Hazard Mitigation Plan

THE EASTERN SHORE OF VIRGINIA

Eastern Shore Hazard Mitigation Planning Committee

Accomack-Northampton Planning District Commission

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2011
Hazard Mitigation Plan

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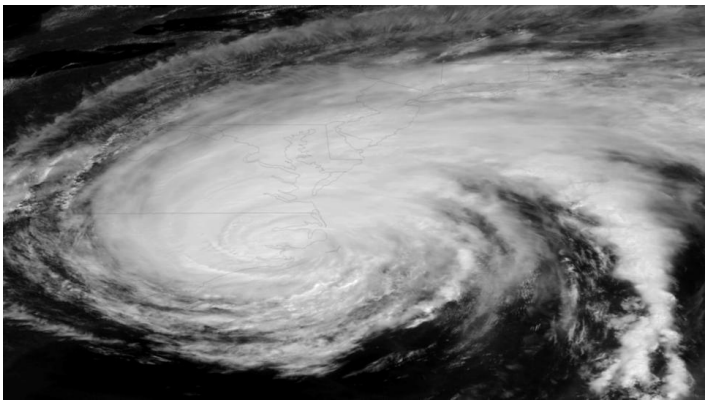
FEMA

A-NPDC

Foreword

Hurricane Irene – August 28, 2011



During the final stages of the completion of the 2011 update to the *Eastern Shore of Virginia Hazard Mitigation Plan*, the Eastern Shore was impacted by Hurricane Irene. The Eastern Shore narrowly missed a direct hit from Irene as the eye of the storm passed just offshore of the seaside sparing the Shore from the strongest winds on the storms eastern side. Initial forecasted models predicted a Category 3 or 4 storm making a direct hit on North Carolina before tracking northward directly up the Chesapeake Bay. This scenario is the worst-case scenario for the Eastern Shore and likely would have resulted in catastrophic and devastating conditions. The Eastern Shore was truly spared from this dire scenario, but the impacts of a nearly direct hit from the Category 1 storm still caused widespread and severe impacts on the Eastern Shore.

Top of Page: Satellite image of Hurricane Irene shortly after landfall at the Outer Banks of North Carolina (image from NOAA). Above: Images of destruction of crab houses at Harborton (left) and Tangier (center) and a fallen tree damaging a house in Accomack County (right) (photos courtesy of Accomack County).

Hurricane Irene's greatest damages occurred to the agriculture and aquaculture industries on the Eastern Shore. Nearly 80% of agricultural damage was attributed to tomatoes. Damage to tomato crops comes with significant secondary field cleanup costs of damaged field stakes that were not considered in the damage summary below.

The initial estimate of primary damages from Hurricane Irene stands at greater than $15 million. Eastern Shore localities have reported thousands of dollars worth of additional damage to property. The secondary impacts of storm water runoff on water quality in the Chesapeake Bay remain to be seen, but it is likely that this will add further damages to the Eastern Shore's aquaculture industry. In addition, the threat of Irene prompted mandatory evacuations for Eastern Shore residents in low-lying areas.

Initial Damage Summary – Hurricane Irene			
	Accomack County	***Northampton County***	***Eastern Shore***
Agriculture	$7.4 M	$6.8 M	$14.2 M
Aquaculture	$0.5 M	$0.5 M	$1.0 M
Total	$7.9 M	$7.3 M	$15.2 M

Source: Virginia Cooperative Extension, Eastern Shore Post

Despite Hurricane Irene occurring too late to completely incorporate its impacts and lessons into the current update of the Eastern Shore of Virginia Hazard Mitigation Plan, it is important and necessary to acknowledge this storm as it serves as a classic example of the severe threat hurricanes pose to the Eastern Shore.

Introduction

This section provides a general introduction to the Eastern Shore of Virginia Hazard Mitigation Plan. The section consists of the following subsections:

- *Background*
- *Purpose*
- *Plan Organization*

Background

Since the 1960s, Congress and the President have been under increasing pressure to organize resources for the nation during large disasters. The government has increasingly turned its attention to the federal response to these types of disasters. In the 1960s, the government created the National Flood Insurance Program to shift some of the costs to those who choose to live in the areas of most risk. In the 1970s, the Federal Emergency Management Agency (FEMA) was created to centralize a great deal of the assistance the federal government offers to states in emergency situations. In the 1980s, the Stafford Act was passed to standardize the federal response and to institute programs to decrease the United States' vulnerability to disasters. In the early '90s, the National Flood Insurance Program was reformed to increase the participation of those most at risk to flooding. Still, disaster assistance costs mounted and the late '80s and early '90s saw some of the largest disasters the country has ever experienced. This included multiple billion dollar events such as Hurricane Hugo, the Loma Prieta Earthquake, the Northridge Earthquake, Oakland wildfire, the Midwest Floods of 1993, Hurricane Andrew and Hurricane Iniki (*Planning for Post-Disaster Recovery and Reconstruction*, 1998).

In October 2000, the United States Congress passed an amendment to the Stafford Act called the Disaster Mitigation Act of 2000. This act seeks to protect lives and property and to reduce disaster assistance costs by mitigation, sustained actions to reduce long-term risk. FEMA has since written regulations based on this act.

Local governments are required to complete a Hazard Mitigation Plan to continue to receive certain types of disaster assistance.

In spring of 2003, the Virginia Department of Emergency Management asked the counties of the Eastern Shore and the Accomack-Northampton Planning District Commission (A-NPDC) to undertake this work and directed the A-NPDC to apply for a Pre-disaster mitigation grant to finance the planning process. The Eastern Shore's plan was originally completed and adopted in 2006 According to 44 CFR Part 78, flood mitigation assistance, and the Disaster Mitigation Act of 2000. The current update to the plan occurred in 2010 and 2011 with the updated plan being adopted in 2011.

As these plans continue to evolve across the country, the understanding of different hazards and hazard planning has expanded to include a broad range of potential disasters and a concept of community resiliency.

The counties and towns of the Eastern Shore of Virginia have worked diligently to complete the following revised Hazard Mitigation Plan, which is presented to address the requirements of the Disaster Mitigation Act of 2000.

Purpose

The purpose of the Eastern Shore of Virginia Hazard Mitigation Plan is to:

- *Ensure the protection of life, safety, and property by reducing the potential for future damages and economic losses that result from hazards;*
- *Make local communities safer places to live, work, and play;*
- *Assist localities in meet the criteria for grant funding prior to and following disasters;*
- *Expedite the recovery and redevelopment process following disasters;*
- *Exhibit a commitment from localities to hazard mitigation in the region; and*
- *Comply with federal and state legislative requirements for hazard mitigation plans.*

Plan Organization

The chapters comprising this document follow the process spelled out in the Disaster Mitigation Act of 2000 and are organized to be both functional and reader-friendly as possible. The organization and intended flow of this document is described in the following sections.

Chapter 1, Hazards on the Shore, provides an overview of the hazards that have historically impacted the region and provides insight into the geographic and geologic setting of the region. A chronology of hazard events documents both pre-historic and historic hazard events that have impacted the Shore.

Chapter 2, Planning Process, narrates a complete description of the process used to prepare the Plan including how the public and other stakeholders were involved and who participated on the Hazard Mitigation Planning Committee.

Chapter 3, Brief Description of Risk, identifies and analyzes the hazards, assesses the risks associated with each hazard that threatens the region, and gauges the capability of available and cost-effective mitigation options for each hazard. This process builds on available historical data, defines detailed profiles for each hazard, and ranks each hazard for associated risk based

on occurrence frequency, affected structures, primary and secondary impacts, and mitigation options. The outcome of this process is a priority ranking of hazards that impact the region.

Chapters 4 through 7 profile the four hazards that were given the highest hazard priority ranking: coastal flooding, storm water flooding, high wind, and coastal erosion. Each chapter provides background information, historical accounts, explanations of potential damages, and vulnerability overviews regarding each of the four high priority hazards.

Chapters 8 through 22 are profiles of each locality that took part in the planning process. The profiles are ordered by location from north to south along the Shore and provide a general description of the community including geographic, physical, demographic, and economic characteristics. In addition; land-use patterns, general historical disaster data, and building characteristics are discussed. These profiles assist local officials and residents by providing baseline information on each community's social, environmental, and economic character that is plays a role in determining community vulnerability to hazards. Maps illustrating areas expected to be impacted by the highest priority hazards are included in the profile chapters for Accomack and Northampton Counties.

Chapters 23 through 27 consist of broad vision and regional goal statements that guide the identification and prioritization of specific mitigation projects for the region and for each local government jurisdiction participating in the planning process. Descriptions for how the plan is to be maintained by government officials are included in the mitigation strategy chapters for Accomack County, Northampton County, and the Town of Chincoteague (Chapters 24, 25, and 26 respectively). Each specific project is assigned a start timeline and a responsible department/person to ensure action is taken to make localities less vulnerable to the damaging forces of hazards, while improving the economic, social, and environmental health of the community. Chapter 27 describes federal mitigation funding options available to localities prior to and following natural disasters. Together, these chapters are designed to make the Plan both strategic through identification of long-term goals and functional through the identification of short-term and immediate actions that will guide daily decision making and project implementation.

Definitions of Frequently Used Mitigation Terms in the Plan

Mitigation Term	***Definition***
Acquisition of Hazard-Prone Structures	Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.
Adaptation	The process of developing traits or habits suitable for sustainment of a given activity
Base Flood Elevation (BFE)	The elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The BFE is used as a standard for the National Flood Insurance Program.
Capability Assessment	An assessment that provides a description and analysis of a community or state's capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.
Community Rating System (CRS)	CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of these policyholders in communities are reduced.
Critical Facilities	Facilities vital to the health, safety, and welfare of the population that are especially important following disasters. These include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris transported by a wind or water hazard event can cause additional damage to other assets.
Disaster Mitigation Act of 2000	The latest legislation to improve the planning process. Signed into federal law on October 30, 2000, this legislation reinforces the importance of mitigation planning and emphasizes planning for disasters prior to their occurrence.
Displacement Time	The average time which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.
Elevation of Structures	Raising structures above the base flood elevation to protect structures located in areas prone to flooding.
Erosion	Wearing away of the land surface by detachment and movement of sediments during a flood or storm through the action of wind, water, or other geologic processes.
Federal Emergency Management Agency (FEMA)	Federal agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. FEMA is currently part of the U.S. Department of Homeland Security.
Flood	A general and temporary condition of partial or complete inundation of normally dry areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation of runoff or surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.
Flood Depth	Height of the flood water surface above ground surface.
Flood Elevation	Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.
Flood Insurance Rate Map (FIRM)	Map of a community prepared by FEMA that shows both the special flood hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study (FIS)	A study that provides an examination, evaluation, and determination of flood hazards and if appropriate, corresponding water surface elevations in a community or communities.

Mitigation Term	***Definition***
Flood Mitigation Assistance (FMA) Program	A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risks of flood damage to buildings, manufactured homes, and other NFIP insurable structures with a focus on repetitive loss properties.
Flood Zone	A geographical area shown on a Flood Insurance Rate Map that reflects the severity or type of flooding in the area.
Frequency	A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a one percent chance, its probability, of happening any given year. The reliability of this information is varies depending on the kind of hazard being considered.
Hazard	A source of potential danger or adverse condition. Hazards include naturally occurring events that strike populated areas and have the potential to harm people or property.
Hazard Event	A specific occurrence of a type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
Hazard Mitigation Grant Program (HMGP)	HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.
Hurricane	An intense tropical cyclone formed in the atmosphere over warm ocean waters, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center, or eye.
Hydrology	The science of dealing with the waters of the earth.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or internet access, vital services such as public water supplies and waste water/sewer treatment facilities, and transportation systems such as airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, rail yards, depots, waterways, seaports, ferries, harbors, dry docks, piers, and regional dams.
Loss Estimation	Forecasts of human and economic impacts and property damage from future hazard events based on current scientific and engineering knowledge.
Lowest Floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.
Magnitude	A measure of strength of a hazard event. The magnitude (also referred to as severity) of a given hazard is usually determined using technical measures specific to the hazard.
Mitigate	To cause something to become less harsh or hostile; to make less severe or painful.
Mitigation Plan	The document that articulates results from the systematic process of identifying hazards, assessing risks, evaluating vulnerability, identifying goals and strategies to reduce or eliminate the effects of identified hazards, and an implementation plan for carrying out the strategies.
Mitigation Strategies	Activities or projects that help achieve the goals and vision of a mitigation plan.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available to communities that enact minimum floodplain management regulations in 44CFR 60.3.

Mitigation Term	***Definition***
National Weather Service (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.
Northeaster	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
Pre-Disaster Mitigation	Mitigation funding program administered by FEMA to provide funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.
Recurrence Interval	The time between hazard events of similar size in a given location that is based on the probability that the given event will be equaled or exceeded in any given year.
Relocation out of Hazard Areas	A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area.
Repetitive Loss Property	A property that is currently insured for which two or more NFIP losses (occurring more than 10 days apart) of at least $1,000 each have been within any 10-year period since 1978.
Replacement Value	The cost of rebuilding a structure. Usually expressed in terms of cost per square foot and reflects the present-day cost of labor and materials to construct a building of a particular size, type, and quality. This is not the same as market value.
Resiliency	The ability to recover from change.
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in terms of such as high, medium, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Special Flood Hazard Area (SFHA)	An area with a floodplain having a one percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with flood zone designations that include the letter A or V.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.
Storm Surge	Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.
Structural Retrofitting	Modifying existing buildings and infrastructure to protect them from hazards.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Tropical Depression	A tropical cyclone with maximum sustained winds of less than 39 mph.
Tropical Storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Tsunami	A series of water waves caused by the displacement of a large volume of a body of water.
Vulnerability	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses rely on uninterrupted electrical power – if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often the indirect effects can be much more widespread and damaging than direct effects.
Vulnerability Assessment	An assessment of the extent of injury and damage that may result from a hazard event of a given intensity in a given area.

List of Acronyms Used in the Plan

ACRONYMS
A-NPDC – Accomack-Northampton Planning District Commission
BFE – Base Flood Elevation
CBBT – Chesapeake Bay Bridge Tunnel
CBPA – Chesapeake Bay Preservation Area
CRS – Community Rating System
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
FIS – Flood Insurance Study
GIS – Geographical Information System
HAZMAT – Hazardous Materials
HIRA – Hazard Identification and Risk Assessment
HMGP – Hazard Mitigation Grant Program
MSC - Marine Science Consortium
NASA – National Aeronautics and Space Administration
NFIP – National Flood Insurance Program
NHC – National Hurricane Center
NOAA – National Oceanic Atmospheric Administration
NOAA CSC – National Oceanic Atmospheric Administration Coastal Services Center
NWS – National Weather Service
RMA – Resource Management Area
RPA – Resource Protection Area
SFHA – Special Flood Hazard Area
USGS – United States Geological Survey
UVA LTER – University of Virginia Long Term Ecological Research
VDEM – Virginia Department of Emergency Management
VDEQ – Virginia Department of Environmental Quality
VDOF – Virginia Department of Forestry
VIMS – Virginia Institute of Marine Science
WFF – Wallops Flight Facility

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Chapter

1

Hazards on the Shore

The Great September Gust of 1821 was for much of the Eastern Shore the worst disaster ever experienced in recorded history. This hurricane caused an ocean recession in the vicinity of the Chincoteague Island. Although not completely understood it is believed that the hurricane may have triggered a landslide on the continental slope causing a tsunami in tandem with the force of the hurricane. This destroyed so many homes that it is unlikely that any of the homes standing today predate this event. In fact, two of the oldest homes on the island were probably erected to replace destroyed houses (*Once Upon an Island*, Kirk Mariner). Flooding caused by hurricanes, northeasters, and tropical storms has proven to be the greatest natural hazard to impact the Eastern Shore.

Cold snaps, wildfires, and high coastal winds have also caused substantial damage to the communities on the Shore. These events have destroyed property, caused extended isolation of communities where provisions such as fuel and food have grown thin and at several times whole industries have been wiped out or dealt such a heavy blow that months or years were necessary to recover. In modern times, investments in real estate, infrastructure, and industry have increased the potential for significant damage and the need for advance planning.

Description of Conditions

Geographic and Geologic Setting. The Eastern Shore is a low-lying peninsula separating two great bodies of water, the Chesapeake Bay and the Atlantic Ocean. The highest elevation on the Shore is in the Town of Melfa in Accomack County at 53 feet above mean sea level. The Eastern Shore of Virginia formed as a southward prograding peninsula that

consists of unconsolidated sediments deposited predominantly in marine conditions during approximately the last 500,000 years. Sea level fluctuations during this time have created the landforms seen on the Eastern Shore today.

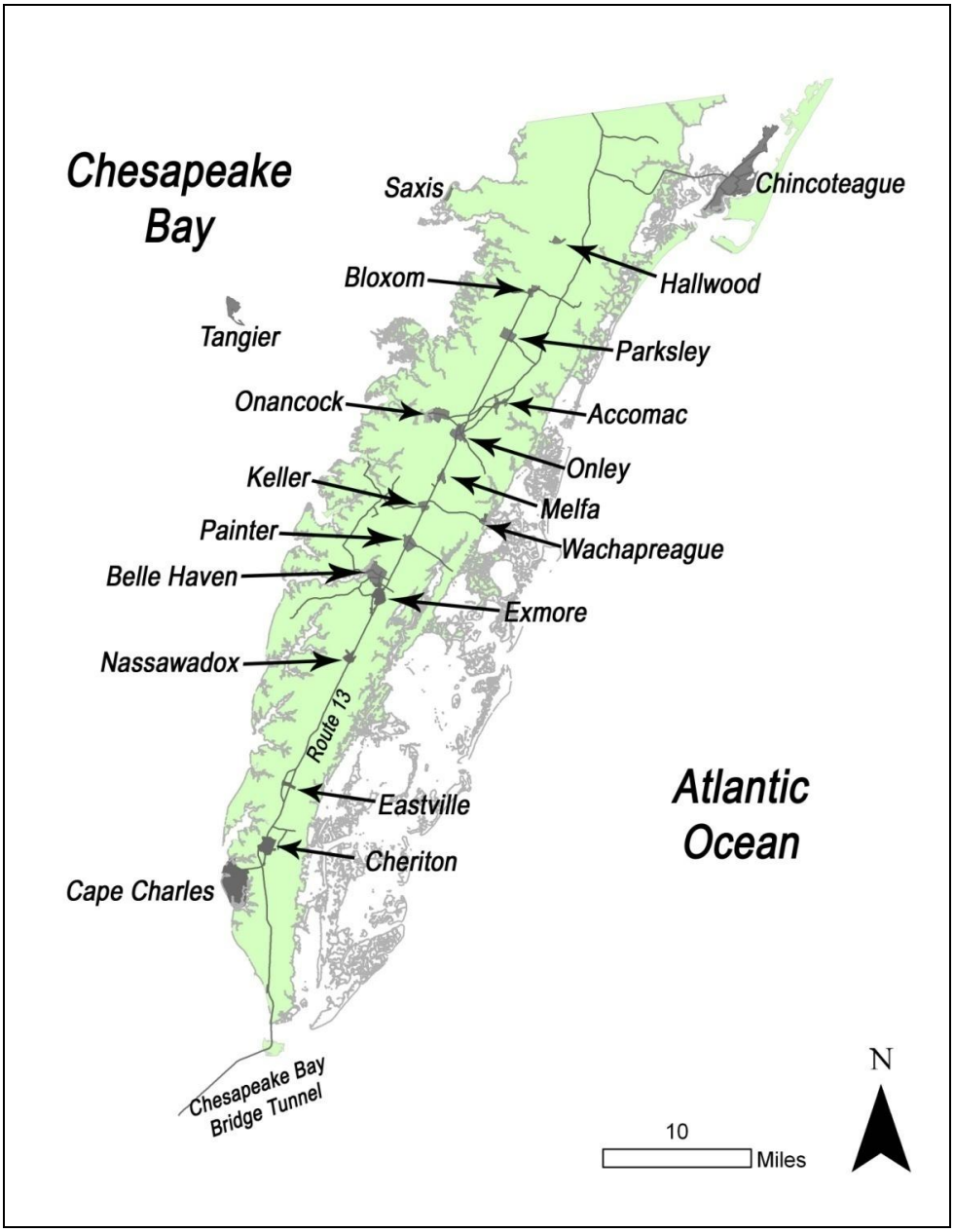


FIGURE 1.1 Vicinity Map of the Eastern Shore of Virginia.

In addition to marine influences on the creation of the peninsula, there were two other phenomena that had a great influence on the geologic

framework of the region: a bolide impact that occurred nearly 35.5 million years ago and the melting and retreat of a massive continental ice sheet.

It has been determined that a bolide, or object from space, struck near the area of what is now Cape Charles nearly 35.5 million years ago towards the end of the Eocene epoch. During this time, sea levels were much higher than today. The coastline existed above the Fall Line and west of the City of Richmond and what is now eastern Virginia lay beneath a shallow sea approximately 100 feet in depth. The impact created a crater twice the size of Rhode Island and generated an enormous tsunami that engulfed the continent, possibly overtopping the Blue Ridge Mountains. The crater, now underlying all of Northampton County and portions of southern Accomack County, and the sediments that have buried it have continuously settled over time, creating increased subsidence of landforms in the region. It is speculated that the subsidence associated with the crater has influenced the geologic evolution of the southern Delmarva Peninsula and southern Chesapeake Bay region.

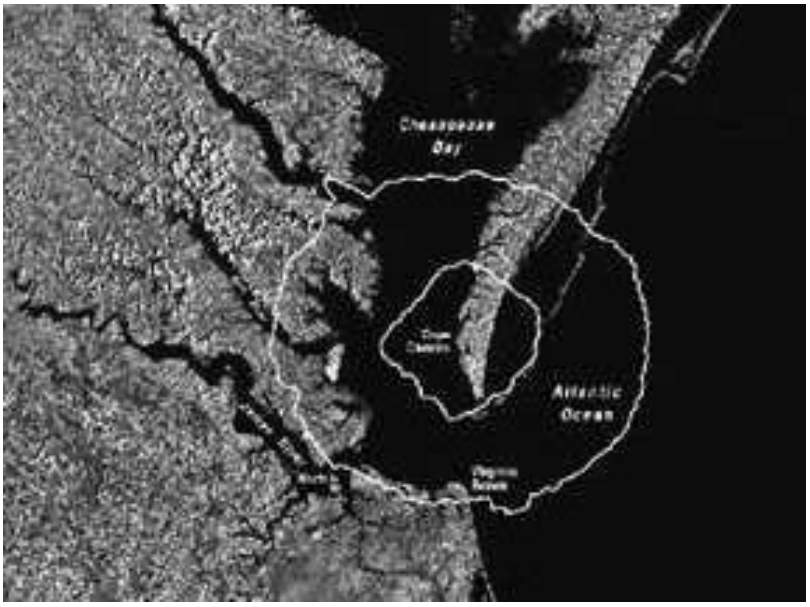


FIGURE 1.2 The inner and outer rims of the Chesapeake Bay Impact Crater (white outlines) underlie approximately the southern half of the Eastern Shore . *Image from USGS Professional Paper 1622.*

The enormous weight of the three to four kilometer thick Laurentide ice sheet that covered most of Canada and a large portion of the northern United States existed from approximately 95,000 to 20,000 years ago

created an extensive forebulge to the south of the ice sheet, causing the unconfined sediments of the coastal plain in Virginia to uplift. As global climate warmed, the ice sheet melted and retreated further northward. The sediments comprising the Eastern Shore responded elastically to this phenomenon causing subsidence in the region. The Eastern Shore is still subsiding today in response to the elastic rebound from the removal of the ice sheet, which is in part causing rates of relative sea level rise to be above average for the Atlantic coast.

Sea level during the last ice age approximately 20,000 years ago receded to a maximum of nearly 400 feet lower than present and the coastline was approximately 65 miles eastward of the modern shoreline at the edge of the continental shelf (NASA Science Briefs: *Sea Level Rise, After the Ice Melted and Today*, 2007). The oldest portions of the barrier island chain along the seaside of the Eastern Shore formed in response to sea level rise and other coastal processes approximately 3,500 years ago.

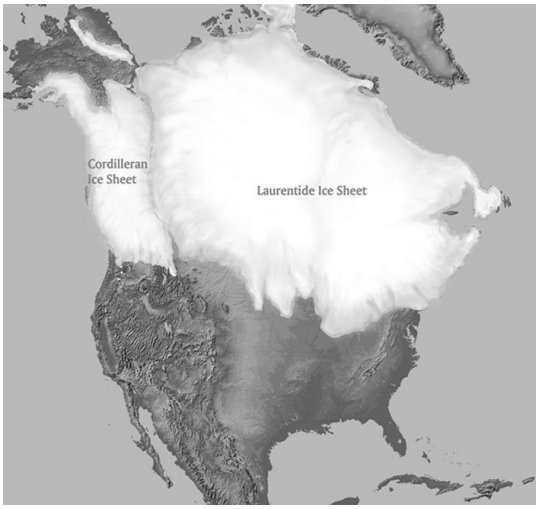


FIGURE 1.3 The tremendous weight of the massive Laurentide Ice Sheet (shown in white) influenced the geologic evolution of the region. *Image from Cosmographic Research Institute, http://www.cosmographicresearch.org/prelim_glacial_maximum.htm, 2009.*

The Chesapeake Bay consists of a series of drowned river valleys that were carved from layers of unconsolidated Coastal Plain sediments during a succession of sea-level fluctuations during the past 200,000 years. There are three main paleochannels (Exmore, Eastville, and Cape Charles) buried beneath the Eastern Shore that still impact groundwater quality and control the locations of some creek basins, coastal inlets, and beach

ridges. The modern Chesapeake Bay began to attain its modern resemblance sometime around 4,000 years ago as sea level had risen to levels where the Susquehanna River valley and its tributaries became partially and completely submerged (Sea Level Rise meeting with the EPA, February 2004).

In addition to the peninsula, uninhabited barrier islands protect the Atlantic coastline. Many of these are part of the Nature Conservancy's Virginia Coastal Reserve. Some islands also exist in the Chesapeake Bay. Many of these islands once held communities but in recent years many have been abandoned in the face of hazards from the sea. Six of the islands still have development in some manner. Chincoteague Island, Wallops Island, Cedar Island, and Hog Island in the Atlantic and Tangier Island and Saxis Island in the Chesapeake Bay.

Chronology of Hazard Events on the Shore

Pre-1564

Inhabitants of the Eastern Shore have historically needed to adapt to the natural hazards that commonly occur in the area. Coastal storms have shaped the shorelines and both created and destroyed landforms on a regular basis. It was not until these natural events began to impact inhabitants' properties and affect local economies, especially during the 20th and 21st Centuries, that they were deemed "hazardous".

1564-1799

Virginia was affected by great storms throughout the 16th, 17th and 18th Centuries. Some 16th century storms were recorded because of the shipwrecks. The first records of these occurred in 1564. Others followed in June 1566, June 1586, August 1587 and August 1591. The June 1586 storm dropped hail and caused waterspouts that threatened Sir Francis Drake's crew. Most information on hurricanes during this time is found in period correspondence as American newspapers were scarce until the middle of the 18th Century. Captain John Smith also noted in his journal in 1608 that he encountered a fierce storm that he described as "such an extreame gust of wind, rayne, thunder, and lightening happened, that with great danger we escaped the unmercifull raging of that Ocean-like water". Newspaper accounts suggest that major coastal storms impacted the Mid-Atlantic region in August 1635, September 1675, and November 1706,

though scarce information is available (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007).

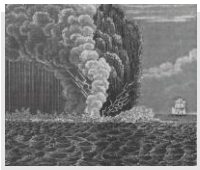
The September 1667 hurricane, called the Dreadful Hurricane of 1667, was a great storm that destroyed at least 10,000 homes in Virginia and demolished the colony of Jamestown (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007). Historic records show that this hurricane and a July 1788 hurricane may have followed a similar track to the 1933 hurricane, which caused massive devastation on the Eastern Shore. Twelve days of rain accompanied the storm, potentially indicating a second storm skirting the coast. A storm that struck in October 1693 is named the Accomack Storm in reference to the only surviving account of the storm by a Mr. Scarburgh who was a resident of the Eastern Shore. Mr. Scarburgh wrote:

> *"There happened a most violent storme in Virginia, which stopped the course of the ancient channels, and made some where there never were any: So that betwixt the bounds of Virginia and Newcastle in Pennsylvania, on the seaboard side, are many navigable rivers for sloops and small vessels."* – Letter by a "Mr. Scarburgh" *(Transactions of the Royal Society*, 1694*)*

There is little other information available from the Accomack Storm, but it can be inferred from this account that a considerable amount of erosion occurred in the region (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007).

In October 1703, an early snowstorm heralded the arrival of a hurricane just days later. The Great Gust of August 1724 actually refers to a pair of hurricanes that struck just days apart in the Chesapeake Bay region. The October 1749 storm was a great disaster for Virginians. Besides creating Willoughby Spit in Norfolk, the storm flooded the City of Hampton with four feet of water and bodies from shipwrecks washed up for days after the storm (*Virginia Hurricanes*, VDEM). Accounts estimate the storm surge from this powerful storm to be approximately 15 feet in the Chesapeake Bay (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007). A storm of this magnitude would be catastrophic to the Eastern Shore. The Great Chesapeake Bay Hurricane of September 1769, the Great Coastal Hurricane of 1785, George Washington's Hurricane of July 1788, and a pair of hurricanes that occurred within 10 days in August 1795 all terrorized the Chesapeake Bay region and rank among the strongest

storms during the 18th Century (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007).



The 19th Century

As newspapers became more widespread throughout the Mid-Atlantic, accounts of storm events became increasingly accurate. However, a series of powerful storms continued to wreak havoc on the Virginia coast during the 19th Century.

The Great September Gust of 1821, also known as the Norfolk and Long Island Hurricane passed over the Eastern Shore likely as a Category 2-strength hurricane. Accounts from Eastern Shore residents indicated that the storm covered Tangier Island with at least three feet of water; destroyed houses, trees, and crops at Bradfords Neck near Quinby; and potentially unleashed a tsunami that destroyed Assateague and Chincoteague, killing five residents in the process (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007). After the Great September Gust of 1821, hurricanes and other storms swept up the Virginia coast. The residents of Smith Island reported to Second Lieutenant Robert E. Lee that the April Gale in 1831 nearly covered all of Smith Island with seawater. The Great October Gale of 1878 completely inundated Smith and Cobb Islands located in Northampton County. The April 1889 storm came from the east and inundated the Island of Tangier for 48 hours (*Seashore Chronicles*, Brooks Miles Barnes & Barry R. Truitt). In October 1891, the proximity of two tropical storms and a hurricane created treacherous coastal currents and surf that sank the presidential yacht of President Benjamin Harrison off of the coast of Assateague Island (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007). During January 1893, the Eastern Shore suffered extreme cold, the Town of Accomac had 14 inches of snow and men could walk from Chesconessex to Watts Island (*Seashore Chronicles*, Brooks Miles Barnes & Barry R. Truitt). In October 1897, a tropical storm that lingered off Virginia for three days submerged Chincoteague, Cobb, Cedar, and other islands along the Seaside. The storm surge from this storm equaled that of the Great October Gale of 1878 (*Hurricanes and the Mid-Atlantic States*, R. Schwartz, 2007).

The 20th Century. Major storms have continued to strike the Eastern Shore throughout the 20th century. The century started with three relatively quiet decades after the tremendous damages that occurred during the 1890s. The 1930s would change that trend.

Chesapeake-Potomac Hurricane – August 1933

The Chesapeake-Potomac Hurricane of 1933, also called the August storm, wreaked much havoc on the various communities of the Eastern Shore. The sea broke over Assateague Island in 25 foot waves. On Chincoteague, Main Street was flooded (*The Great Hurricane of 1933*, Assateague Naturalist, www.assateague.com). On the Eastern Shore, 6 people died. Much of Tangier Island was inundated and children jumped from second floor windows to swim. When the water receded parts of the island were gone (*God's Island: The History of Tangier*, Kirk Mariner). In addition, the Towns of Cape Charles, Chincoteague, Wachapreague and villages of Willis Wharf and Kiptopeke all were flooded. In September, another hurricane followed causing more damage. The September 1936 hurricane caused heavy damage to agriculture and aquaculture. Oyster beds were damaged. Late crops were destroyed and some 60,000 broiler chickens were killed. By the time this succession of major storms occurred during the 1930s, eel grass, which is a critical habitat for clams, oysters, and bay scallops in the coastal bays along the seaside of the Eastern Shore had been decimated by widespread disease. The succession of storms likely was the main factor in wiping out the eel grass population that were remaining following the pandemic. The industries associated with these hardshell varieties suffered greatly or disappeared altogether. Nearly 70 years later, in thanks to the largest seagrass restoration project in the world, eel grass is beginning to flourish once again in the seaside coastal bays.

FIGURE 1.4 Flooding on Randolph Avenue, 3 ½ blocks from the Chesapeake Bay, in Cape Charles from one of the 1930s hurricanes. *Photo printed in the Army Corp of Engineers Flood Plain Report for Cape Charles*

Hurricane Hazel – October 15, 1954
Hurricane Hazel's eye tracked through the center of Virginia and she caused a great deal of damage over the entire state. She caused a storm surge of 3 to 7.5 feet that caused extensive erosion. Electric lines were damaged and many were without power (*Flood Reports of the 1962 Ash Wednesday Storm*, USACE).

Northeaster of October 1957
The northeaster caused tides in the Town of Wachapreague four feet above normal. Many boats were sunk. The storm also caused wind gusts of 70 mph and caused a great deal of rain (*Flood Reports of the 1962 Ash Wednesday Storm*, USACE).

Hurricane Donna – September 1960
Hurricane Donna struck the Eastern Shore with damaging winds that gusted upwards to 105 mph, storm surges, and heavy rains. Much of the damage was concentrated on the bayside. Flooding occurred in Cape Charles, Bayford, Onancock and other areas on the Chesapeake Bay. She was considered the most destructive storm since accurate weather records began in 1840 (*Flood Reports of the 1962 Ash Wednesday Storm*, USACE).

Ash Wednesday Storm – March 6-8, 1962
The Ash Wednesday storm was a northeaster that moved north over the Eastern Shore and then reversed course moving south. Coastal flooding continued for several days. There was flooding on Chincoteague's Main Street with waves from Chincoteague Bay breaking on the High School and splashing the roof. In all on the island, five homes were destroyed, and almost 1,000 homes were inundated by floodwaters. One hundred of the famous Assateague ponies were killed in this storm. This storm also dealt a deathblow to the poultry industry on Chincoteague. The seafood industry, while damaged, would survive this northeaster. Many other coastal communities also were flooded during this storm (*Flood Reports of the 1962 Ash Wednesday Storm*, USACE).

FIGURE 1.5 Flooding during the Ash Wednesday Storm of 1962. *Photo printed in the Army Corp of Engineers Flood Plain Report for Wachapreague*

Northeaster of March 28-29, 1984

The storm dealt a harsh blow to Virginia and in particular Accomack County. This winter storm produced rain in the Tidewater area of Virginia. The storm's track over the lower Chesapeake Bay caused the worst tidal flooding in Accomack County since the 1962 Ash Wednesday storm. Gusts of 50 mph were recorded and towns on the bayside were inundated with water. Saxis and Onancock were inundated with as much as 5 feet of water. Tangier Island had a foot of water over 75% of the island. East Point, Chesconessex, Mears and Sanford were all flooded (Accomack County Community Rating System application).

Hurricane Gloria – September 1985

Hurricane Gloria brushed past the Eastern Shore causing $2 million in damage to Accomack County. She was a Category 2 hurricane that caused wind gusts and rain but did not directly strike the area (Accomack County Community Rating System application).

Halloween Northeaster – October 1991

This storm, known as the Halloween Storm or the Perfect Storm, hit the Eastern Shore unexpectedly. It caused extensive damage to the barrier

islands. Many piers and a motel were destroyed by the storm. Many residents did not react in time to keep themselves from being stranded by the storm (Accomack County Community Rating System application).

