional "Program for Public Information" (PPI) Committee to assist localities with education, distribution, and management.
2017 Goal	Increase natural hazard awareness of our citizens. Educate the Northern Neck Region's citizens and part time residents on citizen and Community Hazard resilience.



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Goal #6	Encourage education and assist communities in the development and enforcement of solid floodplain management programs and participation/compliance with the National Flood Insurance Program (NFIP), utilizing available resources and tools to identify the floodplains and risks areas.
Objective	Lead communities in flood mitigation efforts utilizing data and Flood Resistant Design and Construction guidance (ASCE 24-05) to limit development in floodplain areas, adopt and enforce building codes that increase resiliency and decrease natural habitat detriment, and to plan and execute projects for stormwater management/stormwater runoff improvements. Promote implementing floodplain management techniques that exceed minimum requirements.
2017 Goal	Participate and Comply with the National Flood Insurance Program (NFIP) through Floodplain Identification, Mapping, and Floodplain Management.

Specific objectives and actions to support these goals are described in Table 9-2 and jurisdiction specific actions are described in Table 9-3.

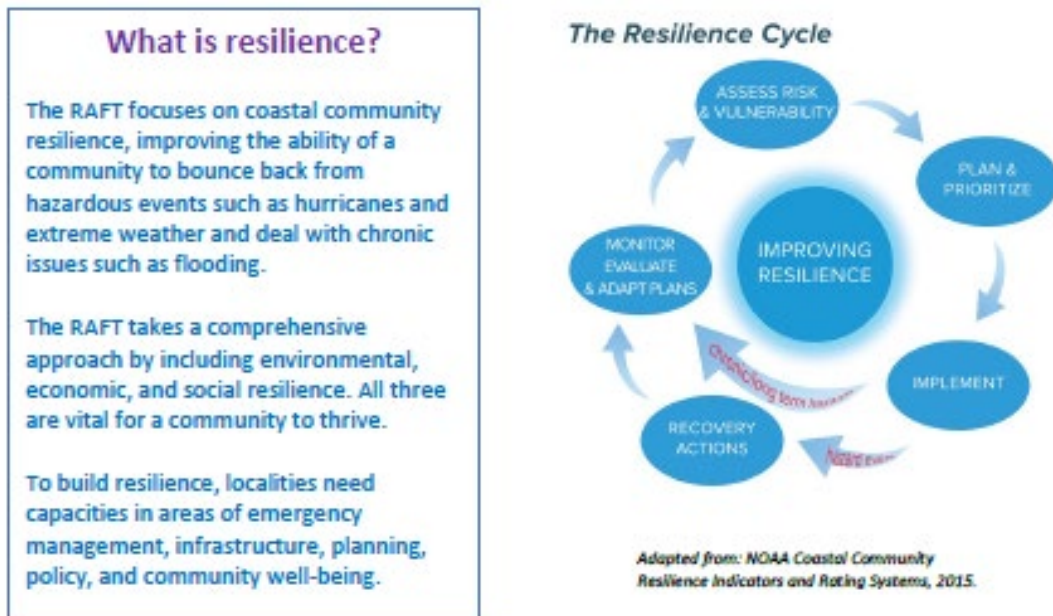
9.2.1 RAFT

The Resilience Adaptation Feasibility Tool is an instrument provided through a collaborative effort of The Institute for Engagement & Negotiation at the University of Virginia, The Virginia Coastal Policy Center at William & Mary Law School, and Old Dominion University/Virginia Sea Grant Climate Adaptation and Resilience Program. The tool assists communities in self-assessment and emergency risk communications to identify needs, goals, and objectives. Participating communities receive a report referred to as the "RAFT Scorecard," which provides an in-depth valuation of the community's resilience, and then attend a workshop to review the information and recommendations on the RAFT Scorecard. A plan for improving mitigation actions in the community starts at this workshop, followed by an established timeline for the review of completed projects at the one-year mark. Participating in a RAFT process provides the communities with opportunities to identify planning tasks and more funding opportunities and can increase a community's Community Rating System (CRS) score.

Eight of the ten participating jurisdictions participated in a RAFT process in 2020-2022, with Montross and Irvington being included in their respective counties' process. The results of the workshops were taken back to the jurisdictions and utilized by emergency management personnel to strive for a better understanding of their needs and to begin working through the action plan created.

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Figure 9-1: Resilience Cycle



Source: RAFT - <https://raft.iem.virginia.edu/>

Each jurisdiction was scored based on categories as defined below and then demonstrated in Table 9-2 and each category offers up to possible points.

- *Policy, Leadership, & Collaboration* – Measures policy and legislation in place for coastal resilience and includes coordination and collaboration between various levels of government, and how accessible and open government data is to the public.
- *Risk Assessment & Emergency Management* – Examines how well a locality has conducted risk assessments to prepare for coastal storm hazards, identified vulnerable populations and their needs during or after a coastal storm hazard, and developed plans for disaster preparedness, including a Hazard Mitigation Plan.
- *Infrastructure Resilience* – Assesses how well the locality has identified methods and plans for storm water and protecting critical infrastructure including using natural and nature-based features (NNBF).
- *Planning for Resilience* – Assesses the comprehensive plan and zoning code for resilience, how a locality is using incentives to promote resilience in building and development, how policies protect ecosystems, how they use green infrastructure to improve resilience, and how much resilience has been incorporated into planning.
- *Community Engagement, Health, and Wellbeing* – Assesses how the community engages with residents in planning for coastal storm hazard including social equity considerations and examines the locality's attention to issues of health and wellness during and after coastal events.



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Table 9-2: Northern Neck Jurisdiction's RAFT Scorecard Data

Jurisdiction	Policy, Leadership, & Collaboration	Risk Assessment & Emergency Management	Infrastructure Resilience	Planning for Resilience	Community Engagement, Health, & Well Being	Total Score
Lancaster County	14	16	14	12	13	69
Town of Irvington	n/a	n/a	n/a	n/a	n/a	Incorporated into Lancaster County's
Town of Kilmarnock	9	13	10	9	10	51
Town of White Stone	7	15	9	3	5	39
Northumberland County	14	15	10	17	11	67
Richmond County	11	16	11	9	8	55
Town of Warsaw	8	15	11	14	13	62
Westmoreland County	11	18	13	10	6	58
Town of Colonial Beach	9	14	9	12	10	54
Town of Montross	n/a	n/a	n/a	n/a	n/a	Incorporated into Westmoreland County's

The Commonwealth of Virginia published the *Coastal Resilience Master Plan* in 2021 in which 2,000 stakeholders assisted to compile the data and subsequent publication that presents the impacts of future flooding scenarios on coastal Virginia, its resources, and community infrastructure. Takeaways from the plan were alarming for an area such as the Northern Neck with data providing indications of the following between 2020 and 2080:

- An estimated 170,000 acres (89%) of existing tidal wetlands and 3,800 acres (38%) of the existing dunes and beaches may be permanently lost to open water.
- Annualized flood damages are expected to increase by 1,300% (\$0.4 billion to \$5.1 billion)
- The number of residents and their homes that will be exposed to extreme coastal flooding shows projections growing 160% (360,000 to 943,000)
- Buildings of all natures, residential, public, and commercial, present a potential increase from 140,000 to 340,000 (nearly 150%)
- An increase of almost 280% is projected in the number of miles of roadway exposed to chronic coastal flooding (approximately 1,000 to 3,800 miles)



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The Commonwealth of Virginia Coastal Resilience Master Plan is a phased plan, the 2024 phase is forecasted to address subjects relative to pluvial flooding, riverine flooding, and compound flooding, in addition to expanding upon current resiliency projects, working with stakeholders, and extending the plan actions to jurisdictions further inland to expand statewide resiliency.

The Northern Neck Region embraces the State's stance on coastal resiliency and is committed to the following guiding principles – the "Commonwealth Resilience Planning Principles", which this plan has incorporated throughout.

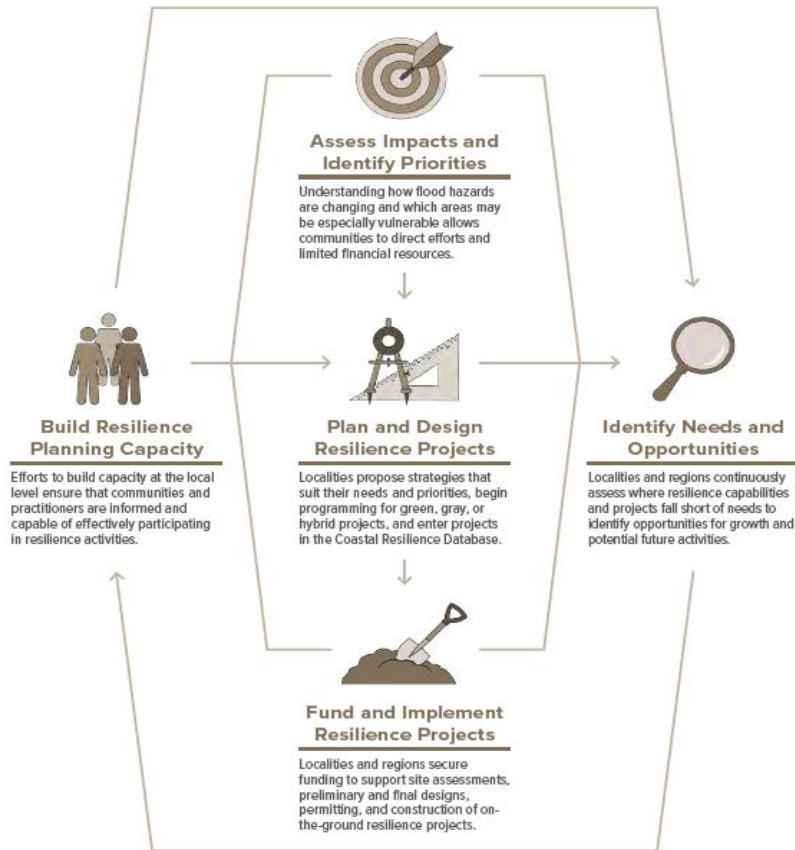
1. Acknowledge climate change and its consequences, and base decision making on the best available science.
2. Identify and address socioeconomic inequities and work to enhance equity through adaptation and protection efforts.
3. Utilize community and regional scale planning to the maximum extent possible, seeking region-specific approaches tailored to the needs of individual communities.
4. Understand fiscal realities and focus on the most cost-effective solutions for the protection and adaptation of communities, businesses, and critical infrastructure. The solutions will, to the extent possible, prioritize effective natural solutions.
5. Recognize the importance of protecting and enhancing green infrastructure in all regions and in the coastal region, natural coastal barriers, and fish and wildlife habitat by prioritizing nature-based solutions.

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Figure 9-2: Process for Building Coastal Resilience

Process for Building Coastal Resilience

Achieving coastal resilience requires a continuous process of building capacity, implementing resilience projects, and identifying outstanding needs and opportunities, aligned with Commonwealth oversight to collaborate, coordinate, and communicate across and between localities and regions to achieve consistent results.



Source: The Commonwealth of Virginia Coastal Resilience Master Plan

9.2.2 Community Rating System

Per FEMA, “The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP.” (<https://www.fema.gov/floodplain-management/community-rating-system>). Jurisdictions that participate in the CRS program are demonstrating that efforts are being taken to do the follow:

- Lessen and avoid flood damage to insurable property
- Support and reinforce the insurance aspects of the NFIP
- Foster comprehensive floodplain management

The Northern Neck Regional jurisdictions that participated in the RAFT process above participated in a workshop to explore the potential of joining the CRS. The workshops and RAFT assisted each jurisdiction in elevating their scores and increasing the potential for lower insurance rates and it is a step towards already being compliant with the program at the time a decision may be made to join. Jurisdictions are awarded points and a community classification based on criteria in four categories:

- Public Information



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- Mapping and Regulations
- Flood Damage Reduction
- Warning and Response

Flood insurance premium rates in Community Rating System communities are discounted in increments of 5%. Participation in the CRS is under consideration by the Northern Neck Region's jurisdictions and is a noted 2023 Mitigation Action Goal for several jurisdictions. This can be viewed in the jurisdiction matrixes below.

9.3 Identification and Analysis of Mitigation Actions

Actions are detailed and specific strategies and projects that help support regional natural hazard resiliency and mitigation goal achievement. The actions from the 2017 plan formed a platform for discussing mitigation actions for the 2023 plan. The goal-action mitigation strategy structure was continued, and objectives were outlined as well to meet current standards and to provide a clear picture of the mission of the mitigation actions and strategies. A discussion was held via electronic means, interviews, and conversations at official meetings concerning the 2017 plan mitigation actions and strategies to help frame which actions should be continued and what organizational form the 2023-2027 mitigation actions should take.

Each community participated in an individual interview process attended by local personnel, NNPDC Staff, and Olson Group, LTD personnel. In addition, the jurisdiction representatives evaluated the actions for inclusion in the plan with the following criteria from the FEMA Local Mitigation Planning Guidebook:

- What long-term goals does the community want to achieve?
- What specific actions will local government, community organizations, and others take to reduce risks to hazards?
- How will the actions be implemented and prioritized?
- How effectively will the action protect lives and prevent injuries?
- How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- Is the mitigation action technically feasible? Is it a long-term solution?
- Does the public support the mitigation action? Is there the political will to support it?
- Does the community have the personnel and administrative capabilities to implement the action and maintain it, or will outside help be necessary?
- Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation?

The 2023-2027 mitigation actions are organized into six major categories. Mitigation actions per community are organized by the following action types:

- 1) Prevention
 - a. Planning and zoning
 - b. Building codes
 - c. Open space reservations
 - d. Floodplain regulations
 - e. Stormwater management regulations
 - f. Drainage system maintenance



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- g. Capital improvements programming
 - h. Shoreline/Riverine setbacks
- 2) Property Protection
 - a. Acquisition/demolition
 - b. Relocation
 - c. Building elevation
 - d. Critical facilities protection
 - e. Retrofitting (wind proofing, flood proofing, seismic design)
 - f. Safe rooms, shutters, shatter resistant glass
 - g. Insurance
- 3) Natural Resource Protection
 - a. Land Acquisition
 - b. Floodplain protection
 - c. Watershed management
 - d. Beach and dune preservation
 - e. Riparian buffers
 - f. Forest and vegetation management (fire resistant landscaping, fuel breaks)
 - g. Erosion and sediment control
 - h. Wetland preservation and restoration
 - i. Habitat preservation
 - j. Slope stabilization
 - k. Historic properties and archaeological site preservation
- 4) Structural Projects
 - a. Reservoirs
 - b. Dams/levees/dikes/floodwalls/seawalls
 - c. Diversions/detention/retention
 - d. Channel modification
 - e. Beach nourishment
 - f. Storm sewers
- 5) Emergency Services
 - a. Warning systems
 - b. Evacuation planning and management
 - c. Emergency response training and exercises
 - d. Sandbagging for flood protection
 - e. Installing temporary shutters for wind protection
- 6) Education & Awareness
 - a. Outreach projects
 - b. Speaker series/demonstration events
 - c. Hazard mapping
 - d. Real estate disclosure
 - e. Library materials
 - f. School children's educational programs
 - g. Hazard expositions



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Table 9-3: 2023-2027 Northern Neck Regional Mitigation Actions

#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Northern Neck Region Planning District Commission									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Agency Wide	Initiated & Ongoing	TBD on a case-by-case basis	HMGP FMA	High
2	Promote and expand upon the Living Shoreline Initiative in both its non-structural and combined structural/non-structural aspects. Utilize techniques such as grading land away from eroding shorelines, maintaining, and upgrading riparian buffers adjacent to shorelines, and implementing green infrastructure and stormwater management improvements.	<ul style="list-style-type: none"> Flooding Coastal Erosion 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Agency Wide	Initiated & Ongoing	\$1 million	Coastal Resiliency Programs HMGP	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
3	Provide technical assistance to Northern Neck jurisdictions, to integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Agency Wide	Ongoing	N/A	Existing Budget	High
4	Promote practices implementing nature-based approaches that increase regional resiliency. Projects sought include but are not limited to: Ecosystem restoration and adaptation, green infrastructure, and eco-system-based approaches addressing climate change, coastal resources, and conservation of protected areas.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection 	All	Agency Wide	Ongoing	N/A	Existing Budget	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
5	Seek data sources and educational opportunities that increase regional hazards awareness and provide additional knowledge to jurisdictional personnel that will be applied to project building and initiation.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Emergency Services Education & Outreach 	All	Agency Wide	1-2 years	\$50,000	Existing Budget	High
6	Expand upon current and create new public outreach activities. Utilize the PDC's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education & Outreach 	All	Agency Wide	Ongoing	\$60,000	DCR, USACE	High
7	Seek education and funding to initiate a program that will organize investigations and risk assessments	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection 	All	Agency Wide	1-3 years	N/A	Existing Budget	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
	that will utilize FEMA's risk prioritization methodology to define the HHPDs within the Region.		<ul style="list-style-type: none"> Natural Resource Protection Structural 		Regional Planner Project Manager				
8	Provide technical assistance to Northern Neck jurisdictions to organize projects that will repair, remove, or provide other structural or non-structural means to rehabilitate eligible HHPDs	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural 	All	Agency Wide Project Manager Regional Planner	5 years	N/A	Existing Budget	Medium



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Mitigation action plans were developed for all the identified actions. Each mitigation action plan includes:

- Goal(s) it is intended to help achieve,
- Hazard(s) it is designed to mitigate,
- Agency assigned responsibility for carrying out the strategy,
- Status of the goal,
- Timeframe for completion, and
- Priority level for its implementation (high, medium, or low).



