

Northern Neck Regional Hazard Mitigation Plan

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Section I. Executive Summary

Background

Beginning in 2003, the Commonwealth of Virginia encouraged the twenty-one planning districts in the commonwealth to take the lead on development of local hazard mitigation plans. These plans, which are required by the Disaster Mitigation Act of 2000 (DMA2K), help local governments determine risks and vulnerabilities and identify projects to reduce these risks. The Northern Neck Regional Hazard Mitigation Plan was developed through the coordination of the Northern Neck Planning District Commission. It should be noted that the area covered by this plan includes the unincorporated areas of Lancaster, Northumberland, Richmond, and Westmoreland Counties. Towns included in this plan are Colonial Beach, Irvington, Kilmarnock, Montrose, Warsaw, and White Stone.

The communities of the Northern Neck had established a Local Emergency Planning Committee (LEPC) to address local emergency management issues. Members of the LEPC are appointed by resolution by the counties. The mission of this committee was closely aligned to the needs of a Mitigation Advisory Committee. The planning district commission, therefore, 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 and state agencies such as the Virginia Department of Transportation.

Hazard Identification and Risk Assessment

The Hazard Identification and Risk Assessment consists of three parts:

1. Identify what hazards that could affect the Northern Neck
2. Profile hazard events and determine what areas and community assets are the most vulnerable to damage from these hazards
3. Estimate losses and prioritize the potential risks to the community

Hazards were ranked by the steering committee to determine the hazards with the largest impact on their communities. Certain hazards were not addressed due to the infrequency of occurrence and/or limited impact. Table I-1 summarizes the results of the hazard identification, which are explained fully in Section V of this plan.

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Table I-1. Northern Neck Planning Consideration Levels	
Hazard Type	Planning Consideration
Hurricane	Significant
Flooding	Moderate
Winter Storm	Moderate
Coastal Erosion	Moderate
Drought	Limited
Northeaster	Limited
Tornado	Limited
Wildfire	Limited
Earthquake	None

The Hazard Identification and Risk Assessment described each of the hazards in varying levels of detail consistent with the planning consideration level. In general, hurricanes were found to be the most significant hazard, causing both wind and flood damages. According to the analyses, increased damages could be expected due to high winds than from flooding. Coastal erosion, in the Northern Neck, often occurs because of storm surge associated with hurricanes. Among the four counties, Westmoreland County has the least amount of overall coastline with high erosion vulnerability.

Winter storms also impact the Northern Neck, causing primarily a loss of power and blocked transportation routes and access to community services. Wildfire poses a serious risk on the southeastern end of the peninsula, particularly in areas where debris from past storms has accumulated.

Capability Assessment

The Capability Assessment evaluates the current capacity of the communities of the Northern Neck to mitigate the effects of the natural hazards identified in the Hazard Identification and Risk Assessment. By providing a summary of each jurisdiction’s existing capabilities, the Capability Assessment serves as the foundation for designing an effective hazard mitigation strategy. Table I-2 summarizes the Capability Self-Assessment provided by the participating jurisdictions.

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Table I-2. Capability Assessment Summary

Jurisdiction	Staff and Organizational Capability	Technical Capability	Policy and Program Capability	Legal Authority	Fiscal Capability	Political Capability	Overall Capability
<i>Lancaster County</i>	Moderate	Moderate	High	High	Low	Moderate	Moderate
<i>Northumberland County</i>	Moderate	Moderate	High	High	Moderate	Moderate	Moderate
<i>Richmond County</i>	Moderate	Moderate	High	High	Low	Moderate	Moderate
<i>Westmoreland County</i>	Moderate	Moderate	High	High	Moderate	Moderate	Moderate

Mitigation Strategy

The Northern Neck committee members used the results of the Hazard Identification and Risk Assessment as well as the Capability Assessment to develop goals and actions for the region and their jurisdictions. In addition, the committee prioritized actions for the region and their own 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 committee members developed the following five goals:

- ❖ Goal 1: Promote new development that acknowledges the risks posed by natural hazards and is resilient to natural disasters.
- ❖ Goal 2: Address risks that threaten existing development.
- ❖ Goal 3: Ensure that the appropriate infrastructure is in place and maintained to ensure continued functionality of all critical services necessary to protect the residents of the Northern Neck.
- ❖ Goal 4: Enhance the capabilities of local government to address natural hazards and potentially limit their impacts.
- ❖ Goal 5: Increase the awareness of our citizens regarding the natural hazards present in the Northern Neck. Educate them about how to prepare for and mitigate against these hazards.

In addition, the committee identified and prioritized actions for the region and individual jurisdictions. The priorities differ somewhat from jurisdiction to jurisdiction. Each jurisdiction’s priorities were developed based on past damages,

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existing exposure to risk, community goals, and weaknesses identified in the Capability Assessment.

Plan Maintenance Procedures

The plan outlines a procedure for implementing, maintaining, and updating the plan. Each jurisdiction will provide annual progress reports on implementation of its Mitigation Action Plan. The Northern Neck Planning District Commission will receive these progress reports and coordinate an annual review of them with the Mitigation Advisory Committee. The Mitigation Advisory Committee members will develop annual measures of success and five-year measure of success for each action against which progress can be measured.

In accordance with FEMA regulations, a written update will be submitted to the commonwealth and FEMA Region III in five years, unless circumstances (e.g., Presidential disaster declaration, changing regulations) require a formal update prior to the five-year update. The public will be continually informed of changes to the plan as they occur.

Conclusion

This plan symbolizes the continued commitment and dedication of the Northern Neck's local governments and community members to enhancing the safety of residents and businesses by taking actions before a disaster strikes. While nothing can be done to prevent natural hazard events from occurring, the region is poised to minimize the disruption and devastation that so often accompanies these disasters.

Section II. Introduction

Mitigation

Mitigation is commonly defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Hazard mitigation focuses attention and resources on community policies and actions that will produce successive benefits over time. A mitigation plan states the aspirations and specific courses of action that a community intends to follow to reduce vulnerability and exposure to future hazard events. These plans are formulated through a systematic process centered on the participation of citizens, businesses, public officials, and other community stakeholders.

A local mitigation plan is the physical representation of a jurisdiction's commitment to reduce risks from natural hazards. Local officials can refer to the plan in their day-to-day activities and in decisions regarding regulations and ordinances, granting permits, and funding capital improvements and other community initiatives. Additionally, these local plans will serve as the basis for states to prioritize future grant funding as it becomes available.

It is hoped that the Northern Neck Hazard Mitigation Plan will be a useful tool for all community stakeholders by increasing public awareness about local hazards and risks, while at the same time providing information about options and resources available to reduce those risks. Teaching the public about potential hazards will help each of the area's jurisdictions protect themselves against the effects of the hazards, and will enable informed decision making on where to live, purchase property, or locate businesses.

It should be noted that the area covered by this plan includes the incorporated and unincorporated areas of Lancaster, Northumberland, Richmond, and Westmoreland Counties. Towns included in this plan are Colonial Beach, Irvington, Kilmarnock, Montrose, Warsaw, and White Stone.

The Local Mitigation Planning Impetus

On October 30, 2000, President Clinton signed into law the Disaster Mitigation Act of 2000 (DMA 2000), which established a national disaster hazard mitigation grant program that would help to reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act, and added a new section to the law, Section 322, Mitigation Planning. Section 322 requires local governments to prepare and adopt jurisdiction-wide hazard

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mitigation plans for disasters declared after November 1, 2003, (subsequently revised to November 1, 2004) as a condition of receiving Hazard Mitigation Grant Program (HMGP) project grants and other forms of non-emergency disaster assistance. Local governments must review, and if necessary, update the mitigation plan every five years from the original date of the plan to continue program eligibility.

Interim Final Rule Planning Criteria

As part of the process of implementing DMA 2000, FEMA prepared an Interim Final Rule to define the mitigation planning criteria for States and communities. Published in the Federal Register on February 26, 2002, at 44 CFR Part 201, the Rule serves as the governing document for DMA 2000 planning implementation.

Organization of the Plan

The remaining sections of this document follow the process enumerated in DMA 2000.

Section III – Planning Process describes the Northern Neck region’s stakeholder involvement and defines the processes followed throughout the creation of this plan.

Section IV – Community Profile provides a physical and demographic profile of the area, looking at things such as geography, hydrography, development, people, and land uses.

Section V – Hazard Identification and Risk assessment evaluates the natural hazards likely to affect the Northern Neck, and quantifies whom, what, where, and how the region might be affected by natural hazards.

Section VI – Capability Assessment analyzes each of the four counties’ policies, programs, plans, resources, and capability to reduce exposure to hazards in the community.

Section VII – Mitigation Strategy addresses the Northern Neck’s issues and concerns for hazards by establishing a framework for mitigation activities and policies. The strategy includes a future vision statement, goals, objectives, and a range of actions to achieve the goals.

Section VIII – Plan Maintenance Procedures specifies how the plan will be monitored, evaluated, and updated, including a process for continuing stakeholder involvement once the plan is completed.

Section IX – References include a list of reports and data used to develop this plan.

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Appendices – Appendices are included at the end of the plan, and contain supplemental reference materials and more detailed calculations and methodologies used in the planning process. The appendices also provide a list of commonly used mitigation terms and acronyms.

SECTION III. PLANNING PROCESS

The Northern Neck Planning District Commission is a voluntary organization of the region's four county governments, whose primary goal is to help find regional solutions to common problems. The commission was established to plan for the orderly and efficient physical, social, and economic development of Virginia's Northern Neck Region. Activities and policies of the Commission, which are set by sixteen Commissioners appointed by the local governing bodies, include a wide range of comprehensive planning, technical assistance, grant seeking, and regional coordination activities. The Planning District was formed by local governments in 1968 under the authority of the Virginia Area Development Act.

Beginning in 2003, the State of Virginia encouraged the twenty-one planning districts in the state to take the lead on development of local hazard mitigation plans. These plans, which are required by DMA 2000, help local governments determine risks and vulnerabilities, and identify projects to reduce these risks. The plan developed under the auspices of the Northern Neck Planning District will include the jurisdictions of Lancaster, Northumberland, Richmond and Westmoreland Counties and the incorporated towns within these counties.

After receiving funding in 2004, the Northern Neck Planning District contracted with the engineering consulting firm, Dewberry, to develop a multi-hazard mitigation plan including a Hazard Identification and Risk Assessment (HIRA) and mitigation strategies. The Mitigation Advisory Committee worked with the consultants throughout the planning process to ensure that potential stakeholders participated in the planning process and had opportunities for input in the draft and final phases of the plan.

The Northern Neck Regional Hazard Mitigation Plan incorporates a number of other plans, studies and reports that have been produced about the Northern Neck. These documents include county comprehensive plans, the regional emergency operations plan, and a shoreline erosion study. Information about these plans and studies is included in Sections IV, V and VI of the plan and full reference information is provided in Section IX.

The Mitigation Advisory Committee

The communities of the Northern Neck have established a Local Emergency Planning Committee (LEPC) to address local emergency management issues. Members of the LEPC are appointed by resolution by the counties. The membership of this committee

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is closely aligned to the needs of a Mitigation Advisory Committee. The planning district commission, therefore, decided to utilize the existing LEPC as its Mitigation Advisory Committee. Representatives include county administrators, planning directors, emergency services staff, school board officials, local non-profits and state agencies such as the Virginia Department of Transportation.

The Mitigation Advisory Committee worked with the Dewberry team and provided input at key stages of the process. Efforts to involve county departments and community organizations that might have a role in the implementation of the mitigation actions or policies included invitations to attend meetings and serve on the Mitigation Advisory Committee, e-mail updates, strategy development workshops, and outreach through local government meetings and public libraries, plus opportunities for input and comment on all draft deliverables.

The Northern Neck Planning District Commission would like to thank and acknowledge the following persons who served on the Mitigation Advisory Committee and their representative departments and organizations throughout the planning process:

Table III-1. Northern Neck Mitigation Advisory Committee Members		
Name	Title/Department	Jurisdiction
Jerry Davis	Executive Director/ Northern Neck Planning District Commission	Region
Jack Larson	Planning and Land Use Director	Lancaster County
Steve Daum	Building Official	Lancaster County
William H. Pennell, Jr	County Administrator	Lancaster County
B. Wally Beauchamp	Board of Supervisors	Lancaster County
Scott Hudson	Emergency Services Supervisor	Lancaster County
Walter Harcum	Lancaster Sheriff's Office	Lancaster County
Kenneth D. Eades	County Administrator	Northumberland County
E. Luttrell Tadlock	Assistant County Administrator	Northumberland County
W.M. Knight	Building Official/Director of Code Compliance	Northumberland County
Phillip Keyser		Northumberland County

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Table III-1. Northern Neck Mitigation Advisory Committee Members

Kenny Eades	County Administrator	Northumberland County
Sally Conley	Northumberland NAACP	Northumberland County
Wayne Middleton	Northumberland Sheriff	Northumberland County
Mike Marlow	Rappahannock General Hospital	Region
Chris Jett	Director of Planning and Information	Richmond County
Barry Sanders	Building Official/Code Administrator	Richmond County
Bill Duncanson	County Administrator	Richmond County
Bob Luttrell	School Board	Richmond County
Doug Bryant	Sheriff 's Office	Richmond County
Deborah Mills	VDEM	State
Brittany Schaal	VDEM	State
Joe Staton	VDOT – Richmond County	Richmond County
JB Waltermire Jr.		Westmoreland County
Paul Brunkow	Building Official	Westmoreland County
Norm Risavi	County Administrator	Westmoreland County
Mike Tompkins	Planning Department	Westmoreland County
Elaine Fogliani	School Board	Westmoreland County
Bryon Wilkins	Sheriff's Office	Westmoreland County
Eddie Westow	Volunteer Fire Department	Westmoreland County
<i>Other participants in the planning process</i>		

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Table III-1. Northern Neck Mitigation Advisory Committee Members

Brian Hooten	Town Manager	Town of Colonial Beach
Brenda Reamy	Town Manager	Town of Montross
Lee Hood Capps	Town Manager	Town of Kilmarnock
Jonathan Sanders	Planner	Town of Kilmarnock
W.H. Evans	Town Council Member	Town of Irvington

Between November 2004 and July 2005, the Mitigation Advisory Committee held four meetings and supervised work on the area’s mitigation plan. The Mitigation Advisory Committee members coordinated and consulted with other entities and stakeholders to identify and delineate natural hazards within the seven local jurisdictions, and to assess the risks and vulnerability of public and private buildings, facilities, utilities, communications, transportation systems, and other vulnerable infrastructure.

In developing the mitigation plan, a majority of necessary communication occurred through telephone calls and emails. The Mitigation Advisory Committee and its consultant chose this avenue to best accommodate budgets and schedules. Table III-2 documents formal meeting dates and their purposes.

Table III-2. Mitigation Advisory Committee

Meeting Dates	Summary of Discussions
November 16, 2004	Planning process was described. Commitment to the project and schedule was obtained. Discussion regarding the purpose of the plan was held.
January 6, 2005	Results of the HIRA were presented. Discussion of mission and region-wide goals for the plan were discussed and debated.
March 28, 2005	Draft plan presentation. Ranking of regional strategies. Held at Rappahannock Community College.
July 18, 2005	Final plan presentation.

Copies of the plan were made available to the Northern Neck’s neighbors, the Rappahannock Area Development Commission and the Middle Peninsula Planning District Commission, for their review and input.

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Public Participation and Citizen Input

Opportunities for public input were provided throughout the planning process. As noted above, the Mitigation Advisory Committee members included representatives of community organizations and businesses. In addition, an open public meeting was held July 18, 2005, to allow the general public an opportunity to meet with the planning consultants and Mitigation Advisory Committee members, ask questions, and provide comments and input on the draft mitigation plan. The plan also was made available to the public for review by placement in local government offices and libraries. Finally, the Planning District Commission publicized the planning process in its quarterly newsletter.

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Section IV. Community Profile

Introduction

The Northern Neck Planning District Commission (NNPDC) covers four counties and five towns between the Rappahannock and Potomac Rivers in the eastern part of Virginia. The jurisdictions included in this plan are:

- ❖ Lancaster County
- ❖ Northumberland County
- ❖ Richmond County
- ❖ Westmoreland County

The planning area encompasses approximately 745 square miles. The Northern Neck is bound by the Potomac River on the north, the Chesapeake Bay on the east, the Rappahannock River to the south, and Essex and King George Counties on the west. The location of the Northern Neck area within the State of Virginia is depicted in Figure IV-1. The planning area is approximately 65 miles northeast of Richmond, the state capital, and 120 miles southeast of Washington, D.C.

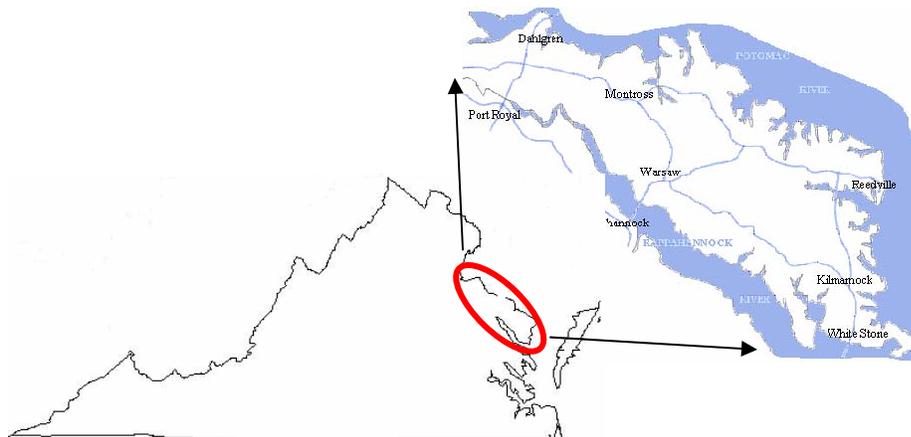


Figure IV-1. Location of the Northern Neck

Based on total land mass, Lancaster County is the smallest county in the planning area with 133 square miles. 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 over 1,110 miles of shoreline.

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Physiography

The District falls within two subprovinces of the Coastal Plain of Virginia (see Figure IV-2 for a map of the physiographic provinces and subprovinces). The Upland Subprovince (CU) is characterized by low slopes and gentle drainage divides. Steep slopes develop in areas dissected by streams. Steep slopes also are present where the upland meets the Potomac and Rappahannock Rivers. Elevations range from 60 to 250 feet. The other subprovince is the Lowland Subprovince (CL), which is the flat, low-relief region along major rivers and near the Chesapeake Bay. Elevations range from 0-60 feet.ⁱ

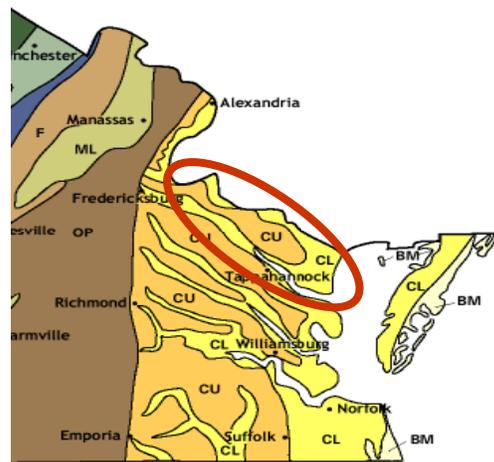


Figure IV-2. Physiographic Provinces of the Northern Neck

Hydrology

The planning area lies within three major watersheds – the Potomac, the Rappahannock, and the Bay Coastal. The Potomac watershed spans 5,702 square miles, the third largest in Virginia, and is fed mainly by the Potomac River and the North and South Forks of the Shenandoah River. The Rappahannock river basin is fed by the Rappahannock River, Rapidan River, and Hazel River and covers about 2,714 square miles. The Bay Coastal watershed is comprised of the Chesapeake Bay and the Piankatank River. The watershed size is 2,577 square miles, though only a small portion of the planning area falls within it.

As noted previously, the planning area is bound by the Potomac and Rappahannock Rivers and the Chesapeake Bay. In addition, the Great Wicomico and the Corrotoman Rivers flow through it. Numerous creeks crisscross the planning area, and the shoreline is marked by numerous inlets and coves.

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Land Use and Development Trends

The jurisdictions in the planning area are primarily rural. There are five incorporated towns in the jurisdictions. They typically have a more suburban development pattern with a central node around the intersection of two primary roads, or as a corridor along a primary road.

Lancaster County

Lancaster County is known for its tourist and recreational attractions. The historic buildings and marinas attract visitors throughout the year. The retiree population is increasing and the younger population is decreasing. The County's comprehensive plan recognizes a need to retain the rural character of the county while providing economic opportunity to encourage the younger population to stay.

The county's infrastructure, due to its rural nature, is limited. Development opportunities are tied to the characteristics of the site, primarily whether a septic system is viable. The presence of steep slopes and floodplains also are taken into account.

Development trends towards large residential subdivisions. For instance, Hills Quarter, a large mixed use development, began on 460 acres in 1997. The development plan calls for 500 homes, a commercial development, winery, a community club house, and a golf course. The county's 265 miles of tidal shorelines makes it a popular spot for waterfront development.ⁱⁱ

Northumberland County

As of 1995, the biggest land uses in Northumberland County were agriculture and forestry. 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. Almost 66% of residential waterfront development (or over 100 lots) in Northumberland County is located in seven subdivisions. Many of the inland lots in these subdivisions have not yet been built.

Commercial development tends to occur along highways and in the villages such as Fairport and Reedville. Marinas and industrial sites are found along the waterfront.ⁱⁱⁱ

Richmond County

Early in the 20th century, agriculture, fishing and timber were the main industries in Richmond County, but they have since been replaced by the retail trade and service

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industries. The county is mainly rural, with hunting and fishing as major recreational uses. Agricultural uses are the dominant land use shown on the 2001 zoning map. Large lot residential uses are included in this category. Along the shorelines, residential uses account for 53% of total use, followed by farms and forests. Industrial uses are comprised of a few seafood processing plants. Zoning regulations for the county were adopted in 1995.

The 2001 Future Land Use Map shows a large portion of the County destined for conservation uses. These areas tend to be along the Rappahannock River in the northern part of the county and the southern tip of the county along the border of Northumberland County. The southeastern part of the County also is highlighted as a potential reservoir location, and the land slated for business use is greatly increased from the current amount used.

Based on an agreement stemming from the 1985 Future Annexation Plan, the Town of Warsaw annexed land from the county in 1999. The County plans to direct future intense growth towards this area and other areas slated for annexation.

A major constraint on development is the presence of steep slopes. About 57 square miles (or about 30%) of the land in the county has a slope greater than 15%.^{iv}

Westmoreland County

Rural residential uses dominate the landscape of Westmoreland County. Manufactured homes have represented an increasing percentage of the available housing stock since 1980. As of 1990, manufactured homes accounted for 12 percent of the housing stock (up from 8.9% in 1980). Specifically, there were 536 manufactured homes in the county in 1980; that number had jumped to 1,006 by 1990. Waterfront properties, used as both vacation and rental homes, command a premium price. Agriculture, retail and tourist uses provide the bulk of the remaining land uses, while the fishing and seafood industry is endangered. There are two towns, Montross and Colonial Beach, that act as community centers and growth nodes.

The county has invested in water and sewer infrastructure to encourage development. The county also built an industrial park to attract commercial uses. About 95% of the land in the county exceeds an 8% slope, making development difficult. A large portion of the floodplain has been zoned C-1 (Conservation), though some of it has already been developed.^v

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Climate

The present-day climate of the Northern Neck is generally classified as temperate semi-maritime.^{vi} Winters are generally mild and summers are warm and humid.^{vii} Average temperatures in the Northern Neck are about 77 degrees Fahrenheit in the summer and 38 degrees in the winter. Average annual rainfall is approximately 43 inches and average annual snowfall is 15 inches.

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 provide a buffer to atmospheric changes and allow for breezes that offset humidity.^{viii}

Population

The total population of the jurisdictions included in this study is 49,353 (as of the 2000 Census). The growth rates between the four counties vary dramatically, ranging from a high of 21.1% (Richmond County) to a low of 6.2% (Lancaster County).

Table IV-1 shows the population breakdown by jurisdiction with the associated growth rate and number of persons per household.

Table IV-1. Population by Jurisdiction ^{ix}				
	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Population, 2000	11,567	12,259	8,809	16,718
Population, percent change, 1990 to 2000	6.20%	16.50%	21.10%	8.00%
Persons per household, 2000	2.23	2.24	2.4	2.43

According to the 2000 Census, slightly under half of the population in the planning area is female (49.6%). Of note, Richmond County's population is only 44% female.

According to the Census, the majority of the population is White (66.1%). African-Americans make up about 29% of the population. Less than two percent of the population is of Hispanic origin. Very few residents (2.1%) in the planning area were

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foreign-born and less than 4% of the population reported that they spoke a language other than English at home.

One type of special needs group is characterized by age. About 4.4% (2,243) of the population is under the age of five while 19.6% (9,944) is under the age of 18. The percentage of people over the age of 65 is 22.2%, about double that of the state average (11.2%). The counties of the Northern Neck are recognized as popular retirement spots. Lancaster and Richmond Counties, in particular, have seen a trend towards an aging population of both long-term residents and newly moved retirees. These people are taking advantage of the Northern Neck's proximity to water, reasonable land prices, low taxes and rural character. In response, there has been an increase in demand for residential development, recreational opportunities, and medical services aimed at senior citizens. Therefore, special consideration for the needs of the younger and older generations should be given when developing mitigation strategies.

Significantly fewer people in the planning area graduate from high school when compared to the state as a whole (81.5%); about 68.5% of residents are high school graduates. Approximately 17% hold bachelor's degrees or higher, compared to the state average of 29.5%. Lancaster and Northumberland Counties have higher educational attainment rates that are more in line with the state average (24.5% and 21.7% respectively). These numbers, coupled with the population characteristics described in the previous paragraph, are important to keep in mind when developing public outreach programs. The content and delivery of public outreach programs should be consistent with the audiences' needs and ability to understand complex information.

The average median household income is approximately \$35,047, about 75% of the state average (\$46,677). The average per capita household income of \$20,932 is somewhat lower than the state per capita income of \$23,975. About 13.3% (6,768) of residents within the Northern Neck planning area live below the poverty line. This rate is higher than that of the national rate of 11.3% and the state rate of 9.6%. These numbers may indicate that a significant portion of the population will not have the resources to undertake mitigation projects that require self-funding.

The statistics are fairly consistent between jurisdictions in the planning area. Table IV-2 shows the breakdown by jurisdiction. As the table illustrates, Northumberland County has a slightly higher median household income, while Lancaster County has a slightly higher per capita income.

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Table IV-2. Income Characteristics by Jurisdiction

	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Median household income, 1999	\$33,239	\$38,129	\$33,026	\$35,797
Per capita money income, 1999	\$24,663	\$22,917	\$16,675	\$19,473
Persons below poverty, percent, 1999	12.5%	12.3%	15.4%	14.7%

Housing

There are 27,809 housing units in the planning area. Northumberland and Westmoreland Counties each have about a third of the housing units while only about 13% are in Richmond County. Lancaster County has the remaining quarter of housing units. Only 3% of the housing units in the planning area are in multi-unit structures. Northumberland County has virtually no multi-unit structures while Richmond County has the highest percentage in the planning area with 6.4% (228 units)

Almost 80% of residents own their own homes. Northumberland County has the highest homeownership rate with 87.4% while Richmond County has the lowest in the planning area at 77.4%. All of the homeownership rates are significantly higher than the national average of 66.2% or the state average of 68.1%. Table IV-3 illustrates the housing characteristics of each jurisdiction.

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Table IV-3. Housing Characteristics by Jurisdiction

	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Housing units, 2002	6,609	8,251	3,560	9,389
Housing units in multi-unit structures, percent, 2000	3.20%	1.10%	6.40%	3.50%
Homeownership rate, 2000	83.00%	87.40%	77.40%	79.20%
Median value of owner-occupied housing units, 2000	\$131,600	\$129,100	\$86,700	\$95,300

According to County comprehensive plans, manufactured housing represents an increasing percentage of the housing available in the Northern Neck. For instance, manufactured housing accounted for 44.1 and 43.5 percent of the building permits issued in 1999 in Richmond and Westmoreland Counties, respectively.^x

Business & Labor

The rural nature of the communities in the planning area is reflected in the top employment sectors. Table IV-4 presents information on each jurisdiction's top employment sectors. These numbers do not reflect employment in the following sectors, as information is not published by county:

- ❖ Construction,
- ❖ Finance & insurance,
- ❖ Information,
- ❖ Mining,
- ❖ Transportation & warehousing,
- ❖ Utilities, and
- ❖ Management of companies & enterprises.

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In addition, businesses without employees (such as farmers or fisherman) are not included in this summary. The five most represented employment sectors (as of 1997) are:

- ❖ Retail trade,
- ❖ Wholesale trade,
- ❖ Accommodation & foodservices,
- ❖ Manufacturing, and
- ❖ Professional, scientific, & technical services.

Table IV-4. Economic Characteristics by Jurisdiction^{xi}

Sector	Establishments	Sales, receipts or shipments (\$1,000)	Annual payroll (\$1,000)	Paid employees
Lancaster County				
Wholesale trade	17	35,908	1,558	64
Professional, scientific, & technical services	28	5,269	1,633	73
Accommodation & foodservices	37	9,663	2,634	253
Retail trade	71	83,399	7,986	546
Manufacturing	16	124,593	13,508	694
Northumberland County				
Other services (except public administration)	29	6,762	1,768	108
Accommodation & foodservices	16	3,148	1,071	115
Wholesale trade	13	D	D	(100-249)
Retail trade	54	42,413	5,013	338
Manufacturing	19	59,582	12,947	575

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Table IV-4. Economic Characteristics by Jurisdiction^{xi}

Sector	Establishments	Sales, receipts or shipments (\$1,000)	Annual payroll (\$1,000)	Paid employees
Richmond County				
Accommodation & foodservices	11	D	D	(20-99)
Professional, scientific, & technical services	13	1,626	690	30
Wholesale trade	17	18,735	2,157	89
Health care & social assistance	6	8,961	4,075	282
Retail trade	49	62,649	5,812	460
Westmoreland County				
Wholesale trade	17	35,908	1,558	64
Professional, scientific, & technical services	28	5,269	1,633	73
Accommodation & foodservices	37	9,663	2,634	253
Retail trade	71	83,399	7,986	546
Manufacturing	16	124,593	13,508	694
D = Withheld to avoid disclosure				
Note: numbers in parentheses indicate the range that the number of paid employees falls into				

Major employers in the jurisdictions include:

❖ Lancaster County

Bank of Lancaster
 Rappahannock General Hospital
 Rappahannock Westminister Canterbury
 The Lancashire
 The Tides Inn Inc.

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- ❖ Northumberland County
 - Cowart Seafood Corp.
 - Little River Seafood, Inc.
 - Omega Protein Inc.

- ❖ Richmond County
 - Haynesville Correctional Facility
 - Northern Neck Electric Cooperative
 - Northern Neck Lumber Company, Inc.
 - Verizon Communications
 - Warsaw Health Care Center
 - Wood Preservers, Inc.

- ❖ Westmoreland County
 - Bevans Oyster Company, Inc.
 - Ingleside Plantation Inc.
 - Potomac Supply Corporation

Agriculture

Agriculture is a major economic sector in the Northern Neck. As can be seen in Table IV-5, the amount of land farmed in three of the four counties increased between 1997 and 2002. Total agricultural sales were over \$34 million, mainly from crops. Major crops include soybeans, corn, and wheat.

Table IV-5. Agricultural Sector^{xiii}

Jurisdiction	Land in farms - 2002 acreage (change from 1997)	Market Value of Agricultural Products Sold		
		Total value of agricultural products sold	Value of crops including nursery and greenhouse	Value of livestock, poultry, and their products
<i>Lancaster</i>	12,453 (-22%)	\$2,265,000	\$2,193,000	\$71,000
<i>Northumberland</i>	40,141 (+3%)	\$7,408,000	\$7,063,000	\$345,000
<i>Richmond</i>	44,771 (+19%)	\$6,655,000	\$5,823,000	\$831,000
<i>Westmoreland</i>	67,652 (+4%)	\$20,110,000	\$19,104,000	\$1,006,000

Transportation

The Northern Neck is a peninsula of land bound by two rivers and the Chesapeake Bay. Transportation options are somewhat more limited than in surrounding areas.

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No interstate serves the planning area directly, though Interstate-95, the major north-south route on the East Coast, is easily accessible via SR-3 (about 30 miles from Westmoreland County). US-360 is the main east-west route, while SR-3 is the major north-south route in the planning area.

The closest commercial airports are in Richmond and Newport News (both within approximately 55 miles). Three general aviation facilities, Tappahannock Municipal Airport, Hummel Field, and Tangier Island Airport, also serve the planning area. There is no rail service to the Northern Neck.

As described before, a number of rivers run through the planning area. The Potomac and Rappahannock Rivers and the Chesapeake Bay are all navigable by medium to large ships. However, the nearest major commercial ports are in Richmond and Norfolk, Virginia. Small local barge facilities are available in Richmond County. Over seventeen local marinas dot the shorelines of the Northern Neck.

A bridge crosses the Rappahannock River between White Stone in Richmond County and Greys Point in Middlesex County. Seasonal (summer) passenger ferries run to Tangier Island and Maryland's Smith Island.

Infrastructure

The Richmond Regional area is served by two electricity providers: Dominion Virginia Power and the Northern Neck Electric Cooperative. Natural gas is provided by Columbia Gas of Virginia. Telephone service is available from Verizon. Public water is available in the Towns of Colonial Beach, Kilmarnock, Montross and Warsaw. Sydnor Hydrodynamics, Inc. and the Westmoreland County also provide potable water.

Wastewater treatment is available in the Towns of Colonial Beach, Kilmarnock, and Warsaw. The Reedville Sanitary District and Montross-Westmoreland Sewer Authority also provide wastewater services. Private well and septic systems serve the remainder of the planning area.

SECTION V. HAZARD IDENTIFICATION AND RISK ASSESSMENT

In accordance with the requirements of DMA 2000, a multi-hazard mitigation plan is being prepared for the Northern Neck Planning District Commission. This document represents the Hazard Identification and Risk Assessment (HIRA) portion of the hazard mitigation plan. The HIRA provides information to allow the planning district to better understand local hazards and the risks posed by such hazards, to begin to develop mitigation activities to lessen the impacts, and to acquire disaster-related grants in the aftermath of a disaster.

The Northern Neck Planning District Commission, on behalf of the jurisdictions which comprise the planning area, has developed this HIRA to serve as a guide to all communities in the Northern Neck planning area when assessing potential vulnerabilities to natural hazards. When developing this plan, every effort was made to gather input from all aspects of the project area communities to assure that the results of this analysis were as accurate as possible.

The planning area for this study includes four counties and six incorporated towns. All jurisdictions located throughout these counties have been included in this portion of the study, as this analysis has been completed on a regional basis. It should be noted, however that a local jurisdiction's inclusion in the Full Mitigation Plan is dependent on the community's participation in the remainder of the planning process.

The purpose of the HIRA is to:

1. Identify what hazards could affect the Northern Neck Planning District Commission
2. Profile hazard events and determine what areas and community assets are the most vulnerable to damage from these hazards
3. Estimate losses and prioritize the potential risks to the community

The first step, hazard identification, identifies all the natural hazards that might affect the Northern Neck. The hazards are ranked to determine what hazards are most likely to impact the communities of Northern Neck. The hazards that are determined to have significant impact are analyzed in the greatest detail to determine the magnitude of future events and the vulnerability for the community and the critical facilities. Hazards that receive a moderate impact ranking are analyzed with available data to determine the risk and vulnerability to the specified hazard. The limited impact hazards are analyzed using the best available data to determine the risk to the community.

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Planning Area Description

The Northern Neck is located in the tidewater area of Virginia. The “Northern Neck” is the ancient name for the narrow peninsula between the Rappahannock River and the Potomac River. Main bodies of water in the Northern Neck are the Potomac River, Rappahannock River and the Chesapeake Bay. The Northern Neck is made up of the Town of Colonial Beach, Town of Irvington, Lancaster County, Northumberland County, Town of Montross, Richmond County, Town of Kilmarnock, Town of Warsaw, Westmoreland County and Town of White Stone.

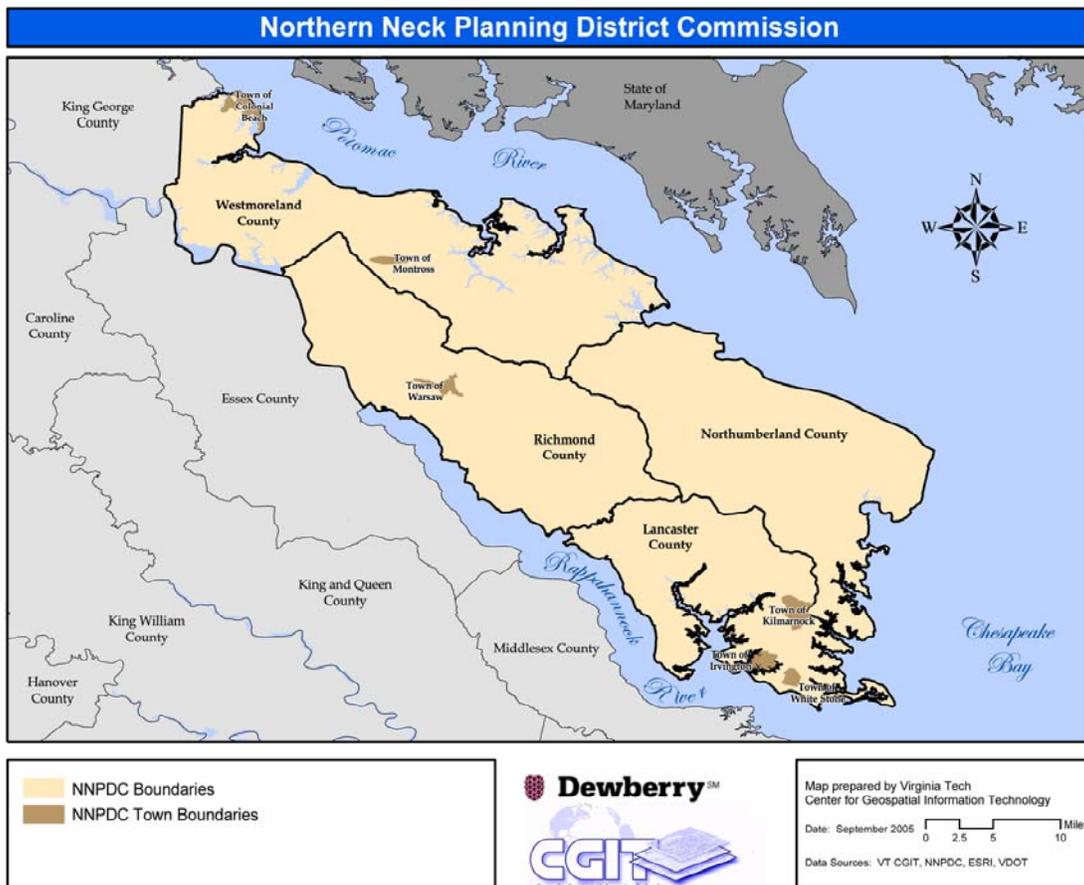


Figure V-1. Northern Neck PDC Boundaries

Watersheds

The major watersheds for the Northern Neck include the Chesapeake Bay Coastal, Potomac River (including the Shenandoah River) and the Rappahannock River. The following Figure V-2 illustrates the location of the major watershed boundaries for the planning district.

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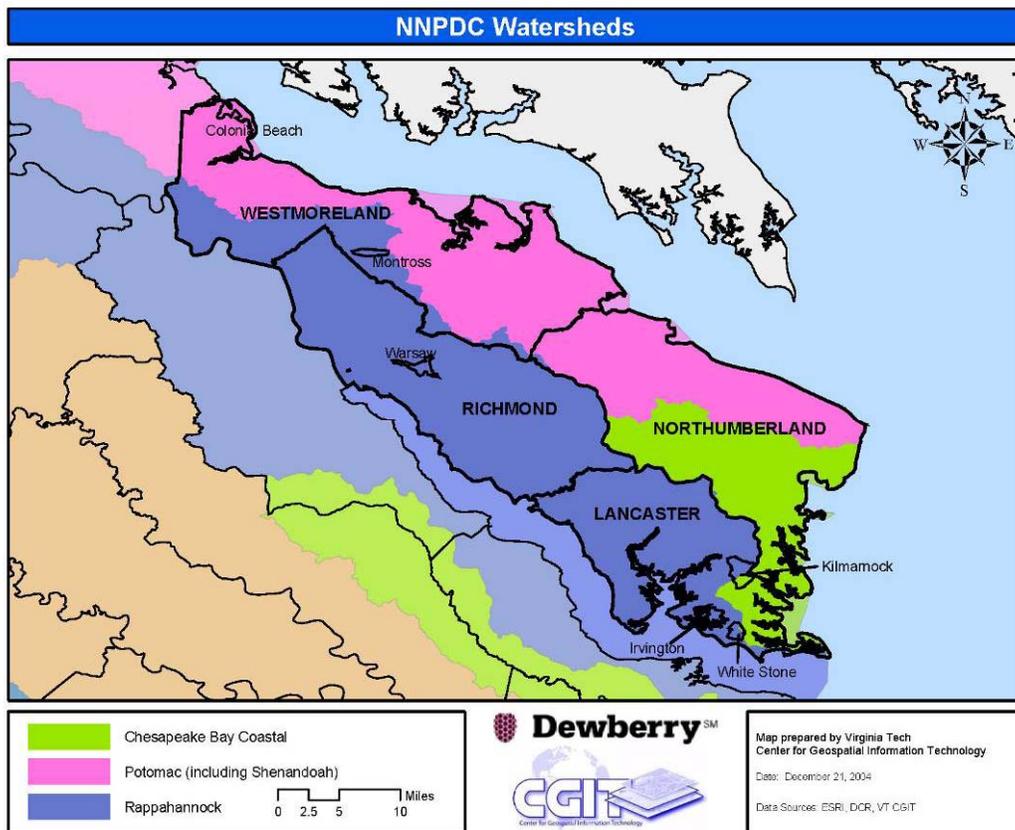


Figure V-2. Northern Neck Watersheds (VA-DCR)

Critical Facilities

According to the FEMA State and Local Plan Interim Criteria, a critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.

Critical facilities for the Northern Neck were derived from a variety of sources. Information provided by the Northern Neck Planning District Commission was supplemented with ESRI data as well as geocoded facilities completed at the Virginia Tech Center for Geospatial Information Technology (CGIT). Analysis for the region was completed using the best available data. Census blocks were used to assess the areas vulnerability to specific hazards. Flooding analysis was conducted in a slightly different manner. Structure points were determined using Virginia Base Mapping imagery which was then intersected with the floodplain data for the region. Structure value was established using average house value in the 2000 Census data. The 2000 Census data for average structure value per block was used as a replacement cost in

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the event of a disaster. This value can serve as a guide in assessing the impacts of various hazards. Figures V-3 through V-6 show the locations of critical facilities in the four counties.

The Town of Kilmarnock provides municipal water and wastewater services. The wastewater facility is in a wooded area, which could affect access after a disaster. The Lancaster County Rescue Squad is located within the town boundaries, as is the main hospital for the region.