Hurricane Fran – September 1996
Hurricane Fran hit Virginia as a tropical storm. She created damaging winds across the Eastern Shore and also spurred tornados that touched down during the storm (Accomack County Community Rating System application).

Twin Northeasters – February 1998
The Twin Northeasters created a great deal of damage. Roofs were damaged by strong winds and many areas were flooded by storm water. After the two storms moved out standing water remained on much of the Eastern Shore. The fields along Route 13 appeared to be lakes. During the storms, half of Chincoteague was submerged and many Tangier residents could not remember a storm with higher tides (Accomack County Community Rating System application).

Hurricane Floyd – September 1999
The end of the century did not leave quietly. Hurricane Floyd struck the Eastern Shore after it had weakened substantially and still caused a great deal of bayside flooding. Three hundred buildings had flood damage from a 7-foot storm surge. Over the course of the storm, the peninsula received 10 to 20 inches of rain creating a great deal of storm water flooding (Accomack County Community Rating System application).

The 21st Century

Despite advancements in modern technology and understanding of coastal storms, the residents of the Eastern Shore still face the same hazards in the 21st Century that have plagued residents throughout history.

Hurricane Isabel – September 2003
As Hurricane Isabel approached the Eastern Coast as a Category 4 hurricane, Virginians avidly checked her progress. When she got to the coast her highest winds considerably reduced in speed but her dangerous hurricane and tropical force winds dramatically expanded over a huge area. On September 18, 2003, Hurricane Isabel made landfall near Ocracoke Inlet, NC and quickly moved into Virginia. Her path was quite

similar to Hazel in 1954. For 29 hours, tropical storm force winds battered much of Virginia. Virginia suffered extreme tree damage and power outages over large sections of the state. In Hampton Roads, the outages lasted up to 2 weeks for some. During the height of the storm, 2 million Virginians were without power. Other heavily damaged places or remote locations were out for over a month. In the end it was estimated that Hurricane Isabel had generated an overwhelming 20 million cubic yards of debris and destroyed or heavily damaged thousands of homes and businesses.

On the Eastern Shore, the storm surge inundated many communities on the seaside and bayside of the peninsula. Wachapreague, Oyster, Tangier and Saxis all experienced significant coastal flooding. The Town of Wachapreague's tide monitor was swept away; the Chesapeake Bay Bridge-Tunnel registered a surge of 7.4 feet and at Kiptopeke the surge registered at 6.4 feet. Other hazards also caused damage to the Eastern Shore. Farmers lost crops due to salt spray caused by the high winds associated with the hurricane and this same salt coated the power lines causing power outages until precipitation after the hurricane washed the salt off the lines (Local oral accounts of the storm).

Tropical Depression Ernesto – August/September 2006

Ernesto made landfall on August 31, 2006 in North Carolina near the South Carolina border as a very strong tropical storm that was just shy of hurricane status. Following landfall, she travelled northward through North Carolina and approached southern Virginia on September 1, 2006 as a tropical depression bringing heavy rainfall that peaked on the Eastern Shore at 8 inches in Chincoteague. The storm surged coastal waters on the Shore between 5 and 7 feet causing damages to boats and docks, flooding several homes, and eroding shorelines. Despite being classified as a tropical depression, Ernesto interacted with a strong weather front over the western Atlantic Ocean to produce a tight pressure gradient, resulting in strong winds that peaked at 87 mph near the mouth of the York River. The strong wind gusts downed numerous trees causing widespread power outages that left 49,000 residents without power on the Maryland and Virginia Eastern Shore. Total damage in the United States was estimated at $500 million with $118 million in damages occurring in Virginia and an estimated $27 million in Accomack County (*Tropical Storm Ernesto Post Storm Report*, NWS, 2006).

FIGURE 1.6 Storm water flooding on U.S. Route 13 during Tropical Depression Ernesto in 2006. *Photo by Jay Diem, Eastern Shore News.*

Northeasters of November & December 2009

Two northeasters struck the Eastern Shore towards the end of 2009. The November storm produced high winds and heavy rains across the Shore that caused power outages, damaged trees, and flooded roadways. The storm persisted over several tidal cycles and caused extensive coastal flooding. A local emergency was declared in the Town of Chincoteague where wind gusts of 50 to 70 mph, 13 inches of rain, and 4 to 5 foot storm surges battered the island and overtopped the causeway to the island. Overwash on Assateague Island caused approximately $450,000 in damages to parking lots at the Chincoteague National Wildlife Refuge. The Eastern Shore was still saturated from the November storm when a second northeaster struck in December. The December storm brought damaging winds and a storm surge, but its greatest impact came in the form of ice. Ice accumulations totaled up to an inch in places on the Eastern Shore causing widespread power outages that left some without power for up to 10 days.

Modern Storm Tracking.

Advances in modern technology have allowed for improved weather forecasting and storm tracking. Residents of the Eastern Shore are provided more information on approaching weather events from multiple

media outlets including television, internet, and radio with the end result being increased hazard preparedness.

In addition, the Wallops Flight Facility in northern Accomack County is home to the NOAA Wallops Command and Data Acquisition Station, which is one of only two facilities of this type in the world. This facility provides accurate weather data to the entire nation and also has a global reach, monitoring natural phenomena such as sea surface temperatures, forest fires, ice bergs in shipping lanes, hurricanes, tsunamis, and earthquakes, among others around the world.

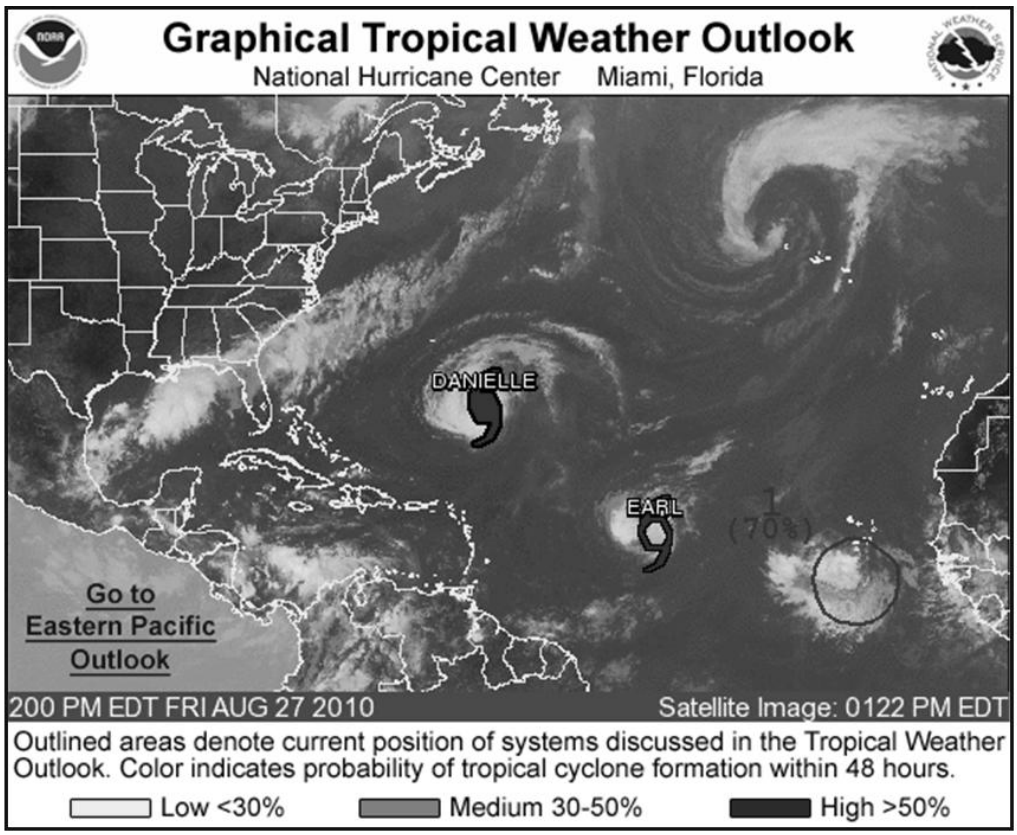


FIGURE 1.7 An example of modern storm tracking data from the NOAA Wallops Command and Data Acquisition Station at the Wallops Flight Facility in northern Accomack County. *Courtesy of NOAA.*

Chapter

2

Planning Process

The Accomack-Northampton Planning District Commission (A-NPDC) staffed the Eastern Shore Hazard Mitigation Planning Committee. A-NPDC Staff members coordinated all Committee meetings and drafted the plan based on the Committee's work. Staff also reviewed various documents and presented that material to the Committee. These documents included local historical books, Army Corps of Engineer Flood Reports of storms that struck the Eastern Shore, applicable sections of the Building Code, FEMA's Coastal Construction Manual, NOAA and USGS data, historical information and technical information available through various government websites such as the National Wildlife Refuge on Assateague Island and the Virginia Department of Emergency Management, local town and county plans, Saxis Erosion Study, and Accomack County's Community Rating System (CRS) application materials. Staff also listened to local accounts of various hazard events.

For the current update to the plan, the Committee reformed in January 2010 to update the Hazard Identification and Risk Assessment. Local governments, including the counties and towns, appointed members to serve on the Committee. Other entities such as the Virginia Eastern Shore Land Trust and the Nature Conservancy were invited to join the Committee. The Committee reviewed and updated plan materials and draft documents; identified, updated and prioritized mitigation projects; and approved the final draft document. All work was presented to the public through a series of press releases and public presentations of the information. The Committee then began work on completing an updated draft of the Plan and once finalized, the draft of the updated plan was submitted to the Virginia Department of Emergency Management and the Federal Emergency Management Agency.

In addition, 30 GIS users associated with planning for flood inundation representing academic institutions; non-profit coastal management agencies; and local, state, and federal government agencies participated in a Coastal Inundation Mapping Course in August 2011. The NOAA Coastal Services Center directed this two-day, computer intensive training course that provided essential skills for inundation mapping on the Eastern Shore. The end result of this training was extensive improvement for flood mitigation planning on the Eastern Shore of Virginia.

FIGURE 2.1 The Eastern Shore of Virginia Coastal Inundation Mapping Course provided coastal managers and planners extensive training on inundation mapping techniques and mitigation mapping. *Photo by Curt Smith.*

2011 Update Committee Members

Sandra Benson	Director of Planning, Northampton Co.
Dan Bilicki	Zoning Administrator, Town of Wachapreague
Jeb Brady	Code Official, Town of Cape Charles
Kimberly Cathell	Mayor, Town of Bloxom
Gary Fisher	Interim Building Official, Northampton Co.
Marshall Cox	Resident, Northampton Co.
Denise Drewer	Mayor, Town of Saxis
David Eder	Town Sergeant, Town of Eastville
Dave Engelhart	Zoning Administrator, Town of Onley
James Eskridge	Mayor, Town of Tangier
David Fluhart	Director of Building and Zoning, Accomack Co.
Peter Henderson	Executive Director, Virginia Eastern Shore Land Trust
Sandy Manter	Town Manager, Town of Onancock
Fred Matthews	Public Works and Zoning Official, Town of Parksley
Robert Meyers	Resident, Northampton Co.
Artie Miles	Town Manager, Town of Exmore
Ginny Mueller	Mayor, Town of Keller
Bill Neville	Town Planner, Town of Chincoteague
Steve Parker	Director, The Nature Conservancy
Sara Seaman	Deputy EM Coordinator, Accomack Co.
Charles Tull	Mayor, Town of Saxis
Renee Tyler	Town Manager, Town of Tangier
Connie Wilson	Vice Mayor, Town of Hallwood

Other Participants

John Aigner	Community Development Coordinator, Accomack-Northampton Planning District Commission
Robert Barnes	Town Clerk, Town of Bloxom
Thomas Beasley	Vice Mayor, Town of Bloxom
Denise Bernard	Town Clerk, Town of Parksley
Tom Bonadeo	Town Planner, Town of Cape Charles
Hollye Carpenter	Emergency Services Coordinator, Northampton Co.
Will Cumming	Interim Town Manager, Town of Onancock
Jim Eichelberger	Vice Mayor, Town of Parksley
Jake Foerster	Vice Mayor, Town of Saxis
Bruce Herbert	Code Enforcement Officer, Accomack Co.
Katie Nunez	County Administrator, Northampton Co.
Curt Smith	Regional Planner, Accomack-Northampton Planning District Commission
Peter Stith	Long Range Planner, Northampton Co.

Public outreach efforts. Three articles describing the Eastern Shore Hazard Identification and Risk Assessment were written for the Regional Update for February, April and July 2004 and sent to 603 businesses, local and state government officials and private citizens. One citizen responded to the July article on the release of the first draft of the Eastern Shore Hazard Identification and Risk Assessment. He had suffered from storm water flooding in the Great Bloxom

Flood of 2003. He contributed his experience of the local flooding situation and pictures of the flood for inclusion in the final draft. A booth on flood damage and the Eastern Shore Hazard Identification and Risk Assessment was also presented at the 2004 Watershed Festival at Silver Beach.

Summation of public planning process. The following documents the efforts made to generate interest, opinion and comments about the Eastern Shore Hazard Identification and Risk Assessment and Hazard Mitigation Plan.

The Public in Accomack County: The public were invited to participate in each of meeting of the Hazard Mitigation Planning Committee and time was allotted at the end of each meeting specifically to solicit input from residents. Residents were also encouraged to provide input by reviewing the plan, which was available on the A-NPDC website at www.a-npdc.org. A public presentation was given at the Accomack County Board of Supervisors meeting in September 2011. Approximately 50 people were in attendance. Presentations were also made to the public at Town council meetings in Chincoteague and Saxis. The *Eastern Shore News* (circulation 9,589) published an article entitled "Study shows Accomack's flooding hazards" on the front page of the October 8, 2011 edition describing the findings of the 2011 Hazard Identification and Risk Assessment for Accomack County.

The Public in Northampton County: The public were invited to participate in each of meeting of the Hazard Mitigation Planning Committee and time was allotted at the end of each meeting specifically to solicit input from residents. Residents were also encouraged to provide input by reviewing the plan, which was available on the A-NPDC website at www.a-npdc.org. Northampton County appointed two citizens to serve on the Eastern Shore Hazard Mitigation Planning Committee. A public presentation was given at the Northampton County Board of Supervisors meeting in September 2011. Approximately 50 people were in attendance. Another presentation was given to the Town council of Cape Charles.

Businesses: The Eastern Shore Chamber of Commerce was invited to appoint a representative staff member to the Eastern Shore Hazard Mitigation Planning Committee, but declined due to limited staff resources and availability.

Academia: The Eastern Shore Community College was invited to appoint a member to the Eastern Shore Hazard Mitigation Planning Committee, but declined due to limited staff resources and availability. Researchers from local research laboratories including the Virginia Institute of Marine Science and the University of Virginia's Long Term Ecological Research Laboratory participated in a Coastal Inundation Mapping Course.

Government Agencies: Representatives of the Chincoteague and Eastern Shore of Virginia National Wildlife Refuges (ESVA-NWR) were valuable resources during the Hazard Identification and Risk Assessment process. Staff from the ESVA-NWR, the Virginia Coastal Zone Management Program, and the NASA-Wallops Flight Facility participated in a Coastal Inundation Mapping Course.

Non-profit Interests: The Nature Conservancy and the Virginia Eastern Shore Land Trust appointed members to the Eastern Shore Hazard Mitigation Planning Committee. These representatives were vital components during the Hazard Identification and Risk Assessment and mitigation strategy development processes. The Nature Conservancy also participated in the Coastal Inundation Mapping Course.

Neighboring Jurisdictions: Drafts of the Eastern Shore Hazard Mitigation Plan were sent to the planning departments of Somerset County, Maryland and Worcester County, Maryland, the only two Maryland Counties that border Accomack County.

Chapter

3

Risk Assessment

At the initial Eastern Shore Hazard Mitigation Planning Committee meeting, sheets from the FEMA publication, *State and Local Mitigation Planning*, How-to Guides were passed out. Members reviewed these sheets and listed all the hazards on the sheets that affect the Eastern Shore and some unique hazards that were not listed including:

- **Coastal Flooding**
- **Storm Water Flooding**
- **High Wind**
- **Coastal Erosion**
- **Ice-Snow**
- **Sewage Spills**
- **Drought**
- **Wildfire**
- **Hazmat Incidences**
- **Heat Wave**
- **Biohazards**
- **Well Contamination**

The Eastern Shore Hazard Mitigation Planning Committee utilized five criteria to rank the hazards from highest to lowest priority. Those five categories included probability based on past events, number of structures damaged, primary impacts, secondary impacts and potential mitigation options. The following definitions were agreed upon to use as a standard for evaluation of all the hazards.

Probability
Frequency of occurrence based on historical data of all potential hazards
Level
1 Unlikely (less than 1% occurrence: no events in the last 100 yrs)
2 Likely (between 1% and 10% occurrence: 1 - 10 events in the last 100 yrs)
3 Highly Likely (over 10% occurrence: 11 events or more in the last 100 yrs)

Affected Structures
Number of structures affected
Level
1 Small (limited to 1 building)
2 Medium (limited to 2-10 buildings)
3 Large (over 10 buildings)

Primary Impacts
Based on percentage of damage to typical structure or industry in the community
Level
1 Negligible (less than 3% damage)
2 Limited (between 3% and 49% damage)
3 Critical (more than 49% damage)

Secondary Impacts
Based on impacts to the community at large
Level
1 Negligible (no loss of function, no displacement time, no evacuations)
2 Limited (some loss of function, displacement time or evacuations)
3 Critical (major loss of function, displacement time or evacuations)

Mitigation Options
Number of cost effective mitigation options
Level
1 Few (0-1 cost effective mitigation options)
2 Several (2-3 cost effective mitigation options)
3 Many (over 3 cost effective mitigation options)

TABLE 3.1 Prioritization Criteria for Hazards on the Eastern Shore.

The Eastern Shore Hazard Mitigation Planning Committee then prioritized and ranked these hazards based on the preceding criteria.

In the general discussion of the hazards, the Committee determined that well contamination is usually the result of secondary effects of coastal or storm water flooding. For this reason, a discussion of this hazard will be included with the coastal flooding profile. The four hazards that have the highest priority are coastal flooding, high wind, storm water flooding, and coastal erosion. The following table represents the Committee's prioritization criteria and how each individual hazard was ranked.

Hazard Type	Probability	Impacts			Mitigation Options	Total Score	Hazard Priority
		Affected Structures	Primary Impact	Secondary Impact			
Coastal Flooding	3	3	3	3	3	15	High
High Wind	3	3	3	3	3	15	High
Storm Water Flooding	3	3	3	2	3	14	High
Coastal Erosion	3	3	3	1	2	12	High
Ice-Snow	3	1	2	3	2	11	Medium
Sewage Spills	3	1	2	2	3	11	Medium
Drought	3	1	3	2	2	11	Medium
Wildfire	3	1	1	1	3	9	Medium
Hazmat Incidents	3	1	1	2	1	8	Low
Heat Wave	3	1	1	1	1	7	Low
Biohazards	2	1	1	2	1	7	Low
Well Contamination	3	1	-	-	-	-	-

HIGH *12-15*
MEDIUM *9-11*
LOW *5-8*

TABLE 3.2 Prioritization worksheet for Hazards on the Eastern Shore.

Definitions of Hazards on the Eastern Shore

High Priority Hazards.

Coastal Flooding – These events are highly likely, affecting large numbers of buildings, infrastructure, and people. Damages can be critical with buildings suffering over 49% damage from these events. These events are also typically very disruptive to the region causing major displacement and evacuations.

Storm Water Flooding – These events are highly likely, affecting large numbers of buildings, infrastructure, and people. Damages can be critical with buildings suffering over 49% damage from these events. These events are also typically disruptive to the region causing some displacement and evacuations.

High Wind – These events are highly likely, affecting large numbers of buildings. This hazard received the maximum available score during the current update, surpassing storm water flooding and tying coastal flooding. Damages were considered to be limited during development of the original plan in 2006, but the current update considered damages to be critical with buildings suffering over 49% damage from these events. These events are also typically disruptive to the region causing some displacement and evacuations.

Coastal Erosion – Erosion is considered to be highly likely, affecting large numbers of buildings. Damages can be critical with buildings suffering over 49% damage from these events. These events are not typically disruptive to the region.

Medium Priority Hazards.

Ice/Snow –The probability of winter weather events rose to highly likely during the current update, but these hazards affect small numbers of structures. Ice and snow are considered to cause limited damage to the structures on the Eastern Shore. Winter weather is very disruptive to the region, causing major loss of function to the area's commercial businesses, schools, shellfish harvesting industry, and aquaculture industry.

Sewage Spills – This hazard was considered during the original 2006 plan, but did not receive a score. The current update considers sewage spills to be highly likely with a small number of structures affected by an event. These events cause limited damages to structures and cause limited disruption to the region. The committee considers there to be over 3 cost effective options for mitigating these events.

Drought – This hazard was considered likely during the original 2006 plan, but has been elevated to highly likely for the current update with a small affect on the built environment. Droughts cause critical damages to the water supply for farmers and residents. Crop loss is especially damaging to the regional agriculturally-based economy and is a secondary impact of

drought. These events are also typically disruptive to the region causing some loss of individual water supply wells.

Wildfires – These events were considered to be low priority originally, but have been elevated to medium priority for the current update. These events are considered highly likely but affect small numbers of structures. Wildfires generally cause negligible damage to the larger wood product industry. These events are not typically disruptive to the region.

Low Priority Hazards.

Hazmat Incidents – These events are elevated to highly likely for the current update, but affect almost no structures. They cause negligible damage to the structures on the Eastern Shore and are moderately disruptive to the region.

Heat Waves – These events are very likely but generally do not affect the built environment. Heat waves cause negligible damages to structures and industries in the community. These incidents are not typically disruptive to the region.

Biohazards – These events include algal blooms and fish kills and are considered to be likely. They have little impact on structures and cause short-term disruption to the fishing industry. Biohazards have limited impact on the community at large.

Risk Descriptions

The Eastern Shore Hazard Mitigation Planning Committee members prioritized the hazards based on primary and secondary impacts, probabilities that the event would occur again and cost effective mitigation options. Four hazards are considered high priority hazards under the criteria. Hazards ranked as medium or low priority are not considered in substantial detail since mitigation options either do not exist or the mitigation options are not as cost effective as the high priority mitigation options. On the Eastern Shore, mitigating damages from ice-snow events, sewage spills, drought, wildfire, Hazmat incidents, heat waves, or biohazards are not as cost effective as mitigating damages from coastal flooding, storm water flooding, coastal erosion, and high wind events, which cause extensive disruption and damage.

Chapter

4

Coastal Flooding

Hazard. Coastal high water threatens the shoreline and low-lying areas of the Eastern Shore several times a year. The three causes of high water are astronomical high tides, high water from atmospheric events, and storm surge. Astronomical tides do not typically cause dangerous coastal flooding, but astronomically high tides in tandem with storm surge or onshore winds can exacerbate coastal flooding.

Astronomical high tides are caused by the gravitational pulls of the moon and sun that are asserted on the earth. Gravity is a force that is affected by distance and since the moon is closer to the earth, it has a greater effect than the sun. The moon's gravity pulls the liquid ocean water toward a place on the earth directly below its orbit. This bulge of water moves across the earth remaining in place below the moon as the earth rotates causing a high tide. The other tide is the result of a bulge of water on the opposite side of the earth. Here the moon's gravity is weakest and water circulating on the earth will resist the change in the direction caused by the earth's rotation. As this water tries to flow off the earth, a bulge is created. As the earth rotates, the bulge remains, causing another high tide as each part of the earth passes through it (Verbal Communication, Prof. Arthur Snoke, Virginia Tech).

The sun creates solar tides in the same manner. Periodically, special astronomical tides will occur that relate to the position of the earth, moon and sun. When the moon is totally dark it is called the new moon. This indicates that the moon is directly in-between the earth and the sun. When the moon is fully visible, it is called the full moon. The full moon indicates that the earth is between the moon and the sun. Either of these configurations causes the two opposing bulges of water to be larger than usual. The tides generated are called spring tides. The first and third quarter moons, lit up as half of a circle, occur when the moon is at right

angles to the earth and the sun. Thus, the force of gravity is cancelled out causing smaller bulges of water. The tides generated during this scenario are called neap tides (Verbal Communication, Prof. Arthur Snoke, Virginia Tech).

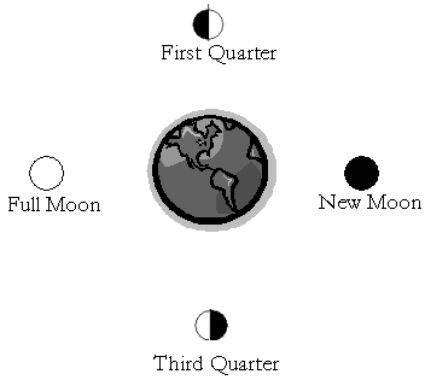


FIGURE 4.1 Phases of the Moon.

Perigee – the point on the elliptical orbit where the Moon is closest to the Earth

Apogee – the point on the elliptical orbit where the Moon is farthest from the Earth

In addition to the earth's rotation under the moon, the moon is orbiting the earth. This orbit is an ellipse and has points where the moon is closer and farther away from the earth. Since gravity is affected by distance, this orbit causes other special tides. When the moon is at the perigee and is closest to the earth, it causes a larger dome of water than usual on both sides of the earth. Thus, the perigean tide is a larger tide. Conversely, when the moon is at the apogee and is farthest from the earth, the bulge of water is smaller and the apogean tides lower. When these tides correspond with spring or neap tides, extremely high or low tides can occur (Verbal Communication, Prof. Arthur Snoke, Virginia Tech).

The high tides are of greatest interest for the purpose of examining coastal flooding hazards to the Eastern Shore. Spring tides occur approximately 24 times a year and perigean spring tides occur approximately twice a year. These tides play a huge role in the damage seen during storms and various atmospheric conditions that cause high water.

Storm	***Phase of the Moon***	***Perigee/Apogee***
September 3, 1821 (The Great September Gust)	First Quarter (Neap Tide)	Apogee
August 23rd, 1933 (The Chesapeake-Potomac Hurricane)	Waxing Crescent – 3 Days from the New Moon (Spring Tide)	In between
October 15, 1954 (Hurricane Hazel)	Waning Gibbous – 3 Days from the Full Moon (Spring Tide)	2 Days after the Perigee
March 6th-8th, 1962 (The Ash Wednesday Storm)	New Moon (Spring Tide)	Perigee
September 15th-16th, 1999 (Hurricane Floyd)	Waxing Crescent – 6 Days from the New Moon and 2 Days to the First Quarter (Neap Tide)	Apogee
September 18th, 2003 (Hurricane Isabel)	Waning Gibbous – 8 Days from the Full Moon and 1 Day to the Third Quarter (Neap Tide)	Apogee
NOTE: The Ash Wednesday storm occurred during a perigean spring tide. Both the new moon and the perigee occurred on March 6th, 1962 the first day of the storm.		

TABLE 4.1 Historic summary of storms showing the moon/tide phase occurring during landfall/storm approach.

The magnitude of the tidal change is great. For example at Wachapreague on the seaside, the difference in tides from the lowest tide to the highest tide over the course of the year 2004 is 6.8 feet. The average change over the course of a day is 4.3 feet. It is easy to see from the magnitude of these numbers that a moderate storm surge occurring with a perigean spring tide and at high tide could cause severe damage while a high storm surge occurring with an apogean neap tide and at low tide could cause low or moderate damage. On the bayside, the magnitudes of the differences are lower but the same effect can still be seen. Onancock on the bayside has a difference of approximately 3.0 feet from the lowest tide to the highest tide. The average daily change in tides there is 2.0 feet (Center for Operational Oceanographic Products and Services, NOAA).

FIGURE 4.2 Causeway to Quinby during spring tide. *Photo by Elaine Meil*

While it is clear that great storms can damage with or without the additional water from tides, the lesson of the Ash Wednesday Storm is that when the tides work in tandem with storm surge the resulting damage is catastrophic.

Several types of storm systems also affect the Eastern Shore. These storms include northeasters, tropical storms and hurricanes, Alberta clippers, and thunderstorms. Northeasters and hurricanes have historically been the most destructive storm systems.

Northeasters and hurricanes can both produce powerful storm surges, strong winds, and heavy rain, but they are fundamentally different in several ways. Hurricanes typically occur in the Mid-Atlantic region during the months of June through November (though they can occur at anytime) and feed off of the warm tropical waters present in the ocean during this period. Northeasters can occur year-round, but are slightly more common in the winter months. These storms thrive off the interaction between cold and warm air masses. Another fundamental difference between these storms is duration. Hurricanes are typically faster moving and last for hours as opposed to northeasters which can last for many days. It is the northeaster's longer duration that causes tidal waters to back-up over several tidal cycles in an area; therefore worsening coastal flooding in an area.

Saffir – Simpson Hurricane Scale

Category 1 – Winds 74–95 mph Some Damage
Winds 96–110 mph
Winds 111–130 mph Structural Damage
Category 4 – Winds 131–155 mph Curtainwall & Roof Failures
Winds 131 mph + Complete Building Failure

The atmospheric low pressures associated with tropical storms and hurricanes influence storm surge heights. The low atmospheric pressure causes the seas to elevate in the column of air over the ocean. Furthermore, these storms have closed circulation wind patterns that push water ahead of them, creating an elevated storm surge in the leading edge of the storm. For example, a Category 1 hurricane may cause 4 to 5 feet of surge. However, the Chesapeake Bay acts to pinch the water and thereby make the surge grow in height on the bayside. These surges would be on top of the tides.

The Base Flood Elevation (BFE) on the seaside of the Eastern Shore is 11 to 13 feet and on the bayside the BFE is usually 7 to 10 feet. The BFE is the elevation of water in the 1% probability base flood event also known as the 100-year event. This BFE is consistent with a Category 2 hurricane or Category 3 hurricane's surge. However, due to the geometry

of the Bay a Category 1 hurricane or a tropical storm can cause this amount of surge.

The bathymetry of the ocean and bay floors also greatly influence storm surge. Shallower gradients, such as those along the bayside and seaside of the Eastern Shore, allow for greater storm surge.

FIGURE 4.3 Causeway to Quinby during Hurricane Isabel in 2003. *Photo by David Fluhart*

Another less well known hazard associated with coastal flooding is tsunami. Tsunamis are a series of water waves that are caused by a large displacement of water. Traditionally, the East Coast of the United States has been thought of as an area that has been almost entirely free of tsunamis. However, there have been at least 40 tsunamis that have occurred in the eastern United States since 1600. The source of these tsunamis are mostly not from the most common worldwide source, earthquakes, but from alternative sources such as volcanic debris falls or catastrophic failure of volcanic slopes, explosive decompression of underwater methane deposits, or oceanic meteor splashdowns (Lockridge et al., 2002).

Modern studies have suggested potential tsunami scenarios that could impact the Mid-Atlantic coast. Recent discoveries on the continental slope have demonstrated the existence of pressurized gases and water that could cause sudden and violent releases of compressed material and in turn, generate underwater landslides and tsunamis (Lockridge et al., 2002). Another study suggests that an area of the outer continental shelf off of Virginia and North Carolina could be in the initial stages of large-scale

slope failure, which represents a significant tsunami risk (Driscoll et al., 2000). The Canary Islands in the eastern Atlantic Ocean have also been identified as a potential source for tsunamis that could affect the East Coast of the United States (McGuire, 1999).

There are two historic accounts of tsunamis impacting the Eastern Shore. The first account has been interpreted from the geologic record underlying the region, which reveals the sixth largest impact crater discovered on the planet. The crater, named the Chesapeake Bay Impact Crater, is the result of a bolide impact that occurred nearly 35.5 million years ago. The impact generated an enormous tsunami that engulfed the continent, possibly overtopping the Blue Ridge Mountains. A second historic account of tsunami occurred much more recently during a hurricane that approached Chincoteague in 1821. Residents reported that as the storm approached the coast from the southeast, the sea receded and exposed miles of ocean bottom. Soon afterward, a deep roar could be heard moments before a "monstrous wall of inky waters rushed with the speed of lightning toward the island". The wall of water struck Assateague first, decimating trees and anything else in its path, and then struck Chincoteague, carrying away men and ponies "like insects". One man with his grandson clinging to his neck was reportedly swept far up on to the mainland six miles to the west and another was found the next morning hanging in a pine tree by his waistband twenty feet from the ground (*Scribner's Monthly*, April 1877). Modern interpretations of the cause of the tsunami of 1821 include an offshore hurricane, whose wave action generated an underwater landslide.

Coastal floodwaters generated by tsunami waves typically impact coastal areas and structures in a manner similar to storm surges associated with extratropical storms, but the historic and geologic record show that these waves can carry much greater force and be extremely hazardous. Mitigation strategies for tsunami events are similar in scope to those for other coastal flood hazards.

Broadwater, Virginia – An Eastern Shore Community Claimed by the Sea

Broadwater, Virginia located on Hog Island was once a village of about 200 persons. The founding of the village occurred after the Revolutionary War. In 1864, there were approximately 10 families on the island constituting 60 people.

Howard Pyle a visitor in 1878 was already noting a "rolling sea of grit", sand dunes that were retreating inland and already overwhelming fences, and trees in the village. While he was there a northeaster blew in, overfilling the marsh.

In 1897, Cobb's Island, south of Hog Island, had largely been abandoned as a northeaster in 1895 followed by a hurricane in 1896 demolished the resort area there. With this Broadwater became the last village south of Chincoteague on the barrier islands.

The island's population grew in the late 1800s and early 1900s. Wealthy sportsmen from northern cities built hunting lodges and summer residences on the island. President Cleveland came in 1892 and 1893 while he was serving his second term and some of his friends erected a clubhouse on the island.

A visitor to the island in 1906 recorded that there were 42 houses there. In addition, the islanders had built a school, church, hotel and stores. The government built a lighthouse and two Coast Guard stations.

By the 1920s, erosion was seriously threatening the village. It was during this time that a migration of the community began. Buildings were jacked up and floated on barges to the mainland where many can be seen in Oyster and Willis Wharf. By 1930, the sea was wearing at the dune and wood buffer protecting the village. The hurricanes of the 1930s finished the demise of the community. Soon after those storms, astronomical high tides inundated the ground floors of the remaining houses. By 1941, Broadwater had been abandoned.

Within 20 years, the sea was washing over the cemetery initially laid out a mile from the original shoreline. Today, Broadwater lies under the ocean.

There are many parallels between Broadwater and the communities that still exist on the Eastern Shore and the outlying islands. These communities face serious hazard threats.

Damages.

Primary Flood Hazards –

Much of the damage from coastal flooding is from hydrodynamic force called velocity flow. This type of flow is known to scour around buildings and to destroy structures in its path. In addition, velocity flow picks up debris and smashes that debris into anything in its way.

FEMA has identified areas where velocity flow from the 100-year flood event would occur. These areas are called V zones. These flows commonly damage or destroy any wall that is struck by this moving water. Current floodplain management ordinances require that in V zones any new structure be built with its lowest horizontal structural element's bottom to be elevated above the Base Flood Elevation. Further, no living space is to be put below the Base Flood Elevation and any enclosures must have breakaway walls.

FIRM – Flood Insurance Rate Map

Post-FIRM – built after a community has adopted an NFIP acceptable floodplain ordinance

Pre-FIRM – built before a community has adopted an NFIP acceptable floodplain ordinance

The debris carried by velocity flow can destroy a structure that is built to flood regulations. This debris commonly includes parts of houses, decks, vehicles, propane or oil tanks, and any other objects that the floodwater picks up. During Hurricane Isabel in 2003, 6 ton of riprap was swept-up from beaches and came to rest in front of houses. Smaller riprap actually was swept through broken walls and came to rest inside of structures. If flood borne debris strikes or gets caught against the foundation of a post-FIRM structure, that structure could sustain severe damage or destruction despite it being built to floodplain regulations.

Waves are another source of damage to structures in velocity flow areas. When waves break against a structure the tremendous force can damage the walls. Waves commonly destroy decks as waves advance up a vertical wall further than they would on a sloped surface. FEMA reports that post storm damage inspections show that "breaking wave loads destroy virtually all wood-frame or unreinforced masonry walls" (*FEMA Coastal Construction Manual*, 2000).