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Table 9-4: 2023-2027 Northern Neck Region Jurisdiction Specific Mitigation Actions

#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Lancaster County									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Lancaster County Emergency Management Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	Lancaster County, HMGP, CDBG	Medium
2	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green-space, and improve stormwater drainage capacity, discouraging items such as impermeable surfaces, the disturbance of natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.	<ul style="list-style-type: none"> Flood Coastal Erosion 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural 	New	Lancaster County Emergency Management Public Works Building & Zoning	1-3 years	Staff Time	Lancaster County, FMA, HMGP, BRIC, DRC	High
3	Seek funding sources to build nature-based shoreline stabilization strategies. Continue best management practices in shoreline erosion prevention, and mandate that new subdivisions require coordinated shoreline protection plans.	<ul style="list-style-type: none"> Flood Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Lancaster County Building & Zoning Floodplain Manager	Initiated & Ongoing	Staff Time	CDBG, DRC, HMGP, USACE, VA DEQ	High



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4	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Lancaster County County Administration Emergency Management	Initiate & Ongoing	NNPDC Staff Time, County Staff Time	CDBG, HMGP	Medium
5	Consider using free, simple, and/or permanent easement to prevent development in the highest priority undeveloped floodplain (and/or wetlands) areas. Use these areas as public open space for passive recreational uses including water access.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection 	New	Lancaster County Floodplain Manager Building & Zoning	Ongoing	TBD	HMGP, DRC	Low
6	Identify areas of repetitive loss and severe repetitive loss structures to seek appropriate improvements under HMA guidelines.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection 	Existing	Lancaster County Building & Zoning NNPDC	1-5 years	Staff Time, Project Costs TBD	FMA, HMGP	High
7	Encourage waterfront property owners in existing communities to consider community based multi-parcel shoreline protection strategies before they pursue individual approaches.	<ul style="list-style-type: none"> Coastal Erosion 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structure 	Existing	Lancaster County Building & Zoning NNPDC	Ongoing	Staff Time, NNPDC Staff Time	FMA, HMGP	High



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8	Continue to upgrade and expand the current GIS capabilities, training, and resources throughout the community.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Emergency Services 	Existing	Lancaster County County Administration GIS Coordinator	Initiated & Ongoing	Staff Time	CDBG	Medium
9	Seek further improvements to hazard mitigation elements that will enable the community to become eligible for CRS participation.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Emergency Services Education and Outreach 	All	Lancaster County Emergency Management Building & Zoning	Initiated & Ongoing	Staff Time, NNPDC Staff Time	HMGP	Low
10	Expand the purchase and training on the use of NOAA radios. Provide NOAA radios to public facilities.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Emergency Services 	Both	Lancaster County Emergency Management	Initiated & Ongoing	\$50,000	CDBG, HMGP	High
11	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Planning Structural 	Both	Lancaster County Building & Zoning	Initiated & Ongoing	\$150,000	CDBG, FMA, HMGP	High
12	Inform community property owners about changes to the DFIRM/FIRM that may impact their insurance rates.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Education and Outreach 	Both	Lancaster County Building & Zoning	Ongoing	Staff Time, NNPDC Staff Time	Lancaster County	Medium



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13	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Lancaster County Emergency Management Community Planning	Initiated & Ongoing	Staff Time, NNPDC Staff Time	Lancaster County, CDBG, FMA, HMGP	High
14	Seek funding for and implement early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Property Protection Emergency Services 	All	Lancaster County County Administration Emergency Management	New	Staff Time, NNPDC Staff Time	Lancaster County, CDBG, FMA, HMGP	High
15	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Lancaster County Emergency Management	New	Staff Time, Consultant	Lancaster County, EMPG	Medium



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16	Seek education and funding to initiate a program that will organize investigations and risk assessments that will utilize FEMA's risk prioritization methodology to define the HHPDs within the Region.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural 	All	Lancaster County Emergency Management Floodplain Administrator	New	Staff Time	Existing Budget	High
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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of Irvington									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of Irvington Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	Irvington, HMGP, CDBG	Medium
2	Integrate mitigation plan requirements and resiliency actions into other appropriate planning mechanisms such as comprehensive plans and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Irvington Emergency Management Town Administration	Ongoing	NNPDC Staff Time, Irvington Staff Time	CDBG, HMGP	High



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3	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Town of Irvington Emergency Management Community Planning	Initiated & Ongoing	Staff Time, NNPDC Staff Time	Irvington, CDBG, FMA, HMGP, EMPG	Medium
4	Seek funding for and implement early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Property Protection Emergency Services 	All	Town of Irvington Emergency Management	New	Staff Time, NNPDC Staff Time	Irvington, CDBG, FMA, HMGP	High
5	Seek funding to assess and subsequently improve stormwater management capabilities.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resources Protection 	All	Town of Irvington Floodplain Manager	New	Staff Time, NNPDC Staff Time	Irvington, FMA, HMGP, BRIC	Medium



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of Kilmarnock									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of Kilmarnock Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	Kilmarnock, HMGP, FMA, BRIC	Medium
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Kilmarnock Emergency Management Town Administration	Ongoing	NNPDC Staff Time, Kilmarnock Staff Time	CDBG, HMGP, EMPG	High



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3	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Town of Kilmarnock Town Administration Community Planning	Initiated & Ongoing	Kilmarnock, Staff Time, NNPDC Staff Time	Kilmarnock, CDBG, FMA, HMGP, EMPG	Medium
4	Seek funding for and implement early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Property Protection Emergency Services 	All	Town of Kilmarnock Emergency Management	1-5 years	Kilmarnock, Staff Time, NNPDC Staff Time	Kilmarnock, County, CDBG, FMA, HMGP	High
5	Seek funding to assess and subsequently improve stormwater management capabilities.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resources Protection 	All	Town of Kilmarnock Floodplain Manager	1-3 years	Kilmarnock, Staff Time, NNPDC Staff Time	Kilmarnock, County, CDBG, FMA, HMGP	Medium
6	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Flooding 	All	Town of Kilmarnock Building & Zoning	Ongoing	Staff Time, Projects TBD	HMGP, FMA, BRIC, EMPG	Medium



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7	Create open communication, education, and planning opportunities between emergency management and the business sector during severe weather emergencies or evacuations.	<ul style="list-style-type: none">▪ Tornado▪ Severe Weather▪ Wildfire▪ Flooding▪ Coastal Erosion▪ Landslide▪ Drought▪ Heatwave▪ Earthquake	<ul style="list-style-type: none">▪ Education and Outreach	Existing	Town of Kilmarnock Emergency Management Community Planning	1-3 years	Kilmarnock Staff Time	FMA, HMGP, CDBG, EMPG	High
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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of White Stone									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of White Stone Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	White Stone, HMGP, FMA, BRIC	Medium-High
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of White Stone Emergency Management Town Administration	Ongoing	NNPDC Staff Time, White Stone Staff Time	CDBG, HMGP, EMPG	Medium
3	Seek new and continue incorporating hazard mitigation techniques into new community facilities to minimize damages, such as the new wastewater treatment facility and backup electricity, continuing Phases of project.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Town of White Stone Town Administration Building & Zoning	Initiated & Ongoing	Staff Time, Projects TBD	HMGP, FMA, BRIC	Medium High
4	Evaluate existing storm water system to determine if it is adequate for existing (or future) flood hazards and plan for upgrades.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Town of White Stone Floodplain Manager	1-3 years	\$60,000	HMGP, FMA, CDBG	High



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5	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Town of White Stone Emergency Management Community Planning	1-3 years	White Stone, Staff Time, NNPDC Staff Time	White Stone, CDBG, FMA, HMGP, EMPG	Medium
6	Evaluate exiting storm water system to determine if it is adequate for existing (or future) flood hazards and plan for upgrades.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Property Protection Emergency Services 	All	Town of White Stone Floodplain Manager	1-5 years	\$150,000	HMGP CDBG, EMPG	High
7	Seek funding to identify needs and execute needed upgrades to retrofit critical infrastructure buildings with emergency utility backups.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Emergency Services 	Existing	Town of White Stone Town Administration	1-3 years	Study \$75,000 Projects TBD	HMGP, HMGP 5%	High
8	Continue with a ditch maintenance program consisting of routine inspections and subsequent debris	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	Existing	Town of White Stone Public Works	Ongoing	White Stone Staff, Upgrades TBD	White Stone Budget	High



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	removal to reduce the risk of pluvial flooding events.								
9	Research and seek funding for upgrades to communications that would include early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Emergency Services 	All	Town of White Stone Emergency Management	1-3 years	White Stone Staff Time, NNPDC Staff Time	White Stone, CDBG, FMA, HMGP	Medium



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Northumberland County									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Northumberland County Building & Zoning NNPDC	Initiated & Ongoing	County Staff Time	County, HMGP, FMA, BRIC	High
2	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green-space, and improve stormwater drainage capacity, discouraging items such as impermeable surfaces, the disturbance of natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.	<ul style="list-style-type: none"> Flooding Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Northumberland County Building & Zoning Floodplain Manager	Ongoing	Staff Time	County, FMA, HMGP, BRIC, DRC	High
3	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Northumberland County Emergency Management County Administration	Initiated & Ongoing	NNPDC Staff Time, County Staff Time	CDBG, HMGP, EMPG	Medium



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4	Seek funding sources to build nature-based shoreline stabilization strategies. Continue best management practices in shoreline erosion prevention, and mandate that new subdivisions require coordinated shoreline protection plans.	<ul style="list-style-type: none"> Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resources Protection 	All	Northumberland County Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	CDBG, DRC, HMGP, USACE, VA DEQ	High
5	Seek new and continue incorporating hazard mitigation techniques into new community facilities to minimize damages, such as the new wastewater treatment facility and backup electricity, continuing Phases of project.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Northumberland County Emergency Management Building & Zoning	Initiated & Ongoing	Staff Time, Projects TBD	HMGP, FMA, BRIC	High
6	Consider using fee simple and/or permanent easements to prevent development in the highest priority undeveloped floodplain (and/or wetlands) areas. Use these areas as public open space for passive recreational uses including water access.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resources Protection Structural 	All	Northumberland County Building & Zoning Floodplain Manager	Ongoing	Staff Time, Projects TBD	County	High
7	Engage in a wetlands acquisition and /or restoration program with Wetlands Watch and other conservation partners.	<ul style="list-style-type: none"> Prevention Flooding Natural Resources Protection 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Northumberland County Floodplain Manager NNPDC	Ongoing	Staff Time, Projects TBD	HMGP, BRIC, DRC, USACE	Low
8	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI)	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave 	<ul style="list-style-type: none"> Education and Outreach 	All	Northumberland County Emergency Management Community Planning	1-3 years	County Staff Time, NNPDC Staff Time	County, CDBG, FMA, HMGP	Medium



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	Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Earthquake 							
9	Encourage waterfront property owners in existing communities to consider community-based multi-parcel shoreline protection strategies before they pursue individual approaches.	<ul style="list-style-type: none"> Flooding Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection Structural 	All	Northumberland County Building & Zoning NNPDC	1-5 years	County Staff Time, NNPDC Staff Time	HMGP, DRC	High
10	Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign)	<ul style="list-style-type: none"> Prevention Flooding Structural 	<ul style="list-style-type: none"> Planning 	Existing	Northumberland County Public Works	1-3 years	Staff Time, Projects TBD	HMGP, VDOT, CDBG	High
11	Investigate implementation of cumulative damage provision as part of floodplain ordinance.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection 	All	Northumberland County Floodplain Manager	Ongoing	County Staff Time	County, HMGP	Low
12	Assist with local floodplain determinations and maintain a record of approved changes to the local floodplain.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Education and Outreach 	All	Northumberland County Floodplain Manager	1-3 years	County Staff Time	County, HMGP	Medium
13	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Structural 	All	Northumberland County Building & Zoning	Ongoing	Staff Time, Projects TBD	HMGP, FMA, BRIC, EMPG	Medium
14	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention 	All	Northumberland County Emergency Management	Ongoing	Staff Time,	HMGP, EMPG	High



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	storage of chemicals in SFHA, prohibition or certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit any new residential or non-residential structures in the SFHA.				Building & Zoning Floodplain Manager NNPDC				
15	Seek further improvements to hazard mitigation elements that will enable the community to become eligible for CRS participation.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Northumberland County Emergency Management	1-3 years	Staff Time,	HMGP, EMPG	Low
16	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Northumberland County Emergency Management Community Planning	1-3 years	Staff Time, Consultant	County, EMPG	Medium



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Richmond County									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Richmond County Building & Zoning NNPDC	Initiated & Ongoing	Staff Time	Richmond County, HMGP	High
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Richmond County Emergency Management County Administration	Initiated & Ongoing	NNPDC Staff Time, County Staff Time	CDBG, HMGP	Medium
3	Continue to seek training opportunities for staff to enhance abilities of current GIS capabilities within the jurisdiction.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave 	<ul style="list-style-type: none"> Planning 	Existing	Richmond County Emergency Management GIS Coordinator	Ongoing	County Staff Time	CDBG, HMGP, EMPG	Medium



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		<ul style="list-style-type: none"> Earthquake 							
4	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Richmond County Emergency Management Community Planning	1-3 years	County Staff Time, NNPDC Staff Time	Richmond County, CDBG, FMA, HMGP	Medium
5	Encourage waterfront property owners in existing communities to consider community-based multi-parcel shoreline protection strategies before they pursue individual approaches.	<ul style="list-style-type: none"> Flooding Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection Structural 	All	Richmond County Building & Zoning NNPDC	1-5 years	County Staff Time, NNPDC Staff Time	HMGP, DRC	Medium
6	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Richmond County Emergency Management	1-3 years	County Staff Time, Consultant	Richmond County, EMPG	Medium
7	Identify funding for non-CIP coastal resilience projects, including priority needs of vulnerable populations.	<ul style="list-style-type: none"> Coastal Erosion Flooding 	<ul style="list-style-type: none"> Planning 	All	Richmond County	1-3 years	County Staff Time, Consultant	Richmond County, EMPG	Medium



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					Emergency Management NNPDC				
8	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none">▪ Flooding▪ Coastal Erosion	<ul style="list-style-type: none">▪ Prevention▪ Structural	All	Richmond County Floodplain Manager	Initiated & Ongoing	Staff Time, Projects TBD	HMGP, FMA, BRIC, EMPG	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of Warsaw									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of Warsaw Building & Zoning NNPDC	Initiated & Ongoing	Town Staff Time	Warsaw, HMGP	High
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Warsaw Emergency Management Town Administration	Initiated & Ongoing	NNPDC Staff Time, Town Staff Time	CDBG, HMGP	Medium



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3	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Town of Warsaw Emergency Management Community Planning	Ongoing	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High
4	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Warsaw Emergency Management	1-3 years	Town Staff Time, Consultant	Town, EMPG	Medium
5	Seek funding for and implement early warning signals/systems/emergency warning tools for residents (especially vulnerable populations).	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Planning 	All	Town of Warsaw Emergency Management	1-3 years	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Westmoreland County									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Westmoreland County Building & Zoning NNPDC	Initiated & Ongoing	County Staff Time	County, HMGP	Medium
2	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green-space, and improve stormwater drainage capacity, discouraging items such as impermeable surfaces, the disturbance of natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.	<ul style="list-style-type: none"> Flood Coastal Erosion 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural 	New	Westmoreland County Public Works Floodplain Manager	1-3 years	County Staff Time	County, HMGP, BRIC, DRC	High
3	Seek funding sources to build nature-based shoreline stabilization strategies. Continue best management practices in shoreline erosion prevention, and mandate that new subdivisions require coordinated shoreline protection plans with specific attention to the Stratford Hall area erosion and cliff failure issues.	<ul style="list-style-type: none"> Flood Coastal Erosion 	<ul style="list-style-type: none"> Property Protection Natural Resource Protection 	All	Westmoreland County Floodplain Manager Building & Zoning	Initiated & Ongoing	County Staff Time	CDBG, DRC, HMGP, USACE, VA DEQ	High



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4	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Westmoreland County Emergency Management County Administration	Initiate & Ongoing	NNPDC Staff Time, County Staff Time	CDBG, HMGP	Medium
5	Continue to upgrade and expand the current GIS capabilities, training, and resources throughout the community.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning Emergency Services 	Existing	Westmoreland County Emergency Management GIS Coordinator	Initiated & Ongoing	County Staff Time	CDBG	Medium
6	Seek further improvements to hazard mitigation elements that will enable the community to become eligible for CRS participation.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Emergency Services Education and Outreach 	All	Westmoreland County Emergency Management	Initiated & Ongoing	County Staff Time, NNPDC Staff Time	HMGP	Low
7	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Planning Structural 	Both	Westmoreland County Building & Zoning	Initiated & Ongoing	\$150,000	CDBG, FMA, HMGP	High



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8	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Westmoreland County Emergency Management Community Planning	Initiated & Ongoing	County Staff Time, NNPDC Staff Time	County, CDBG, FMA, HMGP	High
9	Consider using fee simple and/or permanent easement to prevent development in the highest priority undeveloped floodplain (and/or wetlands) areas. Use these areas as public open space for passive recreational uses including water access.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Planning Property Protection 	All	Westmoreland County County Administration Building & Zoning	Ongoing	County Staff Time, Projects TBD	County	Medium
10	Evaluate built-upon areas within the floodplain or along the high erosion risk shoreline for possible relocation and/or acquisition. Target FEMA's Repetitive Loss Properties	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Property Protection Structural 	All	Westmoreland County Building & Zoning NNPDC	Ongoing	\$85K - \$120K	HMGP, FMA	High