Lancaster County, Virginia

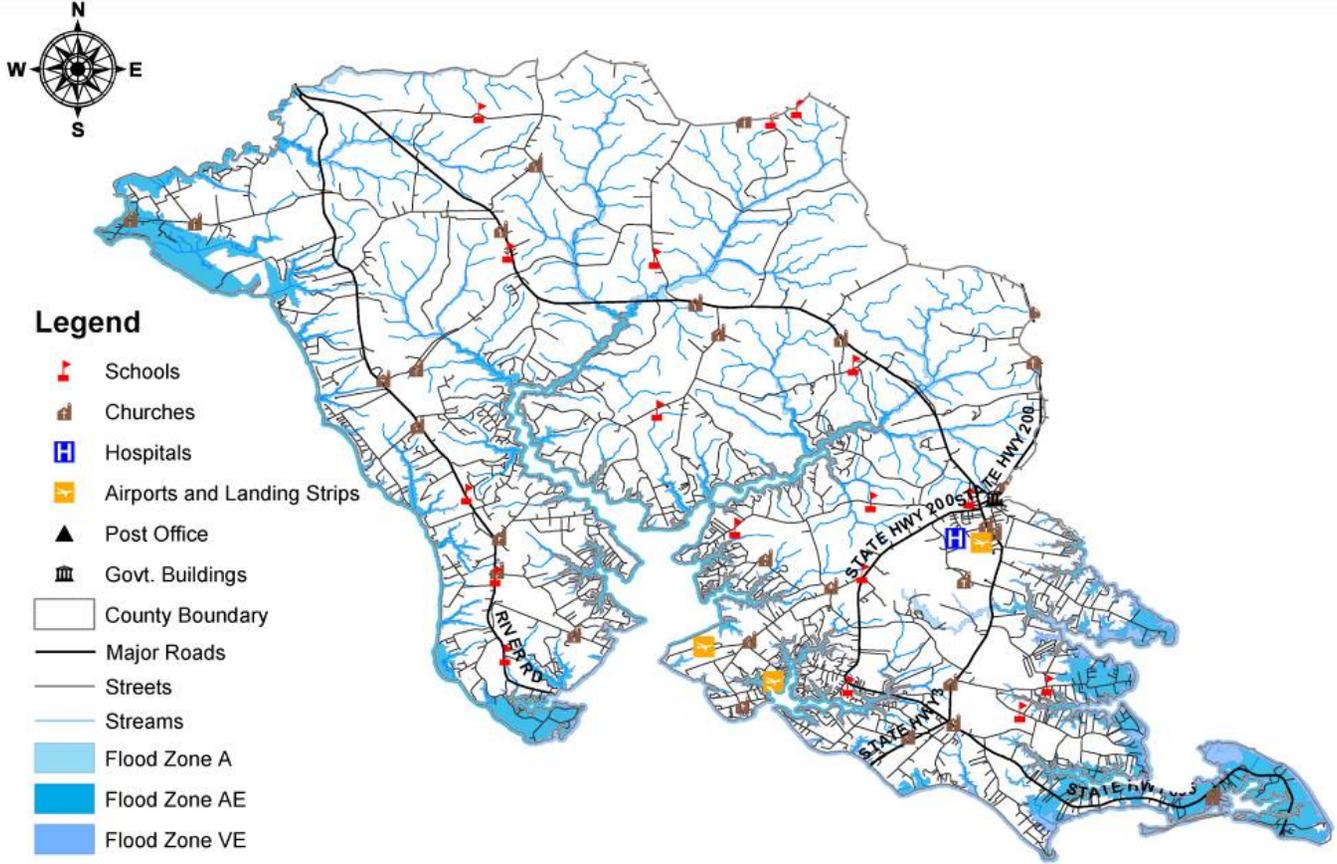


Figure V-3. Critical Facilities in Lancaster County

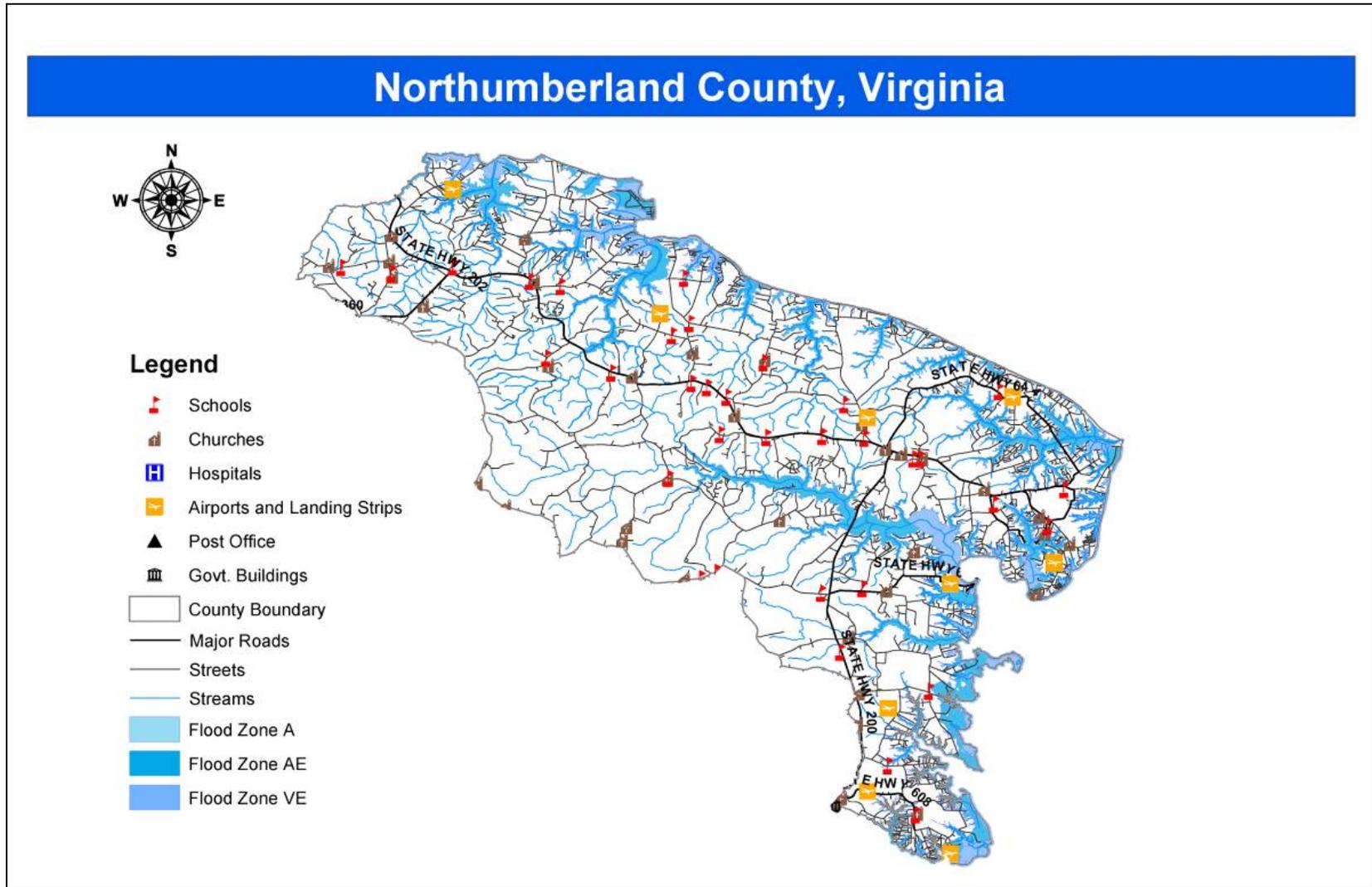


Figure V-4. Critical Facilities in Northumberland County

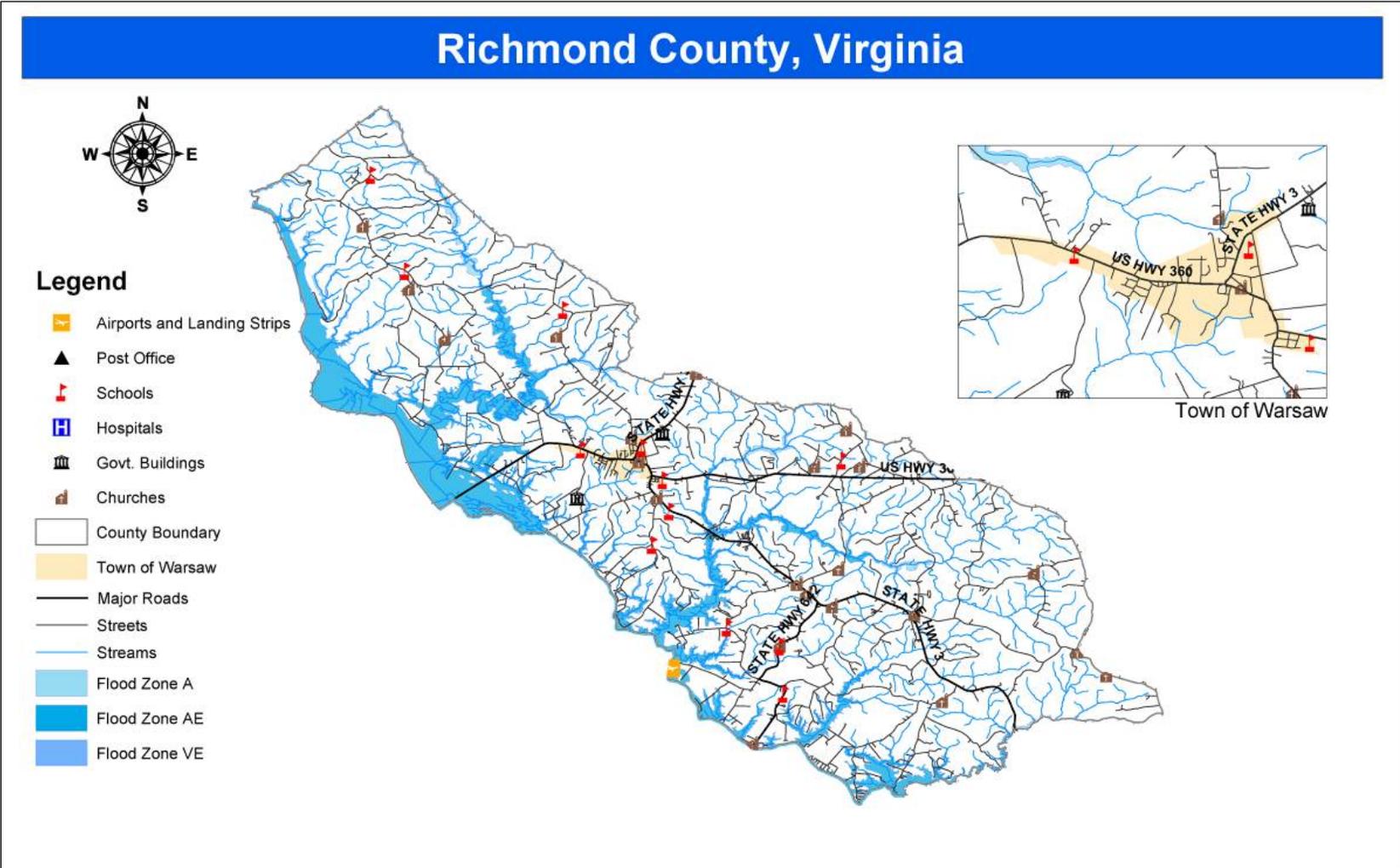


Figure V-5. Critical Facilities in Richmond County

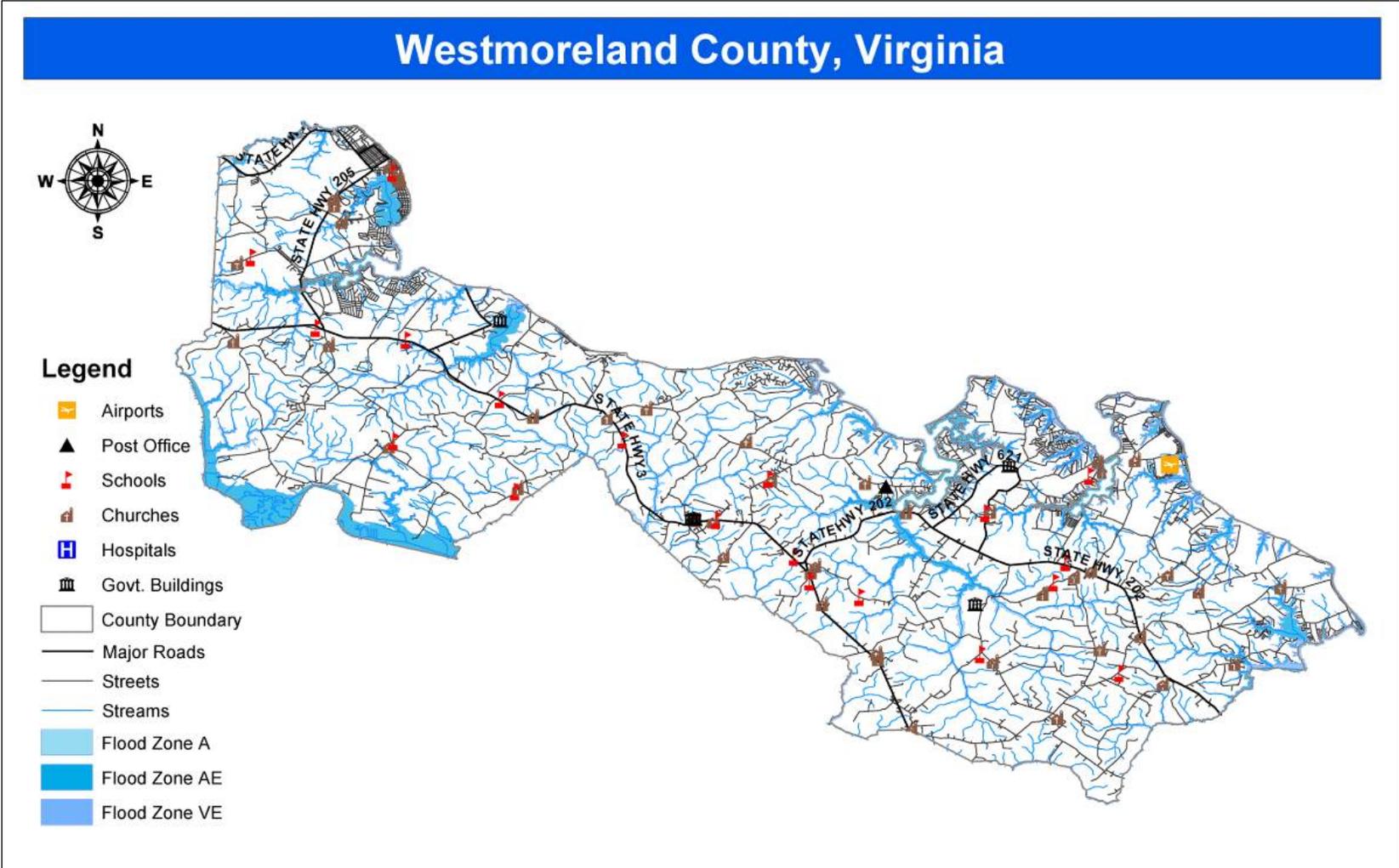


Figure V-6. Critical Facilities in Westmoreland County

Data Limitations

Inadequate information posed a problem for developing loss estimates for most of the identified hazards. The limiting factor for the data was that the hazard mapping precision is at only the county or jurisdiction level. Currently, many of the hazards do not have defined damage estimate criteria.

Available data for this plan was very limited. The FEMA guidelines emphasize using “best available” data for this plan. The impact of these data limitations will be shown through the different vulnerability assessment and loss estimation methods used for hazards.

The Planning District Commission provided available base map data including water networks, street mapping and some zoning information. All other data was derived from existing sources or created by the Virginia Tech Center for Geospatial Information Technology.

Critical facilities were determined based on best available data. Critical facilities, residential and industrial buildings within the 100 year floodplain were identified for flood analysis. The Hazards US – Multi-Hazard (HAZUS-MH) model was used to estimate damage from hurricanes in the Northern Neck region.

Hazard Identification

Types of Hazards

Although any type of disaster is possible for any given area in the United States, the most likely hazards that could potentially affect the communities in the Northern Neck Planning District include:

- Coastal Erosions
- Droughts
- Flooding
- Hurricanes
- Northeasters
- Tornadoes
- Wildfires
- Winter Storms

Probability of Hazards

Hazards were ranked by the steering committee to determine what hazards they judged to have the largest impact on their communities. The results are summarized in Table V-1. Certain hazards were not addressed as a result of the infrequency of occurrence and/or limited impact. Earthquake, for example, falls into this category.

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Analysis level was determined by the type of data available and the scale of data available for the analysis.

Hazard Type	Planning Consideration
Hurricane	Significant
Flooding	Moderate
Winter Storm	Moderate
Coastal Erosion	Moderate
Drought	Limited
Northeaster	Limited
Tornado	Limited
Wildfire	Limited
Earthquake	None

Additional areas of impact were noted by the committee members through a problem spot worksheet, as well as indicating what areas were of concern on paper maps for the region. Each locality provided input, to the best of their ability, in determining what areas were concerns or “problems” in their communities. The areas that the committee members and public indicated were taken into consideration during the analysis phase. The individual community problem spot maps that were developed include flooding, coastal erosion, and wildfire.

Major Disasters

Table V-2 lists the major disasters that have occurred in the Planning District over the past seventy-five years, including Presidentially-declared disasters.

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Table V-2. Northern Neck Federal Disasters

Date	Disaster Number	Type of Disaster	Damage \$	Description
8/23/1933	Not Available	Hurricane	Not Available	Most destructive on record as of 1989. The storm surge in the Chesapeake Bay and estuaries was the highest on Record. The tide at the mouth of the Potomac reached 7.4 feet above mean low water.
10/15/1954	Not Available	Hurricane Hazel	Not Available	Second most destructive to strike the area. Not as bad as 1933, storm tide only 5.1 feet above mean low water. However, much damage to roofs, communication lines and other structures from high winds.
8/12/1955	Not Available	Hurricane Connie	Not Available	Followed similar path as 1933 storm, produced high storm surge, but only minor damage.
8/17/1955	Not Available	Hurricane Diane	Not Available	Passed inland and to the west, did not produce a damaging tide.
8/23/1969	Not Available	Severe Storms & Flooding	Not Available	Worst storm area saw in decades. Northwest winds in excess of 65 MPH. Tides 5 feet above normal, with damage to waterfront structures.
6/23/1972	Not Available	Tropical Storm Agnes	Not Available	On June 23, a severe storm system entered Virginia producing wind gusts of 60 mph and 6.9 inches of rain reported in Tappahannock. This storm was primarily a rainstorm with some locally strong winds.
1/26/1977	Not Available	Ice Conditions	Not Available	Ice, snow and very unusually low temperatures produced one of the coldest winter seasons with record low temperatures of -12F

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Table V-2. Northern Neck Federal Disasters

Date	Disaster Number	Type of Disaster	Damage \$	Description
11/9/1985	FEMA-755-DR	Severe Storms & Flooding	Not Available	Climaxing five days of northeast winds and unusually high tides, on the morning of August 12, an unpredicted severe storm system entered Virginia producing heavy rain, winds in excess of 65 mph and tides five feet above normal. The storm, spawned off the Carolina coast was driven through the Chesapeake and up the Potomac River, forcing tides and water over islands, points of land and riverbanks.
3/10/1994	FEMA-1014-DR	Severe Ice Storms, Flooding	Not Available	Coupled with low temperatures, a freezing rain on February 14, produced a major ice storm in the Northern Neck area.
1/13/1996	FEMA-1086-DR	Blizzard of 1996 (severe storm)	\$50,000	From January 6 through January 15, two snow fronts, striking first from the south and then from the north produced large and prolonged snowfall, sleet, along with windy conditions (15-20 knots)
9/18/1999	FEMA-1293-DR	Hurricane Floyd	Not Available	On the afternoon of September 15, a severe storm system entered Virginia producing average winds of 50 mph with 70 mph gusts and about 13 inches of rain at Kinsale and 18 inches in Warsaw.
2/28/2000	FEMA-1318-DR	2000 Winter Storms	Not Available	During a one-week period in January, two winter storms produced record snowfall, blizzard conditions and damaging ice accumulations.

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Table V-2. Northern Neck Federal Disasters

Date	Disaster Number	Type of Disaster	Damage \$	Description
9/18/2003	FEMA-1491-DR	Hurricane Isabel	\$506,000,000	On the afternoon of Thursday, September 18, a severe storm system (Hurricane Isabel) entered Virginia, peaked around 7 pm ending Friday morning September 19. Rainfall varied from 3.5 inches in Newland to 2 inches in Heathsville, averaging 2 inches. Record storm surges varied from 5 feet on the Rappahannock River, 6 feet, 4 inches at Wicomo Church, 10 feet at Colonial Beach. Sustained winds for this storm were between 50-55 mph with gusts as strong as 68 mph.

Level of Hazard

Table V-3 provides a breakdown of the natural hazards addressed in this plan. The level of planning consideration given to each hazard was determined by the committee members. Based on the input of committee members at the kick-off meeting, the hazards were broken into four distinct categories which represent the level of consideration they will receive throughout the planning process.

In order to focus on the most critical hazards that may affect the Planning District communities, hazards assigned a level of *Significant* or *Moderate* will receive the most extensive attention in the remainder of the planning analysis, while those with a *Limited* planning consideration level will be assessed in more general terms. The hazards with a planning level of *None* will not be addressed in this plan. The hazards assigned a ranking of *None* are not critical enough to warrant further evaluation; however, these hazards should not be interpreted as having zero probability or impact.

As can be seen in Table V-1, earthquakes have been designated with a hazard level of *None*, and will not be included in this analysis. An earthquake is the shaking of the ground's surface caused by movements of the plates beneath it. Though there have been historical occurrences of earthquakes that have affected the area, the probability and impact is low enough for the overall risk to be considered "none" at a planning level. This reasoning is supported by a loss estimate created using FEMA's HAZUS-MH that shows annualized losses for the region as about \$65,000. This number is compared to annualized losses from wind events at \$4.6 million.

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Additional areas of impact were noted by the committee members through a problem spot worksheet, as well as by indicating areas of concern on paper maps for the region. The areas that the committee members indicated were taken into consideration during the analysis phase.

Table V-3. Northern Neck Natural Hazards HIRA Overview

Hazard	Type	Detail Level	Analysis Level	Data Reference
Hurricane	Hurricane	Significant	Covered by HIRA hurricane analysis	FEMA DFIRM, Q3, and FIRM Mapping and ASCE Design Wind Speed Maps, FEMA HAZUS model
Blizzards/ Winter Storms	Including winter storms, ice storms, and excessive cold	Moderate	Covered by HIRA blizzards/winter storm analysis	NOAA National Weather Service Records, VirginiaView PRISM
Coastal/ Shoreline Erosion	Coastal/Shoreline Erosion	Moderate	Covered by HIRA coastal/shoreline erosion analysis	SURGO Data, FEMA Q3 and FIRM Mapping
Flooding	Coastal	Moderate	Covered by HIRA flood analysis	FEMA DFIRM, Q3, and FIRM Mapping
	Riverine	Moderate		
Northeasters	Northeasters	Limited	Description and Regional Maps	NOAA National Weather Service Records
Drought	Including excessive heat	Limited	Covered by HIRA drought analysis	Drought Monitor
Tornado	Tornados	Limited	Description and Regional Maps	NOAA National Weather Service Records
Wildfire	Wildfire	Limited	Covered by HIRA wildfire analysis	Virginia Department of Forestry
Earthquake	Earthquake	None	None, due to infrequency of occurrence	None

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Hurricane (Significant Ranking)

Hazard History

Table V-4 includes descriptions of major hurricane events in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description applies to the entire planning area.

Table V-4. Hurricane Hazard History	
Date	Damages
August 23, 1933	<p>On the morning of August 23, a severe storm system entered Virginia producing strong winds and rain which intensified and continued all day. The entire waterfront of the Northern Neck had damages. Wharves, businesses, and homes were completely destroyed. Crops were destroyed, livestock were killed. Electric and telephone systems were out and so badly damaged and communication was impossible.</p> <p>Considerable damage reported at White Stone Beach, Chesapeake Beach, Colonial Beach, Potomac Beach, Lewisetta and Reedville. Downing Bridge was covered with 6 inches of water. Simonsons had slight damage. Property damages due to flooding occurred at Sharps Wharf, Morattico, and Naylor's. The bridge over Cat Point Creek, in Naylor's, was carried away. Farnham Creek bridge was found floating.</p> <p>In Chesapeake Beach, 35 feet of high bank was washed away impacting buildings. Fallen trees divided buildings. The storm widened beaches from 50 to 75 feet in some areas and carried away 10 feet of bank every hour in others.</p> <p>Estimated damages: Property and crop damage, \$1,000,000.</p> <p><u>Lancaster:</u> White Stone Beach resort and steamboat wharf destroyed. Four feet of water covered the East Coast Utilities Company. Property damage to Bertrand, Corrotoman, Weems Island and Bluff point. At least fifty percent of crops damaged in county.</p> <p><u>Westmoreland:</u> Colonial Beach's entire waterfront (1 mile) including the houses along it was damaged. Colonial and Potomac Beach wharves destroyed and piers gone. Property damage reported in Potomac Beach, Colonial Beach, and Sandy Point.</p> <p><u>Northumberland:</u> Kinsale Creek bridge destroyed. Significant business, residential (cottages) and boat damages reported in Lewisetta. In Lewisetta, there was significant damage to a packing house and cannery. Steamboat wharf and cannery washed away at Cowarts.</p> <p><i>(Source: Northern Neck News)</i></p>
October 15, 1954	<p>On the morning of October 15, a severe storm system entered Virginia from North Carolina producing light rain but strong gale winds (60-100 mph) from the</p>

Northern Neck Regional Hazard Mitigation Plan

Table V-4. Hurricane Hazard History

Date	Damages
	<p>east that increased in intensity during the day.</p> <p>Damages were caused more by wind than tides. Damages were spread across the Northern Neck. Many roofs blown from homes, barns and outbuildings demolished, numerous boats sunk, trees uprooted and utility poles leveled knocking out communication and electricity.</p> <p>Thousands of trees blown over or torn apart blocking roads and knocking down power/telephone lines. Along Rappahannock River and other rivers/creeks boats were sunk, blown ashore or badly battered. Docks and wharves along waterfronts washed away completely.</p> <p>Oyster houses and the roads to them were damaged. More damage noted along Potomac River shore than Rappahannock River shore. Carters Creek had heavy damage to boats, docks, railways and several buildings.</p> <p><u>Lancaster:</u> Estimated damages over \$1,000,000. Litwalton, Palmer, Morattico, Historic Cobbs Hall, Kilmarnock, and Lively suffered damages to roofs, porches and windows. Morattico hard hit with most trees knocked down, bank washed out and large sections of road damage. Morrattico also had large boats, skiffs and crab floats on adjoining fields and yards. Severe boat damage at Simonson. White Stone factories received some damage.</p> <p>Power outages occurred in White Stone, Irvington, Weems, Kilmarnock, Lancaster and Lively.</p> <p><u>Westmoreland:</u> Private wharfs and docks at Coles Point washed away.</p> <p><u>Northumberland:</u> Reedville factories received some damage. Power outages in Burgess, Wicomico Church and Heathsville.</p> <p><u>Richmond:</u> Dance hall and canning factory in Wellford’s Wharf demolished. A microwave tower fell and fair grounds buildings demolished in Warsaw.</p> <p><i>(Source: Northern Neck News and Rappahannock Record)</i></p>
August 12, 1955	<p>On the morning of August 12, a severe storm system entered Virginia from the Caribbean producing an abnormally high tide, heavy rain and wind, but below hurricane strength. Wind gusts of 45 to 50 mph occurred during a short period in the afternoon.</p> <p>Light damages were reported. Damages to waterfront properties on the Potomac River shore and to crops generally. Property damages to homes and businesses minimal as compared to past events.</p> <p><u>Lancaster:</u> Limited building damages reported in White Stone and Kilmarnock. River banks washed away Roof damages reported in Palmer and Kilmarnock.</p> <p><u>Northumberland:</u> Limited building damages reported in Lewisetta.</p> <p><i>(Source: Northern Neck News and Rappahannock Record)</i></p>

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Table V-4. Hurricane Hazard History

Date	Damages
August 17, 1955	Hurricane Connie Followed similar path as 1933 storm, produced high storm surge, but only minor damage.
June 23, 1972	<p>On June 23, a severe storm system entered Virginia producing wind gusts of 60 mph and 6.9 inches of rain reported in Tappahannock. This storm was primarily a rainstorm with some locally strong winds.</p> <p>Almost all damage was due to heavy rains. Upper Richmond and Westmoreland Counties received more rain. Dams broke and trees impacted buildings. The Rappahannock and Potomac Rivers and tributaries overflowed causing fields to be flooded. About 5,000 were without power.</p> <p>Roads and bridges were washed out and impassable. This event produced crop damage and a severe oyster kill, impacting economics of the region.</p> <p>Highway damages estimated at \$74,766.</p> <p><u>Lancaster:</u> In the Kilmarnock area trees were blown down blocking roads and causing power outages.</p> <p><u>Westmoreland:</u> Power outages were severe in Westmoreland County. Highway damages estimated at \$61,100. The dam at Chandler Mill Point which supports State 647 in Westmoreland County was washed away.</p> <p><u>Northumberland:</u> Power outages were severe in Northumberland County.</p> <p><u>Richmond:</u> Power outages were severe in Richmond County. Crop damage estimated at \$250,000. Warsaw received 4.53 inches of rainfall during the event and about 7 inches of rain from several days before and after. Highway damages estimated at \$9,850.</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Westmoreland News)</i></p>
September 6, 1996	<p>On September 6, a severe storm system entered Virginia from North Carolina producing heavy winds from the east and southeast, up to 45 mph (40-50 knots), high tides (six feet above sea level) with moderate rainfall. Between 11 to 17 inches of rain were recorded. The Rappahannock River crested at 26.9 feet (5th highest level).</p> <p>Damages caused were mostly from wind, high tides and powerful waves swelling the Potomac and Rappahannock Rivers. Trees were uprooted from wind and saturated soil disrupting electric service to over 10,000 customers. The effects of the storm were felt more in neighboring Tappahannock. Thirty residents were stranded on Coleman's Island.</p> <p>Most road problems were in upper Lancaster County and the interior of Northumberland from rushing waters. Culverts and bridge abutments were torn out. Closed roads included Routes 604, 611 and 612. Significant bridge repair work at Rt. 201, Courthouse Road was reported.</p> <p><u>Lancaster:</u> Little property damage was noted with the river cresting about two</p>

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Table V-4. Hurricane Hazard History

Date	Damages
	<p>feet above normal. 74 residents sought shelter. The Rappahannock River flooded Morattico making roads impassible and damaging outbuildings. Routes 600 and 604 reported damage.</p> <p><u>Westmoreland:</u> Water rose over breakwaters at Kinsale. Waves and wind from the Potomac River took out most of the beach area, damaged docks, and boathouses in Colonial Beach. Irving Avenue in Colonial Beach also was closed due to flooding and debris. Rt. 601 reported damage and the Mattox Creek Bridge were closed. Schools were closed. Boats were lifted off boat lifts and water levels were up to doors. Power disruptions occurred in Montross and beach erosion, pier and damage occurred in Sandy Point. At Coles Point boat shed roofs were peeled off, boats were damaged and two thirds of the fishing pier was destroyed.</p> <p><u>Northumberland:</u> Northumberland County had some minor damages with trees blown over and beach erosion (Note: article mentioned tornados from Hurricane Bertha earlier in the year). The Judith Sound and Lewisetta areas in the county on Rt. 624 were hardest hit. In Juidith Sound water levels reached the main road and generated sewage problems. Lewisetta had 4-12 inches of water covering yards and roads, causing erosion and blowing sailboats on their sides. Rt. 620 reported damages. 141 residents sought shelter.</p> <p><u>Richmond:</u> Heavy rain and damaging winds producing flooding on the low shores of the Rappahannock. Power lines were down and trees uprooted. Homes were flooded in Pearson Island and Hales Point. Cat Point Creek Bridge and Naylor's Bridge were flooded and closed. Rt. 642 reported damage. Boats and piers were damaged or destroyed.</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Westmoreland News)</i></p>
September 18, 1999	<p>On the afternoon of September 15, a severe storm system entered Virginia producing average winds of 50 mph with 70 mph gusts and about 13 inches of rain at Kinsale and 18 inches in Warsaw.</p> <p>This storm event was not as powerful as expected. Trees were knocked down, power lines were down and roads were washed out. Yards and fields were flooded, trees fell on residential homes. Schools and businesses were closed. Creeks were full to overflowing. Electric and phone service disrupted. About 15,000 customers were without power. Many roads and bridges were closed and covered with water. The Robert O. Norris Bridge connecting Lancaster and Middlesex Counties was closed. Cat Point Bridge was covered over with water. Routes 3, 201, 611, 612 and 682 were either washed out or covered in water.</p> <p><u>Lancaster:</u> In Lancaster County, the following roads were impacted: Rt. 600, Rt. 612, Rt. 616, and Rt. 642.</p> <p><u>Westmoreland:</u> In Westmoreland County, Rt. 601 was impacted. 13 inches of rain was recorded at Kinsale. Water covered docks at Kinsale. Colonial Beach was hard hit with 40 foot deep sections of beach erosion and pier damage.</p>

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Table V-4. Hurricane Hazard History

Date	Damages
	<p>Montross' water system was disrupted and sewage pump stations were damaged.</p> <p>Northumberland: Northumberland County was hit worst in road damage with four roads closed for several weeks (e.g., Rt. 201). The Essex Mill Dam broke. Estimated damages: \$309K for Northumberland, mostly road work.</p> <p>Richmond: 18 inches of rain was recorded in Warsaw. Haynesville Correctional Center evacuated 1,000 inmates. Emergency shelters were open; 249 residents sought shelter. Sharps Road, Garland Millpond Bridge and the County Bridge near Newland were covered in water. Sydnors Mill Pond had damage. Rt. 642 was washed out. Estimated damages: \$259K for Richmond, mostly road work.</p> <p><i>(Source: Northern Neck New and Westmoreland News)</i></p>
September 18, 2003	Hurricane Isabel – see description in Flooding Hazard History, Table V-10.

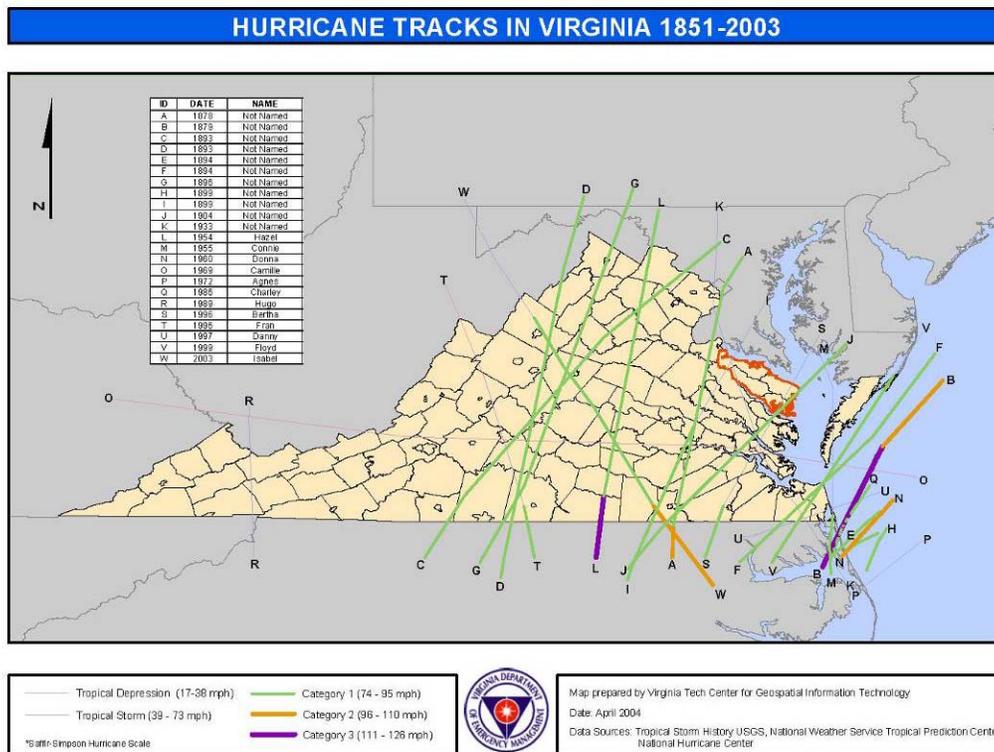


Figure V-7. Virginia Hurricane Tracks (VDEM)

The Commonwealth of Virginia’s Standard Hazard Mitigation Plan includes hurricane tracks in Virginia spanning from 1851 to 2003 (Figure V-7). The hurricane track map gives an idea of the historical occurrences in the Northern Neck region. The hurricane in 1904, which is “Not Named”, tracked through the southeast portion of Lancaster County with a Saffir-Simpson hurricane category of 1. A majority of the

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remaining hurricanes that have tracked through the Northern Neck region were considered tropical storms, resulting in large secondary impacts causing little property damage but widespread infrastructure damage (i.e., power and phone disruptions).

Hazard Profile

A tropical cyclone is the generic term for a non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation. Depending on strength, they are classified as hurricanes or tropical storms. Tropical cyclones involve both atmospheric and hydrologic characteristics, such as severe winds, storm, surge flooding, high waves, coastal erosion, extreme rainfall, thunderstorms, lightning, and, in some cases, tornadoes. Storm surge flooding can push inland, and riverine flooding associated with heavy inland rains can be extensive. Many areas of the Tidewater region are flat, and intense prolonged rainfall tends to accumulate without ready drainage paths. High winds are associated with hurricanes, with two significant effects: widespread debris due to damaged and downed trees and damaged buildings; and power outages. The Northern Neck is especially vulnerable to hurricanes and their impacts.

As the storm moves into more shallow waters, the waves lessen, but water levels rise, bulging up on the storm's front right quadrant in what is called the "storm surge." This is the deadliest part of a hurricane. The storm surge and wind driven waves can devastate a coastline and bring ocean water several miles inland.

Secondary Hazards

Secondary hazards from a hurricane event could include high winds, flooding, heavy waves, and tornadoes. Once inland, the hurricane's band of thunderstorms produces torrential rains and, sometimes, tornadoes. A foot or more of rain may fall in less than a day causing flash floods and mudslides. The rain eventually drains into the large rivers, which may still be flooding for days after the storm has passed. The storm's driving winds can topple trees, utility poles, and damage buildings. Communication and electricity is lost for days and roads are impassable due to fallen trees and debris.

Hurricane Damage Scale

Hurricanes are categorized by the Safer-Simpson Hurricane Damage Scale listed below (Table V-5). Following the table are detailed descriptions of each category and the potential damage caused by each.

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Table V-5. Saffir-Simpson Hurricane Damage Scale

Hurricane Category	Sustained Winds (mph)	Damage Potential	Description
1	74 - 95	Minimal	Minimal damage to unanchored mobile homes along with shrubbery and trees. There may be pier damage and coastal road flooding, with storm surge 4-5 feet about average.
2	96 - 110	Moderate	Moderate damage potential to mobile homes and piers, as well as significant damage to shrubbery and trees with some damages to roofs, doors and windows. Impacts include flooding 2-4 hours before arrival of the hurricane in coastal and low lying areas. Storm surge can be 6-8 feet above average.
3	111 - 130	Extensive	Extensive damage potential. There will be structural damage to small residences and utility buildings. Extensive damage is to mobile homes and trees and shrubbery. Impacts include flooding 3-5 hours before the arrival of the hurricane cutting off the low lying escape routes. Coastal flooding has the potential to destroy the small structures, with significant damage to larger structures as a result of the floating debris. Land that is lower than 5 feet below mean sea level can be flooded 8 or more miles inland. Storm surge can be 6-12 feet above average.
4	131 - 155	Extreme	Extreme damage potential. Curtain wall failure as well as roof structure failure. Major damage to lower floors near the shoreline. Storm surge generally reaches 13-18 feet above average.
5	> 155	Catastrophic	Severe damage potential. Complete roof failure on residence and industrial structures, with complete destruction of mobile homes. All shrubs, trees and utility lines blown down. Storm surge is generally greater than 18 feet above average.

Vulnerability Analysis

HAZUS-MH was used to complete the wind analysis for vulnerability and loss estimates. The HAZUS software has been developed by FEMA and the Nation Institute of Building Sciences. Level 1, with default parameters, was used for the analysis done in this plan. For analysis purposes, the U.S. Census tracks are the

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smallest extent in which the model runs. The results of this analysis are captured in the vulnerability analysis and loss estimation.

HAZUS-MH uses historical hurricane tracks and computer modeling to identify the probable tracks of a range of hurricane events. Figure V-8 on the shows the wind speeds predicted by the FEMA HAZUS-MH model for the Northern Neck. As shown on the maps, higher wind speeds are predicted for Lancaster and Northumberland Counties. The impacts of these various events are combined to create a total annualized loss or the expected value of loss in any given year.

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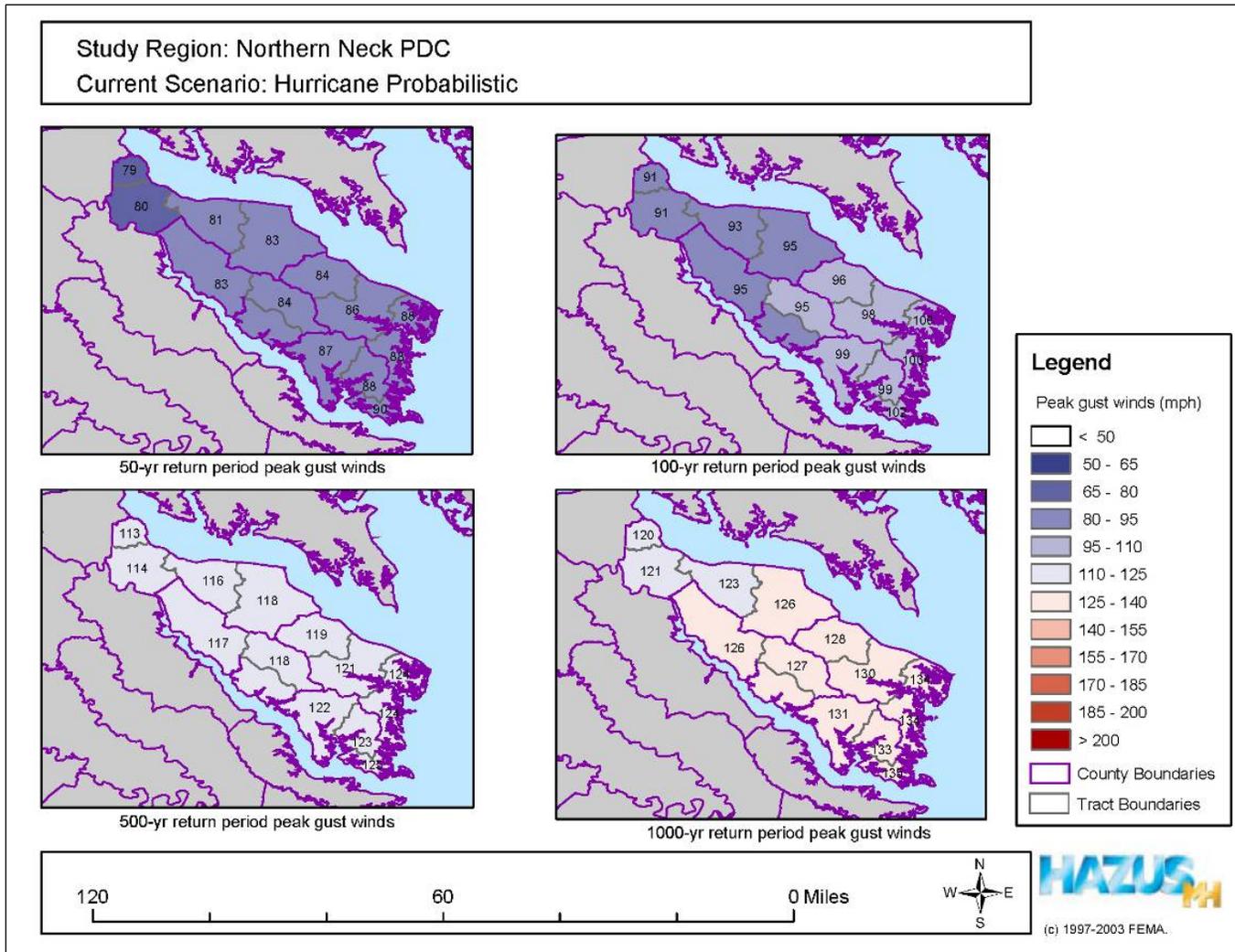


Figure V-8. HAZUS-MH Hurricane Winds for 50-,100-, 500-, and 100-yr return periods

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Building Types

Table V-6 illustrates the probabilistic building stock exposure by building type to hurricanes. Information is based on Census 2000 data. For the Northern Neck region, wood-frame buildings account for a large percentage of the building stock. Table V-7 illustrates the building stock exposure broken down by the type of occupancy. From the table, 88% of the building stock for the Northern Neck region is considered residential, with approximately 9% of the building stock is commercial and/or industrial. HAZUS-MH hurricane model only conducts analysis at the U.S. Census track level; which is larger than most of the towns in the region. Town exposure has been estimated based on the percentage of the housing units in the County. The county totals include the town subtotals. Differences in total exposure between Table V-6 and V-7 result from rounding in the HAZUS-MH software.

Table V-6. Building Stock Exposure by Building Type (from HAZUS-MH)

Community	Wood	Masonry	Concrete	Steel	MH	TOTAL
Lancaster County	\$591,487.00	\$243,066.00	\$31,124.00	\$75,625.00	\$19,156.00	\$960,458.00
<i>*Town of Kilmarnock</i>	<i>\$63,584.85</i>	<i>\$26,129.60</i>	<i>\$3,345.83</i>	<i>\$8,129.69</i>	<i>\$2,059.27</i>	<i>\$103,249.24</i>
<i>*Town of Irvington</i>	<i>\$34,424.54</i>	<i>\$14,146.44</i>	<i>\$1,811.42</i>	<i>\$4,401.38</i>	<i>\$1,114.88</i>	<i>\$55,898.66</i>
<i>*Town of White Stone</i>	<i>\$18,336.10</i>	<i>\$7,535.05</i>	<i>\$964.84</i>	<i>\$2,344.38</i>	<i>\$593.84</i>	<i>\$29,774.20</i>
Northumberland County	\$704,949.00	\$257,169.00	\$8,904.00	\$43,941.00	\$30,865.00	\$1,045,828.00
Richmond County	\$304,330.00	\$139,861.00	\$27,113.00	\$52,901.00	\$14,716.00	\$538,921.00
<i>*Town of Warsaw</i>	<i>\$47,505.91</i>	<i>\$21,832.30</i>	<i>\$4,232.34</i>	<i>\$8,257.85</i>	<i>\$2,297.17</i>	<i>\$84,125.57</i>
Westmoreland County	\$801,721.00	\$294,833.00	\$13,835.00	\$49,008.00	\$32,620.00	\$1,192,017.00
<i>*Town of Colonial Beach</i>	<i>\$154,812.33</i>	<i>\$56,932.25</i>	<i>\$2,671.54</i>	<i>\$9,463.44</i>	<i>\$6,298.92</i>	<i>\$230,178.48</i>
<i>*Town of Montross</i>	<i>\$15,072.35</i>	<i>\$5,542.86</i>	<i>\$260.10</i>	<i>\$921.35</i>	<i>\$613.26</i>	<i>\$22,409.92</i>
Total	\$2,736,223.09	\$1,067,047.50	\$94,262.07	\$254,993.08	\$110,334.33	\$4,262,860.06

All values are in thousands of dollars

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Table V-7. Building Stock Exposure By General Occupancy (from HAZUS-MH)

Community	Residential	Commercial	Industrial	Agri.	Religion	Gov't	Ed.	Total
Lancaster County	\$813,127.00	\$113,684.00	\$16,803.00	\$2,766.00	\$10,512.00	\$667.00	\$2,893.00	\$960,452.00
<i>*Town of Kilmarnock</i>	<i>\$87,411.15</i>	<i>\$12,221.03</i>	<i>\$1,806.32</i>	<i>\$297.35</i>	<i>\$1,130.04</i>	<i>\$71.70</i>	<i>\$311.00</i>	<i>\$103,248.59</i>
<i>*Town of Irvington</i>	<i>\$47,323.99</i>	<i>\$6,616.41</i>	<i>\$977.93</i>	<i>\$160.98</i>	<i>\$611.80</i>	<i>\$38.82</i>	<i>\$168.37</i>	<i>\$55,898.31</i>
<i>*Town of White Stone</i>	<i>\$25,206.94</i>	<i>\$3,524.20</i>	<i>\$520.89</i>	<i>\$85.75</i>	<i>\$325.87</i>	<i>\$20.68</i>	<i>\$89.68</i>	<i>\$29,774.01</i>
Northumberland County	\$948,205.00	\$50,915.00	\$24,418.00	\$3,754.00	\$10,576.00	\$1,199.00	\$6,756.00	\$1,045,823.00
Richmond County	\$438,460.00	\$56,448.00	\$12,197.00	\$4,882.00	\$11,793.00	\$7,744.00	\$7,398.00	\$538,922.00
<i>*Town of Warsaw</i>	<i>\$68,443.61</i>	<i>\$8,811.53</i>	<i>\$1,903.95</i>	<i>\$762.08</i>	<i>\$1,840.89</i>	<i>\$1,208.84</i>	<i>\$1,154.83</i>	<i>\$84,125.72</i>
Westmoreland County	\$1,088,675.00	\$64,515.00	\$13,922.00	\$6,778.00	\$9,069.00	\$2,893.00	\$6,172.00	\$1,192,024.00
<i>*Town of Colonial Beach</i>	<i>\$210,223.14</i>	<i>\$12,457.85</i>	<i>\$2,688.34</i>	<i>\$1,308.83</i>	<i>\$1,751.22</i>	<i>\$558.64</i>	<i>\$1,191.81</i>	<i>\$230,179.83</i>
<i>*Town of Montross</i>	<i>\$20,467.09</i>	<i>\$1,212.88</i>	<i>\$261.73</i>	<i>\$127.43</i>	<i>\$170.50</i>	<i>\$54.39</i>	<i>\$116.03</i>	<i>\$22,410.05</i>
Total	\$3,747,542.92	\$330,405.90	\$75,499.17	\$20,922.41	\$47,780.32	\$14,456.06	\$26,250.73	\$4,262,857.52

All values are in thousands of dollars

Critical Facilities

Vulnerability to critical facilities from hurricane winds is fairly uniform throughout the region. As Figure V-8 showed, there is only slight variation (around 10%) from the eastern to western portions of the region. In general, critical facilities in Northumberland and Lancaster Counties will have slightly higher vulnerability than those in Westmoreland and Richmond Counties.

Loss Estimation

Table V-8 provides the loss estimations from HAZUS-MH by building type. As noted earlier, wood structures compose the majority of the structures, and also account for the majority of the losses. Table V-9 shows the loss by occupancy type. Note that the difference between the totals in the tables is due to rounding calculations in HAZUS-MH.