Besides V zones the Eastern Shore has a great deal of A zones. A zones are areas where the 100-year flood would inundate but that would not have waves in excess of 3 feet. The FEMA Coastal Construction Manual defines two types of A zones although neither area is regulated differently.

The following definition applies to most of the A zones on the Eastern Shore.

> "The Coastal A zone is the portion of the Special Flood Hazard Area in which the principal sources of flooding are astronomical tides, storm surges, seiches or tsunamis. Like the flood forces in V zones, those in coastal A zones are highly correlated with coastal winds. Coastal A zones may therefore be subject to wave effects, velocity flows, erosion, scour or combinations of these forces. The forces in coastal A zones are not as severe as those in V zones but are still capable of damaging or destroying buildings on inadequate foundations."
>
> – *FEMA Coastal Construction Manual*, 2000

FEMA post-storm inspections have shown that coastal A zones are areas of increased damages. The A zone regulation does not take into account the hazards of waves, hydrodynamic flow and erosion. Yet coastal A zones can be subject to all of these hazards during a 100 year flood event. Wall panels that were tested in a wave tank at Oregon State University show standard wood stud wall construction will fail after being struck with several breaking waves averaging 2 feet in height. These size waves can be generated in water that is 2 ½ feet in depth. Breaking waves destroy vertical surfaces by trapping and compressing air against the surface centered at the stillwater level (*FEMA Coastal Construction Manual*, 2000).

Some of the coastal A zones may not experience these types of hazards but will suffer from damage from standing water. Common types of direct damage include waterlogged and corroded building elements, waterlogged furniture, damaged electronic appliances and equipment, damaged tanks from buoyancy forces, and contaminated exteriors and interiors from blackwater. In addition, building materials may wick up floodwater to higher areas not directly inundated (*FEMA Coastal Construction Manual*, 2000). All new construction must address these issues and meet the Virginia Uniform Statewide Building Code.

FIGURE 4.4 Flood waters inundating homes located in an A zone in Wachapreague during Hurricane Isabel. *Photo by Dan Bilicki*

Secondary Flood Hazards -

Secondary hazards associated with coastal flooding include water that contaminates wells. Floodwater commonly becomes contaminated with pollutants. When this water level is above the elevation of a well's air vent, the contaminated water can flow into the well and renders it unusable until the water is treated and in agreement with state and federal health standards. Wells used for public use are required to be tested regularly per state and federal health regulations, but private wells are not held to the same standards. Therefore, a private well owner is responsible for tracking the water quality of their well. In economically disadvantaged communities, private well owners may not be able to afford the sampling needed to ensure adequate water quality.

On the Eastern Shore, several types of older wells are in use. The rarest type is the hand dug well. This well is usually 10 to 12 feet deep and would have initially been used with a bucket. There are also shallow wells, less than 100 feet deep, that have a static water level near the top of the well and a non-submersible pump that pulls water into a tank. Deeper wells, greater than 100 feet, are designed in much the same way but

instead of just a pump located in the top of the well there is a second pipe running down to the static water level capped by a packer with a venturi. These wells do not have an air vent and are not as susceptible to floodwaters. The packers were most useful with metal pipes but in the 1970s most well pipes were replaced with PVC and the packers could not easily maintain a seal against this material. These wells also have low pumping rates and are hard to prime if power is lost (Verbal Communication, Artie Miles, formerly of the Accomack and Northampton Health Department).

Since the 1970s, submersible pumps have been used. The well with this setup needs an air vent. During a flood, water can enter the well through the air vent. Elevating this air vent above the Base Flood Elevation is one of the best ways to avoid contaminated floodwater entering the well. An NFIP flood policy will not cover wells damaged by floods (NFIP Standard Flood Policy).

Septic tanks and septic systems are also not covered under a NFIP flood policy. When a flood is in the area of a septic tank, the water will backflow from the drainfield into the tank causing the cushion of air at the top of the tank to disappear. This means the tank can no longer handle flow from the structure and drainage will fail inside. After the floodwater recedes a small cushion of air will redevelop and it is during this time that sewage can escape the septic tank through the drainfield. This small cushion of air will allow the tank to accept wastewater from the structure, but at the level of drainage inside the tank the water is poorer than it usually is. This poor quality water containing sewage can escape into the drainfield (Verbal Communication, Artie Miles, formerly of the Accomack and Northampton Health Department).

Vulnerability. V Zones are the worst area a structure can be located in a flood. The base flood event in V-zones would still cause property damage regardless of compliance with NFIP requirements. Compliance reduces flood damage. Since homes must have foundations within the moving floodwater the water or flood borne debris can destroy or damage the foundations. For example, a $100,000 one-story home with $65,000 in contents that is built to the minimum floodplain standards, with no obstruction below the Base Flood Elevation and in compliance with all regulations will still likely receive around $15,000 in damage to the

structure and $9,750 in damage to contents in the base flood. The same house with an obstruction for storage but still in compliance with all floodplain regulations would likely receive $24,000 in damage to the structure and $15,600 in damage to the contents. It is important to stress that these homes meet the minimum requirements. For a home not built to these standards the damage would be much greater (*FEMA Coastal Construction Manual*, 2000).

According to FEMA, a structure, without obstructions that experienced flooding to the Base Flood Elevation, would require about 15 days before business could resume elsewhere and approximately 70 days before the building could be reoccupied. That same structure, with an obstruction, would require 24 days before business could resume in a different location and approximately 142 days before the building could be reoccupied (*FEMA Coastal Construction Manual*, 2000).

It is also important to realize that the base flood is not necessarily the worst flood event that could occur. If the base flood were exceeded by one foot, that home in the V-zone without obstruction would then receive about $23,000 in damage to the structure and $14,950 damage to the contents. The home with an obstruction would receive $29,000 in damage to the structure and $18,850 in contents damage. The displacement time of the home without obstruction would be 134 days and 182 days for the home with obstruction (*FEMA Coastal Construction Manual*, 2000).

Any structures are at more risk when they are located near debris producing areas including areas with pre-FIRM structures and highly engineered structures that channel flow away and towards other property (*FEMA Coastal Construction Manual*, 2000).

The Eastern Shore's greatest vulnerability is located in the A zones. Most structures located in the 100-year flood plain are within these areas. Past disasters have affected these areas the greatest. Both Counties have elevated homes using the Hazard Mitigation Grant Program and the vast majority of these elevations has been of an A zone property. The Counties elevated an additional 60 structures with Hurricane Isabel Hazard Mitigation Grant Program funds following the 2003 storm event.

Accomack County submitted an application to elevate an additional 9 structures in 2011 (Review of HMGP applications).

Coastal A zones also represent increased vulnerability to both Accomack and Northampton County. The NFIP does not recognize the difference between A zones where the source of water is an inland river or an A zone where the source of water is from a bay or ocean. Therefore, the NFIP regulations do not require special construction for coastal A zones. However, structures in these zones are commonly exposed to weaker V zone conditions including waves, scour, and velocity flows. Open foundations are not required in these areas. However, waves and debris can still destroy structures there. If a structure is built with a closed foundation, that structure can expect to receive more damage if struck with storm surge water than a similar structure with an open foundation.

FIGURE 4.5 Homes in Wachapreague during Hurricane Isabel. These homes are located in an A zone with a Base Flood Elevation that includes a wave height component. *Photo by John Aigner*

While NFIP flood insurance covers some losses associated with flood events, several types of property have no available coverage under this program. Although NFIP flood insurance has many exclusions and types of property not covered, some of the more important ones to remember are wells, septic systems, land, seawalls, bulkheads, piers, wharves, containers, decks, driveways, and walks. In addition to these, FEMA's

General Property Form, Standard Flood Policy lists several other types of property that will not be covered. Finally, NFIP flood insurance only covers flood damage not coastal erosion, rain damage, wind damage, or water spray.

Past disasters have shown that many policyholders while carrying flood insurance for the structure do not purchase flood contents insurance. In Hurricane Floyd, several homes were not structurally damaged to a great degree yet the contents were totally destroyed (Local oral accounts).

The federal government requires that all improved property in a Special Flood Hazard Area with a federally backed mortgage be covered with flood insurance. Contents coverage is not required unless it is part of the security of the mortgage. Generally, buyers who are confronted with this requirement will obtain flood insurance for the structure but will opt not to buy contents insurance to reduce the cost of closing on the property. After an event occurs, these policyholders learn the consequences of this decision and some express bad feelings toward FEMA.

Although the 100-year base flood is a 1% chance in each year that it will occur, over 30-years (the standard mortgage) a structure in an A or V zone will have a 26% chance of experiencing a 100-year flood. If that same house lasts 70 years, the useful life of most buildings, it has a 50% chance of experiencing a 100-year base flood.

The 50-year flood event has a 45% probability of occurring within its floodplain over the course of a 30-year mortgage and a 76% chance of occurring in 70 years. It is important to understand that a smaller flood such as the 50-year event could damage a structure, especially those built below the Base Flood Elevation.

The 50-year stillwater elevation for V zones ranges from 7.5 – 8.5' on the seaside and 3.8 – 7.4' on the bayside. In addition, the 50-year stillwater depth in Chincoteague Bay ranges from 4.8 – 6.0'.

Over time, buildings become more susceptible to hazards. It is important to maintain coastal structures. The predominant hazards in coastal areas are corrosion from salty air and wind driven salt spray, termites, moisture, and sun-caused weathering. Regular maintenance lowers the risk of flood damage during a storm event. Coastal buildings will also have building

components that require frequent repairs or replacement including replacing exterior metal every 5 to 10 years, wood pilings will every 25 to 40 years, and exterior equipment every 8 to 15 years (*FEMA Coastal Construction Manual*, 2000).

Localities volunteering to participate in the NFIP Community Rating System (CRS) have chosen to recognize and encourage floodplain management activities that exceed the minimum NFIP requirements. The CRS is a voluntary incentive program that rewards residents with reduced flood insurance premium rates as result of the participating community's actions pertaining to the three goals of the CRS: reducing flood losses, facilitating accurate insurance rating, and promoting the awareness of flood insurance. Flood insurance premium rates are discounted in increments of 5% for the ten different class ratings. These discounts are described in Table 4.2.

Credit Points	***Class***	***Premium Reduction SFHA****	***Premium Reduction Non-SFHA*****
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

* Special Flood Hazard Area
**Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. The CRS credit for AR and A99 Zones are based on non-Special Flood Hazard Areas (non-SFHAs) (B, C, and X Zones). Credits are: classes 1-6, 10% and classes 7-9, 5%. Premium reductions are subject to change.

TABLE 4.2 The table documents the credit points earned, classification awarded, and premium reductions given to communities participating in the CRS. From FEMA, http://www.fema.gov/business/nfip/crs.shtm.

CRS class rankings are based on 18 specific creditable activities that are organized the following four categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. The creditable activities are summarized in the following list:

- Elevation Certificates
- Map Information Services
- Outreach Projects
- Hazard Disclosure
- Flood Protection Information
- Flood Protection Assistance
- Additional Flood Data
- Open Space Preservation
- Higher Regulatory Standards
- Land Development Criteria
- Flood Data Maintenance
- Storm Water Management
- Repetitive Loss Requirements
- Floodplain Management Planning
- Acquisition and Relocation
- Flood Protection
- Drainage System Maintenance
- Flood Warning Program
- Levee/Dam Safety

Sea Level Rise

Eustatic Sea Level- the amount of sea level change over the entire globe

The Eastern Shore of Virginia is experiencing sea level rise. Sea level rise can happen when ice melts, when thermal expansion occurs making the amount of water in the oceans now take up more space, and when the land subsides. This is called relative sea level rise.

Current estimates for relative sea level rise in the lower Chesapeake Bay region, including the Eastern Shore, are between 2.3 feet and as much as 5.2 feet in the next century. Virginia is the third most threatened state, behind Louisiana and Texas, for potential damage from sea level rise. Accomack County and Northampton County are the first and second most threatened counties in Virginia, respectively. These two counties account for about 61% of all the threatened land in Virginia. Accomack County has approximately 40 acres each year that are within 3 mm of the tides. Each year, this land is being converted from dry land to wetland. Northampton has approximately half that amount converting each year.

However, sea level rise, while continuous, is not the primary threat for the peninsula in the short term. A greater threat caused by sea level rise is the magnification of erosion and surge effects from storm events.

The island communities of Chincoteague, Tangier, and Saxis are at greater risk to the secondary effects of sea level rise. Tangier and Saxis already face a severe erosion problem and rising sea level will increase the damage from floods and erosion.

The Flood Insurance Administration, part of FEMA, has commissioned a study on the effects of sea level rise on the NFIP. Given a 1-foot sea level increase by 2100, NFIP premiums in A zones would have to be increased 58% while in V zones they would have to increase 36%. A 3-foot sea level increase by 2100 would cause NFIP premiums to increase by 200% in A zones and 102% in V zones.

Chapter

5

Storm Water Flooding

Hazard. Storm water flooding is unlike coastal flooding in that it is caused by intense downbursts of rain or from rainwater accumulation in low-lying areas or areas where debris blocks drainage paths. Once rainwater falls on the land surface, it drains into the soil and enters the ground water system, re-enters the atmosphere through evaporation, is taken up by vegetation via transpiration, or enters streams or creeks as surface runoff and eventually enters the tidal waters draining towards the Atlantic Ocean or Chesapeake Bay.

The greatest amount of flow in the creeks and streams lags after the peak rainfall. This is due to the various factors that cause the rain to slow down as it flows over the land including land cover, slope, extent of soil saturation, and capability of drainage in ditches and culverts.

Historically on the Eastern Shore, storm water has accumulated and caused flooding. One such instance occurred in Bloxom in Accomack County in 2003 when a massive thunderstorm produced heavy rains that were backed-up by the railroad tracks in Town causing extensive storm water flooding that impacted several homes. In a very short period of time, 6 to 8 inches of rain fell. The extent of flooding was worsened due to an afternoon rainstorm that had saturated the soils earlier in the day, which is a common problem with storm water flooding on the Shore. The drainage ditches could not adequately drain the rainwater due to two main factors. Tidal waters had inundated the ditches as result of the high tide occurring during the storm. Secondly, the ditches had not been maintained leading up to the storm event and could not accommodate the large amounts of water. Furthermore, many acres of tomato fields in the area were covered in plastic, greatly increasing the amount of impervious surfaces and increasing storm water runoff. In Bloxom, floodwaters reached a depth of at least 2 feet. In some areas the flooding was greater.

Although there were no estimates of the probability of this storm event, the entire 12-hour period including the initial storms in the afternoon would put this above the 100-year storm event level, which on the Eastern Shore is 7 to 8 inches in 12 hours. Residents who remember the Bloxom storm recall that the larger storm's rainfall occurred over approximately 2 hours, making this storm above the 100-year storm event. The 2-hour 100-year storm on the Eastern Shore is between 4.5 and 5 inches of rain.

Recurrence intervals of rainfall intensity are presented in the following table:

Recurrence Interval	***Rainfall (inches)***
1-year 24 hour	3.0 - 3.5*
2-year 24 hour	3.5 - 4.0
5-year 24 hour	4.5 - 5.0#
10-year 24 hour	5.0 - 6.0
25-year 24 hour	6.0 - 7.0
50-year 24 hour	7.0 - 8.0
100-year 24 hour	8.0 - 9.0
* All of the Eastern Shore has this recurrence interval except for the immediate environs around the Town of Saxis. Recurrence Interval: 2.5 – 3.0 # All of the Eastern Shore has this recurrence interval except for the Southeast corner of Northampton County. Recurrence Interval: 5.0 – 5.5	

TABLE 5.1 Recurrence Intervals of 24 hour rainfall totals.

The U.S. Weather Bureau established that the worst case scenario for the Eastern Shore would be 28 to 30 inches of rainfall during a 6-hour precipitation event for a 10 square mile area.

There are secondary hazards from storm water flow. Generally, intense rainfalls will not only affect the immediate area but will affect other places downstream. On the Eastern Shore, this is less of a problem then other areas in Virginia that have much larger watersheds. Unlike most places in Virginia and the nation, Accomack and Northampton are not coping with storm water coming from other jurisdictions.

Intense rainfalls also increase the amount of contaminants in the water. Since the increased over land flows run over agricultural land, residential yards, roads and commercial parking lots contaminates are picked up and

carried into the streams. Finally, larger overland flows erode streams. If this erosion is severe, property damage can ensue.

Storm Potential. Extratropical storms including hurricanes and northeasters represent the greatest threat of catastrophic storm water flooding that can occur on the Eastern Shore. Hurricane Cleo is one such example. Cleo dropped a record amount of rain despite being a very weak storm when she impacted Virginia and a tropical storm that weakened to a depression upon landfall in North Carolina. While in Norfolk, her wind speeds were recorded at just 25 to 35 mph with gusts in the low 40s. However, she dropped 13.32 inches of rain on Norfolk. Further, she broke the records for heaviest rain with 11.4 inches in 24 hours in the coastal area of Virginia. Her maximum total rainfall in Virginia was in the Back Bay Wildlife Refuge in southern Virginia Beach where 14.09 inches fell.

FIGURE 5.1 Common scene of flooded roadways following intense rainfall on the Eastern Shore. *Photo by Jay Diem, Eastern Shore News.*

The following table includes descriptions of hurricanes that either impacted the Eastern Shore or represent a potential storm that could impact the Eastern Shore.

Storm Water Impact of Storms on the Eastern Shore or Its Vicinity
September 17, 1876: 8.32 inches of rainfall at Cape Henry in northern Virginia Beach.
August 12-16, 1928: Two tropical depressions move over Virginia bringing heavy rains.
The Chesapeake-Potomac Hurricane, August 23, 1933: Three days after a record-breaking rain of 6.5 inches the storm strikes with more rainfall.
Hurricane Able, August 31, 1952: A very weak storm produces 2 to 3 inches of rain.
Hurricane Barbara, August 14, 1953: Struck as a Category 1 storm in North Carolina, produced record rain on Tangier Island, 10.62 inches and at Onley, 10.43 inches, in Accomack County.
Hurricane Connie, August 12-13, 1955: Norfolk recorded 4.62 inches of rain.
Hurricane Diane, August 17, 1955: Five days after Connie another storm moved north over Virginia. In some areas of central and western Virginia, an additional 5 to 10 inches fell. Together Connie and Diane hold the record rainfall for the month of August.
Hurricane Ione, September 19-20, 1955: Weak storm causes southeast Virginia to receive 3 to 4 inches of rain.
Hurricane Gracie, September 30, 1959: Weakened storm moves over southwest Virginia, Norfolk recorded 6.79 inches of rain in 24 hours.
Hurricane Donna, September 12, 1960: Donna was a Category 3 hurricane when its eye passed up the seaside of the Eastern Shore. She generated 4 to 8 inches of rainfall on the Delmarva Peninsula. Many rivers reached record or near record overflow with this storm.
Hurricane Cleo, September 1, 1964: A weak storm that generated massive amounts of rainfall in southeast Virginia. She set rainfall records in Hampton Roads. Although her rainfall amounts decrease in a northerly direction she is an example of the type of storm that could cause overwhelming storm water flooding on the Eastern Shore.
Tropical Storm Doria, August 27, 1971: She moved up the Delmarva Peninsula and caused 3 inches of rain in Norfolk.
Hurricane Gloria, September 27, 1985: She caused 5 to 6 inches of rain across the Eastern Shore, causing storm water flooding.
Hurricane Bonnie, August 27, 1998: She caused 4 to 7 inches of rain in coastal Virginia.
Hurricane Dennis and Hurricane Floyd, September 5th and September 15-16, 1999: Hurricane Dennis caused substantial rain that created serious problems when Hurricane Floyd moved over southeast Virginia two weeks later. Hurricane Floyd caused 10 to 20 inches of rain to fall in southeast Virginia.
Northeaster, November 11-14, 2009: This storm persisted for nearly three days and caused 13 inches of rain in Chincoteague over the nearly three day duration of the storm. The storm occurred during multiple high tide phases and following a seasonal high rainfall that left the soils saturated prior to the storm.

TABLE 5.2 Storms that have generated intense rainfall on the Eastern Shore or in the vicinity.

Downbursts of rain from thunderstorms also have the potential to create storm water flooding. The worst downburst in Virginia's history was in Guinea across the Bay from Northampton County. On August 24, 1906, 9.25 inches fell in 40 minutes.

Damages. Flash flooding from storm water can be quite hazardous to humans. Since the conditions develop rapidly people can become trapped before even realizing they were in danger. During the Great Bloxom Flood of 2003, two people had to be rescued. Floodwater commonly blocks roads in the area. This is quite a dangerous problem since motorists commonly believe that they can ford these areas without knowing whether the water has damaged the road below.

Still water or slow moving water, moving less than 10 ft per second, generates hydrostatic loads on a structure. These loads operate perpendicular to the surface affected. Therefore, water pressure is highest against a structure that has water on one side of it. Dry floodproofing means that a structure must be built to withstand these forces or the water pressure could collapse the structures walls. Floatation is also a potential form of damage with hydrostatic loads (*FEMA Coastal Construction Manual*, 2000).

Storm water floods that move faster than 10 ft per second are generating hydrodynamic loads in addition to the hydrostatic loads. These loads can destroy walls, push structures off of foundations, and carry sediment and debris (*FEMA Coastal Construction Manual*, 2000).

FIGURE 5.2 Car fording street flooded by surge from Hurricane Isabel in 2003. *Photo by David Fluhart.*

Vulnerability. In some interior areas of the Shore, the Base Flood Elevation (BFE) is 4 feet. However, the A zones identified are associated with creeks, the ocean or a bay. For example, there is no identified Special Flood Hazard Area in Bloxom. Current FIRM maps miss many areas with storm water flooding issues.

To look at potential losses it is necessary to observe what a flood would do to a structure. A $100,000 one-story structure without a basement and with contents worth $65,000 would suffer approximately $14,000 in building component damage and $13,650 in contents damage in a flood where water reached one foot above the floor joist. One-story commercial structures with one foot of flooding inside would require approximately 9 days to resume business at a different location and 62 days to repair and reoccupy the old location (*FEMA Coastal Construction Manual*, 2000).

That same structure with 4 feet of floodwater inside would have about $29,000 in building component damage and $28,275 in contents damage. A business at that location would need approximately 29 days to reopen elsewhere and 182 days to reoccupy the same location (*FEMA Coastal Construction Manual*, 2000).

Since so many areas of storm water flooding are unstudied and unmapped, probabilities of the occurrence of certain flood elevations are not really known. High resolution LiDAR elevation data has been produced for the entire Eastern Shore making the region one of the few regions in the state to have access to such excellent data. However, this dataset was not ready for publication in time to be included in the current update to the Hazard Mitigation Plan. The LiDAR data will provide the resolution needed to map and analyze storm water flooding issues on the Eastern Shore.

Just because a rain event is within a certain probability also does not necessarily correspond to the same flood probability. Since floods are dependent on both rain and other conditions, such as soil moisture, a small isolated low probability rain event might not cause a low probability flood.

In 2011, there were 184 and 169 non-Special Flood Hazard Area (SFHA) NFIP flood insurance policies in the unincorporated portions of

Accomack County and Northampton County, respectively. These numbers represent 6.3% of all policies in Accomack County and 40.1% in Northampton County. Since 2003, there has been an increase in the total number of policies, total number of SFHA and non-SFHA policies, and in the percentage of non-SFHA policies in both Counties (FEMA NFIP Insurance Reports, July 2003 and May 2011). Table 5.3 summarizes these trends. This is an indication that there are areas in both Counties where property owners feel the need to buy flood insurance although their structure is not in an identified flood zone.

Flood Insurance Policy Summary – Unincorporated Areas of Accomack and Northampton Counties				
	Year	***SFHA Policies (% of Total)***	***Non-SFHA Policies (% of Total)***	***Total Policies***
Accomack County	2011	2724 (93.7%)	184 (6.3%)	2908
	2003	2457 (95.8%)	107 (4.2%)	2564
Northampton County	2011	252 (59.9%)	169 (40.1%)	421
	2003	213 (73.2%)	78 (26.8%)	291
*Sources: FEMA NFIP Insurance Reports, May 2011 and July 2003				

TABLE 5.3 Summary of flood insurance policies for the unincorporated areas of Accomack and Northampton Counties.

Chapter

6

High Wind

Fujita Scale of Tornado Intensity

Winds 40–72 mph
Gale Tornado

F1 –
Winds 73–112 mph
Moderate Tornado

F2 –
Winds 113–157 mph
Significant Tornado

F3 –
Winds 158–206 mph
Severe Tornado

F4 –
Winds 207-260 mph
Devastating Tornado

F5 –
Winds 261–318 mph
Incredible Tornado

F6 –
Winds 319 mph +
Inconceivable Tornado

Hazard. Sources of high wind are tornadoes, waterspouts and various coastal storms. The entire Eastern Shore is located in the 110 to 120 mph design wind zone. This means that structures built should be able to withstand 110 mph (Building Code). This is consistent with a strong Category 1 hurricane whose 3 second gusts could be anywhere from 93 to 119 mph.

Tornadoes have traditionally occurred on the Eastern Shore during the spring and summer months with the largest one reaching F3 status in 1967. This tornado caused 5 injuries and about $25,000 in damage. An F3 tornado has wind speeds ranging from 158 to 206 mph. The most common tornado to strike on the Eastern Shore is the F1 with wind speeds of 73 to 112 mph (Weather Bureau online data).

Several hurricanes have generated very strong winds in the vicinity of the Eastern Shore. The August 17, 1899 hurricane struck Hatteras with 140 mph gusts before the anemometer there was blown away. The Great Hurricane of September 14, 1944, caused 134 mph winds and gusts of 150 mph at Cape Henry, south of Northampton County. Hurricane Hazel in 1954, whose path took her through the center of Virginia, generated 130 mph gusts in the City of Hampton. Hurricane Donna in 1960 caused gusts at the Chesapeake Light Ship of 138 mph. Hurricane Gloria in 1985 generated sustained winds of 94 mph on the Bay Bridge Tunnel and gusts there of 104 mph. Wallops Island, in northern Accomack County, recorded sustained winds of 72 mph. Hurricane Fran in 1996 and the Twin Northeasters of February 1998 caused significant wind damage on the Shore (*Virginia Hurricanes*, VDEM).

Auxiliary hazards of high wind are salt spray and soil erosion. High winds that pick up salt from the ocean blow this over the Eastern Shore causing

crops to be destroyed and power lines to fail. Hurricane Isabel caused both types of damage. Additionally, strong winds from the northwest are common during the winter months on the Eastern Shore. These winds can cause significant soil erosion to fields in the winter stripping critical nutrients from fields and depositing them in local waterways (Local oral accounts).

Damages. High wind events cause progressive failure of structures. Once a building's envelope has been breached wind will start to enter the building and either pull or push at other parts of the structure. Partially enclosed buildings experience a 30% higher wind pressure than enclosed buildings. Once a building becomes partially enclosed due to wind damage, higher wind pressures cause further damage (*FEMA Coastal Construction Manual*, 2000).

A building fails in high winds because the wind speed exceeds the capacity of the structure to hold up. This can happen in two ways, wind speed exceeds the design or construction standards used or windborne debris damages the structure and as a result of increased wind pressure the design or construction standards are surpassed. Wind damage commonly assumes a couple of forms. Roofs can fail, lightweight structures can overturn at the foundation, siding and shingles can be pulled off the building and openings can be blown in. Once a structure's envelope has been penetrated by wind, wind-driven rain and debris causes additional damages (*FEMA Coastal Construction Manual*, 2000).

Storms that occur when the trees are in full leaf also cause tremendous tree damage. Hurricane Isabel was such a storm. Thousands of trees were blown over due to the winds from Isabel and saturated soils. Many of these trees and their limbs damaged houses, auxiliary structures, power lines, and vehicles.

FIGURE 6.1 An example of a common streetscape on the Eastern Shore with mature trees, houses, sheds, vehicles and power lines intermingled. *Photo by Elaine Meil.*

Vulnerability. The Eastern Shore is in wind Zone II (ASCE7-98). This means that a community shelter in this area would have to be built to withstand 160 mph winds. This shelter could withstand a F2 tornado and a Category 4 hurricane. The building code requires all structures to withstand 110 mph winds, the equivalent of a Category 1 hurricane.

This wind speed is based on the 100-year return frequency. That means that over 70 years a structure would have a 50% chance that the 110 mph wind speed would be met or exceeded. However, wind speed design

builds in a 1.5 safety factor. So a structure should withstand a higher wind speed (*FEMA Coastal Construction Manual*, 2000).

At a 110 mph wind speed, the default wind damage to a $100,000 wood frame structure would be approximately $20,000 in damage. A Category 3 hurricane with sustained winds of 111-130 mph would be approximately $50,000 in damage. For a masonry or more heavily engineered structure the damage would be reduced (*FEMA Coastal Construction Manual*, 2000).

Siting decisions affect the types of wind speed seen at a building. Ocean promontories generally receive high wind speed due to the topography of the area. A more exposed condition because of lack of vegetation around the structure will open the building up to greater wind speeds. Those structures near open water are exposed to higher winds than structures located more landward. In addition, the height of a structure above the ground affects the wind speeds. The higher a house is located above ground the higher the wind speed will be around the structure. This can be an issue in flood zones since elevation of the building is the primary means of mitigating flood damage (*FEMA Coastal Construction Manual*, 2000).

In addition, a structure is only as wind resistant as its smallest component. If a window, door, roof covering, siding or chimney fails, the rest of the structure will be subjected to wind pressures that can cause other components to fail even though they perform to their design guidelines (*FEMA Coastal Construction Manual*, 2000).

Chapter

7

Coastal Erosion

Hazard. Coastal erosion occurs when coastal land is worn away. Erosion occurs on both short- and long-term time scales. Short-term erosion occurs typically during a single storm, high tide, or high wind event. This process wears away land for a relatively short period of time, but the sediments eventually will come back due to accretion. Long-term erosion is measured over many years resulting in a net deficit.

There are several causes of coastal erosion. Some of these include storms, floods, wind exposure, sea level rise, changes in shoreline features such as inlets, and manmade structures.

Storm-induced erosion is rapid and can be the equivalent of decades of long-term erosion. Structures that sit atop unconsolidated bluffs may be damaged or destroyed if the bluff recedes.

Erosion is accelerated by sea level rise. Historic levels of sea level rise are approximately 1 foot per century. However, experts believe there is a possibility that sea level rise in the next century may be as high as 2 to 7 feet. The FEMA Flood Insurance Administration has prepared a report documenting the effects of a 1-foot or 3-foot sea level rise on the NFIP. Unlike other portions of the United States, Accomack and Northampton Counties have a high risk since much of their land is low-lying.

Coastal Processes. Waves have a specific waveform. Over the open water waves move in a circular pattern. As the waves move into shallow water, if the depth is less than approximately 50% of the wavelength, the wave's motion will be flattened out into an ellipse with a horizontal action. Waves tend to converge around points that protrude into the body of water. This is where the highest wave energy is expended. If the shoreline protrusion does not consist of erosion resistance material then the shoreline will erode faster than surrounding areas until the coastline

straightens. Plunging breakers are eroding the beach; spilling breakers that gently run up a beach facilitate sand deposition (*Environmental Geology*, Edward Keller).

Wave energy is very powerful. The cumulative energy of waves with a height of 1 meter (3.28 feet) breaking along a 250-mile segment of open shoreline is roughly equivalent to the amount of energy generated by an average sized nuclear power plant. This wave energy is broken down into two components when it strikes the beach, perpendicular and parallel. The parallel component causes the longshore drift and this drift generally moves sand from the beach south (*Environmental Geology*, Edward Keller).

Much of the most severe erosion on the Eastern Shore is occurring along the barrier islands on the seaside. This chain of barrier islands is unique along the eastern Atlantic seaboard because they are largely undeveloped and in pristine natural condition. These barrier islands serve the Eastern Shore by protecting the mainland from storm surge and also creating low-energy environments that have allowed for thousands of acres of salt marshes to thrive in the coastal bays behind the islands. These marshes all act as a buffer for erosion to the mainland.

FIGURE 7.1 This photograph of southern Cedar Island in Accomack County illustrates the amount of shoreline change occurring on the seaside barrier islands on the Eastern Shore. There are a minimal number of structures located along the oceanfront. *Photo by Curt Smith.*

Erosion and the act of depositing are essential for barrier islands in the face of sea level rise. Since the Eastern Shore barrier islands are largely in their natural state and void of erosion control mechanisms, they are allowed to undergo the natural process of island "rollover", meaning sediment is eroded from the front side of the island and carried via wave and wind action to the center or backside of the island resulting in the island "rolling over". Relatively smaller storm events that do not produce storm surges which completely overtop the island, typically erode the shoreface, but build the island's elevation by re-depositing the sediment atop the center of the island. These more frequent storm events assist in maintaining the island's elevation. Relatively larger storm events that produce storm surges that completely overtop an island will typically erode the shoreface, dunes, and ridges on the front and center portions and re-deposit sediments atop the salt marshes on the backside of the island. These large storms occur less frequently and essentially flatten the island allowing for lateral growth and increased island stability. Both small and large-scale storms work in tandem to sustain barrier islands and in turn, provide protection to the mainland from coastal erosion.

Severe coastal erosion is also prevalent on lands located on the bayside of the Eastern Shore. The island towns of Tangier and Saxis have the greatest number of structures endangered by coastal erosion on the bayside. Tangier's changing shoreline is the result of rising sea level and land subsidence and has been thoroughly documented by several studies. Analysis of historical maps has shown that the island has continually been eroding since accurate maps became available in 1850 and erosion has accelerated in the past several decades. In addition, studies have suggested that the Uppards, the island directly to the north of Tangier, could completely erode by 2100 unless erosion control measures are taken. If the Uppards disappears, the Town would be directly exposed to wind-generated waves from the north and accelerated erosion could severely erode the remainder of Tangier (Mills, 2003).

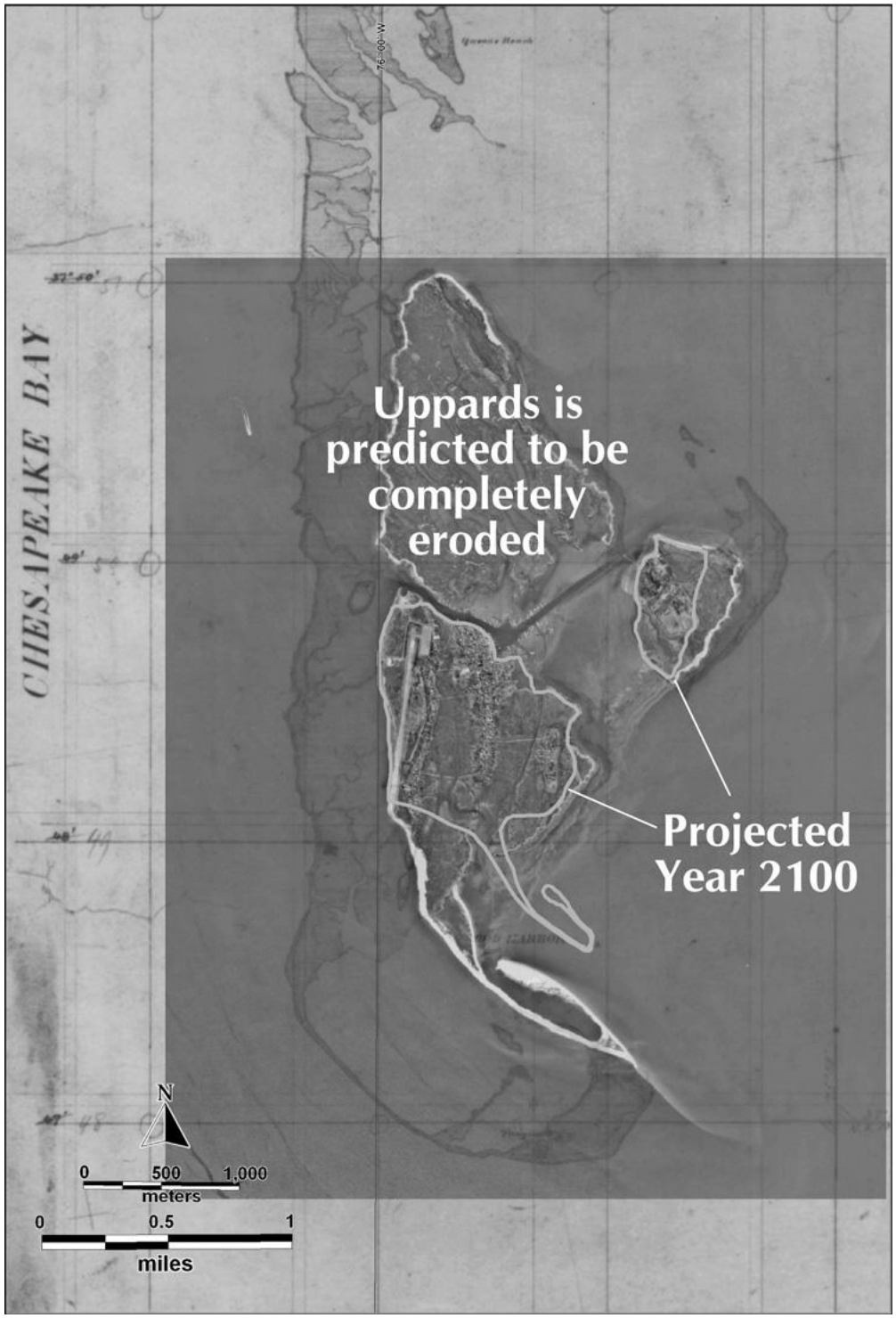


FIGURE 7.2 Illustration of historic shoreline change occurring since 1850 and project shoreline position for 2100 for Tangier Island. A map showing the 1850 location of Tangier is in the background and is overlain by an aerial photo showing the island's position in 2000. The projected shoreline in 2100 is illustrated by darker outline. *From Mills, 2003.*

Damages. Erosion causes several types of damage. Erosion generally causes damage to foundation elements causing a structure to partially or totally collapse or subside. Erosion in the form of scour or undercutting removes supporting soil from foundation elements. This causes the foundation to fail and other components of the building will fail.