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11	Develop a resident and visitor emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Planning Education and Outreach 	All	Westmoreland County Emergency Management	1-3 years	\$85,000	HMGP, EMPG	Medium
16	Seek education and funding to initiate a program that will organize investigations and risk assessments that will utilize FEMA's risk prioritization methodology to define the HHPDs within the Region.	<ul style="list-style-type: none"> Flooding 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural 	All	Westmoreland County Emergency Management Floodplain Administrator	New	Staff Time	Existing Budget	High



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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of Colonial Beach									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of Colonial Beach Building & Zoning NNPDC	Initiated & Ongoing	Town Staff Time	Town, HMGP	High
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Colonial Beach Emergency Management Town Administration	Initiated & Ongoing	NNPDC Staff Time, Town Staff Time	CDBG, HMGP	Medium



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3	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> ▪ Tornado ▪ Severe Weather ▪ Wildfire ▪ Flooding ▪ Coastal Erosion ▪ Landslide ▪ Drought ▪ Heatwave ▪ Earthquake 	<ul style="list-style-type: none"> ▪ Education and Outreach 	All	Town of Colonial Beach Emergency Management Community Planning	Ongoing	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High
4	Develop a resident and visitor emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> ▪ Tornado ▪ Severe Weather ▪ Wildfire ▪ Flooding ▪ Coastal Erosion ▪ Landslide ▪ Drought ▪ Heatwave ▪ Earthquake 	<ul style="list-style-type: none"> ▪ Planning 	All	Town of Colonial Beach Emergency Management	1-3 years	\$85,000	HMGP, EMPG	Medium
5	Seek funding for and implement early warning signals/systems/emergency warning tools for residents (especially vulnerable populations.)	<ul style="list-style-type: none"> ▪ Tornado ▪ Severe Weather ▪ Wildfire ▪ Flooding ▪ Coastal Erosion ▪ Landslide ▪ Drought ▪ Heatwave ▪ Earthquake 	<ul style="list-style-type: none"> ▪ Prevention ▪ Planning 	All	Town of Colonial Beach Emergency Management	1-3 years	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High



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6	Expand upon the stormwater management program consisting of routine inspections and subsequent debris removal and consider additions of culverts where applicable.	<ul style="list-style-type: none"> Flooding Natural Resources 	<ul style="list-style-type: none"> Prevention Planning 	Existing	Town of Colonial Beach Public Works	Ongoing	Town Staff, Projects TBD	HMGP, FMA CDBG	Medium
7	Identify a program of corrective actions to improve shoreline preservation and protection measures.	<ul style="list-style-type: none"> Coastal Erosion Flooding 	<ul style="list-style-type: none"> Natural Resource Protection 	Existing	Town of Colonial Beach Floodplain Manager NNPDC	1-3 years	Town Staff, Projects TBD	HMGP, FMA, DRC, USACE	High
8	Work with VDOT to establish flood level markers along bridges and other structures to indicate the rise of water levels along creeks and rivers in potential flood prone areas.	<ul style="list-style-type: none"> Coastal Erosion Flooding 	<ul style="list-style-type: none"> Prevention Education and Outreach 	Existing	Town of Colonial Beach Public Works	Ongoing	\$50,000	HMGP VDOT	Low
9	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	<ul style="list-style-type: none"> Coastal Erosion Flooding 	<ul style="list-style-type: none"> Prevention 	All	Town of Colonial Beach Building & Zoning	Ongoing	\$150,000	CDBG, FMA, HMGP	High
10	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or storage of chemicals in SFHA, prohibition of certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit	<ul style="list-style-type: none"> Coastal Erosion Flooding 	<ul style="list-style-type: none"> Prevention Planning 	All	Town of Colonial Beach Building & Zoning	Ongoing	Town Staff	HMGP	Low



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	any new residential or non-residential structures in the SFHA.								
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#	Mitigation Action	Hazard(s) Addressed	Project Type	Applies to Existing or New Structures	Responsible Party(s)	Timeframe	Estimated Cost (\$)	Possible Funding Source	Priority
Town of Montross									
1	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Property Protection Natural Resource Protection Structural Emergency Services Education & Outreach 	All	Town of Montross Building & Zoning NNPDC	Initiated & Ongoing	Town Staff Time	Town, HMGP	High
2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Montross Emergency Management Town Administration	Initiated & Ongoing	NNPDC Staff Time, Town Staff Time	CDBG, HMGP	Medium



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3	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Education and Outreach 	All	Town of Montross Emergency Management Community Planning	Ongoing	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High
4	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Planning 	All	Town of Montross Emergency Management	1-3 years	Town Staff Time, Consultant	Town, EMPG	Medium
5	Seek funding for and implement early warning signals/systems/emergency warning tools for residents (especially vulnerable populations).	<ul style="list-style-type: none"> Tornado Severe Weather Wildfire Flooding Coastal Erosion Landslide Drought Heatwave Earthquake 	<ul style="list-style-type: none"> Prevention Planning 	All	Town of Montross Emergency Management	1-3 years	Town Staff Time, NNPDC Staff Time	Town, CDBG, FMA, HMGP	High



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6	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or storage of chemicals in SFHA, prohibition of certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit any new residential or non-residential structures in the SFHA.	<ul style="list-style-type: none">▪ Flooding	<ul style="list-style-type: none">▪ Prevention▪ Planning	All	Town of Montross Emergency Management Building & Zoning Floodplain Manager	Ongoing	Town Staff	HMGP	Medium
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9.4 Flood Mitigation Projects

Across the region, the participating jurisdictions strive to mitigate the effects of flooding. Counties and towns enforce floodplain regulations, regulate flood zone development, and create stormwater management plans and systems.

In cooperation with the Virginia Department of Emergency Management (VDEM), the Northern Neck Planning District Commission works to assist citizens through the FEMA application process for properties that qualify for a home-elevation grant. Qualification for (HMGP) depends on the history and cost of prior claims made by the homeowner. Depending on the grant, the property can be elevated or demolished and replaced with new construction¹.

Living Shorelines is a shoreline management system designed to protect or restore a natural shoreline ecosystem from powerful storms, accelerated sea level rise, and landward erosion using natural and, sometimes, human-caused elements. Throughout the Northern Neck Region and coastal plain, homes and businesses are experiencing increased erosion from winds, waves, currents, tides, and recreational activities, making homes and businesses more vulnerable. There are two categories for living shorelines – Non-structural and Combined structural/non-structural. Each utilizes vegetation to protect the shoreline from erosion, flooding, and storm surges. Depending on the scope of the living shoreline, landowners can apply for a free “*Living Shoreline Group 1 General Permit*” through the Virginia Marine Resources Commission and the local Wetlands Board².

9.5 Prioritization and Implementation of Mitigation Actions

The preceding sections identify specific actions to achieve identified goals, an appropriate responsible party for each action, and a schedule for accomplishment and suggested funding sources. These tables also indicate an initial prioritization of the actions.

9.5.1 Prioritization

The Hazard Mitigation Steering Committee and Working Group used the STAPLE/E (*Social, Technical, Administrative, Political, Legal, Economic, and Environmental*) criteria to select and prioritize the most appropriate mitigation and adaptation alternatives found in Table 9-5. This methodology requires that social, technical, administrative, political, legal, economic, and environmental elements be considered when reviewing potential actions for Northern Neck Region jurisdictions to undertake. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on each jurisdiction’s capabilities.

¹ <https://www.northernneck.us/flood-hazard-mitigation/>

² <https://www.northernneck.us/living-shorelines-initiative/>



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Table 9-5: STAPLE/E Methodology

STAPLE/ E	Considerations
Social	<ul style="list-style-type: none"> is the proposed action socially acceptable to the community(s)? Are there equity issues involved that would mean that one segment of a community is treated unfairly? Will the action cause social disruption?
Technical	<ul style="list-style-type: none"> Will the proposed action work? Will it create more problems than it solves? Does it solve a problem or only a symptom? Is it the most useful action considering other community(s) goals?
Administrative	<ul style="list-style-type: none"> Can the community(s) implement the action? Is there someone to coordinate and lead the effort? Is there sufficient funding, staff, and technical support available? Are there ongoing administrative requirements that need to be met?
Political	<ul style="list-style-type: none"> Is the action politically acceptable? Is there public support both to implement and to maintain the project?
Legal	<ul style="list-style-type: none"> Is the community(s) authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity? Are there legal side effects? Could the activity be construed as a taking? Is the proposed action allowed by a comprehensive plan, or must a comprehensive plan be amended to allow the proposed action? Will the community(s) be liable for action or lack of action? Will the activity be challenged?
Economic	<ul style="list-style-type: none"> What are the costs and benefits of this action? Do the benefits exceed the costs? Are initial, maintenance, and administrative costs considered? Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)? How will this action affect the fiscal capability of the community(s)? What burden will this action place on the tax base or local economy? What are the budget and revenue effects of this activity? Does the action contribute to other community goals, such as capital improvements or economic development?
Environmental	<ul style="list-style-type: none"> How will the action affect the environment? Will the action need environmental regulatory approvals? Will it meet local and state regulatory requirements? Are endangered or threatened species likely to be affected?

This method was used by NNPDC and jurisdictions to weigh the various criteria for each of the identified actions and objectives including the relative cost-effectiveness as part of the “Economic” criteria. A priority level was assigned to each project based on the potential for the projects to be initiated and/or completed given the existing and potential funding, staff availability, and time; this prioritization method was selected because the HMSC and HMWG believed it would foster a realistic expectation of what could be accomplished in the next five years. A priority level of **High** indicates that these projects are currently in progress or are planned to be initiated within 1 year, have staff available, and have designated funds for completion or require minimal funds to complete. A priority level of **Medium** indicates that the community is



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likely to receive funding for these particular projects, has limited staff, funding options/opportunities will be sought, and if funding is received, the projects could be initiated/completed within 1-3 years. Lastly, a priority level of **Low** indicates that staff will have to be sought to accomplish, that these actions will be initiated and/or completed only if outside funding becomes available, and that the projects would take at least 3-5 years to initiate/complete. The resulting priority rankings are demonstrated in Table 9-3 and Table 9-4.

Actions for each jurisdiction were pulled from the 2017 plan and reviewed by planning personnel and jurisdiction officials. Then individual jurisdiction interviews were held and each community updated their mitigation actions, as did the Northern Neck Planning District Commission, with the assistance of the Olson Group. Some actions were kept and re-worded for updating purposes, while others were removed as completed or not applicable, and new ones were created to address new items presented by the jurisdictions and the RAFT reports. Mitigation action status are defined as New, Initiated and Ongoing, and Ongoing. **New** indicates an action that was added to the 2023 plan and has not been initiated. **Initiated and Ongoing** refers to an action in which tasks for all or part of the action have begun but not completed, and the progress on the task continues to be pursued. **Ongoing** refers to mitigation actions that were previously initiated and at this update continue to see progress being made. Appendix E notes all changes between the 2017 plan to the 2023 plan.

9.5.2 Implementation

The 2023 Northern Neck Regional Hazard Mitigation Plan outlines many mitigations action identified as “high” priority. The decision to address which actions first presents an ongoing challenge. Each participating jurisdiction is responsible for integrating mitigation actions into various planning documents, processes, and budgets under locally administered governing policies and procedures. Each action is assigned to a responsible department or departments that will work together to implement designated actions.

Funding is a crucial component of implementing mitigation actions. While several counties in the region have been actively pursuing and implementing mitigation projects funded by FEMA/VDEM Hazard Mitigation Assistance programs, low or no-cost high-priority strategies broaden the region’s mitigation and long-term resiliency approach. The Planning District Commission and participating jurisdictions will continue to pursue grant funding to implement more challenging actions. The NNPDC has been successful at obtaining funding for elevations in the region. Over the next five-year period the NNPDC plans to assist participating jurisdictions in seeking funds via programs such as HMGP or BRIC to seek studies and apply improvements to the dams in the Region.

Applying the “snowball” method is another implementation approach that can be effective in prioritizing mitigation actions. Publicizing a successful project can build momentum to implement other mitigation actions.

It is essential to the long-term implementation of the plan update that the underlying principles of the hazard mitigation plan update are incorporated into other community plans and mechanisms, such as:

- Comprehensive plans
- Development ordinances (Zoning Ordinance, Subdivision Ordinance, or Building Code)
- Resiliency planning
- Disaster recovery planning



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- Economic development plans
- Natural resource protection and shoreline protection plans
- Capital Improvement Program (CIP) budgeting

Section 3.0 Community Profile, provides insight into the current comprehensive plans for each community. Communities should work to ensure that the appropriate information from this plan is incorporated into the next update of their comprehensive plan. Data from the hazard identification and risk assessment, mitigation goals, and strategies can be directly included as a complete plan element. Projects that require significant investments, such as at-risk property acquisition or infrastructure hardening, are candidates for inclusion in capital improvement plans. Hazard vulnerability analysis can be incorporated into local emergency operations plans, debris management, coastal protection, and disaster recovery plans. Floodplain management data and mitigation actions can leverage Community Rating System (CRS) program participation. Mitigation is most successful when it is included in the day-to-day functions and priorities of the government. A constant network effort accomplishes integration, identifies, and highlights multi-objective benefits to each program, the communities, and their constituents. This effort is achieved through continuous communication, messaging, monitoring agendas, attending meetings, and sending memos

Simultaneous with these efforts, it will be necessary to constantly monitor funding opportunities that can be used to implement high-priority, high-cost mitigation actions. Funding opportunities that can be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federally earmarked funds, and grant programs that can serve or support multi-objective applications.

With adoption of the 2023 plan update, the Northern Neck Regional communities commit to:

- Pursuing the implementation of the high-priority, low/no-cost recommended actions.
- Keeping the concept of mitigation in the forefront of community decision-making by identifying and stressing the recommendations of the Hazard Mitigation Plan when other community goals, plans and activities are discussed and decided upon.
- Maintaining a constant monitoring of multi-objective, cost-share opportunities to assist the participating communities in implementing the recommended actions of this plan for which no current regular funding or support exists.
- Incorporate hazard risk information, and priority mitigation actions into appropriate local initiatives and programs through collaborative interaction between all related community departments and staff; and
- Evaluating and assessing regional mitigation plan goal and local jurisdiction action effectiveness to reduce hazard risk exposure.

In addition, the communities of the Northern Neck Region remain committed to the NFIP. They will continue to enforce floodplain regulations and undertake other actions to comply with the program, such as continued flood hazard risk evaluation, participation in Community Assistance Visits (CAVs) with the Commonwealth of Virginia NFIP staff, and education and outreach activities directed at flood-prone residents and businesses.



Section 10 Plan Monitoring and Maintenance

Contents of this Section

- 10.1 44 CFR Requirement for Plan Monitoring and Maintenance
- 10.2 Method for Monitoring the Plan
- 10.3 Schedules for Monitoring the Plan
- 10.4 Method and Schedule for Maintaining and Updating the Plan
- 10.5 Circumstances that will Initiate Plan Review and Updates
- 10.6 Other Local Planning Mechanisms
- 10.7 Continued Public Involvement

10.1 44 CFR Requirement for Plan Monitoring and Maintenance

*Requirement §201.6(c) (4) (i): [The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle*

*Requirement §201.6(c)(4)(ii): [The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

*Requirement §201.6(c) (4) (iii): [The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

10.2 Method for Monitoring the Plan

The Northern Neck Regional Hazard Mitigation Plan (the Plan) will be monitored by the Northern Neck Planning District Commission (NNPDC) for several related purposes:

- Maintain and update of hazard and risk information.
- Ensure that mitigation projects and actions reflect the priorities of jurisdictions that comprise the Northern Neck Region PDC.
- To ensure compliance with Federal Emergency Management Agency (FEMA) and the Commonwealth of Virginia requirements for plan maintenance and maintain the regions jurisdictions eligibility for federal disaster assistance and mitigation grants.

The Northern Neck Planning District Commission Executive Director and staff will continuously monitor the plan with respect to the purposes noted above, according to the schedule described in Section 10.3, and with respect to the update triggers noted in Section 10.5 below.

Specifically, monitoring activities will consist of:

- Soliciting and reviewing reports from participating jurisdictions regarding status of implementation of action items from the Plan. Status reports will indicate if projects have been:
 - Scoped and/or documented for FEMA grant applications
 - Submitted for FEMA funding programs
 - Approved (or denied approval) for FEMA funding



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- Documented for funding by other means (e.g., jurisdictional capital improvement plans)
 - Funded (or not approved for funding) by other means
 - Under construction
 - Projects completed
 - (For completed projects only) Subject to hazard conditions such that avoided losses can be documented.
- Tracking progress of sources of improved or revised data for use in subsequent Plan updates on an annual (at a minimum) basis.
 - Preparing a report of the status of implementation of action items from the Plan and the availability of improved or revised data. The report will include recommendations to the Hazard Mitigation Working Group regarding the need and/or advantages of undertaking updates to all or part of the Plan prior to the five-year required update (see Section 10.4).

10.3 Schedules for Monitoring the Plan

Informal Plan monitoring activities will be ongoing through:

- Annual progress reports from each jurisdiction on Mitigation Action Plan
- An annual review by the Steering Committee
- Annual updates submitted to VDEM and FEMA Region III

Timing of annual reports may coincide with either the anniversary of the approval date or any other date chosen by the committee in consultation with VDEM.