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Table V-8. Building Stock Loss by Building Type (from HAZUS-MH)

Community	Wood	Masonry	Concrete	Steel	MH	TOTAL
Lancaster County	\$856.63	\$305.63	\$20.80	\$74.35	\$28.93	\$1,286.34
<i>*Town of Kilmarnock</i>	<i>\$92.09</i>	<i>\$32.86</i>	<i>\$2.24</i>	<i>\$7.99</i>	<i>\$3.11</i>	<i>\$138.28</i>
<i>*Town of Irvington</i>	<i>\$49.86</i>	<i>\$17.79</i>	<i>\$1.21</i>	<i>\$4.33</i>	<i>\$1.68</i>	<i>\$74.86</i>
<i>*Town of White Stone</i>	<i>\$26.56</i>	<i>\$9.47</i>	<i>\$0.64</i>	<i>\$2.30</i>	<i>\$0.90</i>	<i>\$39.88</i>
Northumberland County	\$995.93	\$324.06	\$7.58	\$43.02	\$45.85	\$1,416.44
Richmond County	\$324.65	\$123.45	\$10.17	\$35.42	\$15.87	\$509.56
<i>*Town of Warsaw</i>	<i>\$50.68</i>	<i>\$19.27</i>	<i>\$1.59</i>	<i>\$5.53</i>	<i>\$2.48</i>	<i>\$79.54</i>
Westmoreland County	\$742.58	\$242.45	\$5.71	\$28.58	\$33.43	\$1,052.76
<i>*Town of Colonial Beach</i>	<i>\$143.39</i>	<i>\$46.82</i>	<i>\$1.10</i>	<i>\$5.52</i>	<i>\$6.46</i>	<i>\$203.29</i>
<i>*Town of Montross</i>	<i>\$13.96</i>	<i>\$4.56</i>	<i>\$0.11</i>	<i>\$0.54</i>	<i>\$0.63</i>	<i>\$19.79</i>
Total	\$3,296.32	\$1,126.35	\$51.15	\$207.58	\$139.33	\$4,820.74
<i>All values are in thousands of dollars</i>						

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Table V-9. Building Stock Loss By General Occupancy (from HAZUS-MH)

Community	Residential	Commercial	Industrial	Agri.	Religion	Gov't	Ed.	Total
Lancaster County	\$1,136.63	\$115.60	\$17.29	\$2.87	\$8.24	\$0.57	\$2.63	\$1,283.82
<i>*Town of Kilmarnock</i>	<i>\$122.19</i>	<i>\$12.43</i>	<i>\$1.86</i>	<i>\$0.31</i>	<i>\$0.89</i>	<i>\$0.06</i>	<i>\$0.28</i>	<i>\$138.01</i>
<i>*Town of Irvington</i>	<i>\$66.15</i>	<i>\$6.73</i>	<i>\$1.01</i>	<i>\$0.17</i>	<i>\$0.48</i>	<i>\$0.03</i>	<i>\$0.15</i>	<i>\$74.72</i>
<i>*Town of White Stone</i>	<i>\$35.24</i>	<i>\$3.58</i>	<i>\$0.54</i>	<i>\$0.09</i>	<i>\$0.26</i>	<i>\$0.02</i>	<i>\$0.08</i>	<i>\$39.80</i>
Northumberland County	\$1,319.89	\$48.78	\$27.09	\$3.53	\$7.69	\$0.93	\$5.05	\$1,412.96
Richmond County	\$439.89	\$39.32	\$8.85	\$3.89	\$6.26	\$5.61	\$4.81	\$508.61
<i>*Town of Warsaw</i>	<i>\$68.67</i>	<i>\$6.14</i>	<i>\$1.38</i>	<i>\$0.61</i>	<i>\$0.98</i>	<i>\$0.88</i>	<i>\$0.75</i>	<i>\$79.40</i>
Westmoreland County	\$990.13	\$36.99	\$10.57	\$4.40	\$3.92	\$1.65	\$3.23	\$1,050.89
<i>*Town of Colonial Beach</i>	<i>\$191.19</i>	<i>\$7.14</i>	<i>\$2.04</i>	<i>\$0.85</i>	<i>\$0.76</i>	<i>\$0.32</i>	<i>\$0.62</i>	<i>\$202.93</i>
<i>*Town of Montross</i>	<i>\$18.61</i>	<i>\$0.70</i>	<i>\$0.20</i>	<i>\$0.08</i>	<i>\$0.07</i>	<i>\$0.03</i>	<i>\$0.06</i>	<i>\$19.76</i>
Total	\$4,388.59	\$277.40	\$70.82	\$16.79	\$29.54	\$10.10	\$17.67	\$4,810.92

All values are in thousands of dollars

Figures V-9 through V-12 show the total losses for each county. Appendix E contains the zoom-in maps of the annualized hurricane wind losses for each of the towns in the region. The appendix contains a full size map for the region, followed by the subsequent locality maps. The hurricane wind mapping resolution, at the census tract level, does not support town based analysis, since most towns would be represented by a portion of a census tract. In the future, as weather data has better spatial resolution, the ability to create practical town based analysis will be improved.

The vulnerability analysis was designed to derive broad regional vulnerability comparisons, not pinpoint location comparisons. As the tables and maps illustrate, Northumberland and Lancaster Counties would expect to have higher losses than Westmoreland or Richmond Counties. The towns of Irvington and White Stone have a higher annual wind loss (>\$400,000) as compared to the towns of Warsaw and Kilmarnock that have a medium wind loss (\$200,000 - \$400,000), and the town of Montross that has a low annualized hurricane wind loss of less than <\$200,000.

Northern Neck Regional Hazard Mitigation Plan

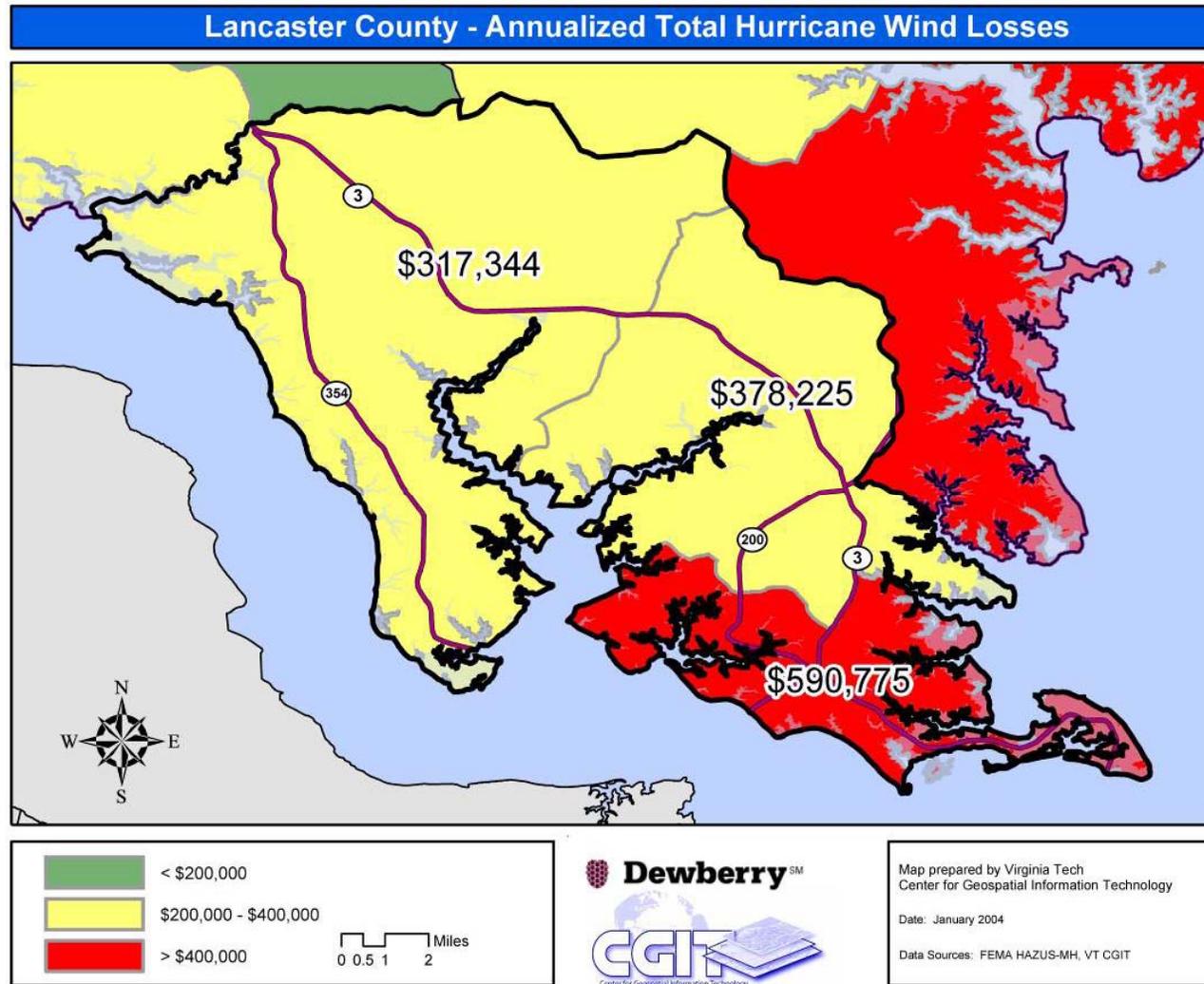


Figure V-9. Lancaster County Annualized Total Hurricane Loss Estimate (3 Tracts).

Northern Neck Regional Hazard Mitigation Plan

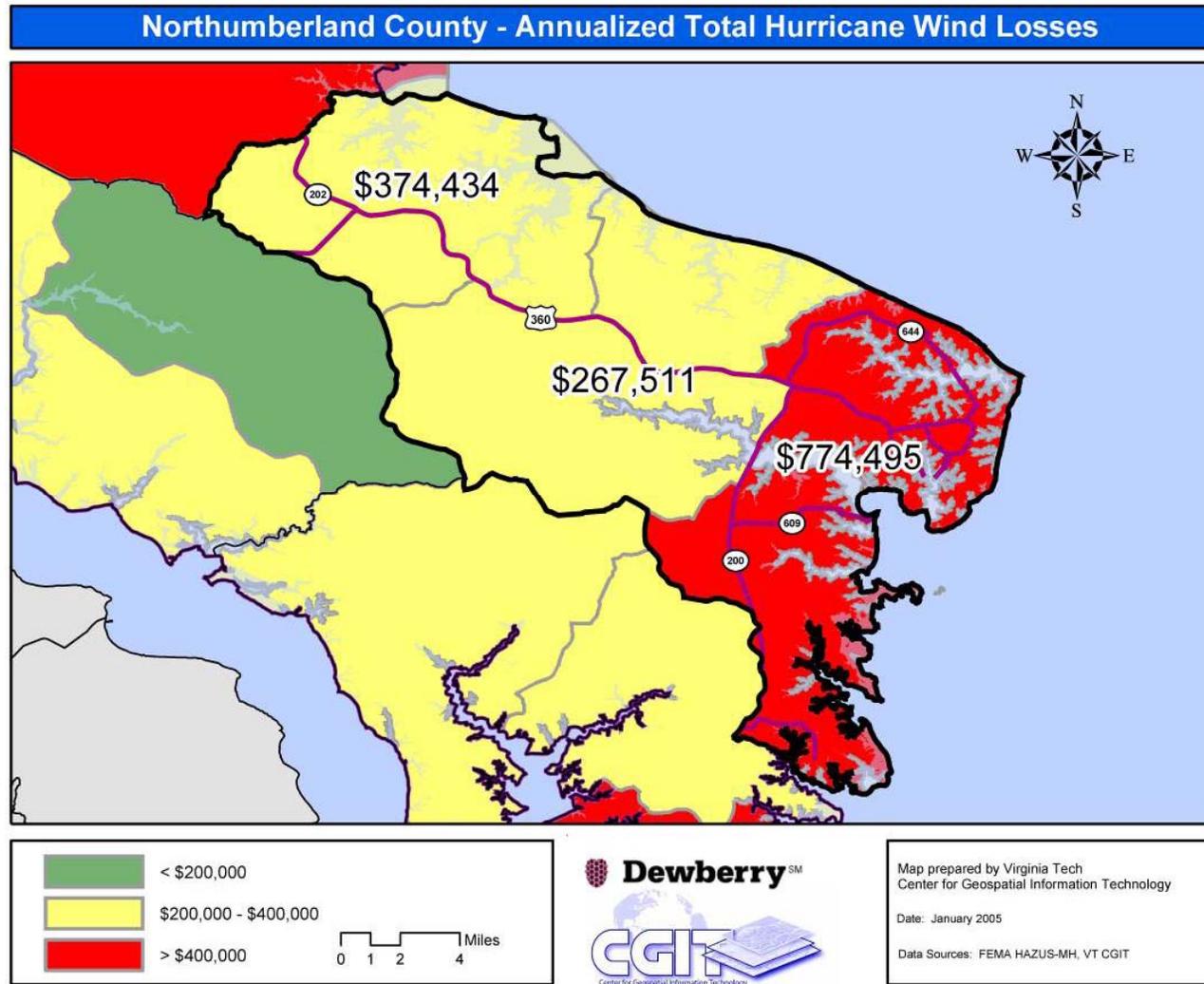


Figure V-10. Northumberland County Annualized Total Hurricane Loss Estimate (3 Tracts)

Northern Neck Regional Hazard Mitigation Plan

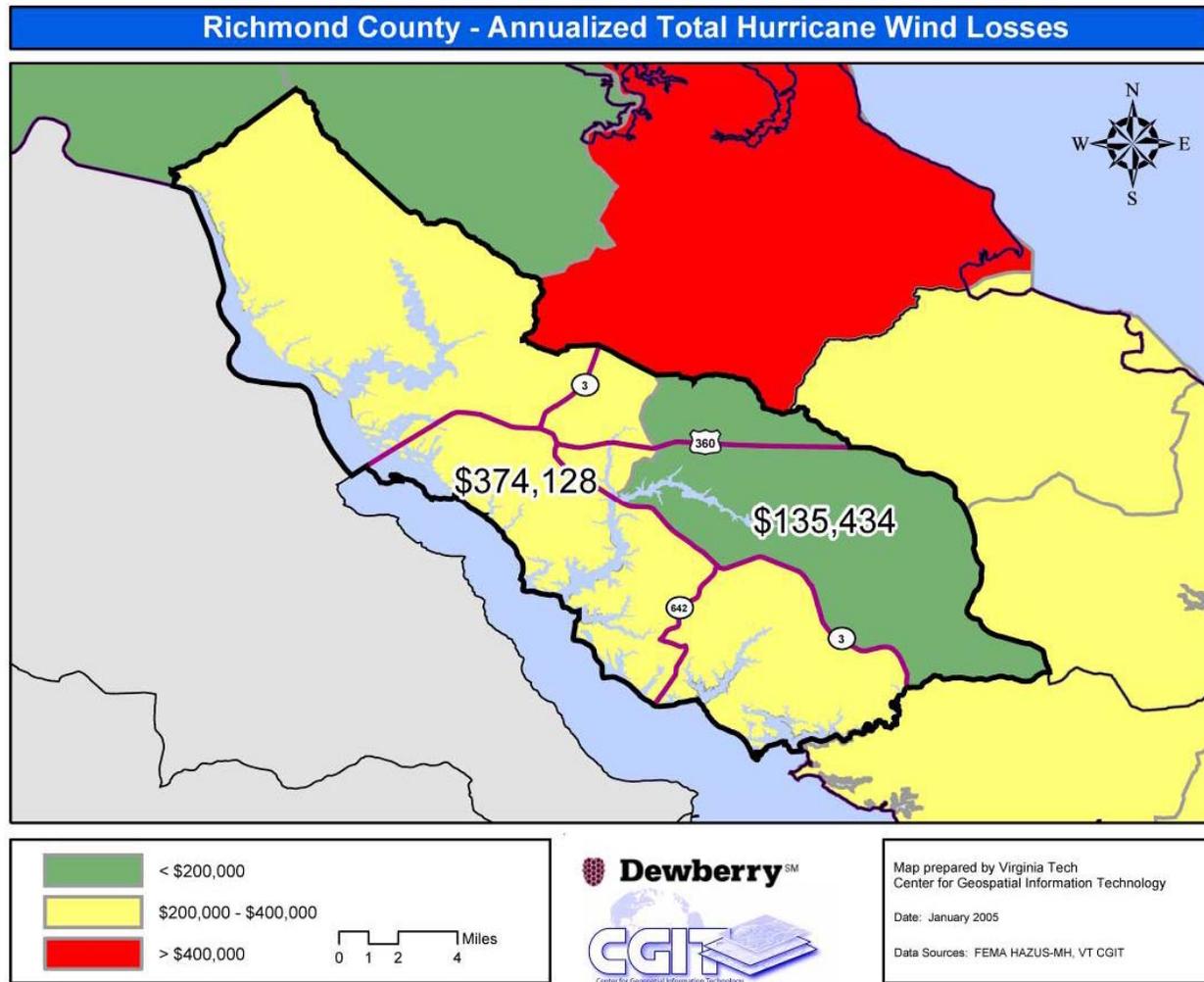


Figure V-11. Richmond County Annualized Total Hurricane Loss Estimate (2 Tracts)

Northern Neck Regional Hazard Mitigation Plan

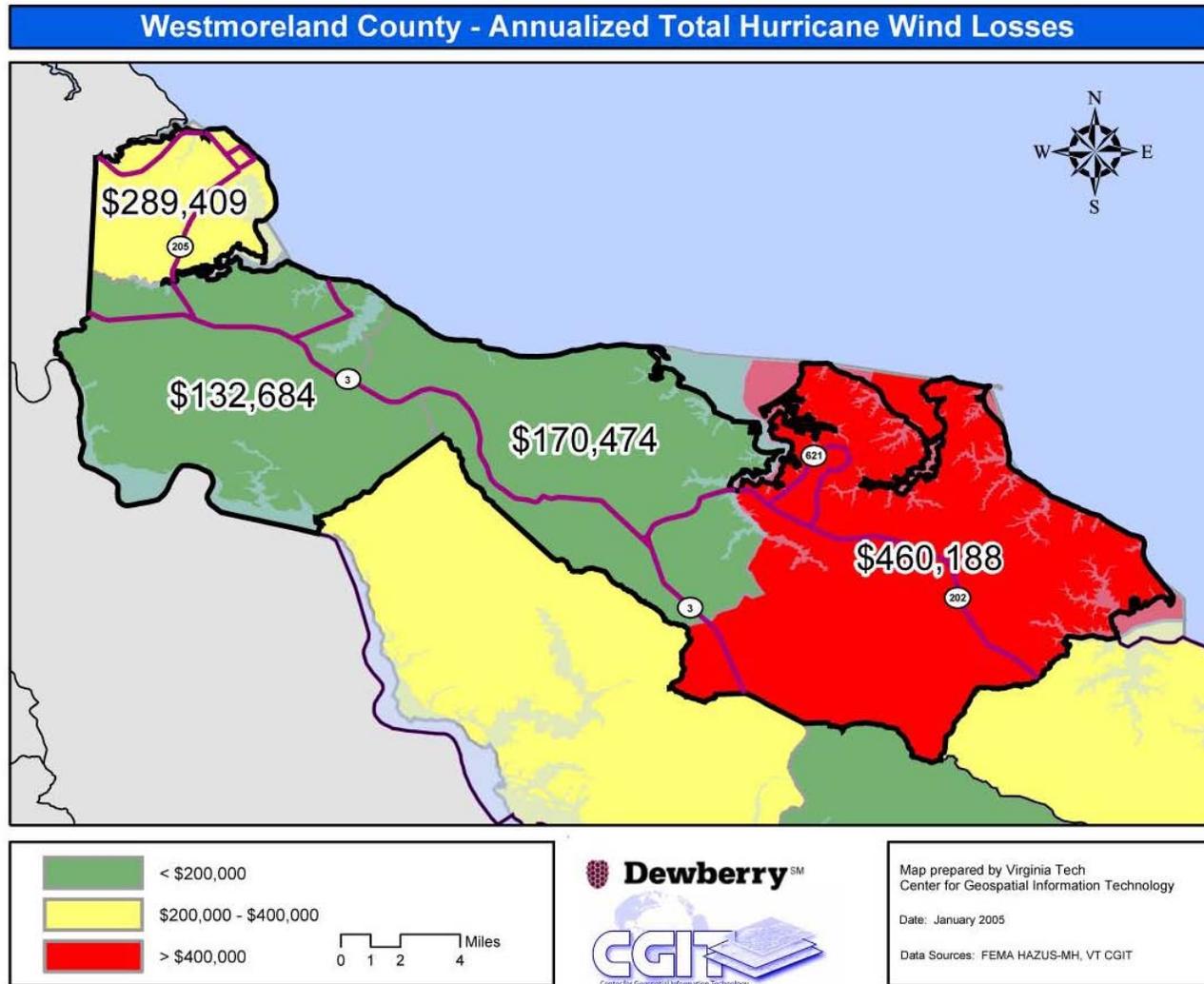


Figure V-12. Westmoreland County Annualized Total Hurricane Loss Estimate (2 Tracts)

Northern Neck Regional Hazard Mitigation Plan

Flooding (Moderate Ranking)

Hazard History

Table V-10 includes descriptions of major flood events in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description applies to the entire planning area.

Table V-10. Flood Hazard History	
Date	Damages
August 23, 1969	<p>On August 19, a severe storm system entered Virginia leaving 7.03 inches of rain in Warsaw and 7.54 inches of rain in Tappahannock.</p> <p>Nominal damages were reported in Northern Neck region. The dam at Chandler Mill Point which supports State Rt. 647 in Westmoreland County was washed away. US Rt. 360 was undermined. Other adjoining regions suffered more damages (e.g. all mill dams in Essex, King & Queen failed)</p> <p>Richmond: Flooded basements and limited road flooding in Richmond County due to a failed dam. 7.03 inches of rain recorded in Warsaw.</p> <p><i>(Source: Northern Neck News and Rappahannock Record)</i></p>
November 9, 1985	<p>Climaxing five days of northeast winds and unusually high tides, on the morning of August 12, an unpredicted severe storm system entered Virginia producing heavy rain, winds in excess of 65 mph and tides five feet above normal. The storm, spawned off the Carolina coast was driven through the Chesapeake and up the Potomac River, forcing tides and water over islands, points of land and riverbanks.</p> <p>Trees damaged power lines and blocked roads, such as State Rt. 205, US Rt. 17 and secondary roads. Damage was reported to Rt. 112 in Monroe Bay, Rt. 650 at Tidwells, and Rt. 678 at Battle Flats. Heavy hit were cottages along the waterfront and the Pond-A-River Marina.</p> <p>Lancaster: Morattico was hardest hit being completely flooded and water 6 feet above flood level. Rt. 621 in Morattico suffered significant beach erosion The inlet to the marina was sanded in and the golf course badly damaged at Windmill Point. Windmill Point road (Rt. 695) was covered in water. Estimated Damages: Lancaster County \$1.5 million</p> <p>Westmoreland: Low-lying sections were flooded and heavy damage to waterfront properties occurred predominately in Westmoreland County. The storm struck heavily along the Potomac shore with Colonial Beach, Sandy Point, Ragged Point, Cherry Grove and waterfront subdivisions sustaining major damage. Most damage was to boat houses, piers, bulkheads, other waterfront structures and home flooding. Severe shoreline erosion and damage to piers were reported in Horner's Beach, Coles Point and about every other waterfront community facing the Potomac. Coles Point had submerged roads. In Colonial Beach there was \$750,000</p>

Northern Neck Regional Hazard Mitigation Plan

Table V-10. Flood Hazard History

Date	Damages
	<p>of public property damage and \$350,000 in private property damage. Major or minor damage to 40 homes, piers and seawalls to 250 homes, major and minor damage to 7 marinas, campgrounds and recreational areas were reported. 45 people were evacuated. Emergency shelters set up in Colonial Beach and Kinsale. Water service was disrupted. 100 trees cleaned off roads. Winds and tides sliced away land 25 to 30 feet deep and ripped out chunks of cliffs along the Potomac River. Few piers remained on the Potomac River shoreline. Piers, pilings, boat houses, logs, large trees and debris were propelled down river. Sections of Irving Avenue in Colonial Beach, Potomac Beach, Rt. 205, and Rt. 1143 were washed out and destroyed. Fifty piers, seawalls and jetties were destroyed. Ten recreation boats, five workboats and 46 homes received direct storm damage. Over 200 additional piers and 90 boats were damaged. The Town of Colonial Beach accounted for \$1.1 million in damage. About 45 people were evacuated from low-lying areas across the county. Some areas lost 15-20 feet of shoreline. Estimated Damages: Westmoreland County \$4.5 million</p> <p><u>Northumberland:</u> Primary losses were by property owners in the Potomac communities of Northumberland Shores and Lewissetta. At Lewissetta, 12-18 inches of sand were deposited on the roadway. Parts of roads were under water (Rts 624, 755, 759, 627). About 30 homes were substantially damaged. 30-40 residents were evacuated.</p> <p>Estimated Damages: Northumberland County \$3.25 million</p> <p><u>Richmond:</u> 2.23 inches of rain recorded at Warsaw. Damage was prominent in Hales Point and “Little Florida,” where 20 homes and 6 mobile homes had water damage. Other damage was primarily confined to 5 recreational boats, private piers/docks, debris clearance and erosion of about 5 acres of land on the Rappahannock River. About 50 people were evacuated. In Richmond County, both sides of Rt. 624 at Naylor’s Bridge were under water. Other roads in Richmond cited included Simonson (Rt. 606, Rt. 616, 612, 600), Sharps (Rt. 642), Hale’s Point (Rt. 647) and Cat Point Creek (Rt. 624).</p> <p>Estimated Damages: Richmond County \$477,000</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Westmoreland News)</i></p>
February 14, 1994	<p>Coupled with low temperatures, a freezing rain on February 14, produced a major ice storm in the Northern Neck area.</p> <p>Damages were primarily due to icy trees falling down, knocking power and phone lines in addition to blocking roads. 23,000 homes were without power and 300 customers lost phone service. Lancaster, Westmoreland and Northumberland Counties opened shelters. The Northern Neck Electric Cooperative suffered the most extensive damage throughout its service territory in its 56-year history with 6,000 of the Cooperative’s 14,000 customers without power.</p> <p><i>(Source: Northern Neck News)</i></p>

Northern Neck Regional Hazard Mitigation Plan

Table V-10. Flood Hazard History

Date	Damages
September 18, 2003	<p>On the afternoon of Thursday, September 18, a severe storm system (Hurricane Isabel) entered Virginia, peaked around 7 pm ending Friday morning September 19. Rainfall varied from 3.5 inches in Newland to 2 inches in Heathsville, averaging 2 inches. Record storm surges varied from 5 feet on the Rappahannock River, 6 feet, 4 inches at Wicomo Church, 10 feet at Colonial Beach. Sustained winds for this storm were between 50-55 mph with gusts as strong as 68 mph.</p> <p>This system produced millions in damages by topped trees, knocked down power lines, flooded roads and damaged homes. Agriculture and seafood industries in the Northern Neck were hit hard. The storm caused a 100 gallon oil spill in Totuskey Creek. During the storm about 24,000 customers were without power. Eleven days after the storm, 4,190 were still without power. Some areas had no electricity for weeks. Phone service was disrupted. Merry Point Ferry was closed. Throughout the Northern Neck road and driveways were blocked primarily by downed trees than flooding. Schools were closed from five to eight days. Shelters were packed, some to capacity. Water and sewer service relied on backup power generators. Homes were washed into the Potomac.</p> <p>Estimated damages: Overall \$50 million</p> <p><u>Lancaster:</u> The hardest hit areas were Morattico, Black Stump/Taylor’s Creek and Windmill Point where damage was mostly to piers, outbuildings and water damage to homes. Windmill Point Road, Morattico Road, Towles Point Road, the Robert O. Norris Memorial Bridge, and Downing Bridge were closed. The storm surge pushed the Rappahannock River about 100 yards inland inundating homes in Morattico, making them unlivable. 400 residents sought shelter. Extensive erosion was noted along the Rappahannock River, especially at Mosquito Point.</p> <p>Damage to personal property was extensive, especially to piers and wharves. At Windmill Point and elsewhere porches slid off houses, and houses off foundations.</p> <p>Estimated damages: \$8 million</p> <p>Estimated agricultural damages: \$800,000</p> <p><u>Westmoreland:</u> Colonial Beach was hit the hardest, with extensive waterfront damage to restaurants and homes. 30 percent of homes were damaged. Montross was on mandatory water restrictions. Colonial Beach Town pier and fishing pier at Coles Point was destroyed. Most serious damage to roads was along Beach and Irving Avenues due to serious erosion where sections of roads were carved out. Roofs peeled off. Mattox Creek pier lost planking. Frances Karn Memorial Boardwalk was devastated. 5 acres were lost to river flooding at Muses Beach. The Potomac River shoreline was severely hit, especially at the Ragged Point Beach area where 10-20 feet of shoreline were removed from behind seawalls. Coles Point Plantation lost a 500 ft fishing pier. In Stratford Harbor hundreds of trees toppled, cliff erosion, a set of docks was lost, and most private piers were damaged. Boats were tossed onto land and buildings. Beach erosion undercut homes and exposed septic tanks. Westmoreland State Park had power out for weeks,</p>

Northern Neck Regional Hazard Mitigation Plan

Table V-10. Flood Hazard History

Date	Damages
	<p>boathouses washed away, gas piers destroyed, and fishing piers were damaged. Also severe water damage was noted in various buildings. Damage to personal property was extensive, especially to piers and wharves. At Colonial Beach and elsewhere, porches slid off houses, and houses off foundations.</p> <p>Estimated damages: \$20 million (with Colonial Beach damage at \$5-6 million).</p> <p><u>Northumberland:</u> Lewisetta was one of the areas hardest hit. Shorelines along the Coan River and the southern shore of the Potomac River were severely eroded. The bluffs around Conduit Pond at the mouth of the Potomac River lost 10 feet of shoreline. 760 residents sought shelter. 200-300 houses were damaged, 100 were destroyed.</p> <p>Estimated damages: \$28 million</p> <p>Estimated agricultural damages: \$1.8 million</p> <p><u>Richmond:</u> Damage to personal property was extensive, especially to piers and wharves. In Sharps and elsewhere, houses were washed from their foundations. Little Florida in Richmond County was one of the hardest hit areas. The area was flooded, leaving all homes (mostly cottages) useless. Water was 10 feet higher than normal. Winds ripped roofs and surges broke windows and doors. 100 residents sought shelter. 2,500 homes were damaged, 25 were destroyed. Public property damage was minor.</p> <p>Estimated damages: \$8-10 million</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Westmoreland News)</i></p>

Hazard Profile

A flood occurs when an area that is normally dry becomes inundated with water. Floods may result from the overflow of surface waters, overflow of inland and tidal waters, or mudflows. Flooding can occur at any time of the year, with peak hazards in the late winter and early spring. Snowmelt and ice jam breakaway contribute to winter flooding, and seasonal rain patterns and torrential rains from hurricanes and tropical systems contribute to spring flooding. Development of flood-prone areas tends to increase the frequency and extent of flooding.

Floods typically are characterized by frequency, for example the “1%-annual chance flood,” commonly referred to as the “100-year” flood. While more frequent floods do occur, in addition to larger events that have lower probabilities of occurrence, for most regulatory and hazard identification purposes the 1%-percent annual chance flood is used. Coastal flooding occurs when strong onshore winds push water from an ocean, bay or inlet onto land. Many of the coastal areas in the Northern Neck region are subject to tidal flooding from storm events like hurricanes and northeasters (see

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subsequent sections for definitions). These extreme storm events push large volumes of water against the shore. Homes and business may suffer damage and are susceptible to collapse. Floods pick up chemicals, sewage and toxins from roads, factories and farms, therefore any property affected by the flood may be contaminated with hazardous materials. Debris from vegetation and man-made structures may also be hazardous following the occurrence of a flood. In addition, floods may threaten water supplies and water quality, as well as initiate power outages.

Secondary Effects

Flooding can pose some significant secondary impacts to the area where the event has taken place. Some of the impacts to consider include infrastructure and utility failure, impacts to roadways, water service and wastewater treatment. These impacts can affect the entire planning district, making the area vulnerable to limited emergency services.

Flood Maps

More detailed data was available as “Q3 flood maps” exist for all of the counties in the PDC. The Q3 flood maps are digital versions of the FEMA paper FIRMs that have been georectified and digitized. These maps were utilized to determine the risk and vulnerability of flooding to the planning district. Figures V-13 through V-17 show the extent of the mapped floodplain in the region. Town-specific maps are included in Appendix E. It should be noted that no FEMA floodplain maps exist for the towns of Montross, Kilmarnock and Warsaw; therefore maps for these towns are not included. Each region is unique in their exposure to flooding. FEMA flood zones encompass a large percentage of the perimeter of the planning district, with the Potomac River to the north, Chesapeake Bay to the southeast, and the Rappahannock River to the southwest.

Figure V-13. Northern Neck Floodplains



FEMA Flood Zones Major Water Bodies Streams & Rivers	NNPDC Counties NNPDC Town Boundaries
--	---

DewberrySM
CGIT
Center for Geospatial Information Technology

Map prepared by Virginia Tech
 Center for Geospatial Information Technology
 Date: September 2005
 Data Sources: FEMA FIRMs, VT CGIT, NNPDC, ESRI, VDOT

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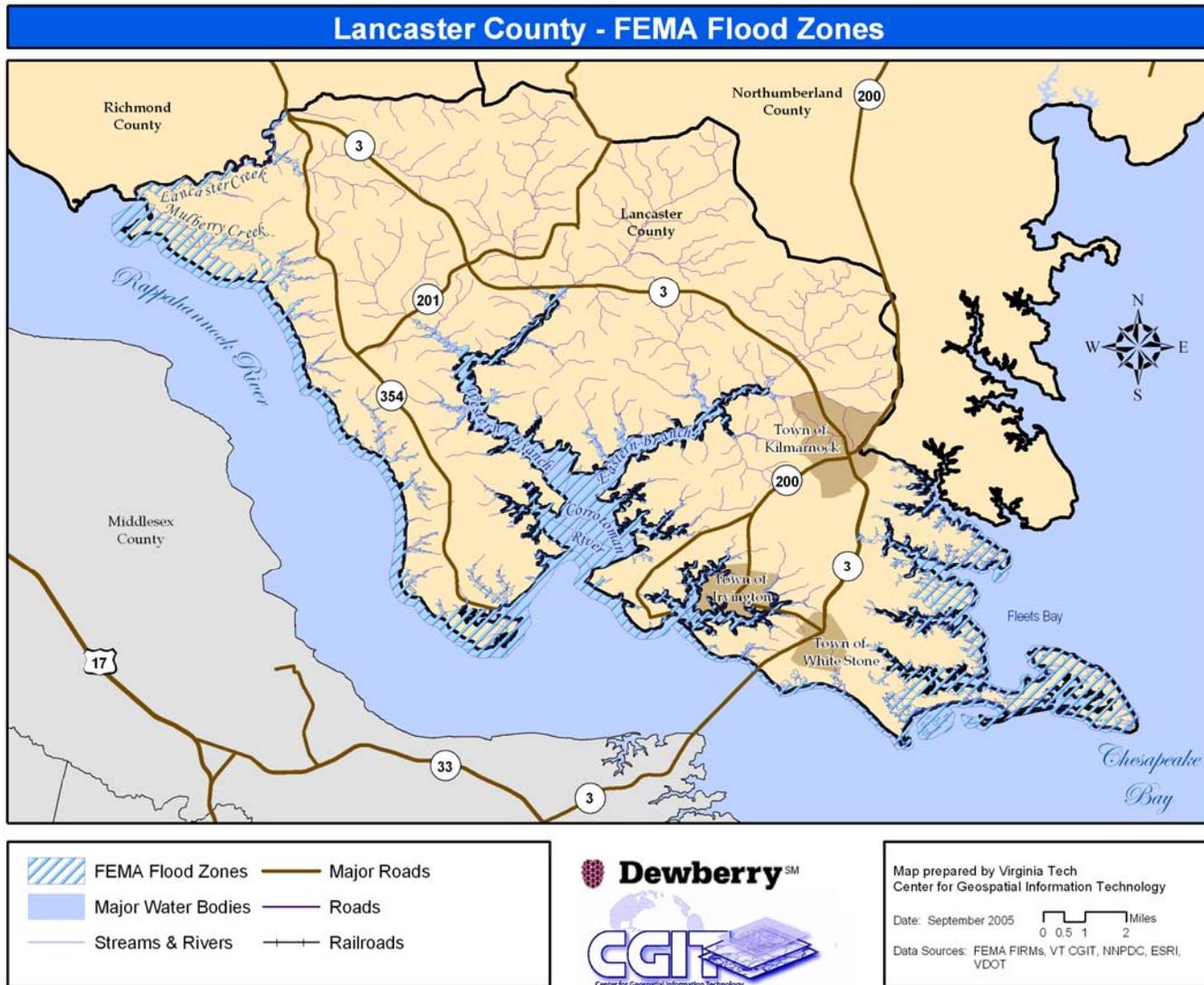


Figure V-14. Lancaster County Floodplains

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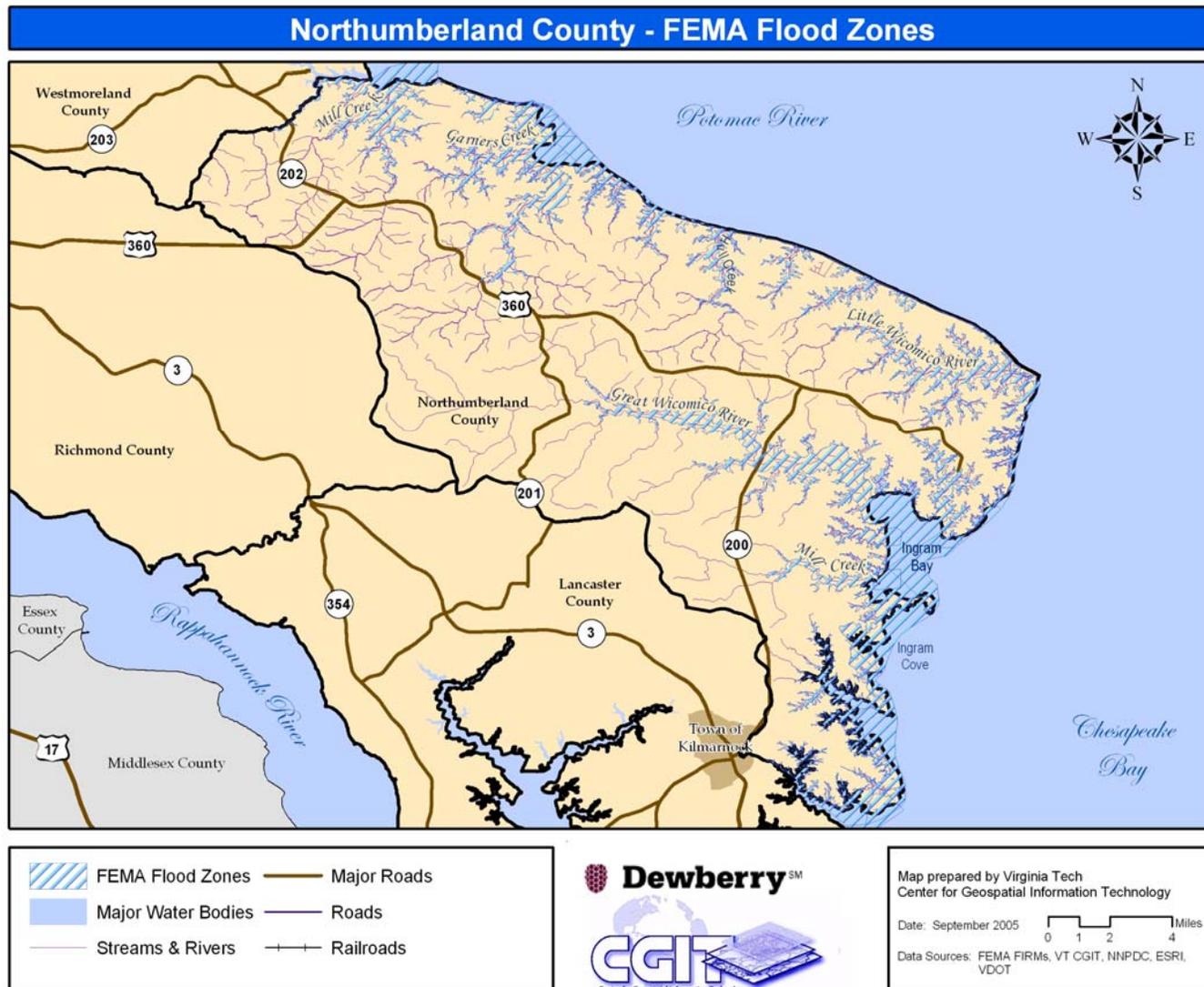


Figure V-15. Northumberland County Floodplains

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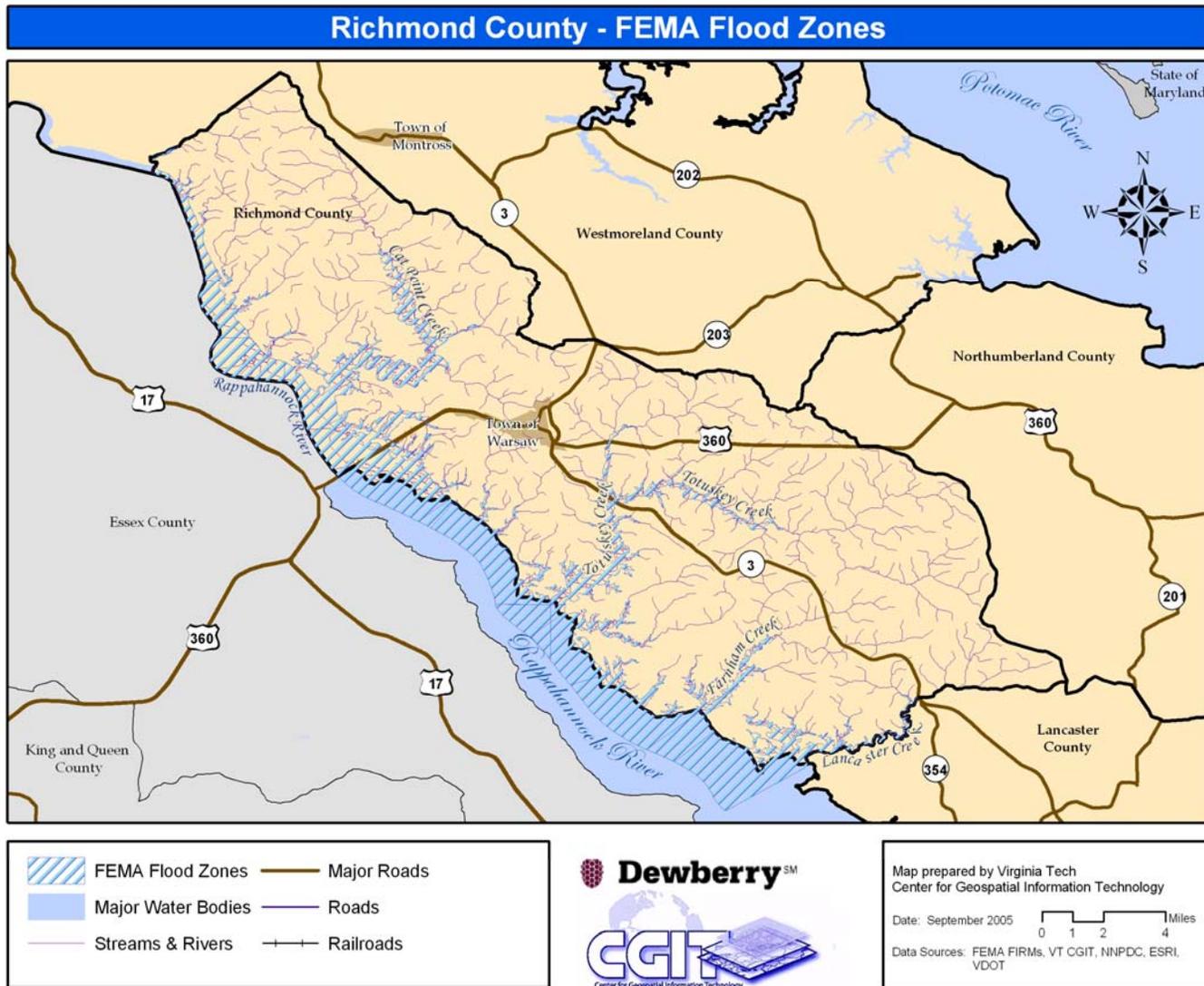


Figure V-16. Richmond County Floodplains

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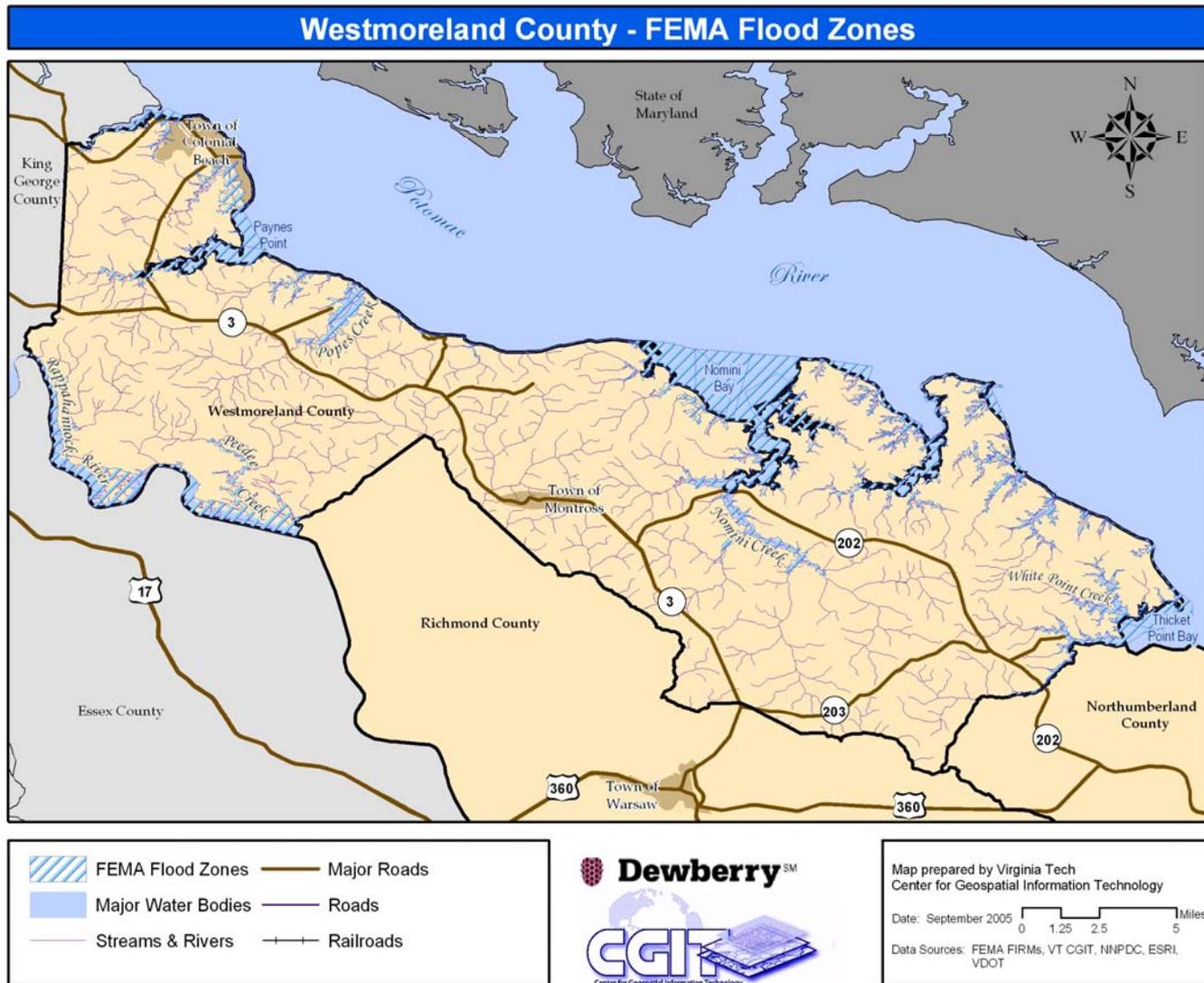


Figure V-17. Westmoreland County Floodplains

Northern Neck Regional Hazard Mitigation Plan

Vulnerability Analysis

Specific areas that are susceptible to flooding were determined during the Northern Neck kick-off meeting. These areas were taken into account when completing the hazard identification and risk assessment.