Unlike other types of damage caused by hazards, erosion destroys dry land. Therefore the consequences of this are different from other hazards. In some areas of the Eastern Shore the eroding land means eroding community.

Damages include removal of tax base to the counties and towns and destruction of structures and infrastructure. Accomack County is experiencing conversion of approximately 40 acres of uplands to wetlands each year as result of the annual 2 mm relative sea level rise. Northampton County is experiencing approximately 20 acres of uplands converting to wetlands each year (Sea Level Rise meeting with the EPA, February 2004).

Vulnerability. Losses due to gradual erosion, storm induced erosion, or bluff recessions are not covered under an NFIP flood policy. The NFIP flood policy does not insure land (Standard NFIP policy).

Privately financed erosion control structures or revetments do not usually protect property from storm-induced erosion. FEMA's post storm inspections show that the majority of these structures fail to protect the land or building they were meant to protect (*FEMA Coastal Construction Manual,* 2000).

Effective coastal erosion control methods are dependent on an understanding of the littoral cell, usually several tens or hundreds of miles of coastline, and wave climate in that cell. Piecemeal erosion control is ineffective. Most communities do not control the entire coastline in their littoral cell (*Environmental Geology*, Edward Keller).

A broad spectrum of actions is currently being implemented to manage the Eastern Shore's coastal resources. These management actions include the following:

- Performing adaptation research and developing adaptation strategies;
- Protecting barrier island systems;
- Conserving uplands to allow for natural migration of marshes as sea levels continue to rise;
- Constructing living shorelines to mitigate erosion and promote water quality;
- Conducting educational programs for residents and elected officials;
- Elevating structures and enforcing building codes to mitigate damages from natural hazards; and
- Regulating industry in manners that mitigate impacts from natural hazards and protect environmental quality.

These coastal management strategies are implemented by the variety of federal, state, and local government agencies and environmental non-profit groups that are diligently working to manage the Eastern Shore's dynamic coastal system. Detailed information of specific coastal management strategies being undertaken on the Eastern Shore are included in the following Profile Chapters for each locality.

Chapter

8

Accomack County Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

There are 14 incorporated towns in Accomack. The following information is for the unincorporated areas of Accomack and the incorporated Towns of Accomac, Belle Haven, Melfa, and Painter. Information for the other incorporated towns in Accomack are located in later chapters. These Towns include Bloxom, Chincoteague, Hallwood, Keller, Onancock, Onley, Parksley, Saxis, Tangier, and Wachapreague.

History. Accomack County is the northern county on Virginia's Eastern Shore. It was formed from Northampton County in 1662. The original settlement of the County was scattered seaside and creek side plantations and farms. In the late 1600s, towns and villages gradually grew around the courthouse, ports and wharfs that the residents used to ship their goods to Europe. In the mid 1800s, the economy boomed as the coming of the railroad opened up the northern markets to seafood products. Trains carried seafood products north and brought tourists south and created many new towns along the spine of the County.

Demographics. In the early twentieth century, Accomack County was one of the richest agricultural counties in the United States. This prosperity drove population growth across the County. In 1930, the County's population stood at 35,854. The County's population experienced an overall decline over the next 50 years with the lowest population of 29,004 persons occurring in 1970. The County experienced its first substantial population increase since 1930 between 1970 and 1980. The population remained relatively stable from 1980 to 1990 (*Accomack County Comprehensive Plan*, 2008). Between 1990 and 2000, the population grew to 38,305 persons. The 2010 Census indicates that the County experienced a decline of 5,141 persons between 2000 and 2010.

The median age for residents in Accomack County in 2000 was 39.4 years and 44.7 years in 2010, signifying a population older than the state and national average (U.S. Census, 2000 and 2010). The County has become a popular destination for retirees and is experiencing a greater influx of

seasonal residents. Seasonal residents and tourists increase the County's population during the warm weather season.

Coastal and Storm Water Flooding. According to the 2008 *Accomack County Floodplain Management Plan*, 61,717 acres, twenty-two percent of all the land, in Accomack County is in the V zone. Sixty-one percent of this land is held in some form of conservation ownership. The three largest landholders are the Commonwealth of Virginia (29,790 acres), the federal government (18,417 acres) and The Nature Conservancy (8,551 acres). Accomack had 118 V zone policies in the unincorporated areas of the County in 2003 and has 127 V zone policies in 2011(FEMA NFIP Insurance Report, July 2003 and May 2011). The primary flood impact area is the 64,950 acres in the A zones. Most of the structures located in a flood zone are in this area. Approximately 44 percent of the County's land lies in a regulated flood zone (*Accomack County Floodplain Management Plan*, 2008).

It is estimated for 2011 that the 100-year coastal flood would impact approximately 8,610 structures located within Special Flood Hazard Areas in all of Accomack County. In Accomack County a structure is defined as a house or out-building that requires a building permit. The 100-year flood event would generate an estimated $382 million in residential losses. It is expected that $143 million of this would be covered by flood insurance (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2011).

Local officials identified various areas in the County that have storm water flooding problems. These areas include, but are not limited to the intersection of Route 13 and Route 175 in New Church, Horntown Road east of Route 13, Neil Parker Road in Sanford, parts of the villages of Pastoria and Mappsville, the low lying lands south from Messongo to Chesconnessex, parts of the Town of Accomac, Bayside Road between Shields and Craddockville, and the Family Dollar store in Tasley.

FIGURE 8.1 This building and its parking lot in Tasley frequently are flooded by storm water. As can be seen from the truck in the picture this building was built in a substantial depression. Just visible in the photo is the platform for customers to access the store after a rain. *Photo by Elaine Meil*

NFIP Community Participation. Accomack County has participated in the NFIP since June 1, 1984. In the first half of 2011, Accomack County's unincorporated and incorporated areas had 740 flood insurance claims since joining the program in 1984 with $6,048,514 paid for damage (FEMA NFIP Insurance Report, May 2011). The average claim for the entire County rose from $7,259 to $8,173 from 2003 to 2011 (FEMA NFIP Insurance Report, July 2003 and May 2011).

The unincorporated areas of the County accounted for 460 of those flood insurance claims in July 2003 and 570 in May 2011. These claims totaled $3,434,634 and had an average claim of $7,467 in July 2003 and $4,379,826 with an average of $7,683 in 2011 (FEMA NFIP Insurance Report, July 2003 and May 2011).

There were 25 repetitive flood loss properties within the County and incorporated towns in December 2003. Eight of these repetitive flood loss properties received $139,098 following flooding experienced during Hurricane Isabel in 2003. As of October 2008, there were 16 repetitive flood loss properties in Accomack County (Annual Report for the *Accomack County Floodplain Management Plan*, 2008).

The *Accomack County Comprehensive Plan* notes that in 1997 the County had 1,697 NFIP policies and had $822,901 paid to the County policyholders since the program was adopted. From 1997 and July 2003, an additional $2,897,983 was paid out and there were 3,338 NFIP policies in July 2003. Much of this was likely related to the damage from Hurricane Floyd in 1999. Between July 2003 and May 2011, an additional $2,237,630 was paid out and there were 679 additional policies bringing the County total to

4,017 in May 2011 (FEMA NFIP Insurance Report, July 2003 and May 2011).

Accomack County also voluntarily participates in the Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. The County's current rating is an 8. Residents and businesspersons in the unincorporated areas of the County are eligible for a NFIP policy discount of 10% in the Special Flood Hazard Area and 5% in the non-Special Flood Hazard Area. The highest rating attainable is 1, which makes residents and businesses eligible for a 45% discount in the Special Flood Hazard Area and 10% in the non-Special Flood Hazard Area. The County can attain credits to improve its CRS rating by implementing specific CRS creditable activities, which are described in Chapter 4.

FEMA defines the Special Flood Hazard Area as the land area covered by the floodwaters of the base flood area where the NFIP's floodplain management regulations must be enforced and flood insurance policies are mandatory. All V zones and A zones are included in the Special Flood Hazard Area. After Hurricane Floyd 1999 the County adopted an ordinance that requires all structures built or substantially improved to be elevated to a foot above the Base Flood Elevation (BFE). This freeboard requirement will protect many structures from a flood greater than the 100-year flood.

In 2009, FIRM maps were published for the entire County. These county-wide maps are unique in that they include data for the incorporated towns and incorporate multiple datasets using GIS techniques, which have simplified the process of identifying BFEs for specific parcels. In addition, the seamless maps have corrected past discrepancies in data within incorporated towns, specifically the low-lying areas in Onancock and Belle Haven. The maps are available online at FEMA's website, www.FEMA.gov.

Special Flood Hazard Area, Participating Communities. The Town of Belle Haven, partially in Accomack County and Northampton County, has Special Flood Hazard Areas. None of these Special Flood Hazard Areas are V zones. Belle Haven joined the NFIP on February 8, 2001. In the

Town of Belle Haven, the floodplain is located along Occohannock Creek. The Flood Insurance Study for the Town indicates the primary source of flooding comes from coastal storms such as hurricanes and northeasters that force water from the Chesapeake Bay into Occohonnock Creek. Development in the Special Flood Hazard Area is limited. There are approximately 35 parcels with some portion within the A zones. There are approximately 5 buildings within or very near the edge of the flood zones. There is one NFIP policy in effect within the Town that is not within the Special Flood Hazard Area as of May 2011 and no flood damage claims have been made (FEMA NFIP Insurance Report, May 2011).

Rescinded Special Flood Hazard Area. The Town of Hallwood is the only locality within the County to have a Rescinded Special Flood Hazard Area. This is addressed in Chapter 11.

No Special Flood Hazard Area. The Towns of Accomac, Bloxom, Melfa, Onley, Keller, and Painter in Accomack County do not have any identified Special Flood Hazard Areas. None of these towns participate in the NFIP.

County officials did identify storm water flooding issues in Accomac, Bloxom, and Tasley. In September 2003, Bloxom was flooded by up to 2 feet of water during a thunderstorm.

NFIP Sanctioned Communities. There are no NFIP Sanctioned Communities in Accomack County.

HMGP Participation. The County of Accomack has historically participated in the Hazard Mitigation Grant Program. After Hurricane Floyd in 1999, the County received a 28 home elevation project. Those homes that were elevated were located in the unincorporated portions of the County and the Town of Tangier. After Hurricane Isabel in 2003, Accomack County elevated 53 homes. Sixteen houses were located in Saxis, twelve houses were located in Tangier, and six were located in Wachapreague. The remaining 19 were located in unincorporated areas including Clam, Hacks Neck, Quinby, Hopkins, and areas surrounding Onancock. The County submitted a HMGP application in 2011 to elevate another 9 houses in the County.

FIGURE 8.2 The County elevated this home in the Deep Creek area using Hazard Mitigation Grant Program money following Hurricane Floyd in 1999. *Photos by David Fluhart*

High Wind Events. The windborne debris hazard area extends one mile inland from the shorelines and is the area where structures are at greatest risk to damage from high winds (FEMA Coastal Construction Manual, 2000). In 2006, there were approximately 576 structures in windborne debris hazard area in Accomack County with 555 located on the bayside and 21 located on the seaside. Assuming, a 110 mph (3 sec gust) event, which is a 100-year event, Accomack County could expect an estimated $6.3 million in wind related damages in 2006 (Eastern Shore of Virginia High Wind Vulnerability Assessment, 2006). In addition, three incorporated towns also lie in the windborne debris hazard area, Tangier, Saxis, and Chincoteague.

An additional hazard created by wind events is the creation of snow drifts during winter storm events. A series of snow storms during the winter of 2009 and 2010 resulted in a significant amount of snow that was subjected to strong winds creating severe snow drifts that covered roadways around Accomack County. These snow drifts made roads impassable putting residents at risk in the case of emergency.

Coastal Erosion. Accomack County is experiencing erosion along the Bayside shoreline and the barrier island shorelines on the Seaside. The inland Seaside shoreline is relatively protected from erosion by the barrier islands, marshes, and bays to the east.

The Virginia Institute for Marine Science's (VIMS) *Shoreline Situation Report* for Accomack County shows that approximately 16 miles of the County's Bayside shore is eroding. The most severe erosion occurs during northeasters and other storms events that bring strong north and northwest winds resulting in wind-generated wave erosion. The average erosion rate for the Bay shoreline (excluding Tangier Island) is 2.2 feet per year. This average dips to 1.6 feet per year for areas bounded by marshes and reaches nearly 3 feet per year for shorelines with beaches. In addition, 24 miles has some form of erosion control structure. Approximately 87.4 miles of the Bay shoreline is developed. Approximately 79 miles is developed as residential (VIMS *Shoreline Situation Report*, 1975 and 2002; *Accomack County Comprehensive Plan*, 2008).

The County's Seaside shoreline is experiencing erosion primarily on the barrier island shorelines. The most extreme erosion occurs during northeasters and hurricanes on the barrier islands. Erosion rates on the barrier islands range from 7 to 17 feet per year on average. The inland Seaside shoreline experiences relatively minimal erosion since these areas are protected for the most part by the barrier islands, marshes, and bays that serve as protection from the Atlantic Ocean to the east (VIMS *Shoreline Situation Report*, 1975 and 2002; *Accomack County Comprehensive Plan*, 2008).

VIMS' 2002 *Shoreline Situation Report* identifies areas of critical or severe erosion in the County. The report classifies areas as experiencing critical, severe, or moderate erosion. Critically eroding areas are considered such because they have buildings, roads, or other structures endangered by erosion. The barrier islands on the seaside of the County were not classified as critically or moderately eroding areas because of the minimal number of infrastructure on the islands. The seaside barrier islands are experiencing extensive coastal erosion despite not being identified as critically eroding areas by the VIMS study. Table 8.1 summarizes areas endangered by coastal erosion in Accomack County identified in VIMS 2002 *Shoreline Situation Report*.

Accomack County Areas Experiencing Coastal Erosion				
Area	***Location Description***	***Erosion Rate (feet/year)***	***Mitigation Strategy***	***Other***
Critically Eroding Areas				
Sluitkill Neck	Between Pungoteague and Matchotank Creeks	4-5 On Bayshore, 1.5 on mainland	Retain as is. Unsuitable for residential or recreational development	Includes Finneys, Scarborough, and Parker Islands
Severely Eroding Areas				
Scarboroughs Neck	Northern shoreline of Occohannock Creek	5	Continue as agricultural use	Unsuitable for residential development. Suitable for recreational camping.
Parkers Marsh	Between Chesconessex and Onancock Creeks	5	Retain as state natural area. Restrict development at Crystal Beach to relatively low value seasonal residences	Includes residentially developed Crystal Beach area
Freeschool Marsh	Between Saxis and mainland	1.9-4.9 (maximum along Saxis waterfront)	Retain as is.	Most is set aside as a wildlife refuge
Moderately Eroding Areas				
Hyslop Marsh	Between Craddock and Back Creeks	2-3	Retain as is.	None.
Nandua Creek	Southwestern Accomack Co.	2-3 in lower creek, 0 in upper creek	Continue as agricultural and low-density residential use	Lower creek unsuitable for residential development
Broadway Neck	Between Matchotank Creek and East Point	2 south of Thicket Point, no data for north of Thicket Point	High flood hazard should be considered before future development	The presence of old beach defenses at East Point indicates history of moderate erosion
Onancock Creek	Central Accomack Co. Bayside	Moderate erosion of sand beaches	Restrict additional development on lower part of creek	Localized erosion in areas such as at the end of Bailey Neck
Big Marsh	Between Chesconessex and Deep Creeks	0-3	Continue as agricultural and low-density residential use	Includes Schooner Bay development
Parksley	Between Hunting and Young Creeks	2 along beaches, 0 along remainder of creeks	Retain as marshland or agriculture	None.
Michael Marsh	Between Cattail and Messongo Creeks	1.3-1.7 along shore facing Beasley Bay	Retain as is.	Most is set aside as part of Saxis Wildlife Management Area

TABLE 8.1 Accomack County Areas Experiencing Coastal Erosion from VIMS 2002 *Shoreline Situation Report.* Areas with buildings, roads, or other structures endangered by erosion were considered as critically eroding areas. It is for this reason that the seaside barrier islands in Accomack County are not included despite experiencing extensive coastal erosion.

In 2006, the entire County had approximately 1,414 structures located within 50 feet of a shoreline that were considered to be in danger of erosion damage. These structures represented an estimated $206 million in potential damage (Eastern Shore of Virginia Coastal Erosion Vulnerability Assessment, 2006). The County has Resource Protection Areas, required by the Chesapeake Bay Act. The County has voluntarily included the seaside portion with Resource Protection Areas zoning. This

100-foot buffer for the entire County protects some new development from being exposed to erosion in the future.

Assateague Island in northeastern Accomack County has experienced severe erosion since the U.S. Army Corps of Engineers constructed two shore-perpendicular stone jetties at Ocean City Inlet shortly after the inlet opened during the Great Hurricane of 1933. The jetties have been successful in maintaining a navigable channel through the inlet and trapping southward-moving sediment to produce a broad beach along the shores of Ocean City to the north, but have starved Assateague Island to the south of sediment. The result has been accelerated westerly movement of the island that has produced an offset of over one half of a mile. The change in sediment transport dynamics along Assateague has also substantially eroded portions of the island leaving it narrow and vulnerable to inlet formation during storm events. If inlets were to form and segment the island it would result in increased wave action in Chincoteague Bay, which could in turn result in increased erosion along Chincoteague Island and the mainland of northeastern Accomack County.

Further, the public beach access area at the southern end of Assateague Island is a vital component to the tourism industry for the entire Eastern Shore. The National Park Service has been struggling in recent years to maintain the parking lots and facilities on the ocean at Assateague due to the severe erosion and as of 2011 is considering several options for the public beach access including abandoning the parking lots and utilizing a trolley system from Chincoteague.

Just to the south of Assateague Island is Wallops Island, which is owned by the federal government and home to the National Aeronautics and Space Administration (NASA) Wallops Flight Facility. The island has been occupied by NASA and the U.S. Navy since the 1940s as an aeronautics research facility and more recently as the Mid-Atlantic Regional Spaceport. Wallops Island, like most barrier islands along the Atlantic coast of the Eastern Shore, has experienced a great deal of erosion and migration. NASA and the U.S. Navy's infrastructure on the island has an estimated value of nearly $900 million. The federal government has been attempting to combat coastal erosion on the island since the late 1950s and early 1960s when a timber seawall and groins

were constructed. The government funded the maintenance of these structures until the early 1990s when they were replaced with a stone seawall along the shoreline. Additional funds have been spent for dune construction, beach nourishment, experimental sand retention measures, and expansion of the seawall (US Army Corps of Engineers, 2006).

FIGURE 8.3 Waves overtopping the seawall on Wallops Island during Hurricane Dennis in September 1999. *Photo Courtesy of U.S. Army Corps of Engineers.*

Coastal erosion hazards on Chincoteague Island are closely related to Assateague and Wallops Islands. The hazards facing the Town of Chincoteague are discussed in Chapter 9.

Other Local Hazards. Besides the previously identified hazards, County officials also identified other hazards that could impact the County. U.S. Route 13 runs through the County and the public safety department identified this corridor as a potential threat for Hazmat incidences. Other potential hazmat sites in the County are bulk fuel sites, within the shipping lanes just off the coast, and poultry industries.

Ground water is the sole source of water for residents of the Eastern Shore and for that reason, it is imperative to protect and preserve its quality. The majority of residents in Accomack County, especially those in the unincorporated areas, utilize conventional septic systems for waste disposal. These systems need to be maintained on a regular basis to work properly. If a conventional septic system does not receive proper care or

is not adequately pumped out, the system can fail. Conventional septic systems located in flood-prone areas can also be harmful to water quality if floodwaters inundate low-lying drainfields. Septic system failure and flooding of drainfields pose immediate threats to contamination of surface waters and ground water, especially in the shallow unconfined aquifer. Water contaminated by failed septic systems can include harmful bacteria and excessive concentrations of nutrients. These bacteria can be extremely harmful if consumed by humans. Excessive nutrients in drinking water can cause infant cyanosis, or "blue-baby syndrome", in infants and are damaging to surface water because they can cause vast algal blooms that deplete dissolved oxygen in water that is essential for marine life (*Eastern Shore of Virginia Ground Water Supply Protection and Management Plan*, 1992). The Accomack-Northampton Planning District Commission has executed grants to assist low to moderate income families on the Eastern Shore with septic pump-outs. The pump-out programs of 2007 and 2010 resulted in pump-outs at 110 households on the Eastern Shore. It is desired to continue this program into the future.

The Eastern Shore 's poultry industry is vulnerable to extensive chicken kills during disasters. The greatest impact from chicken kills is the economic impact these events have on the County. Chicken kills can occur as result of disease, heat waves, and storm events. Any of these hazards are capable of wiping out this industry or cause great economic loss.

Disease can also pose a threat to the residents of the County. In particular, disease spread via mosquito, such as West Nile Virus, poses a threat to the County. Since a large portion of the County consists of wetlands and has poorly drained soils with very low gradients, there is an abundance of stagnant water and consequently an abundance of mosquitoes. In northern Accomack, there is a Mosquito Creek, Little Mosquito Creek and Mosquito Point. The County also conducts mosquito-spraying programs in Greenbackville and Chincoteague in the northern part of the County. Some of the incorporated towns have mosquito control including Chincoteague, Parksley, Accomac, and Onancock. In the past, Saxis and Tangier sprayed to control mosquitoes, but stopped when it was realized that the spraying may have had adverse impacts on crab populations. The mayors indicated that mosquitoes continue to be a major problem in both towns. Other diseases that

threaten County residents include Encephalitis, Rabies, lead poisoning from lead-based paint, Lyme disease, and Salmonella poisoning from environmental contamination (Verbal Communication with Virginia Department of Health, 2011).

Fish kills have historically occurred in the waters surrounding Accomack County. Fish kills are naturally occurring phenomena that are most commonly caused by cold snaps that quickly and drastically reduce the temperature of water or reduced oxygen in the water, which can be the result of drought, algae blooms, overpopulation, or sustained increase in water temperature. Less common causes of fish kills include diseases, parasites, and toxicity. In January 2011, the Chesapeake Bay experienced an extended cold period that killed approximately 2,000,000 spot and croaker in the waters north of Tangier. Cold water in the Bay was also to blame for a large fish kill in January 1976 when approximately 15,000,000 spot perished. A menhaden kill of approximately 50,000 engulfed Quinby Harbor in September 2010. The kill produced a noxious odor that attracted flies and kept locals and tourists from using the Harbor. The cause of the kill was never identified, but reduced oxygen from a drought occurring at the time is a likely factor.

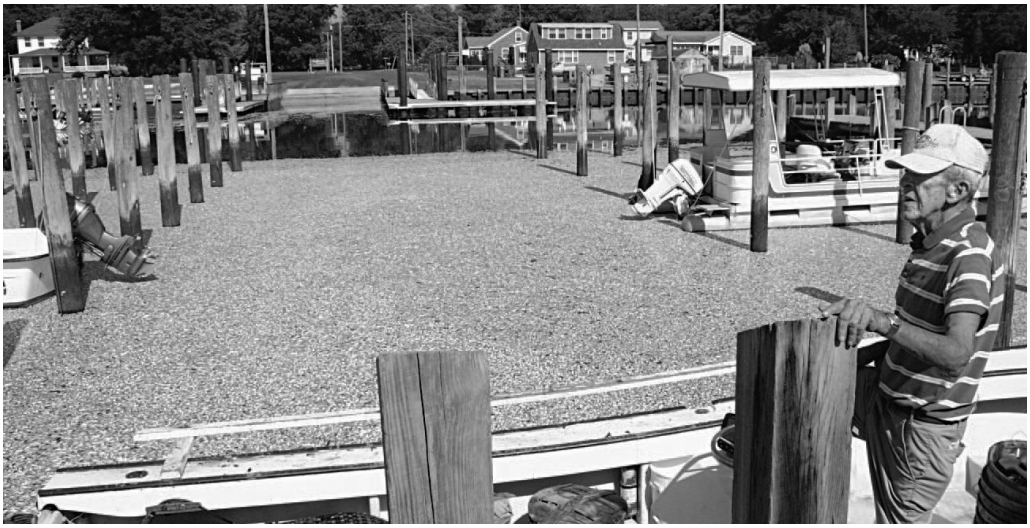


FIGURE 8.4 A waterman looks out over the menhaden kill that engulfed Quinby Harbor in September 2010. *Photo Courtesy of Eastern Shore Post.*

Winter storms have historically had adverse impacts on Accomack County. These events can bring multiple hazards including snow, ice, coastal flooding, and high winds. Snow, ice, and wind or any combination

can cause widespread damage to trees and power lines. A minimal snowfall often forces the closure of public facilities. Travel can also be severely slowed by snow in the County. Snow drifts several feet in height can accumulate on roads, especially in areas adjacent to fields. Stranded vehicles on roads also greatly inhibit the ability for roads to be cleared. U.S. Route 13 is the first road to be cleared, followed by other main routes into the towns off of the highway. Less traveled roads in the unincorporated areas of the County can remain impassable for days until snow drifts or ice are cleared. This puts residents at greater risk during health and fire emergencies. Winter conditions have also caused local waterways to freeze, which can negatively impact the local water-based economy.

Accomack County experienced two snowstorms that were exceptionally large for the area in December 2009 and January 2010. The December 2009 storm brought damaging winds and a storm surge, but its greatest impact came in the form of ice. Ice accumulations totaled up to an inch in places on the Eastern Shore causing widespread power outages that left some without power for up to 10 days. The January 2010 storm occurred before the December 2009 storm could melt and worsened conditions across the County.

The County's agriculturally-based economy has also been historically at risk to severe droughts. Droughts can affect crop yields during a given growing season and can impact farmers not equipped with proper irrigation equipment. Droughts persisting for one or more years have the potential to greatly hamper or cripple the local agricultural economy. Another result of droughts is increased usage of ground water resources. The *Eastern Shore of Virginia Ground Water Supply Protection and Management Plan* encourages farmers and residential users to utilize the shallow, unconfined Columbia aquifer for crop and residential irrigation and to reserve the deeper, confined Yorktown aquifers for human consumption and use. Increased pumping of the Yorktown aquifers during drought conditions has the potential to induce salt water into the aquifer (*Eastern Shore of Virginia Ground Water Supply Protection and Management Plan, 1992).*

Critical Facilities. County officials have identified the critical facilities within the County. These are located throughout the County. Of particular concern are those in flood zones.

Five of fifteen Fire/EMS stations are located in a flood zone. These include Greenbackville Volunteer Fire Department, Chincoteague Volunteer Fire Company, Saxis Volunteer Fire Company, Wachapreague Volunteer Fire Company, and Tangier Volunteer Fire Company. Tangier is the only fire department that serves only the town as the other four serve both the town and adjacent areas. The Town of Wachapreague was granted $300,000 in HMGP funds to relocate their fire station following Hurricane Isabel in 2003, but did not complete the initial relocation planning process in time to complete the relocation. The Town lost the funding on this occasion, but plans to re-apply for funding when funds become available.

The County has four schools located in flood zones. These schools are Chincoteague Elementary, Chincoteague High, Tangier Combined, and Pungoteague Elementary. The Tangier Combined School was originally built to NFIP BFE requirements, but flooding problems persisted following completion of the building and the school had to be elevated several feet above BFE in 2006 to lessen the threat from flooding (Verbal Communication with David Annis, A-NPDC, 2011).

Two health centers are located in the flood zone. These are Chincoteague Health Center and Tangier Community Health Center. The Tangier Community Health Center was constructed several feet above BFE in 2010 and built in a manner that minimizes impacts from natural hazards, specifically flooding and high winds.

In addition, there are three bulk petroleum storage sites in the flood zone. These are located in the Towns of Chincoteague, Tangier, and Onancock. There is also propane storage on Chincoteague and the Chincoteague electric substation, which are both in the community's flood zones.

All critical facilities would be affected by wind damage and manmade damage. Many of the local government buildings are located in and around the County seat of Accomac. During Hurricane Isabel in 2003, bricks from the bell tower on the historic courthouse were knocked off causing some damage.

The Commonwealth of Virginia maintains several offices in the County.

Federal installations located in the County include NASA's Wallops Flight Facility, Aegis training center, a National Guard Armory and U.S. Coast Guard Stations in Chincoteague and Wachapreague.

Review.

Accomack County Comprehensive Plan (originally adopted in 1997, updated in 2008). The Plan addresses two hazards, coastal erosion and storms. The County has identified actions to address these concerns including preparation of a shoreline management plan that outlines areas with erosion problems, adjacent land use and best means to control the problem. In addition, the County has a policy of directing development away from critically eroding shorelines. Other policies also affect these two concerns including policies to encourage new development to locate on suitable soils, encourage open space preservation and conservation of barrier islands, marsh land, forested areas and creek corridors.

1995 Accomack County Floodplain Management Plan. The plan examines flooding in the County to what further measures could be taken to protect residents from flood hazards. The plan discusses existing development regulations in the floodplain, the preservation of floodplain areas as open space, and suggests additional floodplain management measures including lower density zoning districts in the floodplain, drainage system maintenance, and educational outreach opportunities.

Trends. Some development is still occurring near the shorelines. In general, the property at risk to flooding is increasing, but with the NFIP requirements this development is generally able to withstand the 100-year flood inundation. Property owners in campgrounds such as Virginia Landing near Quinby and Trails End in Horntown are replacing RVs with vacation cottages that meet NFIP requirements. The County is also experiencing an increase in seasonal property owners who use their homes as vacation homes typically during the warm weather season. As this trend continues to increase, there will be more homes vulnerable to hazards during the winter months when they are vacant. There are also an increasing number of retired citizens moving to the area that may not be familiar with flooding or high wind hazards. This increasing trend could put a greater number of residents and structures at risk.

Findings.

1. Thirty-nine percent of all V zone land, or approximately 24,000 acres, is privately owned (*Accomack County Floodplain Management Plan*, 2008).
2. During a 100-year flood event there are approximately 8,610 structures that could be affected in the entire County causing an estimated $382 million in damages with only $143 million of the damages covered by flood insurance (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2011). Coastal flooding is the greatest threat to the County.
3. Many areas of storm water flooding are not identified by the current FIRMs.
4. The Towns of Accomac, Bloxom, Keller, Melfa, Onley, and Painter do not participate in the NFIP as of 2011, but have storm water flooding issues. Residents and business owners in these areas cannot currently purchase flood insurance or be eligible for some loan opportunities.
5. There were approximately 576 structures in 2006 that were in the worst areas damaged during a 100-year wind event in the entire County. Five hundred and fifty five of these were located on the Bayside of the County (Eastern Shore of Virginia High Wind Vulnerability Assessment, 2006).
6. Most of the worse coastal erosion in Accomack County has occurred on the bay shoreline. This area has approximately 87.4 miles of developed shoreline. In 2006, there were approximately 1,414 structures within 50 feet of a shoreline that would be destroyed in the next erosion event at that site (Eastern Shore of Virginia Coastal Erosion Vulnerability Assessment, 2006).
7. The County has identified other additional hazards including winter storms, sewage spills, drought, wildfire, hazmat incidents, heat waves, biohazards, and well contamination. Furthermore, the County faces secondary hazards from flooding such as poultry kills and mosquito-borne disease which could potentially impact the health of residents and the local economy.

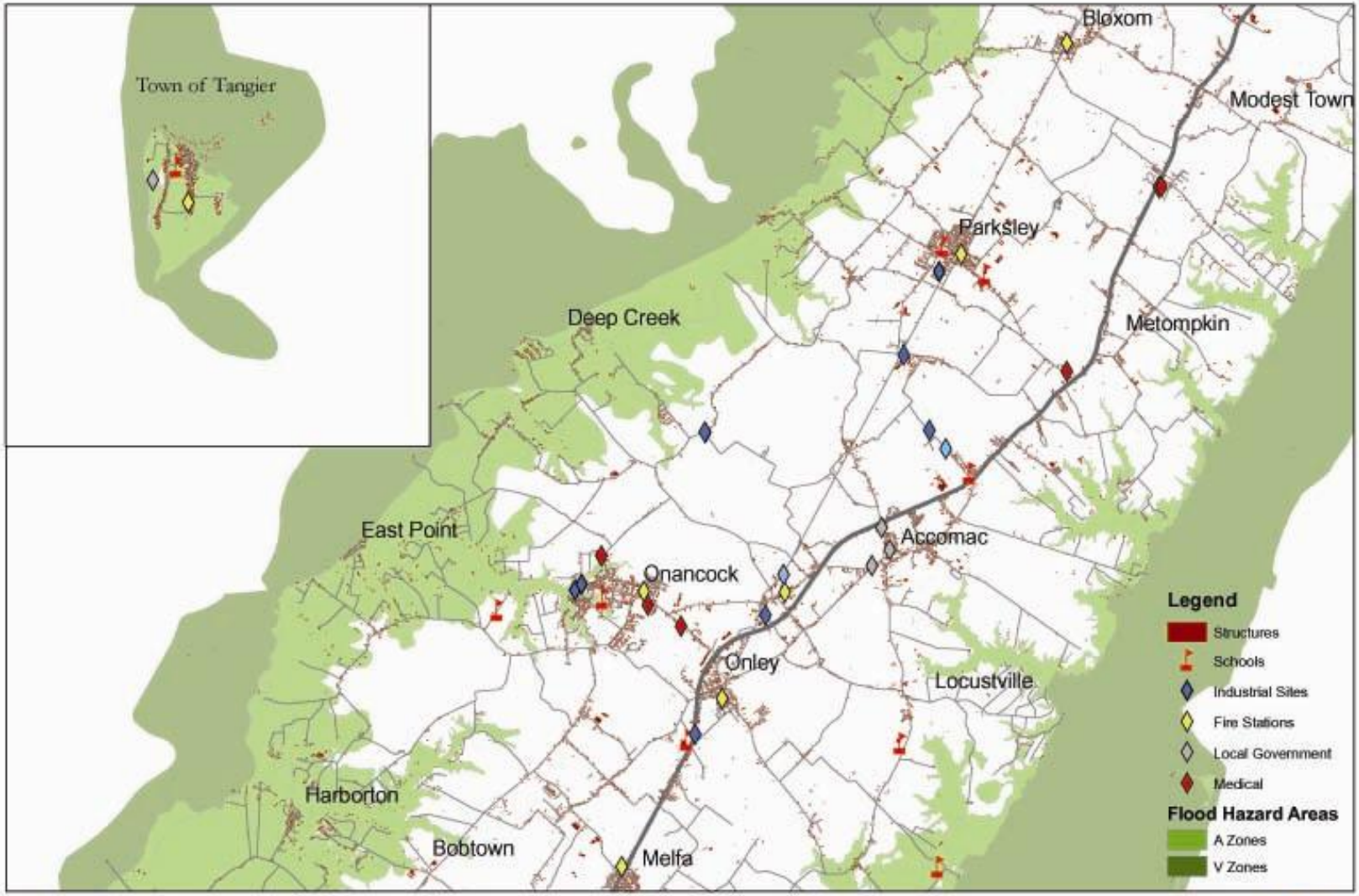
Accomack County Hazard Maps

The following maps illustrate coastal flooding and wind hazard areas for the unincorporated areas of Accomack County and its incorporated towns with the exception of the Town of Chincoteague. Hazard maps for the Town of Chincoteague can be found at the end of Chapter 9. Three coastal flooding maps are included for the County and are oriented geographically from north to south. Descriptions of locations at risk to coastal erosion and storm water flooding are described in detail within each locality's profile chapter.