In addition to the scheduled reports, the Northern Neck PDC will convene meetings after damage-causing natural hazard events to review the effects of such events. Based on those effects, adjustments to the mitigation priorities identified in Section 9 may be made or additional event-specific actions identified.

10.4 Method and Schedule for Maintaining and Updating the Plan

Comprehensive evaluation of and updates to this Plan will be undertaken on a five-year cycle (at a minimum). This Plan must undergo a formal FEMA-compliant update process five years from the adoption date of the first jurisdiction to formally adopt the plan. The Working Group Committee will be responsible for setting annual measures of success and a five-year measure of success for each strategy (Table 10-1: Northern Neck Regional Hazard Mitigation Plan Update Maintenance Schedule). These indicators will be used to measure the progress and success of implementation of the mitigation plan during the 2027 update process. The Working Group Committee will be able to use this information to determine if corrective action is needed or if the action should be continued or discontinued. In addition, the Working Group Committee should review the composition of the committee annually and add members if needed.

In evaluating the plan, the Working Group Committee will assess:

- The goals and objectives addressed in the current plan and any expected conditions
- The nature, magnitude, and/or types of risk present in the region and assess if
- those risks have changed
- The current resources that are required and appropriate for implementing the plan
- Issues with implementation, (ex. technical, political, legal, or coordinating with state and federal agencies)
- The outcome of mitigation strategies, and evaluate their success



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- The agencies and partners and their level of participation as originally proposed
- The Mitigation Advisory Committee will determine at the annual meeting if an update of the plan is needed. Factors to consider when determining if an update is necessary include:
 - Lessened vulnerability because of implementing recommended actions,
 - Increased vulnerability because of failed or ineffective mitigation actions, and/or,
 - Increased vulnerability because of new development (and/or annexation).
 - New state/federal laws, policies, or programs
 - Changes in resource availability

Ongoing public outreach will continue, and public participation will be encouraged through available web postings, social media and press releases to local media outlets, primarily weekly community newspapers and radio stations. As with the previous plan, the Local Emergency Planning Committee (serving as the Working Group Committee) shall be charged with maintaining public outreach through reporting back to government officials.

Table 10-1: Northern Neck Regional Hazard Mitigation Plan Update Maintenance Schedule

Timeframe	Activity	Leadership
2023	Jurisdictions Adoption	Local jurisdictions; Northern Neck PDC submittal to FEMA
2024	Annual implementation review	WORKING GROUP COMMITTEE/LEPC
2025	Annual implementation review	WORKING GROUP COMMITTEE/LEPC
2026	Annual implementation review; seek FEMA HMA funding for 2028 plan update	WORKING GROUP COMMITTEE/LEPC
2027	Annual implementation review initiates 2028 Plan update process;	WORKING GROUP COMMITTEE/LEPC
2028	Continue 2028 Plan update process	WORKING GROUP COMMITTEE/LEPC

10.5 Circumstances that will Initiate Plan Review and Updates

A major event, such as a Presidentially declared disaster, may trigger a need to review the plan. If such an event occurs in the Northern Neck Region, the Working Group Committee will coordinate to determine how best to review and update the plan. The updating of the plan will be through written changes and submissions, as the Northern Neck communities and Working Group Committee deem appropriate and necessary. Major changes to the plan will be submitted to FEMA Region III via the State (VDEM).

Public notice will be given, and public participation will be invited, at a minimum, through available web postings and press releases to the local media outlets, primarily newspapers and radio stations. In addition, an annual event will be held to publicize progress on implementing the mitigation plan. This event could be timed to coincide with the anniversary of a significant event or annual awareness event (i.e.,



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Hurricane Preparedness Week). The circumstances or conditions under which the PDC will initiate Plan reviews and updates are listed but not limited to:

- On the recommendation of the NNPDC Executive Director, at any time
- At approximately the six-month anniversary of the initial Plan adoption, and every six months thereafter
- After natural hazard events that appear to significantly change the apparent risk to the region's assets, operations, and/or constituents

10.6 Other Local Planning Mechanisms

The PDC has no land use planning and zoning authority, so it has few opportunities to incorporate this Plan into other local mechanisms, such as zoning and subdivision ordinances or master plans. However, this Plan will be included, to the extent possible, in the regional jurisdiction's comprehensive planning and capital improvement programs as opportunities occur.

Participating jurisdictions in this Plan will work to incorporate the goals of this Plan into the next update of relevant plans and regulations, including comprehensive plans, zoning codes, and capital improvement plans. Table 10-2: Updates to Relevant Plans and Documents show dates of upcoming jurisdiction updates to these plans and documents. Jurisdictions are not empowered to make alterations or improvements to the state's building code or the Uniform Construction Code.

Table 10-2: Updates to Relevant Plans and Documents

Plan or Document	Next Update
Lancaster County Comprehensive Plan	Scheduled adoption November 2022
Lancaster County Zoning	As needed
Lancaster County Capital Improvement Plan	Yearly
Town of Irvington Comprehensive Plan	In progress at time of this update
Town of Irvington Zoning	As needed
Town of Irvington Capital Improvement Plan	N/A
Town of Kilmarnock Comprehensive Plan	Not currently scheduled
Town of Kilmarnock Zoning	As needed
Town of Kilmarnock Capital Improvement Plan	Yearly
Town of White Stone Comprehensive Plan	Not currently scheduled
Town of White Stone Zoning	As needed
Town of White Stone Capital Improvement Plan	Yearly
Northumberland County Comprehensive Plan	Not currently scheduled
Northumberland County Zoning	As needed
Northumberland County Capital Improvement Plan	Yearly
Richmond County Comprehensive Plan	Scheduled adoption November 2022
Richmond County Zoning	As needed
Richmond County Capital Improvement Plan	Yearly
Town of Warsaw Comprehensive Plan	In progress at time of this plan
Town of Warsaw Zoning	As needed
Town of Warsaw Capital Improvement Plan	Yearly
Westmoreland County Comprehensive Plan	Not currently scheduled
Westmoreland County Zoning	As needed
Westmoreland County Capital Improvement Plan	Yearly
Town of Colonial Beach Comprehensive Plan	Not currently scheduled
Town of Colonial Beach Zoning	As needed
Town of Colonial Beach Capital Improvement Plan	Yearly
Town of Montross Comprehensive Plan	Not currently scheduled
Town of Montross Zoning	As needed
Town of Montross Capital Improvement Plan	N/A



10.7 Continued Public Involvement

As noted above, this Plan will be evaluated and updated periodically and when certain triggering events occur. The NNPDC will utilize public notices and a centralized website to include the public in the update process. In addition, the NNPDC will undertake public outreach and awareness activities as outlined in the Mitigation Action Plan that will include continuing updates on the progress of implementing the Plan and future updates.



Northern Neck Regional Hazard Mitigation Plan 2023

Section 10: Plan Monitoring and Maintenance

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Appendix A Acronyms

ABFE:	Advisory Base Flood Elevation
AICP:	American Institute of Certified Planners
ASCE:	American Society of Civil Engineers
BCA:	Benefit-Cost Analysis
BFE:	Base Flood Elevation
CAV:	Community Assessments Visit
CCRFR:	Commonwealth Center for Recurrent Flood Resiliency
CFR:	Code of Federal Regulation
CIP:	Capital Improvement Program
CMP:	Comprehensive Management Plan
COOP:	Continuity of Operations Plan
COVID-19:	Coronavirus Disease of 2019
CPRI:	Calculated Priority Risk Index
CRS:	Community Rating System
CZM:	Coastal Zone Management
DC:	District of Columbia
DCR:	Department of Conservation and Recreation
DELMARVA:	Delaware Maryland and Virginia Peninsula
DEQ:	Department of Environmental Quality
DFIRM:	Digital Flood Insurance Rate Map
DLUR:	Division of Land Use Regulation
DMA 2000:	Disaster Mitigation Act of 2000
DMTF:	Drought Monitoring Task Force
EF-Scale:	Enhanced Fujita Scale
EMS:	Emergency Medical Services
EOP:	Emergency Operations Plan
EPA:	United States Environmental Protection Agency
EPCRA:	Emergency Planning and Community Right-to-know Act
ERNS:	Emergency Response Notification System
ESF:	Emergency Support Function



FEMA:	Federal Emergency Management Agency
FHBM:	Flood Hazard Boundary Map
FIRM:	Flood Insurance Rate Map
FIS:	Flood Insurance Study
FMA:	Flood Mitigation Assistance Grant Program
F-Scale:	Fujita Tornado Scale
GIS:	Geographic Information System
HAZUS:	Hazards US
HIRA:	Hazard Identification and Risk Assessment
HMA:	Hazard Mitigation Assistance
HMGP:	Hazard Mitigation Grant Program
HMP:	Hazard Mitigation Plan
HMSC:	Hazard Mitigation Steering Committee
HMWG:	Hazard Mitigation Working Group
IBC:	International Building Code
IRC:	International Residential Code
LEPC:	Local Emergency Planning Committee
LWCF:	Land and Water Conservation Fund
MLLW:	Mean Lower Low Water
NCDC:	National Climatic Data Center
NCEI:	National Center for Environmental Information
NDSP:	National Dam Safety Program
NFIP:	National Flood Insurance Program
NHC:	National Hurricane Center
NNEC:	Northern Neck Electric Cooperative
NNPDC:	Northern Neck Planning District Commission
NOAA:	National Oceanic Atmospheric Administration
NPS:	National Park Service
NRI:	National Risk Index
NWS:	National Weather Service
OEM:	Office of Emergency Management
OGL:	Olson Group, LTD
PA:	Public Assistance Grant Program
PDC:	Planning District Commission
PGA:	Peak Ground Acceleration



RAFT:	Resiliency Adaptation Feasibility Tool
RCRA:	Resource Conservation and Recovery Act
RFC:	Repetitive Flood Claims Grant Program
RLP:	Repetitive Loss Property
SARA:	Superfund Amendments and Reauthorization Act
SF:	Square Feet
SFHA:	Special Flood Hazard Area
SHMP:	State Hazard Mitigation Plan
SHMPU:	State Hazard Mitigation Plan Update
SOE:	State of Emergency
SRLP:	Severe Repetitive Loss Property
STAPLEE:	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
TCPA:	Toxic Catastrophe Prevention Act
TIP:	Transportation Improvement Program
TRI:	Toxic Release Inventory
TSD:	Treatment Storage Disposal
TTF:	Transportation Trust Fund
UASI:	Urban Area Security Initiative
UCC:	Uniform Construction Code
USACE:	United States Army Corp of Engineers
USCA:	United States Census of Agriculture
USDA:	United States Department of Agriculture
USDOT:	United States Department of Transportation
USGS:	United States Geologic Survey
VDEM:	Virginia Department of Emergency Management
VDOF:	Virginia Department of Fire Programs
VDOT:	Virginia Department of Transportation
VDSFPM:	Virginia Dam Safety Floodplain Management
VFRIS:	Virginia Flood Risk Information System
VUSBC:	Virginia Uniform Statewide Building Code
WIP:	Watershed Implementation Plan



Appendix B Sources

B.1 Sources for Introduction (Section 2)

- United States Code of Federal Regulations – Title 44 – Emergency Management and Assistance
 - 44 CFR 201.6 Local Mitigation Plan
- 2017 Northern Neck Regional Hazard Mitigation Plan
- Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93288
- Commonwealth of Virginia Hazard Mitigation Plan
- FEMA Hazard Mitigation Grants Program Guidance: <https://www.fema.gov/grants/mitigation/hazard-mitigation-assistance-guidance>

B.2 Sources for Community Profile (Section 3)

- United States
- Virginia Water Resources Research Center: <http://www.virginiawaterradio.org/>
- Jurisdictional Comprehensive Plans
 - Lancaster County
 - Town of Irvington
 - Town of Kilmarnock
 - Town of White Stone
 - Northumberland County
 - Richmond County
 - Town of Warsaw
 - Westmoreland County
 - Town of Colonial Beach
 - Town of Montross
- Resiliency Adaptation Feasibility Tool Reports
- The Virginia Department of Conservation and Recreation: VA's Major watersheds: <https://www.dcr.virginia.gov/soil-and-water/wsheds>
- United States Geological Survey: <https://www.usgs.gov/products/data>
- The Chesapeake Bay Program: <https://www.chesapeakebay.net/state/population>
- United States Census Bureau: 2020 American Community Survey & Decennial Census
- University of Virginia Weldon Cooper Center, Demographics Research Group, 202: Virginia Population Projections
- Virginia Employment Commission, Economic Information & Analytics, Local Area Unemployment Statistics; Community Profile
- Virginia Economic Development Partnership: <https://www.chesapeakebay.net/state/population>
- 2017 United States Census of Agriculture



B.3 Sources for Adoption and Approval (Section 4)

- Code of Virginia, Article VII: Local Government of the Constitution of Virginia
- 1968 Virginia Area Development Act and modified by the Regional Cooperation Act, 21
- Disaster Mitigation Act of 2000 (DMA 2000)

B.4 Sources for Planning Process (Section 5)

- FEMA 386: Local Mitigation Planning Guide

B.5 Sources for Hazard Identification, Profiling, and Ranking (Section 6)

- NOAA NCEI Storm Events Database
- FEMA National Risk Index Community Reports
- Virginia Department of Fire Programs Fire Incident Database
- HAZUS
- USGS Earthquake Database
- FEMA Declared Disasters Database: <https://www.fema.gov/disaster/declarations>
- National Weather Service: <https://www.weather.gov/>
- NOAA and News Leader: Tornado Archive: <https://data.newsleader.com/tornado-archive/>
- United States Army Corp of Engineers: *The North Atlantic Coast Comprehensive Study*
- Commonwealth Center for Recurrent Flooding Resiliency: *The Future Sea Level and Recurrent Flooding Report for Coastal Virginia*
- Virginia Department of Conservation and Recreation ArcGIS Flood Layers
- National Park Service (NPS): *Wildfire Causes and Evaluations*
- National Wildfire Coordinating Group: Wildland Urban Interface Wildfire Mitigation Desk Reference Guide
- VDOF ArcGIS: Wildfire Risk Map Layer: <https://www.arcgis.com/apps/mapviewer/index.html>
- NOAA National Hurricane Center: <https://www.nhc.noaa.gov/>
- Source: National Institute of Standards and Technology: <https://www.nist.gov/image/windzonemap.jpg>
- Virginia Department of Conservation and Recreation: Shoreline Advisory Service
- Commonwealth of Virginia: Coastal Primary Sand Dunes and Beaches in § 28.2-1400 to -1420
- Virginia Institute of Marine Science in conjunction with The College of William & Mary: Shoreline Evolution Studies
- BC Ministry of Energy, Mines and Petroleum Resources: Sea-to-Sky Slide Diagram
- United States Drought Monitor: <https://droughtmonitor.unl.edu/Data.aspx>
- Commonwealth of Virginia Drought Monitoring Task Force
- United States Census of Agriculture 2017
- National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center: Climate at a Glance
- FEMA ArcGIS Mapping U.S. Drought Intensity Layer: Historical Occurrences
- United States Geological Study: *"Science of Earthquakes"*
- Virginia Tech Seismological Observatory: http://www.magma.geos.vt.edu/vtso/va_quakes.html#:~:text=Virginia%20has%20had%20over%20160,with%20two%20felt%20each%20year.