Many factors contribute to the relative vulnerabilities of areas within the floodplain. Some of these factors include development or the presence of people and property in the floodplain, flood depth, flood velocity, elevation, construction type, and flood duration.

FEMA-Designated Repetitive Loss Properties

There are 23 repetitive loss properties in the Northern Neck, with an average payment of \$22,838 per structure (Table V-11). A majority of the repetitive loss structures for the Northern Neck region are single family homes.

Table V-11. Northern Neck Repetitive Loss Structures (as of 12/31/2003)

Community Name	Insured?	Occupancy	Zone	Building Value	Total Building Payment	Tot Contents Payment	Losses	Total Paid	Average Paid
Northumberland	YES	ASSMD CONDO	AE	ASSUMED CONDO	\$57,633	\$7,100	2	\$64,733	\$32,367
Northumberland	YES	SINGLE FMLY	AE	\$76,896	\$76,999	\$2,839	3	\$79,838	\$26,613
Northumberland	YES	SINGLE FMLY	VE	\$56,070	\$35,993	\$0	2	\$35,993	\$17,997
Northumberland	YES	SINGLE FMLY	AE	\$106,950	\$16,768	\$2,461	2	\$19,229	\$9,614
Northumberland	NO	SINGLE FMLY	X	\$53,950	\$11,571	\$3,000	2	\$14,571	\$7,286
Northumberland	YES	SINGLE FMLY	X	\$77,520	\$9,734	\$2,400	2	\$12,134	\$6,067
Northumberland	YES	NON RESIDNT	AE	\$567,600	\$12,109	\$0	2	\$12,109	\$6,055
Richmond	NO	OTHER RESID	EMG	\$525,000	\$86,843	\$1,728	3	\$88,571	\$29,524
Richmond	NO	OTHER	EMG	\$277,400	\$53,746	\$0	2	\$53,746	\$26,873

Northern Neck Regional Hazard Mitigation Plan

Table V-11. Northern Neck Repetitive Loss Structures (as of 12/31/2003)

Community Name	Insured?	Occupancy	Zone	Building Value	Total Building Payment	Tot Contents Payment	Losses	Total Paid	Average Paid
		RESID							
Richmond	NO	OTHER RESID	EMG	\$277,400	\$53,375	\$0	2	\$53,375	\$26,687
Richmond	NO	OTHER RESID	EMG	\$71,000	\$51,917	\$0	2	\$51,917	\$25,958
Richmond	NO	OTHER RESID	EMG	\$277,400	\$51,057	\$0	2	\$51,057	\$25,528
Richmond	NO	OTHER RESID	EMG	\$525,000	\$96,085	\$1,728	4	\$97,813	\$24,453
Richmond	NO	OTHER RESID	EMG	\$277,400	\$69,605	\$0	3	\$69,605	\$23,202
Richmond	NO	OTHER RESID	EMG	\$525,000	\$88,051	\$1,728	4	\$89,779	\$22,445
Richmond	YES	SINGLE FMLY	AE	\$46,800	\$17,936	\$6,736	3	\$24,672	\$8,224
Richmond	YES	SINGLE FMLY	X	\$48,195	\$20,771	\$8,987	4	\$29,758	\$7,440
Richmond	YES	SINGLE FMLY	A	\$108,000	\$8,677	\$0	2	\$8,677	\$4,338
Richmond	NO	SINGLE FMLY	X	\$62,016	\$3,160	\$1,413	2	\$4,573	\$2,287
Westmoreland	YES	NON RESIDNT	AE	\$506,250	\$237,526	\$100,000	2	\$337,526	\$168,763
Westmoreland	YES	SINGLE FMLY	AE	\$95,363	\$41,637	\$13,255	2	\$54,892	\$27,446
Westmoreland	YES	NON RESIDNT	AE	\$48,600	\$23,169	\$0	2	\$23,169	\$11,585
Westmoreland	NO	SINGLE FMLY	AE	\$115,200	\$12,215	\$123	2	\$12,337	\$6,169
Westmoreland	NO	SINGLE	AE	\$78,450	\$634	\$1,758	2	\$2,392	\$1,196

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Table V-11. Northern Neck Repetitive Loss Structures (as of 12/31/2003)

Community Name	Insured?	Occupancy	Zone	Building Value	Total Building Payment	Tot Contents Payment	Losses	Total Paid	Average Paid
		FMLY							
				\$4,803,460	\$1,137,212	\$155,256	58	\$1,292,467	\$22,838

Structures at Risk-Vulnerability

The impact of flooding on structures was estimated based on FEMA floodplain mapping and structure locations directly digitized from the Virginia Base Mapping Project (VBMP) aerial photography completed in 2002. Individual buildings within the mapped floodplains or in the vicinity of the floodplain were denoted with a point location. Most structures in these areas were determined to be residential through conversations with local officials and review of comprehensive plans. Making use of available flood elevation data from FEMA FIRM Mapping and ground elevation data derived from the USGS elevation mapping (30 meter and 10 meter DEM from USGS topographic contours), the relative 100-year flood depth expected for each structure was estimated. Table V-12 shows the four flood classes that were assigned to structures, the range of flood depths, and the 100-year flood structural damage estimate from FEMA Benefit Cost Analysis software. This estimate did not take into account any elevation of a structure above the ground surface. Therefore, all loss estimates maximize the potential losses. Table V-13 shows the total of structures in each flood class in each county. County totals include the town subtotals.

Table V-12. Flood Depth Classes

Flood Class	Flood Depth Range	100-yr % Structural Damage
1	In vicinity of mapped floodplain	0%
2	-1 to +1 ft	11%
3	+1 to + 3 ft	20%
4	> 3 ft	28%

Note: Class 2 includes negative flood depths to account for USGS DEM elevation resolution issues.

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Table V-13. Structure Total Count for Each Flood Class.

Community	Class 1	Class 2	Class 3	Class 4	TOTAL
Lancaster County	481	132	27	537	1,177
*Town of Irvington	25	8	2	8	43
*Town of Kilmarnock	0	0	0	0	0
*Town of White Stone	0	0	0	0	0
Northumberland County	482	53	21	619	1,175
Richmond County	126	24	5	59	214
*Town of Warsaw	0	0	0	0	0
Westmoreland County	422	52	39	492	1,005
*Town of Colonial Beach	65	0	0	49	114
*Town of Montross	0	0	0	0	0
TOTAL	1,511	261	92	1,707	3,571

An estimate of the value of the vulnerable structures used the average structure value information per census block from HAZUS-MH. Table V-14 provides these totals per county. County totals include the town subtotals.

Table V-14. Structure Value Vulnerability for Each Flood Class

Community	Class 1	Class 2	Class 3	Class 4	TOTAL
Lancaster County	\$62,159,500	\$16,571,000	\$3,512,900	\$85,913,800	\$168,157,200
*Town of Irvington	\$4,328,500	\$1,385,120	\$346,280	\$1,385,120	\$7,445,020
*Town of Kilmarnock	\$0	\$0	\$0	\$0	\$0
*Town of White Stone	\$0	\$0	\$0	\$0	\$0
Northumberland County	\$69,721,500	\$7,598,200	\$2,799,300	\$87,712,200	\$167,831,200
Richmond County	\$12,489,800	\$2,621,800	\$569,000	\$6,271,600	\$21,952,200
*Town of Warsaw	\$0	\$0	\$0	\$0	\$0
Westmoreland County	\$44,655,000	\$5,189,300	\$4,013,900	\$54,009,000	\$107,867,200

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*Town of Colonial Beach	\$6,327,640	\$0	\$0	\$4,734,950	\$11,062,590
*Town of Montross	\$0	\$0	\$0	\$0	\$0
TOTAL	\$189,025,800	\$31,980,300	\$10,895,100	\$233,906,600	\$465,807,800

Estimating Losses

Using the property values from Table V-14, an estimate of the potential flood loss for each structure was developed. Losses included structure and contents damage using a method based on FEMA Benefit Cost Analysis. Replacement values for structures were calculated as 10% greater than the average value listed in Table V-15. Contents values were estimated as 30% of the structural replacement value. Structural damage percentages for a 100-year event were taken from Table V-12. Contents damages were estimated as 50% greater than the structural damage percentage. These values were used to predict the damage from a 100-year flood event for the structure. To calculate an annualized flood damage estimate, it was assumed for each structure that damages began with a 25-yr event. A percentage of the 100-year flood damage value was used for events less frequent than the 100-year event. Table V-15 provides these loss estimates for each flood class and county. County totals include town subtotals.

For example, a structure was estimated to be worth \$100,000 based on average structure value information per census block from HAZUS-MH. The replacement value of the structure would be \$110,000 and the contents value \$33,000. Based on the USGS elevation data, the ground elevation was assumed to be 7 feet above sea level. The FEMA FIRM showed the 100-year flood elevation is expected to be 9 feet above sea level, giving a 2-foot flood depth. This places the structure in flood depth class 2, with 20% 100-year structure damage and 30% contents damage. The final 100-year flood damage equals \$22,000 structural plus \$9,900 contents, or \$31,900 total from a 100-year flood event. Figure V-18 shows the probability assumptions used to estimate the annualized loss at \$797.50

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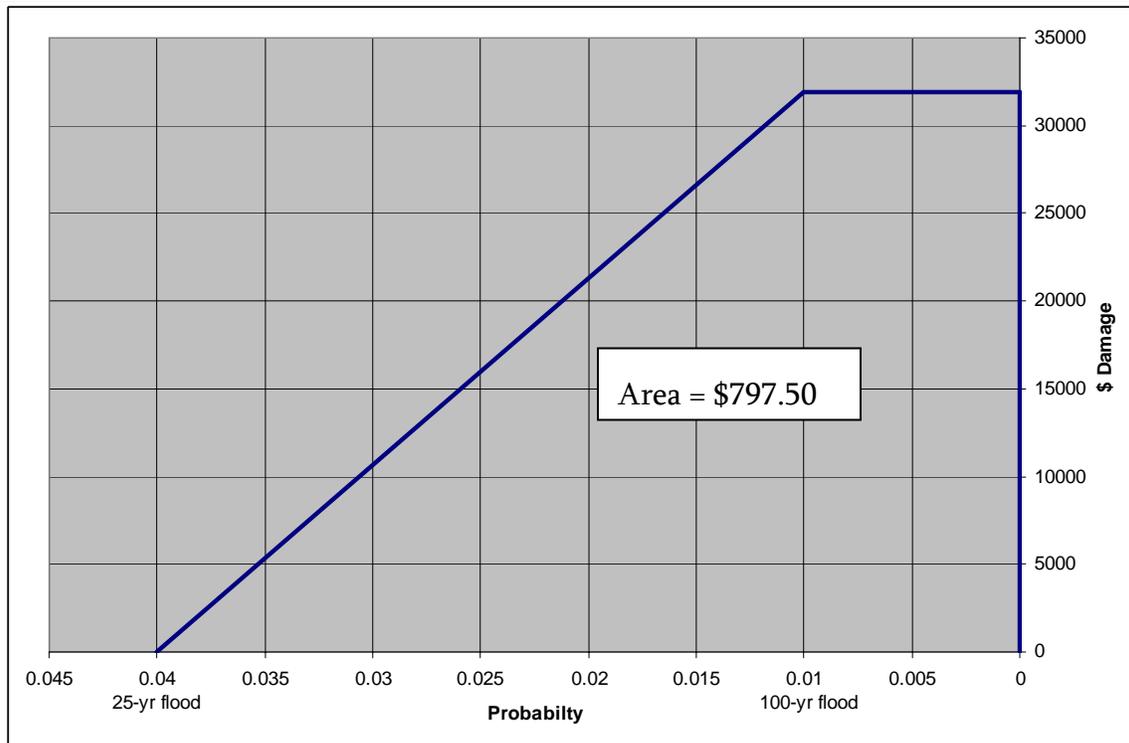


Figure V-18. Example of Flood Loss Estimate Technique.

Table V-15. Annualized Structure and Contents Loss Estimates for Each Flood Class

Community	Class 1	Class 2	Class 3	Class 4	TOTAL
Lancaster County	\$0	\$72,685	\$28,015	\$959,228	\$1,059,928
*Town of Irvington	\$0	\$6,076	\$2,762	\$15,465	\$24,303
*Town of Kilmarnock	\$0	\$0	\$0	\$0	\$0
*Town of White Stone	\$0	\$0	\$0	\$0	\$0
Northumberland County	\$0	\$33,328	\$22,324	\$979,307	\$1,034,959
Richmond County	\$0	\$11,500	\$4,538	\$70,022	\$86,060
*Town of Warsaw	\$0	\$0	\$0	\$0	\$0
Westmoreland County	\$0	\$22,762	\$32,011	\$603,010	\$657,783
*Town of Colonial Beach	\$0	\$0	\$0	\$52,866	\$52,866
*Town of Montross	\$0	\$0	\$0	\$0	\$0
TOTAL	\$0	\$140,274	\$86,888	\$2,611,567	\$2,838,730

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Figures V-19 through V-22 show the census blocks where these losses occur, in addition to local comments regarding areas of flooding specific to the community. Tables V-16 through V-19 summarize the problem spot locations that are denoted on Figures V-19 through V-22. Note that the majority of these blocks are along the coast, especially in Lancaster and Northumberland Counties.

Table V-16. Lancaster County Flooding Problem Spots

Map Letter	Description
A	Morattico: major road flooding (15-20 homes, 1 road)
B	Mollusk area: frequent flooding of several secondary roads
C	Towles Point: secondary roads flooded due to hurricanes (major) and Nor'easters (minor) (20+ homes, roads)
D	Corrotoman River: flooding
E	Windmill Point Road: repeated closures of low-lying road due to coastal flooding and tidal surge, isolating residents, from Palmer to end especially susceptible
F	Palmer: Flooding
G	Ocran/Dymer Creek: flooding due to hurricanes (major) and Nor'easters (minor)
H	Little Bay: flooding
I	Windmill Point: coastal flooding due to hurricanes (major) and Nor'easters (minor). Major artery impassible, potential for 50+ severely damaged homes
J	Foxwells Flooding

Northern Neck Regional Hazard Mitigation Plan

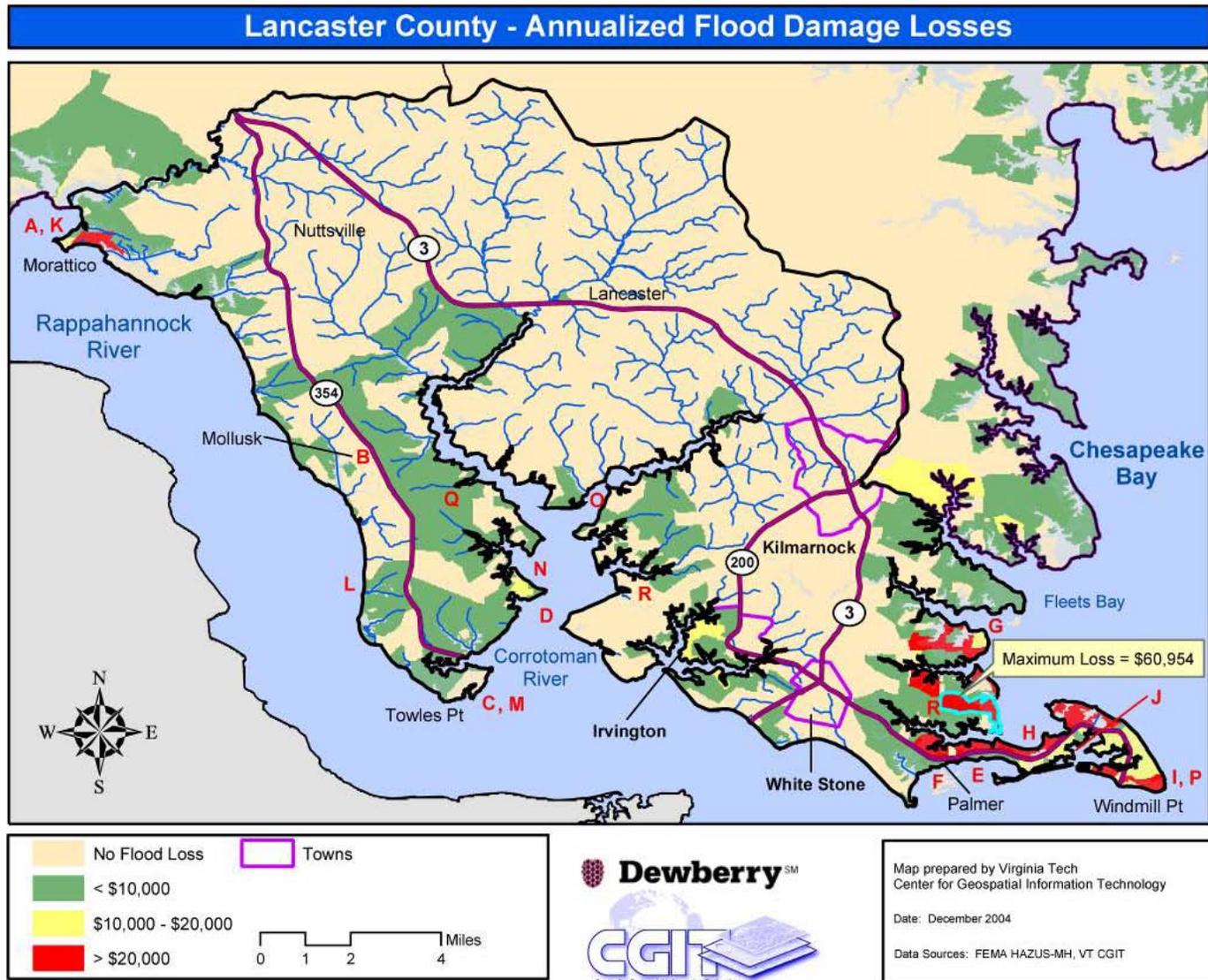


Figure V-19. Lancaster County Flood Losses by Census Blocks

Northern Neck Regional Hazard Mitigation Plan

Table V-17. Northumberland County Flooding Problem Spots

Map Letter	Description
A	Lewisetta (Coan River): high coastal flooding/storm surge risk - several feet during Hurricane Isabel, propane tanks off mounts, houses off foundations; community of 30+ homes right on Potomac River; total of 300 homes and 10 miles of roads in Lewisetta Contact: Bill Knight, Northumberland Building Inspector
B	Coan River flooding (see A)

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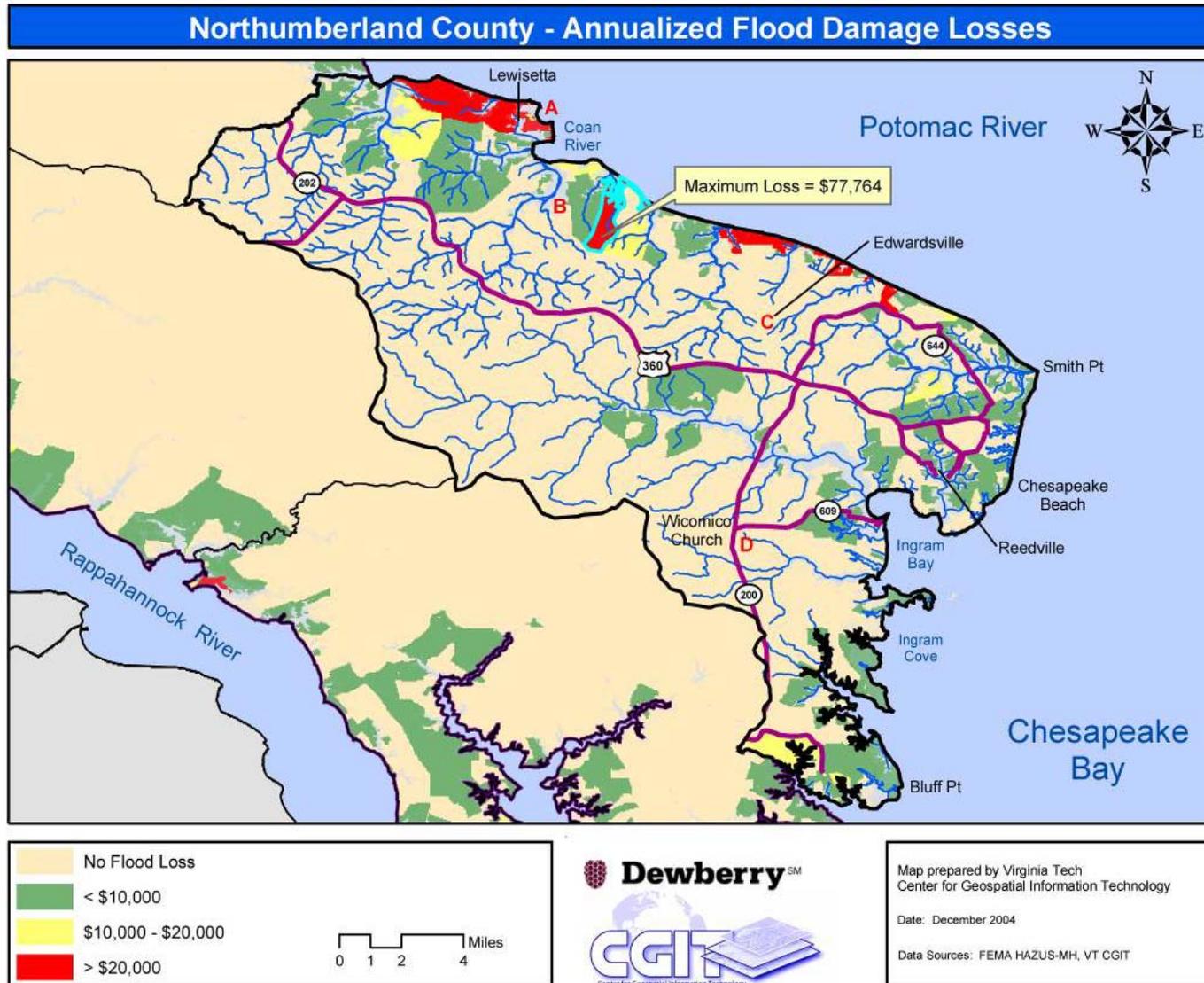


Figure V-20. Northumberland County Flood Losses by Census Blocks

Northern Neck Regional Hazard Mitigation Plan

Table V-18. Richmond County Flooding Problem Spots

Map Letter	Description
A	Naylor's Beach Road Bridge (Mouth of Cat Point Creek): routinely floods (on east side) during high tides, Nor'easters, hurricanes and T-Storms: blocks 1 of 2 means of access to community
B	Little Florida (Wilna Pt Subdivision): severe coastal flooding/surge due to hurricane, Nor'easter, full moon, east wind. First place to flood, lowest area in county. Subdivision has 15 homes; coastal flood area is from 100-yr floodplain to end of Little Florida road; Major damage (walls of homes destroyed) to ~50% during Isabel
C	Hales Point: coastal flooding during hurricane, nor'easter, full moon; coastal flood area is from 100-yr floodplain to end of Hales Pt. Rd; ~20 homes, marina, campground
D	Rt. 608: flooding
E	Simonson/Pearsons Island: flooding during hurricanes, Nor'easters, full moon, high tides; coastal flood area is from 100-yr floodplain to end of Simonson Rd (VHS 608); 2 commercial entities, ~25 homes; during Isabel 3+ feet of water in some homes and significant structural damage to ~25% of residences
F	Sharps Road (USH-642): road culvert inadequate

Northern Neck Regional Hazard Mitigation Plan

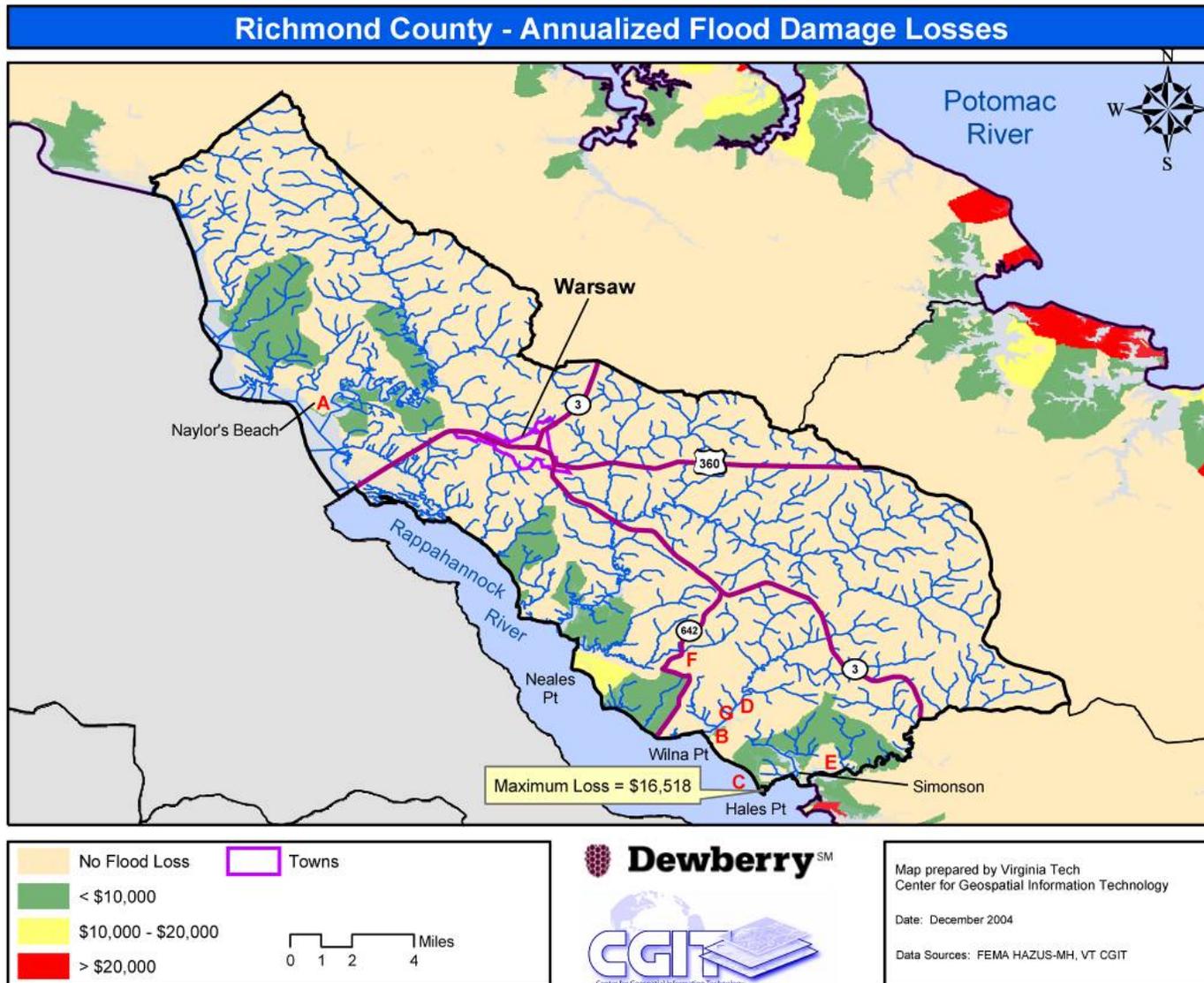


Figure V-21. Richmond County Flood Losses by Census Blocks.

Northern Neck Regional Hazard Mitigation Plan

Table V-19. Westmoreland County Flooding Problem Spots

Map Letter	Description
A	Colonial Beach Rt. 205: flooded on both sides, south of Colonial Beach and North of 205; landlocked during Hurricane Isabel
B	Colonial Beach: severe flooding due to tidal surges; population of 3000+, 2500 homes
C	Colonial Beach Rt. 205: flooded during Hurricane Isabel (see A)
D	Rt. 205/North Matox Creek: frequent flooding of primary highway (3000 vehicles per day)
E	Tidwells: road closures and flooding; 200 homes
F	Sandy Point: roads closures due to flooding; ~400 homes

Northern Neck Regional Hazard Mitigation Plan

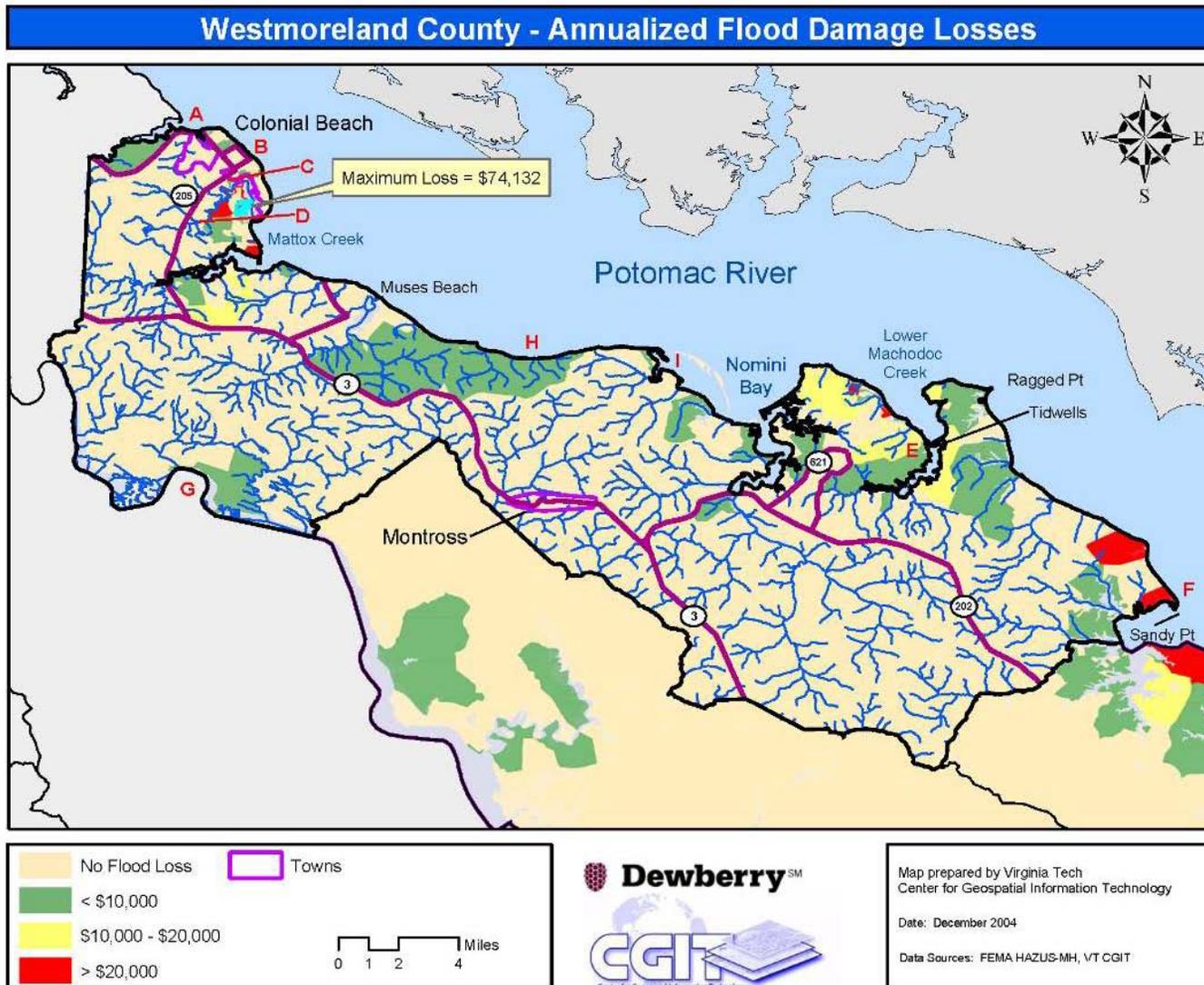


Figure V-22. Westmoreland County Flood Losses by Census Blocks

Northern Neck Regional Hazard Mitigation Plan

Critical Facilities

The impacts of flooding on critical facilities can significantly increase the overall effect of a flood event on a community. It should be noted that these facilities have been determined to be in the floodplain using Geographic Information Systems (GIS) and should be used only as a planning tool. In order to accurately determine if a structure is actually in the floodplain, site-specific information must be available. Only one critical facility, a wastewater treatment plant has been identified as being in the floodplain (Table V-20).

Table V-20. Critical Facilities in the Floodplain.			
Name	County	ZONE	Elevation
Wastewater Treatment Plant	Northumberland	AE	6

Severe Winter Storm (Moderate Ranking)

Hazard History

Table V-21 includes descriptions of major winter storm events in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description should be used as representing the entire planning area.

Table V-21. Winter Storm Hazard History	
Date	Damages
January 26, 1977	<p>Ice, snow and very unusually low temperatures produced one of the coldest winter seasons with record low temperatures of -12F</p> <p>These conditions produced icy roads, closed bridges, closed schools, numerous accidents and frostbite. In rural areas, secondary roads were covered over for weeks and some were impassable. Residences and businesses dealing with frozen pipes. Brownouts, major power and telephone outages occurred in areas of Westmoreland, and Northumberland. Heating oil, gasoline, natural gas and electricity were in low supply.</p> <p>Rivers and tributaries were frozen with ice thicknesses at 12 inches. The Rappahannock River was frozen over and sections of Potomac River almost completely covered with ice. Piers were coming out of the ground as tides lift the pilings out of their footing with the rising ice acting as a lever. Boats and barges were frozen in place. Ice pushed onto the shore at Welford's wharf, piling 12 feet high with thicknesses of 16 inches.</p>

Northern Neck Regional Hazard Mitigation Plan

Table V-21. Winter Storm Hazard History

Date	Damages
	<p>Ice in the Chesapeake Bay and tributaries financially impacted watermen and local sawmills. Three thousand watermen were out of work. Oyster stakes and other stakes in the waters were removed by the ice and many channel buoys set adrift. The Eastern Shore was harder hit with barges carrying pulpwood frozen in place. Landings and cargo also were frozen. Continued freezing weather forced businesses to take shorter hours and reduced room temperatures.</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Rappahannock Times)</i></p>
March 10, 1994	<p>Coupled with low temperatures and a freezing rain on February 14, produced a major ice storm in the Northern Neck area.</p> <p>Damages were primarily due to icy trees falling down, knocking power and phone lines in addition to blocking roads. 23,000 homes were without power and 300 customers lost phone service. Lancaster, Westmoreland and Northumberland Counties opened shelters. The Northern Neck Electric Cooperative suffered the most extensive damage throughout its service territory in its 56-year history with 6,000 of the Cooperative's 14,000 customers without power.</p> <p><i>(Source: Northern Neck News)</i></p>
January 13, 1996	<p>From January 6 through January 15, two snow fronts, striking first from the south and then from the north produced large and prolonged snowfall, sleet, along with windy conditions (15-20 knots)</p> <p>School systems in Northern Neck area closed for eight days. Businesses were closed. Roads were packed with snow and ice that refused to thaw. Carter's Creek in Irvington froze. Roofs collapsed due to the weight of snow. Limited automobile accidents reported.</p> <p>(Note: article referred to January 27, 1987, with the greatest snowfall record (17 inches) in addition to the already 10 inches on the ground (called "Super Bowl Snow")</p> <p>Snow removal costs about \$640,000</p> <p><u>Lancaster:</u> Power outages reported mostly in Lancaster County, County costs for snow removal: \$107,000</p> <p><u>Westmoreland:</u> In Colonial Beach snow buried cars. County costs for snow removal: \$212,000</p> <p><u>Northumberland:</u> County costs for snow removal: \$135,000</p> <p><u>Richmond:</u> 17 inches of snow recorded in Warsaw. County costs for snow removal: \$184,000</p> <p><i>(Source: Northern Neck News, Rappahannock Record and Westmoreland News)</i></p>

Northern Neck Regional Hazard Mitigation Plan

Table V-21. Winter Storm Hazard History

Date	Damages
February 28, 2000	<p>During a one-week period in January, two winter storms produced record snowfall, blizzard conditions and damaging ice accumulations.</p> <p>Nominal damages to the Northern Neck area reported from this event. Robert O. Norris Bridge had a major head-on crash from icy roads. (Note: article discussed an ice storm in December of 1998 where power was out for several days).</p> <p><u>Westmoreland:</u> Westmoreland, Montross and Colonial Beach had no public damages to claim.</p> <p><u>Richmond:</u> Richmond had minor expenses due to fallen trees.</p> <p><i>(Source: Northern Neck News and Rappahannock Record)</i></p>

Hazard Profile

Primary Impacts

The impacts of winter storms are minimal in terms of property damage and long-term effects. The most notable impact from winter storms is the damage to power distribution networks and utilities. Severe winter storms have the potential to inhibit normal functions of the community. Governmental costs for this type of event are a result of the needed personnel and equipment for clearing streets. Private sector losses are attributed to lost work when employees are unable to travel. Homes and businesses suffer damage when electric service is interrupted for long periods of time. Health threats can become severe when frozen precipitation makes roadways and walkways very slippery, when there are prolonged power outages, or if fuel supplies are jeopardized. Occasionally, buildings may be damaged when snow loads exceed the design capacity of their roofs or when trees fall due to excessive ice accumulation on branches. The primary impact of excessive cold is increased potential for frostbite, and potentially death as a result of over-exposure to extreme cold.

Secondary Effects

Some of the secondary effects presented by extreme/excessive cold are a danger to livestock and pets, and frozen water pipes in homes and businesses.

Predictability and Frequency

Winter storms can be a combination of heavy snowfall, high winds, ice and extreme cold. These are classified as extra-tropical cyclones that originate as mid-latitude depressions. Winter weather impacts the state of Virginia between the months of November and April, with varied intensities from east to west. In order to create a

Northern Neck Regional Hazard Mitigation Plan

statewide winter weather hazard potential map that captures this variability, gridded climate data was obtained from the Climate Source and through the VirginiaView program. The data was developed by the Oregon State University Spatial Climate Analysis Service (SCAS) using **PRISM** (**P**arameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel). This climate mapping system is an analytical tool that uses point weather station observation data, a digital elevation model, and other spatial data sets to generate gridded estimates of monthly, yearly, and event-based climatic parameters.

PRISM data was selected for this analysis because it is an interpolation system that incorporates elevation fluctuation into the regression equations that are used to predict the gridded variation of each climate parameter. This winter weather risk assessment uses monthly normal precipitation, mean annual days with snowfall greater than 1 inch, and mean monthly snowfall PRISM data to develop snow and ice potential maps for the state. These datasets have been generated to incorporate topographic effects on precipitation, capture orographic rain shadows, and include coastal and lake effect influences on precipitation and snowfall. The monthly precipitation grid provides a 30-year climatological average of total precipitation in inches. The mean monthly snowfall grid provides a 30-year climatological average depth of freshly fallen snow in inches. The mean annual days map reveals the 30-year average of the number of days that a location will receive greater than 1 inch of snowfall in a 24-hour period in a given year.

A criterion of greater than 1 inch was selected for winter snowfall severity assessment because this depth will result in complete road coverage that can create extremely dangerous driving conditions and will require removal by the local community. This amount of snowfall in a 24-hour period also can lead to business closure and school delays or cancellation. Figure V-23 shows the average number of days with snowfall greater than one inch for the state and Figure V-23 shows the same for the Northern Neck region.

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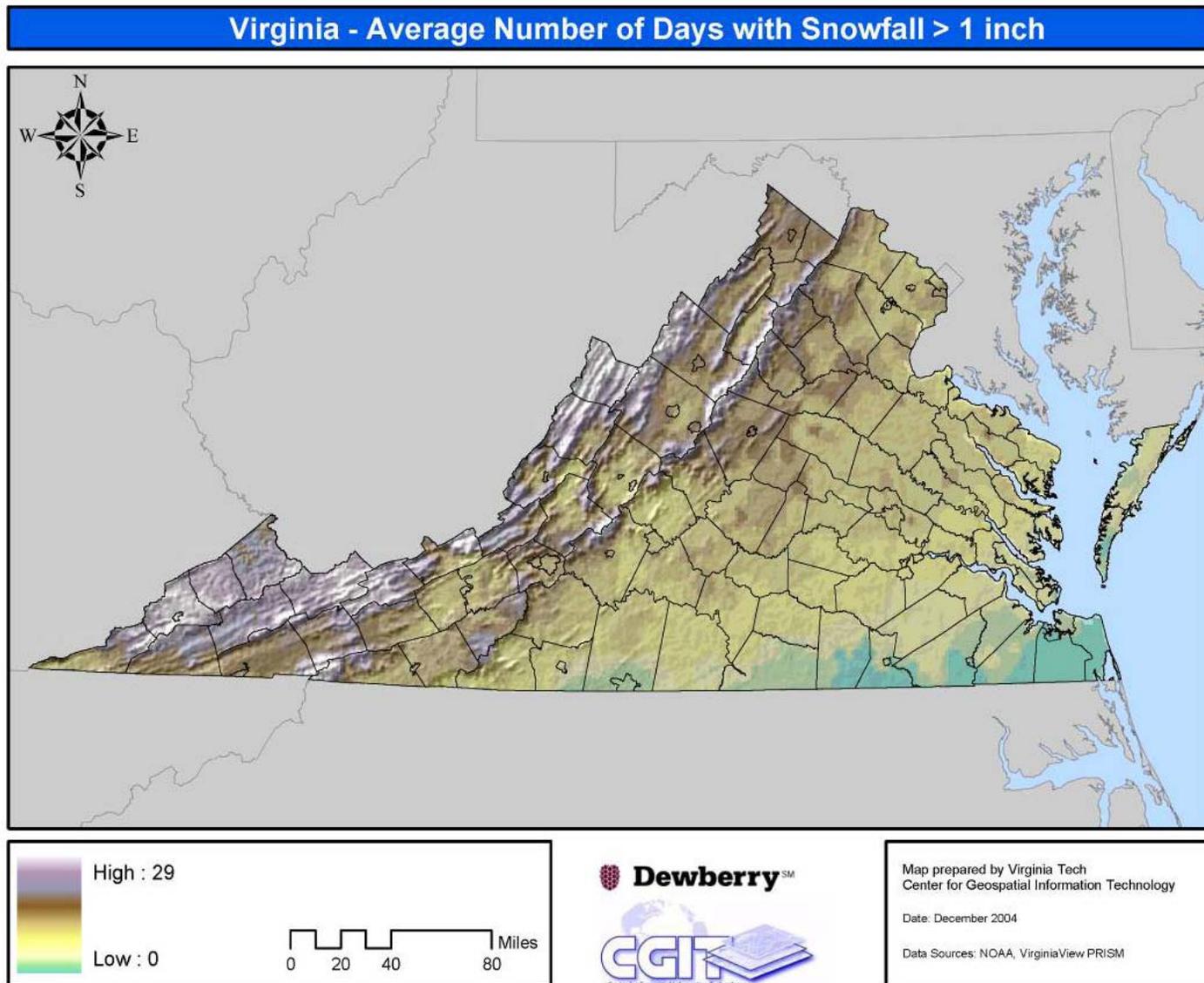


Figure V-23. Virginia Average Number of Days with Snowfall > 1 inch

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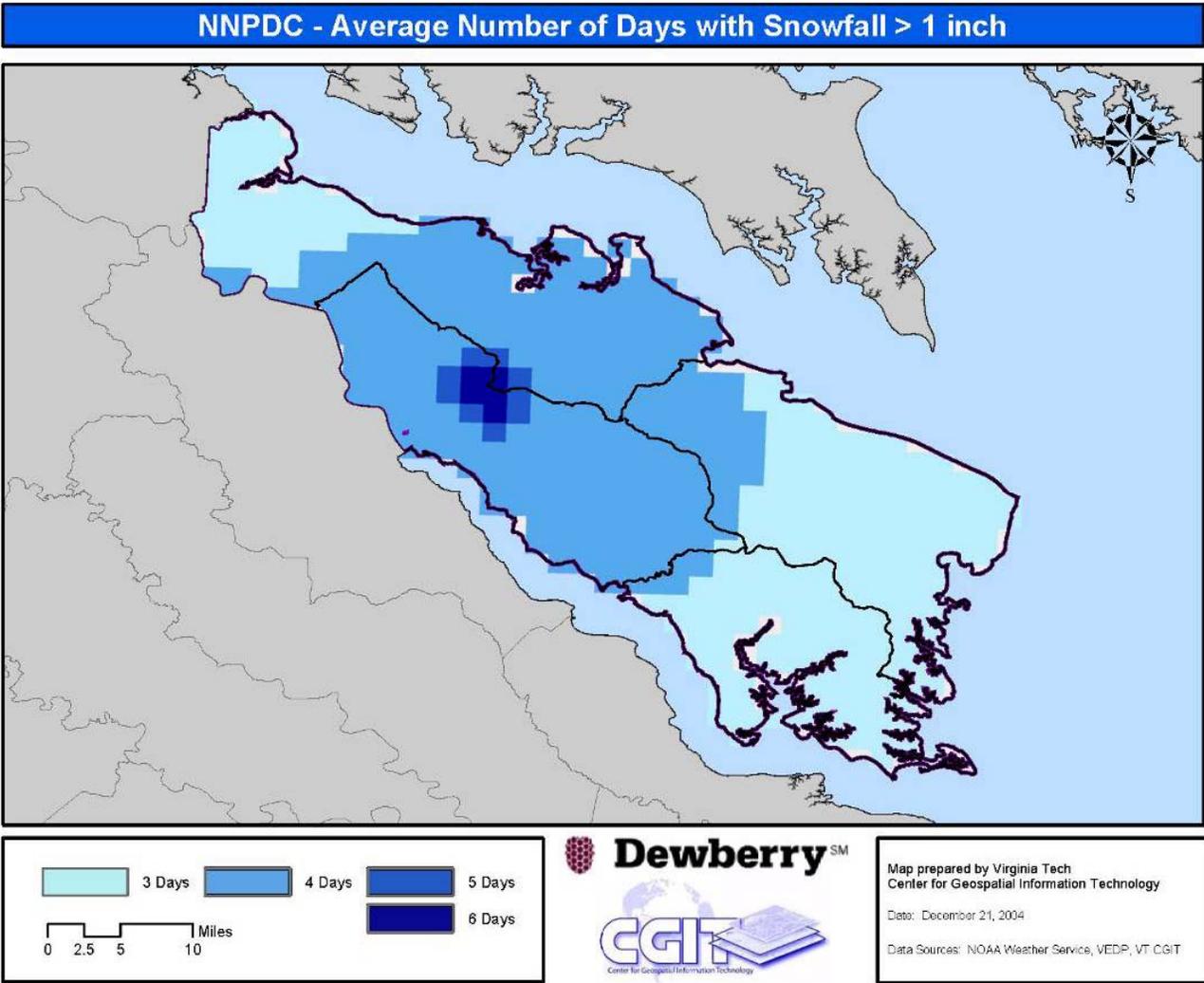


Figure V-24. Northern Neck Average Number of Days with Snowfall > 1 inch

Ice Potential

Another challenge with winter weather in Virginia and the Northern Neck region is the amount of ice that often comes as part of winter weather. Snowfall and ice potential are generated based on the percentage difference between the total precipitation from November to April and the corresponding liquid equivalent snowfall depth. Since snowfall is in a frozen state, it does not accumulate on the surface the same way that liquid rainfall would. In order to account for this difference, characteristic snow/rain relationships have been created. For example, a value of 1 would mean that all of the precipitation at the location falls as liquid rainfall, while a value of 0.5 would mean that half of the precipitation falls as liquid rainfall and half falls as frozen precipitation. It is assumed that the lower this percentage is, the greater potential that precipitation within these months is falling as snow. The values in the middle of the two extremes would represent regions that favor ice conditions over rain and snow. A five quantile distribution was applied to the output statewide grid to split the percentages into five characteristic climatological winter weather categories (snow, snow/ice, ice, rain/ice, and rain). Figure V-25 shows the statewide map and Figure V-26 shows the Northern Neck regional map.