Coastal Flood Hazard Map
Accomack County

Map 1 of 3
Eastern Shore of Virginia Hazard Mitigation Plan 2011

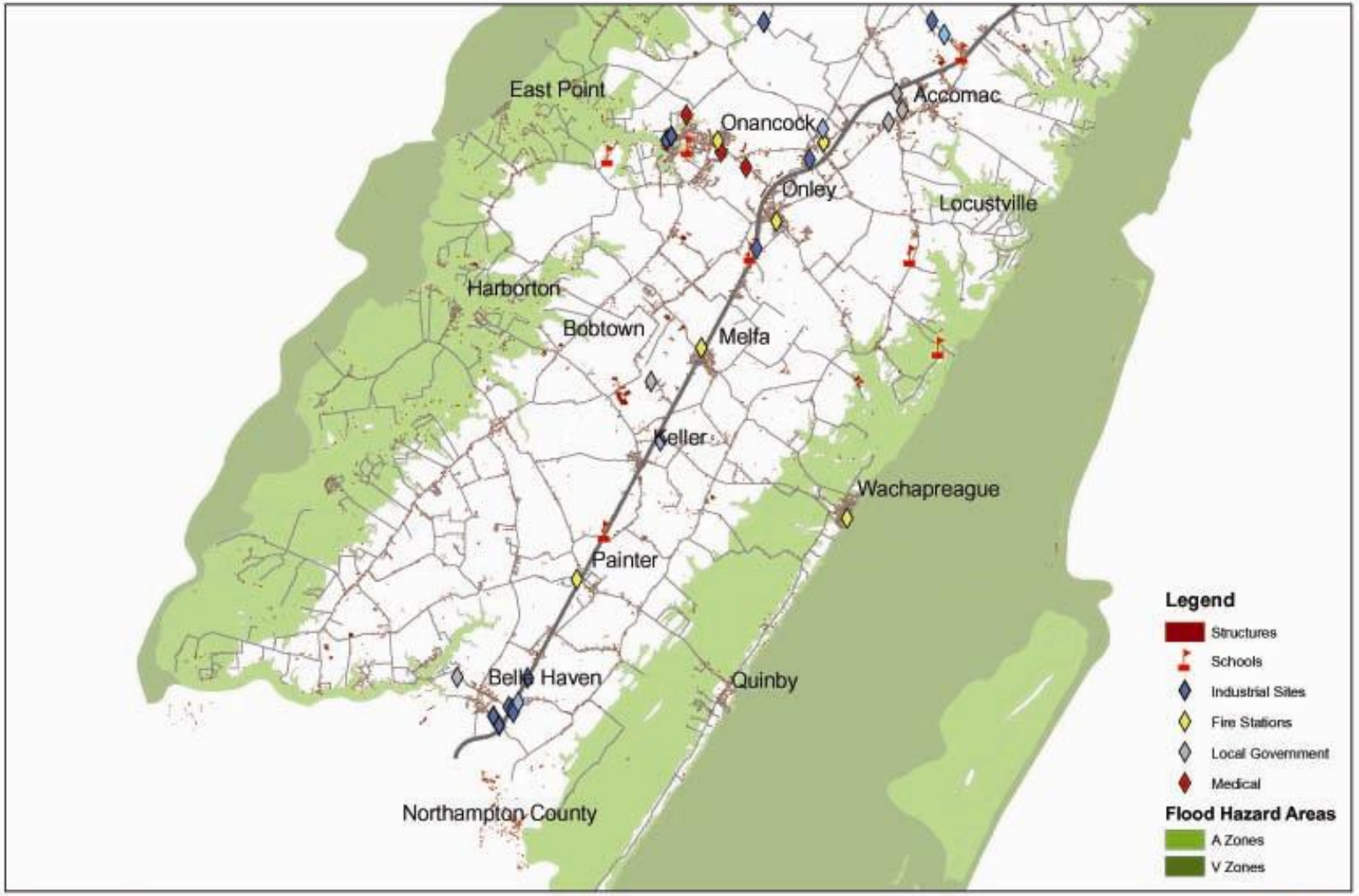
A-NPDC
EM 8-12-11



Coastal Flood Hazard Map
Accomack County

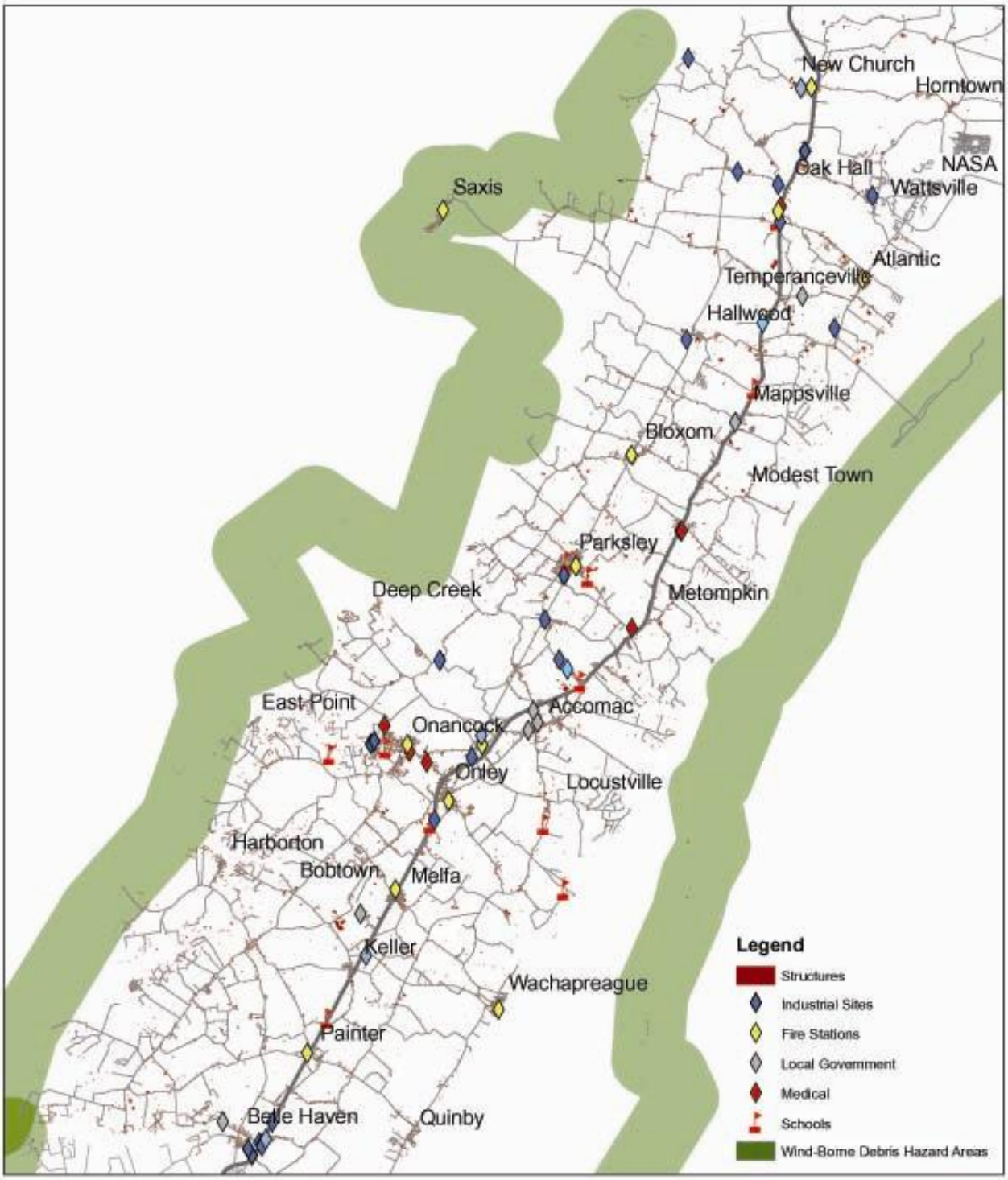
Map 2 of 3
Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11



Coastal Flood Hazard Map
Accomack County
Map 3 of 3
Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11



Wind Hazard Map
Accomack County

Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11

Chapter

9

Town of Chincoteague Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Chincoteague is a barrier island that is characterized by a series of ridges that run in a northeast-southwest direction that were formed approximately 2,000 to 4,000 years ago when the island was connected to the south end of Assateague Island. An inlet eventually formed at what is now the north end of the island separating Chincoteague and Assateague. A spit subsequently developed off the south end of Assateague serving as a barrier that has sheltered Chincoteague Island from erosion. The Accomack County Soil Survey shows that there are nine types of soil on Chincoteague. Several landform types are present including tidal salt marshes, dunes, beaches, intermingled dunes and marshes, coastal upland or floodplain, and fill. Elevation above sea level ranges from 0 to 10 feet with most of the developed areas within the 3 to 7 foot range.

The Town's economy has always been closely tied to natural resources and scenic beauty. Prior to the mid to late 1800s, the inhabitants of the island primarily subsisted by farming and raising cattle and sheep. As the demand for oysters grew throughout the 1800s, the seafood industry became the Town's main source of income. The seafood industry expanded to include clams, crabs, and fish during the 1900s and Chincoteague became widely known as a seafood capital (*Chincoteague Comprehensive Plan*, 2010).

When the causeway to the Island was constructed in 1922, the Town's primary economy began to shift from seafood to tourism. Chincoteague is now heavily dependent on the tourist industry. Many visitors come to enjoy Assateague Island National Seashore and the small coastal town atmosphere (*Chincoteague Comprehensive Plan*, 2010). In the 1950s, the tourist accommodations included rooming houses and small hotels. The island now includes large hotels, campgrounds, and vacation/rental homes to support the tourism industry during the 21st century and can

accommodate approximately 11,000 overnight visitors (*Chincoteague Comprehensive Plan*, 2002).

Demographics. The Town has experienced a significant population growth as it has become an increasingly popular tourist destination. The first significant population gain occurred leading up to the 1990s and has continued into the 21st Century. The population grew 21% from 3,572 to 4,317 between 1990 and 2000 (U.S. Census, 2000). The 2010 Census indicated that the Town experienced a 31.9% decrease in population from 4,317 in 2000 to 2,941 in 2010. The Town has appealed this count and estimates 3,666 as the full year resident population. The median age for residents in Chincoteague in 2000 was 46.1 years, indicating a population older than the national average.

Chincoteague is a gateway community providing a single point of access to the National Wildlife Refuge and Seashore in Virginia with an estimated 1.5 million visitors per year. With tourism as the primary industry on the island, the Town experiences a peak population of over 15,000 seasonal residents and tourists during the summer months (*Chincoteague Comprehensive Plan*, 2010).

Local Industry. Chincoteague supports a seafood industry that has been a vital component of the town's economy for generations. The town also supports a growing aquaculture industry. Both industries are vulnerable to economic losses as result of coastal flooding. Storm events have events have had adverse impacts on the local seafood industry in the past by damaging facilities and gear as well as damaging oyster and clam beds.

There is a significant risk of economic losses to the tourist related businesses if a spring northeaster caused a functional shut down of access to the beach during the summer tourist season. A late summer hurricane could also cause the tourist season to be shorter than usual and also cause functional losses.

The following table illustrates the top five types of businesses establishments located on Chincoteague.

2008 Rank	Name	No. of Establishments 2008	No. of Establishments 2001	2001 Rank
1	Accommodation and Food Services	46	43	1
2	Retail Trade	30	33	2
3	Construction	18	15	3
4	Other Services (except public administration)	16	12	4
5	Real Estate and Rental and Leasing	12	10	5

TABLE 9.1 Top five business sectors located on Chincoteague (Zip Code Business Patterns, 2001 and 2008).

Coastal and Storm Water Flooding. The *Flood Insurance Study* for Chincoteague identifies the greatest threat of flood inundation comes from hurricanes and northeasters.

The entire town is located within the 100 year floodplain. Most areas are designated as an A flood zone, with only a slim edge of the southern shore of the Town located in a V flood zone. The *Flood Insurance Study* for Chincoteague includes a wave analysis. The town's A zones then are likely coastal A zones where waves under 3 feet can be expected in the 100-year flood. This poses additional risk above ordinary A zones and is included in the adoption of Base Flood Elevations by FEMA. The V zone Base Flood Elevation on the island is 10 feet. The A zone Base Flood Elevations range from 7 to 9 feet.

FIGURE 9.1 Map showing Base Flood Elevations (yellow, green and orange) and Coastal Barrier Resource Areas (red) within the vicinity of Chincoteague. *Map courtesy of Accomack County's Accomap mapping service.*

The Town has a significant number of older homes not built to current building code standards for high winds and flooding conditions. All structures on the island are at high risk to coastal flooding. An estimate of residences for built prior to the National Flood Insurance Program (pre-FIRM) is 2,016. There are approximately 609 additional residences built before the wave analysis. Some of these structures should be classified as pre-FIRM since they were built in the unincorporated areas of Accomack County prior to 1984 and annexed into the town in 1989. Prior to 1984, structures were built to the stillwater elevations. The *Flood Insurance Supplemental Study* shows that wave crest increases the Base Flood Elevation by 0.8 to 1.1 feet. All pre-FIRM and pre wave analysis structures are at greater risk of flood damage than post-FIRM structures built after June 1984.

Two commercial districts are located on the island, along Maddox Boulevard and the original downtown area on Main Street. Both of these areas are located in A zones and for the most part lie below 5 feet in elevation. In August 2011, there were 1,269 business licenses within the Town Many of these licenses are for home based businesses and vacation rental homes since U.S. Census Business Patterns zip code data for Chincoteague indicated only 149 business establishments employing 755 persons and 162 businesses employing 807 persons in 2001 and 2008, respectively.

Chincoteague produced a *Phase I Storm Water Master Plan* in 2011 that assessed locations in town vulnerable to storm water flooding and prioritized improvements for specific drainage issues. The plan outlines suggested storm water mitigation actions for Phase II including development of a storm water GIS database, a phased survey of drainage systems, an analysis of selected existing drainage systems, and suggesting site specific improvements. Chincoteague is interested in utilizing HMGP funding to implement Phase II of the master plan.

Flood Insurance. Chincoteague participates in the Community Rating System (CRS) of the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). The NFIP provides participants protection against catastrophic damage of loss from flooding. Communities participate in the NFIP by adopting and enforcing local ordinances that reduce future flood losses by regulating new construction.

These measures include the adoption of floodplain zoning provisions, designed to limit damage to structures in flood hazard areas. Measures also include the adoption of special building codes for affected areas. Homeowners, renters, and business owners living in communities that participate in the NFIP are eligible for federally backed flood insurance.

The Community Rating System rewards communities that voluntarily take steps beyond the minimum requirements of the Flood Insurance Program with discounts on flood insurance premiums. Eligible activities fall under one or more of the following categories: flood preparedness; flood damage reduction; mapping and regulations; and public awareness.

In 2003, Chincoteague improved its rating to Class 8, entitling the community to a 10% discount on flood insurance premiums. Chincoteague's current rating is Class 8. The town had 530 NFIP policies in 2003 and 819 in 2011 that reduce the risk of financial loss experienced following a hazard event (FEMA NFIP Insurance Report, July 2003 and May 2011). Depending on the distribution of NFIP polices, these should provide a portion of the cost of repair. Purchasing NFIP contents insurance is not usually required unless the property is being used to secure a loan. In this case, NFIP building insurance is a requirement to receive a mortgage on the property. Most of the covered losses will be for repair of existing buildings and will not be for replacement of personal property. In 2003, there was approximately $46.3 million in properties that are uncovered for residential structural loss. This amount rose to approximately $89.5 million in 2011 for the Town. In 2003, private residential property owners would have suffered an estimated $107.9 million in structural and contents damage in the event of a 100-year flood. In 2011, this estimate has risen to approximately $208.3 million (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006 and 2011).

Disaster Assistance. In the past, floods that have covered the entire island, such as the 1933 hurricane and the Ash Wednesday Storm of 1962, have garnered federal assistance. However, there is no guarantee that the President would declare a disaster for a specific storm. If a federal disaster was declared, then some Federal Disaster Assistance would become available. The average housing assistance in medium sized states, such as Virginia, is $1,675 per home (CFR-Emergency Management and

Assistance, 2002). This housing assistance can include lodging reimbursement, rental assistance, home repair or home replacement. There were 2,068 households in Chincoteague in 2000 and 4,480 in 2009 (Census 2000; 2005-2009 American Community Survey 5-Year Estimate). If all of these households applied and received the average assistance, the total federal assistance that might be available for repair of the homes would be $3.5 million in 2003 and $7.5 million in 2009, far short of the funds needed in both years.

There is currently some limited Federal Disaster Assistance for personal property such as loss of clothing, household items, et cetera and other necessary costs such as cleanup. For medium sized states, the average amount of this assistance is $2,106 (CFR-Emergency Management and Assistance, 2002). If all the households received the average assistance the total assistance that might be available for contents replacement would be $4.4 million in 2003 and $9.4 million in 2009, far short of the funds needed in both years.

The 2000 Census showed that there were approximately 542 houses with a mortgage and these homes are valued at approximately $85,317,500. The July 2003 NFIP insurance report showed that there were 530 policies for $57,295,800 in 2003. In 2011 the number of policies in the Town had increased to 819 covering $159,316,400 (FEMA NFIP Insurance Report, May 2011) and the number of mortgages had risen to 635 in 2009 (2005-2009 American Community Survey 5-Year Estimate) It appears that most of the flood insurance policies are on mortgaged houses and that as mortgages are paid off owners are dropping their flood insurance. It also appears that those policies are not covering all the losses that would occur in the 100-year flood.

In addition, it appears that few businesses have flood insurance and those that may have flood insurance likely only insure the structure and not the contents. Depending on depth of flooding, the displacement time for a one story commercial structure could be anywhere from 62 days (flood 1 foot above floor) to 302 days (flood 8 feet above floor).

FIGURE 9.2 Chincoteague home elevation project.

NFIP Community Participation. The Town joined the NFIP on March 1, 1977. Wave height analysis wasn't included for the Town until June, 1984. Accomack County also joined the NFIP at this time. Approximately, twenty-five percent of the existing Town has had floodplain regulation from 1977 while the remainder of the Town was administered by Accomack County from 1984 to 1989.

Chincoteague had two Flood Insurance Rate Maps (FIRMs) prior to the most recent 2009 FIRM. The 1984 FIRM shows the old Town boundaries and the 1992 FIRM shows the rest of Chincoteague Island. In 1989, the Town of Chincoteague annexed the remainder of Chincoteague Island and as a result both the 1984 FIRM and 1992 FIRM are incorrect in showing the Town's boundaries. An updated FIRM was provided to the Town by FEMA with an effective date of March 16, 2009.

Chincoteague had 21 flood claims between 1978 and 2003 with the average claim being $2,878 (FEMA NFIP Insurance Report, July 2003). From 2003 to 2011, the Town experienced 21 additional claims bringing the total claims since 1978 to 42 with the average claim being $6,318 (FEMA NFIP Insurance Report, May 2011).

HMGP Participation. The Town has participated in the HMGP through A-NPDC and the adoption of an approved Hazard Mitigation Plan for Chincoteague in September 2006 The Town and A-NPDC are currently working on a project with FEMA and VDEM to reconstruct one severe repetitive loss property. There are Coastal Barrier Resource Areas located along Assateague Island and the northern tip of Chincoteague (see Figure 9.1) that would not be eligible for HMGP and Pre-Disaster Mitigation funding.

High Wind Events. ASCE 7-98 defines the Wind Borne Debris Hazard Area as within 1 mile of the coast where basic wind speed is equal to or greater than 110 mph (3 sec gust). Chincoteague is within the 110-120 mph range. The coast of Assateague Island and Wallops Island generally are further than 1 mile from Chincoteague. The southern tip of Chincoteague is the only place that falls near or within this zone. There are two mobile home parks in this area. There are approximately 180 units in the park most threatened worth approximately $6.8 million. Assuming, a 110 mph (3 sec gust) event, which is the 100-year event in hurricane prone areas, Chincoteague could expect that many of these mobile homes would be a complete loss. It should be noted that the Floodplain Ordinance adopted by the Town in September 2006 requires elevation and anchoring for all new or substantially improved structures.

FIGURE 9.3 Mobile Home Park on the southern tip of Chincoteague Island. *Photo courtesy of Capt'n Bob's Marina.*

Coastal Erosion. Currently, the town is not experiencing a great deal of shoreline erosion. The island, located in Chincoteague Bay behind Assateague Island, is not currently exposed to the harsher wave climate of the Atlantic Ocean. Assateague Island serves as a barrier protecting Chincoteague from coastal erosion. Natural changes to the Tom's Cove hook have significantly increased the width of the Chincoteague inlet in recent years causing greater high tides and erosion of the marshland at the south end of Chincoteague.

In 1934, a jetty was constructed at the north end of Assateague Island to prevent shoaling at Ocean City Inlet. The jetty has successfully kept the inlet to the north navigable, but has starved Assateague Island of sediment and greatly accelerated erosion and island transgression. These impacts make the island vulnerable to inlet formation during storm events. Should an inlet breach Assateague, the island of Chincoteague could be exposed to greater flood elevations, wave energy and experience increased coastal erosion. Base flood elevations on Chincoteague are currently reduced by 4 to 5 feet due to the sheltering effect of Assateague Island (Accomack County online GIS).

A 50 year shoreline restoration project has been approved by the USACE for Wallops Island approximately 5 miles to the south of Chincoteague. Beach replenishment and extension of a seawall will protect significant federal property investments and may impact sand movement in the vicinity of Chincoteague inlet.

Approximately, 11.2% of the island's shoreline is hardened with bulkheads or riprap. Most of this is along commercial areas and privately owned land. Approximately 15 structures are located close to the shoreline with little buffer if erosion were to occur at that location. In several locations, critical infrastructure such as the Route 175 Causeway and portions of South Main Street come within several feet of the shoreline. A variety of shoreline management tools will be needed to promote a balance between perimeter marshland protection and meeting community needs for recreation, working waterfronts, and real estate value.

Other Local Hazards. On February 28, 2004, a tanker carrying 3.5 million gallons of ethanol exploded and sunk off of the coast near Chincoteague.

Although the ethanol evaporated and the fuel oil slick moved out into the ocean, an accident of this nature could have adverse impacts on the area's coastal environments and habitats. This is a significant concern for the Town since so much of its economy is related to the tourism and seafood industries and the major draw for the area the National Seashore on Assateague Island. An event of this nature could affect the economy for years.

NASA has planned seven major Taurus II rocket launches from the Wallops Flight Facility that will supply the International Space Station over the next several years beyond 2011. The Range Safety Officer establishes a safety performance envelope around the launch site as well as a circular hazard area in the event of a launch failure. This perimeter has been set in the past at 8,500 feet allowing for safe observation from Chincoteague.

Thunderstorms during warm weather months pose a significant threat to the Town. Lightning and high winds associated with thunderstorms are potentially hazardous especially during the annual Pony Penning event each third week in July. This event attracts tens of thousands of people to the pony swim, pony auction and fireman's carnival. During 2004, while thousands were attending the events a thunderstorm passed through and caught many out in the open.

Other significant hazards commonly experienced on the island include ice/snow storms and heat waves. Heat waves, unlike ice/snow storms, occur during the height of the tourist season when the population is at its greatest, putting a larger number of people at risk. Ice/snow storms regularly cause damages to trees and power lines and make access to and around the Town difficult.

Critical Facilities. Town officials evaluated high priority hazards that may affect Chincoteague's critical facilities. All of the Town's critical facilities are located in hazard areas.

FIGURE 9.4 Firehouse on Chincoteague Island. *Photo by Elaine Meil*

The following table lists the critical facilities and their importance to the Town.

Town of Chincoteague – Critical Facilities

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Chincoteague Municipal Complex	Wind, Manmade	4,000+	Major Disruption	No	Yes
Chincoteague Fire Station	Flooding, Wind, Manmade	4,000+	Major Disruption	Yes	No
Chincoteague Docks, Bridges, and Harbor of Refuge	Wind, Flooding, Manmade	4,000+	Devastating	No	No
ANEC Power Delivery Substation	Wind, Flooding, Manmade, Loss of Power	4,000+	Devastating		
Chincoteague Water Supply & Distribution	Wind, Flooding, Fire, Loss of Power, Manmade	4,000+	Devastating	No	No
Emergency Medical Centers	Wind, Flooding, Fire, Loss of Power	4,000+	Major Disruption	Yes	Yes
Banks	Wind, Flooding, Fire, Loss of Power, Manmade	3,000+	Devastating	No	Yes
Hotels, Motels, Restaurants, Convention Center	Wind, Flooding, Fire, Loss of Power, Manmade	12,000+	Devastating	No	Yes

Town of Chincoteague – Critical Facilities (continued)					
Coast Guard Station	Wind, Flooding, Fire, Loss of Power	15,000+	Major Disruption	Yes	Yes
Route 175 Causeway & Bridges	Wind, Flooding, Manmade	30,000+	Devastating	No	Yes
Collector Streets (Maddox, Chicken City, Ridge, Church)	Wind, Flooding, Manmade	4,000+	Major Disruption	No	Yes
Communications Network	Wind, Flooding, Manmade	4,000+	Major Disruption	Yes	Yes
Storm drainage system	Flooding	4,000+	Major Disruption	No	Yes

TABLE 9.2 Critical Town Facilities in Chincoteague.

Planning Documents.

2002 Chincoteague Comprehensive Plan. The 2002 Comprehensive Plan addressed hazards in several areas. The plan identified four hazards, three naturally occurring; flooding, wind, erosion and one manmade; fire. One of the major problems identified was storm water flooding. The Town identified drainage after storms as one of the major concerns. Most of the vacant lands remaining are areas where the island's drainage occurs. The Town discourages filling in open drainage ditches. Some water stands in the ditches until the tide goes down.

2006 Floodplain Ordinance. The Town of Chincoteague adopted a Floodplain Ordinance in 2006 that established floodplain districts based on current FEMA Flood Insurance Rate Maps and created an overlay to all zoning districts. District provisions require permit approval for all new construction or substantial improvements to existing structures. Special construction standards apply and are enforced by professional Town staff.

2010 Chincoteague Comprehensive Plan. The 2010 Comprehensive Plan addresses the same four hazards that the 2002 Plan included: flooding, wind, erosion, and fire. Additionally, ice storms are identified as hazardous to agricultural lands on the Island. Furthermore, the plan recommends that future development adequately address storm water drainage.

Town of Chincoteague, Drainage Maintenance Program. The Town's Code requires local property owners to maintain the drainage ways on their land. Owners must keep these areas clear of natural or manmade material or substance. Allowing this debris to remain constitutes a misdemeanor with each day a separate offense. The Director of Public Works is responsible for conducting two inspections of certain drainage ways prior to northeaster and hurricane season.

Regional Planning. The Town of Chincoteague participates as a member of A-NPDC in regional planning efforts including the NPS General Management Plan, CNWR Comprehensive Conservation Plan, the Nature Conservancy sponsored Adaptation Work Group that will apply new LiDAR data to hazard mitigation planning, and other community facility/natural resource committees working on long range planning issues.

Trends. Chincoteague is currently experiencing challenging but stable economic conditions. Recent growth in home renovations and limited new home construction (10 permits/year) are largely a result of home conversions for vacation rentals. Any significant growth is constrained by lack of public sewer and the cost of engineered septic systems to meet current design standards. There are three major campgrounds, one small campground and one agricultural area located on the island. These constitute the largest areas of remaining undeveloped land. Two large campgrounds, located on the water, are up for sale. Many new structures are being built using easily erodible fill, and incremental fill is disrupting natural drainage patterns. Completion of a storm water drainage master plan with several key projects to reduce shallow flooding has been identified as a high priority by the Town Council.

Findings.

1. The Town lies wholly in the Special Flood Hazard Area. A small number of structures are exposed to potential erosion issues in addition to flooding, and approximately 11% of the island is hardened to avoid erosion. Storm water drainage is also a significant issue on the island.
2. Approximately 2,016 pre-FIRM buildings are vulnerable to damage or destruction in a 100-year flood event.

3. Post-FIRM buildings built with solid walls in A zones that are affected by wave action could be damaged or destroyed, even though in compliance with the NFIP regulations.
4. The 100-year flood event was estimated to cause approximately $107.9 million in direct damage in 2006 and approximately $208.3 million in 2011 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006 and 2011). Federal Disaster Assistance, if received, estimated at $16.9 million in 2009 would not cover the damage.
5. NFIP flood insurance only covers approximately 13.4% of the houses at risk. NFIP policies and mortgages are almost equal and it appears that people are dropping flood insurance as they pay off their mortgages. Few businesses appear to have flood insurance. So in addition to functional shut downs of 62 to 302 days while buildings are repaired, many businesses will have to rely on loans or savings to repair their structures and replace their contents or inventories.
6. The existing 819 flood insurance policies do not appear to cover contents or the entire value of structures that are in the risk areas. However, the coverage deficit has been reduced significantly from approximately $37.7 million in 2006 to approximately $24.1 million in 2011 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006 and 2011).
7. Chincoteague is dependent on the tourist industry. A northeaster, causing a 100-year flooding event, could cause tremendous economic problems if the tourism industry was partially shut down thru the summer season.
8. The water distribution system is dependent on power on both the island and mainland. Without power, water cannot be pumped to the island and fire suppression is a concern. There are no dry hydrants on the island since they do not work well in the salt water environment. The town is dependent on residual pressure in the water tanks and Mutual Aid from other fire companies to combat fire during power outages. Water mains located along the Route 175 Causeway and bridges are critical infrastructure at risk from major storm events.
9. The potential damages are increasing due to increased storm and tidal exposure from Chincoteague inlet. New construction standards and

infrastructure improvements will help to mitigate the effects of hazards to new development on the island.

10. A master plan for storm water drainage that is based on field conditions and analysis of new LiDAR elevation data should be prepared to guide and regulate land development and the Town capital improvement program.

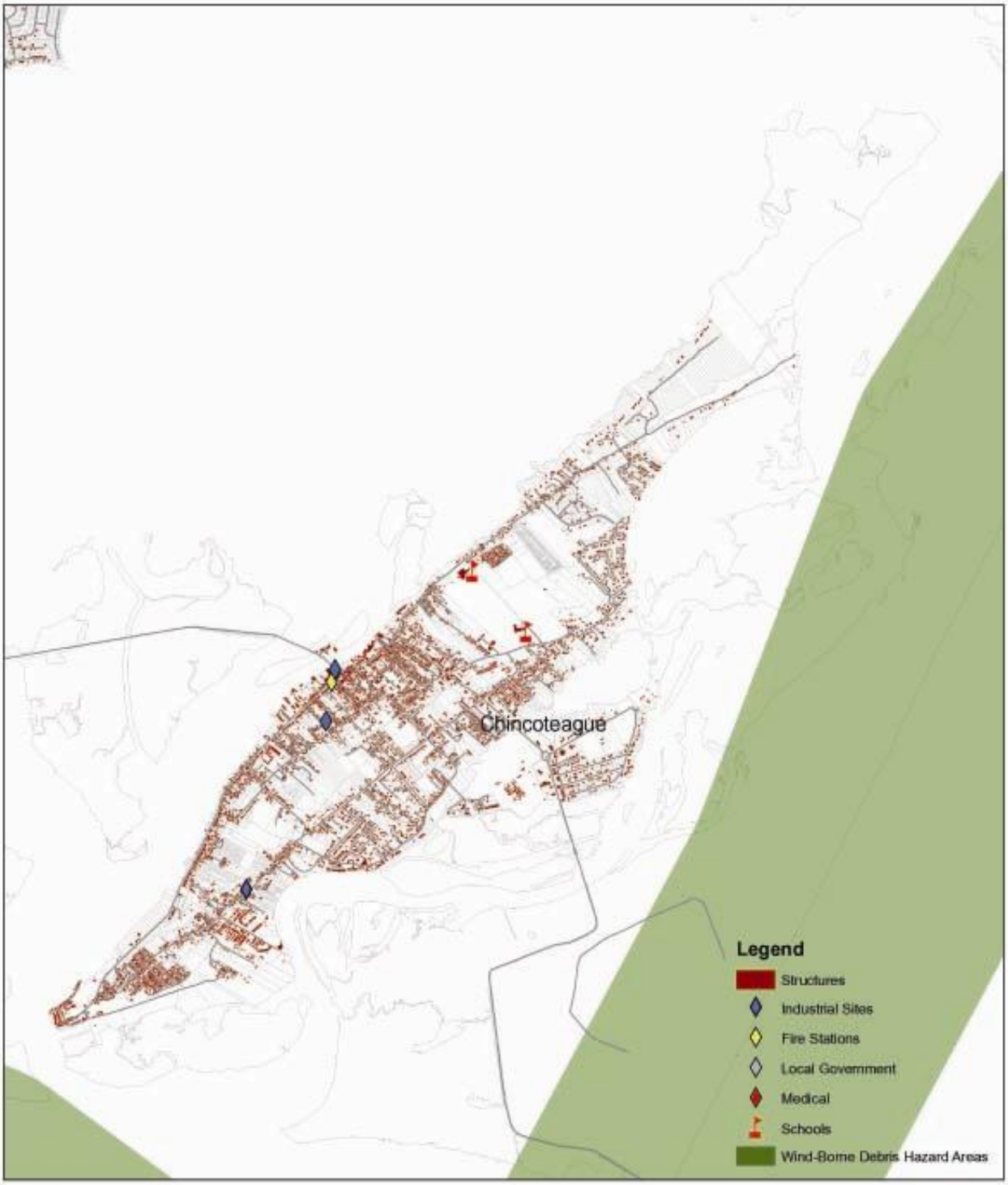
Town of Chincoteague Hazard Maps

The following maps illustrate coastal flooding and wind hazard areas for the Town of Chincoteague. Hazard maps for the remainder of Accomack County can be found at the end of Chapter 8. Descriptions of locations at risk to coastal erosion and storm water flooding are described in detail within Chapter 9.

Coastal Flood Hazard Map
Town of Chincoteague

Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11



Wind Hazard Map
Town of Chincoteague

Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11

Chapter

10

Town of Saxis Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Saxis Island juts into Pocomoke Sound and is separated from the rest of Accomack County by Freeschool Marsh. The island was first patented in 1666 and a single community existed on the island as a single farmstead that primarily raised cattle until 1800 when four families inhabited the island. The community grew in size throughout the 1800s and cattle farming declined due to lack of space on the island. It was during this period that seafood became the primary economy. In the 1920s, the causeway connecting the island to the mainland was constructed and a channel was dredged to the harbor allowing for larger boats to access the island. Seafood continues to be the main economy for the Town to date. Saxis was incorporated as a town in 1959 (*Saxis Town Plan*, 1997).