- Virginia Department of Conservation and Recreation: Dam Database
- Commonwealth of Virginia Hazard Mitigation Plan
- FEMA Rehabilitation of High Hazard Potential Dams: Grant Program Guidance June 2020: Section 5.8.1.3
- Fiscal Year 2021 Rehabilitation of High Hazard Potential Dams – Notice of Funding Opportunity (NOFO)
- News on the Neck – Chandlers Mill Pond Dam Failure:
https://www.newsontheneck.com/news/heavy-rains-devastate-dam/article_ee3dc382-d53e-11eb-8a7a-9f2f799ef5a4.html

B.6 Sources for Risk Assessment (Section 7)

- NOAA NCEI Storm Events Database
- FEMA National Risk Index Community Reports
- Virginia Department of Fire Programs Fire Incident Database
- HAZUS
- USGS Earthquake Database
- National Flood Insurance Program
- Virginia Department of Conservation and Recreation Flood Risk Information System
- FEMA NFIP – Data & Analytics: <https://nfipservices.floodsmart.gov/reports-flood-insurance-data>
- FEMA. Guidance for Severe Repetitive Loss Properties.
https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf
- Code of the Commonwealth of Virginia: §15.2-2223 and §15.2-2280
- National Park Service: *Wildfire Causes and Evaluations* (March 8, 2022)
- United States Department of Environmental Quality
- FEMA Risk Management: Snow Load Safety Guide P-957
- Commonwealth Center for Coastal Recurrent Flooding Resiliency: “Future Sea Level and Recurrent Flooding Risk for Coastal Virginia”
- USDA National Agricultural Statistics Service
- USGS ArcGIS:
<https://www.arcgis.com/apps/mapviewer/index.html?layers=f36207114ae94f3987e5f0423170f2a5>
- Commonwealth of Virginia: The Bay Act Program

B.7 Sources for Capability Assessment (Section 8)

- 44 CFR §201.4 of the Disaster Mitigation Act of 2000 (DMA2K; Public Law 106-390, signed into law October 10, 2000)
- Code of Federal Regulations, Stafford Act Title 44, Chapter 1, Part 201 (44 CFR Part 201)
- Sandy Recovery Improvement Act (SRIA) of 2013
- National Flood Insurance Act of 1968
- Water Infrastructure Improvements for the Nation (WIIN) Act of 2016
- Chesapeake Bay Preservation Act: Area Designation and Management Regulations
- Virginia Uniform Statewide Building Code (VUSBC)
- The Code of Virginia Chapter 3.2 – Commonwealth of Virginia Department of Emergency Management establishment
- Jurisdiction Comprehensive Plans



- Lancaster County
- Town of Irvington
- Town of Kilmarnock
- Town of White Stone
- Northumberland County
- Richmond County
- Town of Warsaw
- Westmoreland County
- Town of Colonial Beach
- Town of Montross
- Northern Neck Planning District Commission: Regional Enterprise Zones:
<https://www.northernneck.us/enterprise-zones/>
- Virginia Marine Institute of Marine Science, College of William and Mary: Virginia Coastal Zone Management Program
- Code of Virginia Article 2.5. Chesapeake Bay Preservation Act. § 62.1-44.15:72

B.8 Sources for Mitigation Action Plan (Section 9)

- Commonwealth of Virginia Coastal Resiliency Master Plan
- Flood Resistant Design and Construction Guidance: ASCE 24-05
- National Flood Insurance Program
- Institute for Engagement & Negotiation at the University of Virginia, The Virginia Coastal Policy Center at William & Mary Law School, and Old Dominion University/Virginia Sea Grant Climate Adaptation and Resilience Program: Resiliency Adaptation Feasibility Tool and Jurisdiction Score Cards
- FEMA Community Rating System Program
- FEMA Local Mitigation Planning Guidebook

B.9 Sources for Plan Monitoring and Maintenance (Section 10)

- 44 CFR Requirement for Plan Monitoring and Maintenance: Requirement §201.6(c)(4)

B.10 Sources for Hazards

Tornado

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- NOAA and News Leader: Tornado Archive: <https://data.newsleader.com/tornado-archive/>

Severe Weather

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- United States Army Corp of Engineers: *The North Atlantic Coast Comprehensive Study*



Coastal Flooding

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- United States Army Corp of Engineers: *The North Atlantic Coast Comprehensive Study*
- Commonwealth Center for Recurrent Flooding Resiliency: *The Future Sea Level and Recurrent Flooding Report for Coastal Virginia*
- Virginia Department of Conservation and Recreation ArcGIS Flood Layers
- Virginia Institute of Marine Science in conjunction with The College of William & Mary: Shoreline Evolution Studies
- Commonwealth of Virginia Coastal Resilience Master Plan
- National Flood Insurance Program
- Virginia Department of Conservation and Recreation Flood Risk Information System
- USGS ArcGIS:
<https://www.arcgis.com/apps/mapviewer/index.html?layers=f36207114ae94f3987e5f0423170f2a5>
- Commonwealth of Virginia: The Bay Act Program

Riverine Flooding

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- Commonwealth Center for Recurrent Flooding Resiliency: *The Future Sea Level and Recurrent Flooding Report for Coastal Virginia*
- Virginia Department of Conservation and Recreation ArcGIS Flood Layers
- National Flood Insurance Program
- Virginia Department of Conservation and Recreation Flood Risk Information System

Wildfire

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- Virginia Department of Fire Programs Fire Incident Database
- National Park Service (NPS): *Wildfire Causes and Evaluations*
- National Wildfire Coordinating Group: Wildland Urban Interface Wildfire Mitigation Desk Reference Guide
- VDOF ArcGIS: Wildfire Risk Map Layer: <https://www.arcgis.com/apps/mapviewer/index.html>

Winter Weather

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- FEMA Risk Management: Snow Load Safety Guide P-957

Hurricane/Tropical Storm

- HAZUS
- National Risk Index



- NOAA NCEI Storm Database
- NOAA National Hurricane Center: <https://www.nhc.noaa.gov/>
- Source: National Institute of Standards and Technology: <https://www.nist.gov/image/windzonemap.jpg>
- Virginia Department of Conservation and Recreation Flood Risk Information System

Coastal Erosion

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- NOAA National Hurricane Center: <https://www.nhc.noaa.gov/>
- Virginia Department of Conservation and Recreation: Shoreline Advisory Service
- Commonwealth of Virginia: Coastal Primary Sand Dunes and Beaches in § 28.2-1400 to -1420
- Virginia Institute of Marine Science in conjunction with The College of William & Mary: Shoreline Evolution Studies
- USGS ArcGIS: <https://www.arcgis.com/apps/mapviewer/index.html?layers=f36207114ae94f3987e5f0423170f2a5>
- Commonwealth of Virginia: The Bay Act Program

Pluvial Flooding

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- NOAA National Hurricane Center: <https://www.nhc.noaa.gov/>
- United States Department of Environmental Quality Agency
- Virginia Department of Conservation and Recreation ArcGIS Flood Layers
- National Flood Insurance Program
- Virginia Department of Conservation and Recreation Flood Risk Information System

Landslide

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- BC Ministry of Energy, Mines and Petroleum Resources: Sea-to-Sky Slide Diagram

Drought

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- United States Drought Monitor: <https://droughtmonitor.unl.edu/Data.aspx>
- Commonwealth of Virginia Drought Monitoring Task Force
- United States Census of Agriculture 2017

Heatwave

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database



- National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center: Climate at a Glance
- FEMA ArcGIS Mapping U.S. Drought Intensity Layer: Historical Occurrences

Earthquake

- HAZUS
- National Risk Index
- NOAA NCEI Storm Database
- United States Geological Study: *"Science of Earthquakes"*
- Virginia Tech Seismological Observatory:
http://www.magma.geos.vt.edu/vtso/va_quakes.html#:~:text=Virginia%20has%20had%20over%20160,with%20two%20felt%20each%20year.



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Appendix C Planning Process

C.1 Meetings and Working Sessions

- C.1.1 July 15, 2022 – Northern Neck 2023 HMP Update Steering Committee Kick Off Meeting
- C.1.2 July 29, 2022 – Northern Neck 2023 HMP Update Working Group Meeting
- C.1.3 August 12, 2022 – Northern Neck 2023 HMP Update Working Group and Public Input Meeting
- C.1.4 September 9, 2022 – Northern Neck 2023 HMP Update Working Group and Public Input Meeting
- C.1.5 September 23, 2022 – Northern Neck 2023 HMP Update Working Group Meeting
- C.1.6 October 7, 2022 - Northern Neck 2023 HMP Update Working Group and Public Input Meeting
- C.1.7 November 16, 2022 – Northern Neck 2023 HMP Update Steering Committee Meeting
- C.1.8 February 3, 2023 – Northern Neck 2023 HMP Update Steering Committee Meeting
- C.1.9 February 3, 2023 – Northern Neck 2023 HMP Update HMSC and DCR/Dams Discussion Meeting

C.2 Jurisdictional Individual Interview Meetings

- C.2.1 Lancaster County
- C.2.2 Town of Irvington
- C.2.3 Town of Kilmarnock
- C.2.4 Town of White Stone
- C.2.5 Northumberland County
- C.2.6 Richmond County
- C.2.7 Town of Warsaw
- C.2.8 Westmoreland County
- C.2.9 Town of Colonial Beach
- C.2.10 Town of Montross

C.3 Public Involvement

C.4 Correspondence

C.5 Stakeholders



D. Capabilities Assessments

This section contains the capabilities assessment updates for each jurisdiction participating in the Northern Neck Regional Hazard Mitigation Plan Update.



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 NNPDC	NEW 2023 NNPDC
Northern Neck Planning District Commission		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Advisor	Advisor
Adoption		
With Coastal Protection Element		
Capital Improvement Plan	Advisor	Advisor
Economic Development Plan	Y	Y
Downtown Development/Re-Development Authority Plans	Advisor	Advisor
Enterprise Zones	Advisor	Advisor
Transportation Planning	VDOT/PDC	VDOT/PDC
Subdivision Regulations	N/A	N/A
Zoning Ordinance	N/A	N/A
Site Plan Review Procedures		
Building Code (or ordinance) addresses flood	N/A	N/A
Designated Building Official		
Regular Inspection Protocols		
Civil Engineer Staff		
GIS Coordinator		
Mitigation Projects		
Private Residential Elevations (self-financed)	N/A	N/A
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	N/A	N/A
Elevate Residences or Property Protection through HMA grants	Y	Y
Grant Officials		
Natural Systems Protection		
Natural or Cultural Resources Inventory		N/A
Open Space	N/A	N/A
Parks and Recreation		N/A
Living Shorelines Program	N/A	Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program		N/A
Erosion and Sediment Control Ordinances	N/A	



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 NNPDC	NEW 2023 NNPDC
Floodplain Management	N/A	N/A
RAFT Card (Resilience Adaptation Feasibility Tool)	N/A	N/A
Floodplain Administrator	N/A	N/A
Participates in NFIP	N/A	N/A
Year Joined NFIP	N/A	N/A
Effective FIRM Date	N/A	N/A
Additional Freeboard Requirements (inches)	N/A	N/A
LiMWA standards in High Hazard Coastal Areas	N/A	N/A
Participates in CRS	N/A	N/A
Emergency Operations Management	LEPC	LEPC
Emergency Operations Plan	2011	N/A
Local Government EOPs		VDEM
Continuity of Operations Plan		advisor
Warning Sirens or warning alert systems		N
Evacuation Plans		
Shelter and Family Re-Unification Plan		
Special Needs Population Emergency Planning		
Companion Animal Sheltering and Re-Unification Plan		
Dedicated Emergency Management Website	Y	
Education Programs	N/A	Y
School Facility Emergency Operations Plans		N/A
School Emergency Notification, Evacuation and Emergency Planning		
College Campus Plans		
College/University Emergency Notification, Evacuation and Emergency Planning		
Tourism	Y*	
Community Planner		3
Additional Capabilities		



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Lancaster County	NEW 2023 Lancaster County
Lancaster County		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Y	Nov. 2022
Adoption	Oct 2013	Y
With Coastal Protection Element	Y	Y
Capital Improvement Plan	Y	Y
Economic Development Plan	Y	Y
Downtown Development/Re-Development Authority Plans	N	Y
Enterprise Zones	Y	N/A
Transportation Planning	N/A	Y
Subdivision Regulations	Y	Y
Zoning Ordinance	Y	Y
Site Plan Review Procedures	Y	Y
Building Code (or ordinance) addresses flood	Y	Y
Designated Building Official	Y	Y
Regular Inspection Protocols	Y	N
Civil Engineer Staff	Y	Y
GIS Coordinator	Y	Y
Mitigation Projects		Y
Private Residential Elevations (self-financed)	Y	Y
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	Y	2
Elevate Residences or Property Protection through HMA grants	Y	Y
Grant Officials	Y	Y
Natural Systems Protection		Y
Natural or Cultural Resources Inventory	Y	Y
Open Space	Y	Y
Parks and Recreation	Y	Y
Living Shorelines Program	Y	Y
Stormwater Management and Water Quality Programs		Y
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**	Y2	Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program	Y	Y
Erosion and Sediment Control Ordinances	Y	



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Lancaster County	NEW 2023 Lancaster County
Floodplain Management		Y
RAFT Card (Resilience Adaptation Feasibility Tool)	Y	Y
Floodplain Administrator	Y	Y
Participates in NFIP	Y	Y
Year Joined NFIP	3-4-1988	03/04/1988
Effective FIRM Date	10/02/2014	07/05/2022
Additional Freeboard Requirements (inches)	N/A	18"
LiMWA standards in High Hazard Coastal Areas	Y	N
Participates in CRS	N	Y
Emergency Operations Management	Y	Y
Emergency Operations Plan	Y	Y
Local Government EOPs	Y	N
Continuity of Operations Plan	N	Y
Warning Sirens or warning alert systems	Y	Y
Evacuation Plans	Y	Y
Shelter and Family Re-Unification Plan	Y	Y
Special Needs Population Emergency Planning	Y	Y
Companion Animal Sheltering and Re-Unification Plan	Y	Y
Dedicated Emergency Management Website	Y	Y
Education Programs	Y	Y
School Facility Emergency Operations Plans	UNKNOWN	Y
School Emergency Notification, Evacuation and Emergency Planning	N	Y
College Campus Plans	Y	Y
College/University Emergency Notification, Evacuation and Emergency Planning	Y	Y
Tourism		Y
Community Planner		



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of Irvington	NEW 2023 Town of Irvington
Town of Irvington		
Comprehensive Plan		Y
With Hazard Mitigation Element		N
Adoption		Sept 2017***
With Coastal Protection Element		N
Capital Improvement Plan		N
Economic Development Plan		N
Downtown Development/Re-Development Authority Plans		N
Enterprise Zones		N
Transportation Planning		N/A
Subdivision Regulations		Y
Zoning Ordinance		Y
Site Plan Review Procedures		Y
Building Code (or ordinance) addresses flood		1
Designated Building Official		1
Regular Inspection Protocols		1
Civil Engineer Staff		1
GIS Coordinator		1
Mitigation Projects		
Private Residential Elevations (self-financed)		1
Resident and Community Outreach Inc. Ready.gov		1
Exclude critical infrastructure from SFHA		N
Elevate Residences or Property Protection through HMA grants		2
Grant Officials		N
Natural Systems Protection		
Natural or Cultural Resources Inventory		Y
Open Space		Y
Parks and Recreation		Y
Living Shorelines Program		Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		1
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***		Y
Erosion or Sediment Control Program		
Erosion and Sediment Control Ordinances		1



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of Irvington	NEW 2023 Town of Irvington
Floodplain Management	-	-
RAFT Card (Resilience Adaptation Feasibility Tool)		N/A
Floodplain Administrator		Y
Participates in NFIP		Y
Year Joined NFIP		10/18/1974
Effective FIRM Date		08/04/1987
Additional Freeboard Requirements (inches)		N/A
LiMWA standards in High Hazard Coastal Areas		N
Participates in CRS		N
Emergency Operations Management		Y
Emergency Operations Plan		1
Local Government EOPs		1
Continuity of Operations Plan		N****
Warning Sirens or warning alert systems		1
Evacuation Plans		1
Shelter and Family Re-Unification Plan		1
Special Needs Population Emergency Planning		1
Companion Animal Sheltering and Re-Unification Plan		1
Dedicated Emergency Management Website		1
Education Programs		N/A
School Facility Emergency Operations Plans		N/A
School Emergency Notification, Evacuation and Emergency Planning		N/A
College Campus Plans		N/A
College/University Emergency Notification, Evacuation and Emergency Planning		N/A
Tourism		3
Community Planner		1
**NOTE: Irvington was not included in the capabilities assessment matrix in the 2017 plan.		



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of Kilmarnock	NEW 2023 Town of Kilmarnock
Town of Kilmarnock		
Comprehensive Plan		Y
With Hazard Mitigation Element		N
Adoption		April 2014
With Coastal Protection Element		N/A
Capital Improvement Plan		Y
Economic Development Plan		N
Downtown Development/Re-Development Authority Plans		Y
Enterprise Zones		Y
Transportation Planning		N/A
Subdivision Regulations		Y
Zoning Ordinance		Y
Site Plan Review Procedures		Y
Building Code (or ordinance) addresses flood		1
Designated Building Official		1
Regular Inspection Protocols		1
Civil Engineer Staff		5
GIS Coordinator		Y
Mitigation Projects		
Private Residential Elevations (self-financed)		N/A
Resident and Community Outreach Inc. Ready.gov		1
Exclude critical infrastructure from SFHA		N/A
Elevate Residences or Property Protection through HMA grants		N/A
Grant Officials		N
Natural Systems Protection		
Natural or Cultural Resources Inventory		Y
Open Space		Y
Parks and Recreation		N
Living Shorelines Program		N/A
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		1
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***		Y
Erosion or Sediment Control Program		
Erosion and Sediment Control Ordinances		N/A



Northern Neck Regional Hazard Mitigation Plan
Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of Kilmarnock	NEW 2023 Town of Kilmarnock
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator		Y
Participates in NFIP		Y
Year Joined NFIP		09/17/2010
Effective FIRM Date		07/05/2022
Additional Freeboard Requirements (inches)		18"
LiMWA standards in High Hazard Coastal Areas		N/A
Participates in CRS		N
Emergency Operations Management		Y
Emergency Operations Plan		1
Local Government EOPs		1
Continuity of Operations Plan		N
Warning Sirens or warning alert systems		Y
Evacuation Plans		1
Shelter and Family Re-Unification Plan		1
Special Needs Population Emergency Planning		1
Companion Animal Sheltering and Re-Unification Plan		1
Dedicated Emergency Management Website		1
Education Programs		Y
School Facility Emergency Operations Plans		Y
School Emergency Notification, Evacuation and Emergency Planning		Y
College Campus Plans		Y
College/University Emergency Notification, Evacuation and Emergency Planning		Y
Tourism		3
Community Planner		Y
**NOTE: Kilmarnock was not included in the capabilities assessment matrix in the 2017 plan.		