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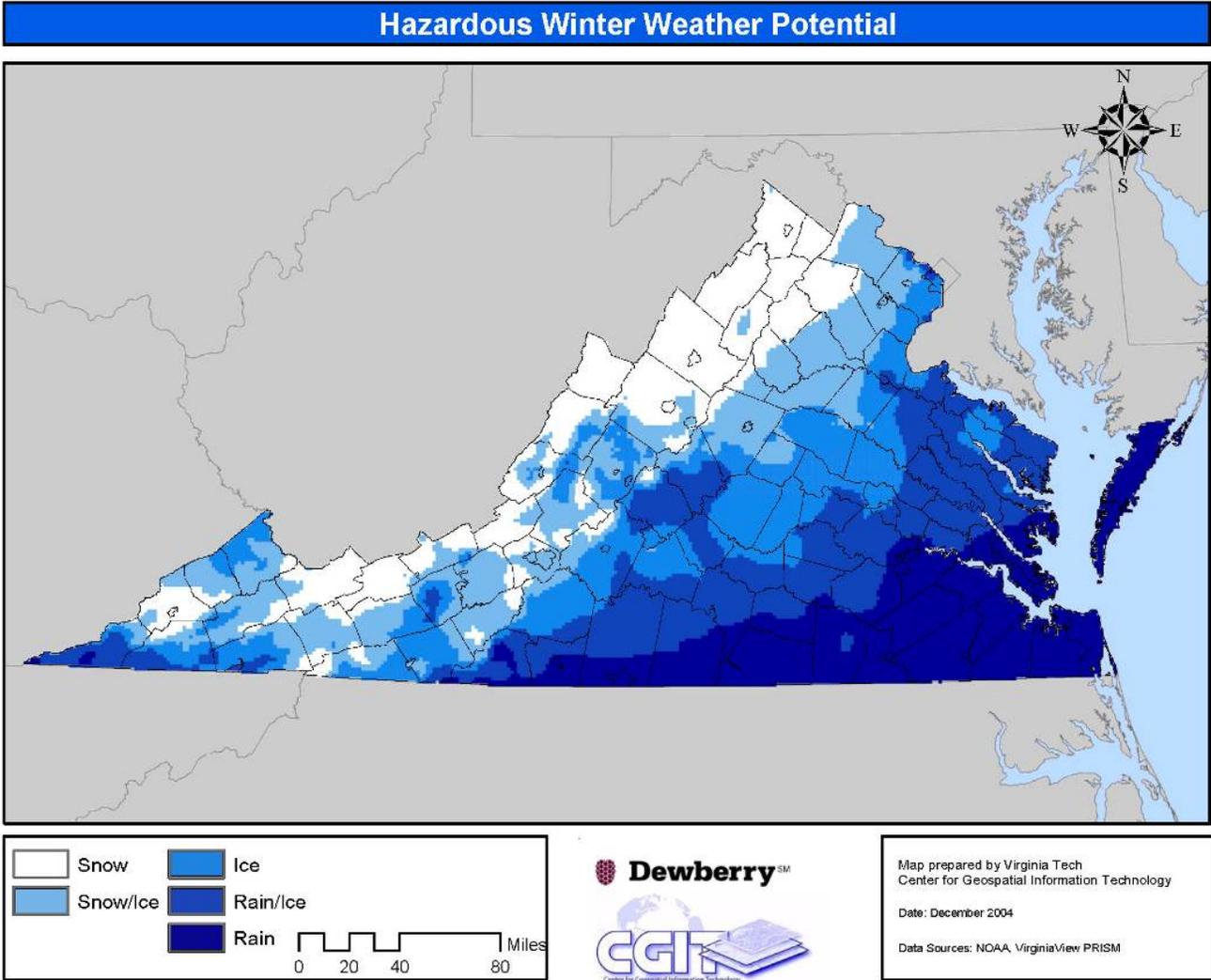


Figure V-25. Virginia Hazardous Winter Weather Potential Based on LEQ Precipitation.

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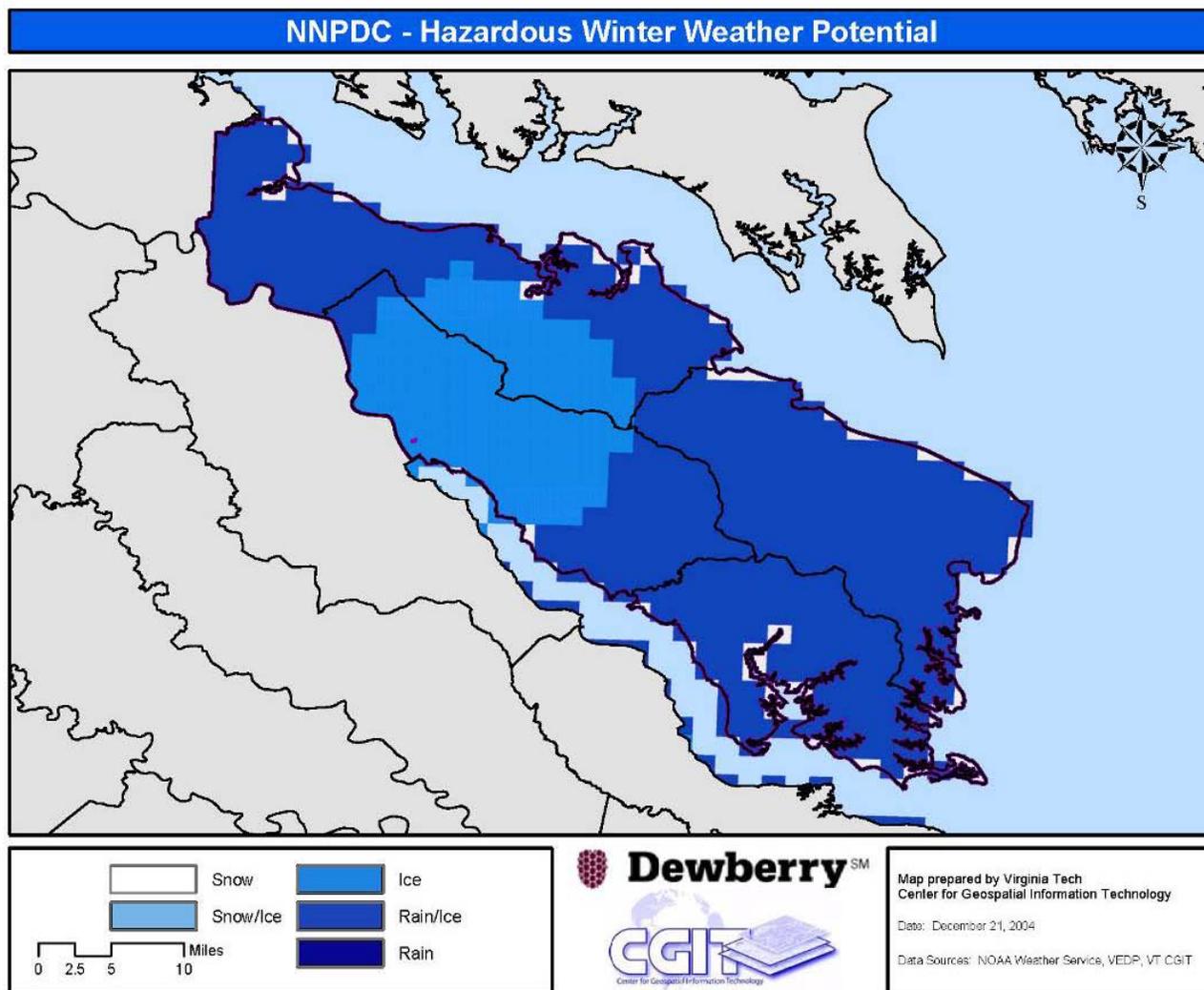


Figure V-26. Northern Neck Hazardous Winter Weather Potential Based on LEQ Precipitation

Vulnerability Analysis

Figures V-27 and V-28 show that the overall winter weather and the ice potential for the Northern Neck region are greater in Richmond County and Westmoreland County than in Northumberland County and Lancaster County. Figure V-26 and V-27 show relative risk or vulnerability based these previous maps. These were developed by assigning a high risk to those census blocks within the regions with the greatest potential for snowy days (> 1 in of snow) or ice. Division into high, medium and low were based on the levels predicted from potential maps. Tables V-22 and V-23 show the population in each county impacted by the overall snowfall and ice risks. County totals include town subtotals. Future revision of this plan will need to develop a method to calculate the potential loss from these winter storms.

Northern Neck Regional Hazard Mitigation Plan

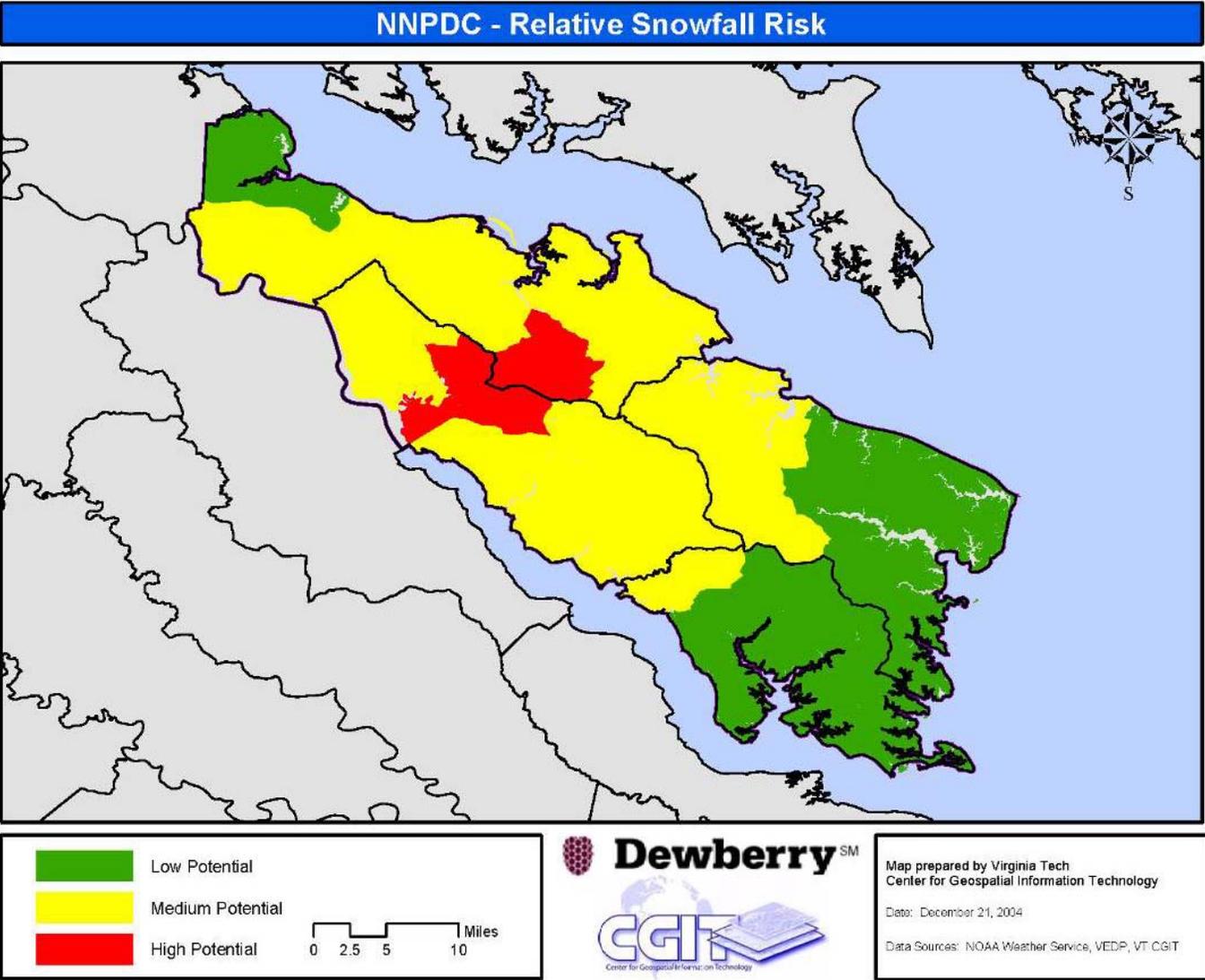


Figure V-27. Northern Neck Snowfall Relative Risk.

Northern Neck Regional Hazard Mitigation Plan

Table V-22. Northern Neck Population Snowfall Relative Risk (from 2000 Census)

Community	Low	Medium	High	TOTAL
Lancaster County	10,859	708	0	11,567
<i>*Town of Kilmarnock</i>	<i>673</i>	<i>0</i>	<i>0</i>	<i>673</i>
<i>*Town of Irvington</i>	<i>1,244</i>	<i>0</i>	<i>0</i>	<i>1,244</i>
<i>*Town of White Stone</i>	<i>358</i>	<i>0</i>	<i>0</i>	<i>358</i>
Northumberland County	7,881	4,378	0	12,259
Richmond County	0	7,460	1,349	8,809
<i>*Town of Warsaw</i>	<i>0</i>	<i>690</i>	<i>685</i>	<i>1,375</i>
Westmoreland County	6,873	8,969	876	16,718
<i>*Town of Colonial Beach</i>	<i>3,228</i>	<i>0</i>	<i>0</i>	<i>3,228</i>
<i>*Town of Montross</i>	<i>0</i>	<i>315</i>	<i>0</i>	<i>315</i>
TOTAL	25613	21,515	2,225	49,353

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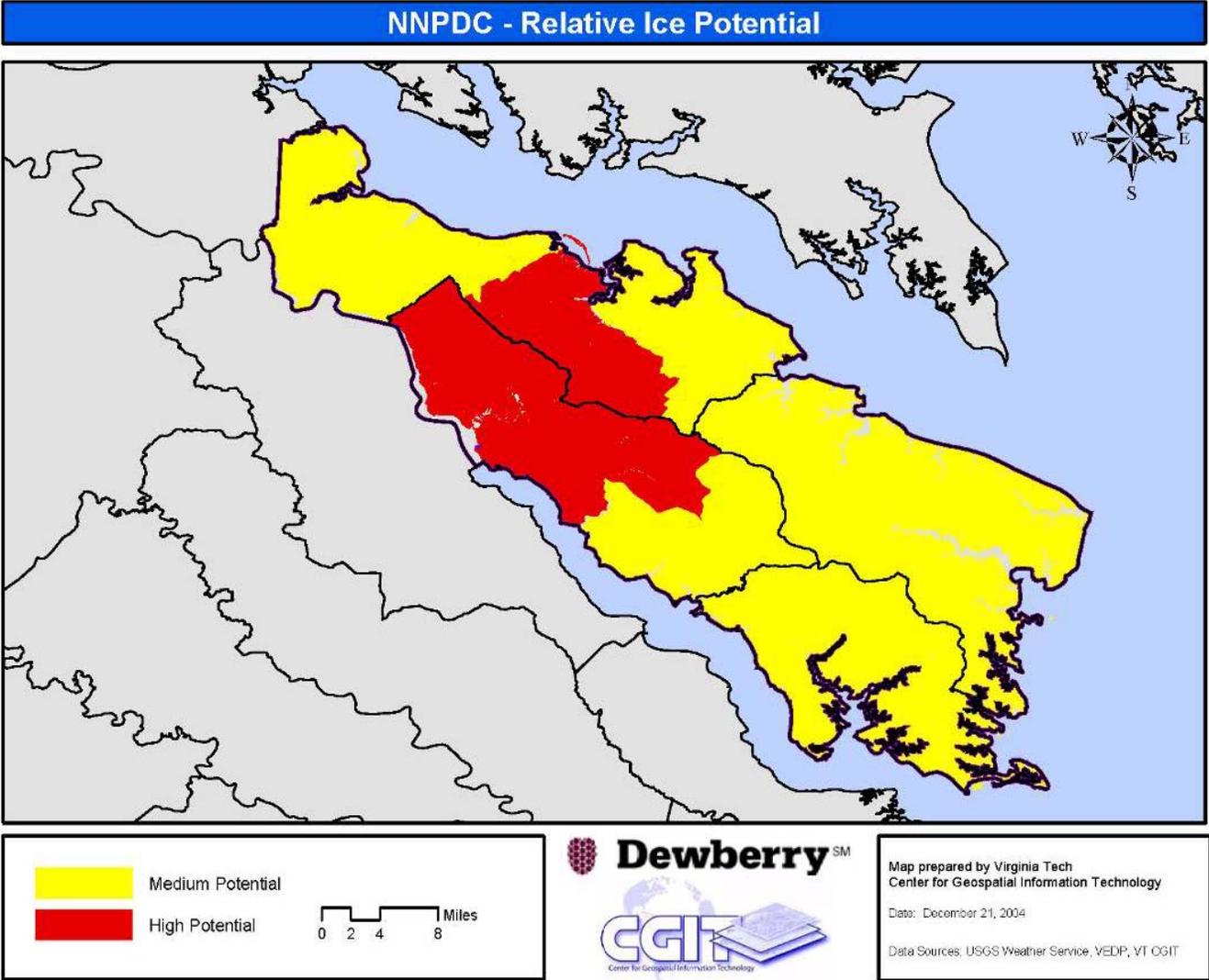


Figure V-28. Northern Neck Ice Relative Risk

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Table V-23. Northern Neck Population Ice Relative Risk (from 2000 Census)				
Community	Low	Medium	High	TOTAL
Lancaster County	0	11,567	0	11,567
<i>*Town of Kilmarnock</i>	<i>0</i>	<i>673</i>	<i>0</i>	<i>673</i>
<i>*Town of Irvington</i>	<i>0</i>	<i>1,244</i>	<i>0</i>	<i>1,244</i>
<i>*Town of White Stone</i>	<i>0</i>	<i>358</i>	<i>0</i>	<i>358</i>
Northumberland County	0	12,259	0	12,259
Richmond County	0	2,246	6,563	8,809
<i>*Town of Warsaw</i>	<i>0</i>	<i>0</i>	<i>1,375</i>	<i>1,375</i>
Westmoreland County	0	12,539	4,179	16,718
<i>*Town of Colonial Beach</i>	<i>0</i>	<i>3,228</i>	<i>0</i>	<i>3,228</i>
<i>*Town of Montross</i>	<i>0</i>	<i>0</i>	<i>315</i>	<i>315</i>
TOTAL	0	38,611	10,742	49,353

Coastal and Shoreline Erosion (Moderate Ranking)

Hazard History

Table V-24 includes descriptions of major areas of erosion in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description represents the entire planning area.

Table V-24. Coastal and Shoreline Erosion Hazard History	
County	Areas of Potential Shoreline Erosion
Richmond County	Severe shoreline erosion was noted for a segment of approximately one-half mile between Maguire Creek and Little Carter Creek. Severe shoreline erosion was noted for 0.1 miles where Lancaster Creek and Morattico Creek join.
Northumberland County	The average annual erosion rate for the shoreline is 1.1 feet per year.

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Westmoreland County	<p>Along the Rappahannock River erosion is caused by the river currents in the turns of the river and by the downhill rain runoff. The river current is the fastest in the outside bends of the river meander, causing erosion in those turns, while the inside turns of the river accumulate deposits. Along bluff areas, rain runoff causes weathering of the cliff face, undercutting the slope which causes the bluff to slump.</p> <p>Severe shoreline erosion noted along the stretch of Popes Creek Landing to Church Point.</p>
Lancaster County	<p>Severe shoreline erosion experienced at Fleets Island, Fleets Bay, Morattico, and the main branch of the Corrotoman River.</p> <p>Moderate shoreline erosion experienced along the Rappahannock River and the main branch of the Corrotoman River.</p>

Hazard Profile

Shoreline erosion poses a noteworthy threat to the Northern Neck region, with shorelines encompassing a large percentage of the communities. It is important to take into account that shoreline erosion occurs sporadically in response to storm events. Average shoreline erosion can be misleading if this is not taken into account. Shoreline erosion rates are determined by four principle factors: storm frequency; storm type and direction; resulting wind, tides, current, and waves; and storm intensity and duration. Other forces which cause increased levels of storm water runoff and shoreline erosion are:

- human activity
- grading
- upland runoff
- vegetation removal

Shoreline erosion has a significant impact on water quality and natural resources. Recent studies have indicated that shoreline erosion is responsible for millions of pounds of nitrogen and phosphorus entering the Chesapeake Bay each year and is responsible for an estimated 15 to 20 percent of sediment entering the Bay.

Residential and industrial parcels are located on the shoreline. The Shoreline Protection Study and Plan (1994) recorded the number of parcels in the shoreline. The Shoreline Protection Study and Plan was developed to address the issues and policies regarding shoreline erosion protection and control measures. The results of this study are summarized in Table V-25. Table V-26 illustrates that Northumberland County represents over 40% of the total shoreline of the Northern Neck and has almost 32% of the parcels at risk from shoreline erosion. Lancaster County represents almost 24% of the shoreline with approximately 34% of the total parcels at risk.

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Table V-25. Coastal Erosion Estimates from 1994

Community	Shoreline length (mi)	Shoreline Parcels	% Total Shoreline Parcels	% Total Shoreline
Lancaster	264	3,916	33.78	23.61
Northumberland	451	3,668	31.64	40.33
Richmond	151.2	710	6.12	13.52
Westmoreland	252	3,300	28.46	22.54

It should be noted that a large percentage of the shoreline also falls within a flooding zone on the FEMA FIRMs and can give an indication of the structures at risk from shoreline erosion as well as flooding. The previous section on flooding includes a breakdown of the structures within the floodplain.

Another way to estimate coastal and shoreline erosion is to identify those areas in or near the mapped floodplain with high soil erodibility. For the Northern Neck region, the USDA soil erodibility factor was mapped for areas within 200 feet of a mapped floodplain. Table V-26 summarizes these results and Figures V-25 through V-28 show the mapping for this analysis.

Table V-26. Coastal, Shoreline, and Floodplain Erosion Area Estimates in Square Miles (includes 200 foot buffer on all mapped floodplains).

Community	Low Erodibility	Medium Erodibility	High Erodibility	Total Area
Lancaster	9.45	6.93	10.06	26.44
Northumberland	8.74	8.86	14.50	32.11
Richmond	10.59	4.06	12.23	26.89
Westmoreland	7.88	23.37	3.48	34.73
Totals	37.66	45.23	43.27	120.17

Tables V-27 and V-28 summarize the problem spot locations that are denoted on Figures V-29 through V-32.

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Table V-27. Lancaster Coastal Erosion Problem Spots

Map Letter	Description
K	Morattico: coastal erosion due to hurricanes/Nor'easters
L	Rappahannock River from Greenvale Creek to Mosquito Point: coastal erosion
M	Towles Point: coastal erosion due to hurricanes/Nor'easters
N	Corrotoman River: coastal erosion along banks up to where Eastern and Western Branches diverge
O	Eastern Branch of Corrotoman River: coastal erosion
P	Windmill Point: coastal flooding, surge due to hurricanes/Nor'easters

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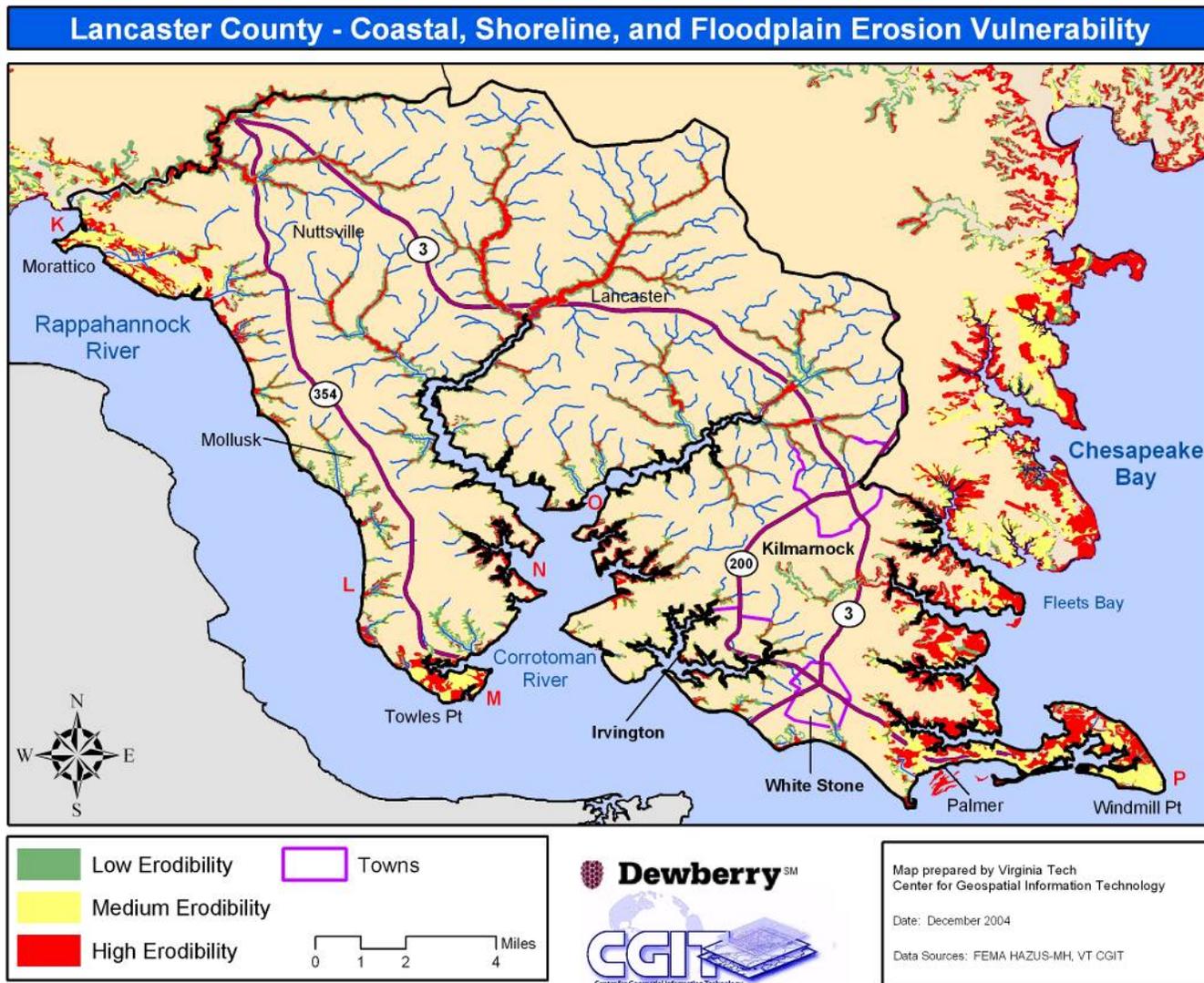


Figure V-29. Lancaster County Coastal, Shoreline, and Floodplain Erosion Vulnerability

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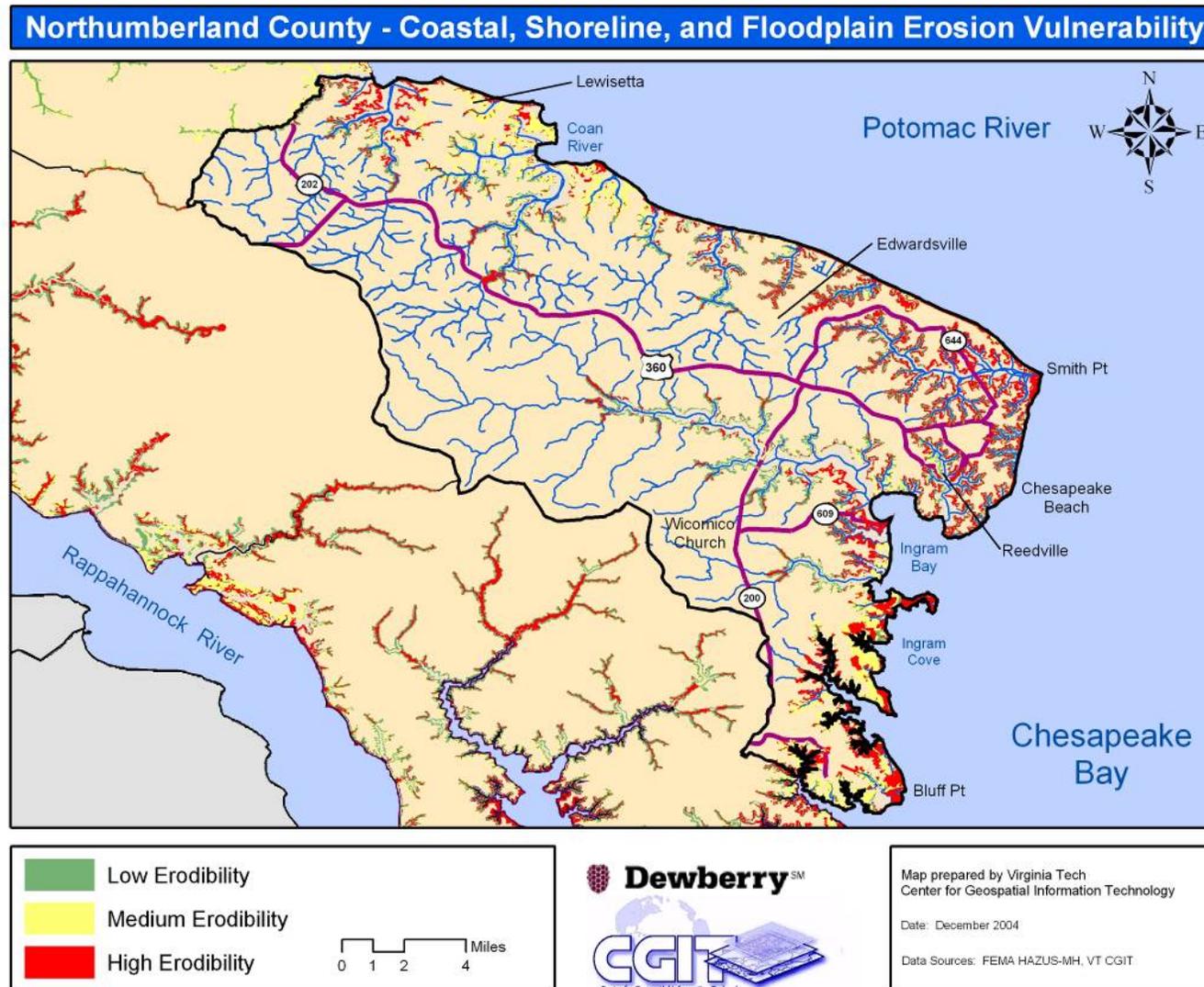


Figure V-30. Northumberland County Coastal, Shoreline, and Floodplain Erosion Vulnerability

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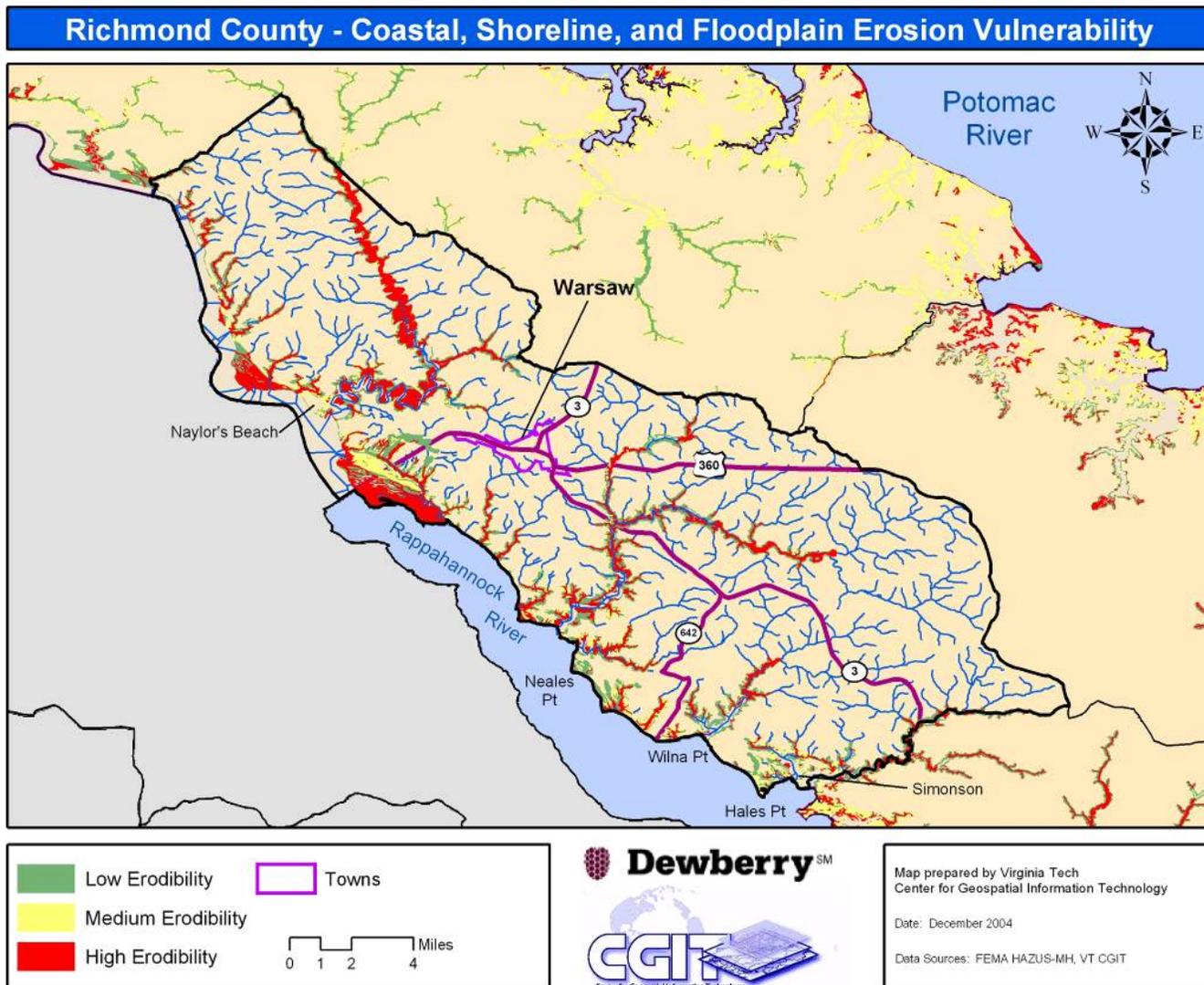


Figure V-31. Richmond County Coastal, Shoreline, and Floodplain Erosion Vulnerability

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Table V-28. Westmoreland County Coastal Erosion Problem Spots

Map Letter	Description
G	Rappahannock River: coastal erosion
H	Potomac River, Colonial Beach to Northumberland County Line: coastal erosion
I	Stratford Harbor Subdivision: steep cliffs along Potomac, Rainstorm/Landslide event: T-storm sloughed off great deal of land thereby threatening houses

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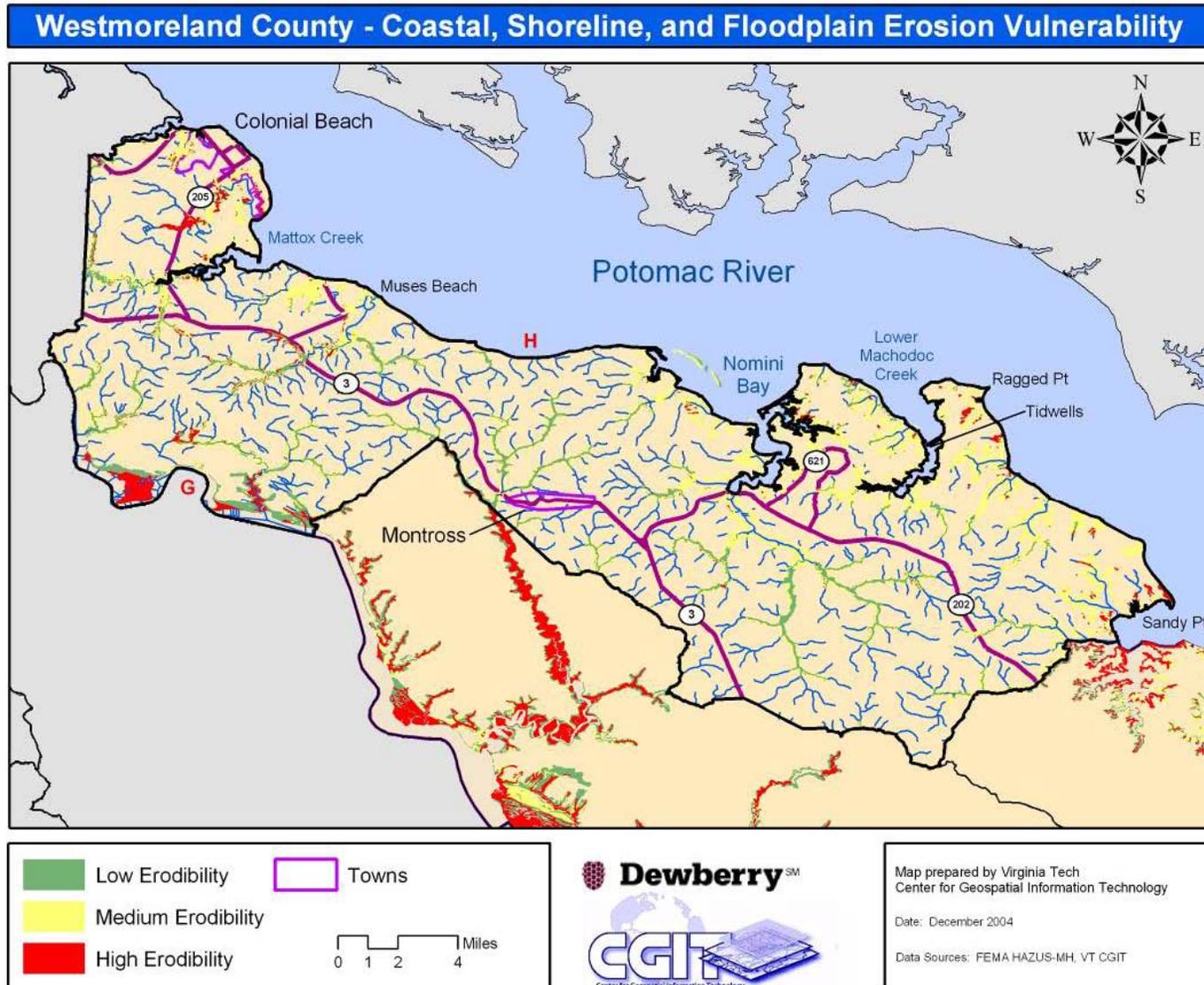


Figure V-32. Westmoreland County Coastal, Shoreline, and Floodplain Erosion Vulnerability

Drought (Limited Ranking)

Hazard History

Table V-29 includes descriptions of major droughts that have occurred in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description applies to the entire planning area.

Table V-29. Drought Hazard History	
Date	Damages
October 1998 - November 1998	Twenty two counties, including Richmond County; Northumberland County; Westmoreland County; Lancaster County, were in the forecast area accounting for \$58.8 million in crop damages.
September 1997	Twenty three counties, including Lancaster County, were in the forecast area accounting for \$63.8 million in crop damages.

Hazard Profile

A drought can be characterized in several different ways depending on the impact. The most common form of drought is agricultural. Agricultural droughts are characterized by unusually dry conditions during the growing season. Meteorological drought is an extended period of time (6 or more months) with precipitation less than 75 percent of the normal precipitation. Severity of droughts often depends on the community reliance on a specific water source. The probability of a drought is difficult to predict given the number of variables involved. As seen in the table above, drought conditions appear to make an appearance at least once a decade.

Many problems can arise at the onset of a drought, some of which include diminished water supplies and quality, livestock and wildlife becoming undernourished, crop damage, and possible wildfires. Secondary impacts from droughts pose problems to farmers with reductions in income, while food prices and lumber prices could drastically increase.

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 the daylight hours. Secondary impacts of excessive heat are severe strain on the electrical power system and potential brownouts or blackouts.

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Table V-30 provides a summary of drought categories and impacts. Notice that water restrictions start off as voluntary and then become mandatory. For excessive heat, the National Weather Service utilizes heat index thresholds as criteria for the issuance of heat advisories and excessive heat warnings.

Table V-30. Drought Severity Classification

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions

Vulnerability Analysis

The 1990 Census contained detailed information about source of water per census block group. For purposes of this analysis, it was assumed that areas with populations having less than 25% of public/private water systems had a high vulnerability ranking. When a drought occurs, these areas would likely feel a larger impact since most homes receive their water from wells, which may dry up during a drought. Table V-31 provides a summary of the 1990 population in three categories of drought vulnerability. Figures V-33 through V-36 show these categories for each of the counties. The vulnerability for a particular area may be understated because the analysis was done on a census block scale. The presence of a water system that may serve a large population in a small geographic portion of the block may skew the ranking for that particular census block and make it appear as though a larger area is served by public water.

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Table V-31. Northern Neck Population Drought Risk (from 1990 Census).