Demographics. The 2010 Census indicated that the Town has a population of 241, which is a 28.5% decline from the 337 people that lived in the Town during the 2000 Census. The Town has experienced a decline in population since 1960 when the population was 577 (*Saxis Town Plan*, 1997). The median age for residents in Saxis in 2000 was 47.3 years and the median age increased to 55.5 years in 2010, signifying a population older than the national average (U.S. Census, 2000 & 2010). The Town has experienced an increase in the number of homes that were purchased as vacation homes and remain vacant throughout the majority of the winter months. These properties are at greater risk to damage during the times they are vacant.

Coastal and Storm Water Flooding. The Flood Insurance Study (FIS) for Saxis identifies that the greatest threat of flood inundation comes from hurricanes. The August 1933 hurricane, September 1936 hurricane, Hurricane Hazel 1954 and Hurricane Donna 1960 all caused flooding in the Town (*Saxis FIS*, 1982). Since this study, the Town has also

experienced flooding during Hurricane Floyd 1999 and Hurricane Isabel 2003. The Town's mayor also indicated that a Hatteras Low, a northeaster that forms rapidly near Cape Hatteras in North Carolina, has potential to strike the Town before adequate preparations can be made.

Substantial portions of the Town lie within a Special Flood Hazard Area. The Town of Saxis has several V zones with Base Flood Elevations ranging from 8 to 10 feet. Most of the structures lie within an A zone, with Base Flood Elevations ranging from 7 to 8 feet. In addition to the Special Flood Hazard Areas, the Town has B zones and C zones. A significant number of the houses that lie outside the Special Flood Hazard Area are within the B zones, which are the 500-year floodplain.

Approximately 160 houses, 82% of all structures, lie in a Special Flood Hazard Area (Accomack County FIRM, 2009; ESVA 911 Commission Data for Accomack County, 2007). The *Flood Insurance Study* for the Town notes that the development within the floodplain is extensive and includes numerous family dwellings, small businesses and seafood related industries. The Base Flood Elevations within the Town include wave heights on top of the stillwater flood heights. This is an indicator that the A zones in Saxis are coastal A zones where waves under 3 feet can be expected. Structures built to the current NFIP standards may suffer increased damage from waves that would not impact a non-coastal A zone.

Saxis' primary economic base is the fisheries industry (*Saxis Town Plan,* 1997). In 2000, there were 130 workers over the age of 16 that lived within the Town (U.S. Census, 2000). Twenty, 15%, worked within the Town while the rest traveled outside of the Town, including watermen, for their employment (U.S. Census, 2000). Eighteen percent were employed in the agriculture, forestry, fishing and hunting, and mining industries. Seventeen, 13%, were self-employed and probably represent working watermen that work out of and live within the community (U.S. Census, 2000). In 1997, there were approximately 64 commercial fishing craft berth within the Town's harbor (*Saxis Town Plan*, 1997) and Town Officials suspect that this number has decreased to approximately 45 in 2011 (Verbal Communication with Town of Saxis, 2011). Individuals that live in Saxis, northern Accomack County, Maryland and Tangier own these craft.

FIGURE 10.1 The harbor at Saxis. *Photo by Elaine Meil.*

In the surrounding Census Block Group, including Saxis and the villages of Sanford and Messongo, there were a total of 56 people who worked in the agriculture, forestry, fishing and hunting and mining industry in 2000. Of these, 43 were self-employed. Not all of these represent the fishing industry, as a few farms were located in the mainland areas within the block group.

The causeway (State Route 695) provides the only vehicular access to Saxis from the mainland. This road regularly experiences coastal flooding during storm events putting residents at great risk. In addition, storm water commonly floods the road in low lying areas near Sanford and Messongo to the east of Town.

FIGURE 10.2 View of the causeway leading westward to Saxis. The causeway is the sole access to the island and is commonly flooded during storm events putting residents at risk. *Photo by Curt Smith*

The harbor at Saxis is a local hub of economic activity. A disastrous flood would adversely affect the Town and surrounding area. Worker productivity would be cut drastically since many persons live and work within the 100-year floodplain. Many employment activities also occur through small businesses. FEMA notes that small businesses are particularly vulnerable after a disaster with some 30% not surviving (*Planning for Post Disaster Recovery and Reconstruction*, FEMA, 1998).

The fisheries industry is based around the southern end of Saxis near the harbor. This area is classified as an Intensely Developed Area (IDA) according to the requirements of the Chesapeake Bay Preservation Act. It is also zoned commercial-waterfront (C-W). This area is intended to provide space for activities and services relating to the seafood industry (*Saxis Zoning Ordinance*, 1993). This area lies in a regulated flood zone.

FIGURE 10.3 Fisheries businesses located in the Intensely Developed Area (IDA) in Saxis. *Photo by Elaine Meil*

A small commercial area is located in the center of the Town on Saxis Road. This area lies in Zones A, B and C. The majority of the area does not lie in a Special Flood Hazard Area.

In the event of a 100-year flood, private residential property owners would suffer an estimated $2.7 million in structural and contents damage in 2011 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2011). This is a $1.1 million increase from the estimated loss for the Town in 2006 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006).

In 2003, the Town had 44 NFIP policies, which represented 28% of structures in the Special Flood Hazard Area (FEMA NFIP Flood

Insurance Report, July 2003). In 2011, there are 48 policies, 46 of which are located in the Special Flood Hazard Area, covering approximately $5,913,000 in damages. The 46 Special Flood Hazard Area policies indicate that the percentage of structures with policies rose gradually to 31% in 2011 (FEMA NFIP Flood Insurance Report, May 2011). These policies would reduce the amount of loss. The Flood Insurance Administration should provide a portion of the cost of replacing contents and repairing structures. In 2011, it is estimated that there would be approximately $1.8 million in uncovered residential loss (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2011). This loss estimate increased by approximately $700,000 since 2006 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006).

There is no guarantee that a 100-year flood in Saxis would be declared a Presidential Disaster. However, if one was declared and all households in the Special Flood Hazard Area applied for and received the average Federal Disaster Assistance, the Town's residents might receive approximately $600,000 in assistance leaving $1.2 million in loss for the residents to absorb.

The 2000 Census showed that there were 35 houses with a mortgage and these homes were worth $2,410,000. In 2011, Town Officials expect that the number of houses with a mortgage has risen since 2000. It is assumed that this number has approximately stayed the same in 2011. In 2011, the Town had 48 NFIP policies and all but 2 are within the Special Flood Hazard Area. These policies cover $5,913,000. The policies in place appear to cover the value of the structures only. This may indicate that contents insurance has not been purchased or that some policies do not have enough coverage to cover a total structural loss while others carry some contents insurance.

Storm water flooding also occurs in the Town. During heavy rains the Town's roads are often flooded (Saxis Town Plan, 1997). The Town's drainage ditches empty directly onto the western shore and often become clogged with sand from tides. Ditches in the Town are also commonly filled with debris and invasive plant species such as phragmites. Phragmites can completely overtake a ditch not allowing proper drainage and is extremely difficult to get rid of. The Town also contends with tidal

influence on the drainage system. When tides are high the storm water remains in the ditches until the tide goes out.

FIGURE 10.4 Drainage ditches in Saxis are commonly clogged by the invasive plant species, phragmites. *Photo by Curt Smith*

NFIP Community Participation. The Town joined the NFIP on November 17, 1982. In 2003, Saxis had 13 flood insurance claims since 1982 (FEMA NFIP Flood Insurance Report, July 2003). There has been one claim in the Town since 2003 bringing the total in 2011 to 14 (FEMA NFIP Flood Insurance Report, May 2011). The average claim was settled for $6,314 (FEMA NFIP Flood Insurance Report, May 2011).

HMGP Participation. The Town elevated 16 houses following Hurricane Isabel in 2003 using HMGP funds. This is the only time the Town has participated in the HMGP.

High Wind Events. The entire Town is located in the wind borne debris hazard area. This area extends 1-mile inland. Assuming, a 110 mph (3 sec gust) event, which is the 100-year event, Saxis could have expect approximately $838,000 in wind damages in 2006 (Eastern Shore of Virginia Wind Vulnerability Assessment, 2006).

Coastal Erosion. The Town recognizes that it has a serious erosion problem. The Town has been working to resolve the erosion problem since 1972. The average long term erosion rate for Saxis' 9,000 ft long

shoreline is 4.9 feet per year (*Saxis Town Plan*, 1997). The Town believes that it is possible that the erosion rate has increased. The Town is only 1,590 feet wide at the widest point. With every bit of erosion, the Town's flood hazard also increases. There are approximately 9 structures in Saxis that are located close to the shoreline with little buffer if erosion were to occur in the immediate vicinity of these structures. They represented approximately $400,000 in damage in 2006 (Eastern Shore of Virginia Coastal Erosion Vulnerability Assessment, 2006). Town Officials believe that there are approximately 14 structures at risk in 2011.

Saxis is the highest point of land for approximately 4.4 miles inland. Both the villages of Sanford and Messongo located inland are lower in elevation than Saxis. Sanford is 2.6 miles from Saxis and Messongo is 4 miles from Saxis. The Town serves these areas with its fire station.

The Army Corps of Engineers in Norfolk proposed building a series of seawalls along the western shoreline of the island to restore protective wetlands and in turn, control erosion. The proposal indicated that the Town must match 35% of construction costs, which was $2.3 million. The Town has unsuccessfully explored multiple funding options and does not expect to be able to secure the needed funds to protect their island.

Other Local Hazards. Since many people rely on the fisheries industry, fish kills and the declining health of the Chesapeake Bay impact the Town. In July 1999, a fish kill near Saxis caused 500,000 young-of-the-year menhaden to be affected. The cause of this fish kill was low dissolved oxygen in the water linked to the prolonged drought Virginia was experiencing at the time. Town Officials also indicated that residents have been historically impacted by concentrations of the pathogenic bacteria, *Listeria monocytogenes*, which originated in the Pocomoke River upstream of the island. These water quality hazards represent a threat to the livelihood of residents in Saxis and northern Accomack County.

The Town also has a significant mosquito problem and residents could potentially be at risk to mosquito-borne illnesses such as West Nile virus. The Town is currently looking into implementing a mosquito control abatement program in 2011.

Winter weather has historically had adverse impacts on the Town's seafood industry. The Town's harbor has historically frozen during

extreme cold snaps bringing the seafood-based local economy to a halt. Ice also poses a threat to the causeway and access to the island.

Critical Facilities. Town officials evaluated the hazards that have or could affect Saxis' critical facilities. The Town's office and fire station are located in the 100-year floodplain. When floodwaters come up, the Town's equipment is moved to the Methodist Church located on the highest point of land in the Town.

The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Saxis Volunteer Fire Company/Town Office	Flooding, Wind, Fire	2,000	Devastating	Yes	Yes
Saxis United Methodist Church	Flooding, Wind, Fire	300	Devastating	No	No
Saxis Harbor	Flooding, Erosion,	500	Devastating	No	Yes
Saxis Causeway	Flooding, Erosion	At least 2,000	Devastating	No	No
Saxis Town Pier	Flooding, Erosion, Ice, Man-made collision, Wind		Minor Distraction	No	Yes

TABLE 10.1 Critical Town Facilities in Saxis.

FIGURE 10.5 Saxis' firehouse and Town office located in a flood zone. *Photo by Elaine Meil*

FIGURE 10.6 Saxis Methodist Church is used to store Town's fire equipment during a flood. *Photo by Elaine Meil*

FIGURE 10.7 The Saxis Town Pier is located on the western shore of the island. *Photo by Curt Smith*

Review.

January 2010 Saxis Town Ordinance Regarding Construction of Mobile Homes. The Town enacted an ordinance restricting the construction of mobile homes on the island. Mobile homes are not permitted without approval of the Town Council. The Town is trying to limit the number of damages to residential structures during storm events.

1997 Saxis Town Plan. The Town Plan identifies various hazards that affect the community. Of particular concern is shoreline erosion. The shoreline's erosion rate is 4.9 feet per year. This has been a major concern of the Town since 1972. Although a report was prepared by the Army Corps of Engineers documenting the need for an erosion control structure or beach nourishment, the Town has not been able to fund this project on their own. The Town is also susceptible to flooding from both rainstorms and bay water. Finally, other hazards are noted including: potential water pollution from boats, failing septic systems, aboveground storage tanks and underground storage tanks, saltwater intrusion in the potable water wells and contamination from failing septic systems of this source of water.

1993 Town Zoning Ordinance of the Town of Saxis, Virginia. The ordinance regulates areas that are impacted by the identified hazards in the following ways. The Town has set up a Chesapeake Bay Preservation Area Overlay District around its tidal wetlands and shoreline. This overlay district consists of a Resource Protection Area (RPA), a Resource Management Area (RMA) and an Intensely Developed Area (IDA). The RPA area is a 100 foot vegetated buffer surrounding the sensitive areas along with tidal wetlands, nontidal wetlands, and tidal shores. The RPA area only allows water-dependent uses or redevelopment. The buffer area can be reduced to 50 foot if certain conditions are met. The IDA is located around the harbor and redevelopment in this area may be exempt from the RPA buffer area. Two of the zoning districts allow hazard control structures by right. The Parks and Open Space District (POS) is located immediately around the harbor, the Town's parcel where the Army Corps of Engineers places dredge material, and most of the shoreline north of this site. The POS district allows erosion control structures by right. The Commercial, General District (C-G) located in the center of Town allows drainage, erosion and flood control devices by right.

1997 Saxis Subdivision Ordinance. The ordinance states that land within the 100-year floodplain shall not be subdivided in such a way as to provide sites for residential occupancy. The subdivider must submit a map of the extent of the 100-year floodplain and the RPA and demonstrate that there is an adequate buildable area outside of the RPA and completely free of the danger of floodwaters.

Trends. In 2011, the Mayor of Saxis indicated that, in general, land prices have decreased in the Town since the national economy collapsed in 2008. Much of Saxis is built-out but, there are a small amount of new houses being built. However, most development in Town is related to remodeling and building additions to older structures. The reason for this is the need not to touch the existing septic system thereby triggering a requirement to put in an expensive alternative septic system.

It was also indicated that is the Town has experienced an influx of new residents purchasing the older houses. The issue with this is the potential that new residents or seasonal residents may be unaware of the impact of hazards in the Town. Of particular concern is the need to evacuate long before it becomes a necessity in Town due to Sanford flooding before Saxis. Town Officials estimate that approximately one third of residents use their homes on a seasonal basis. The Mayor further noted that some native residents may not take precautions either.

Findings.

1. The community appears to have coastal A zones where structures built to NFIP requirements can still suffer flood damage in the 100-year flood.

2. In 2011, it is estimated that 31% of structures in the Special Flood Hazard Areas have flood insurance. This number is up slightly from the 2003 estimate of 28%.

3. Flood insurance coverage numbers indicate that people are buying structure insurance, but not contents insurance.

4. Most storm water flooding issues are related to debris and invasive plant species, such as phragmites, clogging up ditches and drains.

5. Locally, Saxis provides services to the surrounding area and serves as an economic center in northern Accomack County. The Town of Saxis is threatened with erosion although it sits at the highest location in the area. The loss of the harbor, fire station and causeway would adversely impact the entire area including Saxis, Sanford and Messongo.

6. The Town's office and fire station are located in the 100-year flood plain and has been flooded in the past.

7. The Town is experiencing serious erosion and is actively pursuing funding to construct protective wetlands to mitigate the problem.

8. The Town's residents and FEMA need to document damages sufficiently so that the various flood prone homes can receive mitigation assistance.

9. Structures are being built in the local hazard areas and older structures are being added to and remodeled thereby increasing property at risk.

10. New residents may be unaware of the local hazards and need to be educated on the precautions they need to take in the event of a disaster.

Chapter

11

Town of Hallwood Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Hallwood is located near the central spine of the Eastern Shore in the northern portion of Accomack County and encompasses approximately 234 acres. The Town, like a number of other Eastern Shore towns, developed around a railroad station built following the construction of the railroad in 1884. The Town's primary commercial activity in the 18th and 19th centuries was timber harvesting. A canning factory became a prominent feature in Town around the beginning of the 20th century. Hallwood has evolved primarily into a residential community since rail service ceased in the early 1960s (*Hallwood Town Plan*, 2001).

Demographics. The 2010 Census indicated that the Town has a population of 206, which is a 29.0% decline from the 290 people that lived in the Town during the 2000 Census. The Town's population has fluctuated between 206 and 290 residents since 1960 with a maximum population of 290 in 2000 (U.S. Census, 1960 through 2010). The median age for residents in Hallwood was 32 years in 2000 and increased to 40.5 years in 2010, this signifies a population younger than the county, state, and national average. The Town is primarily a residential community with the majority of employed residents commuting out of Town to work. Several major employers are located near Hallwood including NASA, Accomack County Schools, and Tyson and Perdue poultry processing plants (*Hallwood Town Plan*, 2001).

Coastal and Storm Water Flooding. No portions of the Town lie within a Special Flood Hazard Area. The western two thirds of the Town are within the X zone, or the 500-year floodplain. A significant number of the houses in Town are within the X zone. The threat of coastal flooding is considered to be minimal (*Hallwood Town Plan*, 2001).

Several small commercial areas are located in the center of the Town. These areas are within the X zone.

Storm water flooding has the greatest and most frequent impact on the Town. The Town lies on very unsuitable soil for drainage and retains rainwater throughout Town. During heavy rains the Town's roads are often flooded and floodwaters have historically rushed down the main street in Town causing damage to property (*Hallwood Town Plan*, 2001). The Town relies on Accomack County for the maintenance of ditches along roadways throughout the Town.

NFIP Community Participation. Hallwood joined the NFIP on May 1, 2000. Prior to September 28, 2001, when FEMA rescinded the Town's FIRM, the Town had an identified floodway from Messongo Creek that had portions of pre-FIRM vacant industrial buildings within it. Several causes of flooding were identified in the Flood Insurance Study for the Town. Flooding is most prevalent in the spring, but can be caused by short intense rainfall, heavy rains, or lack of adequate drainage. The Flood Insurance Study also noted that the development in the floodplain was moderate with residences and small businesses also located in the former 100-year flood zone. Although no A zones exist in the Town, the zone designation of the former Special Flood Hazard Areas are now Zone B (shaded Zone X). Zone B denotes the 500-year floodplain. The structures located within these areas have a 6% chance of having a flood meet or exceed the 500-year level over the course of a 30-year mortgage. They have a 13% chance to meet or exceed the 500-year flood over the course of 70 years.

The July 2003 NFIP insurance report showed that there were 6 A zone policies within the Town and no claims for flood damage had been made. These 6 policyholders were probably paying more than they should for flood insurance since they were no longer in an A zone.

FEMA revised the Town's FIRM in 2009 and it now shows no Special Flood Hazard Areas located within the Town. However, the NFIP Insurance Report from May 2011 lists one A zone policy located within the Town. It is likely that this policyholder is overpaying for flood insurance since they are no longer located in an A zone.

In 2011, Hallwood has a total of 2 NFIP policies totaling $364,400 in coverage with one located within an A-xone and the other is not located

in a flood zone (FEMA NFIP Insurance Report, May 2011). This may indicate potential storm water flooding issues within the Town.

The Town has had one claim that was awarded $4,923 since joining the NFIP in 2000 (FEMA NFIP Insurance Report, May 2011). This claim was the result of storm water flooding as result of a thunderstorm in 2003.

HMGP Participation. The Town has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the shoreline. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event, falling branches or trees may damage some structures or power lines.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several major facilities in the vicinity. Major ground water withdrawers in the area are Tyson Foods and NASA Wallops Flight Facility. Additionally, Accomack County's Northern Landfill and an unlined septage lagoon are both located within the ground water recharge zone in the vicinity of Hallwood (*Hallwood Town Plan*, 2001).

The residential wells in the Town are also potentially at risk of contamination from aboveground and underground petroleum storage tanks (AST and UST). Most homes in the Town are heated by oil, which is stored in these tanks. If not properly maintained, ASTs and USTs can pose a significant water quality risk to the Town. In addition, residential water supplies can also be threatened by failing septic systems, which the majority of residences operate for waste disposal.

Winter snow and ice storms have historically had adverse impacts on the Town including damage to trees and power lines and making roads

impassable. A winter storm struck in late December of 2010 creating blizzard-like whiteout conditions, extensive snow drifting that blocked roadways and prevented accessibility to and from the Town.

The Town does not have a fire department and relies on the fire departments of neighboring communities. This puts the Town at greater risk for fire damage. Specifically, there are numerous fields in the vicinity of the Town that are prone to catching fire, especially during droughts. These fires have the potential of spreading to residences in Town.

In addition, drought poses a serious threat to Town residents' private water supplies, since all residents rely on individual private water wells.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Hallwood Town Hall	Storm Water Flooding, Wind	206	Major Disruption	No	Yes
Hallwood Post Office	Storm Water Flooding, Wind	206	Major Disruption	No	Yes
Hallwood Town Park	Wind	206	Inconvenience	No	No

TABLE 11.1 Critical Town Facilities in Hallwood.

Review.

2001 Hallwood Town Plan. The Town Plan identifies storm water flooding from rain events as the primary hazard that affects the community. A majority of the land the Town is situated on is very flat and consists of poorly drained hydric soils resulting in flooding following heavy rains. Heavy rains have caused floodwaters to rush down the main street in Town, causing damage to property. The plan identifies a need to correct drainage problems along Main Street and secondary roads in Town by constructing ditches and drainpipes at an estimated cost of $10,000, which the Town was unable to fund at the time. Other hazards are noted including failing septic systems, above ground and underground storage tanks, and contamination of potable water wells from failing septic systems and other industrial sources in the surrounding vicinity.

1993 Town Zoning Ordinance of the Town of Hallwood, Virginia. Areas impacted by the identified hazards are regulated by the ordinance in the following ways. The Town has set up a Chesapeake Bay Preservation Area Overlay District around its wetlands. This overlay district consists of a Resource Protection Area (RPA), a Resource Management Area (RMA) and an Intensely Developed Area (IDA). The RPA area is a 100 foot vegetated buffer surrounding the sensitive non-tidal wetlands in Town. The RPA area only allows water-dependent uses or redevelopment. The buffer area can be reduced to 50 foot if certain conditions are met. The IDA is located around the intersection of Main Street and the railroad and redevelopment in this area may be exempt from the RPA buffer area. The Business, General District (B-G) located in two areas in the center of Town allows drainage, erosion, and flood control devices by right.

Trends. In general, land prices have decreased in the Town since 2006. Hallwood is largely built-out, but there is sparse construction still occurring. The 2000 Census indicated 121 housing units existed in the Town with most of the housing stock being at least 30 years old with many homes over 50 years old. Additionally, it was indicated that 17% of the housing units in the Town were vacant. These trends could potentially increase damages from hazards within the Town. The Town does not experience seasonal population fluctuations from tourism and transient field laborers.

Findings.

1. The hazards expected to have the greatest impact on Hallwood are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other significant hazards facing the Town are ground water contamination, snow or ice storms, and drought.

2. Hallwood's residential areas are typically older and contain older construction and many mature trees around homes and churches in the Town. High wind events bringing down branches and trees pose a significant threat in the form of secondary wind damage and power outages.

3. The Town needs to upgrade undersized drainage pipes within Town that regularly cause storm water to back up causing flood damages to structures within Town.

4. The Town of Hallwood no longer has any areas located in the 100-year floodplain, but residents are still overpaying for A zone polices.

Chapter

12

Town of Bloxom Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Bloxom is located west of the central spine of the Eastern Shore in Accomack County. The Town was established in the early 1880s as a farming community. The railroad was constructed in 1884 and the Town experienced significant growth. By the early 1900s, Bloxom had become a major produce shipping point on the Eastern Shore. As farm labor needs decreased in the 1930s, the population of Bloxom began to decline. By 1952, the railroad had ceased passenger service and the Town's high school had closed. The Town was incorporated in 1951 and has evolved primarily into a residential community (*Bloxom Town Plan*, 2000).

Demographics. Between 1980 and 2000 the community reached a maximum population of 407 in 1980 and minimum of 357 in 1990 (*Bloxom Town Plan*, 2000). The population of Bloxom was 395 in 2000 and has remained fairly stable being 387 in 2010 (U.S. Census, 2000 and 2010). The Town is primarily a residential community with the majority of employed residents commuting out of Town to work. NASA, Accomack County Schools, seafood industry, and Tyson and Perdue poultry processing plants are several major employers located near Bloxom (*Bloxom Town Plan*, 2000). The median age for residents in Bloxom in 2000 was 37.8 years, signifying a population older than the national average (U.S. Census, 2000).

Coastal and Storm Water Flooding. Bloxom lies within the Chesapeake Bay watershed and is drained by Muddy Creek and Guilford Church Branch, which drain the northern and southern parts of the Town, respectively (*Bloxom Town Plan*, 2000).

No portions of the Town lie within a Special Flood Hazard Area. The Town is within the X-zone, which is the 500-year floodplain, and is not likely to be affected by a 100-year flood. However, it is possible for the

Town to be affected by a flood of that magnitude due to flat topography, an elevated water table, and poor drainage. Several small commercial areas are located in the center of the Town. These areas are within the X zone (*Bloxom Town Plan*, 2000).

Storm water flooding has the greatest and most frequent impact on the Town. The Town lies on unsuitable soil for drainage and retains rainwater throughout Town. During heavy rains the Town's roads are often flooded and floodwaters have historically rushed down the main street in Town causing damage to property (*Bloxom Town Plan*, 2000). The Town does not finance the annual maintenance of ditches along roadways throughout the Town and relies on Accomack County and the Virginia Department of Transportation for ditch maintenance. Despite the County and State's efforts, the Town still experiences drainage problems (Verbal Communication with Town Officials, 2011).

In specific instances, storm water has accumulated and caused flooding. Bloxom received a flood of this nature on September 3, 2003, just prior to Hurricane Isabel. A heavy rain occurred and water flowed to the railroad tracks, which acted as a dam, back flooding several homes. In addition, farm fields in the area were covered in plastic that potentially acted like a parking lot does in a more urban environment. Although the storm is called the Great Bloxom Flood of 2003, several areas were flooded including Bloxom, Clam, Guilford, Hallwood and Nelsonia.

This particular incident was caused by several conditions. An afternoon rainstorm had already passed through the area. During the height of this storm, motorists on Route 13 had slowed to a crawl, as the rain was too intense to adequately see ahead of them. That evening at least two thunderstorms passed over Accomack County. In a very short period of time, 6 to 8 inches of rain fell. An 8-inch backyard rain gauge was full to overflowing. Ten inches of rain was found in a bucket left outside. Radar out of Salisbury indicated that the area received about 6 inches during the thunderstorm.

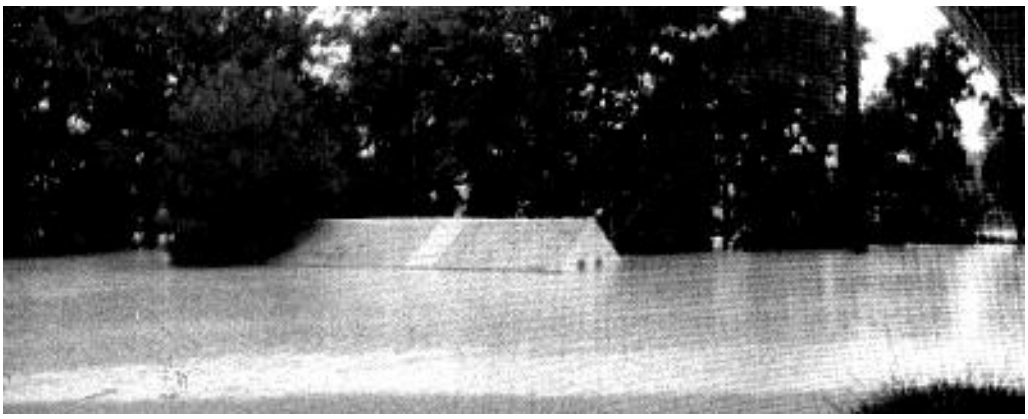


FIGURE 12.1 A structure in the Town of Bloxom on September 3, 2003. The trees in the distance line the railroad. *Photo by Franklin Kreisl*

FIGURE 12.2 Area where the floodwater was dammed against the railroad tracks. The pine in this picture is the same as the lone pine in the previous photo of the flooding. *Photo by Elaine Meil*

In addition, the storm occurred during high tide and the water could not drain away. The drainage ditch was also scheduled for maintenance but Accomack officials believed that had the maintenance been done, it still would not have stopped the areas from flooding. Floodwaters reached a depth of at least 2 feet and in some areas of Town the flooding was greater.

Although there were no estimates of the probability of the storm event, the entire 12-hour period including the initial storms in the afternoon would put this above the 100-year storm event level, which on the Eastern Shore is 7 to 8 inches in 12 hours. Persons who remember the Bloxom storm recall that the larger storm's rainfall occurred over approximately 2 hours, making this storm above the 100-year storm event. The 2-hour, 100-year storm on the Eastern Shore is between 4.5 and 5 inches of rain.

Several drainage ditches, which lead to Muddy Creek and Guilford Creek, are located in Town to accommodate storm water and prevent local flooding. VDOT maintains a small portion of these ditches (less than 100 feet), while the Town finances the maintenance for the majority of these ditches. The drainage system needs to be improved because the Town still experiences drainage problems (*Bloxom Town Plan*, 2000).

NFIP Community Participation. The Town does not currently participate in the NFIP, but has expressed interest in potentially joining the program.

HMGP Participation. Bloxom has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the Bay shoreline. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures. A new firehouse is being constructed in 2011 and is designed to withstand high winds.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several major facilities in the vicinity. Major ground water withdrawers in the area are Perdue Foods, Byrd Foods, the Towns of Onancock and Parksley, and the Accomack County Nursing Home. The large withdrawals of ground water increase the possibility of water quality problems, including well interference, salt water intrusion, and deterioration of water quality. A liquid propane gas (LPG) storage facility

with a capacity of 90,000 gallons was located on the east side of the Town. Town residents were concerned about the safety of these tanks and expressed concerns about similar facilities being located within the Town. The Town requested removal of the facility and now does not allow similar facilities to exist within the Town (*Bloxom Town Plan*, 2000, Verbal Communication with Town Officials, June 2011).

The residential wells in the Town are also potentially at risk of contamination from aboveground and underground petroleum storage tanks (AST and UST). Most homes in the Town are heated by oil, which is stored in these tanks. If not properly maintained, ASTs and USTs can pose a significant water quality risk to the Town. In addition, residential water supplies can also be threatened by failing septic systems, which the majority of residences operate for waste disposal. Bloxom Town Officials indicated that several residences on Back Street use lift stations that drain to a common drainfield located on the outskirts of the Town. If the integrity of the septic drain pipe is compromised in the future, it could pose a significant health risk to residential water supplies and surface water quality (Verbal Communication with Town Officials, June 2011).

Winter snow and ice storms have historically had adverse impacts on the Town including damage to trees and power lines and making roads impassable. A winter storm struck Bloxom in late December of 2010 creating blizzard-like whiteout conditions, extensive snow drifting that blocked roadways and compromised accessibility to and from the Town. Power losses were experienced and Town businesses were closed for days, creating potentially hazardous situations for residents and adverse impacts on the local economy.

The Town Firehouse is equipped with a generator to supply back-up power in the event power is lost during a storm event. In addition, the Town is interested in providing an additional generator for the Town's Police Department.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Bloxom Town Hall	Wind, Storm Water Flooding	387	Major Disruption	No	Yes
Bloxom Fire & Rescue Department	Wind, Storm Water Flooding	Town and County Residents	Devastating	No	Yes
Bloxom Police Department	Wind, Storm Water Flooding	Town and County Residents	Major Disruption	No	Yes

TABLE 12.1 Critical Town Facilities in Bloxom.

FIGURE 12.3 The Bloxom Town Office (left) and Fire and Rescue Department (right) are located near the center of Town. The Fire and Rescue Department will be relocating to a new facility currently being constructed in Town in 2011. The Town Police Department will move into the current Fire and Rescue building after the department is relocated. *Photo by Curt Smith*

FIGURE 12.4 The new Fire and Rescue Department under construction in 2011. The railroad is a vital and historic component of the Town and can be seen in the foreground. *Photo by Curt Smith*

Review.

2000 Bloxom Town Plan. The Town Plan identifies drainage problems that lead to storm water flooding from rain events as a hazard that affects the community. A majority of the land the Town is situated on is very flat and some areas of Town consist of poorly drained, hydric soils resulting in flooding following heavy rains. The plan identifies a need to improve drainage in Town by improving drainage ditches, preserving indigenous vegetation, and reducing impervious cover. Other hazards identified in the plan are failing septic systems, above ground and underground storage tanks, and contamination of potable water wells from failing septic systems and other industrial sources in the surrounding vicinity.

1996 Town of Bloxom Subdivision Ordinance. The ordinance requires storm water management practices and improvements to treat both the quantity and quality of storm water runoff including contour divides, drainage plans, percentages of impervious areas, runoff quantity and quality calculations, flood control devices, and surface water quality protection measures. Drainage plans must be consistent with local and regional drainage plans, including VDOT and Chesapeake Bay Preservation Act water quality objectives.

1992 Town Zoning Ordinance of the Town of Bloxom, Virginia. Areas impacted by the identified hazards are regulated by the ordinance in the following ways. The Town has set up a Chesapeake Bay Preservation Area Overlay District around its wetlands. This overlay district consists of a Resource Protection Area (RPA) and a Resource Management Area (RMA). The RPA area is a 100 foot vegetated buffer surrounding the sensitive non-tidal wetlands in Town. The RPA area only allows water-dependent uses or redevelopment. The buffer area can be reduced to 50 foot if certain conditions are met. The vast majority of the Town is located in the RMA.

Trends. The Town has at least 10 to 15 vacant parcels remaining as of 2011 that could bring significant growth to the Town. Recently there has been limited construction occurring within Town. There were 180 housing units in Bloxom in 2000 with nearly half of the units being at least 50 years old. There were 44 units with a mortgage and the median value of homes in the Town was $60,300 (U.S. Census, 2000).

The Town historically experienced seasonal fluctuations in population as the result of transient field laborers that lived in the Town during the growing season. Currently this trend of seasonal laborers has changed to year-round as more of the laborers have begun working for local industries as opposed to seasonal agriculture. These year-round residents may not be familiar with all hazards that face the Town and may not know what to do during an emergency or storm event. Town Officials also indicated that language barriers exist creating a greater challenge in protecting all Town residents.

Findings.

1. The hazards expected to have the greatest impact on Bloxom are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other significant hazards facing the Town are ground water contamination and snow or ice storms.

2. Bloxom's residential areas are typically older and contain older construction and many mature trees around homes and churches in the Town. High wind events bringing down branches and trees pose a significant threat in the form of secondary wind damage and power outages.

3. The Town currently does not participate in the NFIP, but has expressed interest in joining so that residents can purchase flood policies to protect homes and contents during flood events.

4. The Town needs to identify undersized drainage pipes within Town that regularly cause storm water to back up causing flood damages to structures within Town.

5. The Great Bloxom Thunderstorm of 2003 was a very rare and extreme event that caused extensive flooding within Town. However, Town officials recognize that it does not take a storm event of that magnitude to cause serious storm water flooding that regularly occurs.

Chapter

13

Town of Parksley Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. The Town of Parksley, located in the Chesapeake Bay watershed in central Accomack County was originally created as a planned development that was founded in 1885 along the newly constructed railroad. The Town quickly grew around the railroad and was incorporated in 1904. The railroad has been a vital component of the Town's history, economy, and culture and is still a prominent feature of activity today (*Parksley Comprehensive Plan*, 2006).

Demographics. Parksley's population has remained relatively stable between 1960 and 2010 with the populations reaching a high of 979 in 1980 and a low of 837 in 2000 (*Parksley Comprehensive Plan*, 2006; U.S. Census, 2000). The 2010 Census indicates a current population of 842. Town officials suspect that this number is lower than the actual population, which could be missing as many as 100 residents. The median age for residents in Parksley in 2000 was 40.6 years, signifying a population older than the national average. A large number of the Town's residents live in Parksley year-round.