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of White Stone	NEW 2023 Town of White Stone
Town of White Stone		
Comprehensive Plan		Y
With Hazard Mitigation Element		N
Adoption		Oct. 2013
With Coastal Protection Element		N/A
Capital Improvement Plan		Y
Economic Development Plan		Y
Downtown Development/Re-Development Authority Plans		Y
Enterprise Zones		Y
Transportation Planning		N/A
Subdivision Regulations		1
Zoning Ordinance		1
Site Plan Review Procedures		1
Building Code (or ordinance) addresses flood		1
Designated Building Official		Y
Regular Inspection Protocols		1
Civil Engineer Staff		N
GIS Coordinator		1
Mitigation Projects		
Private Residential Elevations (self-financed)		N/A
Resident and Community Outreach Inc. Ready.gov		1
Exclude critical infrastructure from SFHA		Y
Elevate Residences or Property Protection through HMA grants		N/A
Grant Officials		N
Natural Systems Protection		
Natural or Cultural Resources Inventory		Y
Open Space		Y
Parks and Recreation		N
Living Shorelines Program		N/A
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		1
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***		Y
Erosion or Sediment Control Program		
Erosion and Sediment Control Ordinances		N/A



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Programs and Capabilities	2017 Town of White Stone	NEW 2023 Town of White Stone
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator		Y
Participates in NFIP		Y
Year Joined NFIP		09/24/1984
Effective FIRM Date		11/17/2020
Additional Freeboard Requirements (inches)		N/A
LiMWA standards in High Hazard Coastal Areas		N/A
Participates in CRS		N
Emergency Operations Management		Y
Emergency Operations Plan		1
Local Government EOPs		1
Continuity of Operations Plan		N
Warning Sirens or warning alert systems		1
Evacuation Plans		1
Shelter and Family Re-Unification Plan		1
Special Needs Population Emergency Planning		1
Companion Animal Sheltering and Re-Unification Plan		1
Dedicated Emergency Management Website		1
Education Programs		1
School Facility Emergency Operations Plans		N/A
School Emergency Notification, Evacuation and Emergency Planning		N/A
College Campus Plans		N/A
College/University Emergency Notification, Evacuation and Emergency Planning		N/A
Tourism		3
Community Planner		Y
**NOTE: White Stone was not included in the capabilities assessment matrix in the 2017 plan.		



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Northumberland County	NEW 2023 Northumberland County
Northumberland County		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Y	Y
Adoption	NOV 2016	Nov.2016
With Coastal Protection Element	Y	Y
Capital Improvement Plan	Y	Y
Economic Development Plan	Y	Y
Downtown Development/Re-Development Authority Plans	N	Y
Enterprise Zones	Y	Y
Transportation Planning	N/A	N/A
Subdivision Regulations	Y	Y
Zoning Ordinance	Y	Y
Site Plan Review Procedures	Y	Y
Building Code (or ordinance) addresses flood	Y	Y
Designated Building Official	Y	Y
Regular Inspection Protocols	Y	Y
Civil Engineer Staff	Y	N
GIS Coordinator	Y	Y
Mitigation Projects		
Private Residential Elevations (self-financed)	Y	Y
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	Y	Y
Elevate Residences or Property Protection through HMA grants	Y	2
Grant Officials	Y	N
Natural Systems Protection		
Natural or Cultural Resources Inventory	Y	Y
Open Space	Y	Y
Parks and Recreation	Y	Y
Living Shorelines Program	Y	Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**	Y	Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program	Y	Y
Erosion and Sediment Control Ordinances	Y	Y



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Northumberland County	NEW 2023 Northumberland County
Floodplain Management	Y	
RAFT Card (Resilience Adaptation Feasibility Tool)	Y	Y
Floodplain Administrator	Y	Y
Participates in NFIP	Y	Y
Year Joined NFIP	7/4/1989	7/4/1989
Effective FIRM Date	2/18/2015	12/30/2021
Additional Freeboard Requirements (inches)	12"	24"
LiMWA standards in High Hazard Coastal Areas	Y	Y
Participates in CRS	Y	N
Emergency Operations Management	Y	Y
Emergency Operations Plan	Y	Y
Local Government EOPs	Y	Y
Continuity of Operations Plan	Y	N****
Warning Sirens or warning alert systems	Y	Y
Evacuation Plans	Y	Y
Shelter and Family Re-Unification Plan	Y	Y
Special Needs Population Emergency Planning	Y	Y
Companion Animal Sheltering and Re-Unification Plan	Y	Y
Dedicated Emergency Management Website	Y	Y
Education Programs	Y	Y
School Facility Emergency Operations Plans	Y	Y
School Emergency Notification, Evacuation and Emergency Planning	Y	Y
College Campus Plans	N/A	N/A
College/University Emergency Notification, Evacuation and Emergency Planning	N/A	N/A
Tourism	Y	Y
Community Planner		Y



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Richmond County	NEW 2023 Richmond County
Richmond County		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Y	Y
Adoption	Jul. 2013	Nov. 2022
With Coastal Protection Element	Y	Y
Capital Improvement Plan	Y	Y
Economic Development Plan	N	Y
Downtown Development/Re-Development Authority Plans	Y	Y
Enterprise Zones	Y	Y
Transportation Planning	N/A	N/A
Subdivision Regulations	Y	Y
Zoning Ordinance	Y	Y
Site Plan Review Procedures	Y	Y
Building Code (or ordinance) addresses flood	Y	Y
Designated Building Official	Y	Y
Regular Inspection Protocols	Y	Y
Civil Engineer Staff	Y	5
GIS Coordinator	Y	Y
Mitigation Projects		
Private Residential Elevations (self-financed)	Y	Y
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	Y	Y
Elevate Residences or Property Protection through HMA grants	Y1	2
Grant Officials		Y
Natural Systems Protection	Y	Y
Natural or Cultural Resources Inventory	Y	Y
Open Space	Y	Y
Parks and Recreation	Y	Y
Living Shorelines Program	Y	Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**	Y	Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program	Y	Y
Erosion and Sediment Control Ordinances	Y	Y



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Richmond County	NEW 2023 Richmond County
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator	Y	Y
Participates in NFIP	Y	Y
Year Joined NFIP	03-16-1989	3/16/1989
Effective FIRM Date	04/16/2015	06/26/2022
Additional Freeboard Requirements (inches)	N/A	N/A
LiMWA standards in High Hazard Coastal Areas		N/A
Participates in CRS	N	N
Emergency Operations Management	Y	Y
Emergency Operations Plan	Y	Y
Local Government EOPs	Y	Y
Continuity of Operations Plan		Y
Warning Sirens or warning alert systems	Y	Y
Evacuation Plans	Y	Y
Shelter and Family Re-Unification Plan	Y	Y
Special Needs Population Emergency Planning	Y	Y
Companion Animal Sheltering and Re-Unification Plan	Y	Y
Dedicated Emergency Management Website	Y	Y
Education Programs	Y	Y
School Facility Emergency Operations Plans	Y	Y
School Emergency Notification, Evacuation and Emergency Planning	Y	Y
College Campus Plans	Y	Y
College/University Emergency Notification, Evacuation and Emergency Planning	Y	Y
Tourism	Y	Y
Community Planner		Y



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Town of Warsaw	NEW 2023 Town of Warsaw
Town of Warsaw		
Comprehensive Plan		Y
With Hazard Mitigation Element		N
Adoption		May 2013*
With Coastal Protection Element		N
Capital Improvement Plan		Y
Economic Development Plan		Y
Downtown Development/Re-Development Authority Plans		Y
Enterprise Zones		Y
Transportation Planning		N/A
Subdivision Regulations		Y
Zoning Ordinance		Y
Site Plan Review Procedures		Y
Building Code (or ordinance) addresses flood		1
Designated Building Official		1
Regular Inspection Protocols		1
Civil Engineer Staff		N
GIS Coordinator		Y
Mitigation Projects		
Private Residential Elevations (self-financed)		N/A
Resident and Community Outreach Inc. Ready.gov		N/A
Exclude critical infrastructure from SFHA		N/A
Elevate Residences or Property Protection through HMA grants		2
Grant Officials		N
Natural Systems Protection		
Natural or Cultural Resources Inventory		N
Open Space		Y
Parks and Recreation		N
Living Shorelines Program		N/A
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***		Y
Erosion or Sediment Control Program		
Erosion and Sediment Control Ordinances		N/A



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Programs and Capabilities	2017 Town of Warsaw	NEW 2023 Town of Warsaw
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator		1
Participates in NFIP		1
Year Joined NFIP		N/A
Effective FIRM Date		N/A
Additional Freeboard Requirements (inches)		N/A
LiMWA standards in High Hazard Coastal Areas		N/A
Participates in CRS		N
Emergency Operations Management		Y
Emergency Operations Plan		1
Local Government EOPs		1
Continuity of Operations Plan		N
Warning Sirens or warning alert systems		1
Evacuation Plans		1
Shelter and Family Re-Unification Plan		1
Special Needs Population Emergency Planning		1
Companion Animal Sheltering and Re-Unification Plan		1
Dedicated Emergency Management Website		1
Education Programs		1
School Facility Emergency Operations Plans		1
School Emergency Notification, Evacuation and Emergency Planning		1
College Campus Plans		1
College/University Emergency Notification, Evacuation and Emergency Planning		1
Tourism		3
Community Planner		Y
**NOTE: Warsaw was not included in the capabilities assessment matrix in the 2017 plan.		



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Westmoreland County	NEW 2023 Westmoreland County
Westmoreland County		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Y	Y
Adoption	DEC 2010	Dec.2010
With Coastal Protection Element	Y	Y
Capital Improvement Plan	Y	Y
Economic Development Plan	N	Y
Downtown Development/Re-Development Authority Plans	Y	Y
Enterprise Zones		Y
Transportation Planning	N/A	N/A
Subdivision Regulations	Y	Y
Zoning Ordinance	Y	Y
Site Plan Review Procedures	Y	Y
Building Code (or ordinance) addresses flood	Y	Y
Designated Building Official	Y	Y
Regular Inspection Protocols	Y	Y
Civil Engineer Staff	Y	N
GIS Coordinator	Y	Y
Mitigation Projects		
Private Residential Elevations (self-financed)	Y	Y
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	Y	Y
Elevate Residences or Property Protection through HMA grants	N/A	N/A
Grant Officials		Y
Natural Systems Protection	Y	
Natural or Cultural Resources Inventory	Y	Y
Open Space	Y	Y
Parks and Recreation	Y	Y
Living Shorelines Program	Y	Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**	Y	Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program	Y	



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Appendix D: Capabilities Assessments

Programs and Capabilities	2017 Westmoreland County	NEW 2023 Westmoreland County
Erosion and Sediment Control Ordinances	Y	Y
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator	Y	Y
Participates in NFIP	Y	Y
Year Joined NFIP	03-16-1989	9/18/1987
Effective FIRM Date	04/16/2015	4/16/2015
Additional Freeboard Requirements (inches)	18"	18"
LiMWA standards in High Hazard Coastal Areas		Y
Participates in CRS	N	N
Emergency Operations Management	Y	Y
Emergency Operations Plan	Y	Y
Local Government EOPs	Y	Y
Continuity of Operations Plan		N
Warning Sirens or warning alert systems	Y	Y
Evacuation Plans	Y	Y
Shelter and Family Re-Unification Plan	Y	Y
Special Needs Population Emergency Planning	Y	Y
Companion Animal Sheltering and Re-Unification Plan	Y	Y
Dedicated Emergency Management Website	Y	Y
Education Programs	Y	Y
School Facility Emergency Operations Plans	Y	Y
School Emergency Notification, Evacuation and Emergency Planning	Y	Y
College Campus Plans	N/A	N/A
College/University Emergency Notification, Evacuation and Emergency Planning	N/A	N/A
Tourism	Y	Y
Community Planner		Y



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Programs and Capabilities	2017 Town of Colonial Beach	NEW 2023 Town of Colonial Beach
Town of Colonial Beach		
Comprehensive Plan	Y	Y
With Hazard Mitigation Element	Y	Y
Adoption	DEC 2010	Dec.2010
With Coastal Protection Element	Y	Y
Capital Improvement Plan	Y	Y
Economic Development Plan	N	Y
Downtown Development/Re-Development Authority Plans	Y	Y
Enterprise Zones		Y
Transportation Planning	N/A	N/A
Subdivision Regulations	Y	Y
Zoning Ordinance	Y	Y
Site Plan Review Procedures	Y	Y
Building Code (or ordinance) addresses flood	Y	Y
Designated Building Official	Y	Y
Regular Inspection Protocols	Y	Y
Civil Engineer Staff	Y	N
GIS Coordinator	Y	Y
Mitigation Projects		
Private Residential Elevations (self-financed)	Y	Y
Resident and Community Outreach Inc. Ready.gov	Y	Y
Exclude critical infrastructure from SFHA	Y	Y
Elevate Residences or Property Protection through HMA grants	N/A	N/A
Grant Officials		Y
Natural Systems Protection	Y	
Natural or Cultural Resources Inventory	Y	Y
Open Space	Y	Y
Parks and Recreation	Y	Y
Living Shorelines Program	Y	Y
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		Y
Total Daily Maximum Load (TMDL) Stream Segments**	Y	Y
Watershed Improvement Plans***	Y	Y
Erosion or Sediment Control Program	Y	
Erosion and Sediment Control Ordinances	Y	Y



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Programs and Capabilities	2017 Town of Colonial Beach	NEW 2023 Town of Colonial Beach
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		Y
Floodplain Administrator	Y	Y
Participates in NFIP	Y	Y
Year Joined NFIP	03-16-1989	9/18/1987
Effective FIRM Date	04/16/2015	4/16/2015
Additional Freeboard Requirements (inches)	18"	18"
LiMWA standards in High Hazard Coastal Areas		Y
Participates in CRS	N	N
Emergency Operations Management	Y	Y
Emergency Operations Plan	Y	Y
Local Government EOPs	Y	Y
Continuity of Operations Plan		N
Warning Sirens or warning alert systems	Y	Y
Evacuation Plans	Y	Y
Shelter and Family Re-Unification Plan	Y	Y
Special Needs Population Emergency Planning	Y	Y
Companion Animal Sheltering and Re-Unification Plan	Y	Y
Dedicated Emergency Management Website	Y	Y
Education Programs	Y	Y
School Facility Emergency Operations Plans	Y	Y
School Emergency Notification, Evacuation and Emergency Planning	Y	Y
College Campus Plans	N/A	N/A
College/University Emergency Notification, Evacuation and Emergency Planning	N/A	N/A
Tourism	Y	Y
Community Planner		Y



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Programs and Capabilities	2017 Town of Montross	NEW 2023 Town of Montross
Town of Montross		
Comprehensive Plan		N/A
With Hazard Mitigation Element		N/A
Adoption		N
With Coastal Protection Element		Y
Capital Improvement Plan		1
Economic Development Plan		1
Downtown Development/Re-Development Authority Plans		N
Enterprise Zones		1
Transportation Planning		1
Subdivision Regulations		1
Zoning Ordinance		1
Site Plan Review Procedures		1
Building Code (or ordinance) addresses flood		1
Designated Building Official		1
Regular Inspection Protocols		1
Civil Engineer Staff		1
GIS Coordinator		1
Mitigation Projects		
Private Residential Elevations (self-financed)		N/A
Resident and Community Outreach Inc. Ready.gov		N/A
Exclude critical infrastructure from SFHA		N/A
Elevate Residences or Property Protection through HMA grants		N/A
Grant Officials		N
Natural Systems Protection		1
Natural or Cultural Resources Inventory		1
Open Space		1
Parks and Recreation		N
Living Shorelines Program		N/A
Stormwater Management and Water Quality Programs		
Stormwater Management Plan		1
Total Daily Maximum Load (TMDL) Stream Segments**		Y
Watershed Improvement Plans***		Y
Erosion or Sediment Control Program		
Erosion and Sediment Control Ordinances		1



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Programs and Capabilities	2017 Town of Montross	NEW 2023 Town of Montross
Floodplain Management		
RAFT Card (Resilience Adaptation Feasibility Tool)		N/A
Floodplain Administrator		1
Participates in NFIP		1
Year Joined NFIP		N/A
Effective FIRM Date		N/A
Additional Freeboard Requirements (inches)		N/A
LiMWA standards in High Hazard Coastal Areas		N/A
Participates in CRS		N
Emergency Operations Management		Y
Emergency Operations Plan		1
Local Government EOPs		1
Continuity of Operations Plan		N
Warning Sirens or warning alert systems		1
Evacuation Plans		1
Shelter and Family Re-Unification Plan		1
Special Needs Population Emergency Planning		1
Companion Animal Sheltering and Re-Unification Plan		1
Dedicated Emergency Management Website		1
Education Programs		1
School Facility Emergency Operations Plans		1
School Emergency Notification, Evacuation and Emergency Planning		1
College Campus Plans		N/A
College/University Emergency Notification, Evacuation and Emergency Planning		N/A
Tourism		3
Community Planner		1
**NOTE: Montross was not included in the capabilities assessment matrix in the 2017 plan.		