% Population with Public/Private Water Systems	HIGH (< 25%)	MEDIUM (25% - 50%)	LOW (> 50 %)	TOTAL
Lancaster	3,020	5,432	2,444	10,896
Northumberland	5,946	4,578	0	10,524
Richmond	4,909	2,364	0	7,273
Westmoreland	5,149	2,253	8,078	15,480
TOTAL	19,024	14,627	10,522	44,173

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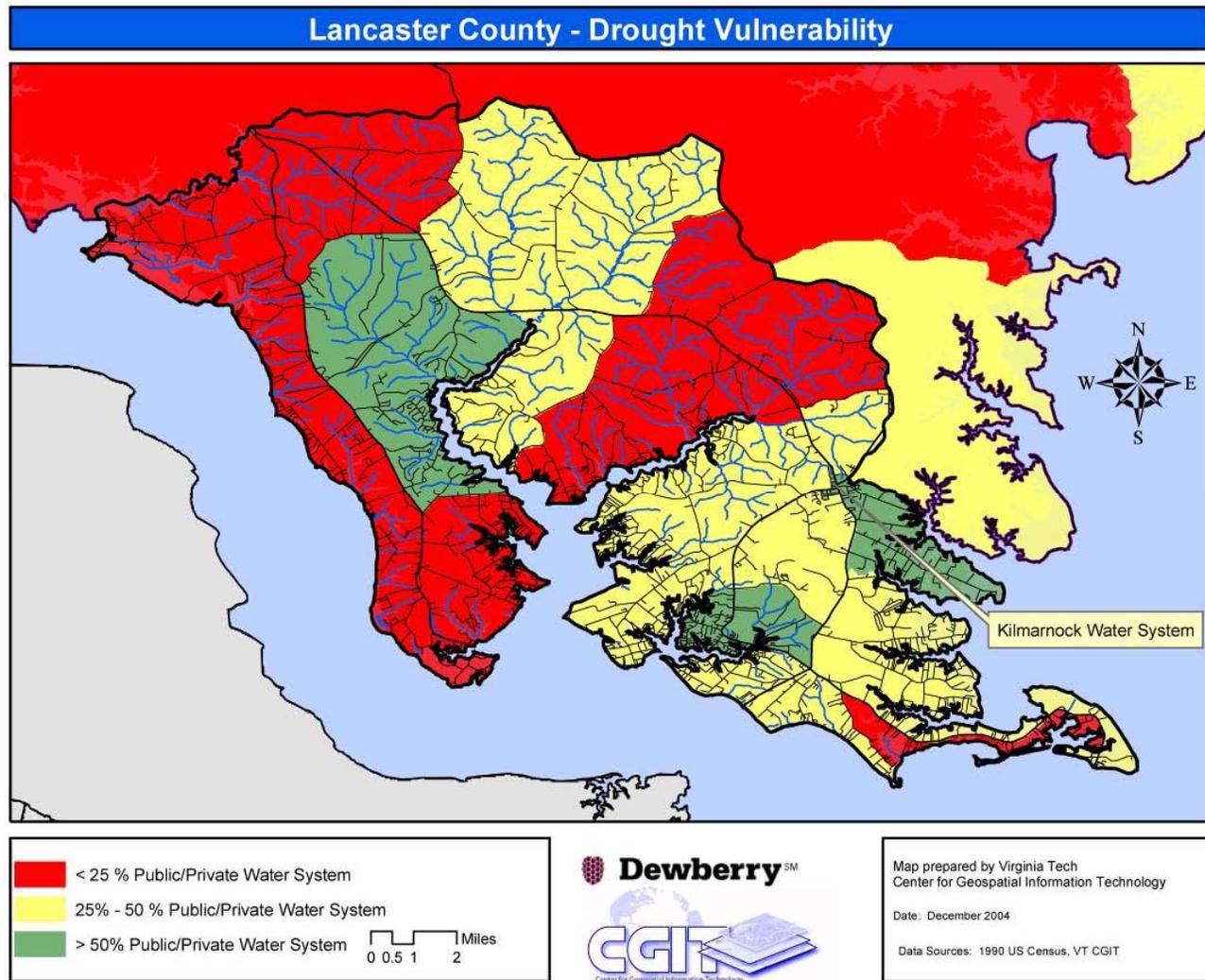


Figure V-33. Lancaster County Drought Vulnerability

Northern Neck Regional Hazard Mitigation Plan

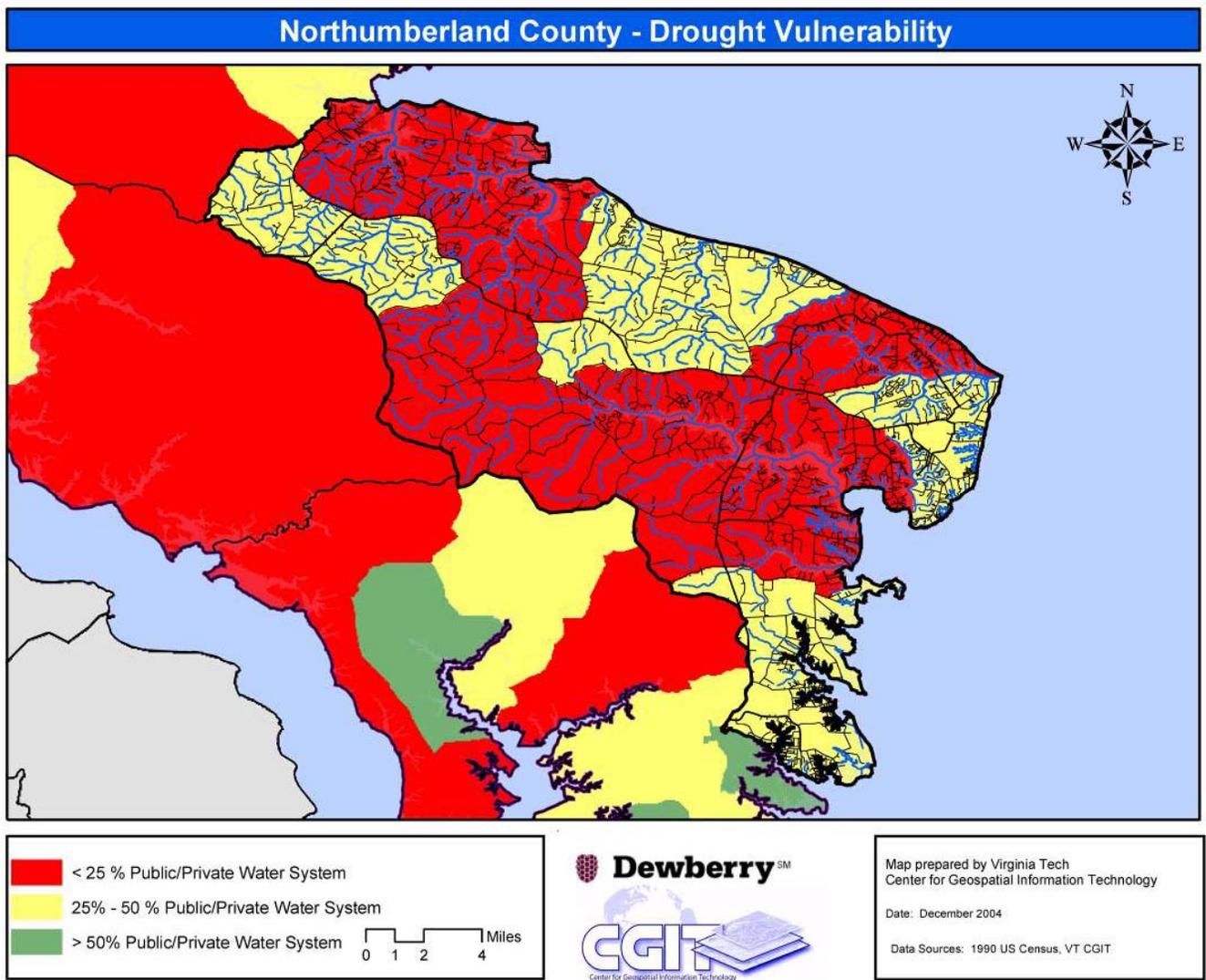


Figure V-34. Northumberland County Drought Vulnerability

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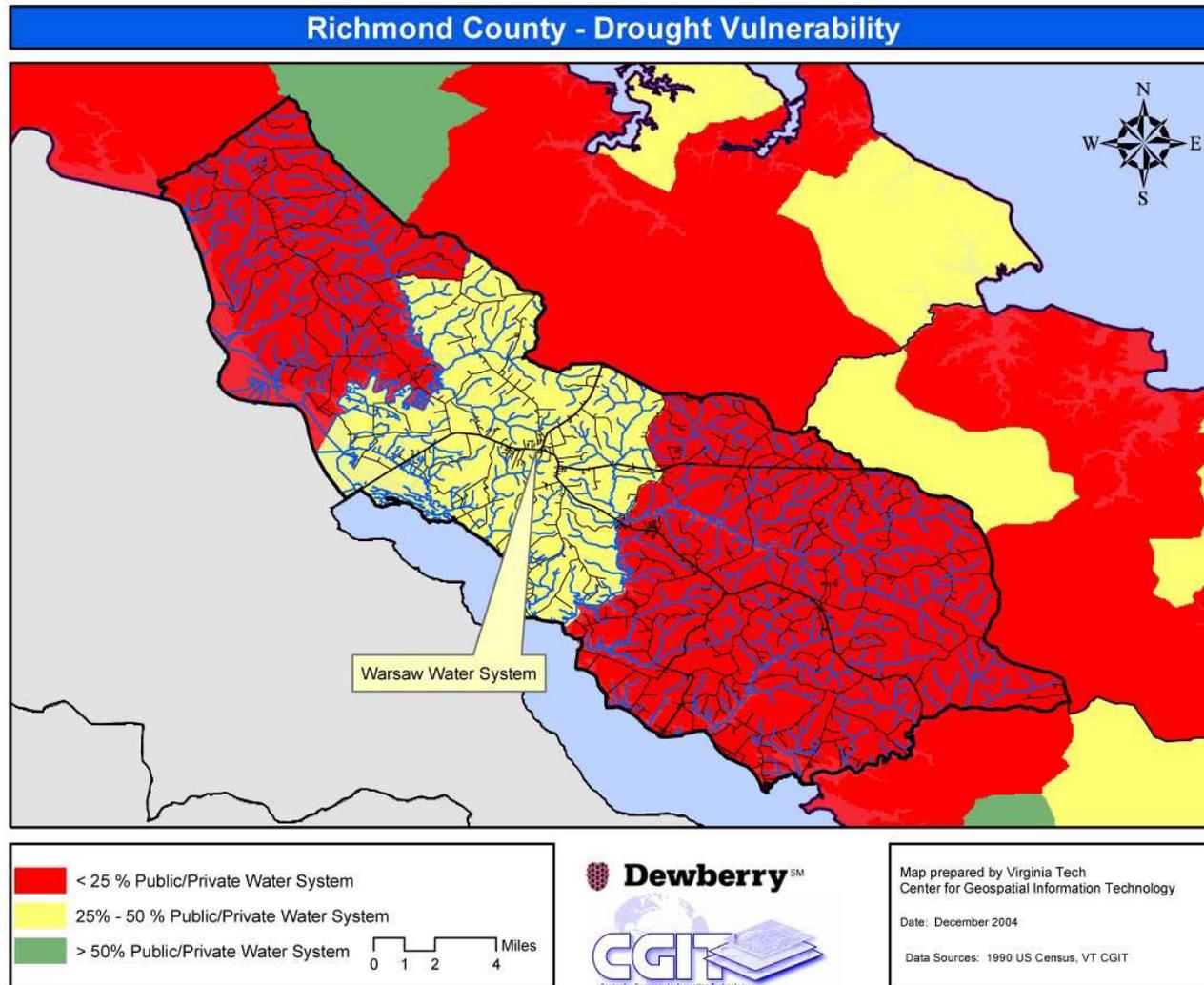


Figure V-35. Richmond County Drought Vulnerability

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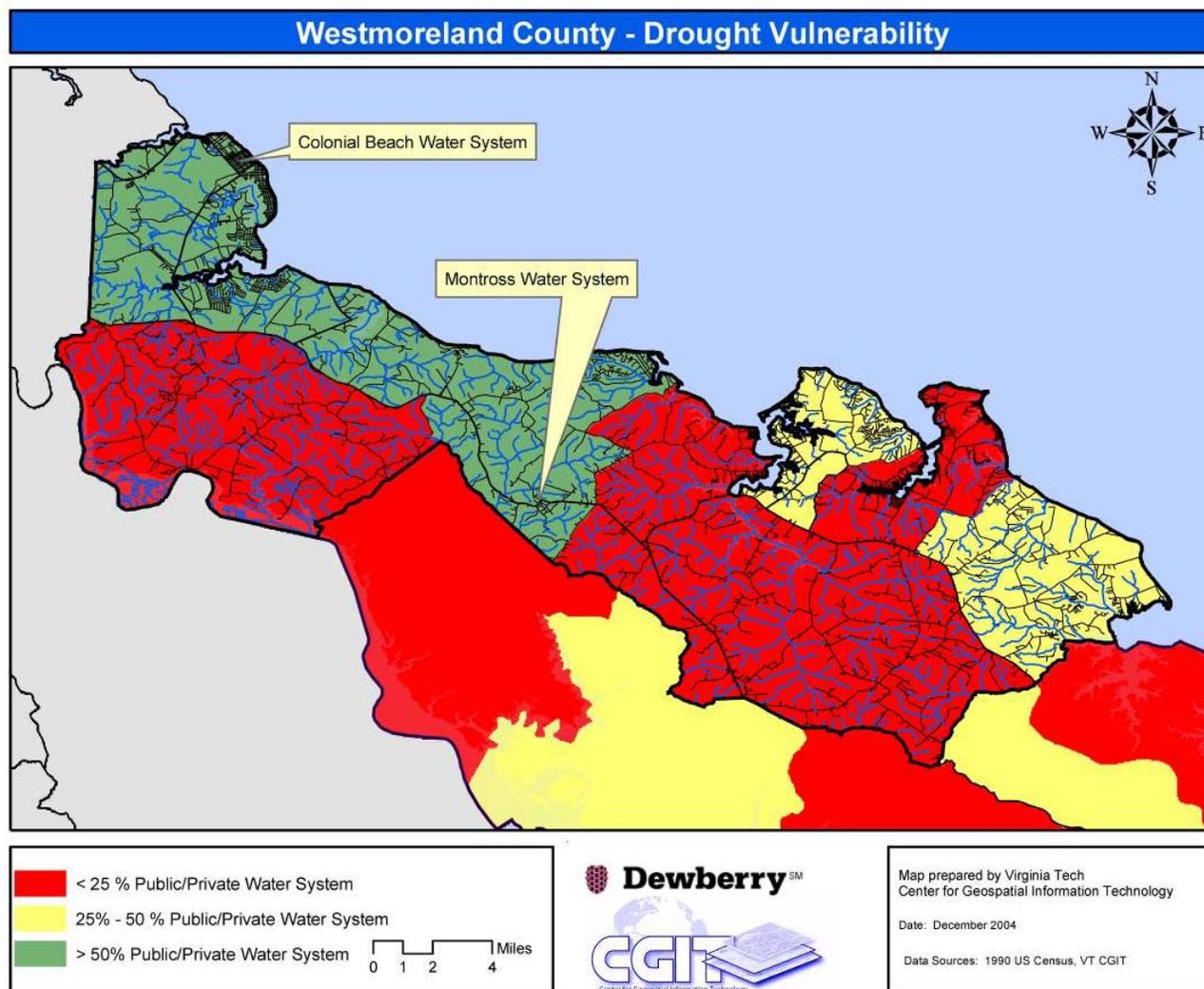


Figure V-36. Westmoreland County Drought Vulnerability

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Northeaster (Limited Ranking)

Hazard Profile

A Northeaster or Nor'easter is very similar to a hurricane and is often labeled "White Hurricane." Nor'easter is derived from strong winds from the northeast. This is a counterclockwise cyclone with the storm center carrying warm, moist air from the Gulf Stream. The air rises over the cold inland air and cools as a result, forming snow. Heavy snow forms within a 50-mile wide path about 150 miles northwest of the low pressure center. Unlike a hurricane, a nor'easter can linger through several tides, with each tide piling more water on shore and in the bays. These events can bring strong winds and anything from rain to ice to snow to even blizzard conditions over a very large area. This combination of heavy frozen precipitation and winds can be quite destructive and lead to widespread utility failures and high cleanup costs.

Nor'easters may occur from November through April, but are usually at their worst in January, February and March. Other hazards already covered (hurricane wind, flooding, and winter storms) take the impact of Nor'easters into account.

Tornado (Limited Ranking)

Hazard History

Table V-32 includes descriptions of major tornado events that have touched down in the Northern Neck. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description applies to the entire planning area.

Table V-32. Tornado Hazard History				
County	Date	Magnitude	Crop Damage	Description
Lancaster County	09/06/75	F1	\$3,000	Not Available
	05/10/90	F1	\$2,500,000	Not Available
	08/06/93	F0	\$500,000	Not Available
	05/25/04	F1	\$20,000	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.
Northumberland	08/10/69	F0	\$300	Not Available

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Table V-32. Tornado Hazard History

County	Date	Magnitude	Crop Damage	Description
County	05/02/89	F2	\$0	Not Available
	05/02/89	F1	\$0	Not Available
	07/12/96	F2	\$250,000	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.
	09/10/97	F3	\$150,000	Tornado damaged 5 homes, with a large porch on one home and a garage/breezeway on another home completely 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 local marina. One row boat near initial damage area lifted up and tossed 300-400 yards from its tied-down position. Several other items were thrown distances of several hundred yards. 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.
Richmond County	11/02/66	F3	\$25,000	Not Available
	04/25/75	F2	\$25,000	Not Available
	08/31/83	F2	\$25,000	Not Available
	01/19/96			On the leading edge of a storm system, a tornado touched down in Richmond County. The tornado came from Essex County crossing the Rappahannock River. The twister touched down twice in Newland, uprooted trees,

downed a shed, blew off an awning, turned a semi-trailer on its side, damaged a greenhouse and knocked down a shed and its cinder block wall. A farm tractor inside of the shed was overturned and a camper trailer flipped 6 times.

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Table V-32. Tornado Hazard History

County	Date	Magnitude	Crop Damage	Description
				<i>(Note: article discussed three to four small tornado touchdowns occurring on November 11, 1995). (Source: Northern Neck News)</i>
	08/26/03	F0	\$5,000	Tornado (F0) briefly touched down and downed numerous trees and caused considerable tree damage. Trees sheared and twisted by tornado.
	01/19/04	F0	\$15,000	Small tornado downed several trees...destroyed at storage shed... overturned a tractor and semi-trailer...and severely damaged a brick wall. Path was only about 1/4 mile long and about 50 yards wide.
Westmoreland County	07/17/75	F	\$25,000	Not Available
	07/13/93	F0	\$10,000	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.
	06/24/96	F0	\$170,000	Brief tornado touched down at Westmoreland State Park. Numerous trees and power lines were downed throughout the park. 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 a bedroom.
	04/04/99	F0	\$25,000	Trees down. Roofs and chimneys damaged.

Hazard Profile

Damaging winds typically are associated with tornadoes or landfalling hurricanes. Isolated “downburst” or “straight-line” winds associated with any common thunderstorm can also cause extensive property damage.

Tornadoes are classified as a rotating column of wind that extends between a thunderstorm cloud and the earth’s surface. Winds are typically less than 100 mph,

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with severe tornado wind speeds exceeding 250 mph. The rotating column of air often resembles a funnel shaped cloud. The widths of tornados are usually several yards across, with infrequent events being over a mile wide. Tornadoes and their resultant damage can be classified into six categories using the Fujita Scale. This scale assigns numerical values for wind speeds inside the tornado according to the type of damage and degree of the tornado. Most tornadoes are F0 and F1, resulting in little widespread damage. Tornado activity normally spans from April through July but tornados can occur at any time throughout the year. In Virginia, peak tornado activity is in July. Hot, humid conditions stimulate the tornadoes' growth.

Strong tornadoes may be produced by thunderstorms and often are associated with the passage of hurricanes. On average, about seven tornadoes are reported in Virginia each year. The total number may be higher as incidents may occur over areas with sparse populations, or may not cause any property damage.

Tornado damage is computed using the Fujita Scale, as shown in Table V-33. Classification is based on the amount of damage caused by the tornado, where the measure of magnitude is based on the impact.

Table V-33. Fujita Tornado Intensity Scale				
Classification	Max. Winds (mph)	Path Length (mi.)	Path Width (mi)	Damage
F0	less than 73	less than 1.0	less than 0.01	Chimneys damaged, trees broken
F1	73-112	1.0-3.1	0.01-0.03	Mobile homes moved off foundations or overturned
F2	113-157	3.2-9.9	0.03-0.09	Considerable damage, mobile homes demolished, trees uprooted
F3	158-206	31-Oct	0.10-0.29	Roof and walls torn down, trains overturned, cars thrown
F4	207-260	32-99	0.30-0.90	Well-constructed walls leveled
F5	261-318	100-315	1.0-3.1	Homes lifted off foundations and carried some distance, cars thrown as far as 300 ft

The classification of the tornado gives an approximate depiction of what the corresponding damage of the tornado will be. A majority of Virginia's tornadoes are F0 and F1 on the Fujita Scale, shown in Table V-34. These result in minimal

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extensive damage. Damage that is likely to occur would be damage to trees, shrubbery, signs, antennas, with some damage to roofs and unanchored trailers.

Table V-34. Virginia Tornado Statistics 1950-2001

Fujita Scale	Class.	MPH	Damage Description	# in VA	% of total	Deaths / Injuries	Damages
							(\$ Mil)
F0	Weak	40-72	Light damage. Tree branches snapped; antennas and signs damaged.	99	26	0 / 0	7
F1	Moderate	73-112	Moderate damage. Roofs off; trees snapped; trailers moved or overturned.	186	50	1 / 85	57
F2	Strong	113-157	Considerable damage. Weak structures and trailers demolished; cars blown off road.	66	18	3 / 72	75
F3	Severe	158-206	Roofs and some walls torn off well constructed buildings; some rural buildings demolished; cars lifted and tumbled.	23	6	19 / 102	140
F4	Devastating	207-260	Houses leveled leaving piles of debris; cars thrown some distance.	2	0.1	4 / 248	50
F5	Incredible	261-318	Well built houses lifted off foundation and disintegrated with debris carried some distance.	0	0	n/a	n/a

Figure V-37 shows tornado occurrence in the Northern Neck Region. Since tornadoes are so infrequent for the region, the Hurricane Wind analysis covers more probable high wind occurrences. Table V-35 denotes tornado touchdowns denoted by the committee members (shown on Figure V-19).

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Table V-35. Northumberland County Tornado Problem Spots

Description	
A	Edwardsville "Tornado Alley" - 125 homes, no roads affected
B	Wicomico Church - tornado

NNPDC - Tornado Touchdowns

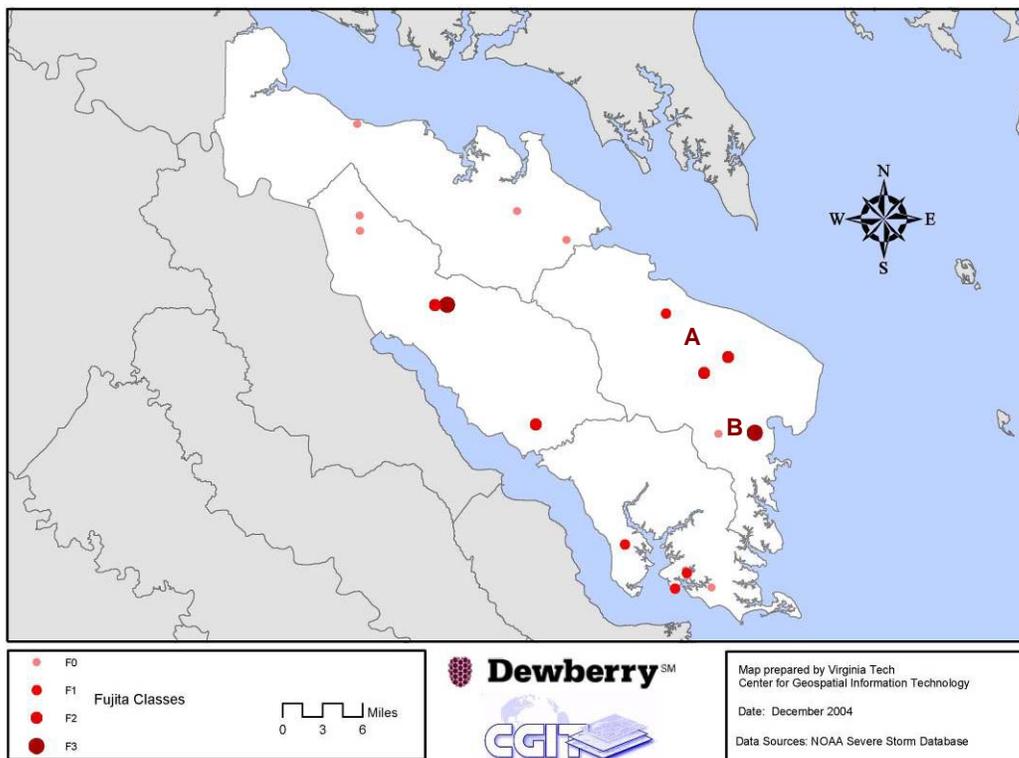


Figure V-37. Northern Neck Tornado Touchdowns.

Wildfire (Limited Ranking)

Hazard History

The Virginia Department of Forestry website provided fire incidence data for fire years 1995-2001. The data provided by VDOF was summarized into the following tables. Table V-36 provides information on the breakdown of number of acres burned and the total amount of damage per county. Table V-37 illustrates the cause of fire,

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broken down by county. It can be noted that 35% of fires were caused by debris, followed by 21% caused by children.

Table V-36. Wildfire Summary 1995-2001 (VDOF)

Fire Year	1995		1996		1997		1998	
COUNTY	Total Acres	Total Damage						
Lancaster	10.5	\$15,200	4.2	\$20,000	10.5	\$51,200	23.1	\$0
Northumberland	11.2	\$2,200	1.7	\$60,200	11	\$500	9.9	\$0
Richmond	0.5	\$0	N/A	N/A	0.6	\$50	1.6	\$0
Westmoreland	0.3	\$0	0.2	0	4.9	\$0	18.5	\$100,000
Grand Total	22.5	\$17,400	6.1	\$80,200	27	\$51,750	53.1	\$100,000

Fire Year	1999		2000		2001		Acres Total	Damage Total
COUNTY	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage		
Lancaster	4.9	\$300	6.7	\$5,500	2.7	\$0	62.6	\$92,200
Northumberland	15.7	\$50	0.4	\$0	19.7	\$300	69.6	\$63,250
Richmond	7.5	\$75	1	\$0	9	\$1,220	20.2	\$1,345
Westmoreland	13.9	\$10,000	0.8	\$100,425	3.6	\$500	42.2	\$210,925
Grand Total	42	\$10,425	8.9	\$105,925	35	\$2,020	194.6	\$367,720

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Table V-37. Wildfire Causes 1995-2001 (VDOF)

COUNTY	Lightning	Campfire	Smoking	Debris	Incendiary	Equip. Use	Children	Misc.	Grand Total
Lancaster		4	33	136	25	36	72	54	360
Northumberland	1	4	18	116	10	48	56	54	307
Richmond	1		12	8		6	40	27	94
Westmoreland	2		30	64	5	18	24	18	161
Grand Total	4	8	93	324	40	108	192	153	922

Hazard Profile

Wildfire is a unique hazard in that it can be significantly altered based on efforts to control its course during the event. The Virginia Department of Forestry (VDOF) indicates that there are three principle factors that can lead to the formation of wildfire hazards: topography, fuel, and weather. The environmental conditions that exist during fire seasons exacerbate the hazard. When relative humidity is low and high winds are coupled with a dry forest floor (brush, grasses, leaf litter), wildfires may easily ignite. Years of drought can lead to environmental conditions that promote wildfires. Accidental or intentional setting of fires by humans is the largest contributor to wildfires. Residential areas or “woodland communities” that expand into wildland areas also increase the risk of wildfire threats.

Fire Seasons

Spring (March and April) and fall (October and November) are the two seasons for wildfires.

Secondary Effects

Secondary effects from wildfires can pose a significant threat to the communities surrounding the hazard. During a wildfire, the removal of groundcover that serves to stabilize soil can lead to hazards such as landslides, mudslides, and flooding. In addition, the leftover scorched and barren land may take years to recover and the resulting erosion can be problematic and extensive.

Hazard Areas

Figure V-38 shows the wildfire hazard map developed by VDOF. In 2002 and 2003, VDOF examined which factors influence the occurrence and advancement of

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wildfires and how these factors could be represented in a GIS model. VDOF determined that historical fire incidents, land cover (fuels surrogate), topographic characteristics, population density, and distance to roads were critical variables in a wildfire risk analysis. The resulting high, medium, and low risk category reflect the results of this analysis.

Vulnerability Analysis

Table V-38 illustrates the number of homes within woodland communities, as designated by Virginia Department of Forestry, in the Northern Neck. In the region, 45% of the woodland homes fall into the high potential for a wildfire. Lancaster County has the highest relative percentage of homes in areas of high wildfire potential, with 83% of homes in the highest risk category. Northumberland County has the second highest relative risk for wildfire with 40% of woodland homes at risk. Figure V-39 and Table V-39 shows the risk to critical facilities. Table V-40 provides a breakdown of the number of critical facilities in wildfire prone areas. Lancaster County has a surprisingly high percentage of critical facilities at risk (73%) followed by Northumberland County (31%). Overall, a relatively low number of critical facilities in the Northern Neck are at risk to wildfire (28%) events. Figures V-40 through 43 show vulnerability for each county. Table V-40 summarizes the problem spot locations that were denoted by committee members.

Table V-38. Number of Woodland Homes by Fire Rank					
County	Low Potential	Medium Potential	High Potential	Grand Total	% High Risk
Lancaster	0	360	1,737	2,097	83%
Northumberland	12	1,868	1,256	3,136	40%
Richmond	43	416	64	523	12%
Westmoreland	212	1,971	959	3,142	31%
Grand Total	267	4,615	4,016	8,898	45%

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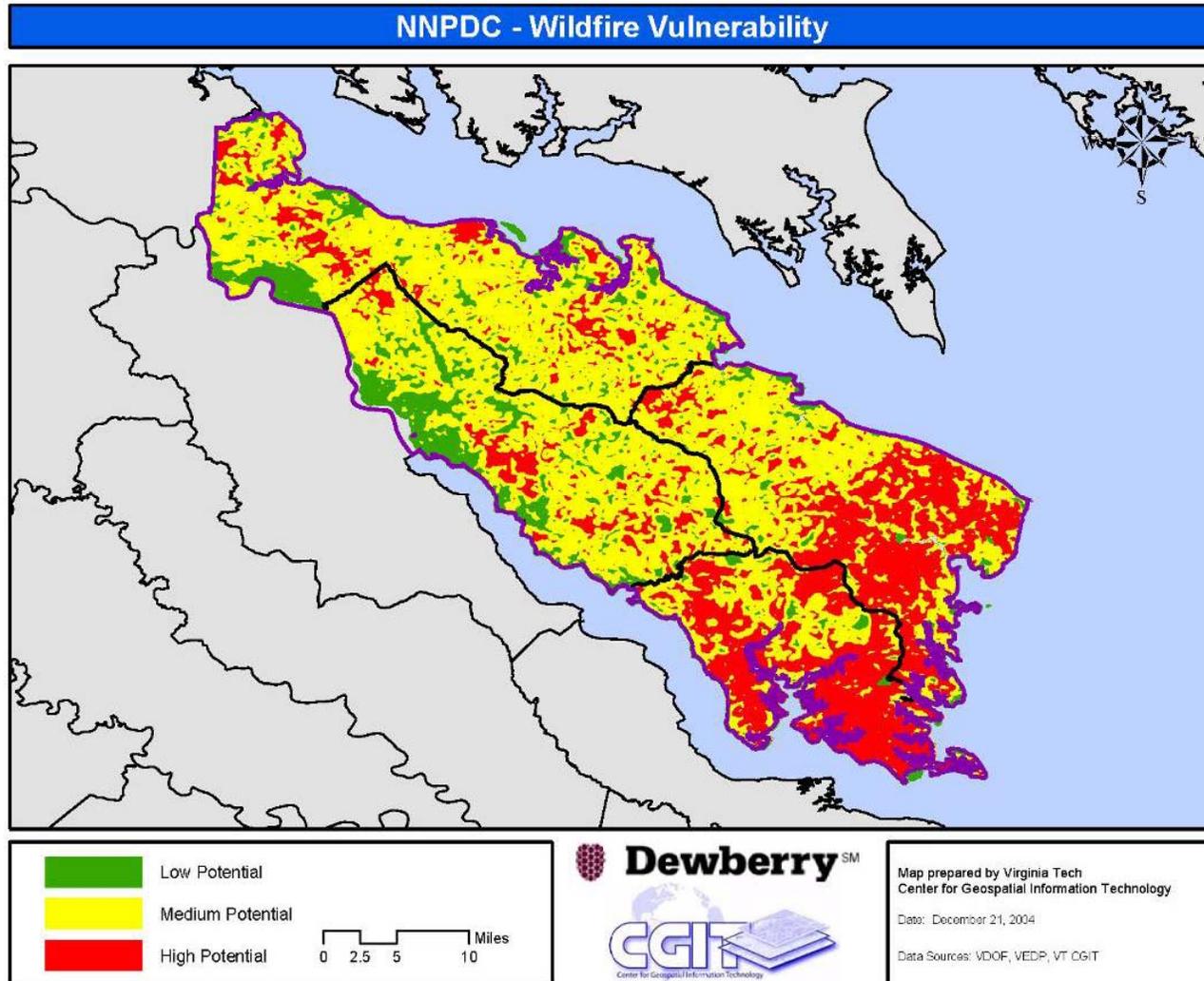


Figure V-38. Northern Neck Wildfire Vulnerability.

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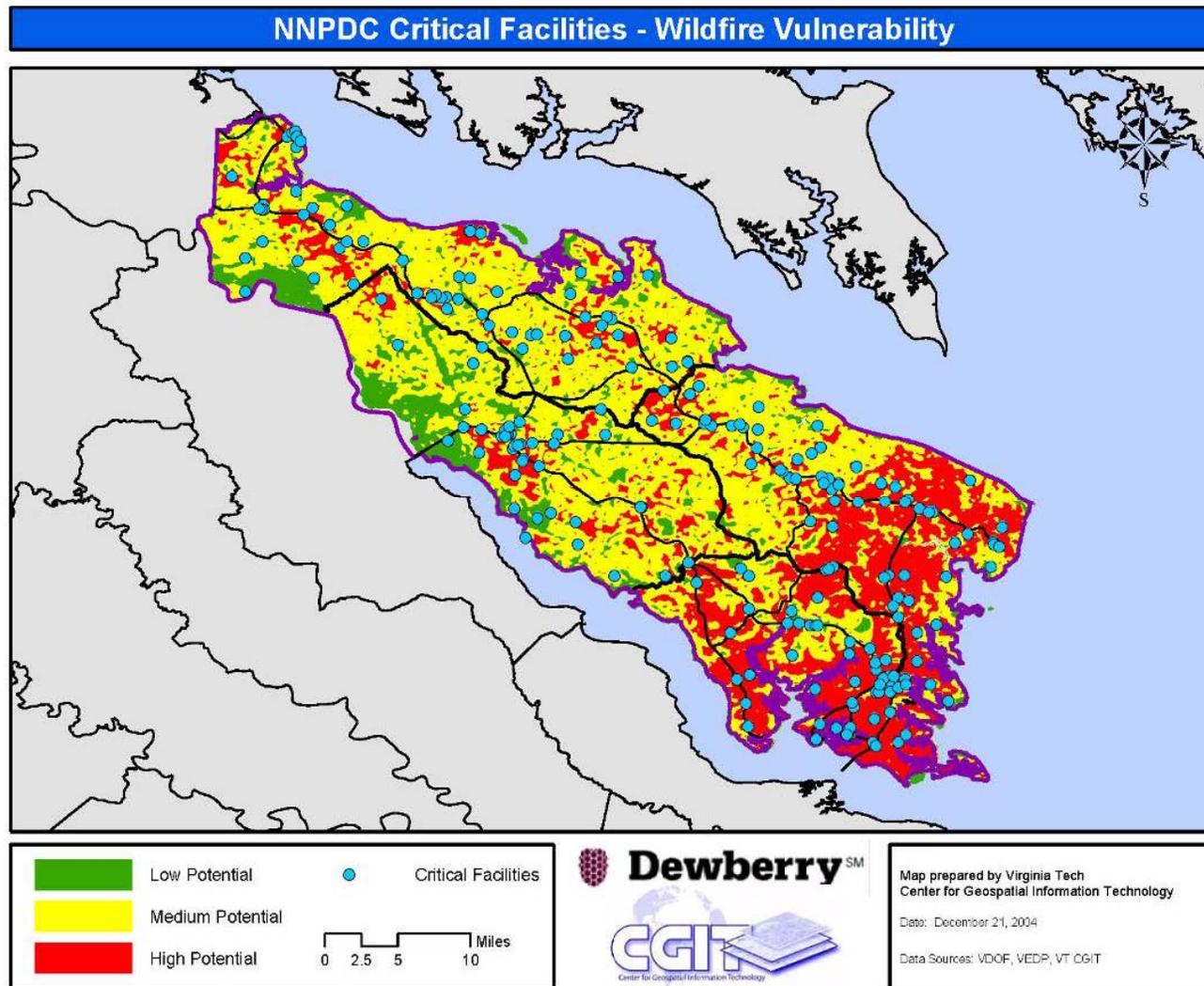


Figure V-39. Critical Facilities Wildfire Vulnerability

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Table V-39. Northern Neck Critical Facilities Wildfire Vulnerability

Number of Critical Facilities by Fire Rank

County	Low Potential	Medium Potential	High Potential	Grand Total	% in High Potential
Lancaster	2	13	40	55	73%
Northumberland	7	43	22	72	31%
Richmond	21	29	4	54	7%
Westmoreland	16	53	7	76	9%
Grand Total	46	138	73	257	28%

Table V-40. Community denoted problem spots - Lancaster County

Description	
	Senior Creek: fallen trees from hurricanes/Nor'easters provide wildfire potential
	Taylor Creek: fallen trees from hurricanes/Nor'easters provide wildfire potential
	Dungeons Thicket: fallen trees from hurricanes/Nor'easters provide wildfire potential

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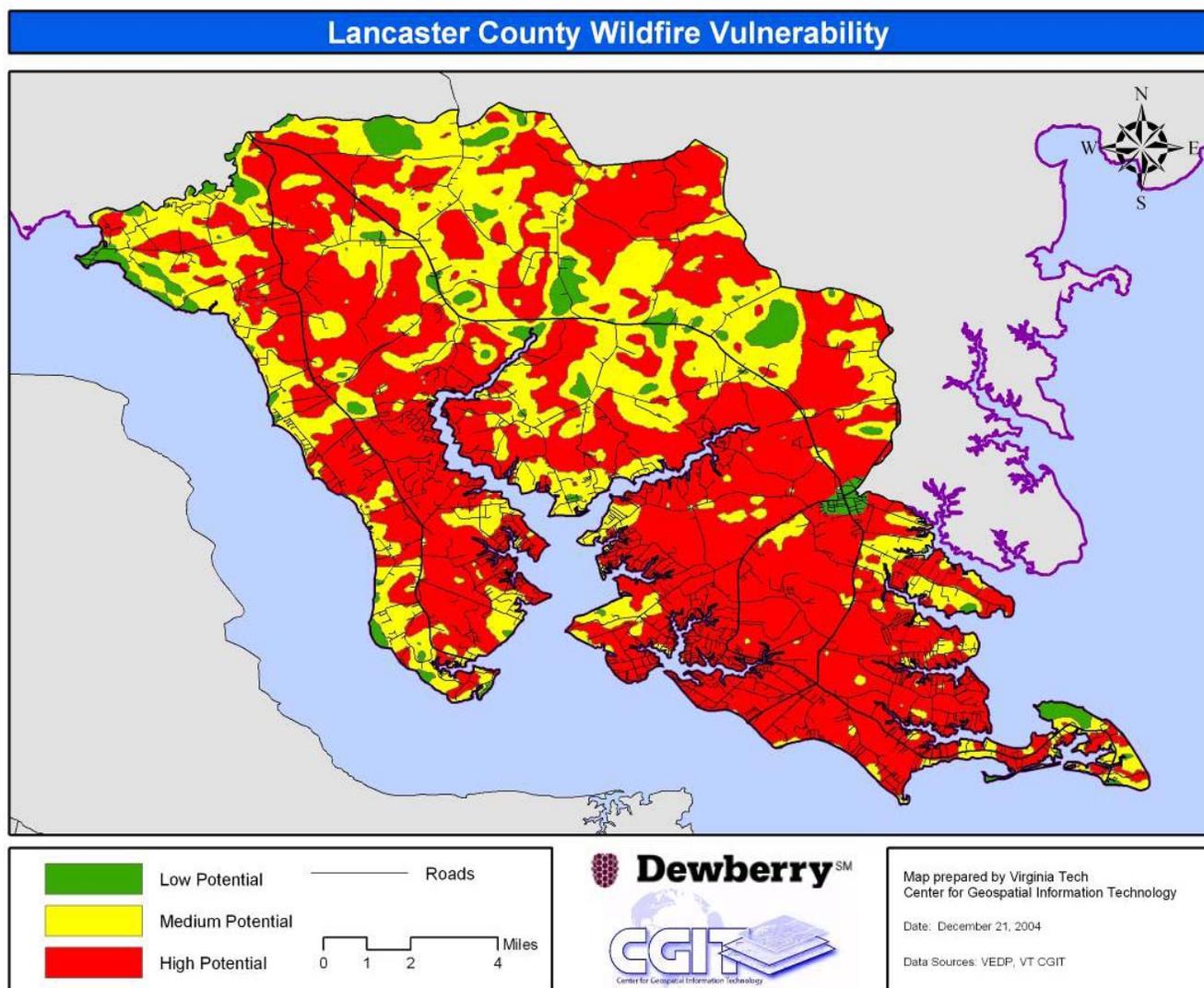


Figure V-40. Lancaster County Wildfire Vulnerability

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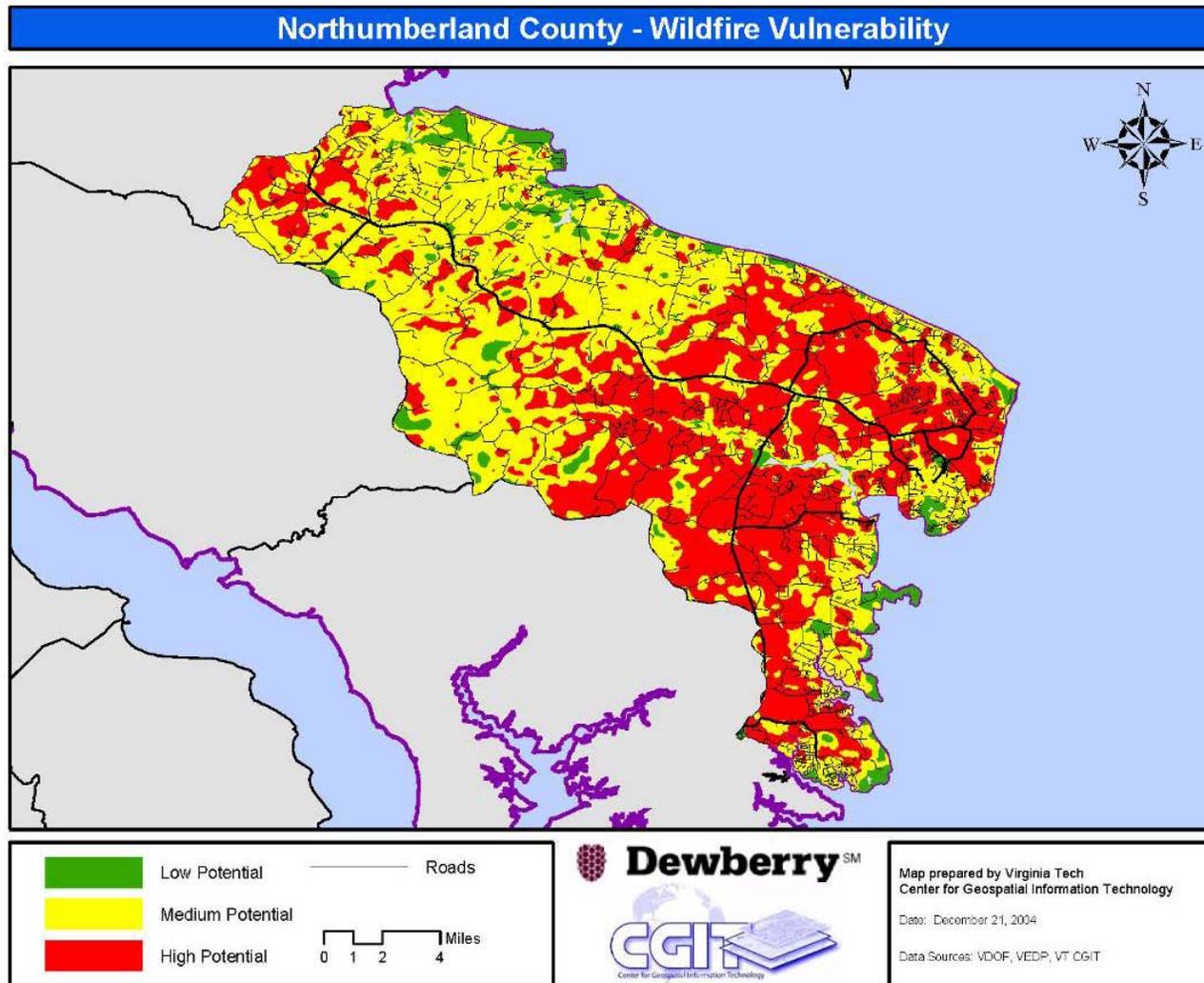


Figure V-41. Northumberland County Wildfire Vulnerability

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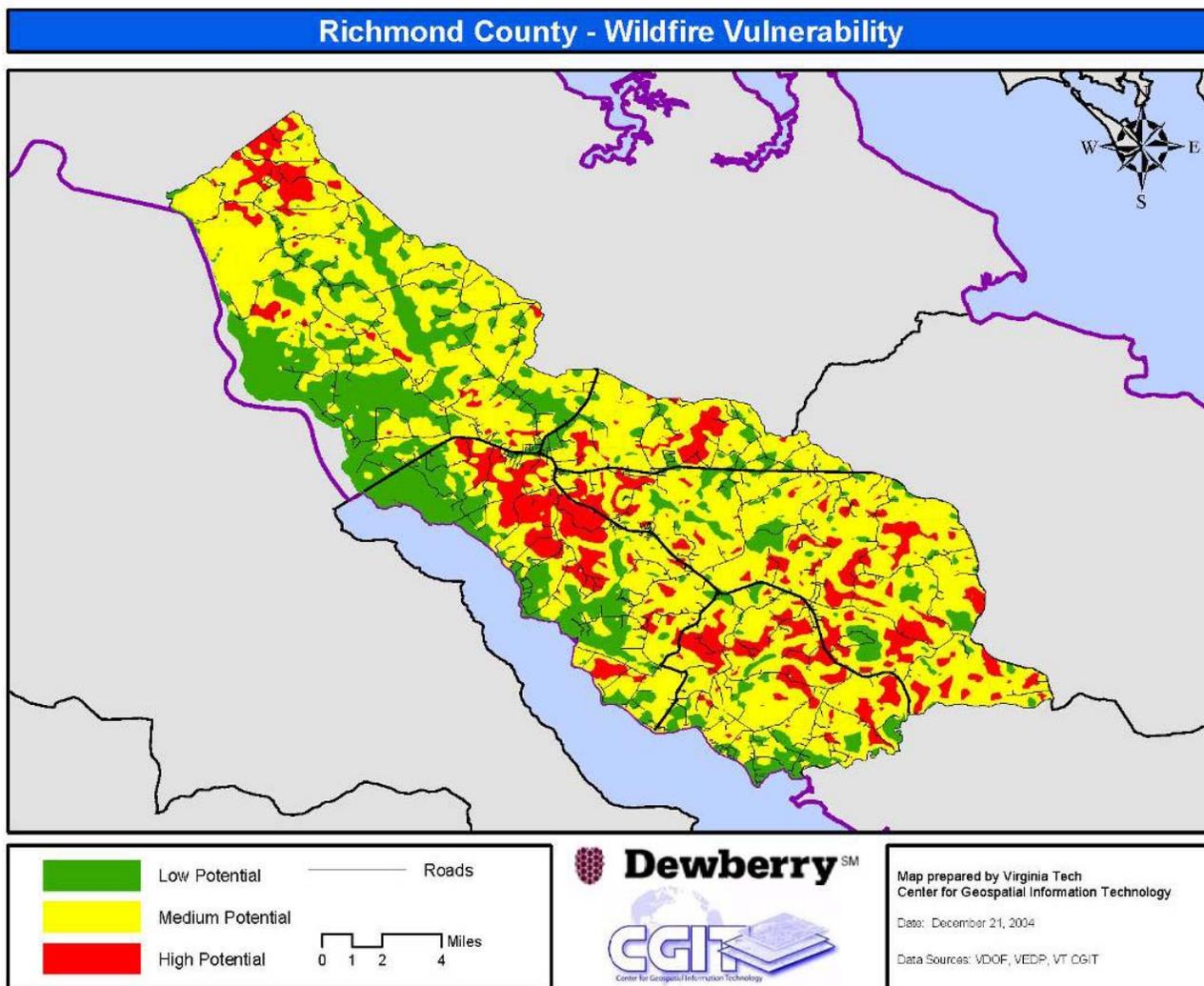


Figure V-42. Richmond County Wildfire Vulnerability

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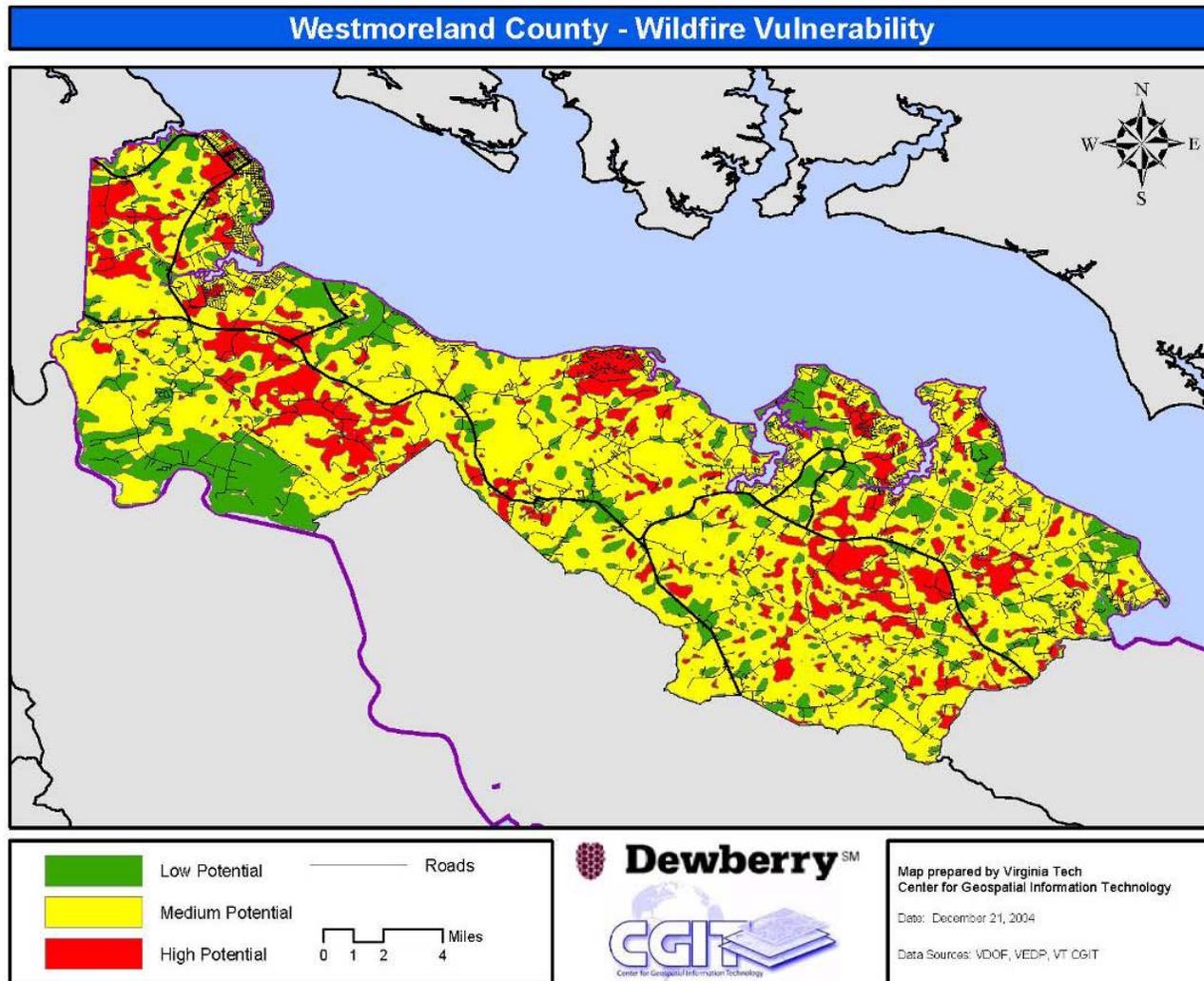


Figure V-43. Westmoreland County Wildfire Vulnerability

Section VI. Capability Assessment

Introduction

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 V of the plan. This assessment includes a comprehensive examination of the following local government capabilities:

- ❖ *Staff and Organizational Capability*
- ❖ *Technical Capability*
- ❖ *Fiscal Capability*
- ❖ *Policy and Program Capability*
- ❖ *Legal Authority*
- ❖ *Political Capability*

The purpose of conducting the capabilities assessment is to assess the ways and means that Northern Neck Regional Planning District's local governments, specifically Lancaster, Northumberland, Richmond and Westmoreland Counties, have available to implement successful mitigation programs. Through careful analysis, any 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 already in place or being completed at the local level that should continue to be supported and enhanced, if possible, through future mitigation efforts.