Coastal and Storm Water Flooding. Elevations in Parksley range from 25 to 43 feet above mean sea level. The Town is bounded to the north by Katy Young Branch, which is a relatively small tributary of Bagwell Creek (*Parksley Comprehensive Plan*, 2006). No portions of the Town lie within a Special Flood Hazard Area or within the X zone, which is the 500-year floodplain. The threat of coastal flooding within the Town is considered to be minimal.

Storm water flooding has the greatest and most frequent impact on the Town. The Town is underlain by some soils that are unsuitable for drainage and retain rainwater. The *Parksley Comprehensive Plan* indicates that the Town's hydric soils are mostly located along Katy Young Branch to

the north and in the far western portion of Town. A secondary hazard from standing water following storms is the potential for mosquito-borne diseases that could impact the health of residents.

The Town maintains the main drainage ditches within the Town limits. Drainage issues are commonly experienced along the boundaries of the Town where the ditches are not maintained as regularly.

A large thunderstorm struck Parksley on September 3, 2003, just prior to Hurricane Isabel, bringing heavy rains that back flooded several homes along Bennett Street on the west side of Town and several stores along Bennett and Dunne Streets in the center of Town. It was suspected that clogged ditches and hydric soils in the area were the main factors in the flooding that occurred during this storm. Town officials have indicated that the storm water culverts around the Downtown Business District are undersized and historically have not been able to handle heavy rains causing flooding that impacts businesses. Rains from northeasters and hurricanes have historically impacted the Town.

FIGURE 13.1 The Downtown Business District in Parksley is regularly flooded during larger rain events because the drainage pipes in this area are undersized. Rainwater commonly becomes backed-up as result and floods the streets and storefronts. *Photo by Curt Smith.*

NFIP Community Participation. The Town joined the NFIP on December 22, 2008. The Town has 2 NFIP policies totaling $630,000 in coverage. Neither policies are located in a flood zone, nor have there historically

been any claims filed in the Town (FEMA NFIP Insurance Report, May 2011). This may indicate potential storm water flooding issues within the Town.

HMGP Participation. Parksley has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the coast. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures.

In September 1985, Hurricane Gloria damaged and up-rooted 23 mature trees in Town. Downed trees are very hazardous to power lines and can cause extensive power outages.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several sources including failed septic systems within Town, leaks and spills of petroleum based products from underground storage tanks, and major industrial facilities within the area. In Parksley, all residential treatment of wastewater and sewage is done through on-site septic systems with approximately 341 on-site septic systems within Town limits. The Town has a central sewer system that was constructed in 2009 that provides wastewater and sewage treatment service to the Downtown Business District. The public water supply and central sewer systems have a secondary power supply in the event of a power outage. Major ground water withdrawers in the area are Perdue, Byrd Foods, the Towns of Onancock and Parksley, and Accomack County Nursing Home. Large withdrawals of ground water in the vicinity increase the possibility of well interference, salt water intrusion, and a deterioration of water quality (*Parksley Comprehensive Plan*, 2006).

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines and also forced local businesses to close for several days. Residents also had no electricity for several days.

As result of historic droughts impacting the Town, Parksley adopted an ordinance regulating water usage during droughts to conserve the Town's water supply.

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Parksley Town Office	Wind	842	Major Disruption	Yes	No
Parksley Public Water Supply and Sewer System	Wind	842	Devastating	No	No
Parksley Fire & Rescue Department	Wind	7,500	Devastating	No	No
Parksley Police Department	Wind	842	Major Disruption	Yes	No
Eastern Shore Railway Museum	Wind	None, impact would be to local economy	Inconvenience	No	No
Parksley Town Park	Trees, Wind	842	Inconvenience	No	No
Parksley Farmer's Market	Wind	842	Inconvenience	No	No

TABLE 13.1 Critical Town Facilities in Parksley.

FIGURE 13.2 The Parksley Water Tower is the water source for Town residents. Wind is the greatest hazard threatening the structure. *Photo by Curt Smith.*

FIGURE 13.3 The Parksley Fire and Rescue Department services 7,500 people within Parksley and surrounding areas. *Photo by Curt Smith.*

Review.

Town of Parksley Comprehensive Plan, Adopted in 1998 and Amended in 2006. The Town Plan identifies storm water flooding from rain events as the primary hazard that affects the community. A majority of the land the Town is situated on is very flat and consists of poorly drained hydric soils resulting in flooding following heavy rains. Other hazards are noted including underground storage tanks, and contamination of potable water wells from failing septic systems and other industrial sources in the surrounding vicinity.

Town Zoning Ordinance of the Town of Parksley, Virginia – Adopted April, 1995 and Amended March 1996 and December 2003. Areas impacted by the identified hazards are regulated by the ordinance in the following ways. The Town has set up a Chesapeake Bay Preservation Area Overlay District around its wetlands. This overlay district consists of Resource Protection Areas (RPA) including non-tidal wetlands and buffer zones and a Resource Management Area (RMA). The RPA area is a 100 foot vegetated buffer surrounding the sensitive non-tidal wetlands adjacent to Katy Young Branch. The RPA area only allows water-dependent uses or redevelopment. The buffer area can be reduced to 50 foot if certain conditions are met. The Commercial-General District (C-G) located in around the southeast corner and center of town allows drainage, erosion, and flood control devices by right.

Trends. The Town is largely built out, but there are sparse vacant parcels remaining and limited construction occurring. Some vacant parcels remaining in Town are situated on soils unsuitable for on-site septic systems, which gives the parcels a very low development potential. There are 15 parcels with high development potential where the former Parksley High School was located on the west side of Town. There were 404 housing units in Parksley in 2000 with nearly 70 percent of the units being at least 50 years old. There were 123 units with a mortgage and the median value of homes in the Town was $76,200 (U.S. Census, 2000). The Town historically experienced seasonal fluctuations in population as the result of transient field laborers that lived in the Town during the growing season. Currently this trend of seasonal laborers has changed to year-round as more of the laborers have begun working for local industries as opposed to seasonal agriculture.

Findings.

1. The hazards expected to have the greatest impact on the Town are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are ground water contamination, ice storms, drought, tornadoes, and mosquito-borne disease.

2. Residential areas are older with older construction and many mature trees around homes and churches in the Town. During a wind event, branches and trees may come down causing secondary wind damage and power outages.

3. The Town has no Special Flood Hazard Areas, but residents are purchasing flood insurance likely to protect their homes from potential impacts from storm water damages.

4. The Town has identified undersized drainage pipes in the Downtown Business District of Town that cannot handle large of amounts of rain water and cause water to regularly back-up into the streets and storefronts.

Chapter

14

Town of Tangier Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. The Town of Tangier is located on an island in the Chesapeake Bay. Tangier was first settled in 1686 as a farming community. The island at that time was much larger and had woodlands. The community on the island is very resilient, surviving an invasion by the British in 1812 and occupation till 1815, a cholera epidemic in 1866 that caused the island to be evacuated and quarantined for a year, and numerous storms that inundated the island with flood waters. One of these storms, the August 1933 storm, covered the entire island with flood water up to the second story of some buildings. After this flood receded some 500 people, a little over a third of the residents at that time, left the island for good.

Demographics. The Town experienced moderate growth from 2000 to 2010. The 2010 Census indicated that the Town's population was 727, which is a 16.9% increase from the 604 people that lived in the Town during the 2000 Census. At the beginning of the 19th Century, the population of Tangier stood around 1,500. By 1960, the population had dwindled to 876.

The median age for residents in Tangier in 2000 was 42.7 years, signifying a population older than the national average. The Town experiences a seasonal increase in tourists visiting the island between the months of May and October. Town Manager Tyler estimates that greater than 90% of the current population consists of full-time residents.

Coastal and Storm Water Flooding. The Flood Insurance Study (FIS) for Tangier identifies that the greatest threat of flood inundation comes from hurricanes and northeasters. Development within the Special Flood Hazard Area is extensive and includes numerous wood frame houses and commercial buildings (*Tangier FIS*). The stillwater flood elevation is 4.1 feet and the 100-year wave crest elevation is 6.3 feet. This indicates that

the A flood zones in the Town are coastal A zones where waves less than 3 feet high can be expected.

Approximately 235 houses, 86% of all houses, are located in an A zone. The Base Flood Elevation ranges from 4 to 5 feet in these zones. Most of the island is below 4 feet in elevation. The entire island does not lie in the Special Flood Hazard Area, however, much of the remaining land is within the 500-year flood plain. Some structures are built in these areas.

The most vulnerable areas include North Main Street, past the school, on Mailboat Harbor, the south end of Canton Road, South Main Street and homes on West Ridge Road near Big Gut. In 2004, then Mayor Parks estimated that there were 47 homes that were affected by high tides. In a 100-year storm these homes are the most vulnerable to damage.

In 2000, 62% of the island's workers were employed in the seafood industry (Census 2000). The primary harvest is Atlantic blue crab (*Tangier Town Plan*, 2001). Tangier watermen also harvest clams and oysters. In 2000, 70% of the island's workers are employed on the island (Census 2000). Large disasters, such as a 100-year flood, will cut drastically into the Town's profits, the incomes of the residents and the productivity of the workers at the same time making it necessary for the residents to arrange and pay for the repair of damaged homes. Unlike other communities where construction companies are available, Tangier had only 12 individuals employed in construction in 2000 (2000 Census) and it is estimated that there are even fewer individuals employed in construction in 2010 (Verbal Communication with Town Manager Tyler, 2010). Additionally, most construction materials need to be shipped to the island.

In September 2003, Hurricane Isabel, although not reaching the Base Flood Elevation, almost wiped out the crabbing industry on Tangier. Some crab houses were completely washed away while others listed into the water. Approximately 34 crab houses, 40%, were destroyed or significantly damaged of an approximate 85 crab houses. These crab houses were located in the southeast of Mailboat Harbor. This was the area where the winds and surge were coming from. Since these buildings are over water they are not eligible for NFIP flood insurance. These crab houses cost approximately $25-$30 per square foot to rebuild.

Commonly, crab houses run 12 x 12 to 16 x 20. Other watermen sustained losses when their crab pots and crab floats were washed away. These were not insignificant losses since one float costs approximately $100 and a crab pot runs about $20-$25. A waterman may have 700 crab pots and 30 floats. Each of these crab-processing businesses generates annual sales of $18,000 to $25,000. Crab season runs from April to November with much of the harvest time corresponding to hurricane season.

FIGURE 14.1 Crab houses on Tangier damaged during Hurricane Isabel. *Left Photo by George Roarty, Right Photo by Chesapeake Fire Department*

Besides the crabbing industry, tourism has become a larger part of the local economy of Tangier. In 2004, there were 79 businesses on Tangier in addition to the seafood industry, of which, 30 are related to the tourism industry. The tourism industry is primarily located around Mailboat Harbor and south along Main Street. The 2006 Town Phone Book lists 42 total businesses on Tangier.

Residential flood losses in the event of a 100-year flood in the Town were estimated to be approximately $4 million in 2006 and approximately $4.2 million in 2011 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006 & 2011). The 2011 NFIP insurance report indicates that a loss of this magnitude would be covered by flood insurance.

Town Manager Tyler indicated that historically and generally, residents have only evacuated the island for storms of Category 2 strength or greater. Since the majority of flooding events occur as result of storms of lesser than Category 2 strength, residents that do not evacuate are at

greater risk since the Tangier Fire and Rescue Department has limited accessibility around the island during flood conditions.

The island is susceptible to poor drainage due to high water and has localized ponding after storms. Currently, there is no storm water management on Tangier (*Tangier Town Plan*, 2001). In particular, storm water carries pollutants into the wetlands and damages the nurseries of marine life that the Town's economy depends on.

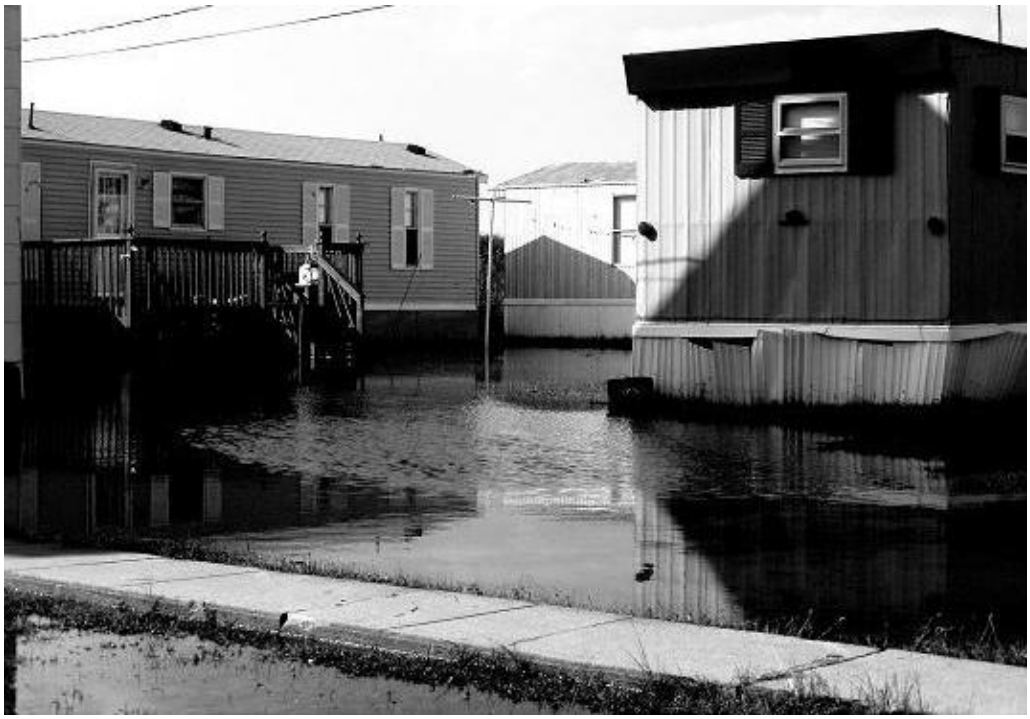


FIGURE 14.2 Flood water ponding around homes on Tangier after Hurricane Isabel in September 2003. *Photo by Deborah Mills*

NFIP Community Participation. The Town joined the NFIP on October 15, 1982. The July 2003 NFIP insurance report indicated the Town had 23 historical flood insurance claims with an average claim of $8,438. The May 2011 FEMA NFIP Insurance Report documents 87 historical claims indicating the Town has had 64 claims since the July 2003 FEMA NFIP Insurance Report, most of which were likely related to Hurricane Isabel in September 2003. The May 2011 FEMA NFIP Insurance Report shows an average claim of $10,705 historically.

The 2010 Census indicated that there were 108 houses with a mortgage, which is an increase from the 72 houses with a mortgage that were collectively worth $5,777,500 (U.S. Census, 2000). In 2003, the Town had 88 flood insurance policies of which 24 were not within the Special Flood Hazard Area. These policies covered $5,123,000 collectively (FEMA NFIP Insurance Report, July 2003). In 2011, there were 96 total flood insurance policies of which 16 were not within the Special Flood Hazard Area. These policies covered $10,562,600 collectively (FEMA NFIP Insurance Report, May 2011). In 2003, the average coverage was less than the average value of the houses on Tangier, suggesting that people were not carrying contents insurance or that some persons were not fully insuring the value of their homes. This is no longer the case in 2011 as the average coverage was greater than the average house value on Tangier.

Coastal Barrier Resource Act (CBRA) lands exist within the Town. They are located in the southeast corner of the Town. In addition, there are CBRA lands outside the Town limits that border the corporate boundaries to the south and to the east. After November 16, 1990, flood insurance cannot be purchased from the federal government for any new development or substantial improvement of an existing structure on these lands. Besides the prohibition on purchase of flood insurance other federal monies cannot be expended in this area including; disaster assistance, Community Block Development Grants (CDBG), flood control projects, construction of new federal highways and beach nourishment projects.

HMGP Participation. The Town has not managed a HMGP grant. Accomack County has used the HMGP to elevate 3 homes on Tangier. Under Disaster Recovery Initiative funds made available following Hurricane Floyd in 1999, the Accomack-Northampton Planning District Commission (A-NPDC) also elevated 6 houses. The Town and A-NPDC elevated 12 homes following flooding from Hurricane Isabel in 2003.

High Wind Events. The entire Town is located in the wind-borne debris hazard area. This area extends 1-mile inland. Assuming, a 110 mph (3 sec gust) event, which is the 100-year event, Tangier could expect approximately $1.6 million in wind damages based on data from the 2000 Census.

Coastal Erosion. The island has a severe erosion problem. In 1713, grants show that there were approximately 1,170 acres of land. In 1813, a garrison of 1,200 to 1,500 British redcoats and the island's population existed on the island. The 1900 Census showed that the island had 1,064 people and at the time of the 1933 hurricanes the island had a population 1,300 to 1,400. Today the island has been reduced in size to approximately 500 acres. From 1967 to 1978, Tangier has experienced erosion of 14 to 21 feet (*Tangier Town Plan*, 2001). One of the ridges, called Canaan, had a roadway until 1923 that connected it with the remaining three developed ridges. Canaan is now separated from Tangier by Tangier Creek.

In 2003, a study was performed to thoroughly assess Tangier's historic erosion problem and to predict the outcomes of future erosion. The study concluded that the island has continually eroded since accurate maps became available in the mid 19th century and erosion has accelerated in the past several decades. Acceleration in the rate of relative sea level rise was identified as the most likely cause for this scenario. The study projected that the Uppards, the island to the north of the main east-west navigation channel, will erode by 2100 unless remedial actions are taken (see Figure 7.3). If this scenario occurs, Tangier will be directly exposed to northerly winds and the study suggests that the presently safe harbor will disappear with no viable alternative location existing on the island. The study indicates that erosion mitigation costs could be an extremely heavy burden on the Town (*Mills et al.*, 2003).

A seawall has been built to stabilize the western shoreline of the island. Shoreline erosion was so great on the western side of the island it was threatening to damage the airport runway. The erosion was from wind driven waves and ice sheets. The seawall has prevented further erosion from occurring in this area.

The Army Corp of Engineers, Congressman Schrock, and the Town of Tangier have been working on developing two projects to protect the Town from further erosion. The breakwater/jetty project will protect the mouth of Tangier Creek from further erosion. The other project is to construct several breakwaters for a proposed aquatic ecosystem restoration, this will protect the island from further erosion and provide habitat, approximately 400 acres, for submerged aquatic vegetation (SAV),

which in turn will provide more nursery habitat for the Atlantic blue crab and other aquatic life (Congressman Schrock Visit to Tangier Island, 2003). The projects have been pushed back until at least 2013 when funding becomes available again.

In 2011, Congressman Rigell proposed anchoring old barges to act as breakwaters along the shoreline to prevent erosion. This approach has previously been successfully on the Eastern Shore at Kiptopeke State Park. The barges would come at no cost to the Town, but require review and approval of the Virginia Marine Resources Commission and the Army Corps of Engineers.

Erosion in Tangier also destroys the Town's natural buffer (trees, shrubs, dunes, etc.) against damages from high wind. If erosion is not mitigated in the future, then the community will be at increasing risks to wind damage as well as flooding damage.

Other Local Hazards. Tangier has various other local hazards. Unlike other places on the Eastern Shore winter weather can be devastating to the community. At times the entire island is surrounded with ice. Without boat access, supplies on Tangier become limited. In the past, supplies had to be flown to the island and dropped into the marsh for residents to collect to prevent starvation. Since the airport was constructed, some of these problems have been alleviated. In 1977, 20-foot piles of ice collected on the western side of the island causing extensive erosion and damage to the airport runway. Since then, a break water structure has been built to protect the airport from water and ice. This has controlled Tangier's vulnerability to erosion at this site.

There have been four epidemics on the island. In 1866, a cholera epidemic swept the island. Numerous people died and were quickly buried in their front yards without a marker. The entire island economy was destroyed when the people put down their livestock and evacuated the island. They were unable to return until the following year. In the 1870s, the island was struck with tuberculosis and measles and in the 1880s the island was swept with smallpox.

Fire suppression is also a problem if the water supply loses power. The water tank holds approximately one day's water supply and without power from the A&N station there is no means to pump additional water.

There are generators at the Tangier substation, but overhead wires supply current to the island and these can come down in high wind events. This substation also powers Smith Island to the north.

FIGURE 14.3 Tangier in February 2003, a coast guard cutter came later to break up the ice and deliver the mail. *Photo by John Aigner*

Salt spray and salt air also cause damage to local building materials. Over time mortar disintegrates in the air, leaving block foundations essentially dry stacked. The blocks themselves crumble over time when exposed to the salt air.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Tangier Town Office	Flooding, Wind	727	Devastating	Yes	Yes
Tangier Airport	Flooding	727	Major Disruption	No	Yes
Tangier Sewage Plant	Flooding, Wind	727	Devastating	No	Yes
Tangier Fire & Rescue Department	Flooding, Wind	727	Devastating	No	Yes
ANEC (power station)	Flooding, Wind	727	Devastating	No	Yes
Tangier Health Center	Flooding, Wind	727	Major Disruption	No	Yes
Tangier Combined School	Flooding, Wind	727	Major Disruption	No	Yes
Tangier History Museum and Interpretive Cultural Center	Flooding, Wind	727	Inconvenience	No	Yes

TABLE 14.1 Critical Town Facilities in Tangier.

FIGURE 14.4 The Tangier Volunteer Fire and Rescue Department. *Photo by Curt Smith*

FIGURE 14.5 The Tangier Combined School was elevated in 2006 to mitigate flooding damages. *Photo by Curt Smith*

Three of the critical facilities on the island: the Health Center, Combined School, and History Museum and Interpretive Cultural Center (HMICC), were completed since the original Hazard Mitigation Plan in 2006. The Health Center was constructed in 2010 and built in a manner that minimizes impacts from natural hazards, specifically flooding and high winds. The Combined School was elevated above BFE in 2006 to lessen the threat from flooding. The HMICC opened in 2008, serving as the historical and cultural center for residents and visitors of Tangier.

FIGURE 14.6 The Tangier Health Center was constructed in 2010 in a manner that minimizes impacts from flooding and high winds. *Photo by Curt Smith*

Review.

2001 Tangier Town Plan. The Town Plan identifies various hazards that affect the community. Although flooding and winds have always caused damage to the community, erosion is the greatest threat to its long term existence. The Town maps show that on the southern hook there are approximately 24 subdivided lots outside the Town limits. These are located in CBRS lands and in the Resource Protection Area (RPA). The Town is actively working to solve the erosion problem on the island.

Trends. Much of Tangier is built out and so most buildings are remodels or demolition and rebuilds. In 2003, then Mayor Parks indicated that most of the newer homes on the island are ranchers that are replacing two story Victorian homes. This presents a risk of increased damage to contents if a flood greater than the 100-year flood occurs. Town Manager Tyler indicated that there have been no new homes constructed since 2004.

Findings.

1. The A-zones in the Town are likely subject to waves less than 3 feet high and therefore houses built to NFIP standards could still be damaged during a flooding event.

2. Flooding disasters have an extremely adverse effect on the island's economy and could potentially wipe it out completely.

3. By its nature, the primary industry on the island cannot obtain flood insurance. This will prolong the recovery period needed.

4. There are a significant number of residents who are uninsured or underinsured from residential flood losses.

5. Erosion is the island's greatest threat and is also aggravating the flooding that occurs on the island.

Chapter

15

Town of Wachapreague Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Wachapreague was originally a Native American fishing village settled by the Matchapungos, a subdivision of the Algonquin Tribe. The land was first patented to Nathaniel Bradford for 1,000 acres in 1662. It was not until the early 1800s that a town settlement developed. In 1825, the Town's wharf was used to ship goods to other American cities (*Wachapreague Town Plan*, 1983). By the late 1800s, a fish oil and fertilizer company located in the Town and the Town had gained a reputation as a resort and vacation spot. Two hotels were opened in the 1880s, but it was the opening of the Wachapreague Hotel in 1902 that brought a measure of fame to the Town. The hotel attracted hunters and fishermen from all over the country until it burned in 1978. Wachapreague historical economy capitalized on its ideal location for shipping, its natural beauty, and its local abundance of game and fish.

Demographics. The population of Wachapreague remained steady from 2000 to 2010. The 2010 Census indicated that the Town has a population of 232, which is a 1.7% percent decrease from the 236 people that lived in the Town during the 2000 Census. The median age for residents in Wachapreague in 2000 was 55.6 years, signifying a population older than the national average. Population has decreased from 404 persons in 1980 (*Wachapreague Town Plan*, 1983), which has likely the result of diminishing seafood and charter fishing industry activity in the Town. Like many other towns on the Shore, Wachapreague experiences an increase in population during the warm weather season as seasonal residents and tourists occupy the Town.

Coastal and Storm Water Flooding. The Flood Insurance Study (FIS) for Wachapreague identifies that the greatest threat of flood inundation comes from northeasters and hurricanes.

The Town of Wachapreague has several V zones within the corporate limits where the Base Flood Elevations range from 9 to 13 feet. The 2009 FIRM shows approximately 20 structures within those zones.

There are approximately 114 structures within the 100-year floodplain. According to the 2000 Census, 211, 92%, of all houses were built prior to the Town adopting the NFIP ordinance. In the event of a 100-year flood it was estimated in 2006 that the Town would have $6.5 million in building and content loss (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006). In 2011, it is estimated that the Town could experience $12.5 million in damages, which is nearly a $6 million increase in the past five years (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2011). There are 111 buildings in the Town with a flood insurance policy as of May 2011. Of the 111 policies, 104 are within Special Flood Hazard Areas with 100 in A-zones and 4 in V-zones (NFIP Insurance Report, May 2011). This is an increase of 16 policies since 2004.

There are the remains of a Works Progress Administration earthen protection dike along Wachapreague Inlet and Atlantic Avenue. This was built in summer 1934 in response to the previous year's hurricanes. It has not been maintained and no longer provides much protection from floodwaters.

The Town's fire hall is located in the floodplain as is the commercial center. Wachapreague's economy is based on the businesses centered on the waterfront. There are seven main docking facilities located there: Wachapreague Town Marina, Wachapreague Seaside Marina, Island House Dock, Fisherman's Lodge, Coast Guard Dock, the clam house and the Virginia Institute of Marine Sciences (VIMS) campus. Most other businesses are located close to Atlantic Avenue. This flood prone area represents most of the commercial activity that occurs in the Town.

The Town has purchased the parcel where the Wachapreague Hotel was once located and maintained the Wachapreague Seaside Park there since 2010. The parcel's waterfront and central location within the Town made it very desirable for development. Maintaining the parcel as a park eliminates any potential flooding hazards that would have been problematic should any development have occurred there.

FIGURE 15.1 Surge impacting the location of the Seaside Park, marina, and Island House Restaurant during a storm event in October 2005. *Photo by Dan Bilicki*

FIGURE 15.2 Photograph showing the surge from Hurricane Isabel in September 2003 impacting the same area depicted in Figure 15.1. *Photo by Dan Bilicki*

The Town is divided into three drainage sheds. One of these runs along the waterfront and expands to include most of the southern portion of the Town. Storm water in this area drains onto Atlantic Avenue and is caught by storm sewers and diverted into Wachapreague Channel and Finney Creek (*Wachapreague Town Plan*, 1983). The second drainage basin includes most of the remainder of the Town and lies just behind the waterfront drainage basin. This basin has the largest amount of development within it. The lowest point is the intersection of Riverview Avenue and Lee Street. It is in this area that water will sit until it drains into the soil or evaporates. Portions of a third basin are within the Town.

The area affected is western pieces of Town centered on Main Street. The water from this area drains west out of the Town. The land south of the ball field holds surface water.

The table below lists the types of business establishments that are within the Town.

Name	No. of Establishments
Plumbing, heating & AC contractor	1
Hotel, Motel, Tourist Home	5
Campground	1
Art Studios	1
Stores	3
Scenic & sightseeing water	1
Marinas & Docks	7
Seafood Processing	1
Other – Home Based	2
Full service restaurants	1

TABLE 15.1 Types of businesses located in Wachapreague.

FIGURE 15.3 Wachapreague Waterfront Commercial Area. *Photo by Elaine Meil*

FIGURE 15.4 Photograph showing the Wachapreague Waterfront Commercial Area during Hurricane Isabel in September 2003. *Photo by Dan Bilicki*

FIGURE 15.5 The Wachapreague Waterfront Commercial Area shown being impacted by Hurricane Isabel in 2003 has historically experienced destructive coastal flooding. *Photo by Dan Bilicki*

NFIP Community Participation. The Town joined the NFIP on September 2, 1982. In 2011, the Town had 111 policies. In 2004, the Town had 5 V-zone NFIP policies and 90 A-zone policies. In 2011, the Town had 4 V-zone policies and 100 A-zone policies. In 2004 and 2011, there were 7 policies for structures that were not located in the 100-year floodplain, which potentially indicate a storm water flooding problem. Since the

Town joined the program there have been 26 flood insurance claims with an average payout of $14,564 (FEMA NFIP Insurance Report, July 2003 and May 2011).

Most of the Town lies in the 100-year flood plain with the remainder lying in the 500-year floodplain. In 2004, the Town has 35 mortgages and 95 Special Flood Hazard Area policies compared to 51 mortgages and 104 policies in 2010. This indicates that a significant number of residents believe they have a flood problem and are actively trying to protect themselves.

The average insurance amount per policy was $119,686 in 2004 and is $190,613 in 2011. The average value of houses in the Town in 2004 was $83,614. This may indicate that many of these policyholders do carry contents insurance along with their structure insurance. In general, it seems that a significant number of residents and businesses are seeking ways to reduce their flood damage.

HMGP Participation. The Town received funding following Hurricane Isabel in 2003 to elevate six homes that had been impacted during the storm. This is the only time the Town has participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the barrier islands. The Town lies in the 110-120 mph design wind zone (Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures. In Hurricane Floyd 1999, several trees came down in the wind.

FIGURE 15.6 High winds from Hurricane Isabel in September 2003 downed trees in Wachapreague including this tree which damaged a car. *Photo by Dan Bilicki*

Coastal Erosion. No structures appear to be at immediate risk to coastal erosion.

Other Local Hazards. The Town has three tall structures in the Town that are vulnerable to lightning. These are the ferris wheel at the carnival grounds, and two churches.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Coast Guard Station (Wachapreague)	Wind	Boaters on the Seaside	Devastating	No	No
Fire Station/EMS	Flooding	1000+	Devastating	Yes	Maybe
Churches	Flooding, Wind, Lightning	50+ Parishioners	Inconvenience	No	Maybe
Wachapreague Inlet Commercial Area	Flooding, Wind	100+	Devastating	No	No
VIMS Campus and Dock	Flooding, Wind	6-8	Devastating	No	Maybe
50' Coast Guard Cutter and two smaller vessels	Flooding, Wind	Boaters on the Seaside	Inconvenience	No	No
Carnival Grounds	Flooding, Wind, Lightning	Supports the fire station, 1000+	Major Disruption	No	No

TABLE 15.2 Critical Town Facilities in Wachapreague.

FIGURE 15.7 The carnival grounds in Wachapreague are at risk to coastal flooding and were inundated with flood waters from Hurricane Isabel in 2003. High winds and lightning also threaten these structures. *Photo by Dan Bilicki*

Review.

1983 Wachapreague Town Plan. The Town Plan identifies two hazards, storm water flooding and coastal flooding. The Town has identified a goal to correct the storm water drainage by pursuing the following projects, obtaining an easement and digging a deep ditch to run through parts of the Riverview-Lee drainage basin. Minor ditches would be required to drain water from the west Main basin to either Atlantic Avenue or into the state road ditches. The Town also would like to repair and improve the Wachapreague Channel dike.

1946 Wachapreague Town Charter. The Town has several powers that bear on the hazards identified. Power 21 allows the Town to compel the abatement and removal of all nuisances including that all lands, lots and other premises within the Town be kept clean, sanitary and free from stagnant water, weeds, filthy unsightly deposits, snow and ice. Power 25 allows the Town to provide for safe construction of houses and a building code. Power 35 authorizes the Town to fill, raise or drain any lands where stagnant water has accumulated at the cost of the owner unless the Town has caused the problem or natural causes beyond the control of the owner has occurred.

Trends. Much of the Town has already been developed. There are remaining undeveloped lots that are gradually being filled up with new buildings. A large parcel on Atlantic Avenue where the historic Wachapreague Hotel used to be located has recently been developed into a town park. The Town received funding to develop the Seaside Park to be used as a town center for various activities. The park was completed in December 2010.

Terminology

Substantial Damage - damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Findings.

1. There are approximately 20 structures in the V zone.
2. Most structures in the Town are in the 100-year floodplain. The 100-year flood is the greatest eminent threat to the Town. In 2011, the Eastern Shore of Virginia Coastal Flood Vulnerability Assessment estimates that Wachapreague could experience approximately $12.5 million in structure and content damages.
3. Approximately ninety-two percent of all homes were built before the NFIP building code requirements were adopted. After a 100-year event there will be significant damage and many structures may trigger the substantial damage regulation that requires the structures to be elevated above the base flood elevation. Not all structures at risk are insured and those that are insured will not likely receive enough money to comply with these requirements. Currently, Increased Cost of Compliance insurance is included in NFIP flood insurance but the maximum amount is $30,000. This will in most cases not be enough to comply with elevating the older homes in Wachapreague.
4. The local fire station that responds to Wachapreague and the surrounding area is located in the floodplain very close to the waterfront. The firehouse does not require a 100-year flood to have water in the building. Its lack of elevation means much less significant events imperil the residents of Wachapreague and surrounding areas of Accomack County. The fire house is a cinderblock building that holds up fairly well in floodwaters. This is a major problem since FEMA's Benefit Cost Analysis is solely based on damage to structures and does not take into

account the importance of the structure. During flood conditions and in the recovery period, it is more important to have a safe, working fire station than elevating or purchasing a single house, approximately the equivalent in project cost. Yet the Benefit Cost Analysis will make the house look better on paper aiding a single family versus the entire community. It is a failure not to take into account all benefits in the Benefit Cost Analysis.

5. Wachapreague's entire commercial area is located in the flood zone and does not require a 100-year flood to suffer damages.
6. The Town has noted several storm water flooding problems in the Town limits.
7. Several Wachapreague residents are proactively trying to protect themselves from flood damage by purchasing flood insurance even though it is not mandatory. These persons make good candidates for other measures to reduce their flood risk.
8. As could be seen in Hurricane Isabel in 2003, mature trees and strong sustained wind can cause massive destruction. Wachapreague, not in the direct path of Isabel, may also be in line for extensive damage from falling branches and trees in a strong wind event. Since so many buildings are in the flood plain in Wachapreague it is likely that fallen trees will substantially damage structures. If a tree damages a house in this manner then owners will have to meet the NFIP's elevation requirement and usually homeowner's policies will not cover this expense.

Chapter

16

Town of Onley Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Onley is located near the central spine of the Eastern Shore in south central Accomack County and encompasses approximately 486 acres. The Town was originally known as Cross Roads until its name was changed to Onley after the name of Virginia Governor Henry Wise's home on Onancock Creek in the latter part of the 19th century. The Town, like a number of other Eastern Shore towns, developed around a railroad station built following the construction of the railroad in 1884. The railroad spurred a thriving downtown which included the headquarters of the Eastern Shore Produce Exchange. The Produce Exchange was the first cooperative marketing organization and proved to be a vital component of the flourishing potato market on the Shore. The Town was incorporated in 1950 and experienced a series of fires in the early 1970s that destroyed much of its business district. At that time the Town's commercial activity began to relocate westward to Route 13. Today, the western portion of Onley along Route 13 is the site of the largest concentration of commercial activity in Accomack County and the remainder of the Town remains largely residential. (*Onley Comprehensive Town Plan*, 2000).

Demographics. The Town's population gradually grew from 415 in 1960 to a maximum of 532 in 1990 (U.S. Census, 1960, 1970, 1980, 1990). After dropping slightly to 496 in 2000 (U.S. Census, 2000) the 2010 Census indicated that the Town has a population of 516. The median age for residents in Onley in 2010 was 48.6 years, an increase from the 2000 average of 45.3 years, signifying a population older than the national average. The Eastern Shore regional hospital has announced plans to relocate just outside of the Town limits and it is expected that commercial growth associated with the hospital will increase along the Route 13 corridor in Onley.