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Appendix D: Capabilities Assessments

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Appendix E

Jurisdiction Mitigation Action Changes

Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
NNPDC-1	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to: 1. Acquisition of Floodprone property 2. Elevation of Floodprone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation	Updated	Cleaned up the language and streamlined the terminology	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.
NNPDC-2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive plans and capital improvement plans.	Updated	Reworded to clarify the purpose and intent.	Provide technical assistance to Northern Neck jurisdictions, to integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
NNPDC-3	Promotion, education and implementation of nature-based resiliency practices. Eligible projects include but are not limited to: 1. Ecosystem restoration approaches such as ecological restoration or forest and wetland landscape restoration. 2. Issue-specific	Broken into 2 mitigation actions.	Reworded # 3 and reference New #5 for new mitigation action separated from #3.	Promote practices implementing nature-based approaches that increase regional resiliency. Projects sought include but are not limited to: Ecosystem restoration and adaptation, green infrastructure, and ecosystem-based approaches addressing



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	ecosystem related approaches such as ecosystem-based adaptation and mitigation, climate adaptation and ecosystem-based disaster risk reduction. 3. Infrastructure related approaches such as green and blue infrastructure. 4. Ecosystem-based management approaches such as integrated coastal zone and water resources management. 5. Ecosystem protection approaches such as area- based conservation and protected area management.			climate change, coastal resources, and conservation of protected areas.
NNPDC-4	Promote and grow the Living Shoreline Initiative in both its Non- structural and Combined structural/non-structural aspects. Actions taken may include, but are not limited to, grading land away from eroding shoreline, maintain riparian buggar adjacent to shorelines, and complement with other stormwater management (rain barrels, rain garden, conservation landscaping).	Updated	Updated the terminology and corrected grammar issues.	Promote and grow the Living Shoreline Initiative in both its Non- structural and Combined structural/non-structural aspects. Utilize techniques such as grading land away from eroding shoreline, maintaining, and upgrading riparian buffers adjacent to shorelines, and implementing green infrastructure and stormwater management improvements.
NNPDC-5		New	Broken into a separate action from action #3.	Seek data sources and educational opportunities that increase regional hazards awareness and provide additional knowledge to jurisdictional personnel that will be applied to project building and initiation.
NNPDC-6		New	NEW to match a regional intent of support to the jurisdictions' actions with similar intent. These initiatives have been occurring and the intent of this addition is to ensure expansion.	Expand upon current and create new public outreach activities. Utilize the PDC's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.



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Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Lancaster -1	<p>The publication projects that will result in protection of public or private property from natural hazards. Eligible projects include, but are not limited to</p> <ol style="list-style-type: none"> 1. Acquisition of flood prone property 2. elevation of flood prone structures 3. Minor structural flooding control projects 4. Relocation of structures from hazard prone areas 5 retrofitting of existing buildings, facilities, infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure 8. Protection measures, stormwater management improvements 9 Advanced warning systems and hazard gauging systems (weather radios, reverse 911, stream gauges. I-Flows.) 10. Targeted hazard education 11. Wastewater and water supply system hardening and mitigation 	Updated.	Cleaned up the language and streamlined the purpose of the action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.
Lancaster-3	Incorporate hazard mitigation techniques into new community facilities to minimize damages.	Updated.	Clarified language and incorporated FEMA and RAFT recommendations.	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green space, and improve stormwater drainage capacity - Discouraging items such as impermeable surfaces, the disturbance of natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.
Lancaster-4	Encourage use of vegetation and revetments.to reduce shoreline erosion.	Updated.	Combined # 4,5 and 15. The intent was similar for all.	plumbing sources to build nature-based shoreline stabilization strategies continue best management practices in shoreline erosion



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				prevention and mandate that new subdivisions require coordinated shoreline protection plans.
Lancaster-5	Require coordinated joint protection plans in new waterfront subdivisions.	Deleted.	Combine # 4 ,5 and 15. The intent was similar for all.	N/A
Lancaster-7	Identify existing prone structures that may benefit from mitigation measures such as elevation.	Updated.	Expanded and clarified language and intent. Change priority to high. Added property protection and structural to project type.	Identify areas of repetitive loss and severe repetitive loss structures to seek appropriate improvements underage and make guidelines.
Lancaster-8	Encourage waterfront property owners in existing communities to consider multi parcel shoreline protection strategies before they pursue individual approaches.	Updated.	Altered wording.	Encourage waterfront property owners in existing communities to consider community-based type parcel shoreline protection strategies before they pursue individual approaches.
Lancaster-9	Work with VDOT to evaluate at risk roads and implement mitigation measures. (e.g., elevation redesign).	Removed.	Not a County responsible action.	N/A
Lancaster-10	Work with private property owners VDOT and private utilities to trim or remove trees that could down power lines.	Removed.	Not a County responsible action.	N/A
Lancaster-11	Identify training opportunities for staff to chance ability to use GIS for Emergency Management needs.	Updated.	GIS actions have been initiated. Action altered to model the current objectives	Continue.to upgrade and expand the current GIS capabilities, training, and resources throughout the community.
Lancaster-12	Identify means to coordinate, collect and store damage assessment data in GIS format for each natural hazard event that causes death, injury or property damage.	Removed.	Completed and ongoing actions are covered in #11.	N/A
Lancaster-13	Consider participating in FEMA"s community rating system. (CRS)	Updated.	Reworded to encompass the	Seek further improvements to hazard mitigation elements that enable the



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Appendix E: Mitigation Action Changes

			next actions towards possible CRS. Some actions have been completed or initiated since the 2017 update.	community to become eligible for CRS participation.
Lancaster-14	Continue to enforce zoning and building codes to prevent construction within the floodplain.	Removed.	Not a mitigation action goal.	N/A
Lancaster-15	Develop vegetative planning programs for public shoreline property to serve as a model for public education purposes.	Removed.	Combined with number 4 and #5 due to similar objectives and goals.	N/A
Lancaster-16	Encourage the purchase of flood and or sewer backup insurance.	Removed.	Not a mitigation action goal. And education for such is integrated in new education and outreach goal action.	N/A
Lancaster- 17	Educate residents about flood insurance and ICC (Increased Cost of Compliance) Coverage.	Removed.	Integrated into new education and outreach goal action.	N/A
Lancaster.18	Prepare an advisory pamphlet and distribute to occupants of housing units or businesses known to be in the floodplain, advising them of potential hazards in the area and of evacuation plans in the event of an emergency.	Removed.	Integrated into new education and outreach goal action.	N/A
Lancaster-19	Encourage the purchase and training on the use of NOAA. Radios. Provide NOAA radios to public facilities.	Updated.	Action has been initiated. Some equipment purchased. Action updated to reflect progress.	Expand the purchase and training on the use of NOAA radios. Provide NOAA radios to public facilities.



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Lancaster-20	Maintain a voluntary agreement with FEMA to participate in the NF IP.	Removed.	This is a mandatory action for NFP participants and not a mitigation Goal action.	N/A
Lancaster-21	Maintain a publicly available copy of the effective flood insurance Rate map. (FIRM) and flood insurance study. (FIS). Support local request for updates when available.	Removed.	This is not a mitigation goal action. This is a requirement.	N/A
Lancaster-22	Adopt the most current DFIRM or FIRM and FIS as they become available.	Removed.	This is not a mitigation goal action. This is a requirement.	N/A
Lancaster-23	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed.	This is not a mitigation goal action. This is a requirement.	
Lancaster-24	Assess local floodplain determination and maintain a record of approved changes to the local floodplain.	Removed.	Action has become obsolete with the implementation of FEMA 2.0 Tool.	N/A
Lancaster-25	Adopt or maintain a floodplain management ordinance that, at minimum, regulates the following. Issue permits for all proposed developments in the SFHA. Obtain review and utilize any base flood, elevation and floodway data and require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres. Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the BFE, including anchoring using flood resistant materials. Designing or locating utilities and service facilities to prevent water damage.	Altered.	The action has been initiated. The completed portion has been moved to completed. The ongoing portion has been retained.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.



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Lancaster-26	Enforce the floodplain management ordinance by monitoring compliance and taking remedial action to correct violations.	Removed.	This is not a mitigation goal action. It is a requirement, and the County has expanded staffing to better accomplish this task.	N/A
Lancaster-27	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community rating system, freeboard prohibition of production or storage of chemicals in the SFHA. Prohibition of certain types of structures, such as hospitals, nursing homes, jails; prohibition of certain types of residential houses, such as manufactured homes and finally floodplain ordinances that now prohibit any new residential or non-residential structures in the SFHA.	Removed.	Objective and intent have been addressed in other actions and some of this has been completed with the RAFT and CRS actions.	N/A
Lancaster-28	Educate community members about the availability and value of flood insurance.	Removed.	County is not responsible for availability of flood insurance, and education is included in the new. Education and outreach action goal.	N/A
Lancaster-30	Provide general assistance to community members relating to insurance issues.	Removed.	County is not responsible for availability of flood insurance, and education is included in the new education and	N/A



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			outreach action goal.	
Lancaster-31	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdictions website to advise citizens and visitors of local natural hazard risks, Encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information Committee" (PPI) to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Lancaster- 32	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Seek funding for and implement early warning signals/ systems/emergency warning tools for residents with increased attention to vulnerable populations.
Lancaster-33	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	develop a resident emergency preparedness plan that identifies risk and needs, including knowledge of water safety.
Lancaster-New	N/A	NEW	New mitigation action created from HHPD section and recognition of HHPD in jurisdiction	Seek education and funding to initiate a program that will organize investigations and risk assessments that will utilize FEMA's risk prioritization methodology to define the HHPDs within the Region.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Irvington-1	Support mitigation projects that will result in protection of public or private property from	Altered.	Cleaned up language and streamlined the	Support mitigation projects that conform to the requirements of the HMA programs in terms of eligibility for participation in projects.



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	<p>natural hazards. Eligible projects include but are not limited to</p> <ol style="list-style-type: none"> 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities, and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation. 		purpose of this action.	
Irvington-3	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Irvington-4	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Seek funding for and implement early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.



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Irvington-5	N/A	NEW	New mitigation action.	Seek funding to assess and subsequently improve stormwater management capabilities. Open
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Kilmarnock-1	Avoid establishing public service facilities and utilities, such as wastewater disposal facilities, within or near the Floodplain where they might create a hazard if damaged during a storm.	Removed.	This is an ordinance, not a future action goal.	N/A
Kilmarnock-2	Incorporate hazard mitigation techniques into new community facilities to minimize damages.	Updated.	Action has been initiated and Status has changed to ongoing.	N/A
Kilmarnock- 3	Investigate all critical community facilities, such as county administrative offices, shelters (non-school buildings), fire stations, and police stations, to evaluate their resistance to flood and wind hazards. Particular attention will be given to the HY AC systems and structural integrity of the buildings. Prioritize facilities in known hazard areas (e.g., floodplains).	Removed.	Action has been integrated. With other action goals. The intent was similar.	N/A
Kilmarnock-4	Implement a ditch maintenance program consisting of routine inspections and subsequent debris removal.	Removed.	This is VDOT's responsibility not the County's.	N/A
Kilmarnock-5	Initiate discussion with private utility companies to incorporate mitigation measures into new and existing development and any infrastructure repairs.	Removed.	Not an applicable action currently.	N/A
Kilmarnock-6	Replace traffic lights hung from wires with traffic lights hung from mast arms. Install all new traffic lights on mast arms. Ensure traffic light mechanisms are weatherproof.	Removed.	Not an applicable action currently.	N/A



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Kilmarnock-7	Identify a program of corrective actions to improve stormwater systems capacity to handle major rain events.	Altered.	Combined multiple actions with the same intent.	Seek funding to assess and subsequently improve stormwater management capabilities. Identify a program of corrective actions to improve stormwater systems capacity to handle major rain events.
Kilmarnock-8	Develop a Continuity of Operations Plan.	Removed.	Not a mitigation plan action.	N/A
Kilmarnock-9	Consider participating in FEMA's Community Rating System (CRS).	Removed	Removed. Not a feasible action currently with lack of resources.	N/A
Kilmarnock-10	Include an assessment and associated mapping of the jurisdiction's vulnerability to location specific hazards and make appropriate recommendations for the use of these hazard areas in the next comprehensive plan.	Removed	Removed – this would be accomplished during the stormwater management study.	N/A
Kilmarnock-11	Investigate using non-conforming or substantial damage provision to require hazard retrofitting of existing development.	Removed	Not a mitigation plan action.	N/A
Kilmarnock-12	Encourage the purchase of flood and/or sewer back-up insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new. Education and outreach action goal.	N/A
Kilmarnock-13	Educate residents about flood insurance and ICC (Increased Cost of Compliance) Coverage.	Removed	County is not responsible for availability of flood insurance, and education is included in the	N/A



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			new. Education and outreach action goal.	
Kilmarnock-14	Encourage the purchase and training on the use of NOAA radios. Provide NOAA radios to public facilities.	Removed.	Not an applicable action for locality.	N/A
Kilmarnock-15	Maintain a publicly available copy of the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS), Support local requests for map updates when available.	Removed	This is a requirement not a mitigation action goal.	N/A
Kilmarnock-16	Adopt the most current DFIRM or FIRM and FIS as they become available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Kilmarnock-17	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a mitigation action goal.	N/A
Kilmarnock-18	Assist with local floodplain determinations and maintain a record of approved changes to the local Floodplain.	Removed.	Obsolete with FEMA's 2.0 tool.	N/A
Kilmarnock-19	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres; Identify measures to keep All new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document	Altered	Action has been initiated and is ongoing – portions completed removed and ongoing portions.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.



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	lowest floor elevation for new or substantially improved structures.			
Kilmarnock-20	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A
Kilmarnock-21	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or storage of chemicals in SFHA, prohibition of certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit any new residential or non-residential structures in the SFHA.	Removed	Moved to completed.	N/A
Kilmarnock-22	Educate community members about the availability and value of flood insurance.	Removed	Integrated into new education and outreach goal action.	N/A
Kilmarnock-23	Inform community property owners about changes to the DFIRM/FIRM that may impact their insurance rates.	Removed	Integrated into new education and outreach goal action.	N/A
Kilmarnock-24	Provide general assistance to community members relating to insurance issues.	Removed	Town is not responsible for insurance and education/outreach action covers the education intent.	N/A
Kilmarnock-25	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.



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	2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities, and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.			
Kilmarnock-26	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms and comprehensive plans, and capital improvement plans.	Altered	Altered for the inclusion of resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as resiliency and comprehensive plans, and capital improvement plans.
Kilmarnock-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Kilmarnock-NEW	N/A	NEW	Combined and updated for stormwater management.	Seek funding to assess and subsequently improve stormwater management capabilities.



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Kilmarnock-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Create open communication, education, and planning opportunities between emergency management and the business sector during severe weather emergencies or evacuations.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
White Stone-1	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities, and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.
White Stone-2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms and comprehensive plans, and capital improvement plans.	Altered	Altered for the inclusion of resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
White Stone-3	Avoid establishing public service facilities and utilities, such as wastewater disposal facilities,	Removed	Completed action.	N/A



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	within or near the floodplain where they might create a hazard if damaged during a storm.			
White Stone-4	Incorporate hazard mitigation techniques into new community facilities to minimize damages.	Altered	Action initiated and ongoing – altered to reflect.	Seek new and continue incorporating hazard mitigation techniques into new community facilities to minimize damages, such as the new wastewater treatment facility and backup electricity. Continuing Phases of project.
White Stone-5	Investigate All critical community facilities, such as county administrative offices, shelters (non-school buildings), fire stations, and police stations, to evaluate their resistance to flood and wind hazards. Particular attention will be given to the HVAC systems and structural integrity of the buildings. Prioritize facilities in known hazard areas (e.g., floodplains)	Removed	Integrated in Action #7 and #8 due to similar intents.	N/A
White Stone-6	Evaluate exiting storm water system to determine if it is adequate for existing (or future) flood hazards.	Altered	Additional intent to upgrade is added.	Evaluate exiting storm water system to determine if it is adequate for existing (or future) flood hazards and plan for upgrades.
White Stone-7	Identify need for backup generators, communications and/or vehicles at critical public facilities. Develop means to address shortfalls identified.	Altered	Clarified and integrated with other actions due to similar intent.	Seek funding to identify needs and execute needed upgrades to retrofit critical infrastructure buildings with emergency utility backups.
White Stone-8	Consider providing necessary electrical hook-up, wiring, and switches to allow readily accessible connections to emergency generators at selected critical public facilities.	Removed	Integrated with other actions of similar intent.	N/A
White Stone-9	Encourage the purchase of flood and/or sewer back-up insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new. Education and outreach action goal.	N/A



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White Stone-10	Develop and implement a ditch maintenance program consisting of routine inspections and subsequent debris removal.	Altered	Initiated and ongoing action – altered to reflect	Continue with a ditch maintenance program consisting of routine inspections and subsequent debris removal to reduce the risk of pluvial flooding events.
White Stone-11	Identify program of corrective actions to improve stormwater systems capacity to handle major rain events.	Removed	Integrated with actions of similar intent - #6.	N/A
White Stone-12	Continue to enforce zoning and building codes to prevent construction within the floodplain.	Removed	This is a requirement, not a mitigation action goal.	N/A
White Stone-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
White Stone-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Research and seek funding for upgrades to communications that would include early warning signals/systems/emergency warning tools for residents with increased attention to vulnerable populations.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Northumberland-1	Incorporate hazard mitigation techniques into new community facilities to minimize damages.	Altered	Expanded and integrated with actions of similar intent.	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green-space, and improve stormwater drainage capacity, discouraging items such as impermeable surfaces, the disturbance of



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				natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.
Northumberland-2	Encourage use of vegetation and revetments to reduce shoreline erosion.	Altered	Expanded and priority upgraded to HIGH.	Seek funding sources to build nature-based shoreline stabilization strategies. Continue best management practices in shoreline erosion prevention, and mandate that new subdivisions require coordinated shoreline protection plans.
Northumberland-4	Consider implementing a wetlands acquisition and /or restoration program.	Altered	Expanded	Engage in a wetlands acquisition and /or restoration program with Wetlands Watch and other conservation partners.
Northumberland-5	Increase enforcement and education regarding the tie down of propane and other fuel tanks	Removed	Fuel tank security is mandated by fuel companies in installation and the education is integrated into new education and outreach action.	N/A
Northumberland-6	Identify existing flood prone structures that may benefit from mitigation measures such as elevation.	Removed	Integrated with actions of similar intent.	N/A
Northumberland-7	Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.	Altered	Clarified wording	Encourage waterfront property owners in existing communities to consider community-based multi-parcel shoreline protection strategies before they pursue individual approaches.
Northumberland-8	Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign).	Altered	Added "prevention" to project types.	N/A
Northumberland-10	Encourage the purchase of flood and/or sewer back-up insurance.	Removed	County is not responsible for availability of flood insurance, and education is	N/A



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			included in the new education and outreach action goal.	
Northumberland-11	Educate residents about flood insurance and ICC (Increased Cost of Compliance) Coverage.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Northumberland-12	Prepare an advisory pamphlet and distribute to occupants of housing units or businesses known to be in the floodplain advising them of the potential hazards in the area and of evacuation plans in the event of an emergency.	Removed	Integrated into the new education and outreach action goal.	N/A
Northumberland-15	Adopt the most current FIRM maps and FIS as they become available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Northumberland-16	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a mitigation action goal.	N/A
Northumberland-17	Assist with local floodplain determinations and maintain a record of approved changes to the local Floodplain.	Altered	Added "property protection" to project types.	N/A
Northumberland-18	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals	Altered	Action has been initiated and is ongoing. Portions moved to complete and ongoing portion retained.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.