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for the Planning District to pursue under this Plan, but assures that those goals and objectives are realistically achievable under given local conditions.

Staff and Organizational Capability

As described previously, the planning area is comprised of four counties. The counties operate under a Board of Supervisors - County Administrator/Manager system. In this form of government, the elected Board of Supervisors hires a County Administrator who oversees daily operations of the county. In the Northern Neck, each of Board of Supervisors has five members.

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Annex GG of the Northern Neck Emergency Operations Plan designates seven departments with specific responsibilities for hazard mitigation:

- ❖ Board of Supervisors
- ❖ Office of Emergency Services (County Administrator)
- ❖ Department of Health
- ❖ Building / Planning / Zoning
- ❖ Law Enforcement
- ❖ Fire Department(s) and Rescue Squad(s)
- ❖ Superintendent of Schools

These departments exist in each of the counties and share similar responsibilities from county to county. Additionally, Lancaster County and Northumberland County have identified responsibilities for the General Services Department (Public Works) and the Reedville Sanitary District, respectively. The County Administrator and Building/Planning/Zoning in each county has primary responsibility for mitigation.

Representatives of these departments have been involved in the development of this mitigation plan in order to identify gaps, weaknesses or opportunities for enhancement in existing mitigation programs. While exact responsibilities differ from jurisdiction to jurisdiction, the general duties of the departments are described below.

The ultimate responsibility to the public for effective hazard mitigation rests with the elected officials, which in the Northern Neck are the County Boards of Supervisors. They must enact the codes, regulations, and ordinances, and provide the funds required to implement and enforce an effective mitigation program.

The Office of Emergency Services is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events. Specifically, the County Administrator, in his role as Coordinator of Emergency Services, has management responsibility for the hazard mitigation program and is tasked with administering an effective hazard mitigation program through the appropriate department or agency heads. He should work with the County's public information officer to promote public education about hazard mitigation.

The Fire Department and Rescue Squad provide medical aid and fire suppression at the scenes of accidents and emergencies. These departments often are responsible for responding to hazardous materials incidents. In the Northern Neck, most of the members of the Fire Department and Rescue Squad are volunteers.

The Department of Health enforces ordinances related to safe handling and the emergency distribution of water and food. In addition, the Department of Health is responsible for the prevention or spread of disease. The Northern Neck is served by

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the Three Rivers Health District. Ninety-six employees cover the ten county region of the Northern Neck and Middle Peninsula. An emergency planner and epidemiologist are on staff at the district.

The County Engineer, Planning, Zoning and Inspections departments have responsibility for administering and enforcing existing building codes and zoning ordinances. They also need to ensure that all repairs and rebuilding comply with county's building codes, zoning, and land-use regulations. In addition, these departments should make recommendations for codes or ordinances addressing hazard mitigation, where applicable.

The Building Inspections office or department enforces the Virginia Uniform Statewide Building Code (VUSBC). This code includes implications for floodplain management.

The Planning Department addresses land use planning. This department enforces the National Flood Insurance Program requirements and other applicable local codes. The Planning Department also has responsibility for advising the public of private actions that could mitigate individual loss.

The Public Works Department can be crucial to the success of a hazard mitigation plan. While the exact responsibilities vary from jurisdiction to jurisdiction, generally the Public Works Department oversees the maintenance of infrastructure including roadways, sewer and stormwater facilities, and the community's water treatment facilities. This department also may review new development plans, ensure compliance with Chesapeake Bay Protection and other environmental regulations, and work with VDOT on road issues.

Other departments may have responsibilities for programs that could complement hazard mitigation activities. For instance, the Parks and Recreation departments may be responsible for open space programs. If acquisition projects are undertaken, coordination with this department becomes critical.

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Table VI-1. Staffing Levels ^{xiii}					
Jurisdiction	Office of Emergency Services	Building/ Planning/ Zoning	Law Enforcement	Fire Department	Public Works
<i>Lancaster County</i>	2	4	24	125	12
<i>Northumberland County</i>	1	6	28	60 active 90 total	2
<i>Richmond County</i>	2	4	15	55	N/A
<i>Westmoreland County</i>	2	7	41	96 active 102 total	N/A
* Includes County Administrator					

Table VI-1 summarizes the number of staff in key departments. For the most part, it was determined that the departments are adequately staffed, trained and funded to accomplish their missions.

Technical Capability

Mitigation cuts across disciplines. For a successful mitigation program, it is necessary to have a broad range of people involved with diverse backgrounds. These people include planners, engineers, building inspectors, emergency managers, floodplain managers, people familiar with Geographic Information Systems (GIS), and grant writers.

GIS systems can best be described as a set of tools (hardware, software and people) used to collect, manage, analyze and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. GIS is invaluable in identifying areas vulnerable to hazards. Access to the Internet can facilitate plan development, public outreach, and project implementation.

Table VI-2 summarizes the technical capabilities of the jurisdictions. As can be seen in the table, none of the jurisdictions have dedicated grant writers on staff. As grants are a primary method for funding mitigation projects, the need for this expertise is great. The Northern Neck Planning District Commission could play a role in assisting

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the counties with grant writing. All of the counties have a designated emergency manager, though it is often the County Administrator, and a floodplain manager. Three of the four counties have GIS capabilities and all of the counties have websites and Internet access.

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Table VI-2. Technical Capability Matrix

Jurisdiction	Land Use Planners	Civil or Building Engineers	Emergency manager	Floodplain manager	Staff knowledgeable about hazards	GIS staff	Grant writers	Internet access?
<i>Lancaster County</i>	✓	✓	✓	✓	✓	✓		✓
<i>Northumberland County</i>	✓		✓ (County Administrator)	✓	✓	✓		✓
<i>Richmond County</i>	✓		✓ (County Administrator)	✓	✓	✓		✓
<i>Westmoreland County</i>	✓		✓ (County Administrator)	✓				✓

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Fiscal Capability

For Fiscal Year 2004, the budgets of the participating jurisdictions range from about \$14 million (Richmond County) to \$34 million (Westmoreland County). Table VI-3 shows the total budget amounts for each jurisdiction in addition to the amount budgeted for public safety, planning/zoning, and building inspections.

The counties receive most of their revenue through state and local sales tax, local services, and through restricted intergovernmental contributions (federal and state pass through dollars). It is unlikely that any of the counties could easily afford to provide the local match for the existing hazard mitigation grant programs. Considering the current budget deficits at both the state and local government levels in Virginia, combined with the apparent increased reliance on local accountability by the federal government, this is a significant and growing concern.

Under DMA 2000, FEMA has made special accommodations for "small and impoverished communities," that will be eligible for a 90% Federal share, 10% non-Federal cost share for projects funded through the Pre-Disaster Mitigation (PDM) grant program. The definition is restricted to "communities of 3,000 or fewer individuals that is identified by the State as a rural community." According to the current Interim Final Rule for Section 322 of the Act, none of the jurisdictions in the planning area will qualify as a small and impoverished community.

Table VI-3. Fiscal Capability Matrix					
Jurisdiction	Overall FY04-05 Budget	Planning and Zoning	Building Inspections	Public Safety (Fire & Rescue)	Hazard Mitigation
<i>Lancaster County</i>	\$23,842,653	\$146,706	\$50,037	\$491,195	\$0
<i>Northumberland County</i>	\$22,713,621	\$217,546	\$133,167	\$443,408	\$0
<i>Richmond County</i>	\$14,711,168	\$124,328	\$92,123	\$909,609	\$0
<i>Westmoreland County</i>	\$34,215,158	\$237,173	\$98,480	\$785,550	\$0

The variety of fiscal tools used by the jurisdictions in the planning areas is shown in Table VI-4. The ability to use these tools for hazard mitigation differs from jurisdiction to jurisdiction. As can be seen in the table, only Northumberland County

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has chosen to use development impact fees. Capital improvement plans (CIPs) and intergovernmental agreements are used by three of the four jurisdictions.

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Table VI-4. Financing Mechanisms by Jurisdiction

Jurisdiction	Development impact fees	CIP	CDBG	General obligation, revenue and/or special tax bonds	Special purpose taxes or taxing district	Gas/electric fees	Water/sewer fees	Stormwater utility fees	Intergov. agreements
<i>Lancaster County</i>		✓		✓					
<i>Northumberland County</i>	✓	✓				✓ (utility tax)	✓ (service area only)		✓
<i>Richmond County</i>				✓	✓				✓
<i>Westmoreland County</i>		✓	✓				✓ (service area only)		✓

Policy and Program Capability

Past Mitigation Efforts

Information on previous mitigation efforts in the Northern Neck is limited. A Community Development Block Grant (CDBG) was used in Westmoreland County to make stormwater improvements between 1994 and 1998. In Richmond County, several homeowners have self-financed elevations of their homes. Most recently, Northumberland County received HMGP funds to elevate homes after Hurricane Isabel. This project began in 2005.

The Tidewater Resource Conservation and Development District, in coordination with USDA and the Virginia Department of Forestry, has begun implementation of a FIREWISE program in the Northern Neck and Middle Peninsula regions. The project began in 2001 with a data collection and awareness phase. Areas of apparent risk, identified using GIS, are now being field verified. A workshop for local planners was held introducing them to wildfire mitigation principles and ways to incorporate them into the local planning process. Demonstration projects have been held in several small communities to illustrate and promote mitigation practices.

Floodplain Management

Communities that regulate development in floodplains are able participate in the National Flood Insurance Program (NFIP). In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. Table VI-5 shows when each of the jurisdictions began participating in NFIP. The table also provides the date of the Flood Insurance Rate Map (FIRM) in effect in each community. These maps were developed by FEMA or its predecessor and show the boundaries of the 100-year and 500-year floods. As the table shows, one map is about fifteen years old while the others have been developed in the past twelve years. Portions of the planning area have experienced development over the past decade that is not reflected in the FIRM. This difference may mean that the actual floodplain varies from that depicted on the map.

The statutes of the Commonwealth of Virginia provide cities and counties land use authority. In particular, issues such as floodwater control are empowered through §15.2-2223 and §15.2-2280. All of the jurisdictions in the planning area have adopted a local floodplain ordinance as a requirement of participation in the National Flood Insurance Program. Table VI-5 shows if the community has adopted a stand alone ordinance or if it has incorporated floodplain regulations into its zoning ordinance.

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Table VI-5. NFIP Entry and FIRM Date

Jurisdiction	Entry into NFIP	Date of Current FIRM	Stand alone or part of zoning ordinance?
<i>Lancaster County</i>	03/04/88	08/03/92	Zoning
<i>Northumberland County</i>	07/04/89	07/20/98	Stand alone
<i>Richmond County</i>	03/16/89	03/16/89	Stand alone
<i>Westmoreland County</i>	09/18/87	08/03/92	Stand alone

The Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. Residents of communities that participate in CRS receive a reduction in the flood insurance premium. There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction. None of the jurisdictions in this hazard mitigation plan are members of the CRS.

One of the CRS requirements is a community floodplain management plan. The Northern Neck hazard mitigation plan is intended to fulfill the CRS planning requirement should the planning jurisdictions decide to enter the CRS.

Comprehensive Plan

A community’s comprehensive plan provides the future vision for the community regarding growth and development. Although hazard mitigation planning is not addressed by name in the comprehensive plans of the Northern Neck jurisdictions, it is present. Many of the plans include land use or environmental protection goals that directly support future mitigation efforts. For example, many of the plans include provisions related to shoreline erosion. The plans typically call for the use of vegetative erosion control methods and a coordinated shoreline approach (versus a lot by lot approach). Many of the plans include policies that limit development in flood-prone areas.

The plans also indicate that communities in the planning area may be willing to use growth management tools such as zoning, cluster regulations, density credits, and conservation easements.

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Appendix B provides excerpts and greater detail on each jurisdiction's comprehensive plan.

Lancaster County

Hazard mitigation concepts are found throughout the Lancaster County Comprehensive Plan. The first goal derived from the land suitability study is "to encourage new and orderly development in areas of the County most suitable for growth." One of the means that the plan recommends to achieve this goal is through the development of a countywide, parcel-specific database highlighting physical constraints of each parcel. This database could be of use for hazard mitigation if floodplains and other natural hazards are included.

A chapter of the comprehensive plan is devoted to shoreline protection. The plan advocates for the use of vegetative methods as opposed to structural solutions such as rip-rap. 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 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 (that give flood control priority).

Northumberland County

The opening goal for the Northumberland County Comprehensive Plan is similar to Lancaster County:

"To provide a framework for managing future development of the County in a way that promotes opportunity for its citizens while directing growth to areas best able to accommodate growth."

The plan includes a section on flood-prone areas and delineates numerous goals and strategies aimed at protecting life and property from floods. These strategies include public education, performance standards, enforcement of existing ordinances, and utility siting criteria. The plan also calls for buildings intended for human occupancy to be elevated 8 feet above the base foot elevation.

As with Lancaster County, shoreline erosion is of concern for Northumberland. The plan includes numerous strategies designed to protect the shoreline. These include the 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.

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Richmond County

Like its neighboring counties, 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 can not 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 objective calls for major buildings to be protected from storm-caused coastal erosion. Recommendations include establishing setbacks in known erosion areas, the use of vegetation and 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.

Westmoreland County

Flood is a primary concern in the Westmoreland County General Plan. The plan suggests that appropriate development practices, land use controls and protection of vulnerable shoreline and drainage conditions should be improved to minimize the effects of flooding. The plan recommends a variety of studies to address shoreline erosion and stormwater drainage. The future land use plan also includes a conservation designation that incorporates areas in the floodplain and calls for limited to no development. The plan recommends that Westmoreland County pursue measures to reduce its class rating for the Community Rating System.

It is clear from the plan that the County is willing to use easements to protect land. While floodplains and other hazardous areas are not specifically mentioned, the use of easements and coordination with the Parks and Recreation Department may provide an opportunity to protect property and achieve open space goals. The plan also recommends the underground placement of utilities for new development.

Emergency Operations Plan

The Northern Neck Planning District Commission worked with the four counties of the Northern Neck to develop a regional Emergency Operations Plan. The plan consists of a basic concept of operations, seven hazard-specific annexes, ten region-wide functional annexes, and a multitude of county-specific functional annexes.

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The plan’s stated purpose is to provide “the legal and organizational basis for operations in Counties of the Northern Neck in response to any type of disaster or large-scale emergency situation.” The plan lays out a set of assumptions, which include a statement that primary hazards in the Northern Neck are severe weather events and numerous man-made hazards (e.g., hazardous material incidents).

The plan outlines roles and responsibilities for the various county departments and agencies, ranging from the County Administrator to the Department of Planning to the Department of Health, which would be involved in the case of an emergency.

The focus of the plan is on emergency response, but it does include a functional annex that addresses hazard mitigation specifically. The plan does not describe any specific mitigation needs or planned actions but rather outlines responsibilities for various organizations including the County Administrator/Coordinator of Emergency Services, County departments/agencies, volunteer organizations, private businesses and citizens.

The plan also states that mitigation measures should “include, but are not limited to, the development of zoning laws and land use ordinances, building codes, regulations, and licensing for handling and storage of hazardous materials, and the inspection and enforcement of such ordinances, codes, and regulations.”

The hazard-specific annexes also address hazard mitigation. For instance, the flood annex states that the Coordinator of Emergency Services will develop hazard mitigation plan for flood and will maintain a flood warning system.

Table VI-6. Availability of Plans and their Support for Hazard Mitigation

Jurisdiction	Comp. LU Plan	Econ. Dev. Plan	Emergency Operations Plan	StormH ₂ O Management Plan
<i>Lancaster County</i>	H		H	✓
<i>Northumberland County</i>	H	✓	H	
<i>Richmond County</i>	H	✓	H	
<i>Westmoreland County</i>	H	✓	H	

✓ = Ordinance exists, no assessment of relationship to hazard mitigation

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Table VI-6. Availability of Plans and their Support for Hazard Mitigation

Jurisdiction	Comp. LU Plan	Econ. Dev. Plan	Emergency Operations Plan	StormH ₂ O Management Plan
H = specifically includes hazard mitigation M = elements could be used to support hazard mitigation L = no mention of hazard mitigation and does not contain elements that would support hazard mitigation or includes elements that would hinder hazard mitigation				

Legal Authority

Local governments in Virginia have a wide range of tools available to them for implementing mitigation programs, policies and actions. A hazard mitigation program can utilize any or all of 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, as 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. Thus, this portion of the capabilities assessment will summarize Virginia’s enabling legislation which grants the four types of government powers listed above within the context of available hazard mitigation tools and techniques.

Regulation

General Police Power

Virginia’ 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.

All of the jurisdictions in the planning area have enacted and enforce regulatory ordinances designed to promote the public health, safety, and general welfare of its

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citizenry. Appendix B provides excerpts and greater detail on each jurisdiction's relevant ordinances including zoning and floodplain management ordinances.

Land Use

Regulatory powers granted by the state to local governments are the most basic manner in which 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.

Planning

According to State Statutes, local governments in Virginia may create or designate a planning agency. The planning agency may perform a number of 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; and
- ❖ Perform other related duties.

The importance of the planning powers of local governments is illustrated by the requirement that zoning regulations be made in accordance with a comprehensive plan. While the ordinance itself may provide evidence that zoning is being conducted “in accordance with a plan,” the existence of a separate planning document ensures that the government is developing regulations and ordinances that are consistent with the overall goals of the community. All of the jurisdictions within the study area have planning departments and comprehensive plans.

Zoning

Zoning is the traditional and most common tool available to local governments to control the use of land. Broad enabling authority is granted for municipalities and counties in Virginia to engage in zoning. Land “uses” controlled by zoning include the type of use (e.g., residential, commercial, and industrial) as well as minimum specifications that control height and bulk such as lot size, building height and set

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backs, and density of population. Local governments are authorized to divide their territorial jurisdiction into districts, and to regulate and restrict the erection, construction, reconstruction, alteration, repair or use of buildings, structures, or land within those districts. Districts may include general use districts, overlay districts, and special use or conditional use districts. Zoning ordinances consist of maps and written text.

Only Lancaster County has chosen to implement floodplain regulations via the zoning ordinance. An overlay district is used to impose additional requirements on properties within the designated floodplain area.

Subdivision Regulations

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls typically require that sub-dividers install adequate drainage facilities and design water and sewer systems to minimize flood damage and contamination. They also may prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures, and they prohibit filling of floodway areas.

All of the jurisdictions in the study area have adopted a subdivision ordinance. Some of the ordinances contain floodplain-specific provisions. For instance, Lancaster, Richmond, and Westmoreland Counties require that sufficient buildable land exist for each lot to ensure that the site is free of flood danger.

Floodplain Regulation

All of the communities in the study area have adopted floodplain regulations. As noted previously, only Lancaster County has done so through zoning. However, Northumberland County's comprehensive plan suggests that the county consider including floodplains in the zoning ordinance.

Three of the four counties set design criteria for utilities and other public infrastructure. Three of the four counties also set design criteria for buildings in the coastal floodplain. None of the communities prohibit manufactured homes in the floodplain but two require them to be elevated and anchored.

Chesapeake Bay Protection Regulations

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

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other adverse impacts to the water quality of the Bay. All of the jurisdictions in the study area are considered part of the Tidewater area and therefore are required to have a local Bay Act program.

A local Bay Act program has two phases: Phase I program elements include the designation of local Chesapeake Bay Preservation Areas (including Resource Protection Areas and Resource Management Areas that often include floodplains) and adoption of local ordinances that include the required performance criteria. Phase II requires local governments to adopt a comprehensive plan or plan element that addresses the protection of water quality through the discussion of a number of policy areas. Table VI-7 summarizes the status of the communities in the two phases of the local program.

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Table VI-7. Chesapeake Bay Act Element Status*^{xiv}

Jurisdiction	Phase I	Phase II
<i>Lancaster County</i>	Inconsistent, with 10 conditions, 3/22/2004, deadline: 5/15/2004	Consistent, 6/18/2001
<i>Northumberland County</i>	Consistent, with 5 conditions 6/21/2004, deadline: 12/31/2004	Consistent, 6/16/1997
<i>Richmond County</i>	Consistent, 3/22/2004	Consistent, 6/18/2001
<i>Westmoreland County</i>	Inconsistent, with 4 conditions 6/21/2004, deadline:9/30/2004	Consistent w/ conditions, 3/19/2001

Other Regulations

Lancaster County has enacted a dune protection ordinance that authorizes specific uses and requires use and alteration permits.

Building Codes and Building Inspection

Many structural mitigation measures involve constructing and retrofitting homes, businesses and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through building codes.

All of the jurisdictions have adopted the Uniform Virginia Building Code. While municipalities and counties may adopt codes for their respective areas if approved by the state as providing “adequate minimum standards,” none of the participating jurisdictions have chosen to do so.

Local governments in Virginia also are empowered to carry out building inspections. The state empowers cities and counties to create an inspection department, and enumerates their duties and responsibilities, which include enforcing state and local laws relating to the construction of buildings; installation of plumbing, electrical, and heating systems; building maintenance; and other matters. Each of the jurisdictions in the planning area have appointed a specific individual or established an office to carry

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out building inspections. Westmoreland County has adopted a minimal building maintenance ordinance. Enforcement is focused on vacant unoccupied buildings.

Table VI-8 summarizes the various ordinances that are in effect in the jurisdictions in the study area. Where known, the adoption date is noted.

Table VI-8. Availability of Ordinances and their Support for Hazard Mitigation

Jurisdiction	Building Code	Floodplain Management Ordinance	Historic Preservation Ordinance	Subdivision Ordinance	Unified Development Ordinance	Zoning Ordinance
<i>Lancaster County</i>	✓	✓	✓	✓	✓	✓ -
<i>Northumberland County</i>	✓	✓	✓	✓		✓
<i>Richmond County</i>	✓	✓		✓		✓ - 1995
<i>Westmoreland County</i>	✓	✓ - 1987		✓ - 1968		✓ - 1971

Acquisition

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find the most effective method for completely “hazardproofing” a particular piece of property or area is to acquire the property (either in fee simple or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. Virginia legislation empowers cities, towns, and counties to acquire property for public purpose by gift, grant, devise, bequest, exchange, purchase, lease or eminent domain.

Acquisition has not been used by any of the communities in the study area though it has been used successfully in other parts of Virginia.

Taxation

The power to levy taxes and special assessments is an important tool delegated to local governments by Virginia law. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development

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in the community. Communities have the power to set preferential tax rates for areas which are more suitable for development in order 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.

Because the usual methods of apportionment seem mechanical and arbitrary, and because the tax burden on a particular piece of property is often quite large, the major constraint in using special assessments is political. Special assessments seem to offer little in terms of control over land use in developing areas. They can, however, be used to finance the provision of necessary services within municipal or county boundaries. In addition, they are useful in distributing to the new property owners the costs of the infrastructure required by new development.

Localities in Virginia collect a 1% sales tax. In addition, all of the counties in the planning area levy property taxes.

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 should be made a routine part of all spending decisions made by the local government, including the adoption of annual budgets and the Capital Improvement Plan (CIP).

A CIP is a schedule for the provision of municipal or county services over a specified period of time. Capital programming, by itself, can be used as a growth management technique, with a view to hazard mitigation. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control growth to some extent, especially in areas where the provision of on-site sewage disposal and water supply are unusually expensive.

In addition to formulating a timetable for the provision of services, a local community can regulate the extension of and access to services. A CIP that is coordinated with extension and access policies can provide a significant degree of control over the location and timing of growth. These tools also can influence the cost of growth. If the CIP is effective in directing growth away from environmentally sensitive or high hazard areas, for example, it can reduce environmental costs.

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The majority of counties in the planning area have a capital improvements program. The construction or renovation of capital facilities, such as schools, municipal offices, and police/fire stations is often a highlight of capital improvements programs. Investments in stormwater and sewer systems also may be included in a capital improvements program.

Political Capability

Residents in the planning area are knowledgeable about the potential hazards that their community faces. Mitigation remains a somewhat unknown practice. However, the North Neck's recent experiences with natural disasters have created an opportunity to educate and engage people in mitigation. It is believed that the current and future political climates are favorable for supporting and advancing future hazard mitigation strategies. Political willpower to implement hazard mitigation programs should be strong.

In general, several obstacles can make hazard mitigation difficult to implement at the local level. Desirable areas for development, such as waterfront properties, are often also hazardous places to build. Local government must balance the economic benefits and demand for building in such places with the public and private costs that future disasters could inflict. In addition, in areas that are already developed, implementing mitigation actions can be costly. Part of this hazard mitigation plan will be to weigh the costs and benefits of such retrofitting projects to ensure that only those that are cost-effective will be chosen.

Hazard mitigation also may not be judged as high a community priority as other projects such as school building or utility improvement. This makes it particularly important to demonstrate how hazard mitigation should be integrated into all community decision-making as opposed to a stand-alone issue. Given the Northern Neck's relationship to the Chesapeake Bay watershed, every opportunity should be made to link hazard mitigation and environmental protection goals and projects in order to maximize the use of resources.

Summary

The counties of the Northern Neck participated in the Local Capability Assessment for Readiness (LCAR) study conducted by the Department of Homeland Security in 2004. The counties provided a self-assessment of their emergency management program. Three areas were relevant to this plan: Hazard Identification and Risk Assessment, Hazard Mitigation, and Planning. The first two areas were assessed on two criteria, while Planning was assessed on thirty-two criteria. Table VI-9 provides

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the results of that study. Generally, the counties believe themselves to be capable in the areas of hazard mitigation and hazard identification. The scores for planning are slightly lower; the planning criteria encompass continuity of operations and response plans as well as mitigation plans.

Table VI-9. Summary of Local Capability Assessment Report (DHS)

Jurisdiction	Hazard Identification and Risk Assessment	Hazard Mitigation	Planning
<i>Lancaster County</i>	2	2	2.84
<i>Northumberland County</i>	3	3	2
<i>Richmond County</i>	3.5	4	3.71
<i>Westmoreland County</i>	3	3	2.9
5 = Fully capable 4 = Very capable 3 = Generally capable		2 = Marginally capable 1 = Not capable	

Each county was assessed on six areas of capability based on the information provided in this capability assessment. Table VI-10 summarizes the capability assessment. Overall, the counties of the Northern Neck are in a strong position to implement viable mitigation programs and projects. Like many other small jurisdictions, funding and staff capacity to implement additional programs will be a challenge but the challenge is one that all of the counties have the ability to meet.

Table VI-10. Capability Assessment Summary

Jurisdiction	Staff and Organizational Capability	Technical Capability	Policy and Program Capability	Legal Authority	Fiscal Capability	Political Capability	Overall Capability
<i>Lancaster County</i>	Moderate	Moderate	High	High	Low	Moderate	Moderate
<i>Northumberland County</i>	Moderate	Moderate	High	High	Moderate	Moderate	Moderate
<i>Richmond County</i>	Moderate	Moderate	High	High	Low	Moderate	Moderate
<i>Westmoreland County</i>	Moderate	Moderate	High	High	Moderate	Moderate	Moderate

SECTION VII. MITIGATION STRATEGY

This section of the Hazard Mitigation Plan describes the most challenging part of any such planning effort – the development of a Mitigation Strategy. It is a process of:

1. Setting mitigation goals,
2. Considering mitigation alternatives,
3. Identifying objectives and strategies, and
4. Developing a mitigation action plan.

Setting Mitigation Goals

The hazard mitigation planning process conducted by the Mitigation Advisory Committee is a typical problem-solving methodology:

1. Describe the problem (Hazard Identification),
2. Estimate the impacts the problem could cause (Vulnerability Assessment),
3. Assess what safeguards exist that might already or could potentially lessen those impacts (Capability Assessment), and
4. Using this information, determine what, if anything, can be done, and select those actions that are appropriate for the community in question (Develop an Action Plan).

When a community decides that certain risks are unacceptable and that certain mitigation actions may be achievable, the development of *goals* and *objectives* takes place. Goals and objectives help to describe what actions should occur, using increasingly narrow descriptors. Initially, long-term and general statements, known as *goals*, are developed. Goals then are accomplished by meeting *objectives*, which are specific and achievable in a finite time period. In most cases there is a third level, called *strategies*, which are detailed and specific methods of meeting the objectives. When developing the goals and objectives for this plan, the Mitigation Advisory Committee was provided with the following model as an example of this relationship.

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GOAL <i>Improve Northern Neck Communities Capabilities To Address Hazard Risks and Vulnerabilities</i>		
Objectives		
Provide Detailed HIRA Data to Communities	Enforce Existing Ordinances	Institutionalize Hazard Mitigation
Actions		
<ul style="list-style-type: none"> Gather information regarding critical facilities Update floodplain maps and ensure availability in digital format 	<ul style="list-style-type: none"> Identify and train floodplain manager Provide funding for additional building inspectors Ensure existing inspectors receive professional certification 	<ul style="list-style-type: none"> Dedicate funding for hazard mitigation projects and programs Include hazard mitigation criteria for public facility siting decisions

The Mitigation Advisory Committee discussed goals and objectives for this plan at two points in the planning process. First, the Mitigation Advisory Committee attended a workshop on January 23, 2005, to discuss the results of the hazard identification and risk assessments. Goal statements were developed based on the findings of the Hazard Identification and Risk Assessment and the capability assessment. These goals were broad and applicable to the region. Objectives were developed to further define and narrow the goals.

Strategies were developed as a logical extension of the plan’s objectives. Most of these actions are dynamic and can change. These actions have been organized into a Mitigation Action Plan for the Planning District and its member jurisdictions.

Data collection supports the goals, objectives and recommended actions in two ways. First, the Hazard Identification/Vulnerability Assessment data identifies the areas exposed to hazards, at-risk critical facilities, and future development at risk. Second, the Capability Assessment data identifies areas for integration of hazard mitigation into existing polices and plans.

Representatives from the counties of Lancaster, Northumberland, Richmond, and Westmoreland Counties and the towns of Colonial Beach, Irvington, Kilmarnock, and Montross, Warsaw and White Stone used the results of the data collection efforts to develop goals and prioritize actions for the region and their jurisdiction. The priorities differ somewhat from jurisdiction to jurisdiction. Each jurisdiction’s priorities were

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developed based on past damages, existing exposure to risk, other community goals, and weaknesses identified by the local government capability assessments.

The goals and their associated objectives form the basis for the development of mitigation strategies and individual Action Plans for each jurisdiction and the region.

- ❖ **Goal 1: Promote new development that acknowledges the risks posed by natural hazards and is resilient to natural disasters.**
- ❖ **Goal 2: Address risks that threaten existing development.**
- ❖ **Goal 3: Ensure that the appropriate infrastructure is in place and maintained to ensure continued functionality of all critical services necessary to protect the residents of the Northern Neck.**
- ❖ **Goal 4: Enhance the capabilities of local government to address natural hazards and potentially limit their impacts.**
- ❖ **Goal 5: Increase the awareness of our citizens regarding the natural hazards present in the Northern Neck. Educate them about how to prepare for and mitigate against these hazards.**

Considering Mitigation Alternatives

During the presentation of findings meeting, the Mitigation Advisory Committee reviewed and commented on the draft Plan's HIRA. Discussions held during the meeting resulted in the generation of a range of potential mitigation goals and actions to address the hazards. A range of alternatives were then identified and provided to the Mitigation Advisory Committee for consideration. These alternatives are presented in Appendix C.

The Mitigation Advisory Committee also was provided with a copy of *Tools and Techniques: An Encyclopedia of Strategies to Mitigate the Impacts of Natural Hazards* to use as a resource to identify potential mitigation actions.

Prioritizing Alternatives

The Mitigation Advisory Committee used the STAPLE/E Criteria (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) to select and prioritize the most appropriate mitigation alternatives for the Planning District communities. This methodology requires that social, technical, administrative, political, legal, economic, and environmental considerations be taken into account when reviewing potential actions for the area's jurisdictions to undertake. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on a jurisdiction's capabilities.

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Table VII-1, below, provides information regarding the review and selection criteria for alternatives.

Table VII-1. STAPLE/E Review And Selection Criteria For Alternatives
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 in light of 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 taken into account? • 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

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Table VII-1. STAPLE/E Review And Selection Criteria For Alternatives

development? • What benefits will the action provide?
Environmental
• 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?

Ranking was completed in order of relative priority based on the STAPLE/E criteria, as well as the strategy's potential to reduce vulnerability to natural hazards. Regional actions were ranked by the Mitigation Advisory Committee during their March 28, 2005, meeting. The committee used a multi-voting system to prioritize the regional actions. Each member present received six votes to distribute between the proposed actions.

Identifying Objectives and Strategies

Goals, Objectives, and Strategies

Through a series of local government workshops and public meetings, the following goals, objectives, and strategies for the Planning District were accepted by the Mitigation Advisory Committee. The goals, objectives, and strategies form the basis for the development of a Mitigation Action Plan and specific mitigation projects to be considered for the Planning District. The process consisted of 1) setting goals, 2) considering mitigation alternatives, 3) identifying objectives and strategies, and 4) developing an action plan results in a mitigation strategy.

Objectives have been developed for each goal. The objectives state more specific outcomes that the jurisdictions of the Northern Neck region expect to accomplish over the next five years. The objectives provide an overall sense of what exactly is desired. The strategies outline the specific steps necessary to achieve that end. Strategies that help to meet multiple goals are noted.

❖ Goal 1: Promote new development that acknowledges the risks posed by natural hazards and is resilient to natural disasters.

- Objective 1.1: Establish standards or other regulations preventing development in certain types of hazard-prone areas.
 - o Strategy 1.1.1: 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.

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- Strategy 1.1.2: Establish special setback regulations where shoreline erosion has been documented, and due to periodic storms, represents a future threat to life and property.
- Strategy 1.1.3: Establish standards for construction which modify the shoreline, such as: bulkheads, piers, and boat houses.
- Objective 1.2: Promote hazard mitigation principles as part of new development and construction.
 - Strategy 1.2.1: Incorporate hazard mitigation techniques into new community facilities to minimize damages. (also Goal #3)
 - Strategy 1.2.2: Provide incentives for property owners to implement mitigation measures. (also Goals #2 & #5)
 - Strategy 1.2.3: Encourage use of vegetation and revetments to reduce shoreline erosion. (also Goal #2)
 - Strategy 1.2.4: Require coordinated shoreline protection plans in new waterfront subdivisions.
- Objective 1.3: Acquire property located in hazard-prone areas.
 - Strategy 1.3.1: 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.
 - Strategy 1.3.2: Consider implementing a wetlands acquisition and/or restoration program.
- ❖ **Goal 2: Address risks that threaten existing development.**
 - Objective 2.1: Use existing regulations to implement hazard mitigation.
 - Strategy 2.1.1: Increase enforcement and education regarding the tie down of propane and other fuel tanks. (also Goal #1)
 - Objective 2.2: Encourage retrofits of existing development.
 - Strategy 2.2.1: Identify existing flood-prone structures that may benefit from mitigation measures such as elevation.
 - Strategy 2.2.2: Investigate all manufactured homes and trailers to evaluate their resistance to wind and flood hazards.

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- Strategy 2.2.3: Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.
- Objective 2.3: Utilize acquisition or relocation programs to permanently protect properties from flood.
 - Strategy 2.3.1: Evaluate built-upon areas within the floodplain or along the high erosion risk shoreline for possible relocation and/or buy-out. In particular, target FEMA's Repetitive Loss Properties throughout the Northern Neck for possible relocation and/or buy-out.
- ❖ **Goal 3: Ensure that appropriate infrastructure is in place and maintained to ensure continued functionality of all critical services necessary to protect the residents of the Northern Neck.**
 - Objective 3.1: Evaluate existing infrastructure to determine its vulnerability to natural hazards.
 - Strategy 3.1.1: 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).
 - Strategy 3.1.2: Evaluate existing stormwater system to determine if it is adequate for existing (or future) flood hazards.
 - Objective 3.2: Ensure continued functionality of government buildings and critical facilities after a disaster.
 - Strategy 3.2.1: Identify need for backup generators, communications and/or vehicles at critical public facilities. Develop means to address shortfall identified. (also #4)
 - Strategy 3.2.2: Consider providing necessary electrical hook-up, wiring, and switches to allow readily accessible connections to emergency generators at selected critical public facilities.
 - Objective 3.3: Upgrade the existing infrastructure to address hazard-prone areas.

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- Strategy 3.3.1: Identify funding opportunities to replace vulnerable or undersized culvert stream crossings with bridges or larger culverts to reduce flood hazards.
- Strategy 3.3.2: Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign).
- Strategy 3.3.3: Develop and implement a ditch maintenance program consisting of routine inspections and subsequent debris removal.
- Strategy 3.3.4: Initiate discussions with private utility companies to incorporate mitigation measures into new and pre-existing development and any infrastructure repairs.
- Strategy 3.3.5: 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 weather-proof.
- Strategy 3.3.6: Identify program of corrective actions to improve stormwater systems capacity to handle major rain events.
- Strategy 3.3.7: Work with private property owners, VDOT, and private utilities to trim or remove trees that could down power lines.
- Objective 3.4: Minimize the disruption to critical systems after a natural hazard event.
 - Strategy 3.4.1: Initiate road clearing efforts early in wind and winter storms. Develop plan for quick deployment of road clearing equipment.
- ❖ **Goal 4: Enhance the capabilities of local government to address natural hazards and potentially limit their impacts.**
 - Objective 4.1: Institutionalize mitigation as part of local decision-making.
 - Strategy 4.1.1: Officially recognize the dual purpose of the Local Emergency Planning Committee as the Mitigation Advisory Committee. Use the Committee to review mitigation projects and coordinate multi-jurisdictional grant applications.
 - Strategy 4.1.2: Develop recommendations for short-term and long-term revenue sources for mitigation, planning, and projects. These options could include grants and private sources.
 - Strategy 4.1.3: Incorporate mitigation principles into local comprehensive, emergency management, and recovery plans.

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- Strategy 4.1.4: Develop a Continuity of Operations plan.
- Objective 4.2: Develop staff capacity to implement hazard mitigation policies and programs.
 - Strategy 4.2.1: Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.
 - Strategy 4.2.2: Identify training opportunities for staff to enhance ability to use GIS for emergency management needs.
 - Strategy 4.2.3: Evaluate the floodplain manager's roles and responsibilities in each local jurisdiction.
- Objective 4.3: Enhance the data needed to identify and implement hazard mitigation policies and projects.
 - Strategy 4.3.1: Develop a detailed building inventory for all structures in the jurisdiction, in a GIS-based format, which catalogues information such as value of the structure, contents, age, location (latitude and longitude), etc.
 - Strategy 4.3.2: 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.
- Objective 4.4: Participate in state and federal programs that recognize community mitigation efforts.
 - Strategy 4.4.1: Consider participating in FEMA's Community Rating System (CRS).
 - Strategy 4.4.2: Consider participating in the *StormReady* program sponsored by the National Weather Service.
- Objective 4.5: Use regulatory means to implement hazard mitigation principles.
 - Strategy 4.5.1: Continue to enforce zoning and building codes to prevent construction within the floodplain.
 - Strategy 4.5.2: Review and revise, if required, existing Subdivision Ordinances to include hazard mitigation-related development criteria in

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order to regulate the location and construction of buildings and other infrastructure in known hazard areas.

- Strategy 4.5.3: Review and revise, if required, local floodplain ordinances. Work with the state to coordinate a Community Assistance Visit to identify potential improvements or enhancements to existing floodplain management program.
 - Strategy 4.5.4: Evaluate the potential costs versus benefits of implementing a freeboard requirement for all new structures in the 100-year floodplain.
 - Strategy 4.5.5: Develop a new Zoning Ordinance or revise the existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.
 - Strategy 4.5.6: 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.
 - Strategy 4.5.7: Investigate using non-conforming or substantial damage provisions to require hazard retrofitting of existing development.
 - Strategy 4.5.8: Investigate implementation of cumulative damage provision as part of floodplain ordinance.
- ❖ **Goal 5: Increase the awareness of our citizens regarding the natural hazards present in the Northern Neck. Educate them about how to prepare for and mitigate against these hazards.**
- Objective 5.1: Conduct public outreach and education activities.
 - Strategy 5.1.1: Work with local media outlets to increase awareness of natural hazards. Implement seasonal hazard awareness weeks or days (e.g., hurricane preparedness week, winter weather awareness day).
 - Strategy 5.1.2: Partner with Parent Teacher Associations and local schools to implement existing curriculum related to natural hazards (e.g., Masters of Disaster, Risk Watch).
 - Strategy 5.1.3: Distribute packets to new residents to raise awareness regarding hazard risks in the Northern Neck.
 - Strategy 5.1.4: Publicize the location of local shelters and emergency phone numbers. Include a map of shelters in local phonebooks or on county/city websites.

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- Strategy 5.1.5: Develop vegetative planting programs for public shoreline property to serve as a model for public education purposes. (also Goal #3 & Goal #5)
- Objective 5.2: Conduct focused outreach related to flooding.
 - Strategy 5.2.1: Encourage the purchase of flood and/or sewer back-up insurance.
 - Strategy 5.2.2: Educate residents about flood insurance and ICC (Increased Cost of Compliance) coverage.
 - Strategy 5.2.3: 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.
 - Strategy 5.2.4: Work with the National Weather Service to promote the “Turn Around, Don’t Drown” public education campaign.
- Objective 5.3: Increase public warning capabilities and access to these warnings.
 - Strategy 5.3.1: Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities. (also #4).
 - Strategy 5.3.2: Investigate, develop or enhance a regional public notification system such as low-power FM or AM radio.
 - Strategy 5.3.3: Increase flood warning capabilities, including the identification of alternative safe routes.
 - Strategy 5.3.4: 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.

Developing a Mitigation Action Plan

Mitigation Actions

In formulating a mitigation strategy, a wide range of activities were considered to help achieve the goals, and to lessen the vulnerability of the Northern Neck Regional Planning District area to the impacts of natural hazards. The Mitigation Action Plan is comprised of proactive mitigation actions designed to reduce or eliminate future losses from natural hazards in the participating jurisdictions.

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Mitigation Strategies by County

Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Strategy 1.1.1. 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.			✓	
Strategy 1.1.2. Establish special setback regulations where shoreline erosion has been documented, and due to periodic storms, represents a future threat to life and property.			✓*	
Strategy 1.1.3. Establish standards for construction which modify the shoreline, such as: bulkheads, piers, and boat houses.		✓*	✓*	
Strategy 1.2.1. Incorporate hazard mitigation techniques into new community facilities to minimize damages.	✓	✓	✓*	✓*
Strategy 1.2.2. Provide incentives for property owners to implement mitigation measures.		✓*		

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Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Strategy 1.2.3. Encourage use of vegetation and revetments to reduce shoreline erosion.	✓*	✓*	✓*	
Strategy 1.2.4. Require coordinated shoreline protection plans in new waterfront subdivisions.	✓*		✓	
Strategy 1.3.1. 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.	✓*	✓	✓	✓
Strategy 1.3.2. Consider implementing a wetlands acquisition and/or restoration program.		✓	✓*	
Strategy 2.1.1. Increase enforcement and education regarding the tie down of propane and other fuel tanks.		✓	✓	

Northern Neck Regional Hazard Mitigation Plan

Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Strategy 2.2.1. Identify existing flood-prone structures that may benefit from mitigation measures such as elevation.	✓*	✓*		✓
Strategy 2.2.2. Investigate all manufactured homes and trailers to evaluate their resistance to wind and flood hazards.		✓		
Strategy 2.2.3. Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.	✓*	✓	✓*	
Strategy 2.3.1. Evaluate built-upon areas within the floodplain or along the high erosion risk shoreline for possible relocation and/or buy-out. In particular, target FEMA's Repetitive Loss Properties throughout the Northern Neck for possible relocation and/or buy-out.				✓
Strategy 3.1.1. Investigate all critical community facilities, such as county		✓		

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Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland 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 system and structural integrity of the buildings. Prioritize facilities in known hazard areas (e.g., floodplains).				
Strategy 3.3.1. Identify funding opportunities to replace vulnerable or undersized culvert stream crossings with bridges or larger culverts to reduce flood hazards.	✓			✓
Strategy 3.3.2. Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign).	✓	✓	✓	✓
Strategy 3.3.3. Develop and implement a ditch maintenance program consisting of routine inspections and subsequent debris removal.		✓		

Northern Neck Regional Hazard Mitigation Plan

Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Strategy 3.3.4. Initiate discussions with private utility companies to discuss incorporating mitigation measures into new and pre-existing development and repairs for infrastructure.			✓	✓(?)
Strategy 3.3.7. Work with private property owners, VDOT, and private utilities to trim or remove trees that could down power lines.	✓*			
Strategy 4.2.2. Identify training opportunities for staff to enhance ability to use GIS for emergency management needs.	✓		✓	✓
Strategy 4.2.3. Evaluate the floodplain manager's roles and responsibilities in each local jurisdiction.			✓	
Strategy 4.3.1: Develop a detailed building inventory for all structures in the jurisdiction, in a GIS-based format, which catalogues information such as value of the structure, contents, age, location				✓

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Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
(latitude and longitude), etc.				
Strategy 4.3.2: 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.	✓		✓	✓
Strategy 4.4.1. Consider participating in FEMA’s Community Rating System (CRS).	✓		✓	✓
Strategy 4.5.1. Continue to enforce zoning and building codes to prevent construction within the floodplain.	✓	✓	✓	✓
Strategy 4.5.2: Review and revise, if required, existing Subdivision Ordinances to include hazard mitigation-related development criteria in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.				✓
Strategy 4.5.3. Review and revise, if				✓

Northern Neck Regional Hazard Mitigation Plan

Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
required, local floodplain ordinances. Work with the state to coordinate a Community Assistance Visit to identify potential improvements or enhancements to existing floodplain management program.				
Strategy 4.5.4. Evaluate the potential costs versus benefits of implementing a freeboard requirement for all new structures in the 100-year floodplain.			✓	✓
Strategy 4.5.5. Develop a new Zoning Ordinance or revise the existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.				✓
Strategy 4.5.8. Investigate implementation of cumulative damage provision as part of floodplain ordinance.		✓	✓	
Strategy 5.1.4. Publicize the location of local shelters and	✓	✓	✓	

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Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
emergency phone numbers. Include a map of shelters in local phonebooks or on county/city websites.				
Strategy 5.1.5. Develop vegetative planting programs for public shoreline property to serve as a model for public education purposes.	✓*			
Strategy 5.2.1. Encourage the purchase of flood and/or sewer back-up insurance.	✓	✓		✓
Strategy 5.2.2. Educate residents about flood insurance and ICC (Increased Cost of Compliance) coverage.	✓	✓		✓
Strategy 5.2.3. 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.	✓	✓		✓*

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Strategy	Lancaster County	Northumberland County	Richmond County	Westmoreland County
Strategy 5.3.1. Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities.	✓	✓	✓	
Strategy 5.3.4. 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.			✓	
*indicates on-going strategy				

Mitigation Strategies by Town

Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
Strategy 1.1.1. 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.			✓	
Strategy 1.2.1. Incorporate hazard mitigation techniques into new			✓	

Northern Neck Regional Hazard Mitigation Plan

Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
community facilities to minimize damages.				
Strategy 1.2.4. Require coordinated shoreline protection plans in new waterfront subdivisions.		✓(?)		
Strategy 1.2.3. Encourage use of vegetation and revetments to reduce shoreline erosion.		✓(?)		
Strategy 2.1.1. Increase enforcement and education regarding the tie down of propane and other fuel tanks.	✓			
Strategy 2.2.3. Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.		✓(?)		
Strategy 3.1.1. 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			✓	

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
and wind hazards. Particular attention will be given to the HVAC system and structural integrity of the buildings. Prioritize facilities in known hazard areas (e.g., floodplains).				
Strategy 3.1.2. Evaluate existing stormwater system to determine if it is adequate for existing (or future) flood hazard.	✓			
Strategy 3.2.1. Identify need for backup generators, communications and/or vehicles at critical public facilities. Develop means to address shortfall identified.		✓		
Strategy 3.2.2. Consider providing necessary electrical hook-up, wiring, and switches to allow readily accessible connections to emergency generators at selected critical public facilities.		✓		
Strategy 3.3.3. Develop and implement a ditch maintenance program consisting of routine	✓		✓	

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
inspections and subsequent debris removal.				
Strategy 3.3.4: Initiate discussions with private utility companies to incorporate mitigation measures into new and pre-existing development and any infrastructure repairs.		✓	✓*	
Strategy 3.3.5. 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 weather-proof.			✓*	
Strategy 3.3.6. Identify program of corrective actions to improve stormwater systems capacity to handle major rain events.	✓		✓	
Strategy 3.4.1. Initiate road clearing efforts early in wind and winter storms. Develop plan for quick deployment of road clearing equipment.		✓*		

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
Strategy 4.1.4. Develop a Continuity of Operations plan.		✓	✓	✓
Strategy 4.2.2. Identify training opportunities for staff to enhance ability to use GIS for emergency management needs.			✓	
Strategy 4.3.1: Develop a detailed building inventory for all structures in the jurisdiction, in a GIS-based format, which catalogues information such as value of the structure, contents, age, location (latitude and longitude), etc.	✓		✓	
Strategy 4.3.2: 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.			✓	
Strategy 4.5.1. Continue to enforce zoning and building codes to prevent construction within the floodplain.	✓	✓		

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
Strategy 4.4.1. Consider participating in FEMA's Community Rating System (CRS).		✓ <small>(as part of County if possible)</small>	✓ <small>(as part of County if possible)</small>	✓ <small>(as part of County if possible)</small>
Strategy 4.4.2. Consider participating in the StormReady program sponsored by the National Weather Service.	✓	✓	✓	
Strategy 4.5.2: Review and revise, if required, existing Subdivision Ordinances to include hazard mitigation-related development criteria in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.	✓*			
Strategy 4.5.5. Develop a new Zoning Ordinance or revise the existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.	✓*			
Strategy 4.5.6. Include an assessment and associated mapping of the jurisdiction's vulnerability to	✓		✓	

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
location-specific hazards and make appropriate recommendations for the use of these hazard areas in the next Comprehensive Plan.				
Strategy 4.5.7. Investigate using non-conforming or substantial damage provisions to require hazard retrofitting of existing development.	✓		✓	
Strategy 5.1.4. Publicize the location of local shelters and emergency phone numbers. Include a map of shelters in local phonebooks or on county/city websites.	✓			
Strategy 5.2.1. Encourage the purchase of flood and/or sewer back-up insurance.		✓	✓	✓
Strategy 5.2.2. Educate residents about flood insurance and ICC (Increased Cost of Compliance) coverage.		✓	✓	
Strategy 5.2.3. Prepare an advisory pamphlet and distribute to		✓		

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Strategy	Town of Colonial Beach	Town of Irvington	Town of Kilmarnock	Town of Montross
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.				
Strategy 5.3.1. Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities.	✓	✓	✓	✓
Strategy 5.3.3. Increase flood warning capabilities, including the identification of alternative safe routes.	✓*		✓	
Strategy 5.3.4. 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.	✓*			
*indicates on-going strategy				

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Regional Strategies

High Priority

- Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.
- Strategy 4.1.3. Incorporate mitigation principles into local comprehensive, emergency management, and recovery plans.

Medium Priority

- Strategy 5.3.2. Investigate, develop or enhance a regional public notification system such as low-power FM or AM radio.
- Strategy 5.1.3. Distribute packets to new residents to raise awareness regarding hazard risks in the Northern Neck.
- Strategy 5.1.1. Work with local media outlets to increase awareness of natural hazards. Implement seasonal hazard awareness weeks or days (e.g., hurricane preparedness week, winter weather awareness day).
- Strategy 4.1.2. Develop recommendations for short-term and long-term funding sources for mitigation, planning, and projects. These options could include grants and private sources.

Low Priority

- Strategy 5.1.2. Partner with Parent Teacher Associations and local schools to implement existing curriculum related to natural hazards (e.g., Masters of Disaster, Risk Watch).
- Strategy 5.2.4. Work with the National Weather Service to promote the “Turn Around, Don’t Drown” public education campaign.

Already Completed.

- Strategy 4.1.1. Officially recognize the dual purpose of the Local Emergency Planning Committee as the Mitigation Advisory Committee. Use the Committee to review mitigation projects and coordinate multi-jurisdictional grant applications.

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Additional Strategies

Lancaster County

- Strategy 3.2.*. Identify methods to safeguard sheriff's generator.
- Strategy 4.4.3. Work with the Virginia Department of Forestry to implement the FIREWISE program in Lancaster County.

Northumberland County

- Strategy 3.4.*. Develop debris management plan.

Town of Colonial Beach

- Strategy 3.3.*. Support VDOT's replacement of the Route 205 bridges at Wilkerson and Oak Grove.
- Strategy 3.3.*. Investigate options for reducing flood risk to Route 205, particularly the low portion in the Wilkerson area.
- Strategy 3.2.*. Identify new location for Rescue Squad.
- Strategy 2.*.*. Study feasibility of installing breakwaters along Central Beach and North Beach.

Town of Kilmarnock

- Strategy 3.2.*. Work with school board and county to ensure sufficient emergency lighting in Lancaster County Middle School.
- Strategy 3.2.*. Replace generators for sewer lift stations. Provide new generator for town hall and town police station. Consider providing separate generator for water tank (to replace generator shared with hospital).
- Strategy 5.3.*. Purchase electronic signs that can be used for emergency information (e.g., route detours).

Town of White Stone

- Strategy 3.4.*. Continue to pursue HMGP funding for two generators and switches for water station
- Strategy 3.4.*. Investigate relocating and/or prioritizing repair of power transformer that controls power to the White Stone Medical facility.

(* indicate additional strategies identified as part of jurisdiction-specific meetings)

Northern Neck Planning District Commission Mitigation Actions

The mitigation actions proposed for the Planning District to undertake are listed on the pages that follow. Each has been designed to achieve the goals and objectives

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identified in this multi-jurisdictional all-hazards mitigation plan. Each proposed action includes:

- (1) the appropriate category for the mitigation technique,
- (2) the hazard it is designed to mitigate,
- (3) the objective(s) it is intended to help achieve,
- (4) general background information,
- (5) the priority level for its implementation (high, moderate, or low),
- (6) potential funding sources, if applicable,
- (7) the agency/person assigned responsibility for carrying out the strategy, and
- (8) a target completion date.

When formulating a Mitigation Action Plan, a wide range of activities should be considered to help achieve the goals of communities and lessen the vulnerability of the participating jurisdictions to the effects of natural hazards. In general, all of these activities fall into one of the broad categories of mitigation techniques described in Appendix C. Appendix C also includes the range of alternatives that were considered in by the Mitigation Advisory Committee.

Regional Action Plan

The strategies below can be undertaken at the regional level and have been identified as high priority by the Mitigation Advisory Committee.

Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.

Affected Jurisdictions	All
Category	Local Capacity
Hazard	All
Objective(s) addressed	4.2

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Background	<p>One key to successful enforcement of floodplain and other regulations is to ensure that staff are adequately trained and have the opportunity to learn about new standards and techniques. It is especially important that staff understand how damage assessments are conducted by state and federal officials. In addition, enforcement staff should be comfortable in making substantial damage determinations.</p> <p>The limited number of staff at the county and town level makes it difficult to send people to extended, out-of-town training courses. Short courses (i.e., one day) should be identified that could be delivered in the Northern Neck, potentially at a site identified by the PDC.</p> <p>Potential class topics could include:</p> <ul style="list-style-type: none"> - Damage assessment - Substantial damage requirements - Floodproofing techniques - Coastal construction and mitigation techniques
Priority	High
Funding sources	VDEM, FEMA HMGP
Responsible party	Northern Neck PDC; Mitigation Advisory Committee; County administrators; Town Managers
Completion date	On-going

Strategy 4.1.3. Incorporate mitigation principles into local comprehensive, emergency management, and recovery plans.

Affected Jurisdictions	All
Category	Prevention

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Hazard	All
Objective(s) addressed	4.1
Background	<p>Although mitigation is a phase of the emergency management cycle, it cannot successfully be implemented by emergency managers alone. The departments and agencies involved include planning, public works, economic development, and public safety. For mitigation to be truly successful, it must become part of local planning and decision-making. Mitigation concepts should be (or should continue to be) integrated into local comprehensive, emergency management and recovery plans. As goals, objectives, and strategies are identified for these types of plans, efforts should be made to include mitigation explicitly and implicitly.</p> <p>As noted in the Capability Assessment section of this plan, most comprehensive plans in the Northern Neck already address coastal erosion and flood hazards. Efforts should be made to ensure future versions of the comprehensive plans continue to incorporate policies to address these hazards and that additional hazards (e.g., wildfire) also are included.</p> <p>This mitigation plan can be adopted as an annex to the existing Emergency Operations Plan. This will help to ensure that mitigation is considered in the post-disaster environment.</p>
Priority	High
Funding sources	N/A
Responsible party	County administrators; Town Managers; Mitigation Advisory Committee
Completion date	On-going

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Jurisdiction Action Plans

Each jurisdiction selected and prioritized mitigation strategies specific to their jurisdiction. The top three to five strategies for each jurisdiction are described below in more detail. These strategies, combined with the regional strategies above, comprise the action plan for each jurisdiction.

Lancaster County

Strategy 5.1.1. Work with local media outlets to increase awareness of natural hazards. Implement seasonal hazard awareness weeks or days (e.g., hurricane preparedness week, winter weather awareness day).

Affected Jurisdictions	Lancaster County
Category	Public Information and Awareness
Hazard	All Hazards
Objective(s) addressed	5.1
Background	<p>A 2004 study sponsored by the American Red Cross and Wirthlin, a survey research firm, found that while Americans recognize the importance of being personally prepared for disaster, fewer than two in ten U.S. adults characterize themselves as very prepared.</p> <p>For people to take the steps to become prepared for disaster, they first must be aware of their risk. Media outlets (e.g., television, radio, print) can play an important role in raising awareness and encouraging personal responsibility to minimize the loss of life and property during a disaster.</p> <p>Public education campaigns can be tied to specific events (e.g., anniversary of a disaster) or to a particular hazard and time of year (e.g., hurricane preparedness week in the early summer).</p>
Priority	High
Funding sources	FEMA/HMGP 5% funds, VDEM, local government operating budgets, private sources

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Responsible party	County Public Information Officer
Completion date	On-going

Strategy 5.3.1. Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities.

Affected Jurisdictions	Lancaster County
Category	Public Information and Awareness
Hazard	All
Objective(s) addressed	5.3
Background	<p>NOAA Weather Radio (NWR) continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. The radios can be programmed to receive information specific to a certain area, using the Specific Area Message Encoder (SAME) feature, and can sound an alarm to alert users of approaching dangerous weather.</p> <p>NWR now broadcasts warning and post-event information for all types of hazards, both natural (such as earthquakes and volcano activity) and technological (such as chemical releases or oil spills).</p> <p>NWR receivers can be purchased at many retail stores that sell electronic merchandise. Prices can vary from \$20 to \$200, depending on the model. Many receivers have an alarm feature, but some may not. Users should be trained how to use the receivers. In particular, users should learn how to set alerts specific to their area.</p>
Priority	High
Funding sources	National Weather Service (NWS), county budget
Responsible party	County Administrator

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Completion date	4 th quarter of 2005
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Strategy 5.1.3. Distribute packets to new residents to raise awareness regarding hazard risks in the Northern Neck.

Affected Jurisdictions	Lancaster County
Category	Public Information and Awareness
Hazard	All Hazards
Objective(s) addressed	5.1
Background	<p>The Northern Neck region is growing rapidly, and many people moving into the area are not familiar with the hazards of the area. Many new residents come from more urban areas and may not be used to living in an area with limited emergency response capabilities. In addition, these newcomers tend to be older and may have special needs in times of disaster.</p> <p>It is imperative that new residents be informed of preparedness information, including how to prepare for emergencies. In addition, it is important to remind the existing population of the area, who may have become complacent with respect to hazards and how to prepare for them.</p> <p>Key messages to include are: (1) whom to call for information in the event of an impending disaster or after a disaster; (2) what items to include in a disaster preparedness kit; and (3) simple hazard specific mitigation measures each resident can take to reduce their risk.</p>
Priority	High
Funding sources	FEMA/Hazard Mitigation Grant Program (HMGP) 5% funds, business community sponsors

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Responsible party	Mitigation Advisory Committee; County/City Public Information Officer
Completion date	On-going

Strategy 5.3.2. Investigate, develop or enhance a regional public notification system such as low-power FM or AM radio.

Affected Jurisdictions	Lancaster County
Category	Public Information and Awareness
Hazard	All
Objective(s) addressed	5.3
Background	<p>Public notification in pre- and post-disaster situations can be a challenge in the Northern Neck. A regional low-power FM radio or AM radio transmission system could be one means to provide region-specific information directly from the local jurisdictions. A network of transmitters would be required to ensure coverage throughout the Northern Neck.</p> <p>A radio system can greatly increase a community's ability to quickly and efficiently provide hazard warnings to its citizens. In addition, in non-emergency situations, the system can be used to broadcast information about the Northern Neck, such as cultural event information. Another advantage is that the information can be delivered in a variety of languages.</p>
Priority	High
Funding sources	DHS; County budget
Responsible party	County Administrator
Completion date	4 th quarter of 2008

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Strategy 3.3.2. Work with VDOT to evaluate at-risk roads and implement mitigation measures (e.g., elevation, redesign).

Affected Jurisdictions	Lancaster County
Category	Property Protection
Hazard	Flood
Objective(s) addressed	3.2
Background	<p>Flooded roads present one of the most dangerous hazards during a flood event. Many people underestimate the danger of driving through floodwaters, and many die or are injured after attempting to drive through them. Areas of repetitive road closures include Morattico and Towles Point. In addition, Windmill Point Road has flooded repeatedly.</p> <p>Roads subject to repeated flooding should be evaluated to determine the extent of the flooding (i.e., short-term nuisance flooding versus long-term, road damaging flooding) and to identify potential structural mitigation measures.</p> <p>Projects should be added to the County's requests and recommendations for the Virginia Department of Transportation's Six Year Improvement Plan.</p>
Priority	High
Funding sources	VDOT, FEMA 406 funds (post-disaster), HMGP, PDM
Responsible party	VDOT, County Engineer
Completion date	2 nd quarter of 2007

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Northumberland County

Strategy 1.2.1. Incorporate hazard mitigation techniques into new community facilities to minimize damages.

Affected Jurisdictions	Northumberland County
Category	Property Protection
Hazard	All
Objective(s) addressed	1.2
Background	As a component of encouraging private property owners to incorporate mitigation techniques into their structures, County government should consider the potential impacts of natural hazards when new community facilities are in the design stage. County officials should ensure that builders of new community facilities are aware of mitigation techniques, and that they incorporate them as appropriate into construction of new community facilities.
Priority	High
Funding sources	PDM, HMGP, FEMA 406 funds (post-disaster), Capital Improvement Budget
Responsible party	County Engineer
Completion date	On-going

Strategy 4.1.3. Incorporate mitigation principles into local comprehensive, emergency management, and recovery plans.

Affected Jurisdictions	Northumberland County
Category	Prevention
Hazard	All

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Objective(s) addressed	4.1
Background	<p>Although mitigation is a phase of the emergency management cycle, it can not be successfully implemented by emergency managers alone. The departments and agencies involved include planning, public works, economic development, and public safety. For mitigation to be truly successful, it must become part of local planning and decision-making. Mitigation concepts should be (or should continue to be) integrated into local comprehensive, emergency management and recovery plans. As goals, objectives, and strategies are identified for these types of plans, efforts should be made to include mitigation explicitly and implicitly.</p> <p>For example, the Northumberland County Comprehensive Plan has sections devoted to flood-prone areas and shoreline conditions. By including these topics in the Comprehensive Plan, the county is better able to address adverse impacts of development in these areas. Future updates to the Comprehensive Plan should continue to address these hazards and consideration should be given to including other hazards such as wildfire.</p> <p>This mitigation plan can be adopted as an annex to the existing Emergency Operations Plan. This will help to ensure that mitigation is considered in the post-disaster environment.</p>
Priority	High
Funding sources	N/A
Responsible party	County Administrator; Planning
Completion date	On-going

Northern Neck Regional Hazard Mitigation Plan

Strategy 5.1.1. Work with local media outlets to increase awareness of natural hazards. Implement seasonal hazard awareness weeks or days (e.g., hurricane preparedness week, winter weather awareness day).

Affected Jurisdictions	Northumberland County
Category	Public Information and Awareness
Hazard	All Hazards
Objective(s) addressed	5.1
Background	<p>A 2004 study sponsored by the American Red Cross and Wirthlin, a survey research firm, found that while Americans recognize the importance of being personally prepared for disaster, fewer than two in ten U.S. adults characterize themselves as very prepared.</p> <p>For people to take the steps to become prepared for disaster, they first must be aware of their risk. Media outlets (e.g., television, radio, print) can play an important role in raising awareness and encouraging personal responsibility to minimize the loss of life and property during a disaster.</p> <p>Public education campaigns can be tied to specific events (e.g., anniversary of a disaster) or to a particular hazard and time of year (e.g., hurricane preparedness week in the early summer).</p>
Priority	Low
Funding sources	FEMA/HMGP 5% funds, VDEM, local government operating budgets, private sources
Responsible party	County Public Information Officer
Completion date	On-going

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Strategy 2.1.1. Increase enforcement and education regarding the tie down of propane and other fuel tanks.

Affected Jurisdictions	Northumberland County
Category	Property Protection
Hazard	Flood, wind
Objective(s) addressed	2.1
Background	<p>Virginia has adopted the 1998 edition of the National Fire Protection Association Standard 58 (NFPA 58), which calls for propane tanks to be secured if subject to flood waters.</p> <p>Although the standard exists, education and enforcement can be an issue. The County will work with propane tank installers to ensure they understand and are implementing the requirements of NFPA 58. In addition, the County will work with sellers of propane tanks to educate homeowners on the importance of securing and maintaining the tanks.</p> <p>Upright tanks can be secured to structures by means of cable, chain, or heavy rope. Horizontal containers would be secured by using two mobile home type anchors and 1/4 inch stainless steel cable.</p> <p>More information can be found at: http://www.fema.gov/pdf/fima/how2005_propane.pdf</p>
Priority	High
Funding sources	County Budget
Responsible party	Building Inspections
Completion date	4 th quarter of 2006

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Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.

Affected Jurisdictions	Northumberland County
Category	Local Capacity
Hazard	All
Objective(s) addressed	4.2
Background	<p>One key to successful enforcement of floodplain and other regulations is to ensure that staff are adequately trained and have the opportunity to learn about new standards and techniques. It is especially important that staff understand how damage assessments are conducted by state and federal officials. In addition, enforcement staff should be comfortable in making substantial damage determinations.</p> <p>The limited number of staff at the county and town level makes it difficult to send people to extended, out-of-town training courses. Short courses (i.e., one day) should be identified that could be delivered in the Northern Neck, potentially at a site identified by the PDC.</p> <p>Potential class topics could include:</p> <ul style="list-style-type: none"> - Damage assessment - Substantial damage requirements - Floodproofing techniques - Coastal construction and mitigation techniques
Priority	High
Funding sources	VDEM, FEMA HMGP
Responsible party	Northern Neck PDC; County administrators;

Northern Neck Regional Hazard Mitigation Plan

Completion date	On-going
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Richmond County

Strategy 5.1.3: Distribute packets to new residents to raise awareness regarding hazard risks in the Northern Neck.

Affected Jurisdictions	Richmond County
Category	Public Information and Awareness
Hazard	All Hazards
Objective(s) addressed	5.1
Background	<p>The Northern Neck region is growing rapidly, and many people moving into the area are not familiar with the hazards of the area. Many new residents come from more urban areas and may not be used to living in an area with limited emergency response capabilities. In addition, these newcomers tend to be older and may have special needs in times of disaster.</p> <p>It is imperative that new residents be informed of preparedness information, including how to prepare for emergencies. In addition, it is important to remind the existing population of the area, who may have become complacent with respect to hazards and how to prepare for them.</p> <p>Key messages to include are: (1) whom to call for information in the event of an impending disaster or after a disaster; (2) what items to include in a disaster preparedness kit; and (3) simple hazard specific mitigation measures each resident can take to reduce their risk.</p>
Priority	High
Funding sources	FEMA/Hazard Mitigation Grant Program (HMGP) 5%

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	funds, business community sponsors
Responsible party	Mitigation Advisory Committee; County/City Public Information Officer
Completion date	On-going

Strategy 5.1.2. Partner with Parent Teacher Associations and local schools to implement existing curriculum related to natural hazards (e.g., Masters of Disaster, Risk Watch).

Affected Jurisdictions	Richmond County
Category	Public Information and Awareness
Hazard	All
Objective(s) addressed	5.1
Background	<p>Incorporating natural disaster preparedness and mitigation concepts into school curriculum is one way to ensure these concepts become a public value. It also can be an effective way to deliver preparedness and mitigation information to the public.</p> <p>At least two curricula that are aligned with the Virginia Standards of Learning have been produced by national organizations.</p> <p><i>Risk Watch: Natural Disasters</i> was developed by the National Fire Protection Association (NFPA). NFPA has designated Champions across the state to help local communities implement the Risk Watch criteria. The Virginia Risk Watch Champion is Rhonda D. Keith, Injury Prevention Specialist at the Center for Injury & Violence Prevention, Virginia Department of Health. For more information, http://www.nfpa.org/riskwatch/advocate.html</p> <p><i>Risk Watch</i> includes units on general disaster preparedness, earthquake, flood, hurricane, severe</p>

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	<p>winter storm, wildfire and tornado.</p> <p><i>Masters of Disaster</i> was developed by the American Red Cross. <i>Risk Watch</i> includes units on general disaster preparedness, earthquake, flood, hurricane, lightening, and tornado. Local American Red Cross chapters can assist local communities with integrating <i>Masters of Disaster</i> into school curriculum.</p> <p>For more information, http://www.redcross.org/disaster/masters/intro.html</p>
Priority	High
Funding sources	American Red Cross; public-private partnerships
Responsible party	County Administrator
Completion date	4 th quarter of 2006

Strategy 5.3.1. Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities.

Affected Jurisdictions	Richmond County
Category	Public Information and Awareness
Hazard	All
Objective(s) addressed	5.3
Background	<p>NOAA Weather Radio (NWR) continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. The radios can be programmed to receive information specific to a certain area, using the Specific Area Message Encoder (SAME) feature, and can sound an alarm to alert users of approaching dangerous weather.</p> <p>NWR now broadcasts warning and post-event information for all types of hazards both natural (such as</p>

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	<p>earthquakes and volcano activity) and technological (such as chemical releases or oil spills).</p> <p>NWR receivers can be purchased at many retail stores that sell electronic merchandise. Prices can vary from \$20 to \$200, depending on the model. Many receivers have an alarm feature, but some may not. Users should be trained how to use the receivers. In particular, users should learn how to set alerts specific to their area.</p>
Priority	High
Funding sources	NWS, county budget
Responsible party	County Administrator
Completion date	4 th quarter of 2005

Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.

Affected Jurisdictions	Richmond County
Category	Local Capacity
Hazard	All
Objective(s) addressed	4.2
Background	<p>One key to successful enforcement of floodplain and other regulations is to ensure that staff are adequately trained and have the opportunity to learn about new standards and techniques. It is especially important that staff understand how damage assessments are conducted by state and federal officials. In addition, enforcement staff should be comfortable in making substantial damage determinations.</p> <p>The limited number of staff at the county and town level</p>

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	<p>makes it difficult to send people to extended, out-of-town training courses. Short courses (i.e., one day) should be identified that could be delivered in the Northern Neck, potentially at a site identified by the PDC.</p> <p>Potential class topics could include:</p> <ul style="list-style-type: none"> - Damage assessment - Substantial damage requirements - Floodproofing techniques - Coastal construction and mitigation techniques
Priority	High
Funding sources	VDEM, FEMA HMGP
Responsible party	Northern Neck PDC; County administrators
Completion date	On-going

Strategy 4.5.1. Continue to enforce zoning and building codes to prevent construction within the floodplain.

Affected Jurisdictions	Richmond County
Category	Prevention
Hazard	Flood
Objective(s) addressed	4.5
Background	<p>Zoning and building codes are powerful tools used to ensure that development does not occur in hazardous areas, and that development is built safely. However, these regulations are only as good as they are implemented.</p> <p>A lack of enforcement of zoning regulations and building inspections is believed to have contributed to</p>

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	<p>the extensive destruction caused by Hurricane Andrew in 1990.</p> <p>Enforcement of zoning and building codes is essential to maintain eligibility for future grants and other financial assistance. In addition, enforcement of the building code contributes to the Building Code Effectiveness Grading Schedule, conducted by the Insurance Services Organization. The score received on this schedule ultimately affects the personal insurance rates in a community.</p>
Priority	High
Funding sources	County budget
Responsible party	Planning
Completion date	On-going

Westmoreland County

Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff. Educate them on GIS, damage assessment, mitigation techniques, and other related topics. Explore short-term training opportunities (e.g., one day) that could be delivered in the region.

Affected Jurisdictions	Westmoreland County
Category	Local Capacity
Hazard	All
Objective(s) addressed	4.2
Background	<p>One key to successful enforcement of floodplain and other regulations is to ensure that staff are adequately trained and have the opportunity to learn about new standards and techniques. It is especially important that staff understand how damage assessments are conducted by state and federal officials. In addition, enforcement</p>

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	<p>staff should be comfortable in making substantial damage determinations.</p> <p>The limited number of staff at the county and town level makes it difficult to send people to extended, out-of-town training courses. Short courses (i.e., one day) should be identified that could be delivered in the Northern Neck, potentially at a site identified by the PDC.</p> <p>Potential class topics could include:</p> <ul style="list-style-type: none"> - Damage assessment - Substantial damage requirements - Floodproofing techniques - Coastal construction and mitigation techniques
Priority	High
Funding sources	VDEM, FEMA HMGP
Responsible party	Northern Neck PDC; County administrators
Completion date	On-going

Strategy 4.3.2. 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.

Affected Jurisdictions	Westmoreland County
Category	Local Capacity
Hazard	All
Objective(s) addressed	4.3
Background	Collecting and managing damage assessment information is essential to an effective response and mitigation effort. By determining what happened, and what the impacts

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	<p>are, communities are in a better position to initially respond to a disaster, and to request additional assistance (e.g., state or federal). GIS systems can be used to effectively manage data and provide maps for emergency response planning and decision-making. This data analysis will help ensure that equipment and personnel can be better used, and assistance can be provided more quickly.</p> <p>This damage assessment information also can be used in future mitigation planning efforts. By capturing locally-specific accurate loss data, future hazard identification and risk assessments can be more detailed and accurate.</p>
Priority	High
Funding sources	Departmental funds, HMGP 5% funds
Responsible party	Emergency Services, Planning Department, Building Department
Completion date	On-going

Strategy 5.1.3: Distribute packets to new residents to raise awareness regarding hazard risks in the Northern Neck.

Affected Jurisdictions	Westmoreland County
Category	Public Information and Awareness
Hazard	All Hazards
Objective(s) addressed	5.1
Background	<p>The Northern Neck region is growing rapidly, and many people moving into the area are not familiar with the hazards of the area. Many new residents come from more urban areas and may not be used to living in an area with limited emergency response capabilities. In addition, these newcomers tend to be older and may</p>

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	<p>have special needs in times of disaster.</p> <p>It is imperative that new residents be informed of preparedness information, including how to prepare for emergencies. In addition, it is important to remind the existing population of the area, who may have become complacent with respect to hazards and how to prepare for them.</p> <p>Key messages to include are: (1) whom to call for information in the event of an impending disaster or after a disaster; (2) what items to include in a disaster preparedness kit; and (3) simple hazard specific mitigation measures each resident can take to reduce their risk.</p>
Priority	Medium
Funding sources	FEMA/Hazard Mitigation Grant Program (HMGP) 5% funds, business community sponsors
Responsible party	Mitigation Advisory Committee; County/City Public Information Officer
Completion date	On-going

Strategy 1.3.1. 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.

Affected Jurisdictions	Westmoreland County
Category	Prevention
Hazard	Flood
Objective(s) addressed	1.3

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Background	<p>Acquisition of flood-prone properties is a very effective means of mitigation. By removing at-risk structures, or preventing development from occurring at all, the negative impact of flooding to property is eliminated. In addition, structural protection measures are no longer required to protect the properties, so acquisition can result in a cost savings.</p> <p>Besides reducing losses to specific properties, acquisition also can be used to achieve other community goals, such as open space preservation, improved water quality, or park creation. Passive recreational uses, or those that require a minimal amount of construction, are ideal uses for acquired lands. Further, by returning the area to its natural floodplain state, flooding in downstream locations could be reduced.</p> <p>All acquisition projects are voluntary. Public education regarding the benefits of acquisition may be necessary to build public support for such a program.</p>
Priority	High
Funding sources	HMGP; PDM
Responsible party	County Administrator
Completion date	4 th quarter of 2008

Strategy 3.3.1. Identify funding opportunities to replace vulnerable or undersized culvert stream crossings with bridges or larger culverts to reduce flood hazards.

Affected Jurisdictions	Westmoreland County
Category	Structural Projects
Hazard	Flood
Objective(s) addressed	3.3

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Background	<p>Parts of roads that cross water bodies such as streams are particularly vulnerable to flooding. Numerous roads in the County use culvert-style crossings to span small streams. If these culverts are too small to handle floodwaters or become clogged with debris, the roads can become flooded.</p> <p>Specific roads and areas to evaluate include Route 205 and the Tidwells and Sandy Point. Projects should be added to the County's requests and recommendations for the Virginia Department of Transportation's Six Year Improvement Plan.</p>
Priority	High
Funding sources	PDM, VDOT
Responsible party	County Engineer
Completion date	4 th quarter of 2008

Town of Colonial Beach

Strategy 4.2.1. Provide training opportunities to county/municipal enforcement staff at a location in the Northern Neck. Educate them on damage assessment, mitigation techniques, and other related topics.

Affected Jurisdictions	Town of Colonial Beach
Category	Local Capacity
Hazard	All hazards
Objective(s) addressed	4.2
Background	<p>One key to successful enforcement of floodplain and other regulations is to ensure that staff are adequately trained and have the opportunity to learn about new standards and techniques. It is especially important that staff understand how damage assessments are conducted by state and federal officials. In addition, enforcement</p>

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	<p>staff should be comfortable in making substantial damage determinations.</p> <p>The limited number of staff at the county and town level makes it difficult to send people to extended, out-of-town training courses. Short courses (i.e., one day) should be identified that could be delivered in the Northern Neck, potentially at a site identified by the PDC.</p> <p>Potential class topics could include:</p> <ul style="list-style-type: none"> - Damage assessment - Substantial damage requirements - Floodproofing techniques - Coastal construction and mitigation techniques
Priority	High
Funding sources	VDEM, FEMA HMGP
Responsible party	PDC, Town Manager
Completion date	On-going

Strategy 4.3.1. Develop a detailed building inventory for all structures in the jurisdiction, in a GIS-based format, which catalogues information such as value of the structure, contents, age, location (latitude and longitude), etc. [funding contingent]

Affected Jurisdictions	Colonial Beach
Category	N/A
Hazard	All hazards
Objective(s) addressed	4.3
Background	The Town of Colonial Beach does not have any building-based GIS information. The lack of data makes it virtually impossible to develop an accurate vulnerability

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	<p>assessment and loss estimate for the town. If this data were collected, it could be used to improve town planning efforts and decision-making, in addition to improving understanding of the town's risks and vulnerabilities.</p> <p>The Town would like to work with the Northern Neck Planning District Commission to develop GIS data specific to the town's needs.</p>
Priority	High
Funding sources	Town funds
Responsible party	Town Manager, Northern Neck PDC
Completion date	4 th quarter of 2006

Strategy 5.1.4. Publicize the location of local shelters and emergency phone numbers. Include a map of shelters in local phonebooks or on county/city websites.

Affected Jurisdictions	Colonial Beach
Category	Public Information and Awareness
Hazard	All hazards
Objective(s) addressed	5.1
Background	<p>Information on where to seek shelter and who to call in the event of an impending disaster is crucial to protecting people's lives. The Town of Colonial Beach, as a resort town, has a significant number of visitors that may not know what to do in the event of a natural disaster. Means to publicize shelter locations and other emergency information are required to reach the broadest audience possible.</p>
Priority	High

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Funding sources	Town funds, private/public partnership
Responsible party	Verizon, Town funds
Completion date	4 th quarter 2005

Town of Kilmarnock

Strategy 3.2.1. Identify need for backup generators, communications and/or vehicles at critical public facilities. Develop means to address shortfall identified.

Affected Jurisdictions	Kilmarnock
Category	Emergency Services
Hazard	All hazards
Objective(s) addressed	3.2
Background	<p>The ability to recover quickly after a disaster rests, in part, on the community's ability to maintain critical functions during response and recovery. An important part of maintaining these critical functions is ensuring that the facilities and resources required are available after a disaster.</p> <p>An inventory and assessment should be completed for community critical facilities (e.g., Emergency Operations Center, Emergency Communications Center, public shelters) that examines the need for backup generators, communications and/or vehicles. Needs should be ranked and a plan developed to address the most critical needs first.</p>
Priority	High
Funding sources	Capital Improvements Program, PDM, FEMA HMGP 5% funds
Responsible party	City Manager

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Completion date	2 nd quarter of 2006
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Strategy 3.3.4: Initiate discussions with private utility companies to incorporate mitigation measures into new and pre-existing development and any infrastructure repairs.

Affected Jurisdictions	Kilmarnock
Category	Property Protection
Hazard	Wind, winter storm
Objective(s) addressed	3.3
Background	A major impact from hurricane and winter storms is the downing of utility lines (e.g., electricity, phone). The Town seeks to work with utility companies to determine how these lines can be better protected from natural hazards. One possibility is for the town to partner with utility companies to apply for grant funds to harden the utility lines and protect them from high winds or winter storm conditions. Another possibility is for the utility companies to examine the standards that they are applying when installing the utility lines (e.g., number and type of fasteners used).
Priority	High
Funding sources	FEMA, private sources
Responsible party	Town Manager, utility companies
Completion date	4 th quarter of 2007

Strategy 4.1.4. Develop a Continuity of Operations plan.

Affected Jurisdictions	Kilmarnock
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Category	N/A
Hazard	All hazards
Objective(s) addressed	4.1
Background	<p>The ability of state and local governments to carry out their executive, legislative and judicial functions effectively and efficiently during or following a disaster or emergency is dependent on sound preparedness and planning. The development and maintenance of a viable Continuity of Operations Plan (COOP) and capability at each level of government is critical to save lives and protect the public health and well-being, protect property and preserve assets, maintain functionality, and maintain essential government operations and services.</p> <p>The Town may want to consider establishing a steering committee to facilitate development of the plan. Once the plan is written, it should be validated with a series of exercises.</p>
Priority	High
Funding sources	Departmental budget. Department of Homeland Security/Homeland Security Grant Program
Responsible party	Town Manager
Completion date	2 nd quarter of 2006

Town of Montross

Strategy 4.1.4. Develop a Continuity of Operations plan.

Affected Jurisdictions	Montross
Category	N/A
Hazard	All hazards

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Objective(s) addressed	4.1
Background	<p>The ability of state and local governments to carry out their executive, legislative and judicial functions effectively and efficiently during or following a disaster or emergency is dependent on sound preparedness and planning. The development and maintenance of a viable Continuity of Operations Plan (COOP) and capability at each level of government is critical to save lives and protect the public health and well-being, protect property and preserve assets, maintain functionality, and maintain essential government operations and services.</p> <p>The Town may want to consider establishing a steering committee to facilitate development of the plan. Once the plan is written, it should be validated with a series of exercises.</p>
Priority	High
Funding sources	Departmental budget. Department of Homeland Security/Homeland Security Grant Program
Responsible party	Town Manager
Completion date	2 nd quarter of 2006

Strategy 5.3.1. Encourage purchase of and training on the use of NOAA radios. Provide NOAA weather radios to public facilities.

Affected Jurisdictions	Montross
Category	Public Information and Awareness
Hazard	All
Objective(s) addressed	5.3

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Background	<p>NOAA Weather Radio (NWR) continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. The radios can be programmed to receive information specific to a certain area, using the Specific Area Message Encoder (SAME) feature, and can sound an alarm to alert users of approaching dangerous weather.</p> <p>NWR now broadcasts warning and post-event information for all types of hazards both natural (such as earthquakes and volcano activity) and technological (such as chemical releases or oil spills).</p> <p>NWR receivers can be purchased at many retail stores that sell electronic merchandise. Prices can vary from \$20 to \$200, depending on the model. Many receivers have an alarm feature, but some may not. Users should be trained how to use the receivers. In particular, users should learn how to set alerts specific to their area.</p>
Priority	High
Funding sources	NWS, town funds
Responsible party	Town Manager
Completion date	4 th quarter of 2005

Strategy 5.2.1. Encourage the purchase of flood and/or sewer back-up insurance.

Affected Jurisdictions	Montross
Category	Public Information and Awareness
Hazard	Flood
Objective(s) addressed	5.2

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Background	<p>Damage from flooding is not covered by homeowner’s or renter’s insurance policies. A specific flood insurance policy must be purchased. Flood insurance is required for homes in the floodplain if there is a federally-backed mortgage on the property.</p> <p>Public education about flood insurance is necessary for several reasons. Homeowners may allow policies to lapse, such as after a mortgage is paid off. In addition, homeowners may be at risk to flooding even if their home is not located in a FEMA-mapped floodplain. A public education campaign regarding flood insurance has been recognized as a national priority for FEMA.</p> <p>In addition, damages from sewer back-up or overflow are not covered by homeowner’s or renter’s insurance policies. Sewer back-up insurance can be purchased as a rider to a regular homeowner’s or renter’s policy. Generally, this increased coverage is inexpensive.</p>
Priority	High
Funding sources	Town funds, FEMA/Flood Insurance and Mitigation Administration
Responsible party	Town manager
Completion date	On-going

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Town of White Stone

Strategy 3.4.*. Continue to pursue HMGP funding for two generators and switches for water station.	
Affected Jurisdictions	White Stone
Category	Property Protection, Emergency Services
Hazard	Flood, Wind
Objective(s) addressed	3.4
Background	During Hurricane Isabel in 2003, the Town was without water for a week or more. A similar problem arose several years before subsequent to severe weather. A generator and switches are needed to maintain water service for the Town and the immediate surrounding area.
Priority	High
Funding sources	Town funds, HMGP
Responsible party	Town manager
Completion date	Contingent on receiving grant funds

Strategy 3.4.*. Investigate relocating and/or prioritizing repair of power transformer that controls power to the White Stone Medical facility.	
Affected Jurisdictions	White Stone
Category	Property Protection, Emergency Services
Hazard	Flood, Wind
Objective(s) addressed	3.4

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Background	While the medical facility faces Rappahannock Avenue, its controlling transformer is located on a side street that has a low priority for restoration by Dominion Power. Consequently, the only medical facility within the Town is among the last of the facilities to have its power restored. Dominion Power has been repeatedly requested to address this condition. Company representatives have promised on a number of occasions to have one of its engineers come to White Stone to assess the problem. However, these promises have never been fulfilled.
Priority	High
Funding sources	Dominion Power
Responsible party	Town manager, Dominion Power
Completion date	First quarter of 2006

SECTION VIII. PLAN MAINTENANCE PROCEDURES

The long-term success of the Northern Neck Planning District’s mitigation plan depends in large part on routine monitoring, evaluating, and updating of the plan so that it will remain a valid tool for the communities to use.

Plan Adoption, Implementation and Maintenance

Formal Plan Adoption

Four counties and their incorporated towns in eastern Virginia participated in this planning process and formally adopted this plan by resolution of their governing Board. These local governments are the counties of Lancaster, Northumberland, Richmond, and Westmoreland Counties and the towns of Colonial Beach, Irvington, Kilmarnock, Montross, Warsaw, and White Stone. The plan was completed under the auspices of the Northern Neck Planning District. Sample adoption language was provided to the participating jurisdictions to facilitate the adoption process (see Appendix A). Jurisdictions were asked to adopt the portions of the plan that applied to the region and to their specific jurisdiction.

The adoption process itself took several months, as significant coordination by the Mitigation Advisory Committee was necessary in order to 1) get the plan review and adoption on the appropriate meeting agendas in each jurisdiction, 2) produce and provide copies in official meeting packets, 3) facilitate the actual adoption, 4) collect the adoption resolutions, and 5) incorporate the adopted resolutions into the final Hazard Mitigation Plan.

The Northern Neck Planning District appreciates the willingness that both Virginia Department of Emergency Management and FEMA Region III demonstrated by reviewing this plan concurrently and providing comments for revision *prior* to the adoption process. Not having done so would clearly have added more months to the adoption process.

Implementation

Upon adoption, the plan faces the biggest test: ***implementation***. While this plan puts forth many worthwhile and “High” priority recommendations, the decision of which action to undertake first will be the primary issue that the Northern Neck Planning District communities face.

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Funding is always an important and critical issue. Therefore, pursuing low or no-cost high-priority recommendations may be one approach that a community chooses to take. An example of a low-cost, high-priority recommendation would be to work with local media outlets to raise awareness about the risks posed by natural hazards and educate citizens on means to reduce their vulnerability.

Another implementation approach is to prioritize those actions that can be completed in a relatively short amount of time. Being able to publicize a successful project can build momentum to implement the other parts of the plan. An example of an effective but easy-to-implement strategy is to purchase NOAA weather radios for school administrative offices.

It is important to the long-term implementation of the plan that the underlying principles of this Hazard Mitigation Plan are incorporated into other community plans and mechanisms, such as:

- Comprehensive Planning
- Capital Improvement Budgeting

The capability assessment section of this plan 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. Information from the hazard identification and risk assessment as well as mitigation goals and strategies can be directly included as a comprehensive plan element. Projects that require large investments, such as acquisition or road retrofits are candidates for inclusion in capital improvement plans.

Mitigation is most successful when it is incorporated within the day-to-day functions and priorities of government and development. This integration is accomplished by a constant effort to network and to identify and highlight the multi-objective, “win-win” benefits to each program, the communities and their constituents. This effort is achieved through the often tedious actions of monitoring agendas, attending meetings, and sending memos.

Simultaneous to these efforts, it will be important to constantly monitor funding opportunities that can be utilized to implement some of the higher cost recommended actions. This will include creating and maintaining a repository of ideas on how any required local match or participation requirement can be met. Then, when funding does become available, the Northern Neck communities will be in a position to take advantage of an opportunity. Funding opportunities that can be monitored include

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special pre- and post-disaster funds, special district budgeted funds, state or federal ear-marked funds, and grant programs, including those that can serve or support multi-objective applications.

With adoption of this plan, the Northern Neck 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.

Maintenance

Plan maintenance requires an ongoing effort to monitor and evaluate the implementation of the plan, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

This monitoring and updating will take place through:

- Annual progress reports from each jurisdiction on Mitigation Action Plan,
- An annual review by the Mitigation Advisory Committee, and
- A 5-year written update to be submitted to the state and FEMA Region III, unless disaster or other circumstances (e.g., changing regulations) lead to a different time frame.

The Executive Director of the Northern Neck Planning District will be responsible for monitoring this plan. The Mitigation Advisory Committee representative from each jurisdiction will make annual updates to the Northern Neck Planning District on the progress of the implementation of their Mitigation Action Plans. The timing of the yearly reports should coincide with either the anniversary of the approval date of this plan or another date chosen by the committee, such as the anniversary of a significant event (e.g., Hurricane Isabel). The annual progress reports will be reviewed by the Mitigation Advisory Committee who will determine what action is needed.

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The Mitigation Advisory Committee will be responsible for setting annual measures of success and a five-year measure of success for each strategy. These indicators can be used to measure the progress and success of implementation of the mitigation plan. The Mitigation Advisory Committee can use this information to determine if corrective action needed. In addition, the Mitigation Advisory Committee should review the composition of the committee annually and add members if needed.

The Mitigation Advisory Committee will determine at the annual meeting, if an update of the plan is needed. At a minimum, the plan will be updated every five years. Factors to consider when determining if an update is necessary include:

- Lessened vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or,
- Increased vulnerability as a result of new development (and/or annexation).
- New state/federal laws, policies, or programs
- Changes in resource availability
- Applicability of goals/objectives/strategies

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, the Mitigation Advisory 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 Mitigation Advisory Committee deem appropriate and necessary. Major changes to the plan will be submitted to the state and to FEMA Region III.

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., Hurricane Preparedness Week). Jurisdictions also should provide annual updates to the governing body to keep them informed about plan implementation.

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Section IX. References

HIRA

Other Mitigation Plans

- Virginia Department of Emergency Management (VDEM) Commonwealth of Virginia's Standard Hazard Mitigation Plan (2004).
- Cumberland Mitigation Plan
- New River Valley Mitigation Plan
- Wyoming County (WV) Mitigation Plan

Websites

- US Census Bureau – American Fact Finder: <http://www.census.gov>
- www.northernneck.com
- www.northernneck.com/nnpdc
- www.northernneck.org
- www.dof.virginia.gov

Software

- FEMA HAZUS software
- ESRI data and software
- PRISM Data
- Data provided by Stuart McKenzie (GIS NNPDC)
- FEMA Flood Insurance Study (FIS) – for community descriptions and flooding/hurricane events

Newspapers

- Northern Neck News
- Rappahannock Record
- Rappahannock Times

Other References

¹ Bailey, C. M. *Physiographic Map of Virginia*. 1999. Retrieved from http://www.wm.edu/geology/virginia/phys_regions.html#coastal_plain

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- iv Richmond County, Virginia. *Comprehensive Plan*. 2001.
- v Westmoreland County, Virginia. *General Plan*. Undated.
- ² Westmoreland County, Virginia. *Quick Facts*. Retrieved from http://www.westmoreland-county.org/wc_fact.htm
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- ix U.S. Census Bureau. *2000 U.S. Census*. Retrieved from <http://www.census.gov>
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- xii United States Department of Agriculture, Virginia Agricultural Statistics Service. *2002 Census of Agriculture. County Profiles*. Retrieved from <http://www.nass.usda.gov/census/census02/profiles/va/index.htm>
- xiii County-specific annexes of the Northern Neck Regional Emergency Operations Plan
- xiv Virginia Department of Conservation and Recreation. Chesapeake Bay Local Assistance. *Tidewater Local Governments*. Retrieved from http://www.cblad.state.va.us/local_status_contacts.cfm