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	larger than 50 lots or 5 acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.			
Northumberland-19	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A
Northumberland-21	Educate community members about the availability and value of flood insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Northumberland-22	Provide general assistance to community members relating to insurance issues.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Northumberland-23	Support mitigation projects that will result in protection of public or private property from	Altered	Cleaned up language and streamlined the	Support mitigation projects that conform to the requirements of the HMA program in



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	<p>natural hazards. Eligible projects include but are not limited to</p> <ol style="list-style-type: none"> 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation. 		purpose of this action.	terms of eligibility for participation and projects.
Northumberland-24	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive, and capital improvement plans.	Altered	Integrated resiliency and changed priority to MEDIUM.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
Northumberland-25	Maintain an Emergency Notification System for citizens (Code Red) which upon voluntary subscription, will notify if an NWS severe weather alert is activated within the County.	Removed	Completed	N/A
Northumberland-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management.



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				(*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Northumberland-NEW	N/A	NEW	NEW	Seek further improvements to hazard mitigation elements that will enable the community to become eligible for CRS participation.
Northumberland-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Richmond-1	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.



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Richmond-2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive, and capital improvement plans.	Altered	Integrated resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
Richmond-3	Consider implementing a wetlands acquisition and /or restoration program.	Altered	Expanded and clarified intent.	Engage in a wetlands acquisition and /or restoration program with Wetlands Watch and other conservation partners.
Richmond-4	Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.	Altered	Clarified wording	Encourage waterfront property owners in existing communities to consider community-based multi-parcel shoreline protection strategies before they pursue individual approaches.
Richmond-5	Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign).	Removed	Not a County level responsibility but VDOT's.	N/A
Richmond-6	Seek training opportunities for staff to enhance GIS ability emergency management needs.			Continue to seek training opportunities for staff to enhance current GIS capabilities within the jurisdiction.
Richmond-7	Evaluate the floodplain manager's roles and responsibilities in each local jurisdiction.	Removed	This is a requirement, not a mitigation action goal.	N/A
Richmond-8	Identify means to coordinate, collect and store damage assessment data in GIS format for each natural hazard event that causes death, injury, and/or property damage.	Removed	Completed	N/A
Richmond-9	Evaluate the potential costs versus benefits of implementing a freeboard requirement for all new structures within the 100-year floodplain.	Removed	Completed	N/A
Richmond-10	Investigate implementation of cumulative damage provision as part of Floodplain ordinance.	Removed	This is a requirement, not a mitigation action goal.	N/A



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Richmond-11	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a mitigation action goal.	N/A
Richmond-12	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	Altered	Action has been initiated and is ongoing. Portions moved to complete and ongoing portion retained.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.
Richmond-13	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A
Richmond-14	Inform community property owners about changes to the FIRM that may impact their insurance rates.	Removed	This is a requirement, not a mitigation action goal.	N/A
Richmond-15	Provide general assistance to community members relating to insurance issues.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and	N/A



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			outreach action goal.	
Richmond-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Richmond-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.
Richmond-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Identify funding for non-CIP coastal resilience projects, including priority needs of vulnerable populations.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Warsaw-1	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.



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	5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.			
Warsaw-2	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive, and capital improvement plans.	Altered	Integrated resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
Warsaw-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Warsaw-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Seek funding for and implement early warning signals/systems/emergency warning tools for residents (especially vulnerable populations).



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Warsaw-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Westmoreland - 1	Incorporate hazard mitigation techniques into new community facilities to minimize damages.	Altered	Updated wording and integrated with other actions of the same intent.	Research and incorporate additional mitigation techniques into community spaces that will further protect flood zones, increase green-space, and improve stormwater drainage capacity, discouraging items such as impermeable surfaces, the disturbance of natural vegetation, or penetration into the floodplains with any structural development not meant to assist in retaining landforms.
Westmoreland -3	Identify existing flood prone structures that may benefit from mitigation measures such as elevation.	Removed	Integrated with action #4	N/A
Westmoreland -4	Evaluate built-upon areas within the floodplain or along the high erosion risk shoreline for possible relocation and/or acquisition. Throughout the Northern Neck for possible relocation and/or buy-out.	Altered	Clarified wording and updated with integration of action #3	Evaluate built-upon areas within the floodplain or along the high erosion risk shoreline for possible relocation and/or acquisition targeting FEMA's Repetitive Loss Properties.
Westmoreland -5	Identify funding opportunities to replace vulnerable or undersized culvert stream crossing with bridges or larger culverts to reduce food hazards.	Removed	Completed	N/A
Westmoreland -6	Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign)	Removed	This is VDOT's responsibility, not an action for the county.	N/A
Westmoreland -7	Initiate discussion with private utility companies to incorporate mitigation measures into new and	Removed	Not a county responsibility.	N/A



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	existing development and any infrastructure repairs.			
Westmoreland -8	Identify training opportunities for staff to enhance ability to use GIS for emergency management needs.	Altered	Initiated and ongoing – updated to reflect.	Continue to upgrade and expand the current GIS capabilities, training, and resources throughout the community.
Westmoreland -9	Identify means to coordinate, collect and store damage assessment data in GIS format for each natural hazard event that causes death, injury, or property damage.	Removed.	Completed and ongoing actions are integrated in other actions.	N/A
Westmoreland -10	Consider participating in FEMA's Community Rating System (CRS).	Altered	Updated to be more applicable to current community situation.	Seek further improvements to hazard mitigation elements that will enable the community to become eligible for CRS participation.
Westmoreland -11	Continue to enforce zoning and building codes to prevent construction within the floodplain.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -12	Review and revise, if required, existing Subdivision Ordinances to include hazard mitigation-related development criteria to regulate the location and construction of buildings and other infrastructure in known hazard areas.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -13	Evaluate the potential costs versus benefits of continuing the freeboard requirement for all new structures within the 100-year floodplain.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -14	Encourage the purchase of flood and/or sewer back-up insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A



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Westmoreland -15	Educate residents about flood insurance and ICC (Increased Cost of Compliance) Coverage.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Westmoreland -16	Prepare an advisory pamphlet and distribute to occupants of housing units or businesses known to be in the floodplain advising them of the potential hazards in the area and of evacuation plans in the event of an emergency.	Removed	New education and outreach action goal created.	N/A
Westmoreland -17	Maintain a voluntary agreement with FEMA to participate in the NFIP	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -18	Maintain a publicly available copy of the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS), Support local requests for map updates when available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -19	Adopt the most current DFIRM or FIRM and FIS as they become available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -20	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -21	Assist with local floodplain determinations and maintain a record of approved changes to the local Floodplain.	Removed	This is a requirement, not a mitigation action goal.	N/A



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Westmoreland -22	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	Altered	Action has been initiated and is ongoing. Portions moved to complete and ongoing portion retained.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.
Westmoreland -23	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland -24	Consider adoption of activities that extend beyond the minimum requirements, including those identified for participation in the Community Rating System, freeboard, prohibition of production or storage of chemicals in SFHA, prohibition or certain types of structures such as: hospitals, nursing homes, jails, prohibition of certain types of residential housing such as manufactured homes, and finally floodplain ordinances, that prohibit any new residential or non-residential structures in the SFHA.	Removed	Not an applicable action to the County currently.	N/A
Westmoreland -25	Educate community members about the availability and value of flood insurance.	Removed	County is not responsible for availability of flood insurance, and	N/A



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			education is included in the new education and outreach action goal.	
Westmoreland-26	Inform community property owners about changes to the DFIRM/FIRM that may impact their insurance rates.	Removed	This is a requirement, not a mitigation action goal.	N/A
Westmoreland-27	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.
Westmoreland-28	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive, and capital improvement plans.	Altered	Integrated resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.



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Westmoreland-29	Evaluate mitigation funding programs to seek a solution to and funding sources to plans with a focus to the Stratford Hall area erosion and cliff failure issues.	Altered	Clarified intent	Seek funding sources to build nature-based shoreline stabilization strategies. Continue best management practices in shoreline erosion prevention, and mandate that new subdivisions require coordinated shoreline protection plans with specific attention to the Stratford Hall area erosion and cliff failure issues.
Westmoreland-30	Work with VDOT and the Town of Colonial Beach to seek ingress and egress access issue solutions.	Removed	VDOT's responsibility, not the County.	N/A
Westmoreland-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.
Westmoreland-NEW	N/A	NEW	New action goal.	Continue to upgrade and expand the current GIS capabilities, training, and resources throughout the community.
Westmoreland-NEW	N/A	NEW	Created a new all-encompassing education and outreach action goal. Note: This is a CRS qualifying activity.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Westmoreland-New	N/A	NEW	New mitigation action created from HHPD section and recognition of	Seek education and funding to initiate a program that will organize investigations and risk assessments that will utilize FEMA's risk prioritization methodology to define the HHPDs within the Region.



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			HHPD in jurisdiction	
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Colonial Beach-1	Increase enforcement and education regarding the tie down of propane and other fuel tanks	Removed	Tank security is mandated by the fuel companies and education is integrated into new education and outreach action goal.	N/A
Colonial Beach-2	Evaluate exiting storm water system to determine if it is adequate for existing (or future) flood Hazards.	Removed	Completed	N/A
Colonial Beach-3	Develop and implement a ditch program consisting of routine inspections and subsequent debris removal.	Altered	Altered and updated to include initiation and integrate other actions with similar intent.	Expand upon the stormwater management program consisting of routine inspections and subsequent debris removal and consider additions of culverts where applicable.
Colonial Beach-4	Identify program of corrective actions to shoreline protection measures.	Altered	Updated and expanded to integrate actions with similar intent.	Identify program of corrective actions to improve shoreline preservation and protection measures.
Colonial Beach-5	Develop a detailed building inventory for all structures in the jurisdiction, which catalogues information such as value of the structure, contents, age, location (latitude and longitude), etc.	Removed	Completed	N/A
Colonial Beach-6	Continue to enforce zoning and building codes to prevent construction within the floodplain.	Removed	This a requirement, not a mitigation action goal.	N/A



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Colonial Beach-7	Include an assessment and associated mapping of the jurisdiction's vulnerability to location specific hazards and make appropriate recommendations for the use of these hazard areas in the next comprehensive plan.	Removed	Removed, this would be accomplished during the stormwater management study.	N/A
Colonial Beach-8	Investigate using non-conforming or substantial damage provision to require hazard retrofitting of existing development.	Removing	This is an ordinance, not a mitigation action goal.	N/A
Colonial Beach-9	Publicize the location of local shelters and emergency phone numbers. Include a map of shelters in local phonebooks or on county websites.	Removed	Integrated into the new education and outreach action goal.	N/A
Colonial Beach-10	Encourage the purchase and training on the use of NOAA radios. Provide NOAA radios to public facilities.	Removed	Not an applicable action to the town currently.	N/A
Colonial Beach-11	Investigate, develop, or enhance a regional public notification system such as low power FM or AM radio.	Removed	Outdated action goal, no longer applicable.	N/A
Colonial Beach-13	Maintain a voluntary agreement with FEMA to participate in the NFIP	Removed	This is a requirement, not a mitigation action goal.	N/A
Colonial Beach-14	Maintain a publicly available copy of the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS), Support local requests for map updates when available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Colonial Beach-15	Adopt the most current FIRM or FIRM and FIS as they become available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Colonial Beach-16	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a	N/A



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			mitigation action goal.	
Colonial Beach-17	Assist with local floodplain determinations and maintain a record of approved changes to the local Floodplain.	Removed	Obsolete with FEMA's 2.0 tool.	N/A
Colonial Beach-18	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres; Identify measures to keep all new and substantially improved construction reasonably safe from flood to or above the Base Flood Elevation (BFE), including anchoring, using flood resistant materials, designing, or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	Altered	Action has been initiated and is ongoing. Portions moved to complete and ongoing portion retained.	Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.
Colonial Beach-19	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A
Colonial Beach-21	Educate community members about the availability and value of flood insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A



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Colonial Beach-22	Inform community property owners about changes to the FIRM that may impact their insurance rates.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Colonial Beach-23	Provide general assistance to community members relating to insurance issues.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Colonial Beach-24	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities, and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements 9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows)	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.



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	10. Targeted hazard education 11. wastewater and water supply system hardening and mitigation.			
Colonial Beach-25	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive, and capital improvement plans.	Altered	Integrated resiliency.	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive and resiliency plans, and capital improvement plans.
Colonial Beach-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident and visitor emergency preparedness plan that identifies risks and needs, including knowledge of water safety.
Colonial Beach-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Seek funding for and implement early warning signals/systems/emergency warning tools for residents (especially vulnerable populations).
Mitigation Action #	2017 Action	Change Type	Reason for Change	2023 Action
Montross-1	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to 1. Acquisition of flood prone property 2. Elevation of flood prone structures 3. Minor structural flood control projects 4. Relocation of structures from hazard prone areas 5. Retrofitting of existing buildings, facilities and infrastructure 6. Retrofitting of existing buildings and facilities for shelters 7. Critical infrastructure protection measures 8. Stormwater management improvements	Altered	Cleaned up language and streamlined the purpose of this action.	Support mitigation projects that conform to the requirements of the HMA program in terms of eligibility for participation and projects.



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	9. Advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. Targeted hazard education 1. wastewater and water supply system hardening and mitigation.			
Montross-3	Develop a Continuity of Operations Plan.	Removed	This a planning mechanism goal not a mitigation action goal.	N/A
Montross-4	Consider participating in FEMA's community rating system. (CRS)	Updated.	Reworded to encompass the next actions towards possible CRS. Some actions have been completed or initiated since the 2017 update.	Seek further improvements to hazard mitigation elements that enable the community to become eligible for CRS participation.
Montross-5	Encourage the purchase of flood and/or sewer back-up insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Montross-6	Encourage the purchase and training on the use of NOAA radios. Provide NOAA radios to public facilities.	Removed	Not an applicable action for the town currently.	N/A
Montross-7	Maintain a voluntary agreement with FEMA to participate in the NFIP	Removed	This is a requirement, not a mitigation action goal.	N/A



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Montross-8	Maintain a publicly available copy of the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS), Support local requests for map updates when available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Montross-9	Adopt the most current DFIRM or FIRM and FIS as they become available.	Removed	This is a requirement, not a mitigation action goal.	N/A
Montross-10	Share with FEMA any new technical or scientific data that may result in map revisions within six months of creation or identification of new data.	Removed	This is a requirement, not a mitigation action goal.	N/A
Montross-11	Assist with local floodplain determinations and maintain a record of approved changes to the local floodplain.	Removed	Obsolete with FEMA's 2.0 tool.	N/A
Montross-12	Adopt or maintain a floodplain management ordinance that at a minimum regulates the following: Issue permits for All proposed developments in the SFHA, Obtain, review, and utilize any base flood elevation and Floodway data, and require BFE data for subdivisions proposals and other development proposals larger than 50 lots or 5 acres; Identify measures to keep All new and substantially improved construction reasonably safe from flood to or above the base flood elevation (BFE), including anchoring , using flood resistant materials, designing or locating utilities, and service facilities to prevent water damage; Document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures.	Removed	Completed	N/A
Montross-13	Enforce the ordinance by monitoring compliance and taking remedial action to correct violations.	Removed	This is a requirement, not a mitigation action goal.	N/A



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Montross-15	Educate community members about the availability and value of flood insurance.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Montross-16	Inform community property owners about changes to the DFIRM/FIRM that may impact their insurance rates.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Montross-17	Provide general assistance to community members relating to insurance issues.	Removed	County is not responsible for availability of flood insurance, and education is included in the new education and outreach action goal.	N/A
Montross-NEW	N/A	NEW	Created new education and outreach mitigation goal.	Expand upon current and create new public outreach activities. Utilize the jurisdiction's website to advise citizens and visitors of local natural hazard risks, encourage citizen-based mitigation efforts and disaster preparation. Consider creating a "Program for Public Information" (PPI) Committee to assist with educating, distribution, and management. (*PPI is a suggestion under Activity 322 in the



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				CRS Manual). Boost increased exposure and awareness to visitors, tourists, and part-time residents.
Montross-NEW	N/A	NEW	New mitigation action created from RAFT Scorecard recommendations.	Develop a resident emergency preparedness plan that identifies risks and needs, including knowledge of water safety.