According to the 2008 Zip Code Business Patters data, the Town had 106 business establishments that employed 1,191 people. This was an increase from the 2001 Zip Code Business Patterns data, which indicated the Town has 86 business establishments that employed 950 people. It is expected that many of these employees do not live within the Town.

Coastal and Storm Water Flooding. Elevations in Onley range from approximately 35 to 45 feet above mean sea level. Surface water in the Town is limited to the end segment of Joynes Branch, a small tributary stream of Onancock Creek and the Chesapeake Bay which extends approximately 700 feet into the Town forming a short segment of the Town's northeastern boundary(*Onley Comprehensive Town Plan*, 2000). No portions of the Town lie within a Special Flood Hazard Area or within the X zone, which is the 500-year floodplain. The threat of coastal flooding within the Town is considered to be minimal.

Storm water flooding poses the greatest risk to the Town and has the most frequent impact. Approximately 40% of the Town contains hydric soils that are unsuitable for drainage and readily retain rainwater. The *Onley Town Comprehensive Plan* indicates that the Town's hydric soils are located primarily on the eastern side of Route 13 with minimal areas on the western side of Town. The depth to ground water in these areas is typically less than three feet. The hydric soils within Onley are a major limiting factor for development as there are severe limitations with respect to their capacity to support on-site septic systems. All residents in Onley utilize on-site septic systems for residential waste disposal. Flood septic drain fields can pose a health risk to residents during and following a storm event. A secondary hazard from standing water associated with poorly drained hydric soils is the potential for mosquito-borne diseases that could impact the health of residents. The Town does implement a mosquito-control program to mitigate this problem.

The Town relies on the Virginia Department of Transportation to perform maintenance on the main drainage ditches within the Town limits. Drainage issues commonly experienced in Onley are summarized in the following table.

Onley Areas Experiencing Storm Water Issues
Drainage from the Wal-Mart property to adjacent areas in Town
Drainage adjacent to Rat Trap Creek on the southern and eastern portions of Town
Along Forest Street
Along Badger Lane
Caroline Avenue
Main Street near the eastern boundary of Town
Residential area between Coastal Boulevard, Main Street, and U.S. Route 13

TABLE 16.1 Areas experiencing historic storm water flooding in Onley.

Beginning with the November Northeaster of 2009, the Town experienced prolonged and extensive storm water flooding throughout the winter of 2009-2010. Transportation in the Town was restricted by flood waters throughout the winter. Historically, flood waters have had prolonged retention times due to poorly drained soils and inadequately maintained and designed drainage ditches in Town. The Town wishes to remediate storm water flooding hazards by cooperating with VDOT and implementing mitigation strategies.

NFIP Community Participation. The Town does not participate in the NFIP but has expressed interest in participating so that residents and businesses can purchase flood insurance.

HMGP Participation. Onley has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind-borne debris hazard area. This area extends 1-mile inland from the coast. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures and cause power outages as much of the Town is served by aboveground power lines. Historically, hurricanes and northeasters have caused damages in Town.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several sources including failed septic systems within Town, leaks and spills of petroleum based products from underground storage tanks, and major industrial facilities within the area. In Onley, all residential treatment of wastewater and sewage is done through on-site septic systems with approximately 253 on-site septic systems within Town limits. The majority of commercial sewage and wastewater is treated at four mass drainfields that exist in or adjacent to the Town (*Onley Comprehensive Town Plan*, 2000)**.** The Town has no public water supply and residents and commercial users are solely reliant on private wells. Major ground water withdrawers in the area are Perdue, Byrd Foods, the Towns of Onancock and Parksley, and Accomack County Nursing Home. Large withdrawals of ground water in the vicinity increase the possibility of well interference, salt water intrusion, and a deterioration of water quality (*Onley Comprehensive Town Plan*, 2000).

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines and also forced local businesses to close for several days. Residents also had no electricity for several days.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Onley Town Office/Police Department	Storm Water Flooding, Wind	516	Major Disruption	Yes	Yes
Onley Volunteer Fire & Rescue Department	Storm Water Flooding, Wind	516	Major Disruption	No	Yes

TABLE 16.2 Critical Town Facilities in Onley.

FIGURE 16.1 Photograph of the building that houses the Onley Town Office and Police Department. *Photo by Ann Devletian, 2003-04.*

FIGURE 16.2 Photograph of the Onley Volunteer Fire and Rescue Department. *Photo by Ann Devletian, 2003-04.*

The Town has purchased land adjacent to the existing Town Hall to construct a new Town Office. Once constructed, the Police Department will be the sole occupant in the existing building. The Town is interested in constructing the new facility to more stringent building codes that would lessen the risk of flooding and wind damage.

Review.

Onley Comprehensive Town Plan – Adopted February 1, 1999; Amended August 7, 2000 and 2010. The Town Plan includes goals associated with hazard mitigation including preservation and protection of the Town housing stock, ensure that drainage facilities are adequately maintained, protection of the quality and quantity of the Town's water supply, achievement of reduction of existing pollution sources. Storm water flooding and ground water contamination are identified as two of the greatest hazards threatening the Town. The plan discusses the possibility of addressing

public water and sewer needs for the Town and keeping commercial development centered along the U.S. Route 13 business corridor.

Trends. Approximately 46% of the land in Town was undeveloped in 2000, including both vacant and agricultural lands (*Onley Comprehensive Town Plan*, 2000). The Town is currently experiencing an increase in commercial development along the Route 13 corridor and expects this trend to continue to increase with recent construction of the only Wal-Mart on the Eastern Shore of Virginia, the relocation of the Eastern Shore regional hospital and the Eastern Shore public library, and other development that is expected to accompany such growth. As new development of the land in and around Onley increases, storm water drainage will become an increasingly important hazard issue because of the increase in impervious surfaces typically accompanying development. The Town also is concerned with increased traffic loads which could pose risks to public safety.

Findings.

1. The hazards expected to have the greatest impact on the Town are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are ground water contamination, ice storms, drought, and mosquito-borne disease.
2. Residential areas are older with older construction and many mature trees around homes and churches in the Town. During a wind event, branches and trees may come down causing secondary wind damage and power outages.
3. The Town does not currently participate in the NFIP and residents and businesses cannot purchase flood insurance. The Town has expressed interest in joining the program.
4. The combination of poorly drained soils and inadequately maintained drainage ditches in Town has resulted in a significant storm water flooding problem for residents and businesses. The Town is interested in mitigating these problems through drainage assessments, design, and construction projects.

5. The Town expects to see increased development along the U.S. Route 13 business corridor that could not only change the current character of Onley, but also increase the storm water flooding problems in Town.

Chapter

17

Town of Onancock Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. The Town's port was founded to collect tax on tobacco and other products exported from Accomack County. In 1680, the Act of Cohabitation set aside 50 acres at the head of Onancock Creek for development of a town center. This area was called Port Scarburgh, but was quickly changed to Onancock. Accomack's county seat was located here until 1693 when a new courthouse was built in the nearby Town of Accomac. The Town was a major port on the Eastern Shore allowing access to Baltimore's markets. The Town declined after the railroad was built further inland (*Onancock Town Plan*, 1999). Today, the Town is a residential center, service area and small active port with 95 business establishments, many in its old downtown (2008 Zip Code Business Patterns).

Demographics. The 2010 Census indicated that the Town has a population of 1,263, which is a 17.2% decline from the 1,525 people that lived in the Town during the 2000 Census. The median age for residents in Onancock in 2000 was 45.3 years, signifying a population older than the national average.

Coastal and Storm Water Flooding. The Flood Insurance Study (FIS) for Onancock identifies that the greatest threat of flood inundation comes from hurricanes and northeasters. Development within the floodplain is minimal (Onancock FIS). The Town is located inland from the Chesapeake Bay. Onancock Creek, North Branch and Titlow Creek border the Town on three sides. In addition, Joynes Branch bisects the Town creating a northern and southern section.

According to the 2009 FIRM, the Town of Onancock does not have any identified V zones. The Town, however, does have A zones located near the Town Wharf and along the three branches of Onancock Creek.

Approximately 5 structures are located in the flood zone. During a 100-year flood event it is expected that these would receive $203,000 in damages as of 2011. All five structures are covered by flood insurance as of 2011 (FEMA NFIP Insurance Report, May 2011).

An additional 25 structures carry flood insurance, but are not located in a flood zone (FEMA NFIP Insurance Report, May 2011). This may indicate potential storm water flooding issues within the Town. The total number of NFIP policies has risen to 30 in May 2011 from 10 in July 2003 (FEMA NFIP Insurance Report, July 2003 and May 2011).

The Town also has three facilities that are affected by flooding, the wastewater treatment plant, Onancock Wharf, and the Harbormaster's House. Bagwell Oil, a bulk storage facility, is also located in the floodplain. The wastewater treatment plant and the bulk storage facility could contaminate Onancock Creek and North Branch and to a lesser extent the Chesapeake Bay if they failed during a flood event. Recent improvements to the plant have lessened threats from coastal and stormwater flooding and in turn have reduced the threat of contamination to the creek.

FIGURE 17.1 Photograph showing the Town Wharf flooded during the November Northeaster of 2009. The Harbormaster's House is visible behind the truck. *Photo by Possum Lane*

FIGURE 17.2 Photograph showing the historic Hopkins Store at the Onancock Wharf flooded during the November Northeaster of 2009. Commercial businesses are located in the two structures seen in this photo. *Photo by Possum Lane*

NFIP Community Participation. The Town joined the NFIP on December 15, 1981. According to the April 2011 NFIP insurance report, the Town has had no flood insurance claims since it joined the program (FEMA NFIP Insurance Report, May 2011).

HMGP Participation. The Town has never participated in the HMGP program.

High Wind Events. The Town is not located in the wind borne debris hazard area. However, most of the residential areas have mature trees. High winds could damage trees within the Town and this might lead to some damage to houses and outbuildings. The Town constructed a water tower in 2008 on the east side of town that was built to withstand high wind events. Major Town facilities, including the wastewater treatment plant and water supply tower, are equipped with back-up power supplies in the event of a power outage.

FIGURE 17.3 Photograph of an uprooted tree during the November Northeaster of 2009. *Photo by Possum Lane*

Coastal Erosion. Although there is some erosion risk around Onancock, no structures located in the Town appear to be vulnerable to coastal erosion at this time.

Other Local Hazards. Due to the existence of two bulk oil storage facilities, there is a potential for a Hazmat incident to cause damage to Onancock Creek, North Branch and the existing homes on King Street and commercial buildings on Market Street and Onancock Wharf. There are also houses located on the creek outside of the Town's boundaries that could be damaged by an incident at one of the facilities.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Town Office	Wind	Town Residents	Major Disruption	No	No
National Guard Armory	Wind				
Fire Station	Wind	2,000+	Major Disruption	No	No
Wastewater Treatment Plant	Flooding, Wind	Entire Town and properties on Onancock Creek	Devastating	No	No
Telephone Company Exchange Building	Wind	Entire Eastern Shore	Major Disruption	No	
Water Supply Tower	Wind	1,500	Major Disruption	No	No
South Street Pump Station	Flooding	Town Residents	Disruption	No	Yes
Bagwell Oil	Wind, Flooding, Manmade		Major Disruption	Yes	Yes

TABLE 17.1 Critical facilities located in Onancock.

Review.
1999 Onancock Town Plan. The Town Plan identifies the 100-year flood plains. The plan does not identify any other hazards. Onancock has not identified any specific goals relating to flooding. There are goals relating to preservation of open space, improvement of Onancock harbor, improvement of the wastewater treatment facility, upgrade of the water lines to meet State mandates and fire protection, continued enforcement of the Resource Protection Areas within the Town and options for managing storm water runoff.

Trends. Much of Onancock is built up. Areas to the east and south are open with some agriculture still being practiced within the Town. Homes are being built just outside of Onancock proper in the surrounding land. Within the Town, property prices are increasing and infill development is occurring. The downtown commercial area has several new stores and restaurants in preexisting buildings. Onancock Wharf is zoned for waterfront condos. Two new residential subdivisions have been platted in the Town, but no homes have been built as of 2011

The Town has become a popular destination for retirees in the past ten years and is experiencing a greater influx of seasonal residents. Both

residents and tourists increase the population of the Town during the warm weather season. This trend is expected to continue to grow in the future and the Town is planning accordingly.

Findings.

1. The greatest threat to the Town is the secondary effects of flooding. A 100-year flood would directly impact 5 structures within the Town and cause $203,000 in damages as of 2011. Secondary impacts could include the failure of the Town's wastewater treatment plant and potential damage to the bulk oil storage facilities located on Onancock Harbor and King Street.

2. Residential areas are older with older construction and many mature trees in and around the homes and churches in the Town. During a storm wind event, branches and trees may come down causing secondary wind damage and power outages.

3. The Town constructed a new water and wastewater facility with increased capacity and back-up power supply.

Chapter

18

Town of Keller Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Keller is located near the central spine of the Eastern Shore in south central Accomack County and comprises an area of approximately 172 acres. The Town, originally called Pungoteague Station, was established as a small community centered around a railroad station. The Town was named after the contractor who constructed the railroad through the neighborhood. Keller was incorporated in 1951 and the Town's early economic activity was centered around the railroad and included several shops and two hotels to serve rail guests. While the railroad still exists, the Town has become a small residential community with commercial business activity located along U.S. Route 13 (*Keller Town Plan*, 1989).

Demographics. The Town's population remained relatively stable between 1960 and 1990 with a maximum population reaching 263 in 1960 (U.S. Census, 1960, 1970, 1980, 1990). The population dropped to 173 in 2000 (U.S. Census, 2000) and the 2010 Census indicated that the Town has a population of 178. The median age for residents in Keller in 2010 was 47.5 years, which is an increase from the 2000 average of 40.2 years, signifying a population older than the national average.

According to the 2008 Zip Code Business Patterns data, the Town had 12 business establishments that employed 60 people. The 2001 Zip Code Business Patterns data indicated the Town has 13 business establishments that employed 65 people. Town Officials expect that the number increased since 2008. It is expected that many of these employees do not live within the Town.

The Town has seen a slight increase in the seasonal migrant farm laborer population. These residents generally occupy the houses during the

growing season and the houses remain vacant from late fall to late spring. These vacant houses could be at greater risk during the winter season.

Coastal and Storm Water Flooding. Elevations in Keller range from approximately 35 to 45 feet above mean sea level. Surface water in the Town is limited to the end segment of Frogstool Branch, a small tributary stream of the Great Machipongo River and the Atlantic Ocean. No portions of the Town lie within a Special Flood Hazard Area or within the X zone, which is the 500-year floodplain. The threat of coastal flooding within the Town is considered to be minimal.

Storm water flooding poses the greatest risk to the Town and has the most frequent impact. The majority of the Town contains soils that are poorly drained and readily retain rainwater. The Town's poorly drained soils are located primarily in the central and northern portions of Town. These soils are a major limiting factor for development as there are severe limitations with respect to their capacity to support on-site septic systems (*Keller Town Plan*, 1989). All residents in Keller utilize on-site septic systems for residential waste disposal. A secondary hazard from standing water associated with poorly drained soils is the potential for mosquito-borne diseases that could impact the health of residents.

Keller regularly experiences storm water flooding during heavy rain events. Drainage problems in Town have been attributed to the soil characteristics, lack of sufficient topography for drainage, and lack of maintenance to existing drainage culverts. The *Keller Town Plan* identifies a need for upgraded drainage culverts and states that funding sources are lacking to implement the improvements. The Town relies on the Virginia Department of Transportation to perform maintenance on the main drainage ditches within the Town limits. Accomack County received a grant funds to improve drainage and allocated some funding to Keller to address drainage problems. This is the first time this funding has been made available and the Town does not think it can rely on this funding source for drainage maintenance in the future. Drainage issues are commonly experienced at the intersection of Center Avenue, West Street, and Lee Street and the northern end of West Street. Town Officials indicate that these areas have poorly maintained ditches that have silted in with sediment and become overgrown with vegetation and the ditch near the intersection of Lee Street and Center Avenue is hardly recognizable.

Town Officials indicate that there has been no residential or commercial property damage within Town as result of storm water flooding.

The Town has historically experienced severe storm water flooding events. Town Officials recall at least two major flooding events where streets were inundated with rain water to the point where residents were traveling down the streets in boats in the areas of Town that still experience flooding today. These flood waters remained for about 24 hours. The majority of houses in Town are elevated and Town Officials do not remember structures being inundated during these flood events.

NFIP Community Participation. The Town does not currently participate in the NFIP, but has expressed interest in potentially joining the program.

HMGP Participation. Keller has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area is defined as the area extending one mile inland from the coast. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures or power lines. All power and communication lines in Town are above ground and susceptible to wind damage.

Keller has experienced several historic wind events from hurricanes and northeasters that have damaged trees and power lines in Town.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several sources including failed septic systems within Town, leaks and spills of petroleum based products from underground storage tanks, and major industrial facilities within the area. In Keller, all residential treatment of wastewater and sewage is done through on-site septic systems with approximately (*Keller Town Plan*, 1989). The Town has no public water supply and residents and commercial users are solely reliant on private wells.

The Town does not have a fire department and relies on the fire departments of neighboring communities. This puts the Town at greater risk for fire damage. Specifically, there are numerous fields in the vicinity of the Town that are prone to catching fire, especially during droughts. These fires have the potential of spreading to residences in Town, especially since there are houses in Town that are dilapidated and most houses are located in close proximity to one another.

The Town has historically been impacted by snow and ice storms that have left residents stranded for extended periods of time. Since the Town has a relatively elderly average population, these residents are at greater risk during these events. Additionally, the Town relies on VDOT to maintain the roads during these events.

It was suspected that a tornado destroyed a commercial building and damaged another commercial building in Town in 1998.

The U.S. Route 13 highway corridor runs through Town putting residents at greater risk from HAZMAT incidences resulting from traffic accidents involving tractor trailers carrying hazardous materials. In addition, a chemical production facility is located just on the outskirts of Town limits. This facility contributes to greater traffic containing hazardous materials through Town. Hazardous materials are transported through Town via the railroad, but this form of transportation is not as prevalent as it once was.

FIGURE 18.1 U.S. Route 13 and the railroad are shown in Keller. *Photo by Curt Smith*

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Keller Town Office	Storm Water Flooding, Wind	178	Major Disruption	No	Yes
Keller Post Office	Storm Water Flooding, Wind	~500	Major Disruption	No	Yes

TABLE 18.1 Critical Town Facilities in Keller.

FIGURE 18.2 The Keller Town Office is at risk from storm water flooding and wind damage. *Photo by Curt Smith*

Review.

1989 Keller Town Plan. The Town Plan proposes actions to mitigate storm water drainage problems within the Town including development of a Storm Water Management Ordinance as part of the *Keller Town Zoning Ordinance*. Additionally, the plan identifies a goal of promoting the development of central water and sewer to serve residents and the natural environment. Storm water flooding and ground water contamination are identified as two of the greatest hazards threatening the Town. The plan also identifies a need to improve the housing stock within Town by improving substandard housing by initiating efforts to develop funding sources. Improvements to substandard housing would lessen the economic impact of hazard events on the Town.

Trends. Approximately 75% of the land in Town was undeveloped in 1988 that includes both vacant and agricultural lands (*Keller Town Plan*, 1989). It is expected that land-use trends are similar in 2011. Commercial activity along the Route 13 corridor has remained relatively constant and this trend is expected to continue in the same manner for the foreseeable future. If development of the land in and around Keller increases, storm water drainage will become an increasingly important hazard issue.

Findings.

1. Storm water flooding and high wind events have historically been and currently are the main hazards facing the Town.

2. The Town of Keller does not currently participate in the NFIP, but is interested in joining the program so that residents and businesses can purchase flood insurance.

3. Secondary hazards facing the Town are HAZMAT incidents impacting water and air quality, winter storms, ground water contamination, drought, and fire.

4. The Town has identified areas within Town that have poorly maintained drainage ditches that regularly cause storm water flooding hazards. The Town is interested in mitigating these problems.

Chapter

19

Northampton County Profile

There are 6 incorporated towns in Northampton. The following information is for the unincorporated areas of Northampton and the incorporated Towns of Cheriton and Nassawadox. The Town of Belle Haven is partially located in both Accomack and Northampton County and the information for this town is presented in the Accomack County chapter. Information on the Towns of Cape Charles, Eastville, and Exmore is located in later chapters.

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Northampton County is located on the southern tip of the Delmarva Peninsula. It is separated from the mainland by the mouth of the Chesapeake Bay. The English first settled Northampton County in 1614. At that time, a salt works was erected on Smith Island and a settlement grew up on Old Plantation Creek near the present Town of Cape Charles. At first, this area was very isolated but in the 1620s the population started to grow. A census of the County, which at that time included both present day counties, showed that 51 colonists lived there. Many were attracted from the Western Shore by the pleasant environment and friendly natives. The Eastern Shore played an influential role in the history of Colonial America. The present County seat in Eastville was founded in 1680 when a courthouse was erected there. Northampton has the oldest continuous court records in the country and is one of the oldest counties in the entire nation.

Demographics. Northampton County was one of the richest agricultural counties in the country at the beginning of the twentieth century. Population growth accompanied this prosperity and in 1930, the County's population reached its peak at 18,565 (U.S. Census, 1930 and *Northampton County Comprehensive Plan*, 2009). The County has experienced an overall decline in population since 1930 with the population being 12,389 persons in 2010. The County's population had not dropped below 13,000 since 1890 when it was 10,313 (U.S. Census, 1890). Several large industries have ceased operations within the County since 1980. As a result many citizens have been unable to find jobs within the County and

have been forced to relocate (*Northampton County Comprehensive Plan*, 2009). The County was beginning to experience growth at the beginning of the 21st century until the national economy turned. Residential sub-divisions were being constructed around the County, especially on and near the waterfront areas. In 2011, many of these residential sub-divisions are sitting empty or are far from being built-out.

The median age for residents in Northampton County in 2000 was 42.4 years, signifying a population older than the national average. While the year-round population does not appear to be growing, the County is experiencing peak seasonal increases as tourists, retirees, and second-home buyers have discovered the County (*Northampton County Comprehensive Plan*, 2009). Additionally, the County has historically experienced seasonal fluctuations in population as the result of transient field laborers that lived in the County during the growing season.

Coastal and Storm Water Flooding. The 1982 Flood Insurance Study for Northampton County indicates that the greatest threat of flooding comes from northeasters and hurricanes. The Study, which is being updated as of 2011, also indicates that the Atlantic shoreline has experienced recorded floods of up to 9 feet and the Bay shoreline has experienced floods up to 7.2 feet. The 100-year stillwater depth for the County is 8 to 9.8 feet with a maximum wave height crest of 12-15 feet. Generally, the 12-foot wave crest is on the bayside and the higher 15-foot wave crest on the seaside.

Local officials identified areas of coastal and storm water flooding in the County. The following list gives a brief description of specific areas with the most frequent problems.

- Waterfront Village of Willis Wharf – homes, businesses, harbor, and roads receive flood damage
- Village of Hare Valley experiences storm water flooding
- Existing Cottage Communities of Battle Point and Silver Beach on Occohannock Neck - homes and roads receive flood damage
- Waterfront Hamlet of Bayford receives coastal flooding
- Waterfront Hamlet of Red Bank receives coastal flooding
- Village of Weirwood receives storm water flooding

- Village of Treherneville receives storm water flooding
- Vicinity of Machipongo receives storm water flooding
- Existing Cottage Community of Smith Beach experiences coastal flooding in the northern portion of the community
- Hamlet of Pat Town receives storm water flooding
- Waterfront Village of Oyster - flooding in homes, harbor, businesses, and roads
- Town of Cheriton - storm water on Mill Street
- Village of Cheapside - septic systems and private wells experience flooding between Arlington and Route 13
- Village of Townsend receives storm water flooding
- Hamlet of Magotha - The 80-year old Ocean Cove Seafood building that withstood the August 1933 hurricane was destroyed during Hurricane Isabel in September 2003.

FIGURE 19.1 Common scene of flooding of low-lying roadways following storm events. *Photo courtesy of Northampton County.*

FIGURE 19.2 The Ocean Cove Seafood building in Magotha was destroyed during Hurricane Isabel in 2003. The 80 year old building had survived numerous storm events including the great hurricane of August 1933. At the time of its destruction, this seafood facility employed five people. *Photo courtesy of Northampton County.*

FIGURE 19.3 Older facilities are common along shorelines in the County and are more vulnerable to damage from coastal flooding. *Photo courtesy of Northampton County.*

In 2006, there were approximately 820 structures in Special Flood Hazard Areas that would be impacted by the 100-year flood event. Excluding the Town of Cape Charles, it was estimated this event would have generated approximately $16.8 million in structure and contents losses in 2006 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment, 2006).

Two hundred and thirteen of the structures, or 26%, were insured at the time (FEMA NFIP Insurance Report, July 2003). In 2004, approximately 20% of all policies were not located in a Special Flood Hazard Area (FEMA NFIP Insurance Report, July 2003).

In 2011, there were approximately 981 structures located in Special Flood Hazard Areas and the number of structures with NFIP policies located in Special Flood Hazard Areas rose to 252 (Eastern Shore of Virginia Coastal Flood Vulnerability Assessment , 2011; FEMA NFIP Insurance Report, May 2011). The 2011 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment estimates that the 100-year flood event would result in approximately $28.2 million in structure and contents losses in 2011. This indicates that the 100-year flood in 2011 would cause an additional $11.4 million in losses compared to 2006. The number of policies not located in Special Flood Hazard Areas rose to 169, or approximately 40%, in 2011 (FEMA NFIP Insurance Report, May 2011). Policies not located in Special Flood Hazard Areas likely indicate areas impacted by storm water flooding.

NFIP Community Participation. The County joined the NFIP program September 11, 1976. A wave analysis was added in 1982. Prior to this time, homes were built to standards based on the stillwater elevation. The current wave crest elevation is a 4-5 foot increase. In 2003, there were a total of 290 NFIP policies in the unincorporated areas in Northampton County (FEMA NFIP Insurance Report, July 2003). The number of policies rose to 421 in 2011 (FEMA NFIP Insurance Report, May, 2011). This number increased following Hurricane Isabel, likely because many households received a Group Flood Insurance Policy out of their federal disaster assistance. These policies only cover up to $25,000 in damage for three years and do not fully insure all losses a structure may sustain. The purpose is to reduce the federal disaster assistance paid out in the next disaster.

The unincorporated areas of the County had 24 NFIP claims from 1978 to July 2003 totaling $87,180 with an average claim of $3,633 (FEMA NFIP Insurance Report, July, 2003). Between 2003 and 2011, the unincorporated areas of the County had 43 claims bringing the total number of claims since 1978 to 67 (FEMA NFIP Insurance Report, May, 2011). Nearly all of these claims were from damages caused by Hurricane

Isabel in 2003. Northampton County had 2 repetitive flood loss properties that received $29,799.52 for damage from Hurricane Isabel in 2003. The County has five repetitive flood loss properties in 2011.

The Town of Nassawadox joined the NFIP program on May 8, 2007 (FEMA Community Status Book Report, June 2011). Nassawadox does not have any identified Special Flood Hazard Areas. NFIP data for Nassawadox indicates that there is one policy covering $280,000 for a structure located in the Town. The policy is not located in a Special Flood Hazard Area indicating that storm water flooding may be a concern within the Town. There have not been any claims filed since the Town joined the NFIP in 2007 (FEMA NFIP Insurance Report, May 2011).

Descriptions of NFIP data for the Towns of Exmore and Cape Charles are included in Chapters 20 and 22, respectively.

Special Flood Hazard Area, Participating Communities. The Town of Belle Haven has identified flood zones. Belle Haven mostly lies in Accomack County, and for a more detailed description of the flood risk see the Accomack County chapter.

No Special Flood Hazard Area, Participating Communities. The Towns of Exmore and Nassawadox do not have any identified Special Flood Hazard Areas, but have joined the NFIP.

No Special Flood Hazard Area, Non-Participating Communities. The Towns of Eastville and Cheriton have no identified Special Flood Hazard Areas and do not participate in the NFIP. Eastville's flood risk is discussed in Chapter 21. Cheriton has identified storm water flooding problems. Residents and business owners in these Towns cannot purchase flood insurance.

HMGP Participation. The County used a HMGP grant following Hurricane Floyd in 1999 to elevate two homes in Battle Point and one in Oyster. The County and the Planning District Commission used HMGP funds following Hurricane Isabel to elevate seven additional homes in the Village of Oyster.

High Wind Events. The County has a great deal of shoreline and 1,296 structures were located in the wind-borne debris hazard area in 2004

(ESVA 911 Commission Data for Northampton County, 2004). The wind-borne debris hazard area is defined as all areas one mile inland from the shore on the mainland and does not consider the barrier islands on the County's seaside. In 2004, a 100-year wind event would have generated $8.4 million in damages in the County excluding Cape Charles. Nine hundred and thirty six of these structures were located on the bayside (ESVA 911 Commission Data for Northampton County, 2004) and the average value of these was higher than those located on the seaside. Most of the damage, approximately $6.7 million, would occur on the bayside of the County. Cape Charles' losses, which were not included in the damage estimates for the County, also occur on the bayside and would increase overall damages to this side of the County.

Some towns located in the County have been settled for hundreds of years and have mature trees located in and around structures. During a strong wind event, such as a hurricane, structures could be damaged or destroyed by falling branches and trees.

The southern end of Northampton County is susceptible to extreme winds from both the Atlantic Ocean and Chesapeake Bay which result in a greater likelihood of wind damage. During Hurricane Isabel in 2003, trees on the southern end of the County were burned from windblown salt spray. As of 2011, the evergreens in this area are still brown. It appears that whole stands of trees that remain standing were killed by the event. These same trees served as protection to inland areas.

In addition, the County's agriculture and aquaculture industries incurred extensive damages from Hurricane Isabel. Large amounts of crops were damaged during this storm by salt spray and high winds. Clam beds on both the bayside and seaside were significantly damaged by storm-induced wave action. A conservative estimate for losses in the County was approximately $10 million in crop damages and $3 million in commercial shellfish damages (Virginia Cooperative Extension, 2003).

Coastal Erosion. While the barrier islands protect much of Northampton County's seaside from erosion from the Atlantic Ocean, the County's Bay shoreline is not protected and has eroded as much as 800 feet since 1937 (Hardaway et al., 2004). Several specific areas in the County have severe

erosion problems including Tankards, Smith, and Silver Beaches and Butler's Bluff.

Tankards Beach is located on Savage Neck to the southwest of the Town of Eastville. The beach contains a bluff approximately 12 feet in elevation that is highly susceptible to erosion (Ibison et al., 1990). This area has experienced an average erosion rate of nearly 20 feet per year (Hardaway et al., 1984) and experiences even greater erosion during storm events. Anecdotally, Hurricane Isabel in 2003 produced a shoreline recession of approximately 40 feet (Verbal communication with County Officials, 2003). Land use at Savage Neck includes agricultural and conservation lands and residential development. Mitigation actions have been necessary in the past to protect structures from erosion and it is expected that erosion control measures and structure relocation will be necessary in the future as erosion is expected to persist.

FIGURE 19.4 Aerial view looking south along Tankards Beach. The Savage Neck Dunes Natural Preserve is located behind a series of dunes created by historic erosion along the Chesapeake Bay shoreline. *Photo from Hardaway et al., 2004.*

Smith Beach is located to the north of Tankards Beach on Savage Neck and also contains structures threatened by erosion. A small-cottage community exists at the Beach. Development at Smith Beach began in the late 1940s and shoreline erosion has resulted in the construction of many groins and bulkheads over time, which has forced the erosion rate generally to zero (Hardaway et al., 2004). Homeowners at Smith Beach

will need to pay maintenance costs to ensure that the groins and bulkheads that are protecting their property will continue to be able to thwart the threat of coastal erosion. The area has a relatively new residential sub-division that is generally vacant as of 2011. If this sub-division is built-out in the future, additional structures may be at risk.

Silver Beach is a community similar to Smith Beach in that it is a small-cottage community that has had to defend its shoreline against erosion with many groins, bulkheads, and rip-rap since its inception in the late 1940s. The community sits atop an elevated bluff overlooking the Bay to the north of Smith beach on Occohannock Neck. Despite hardening of the shoreline to control erosion, the area is heavily developed and several structures are at risk.

FIGURE 19.5 View of the eroded bluff and hardened shoreline protecting the small-cottage community of Silver Beach. *Photo by Peter Stith.*

Other shorelines, including Butlers Bluff between Kiptopeke State Park and Arlington, on the bayside shoreline are also eroding at lesser rates.

In 2004, the County, excluding Cape Charles, had a total of 344 structures, representing $43 million in potential loss, located within the 100 foot buffer required by the Chesapeake Bay Preservation Act (ESVA 911 Commission Data for Northampton County, 2004). Northampton County enforces these requirements on the seaside in addition to the

bayside. Seventy-two of the structures were within 50 feet of the shoreline in 2004 (ESVA 911 Commission Data for Northampton County, 2004).

Other Local Hazards. The Chesapeake Bay Bridge Tunnel (CBBT) serves as a vital link between the Eastern Shore with the Hampton Roads region to the south. Damage to the CBBT impacts both traffic and communications for Northampton County. A significant disruption of traffic on the CBBT would cause commuting, medical, and emergency response problems for County residents. Damage to communication cables that span the CBBT would be a significant disruption to residents and the local economy. Historically, the CBBT has been damaged by vessels and storm events. These damages have closed the CBBT for hours to weeks at a time. High winds are common at the mouth of the Chesapeake Bay and regularly restrict traffic on the CBBT. In May 2011, sudden winds from a suspected microburst overturned two trucks on the CBBT and restricted traffic for hours. Sustained winds escalated by nearly 50 miles per hour over a three minute period and gusts reached 75 miles per hour. CBBT staff was not able to enact wind restrictions for traffic in the extremely short period of time over which the winds became dangerous to traffic (*Eastern Shore News*, May 25, 2011).

FIGURE 19.6 Chesapeake Bay Bridge Tunnel, the only southern road link to the Eastern Shore. *Photo by Chesapeake Bay Bridge Tunnel Commission*

FIGURE 19.7 Sudden high winds created by a suspected microburst overturned two trucks on the Chesapeake Bay Bridge Tunnel in May 2011. One of the overturned trucks is shown. *Photo from Eastern Shore News.*

Northampton County has historically been adversely impacted by winter storms that can bring multiple hazards including snow, ice, coastal flooding, and high winds. Trees and power lines are especially susceptible to snow, ice, and wind or any combination. Public facilities commonly are forced to close and travel can be compromised by relatively minimal snowfalls. Winter conditions have also caused local waterways to freeze, which can negatively impact the local water-based economy. Northampton County experienced a major ice storm in December 1998 that persisted for nearly three days that caused ice accumulations of up to an inch resulting in extensive damage to trees and power lines. Power losses were widespread across the County and some people were without power for up to ten days (*Winter Weather*, VDEM, 2010).

Droughts have historically been a significant hazard to the County's agriculturally-based economy. Droughts can affect crop yields during a given growing season and can impact farmers not equipped with proper irrigation equipment. Droughts persisting for one or more years have significant potential to adversely impact or cripple the local agricultural economy. Other results of droughts are increased usage of ground water resources and heightened risk of wildfire.

The aquaculture and seafood industries have historically played critical roles in Northampton County's economy and are currently experiencing a revitalization in response to current market trends and water quality protection and improvement efforts. The aquaculture industry is vulnerable to several immediate hazards including wind-driven wave action from storm events and water quality degradation from severe droughts. The economic analysis of the County's aquaculture industry performed by the Virginia Institute of Marine Science indicated that the industry was valued at $33 million in 2005.

Critical Facilities. Northampton County and its towns have several critical facilities. Several of these are in Eastville, the County seat. The following table lists the critical facilities and their relative importance to the County.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
County Courthouse Complex	Wind	Entire County	Devastating	No	Yes
Sheriff's Department/Emergency Operations Center	Wind	Entire County	Devastating	No	Yes
Fire/EMS	Wind	Entire County	Devastating	Yes	Yes
Regional Jail	Wind	Entire County	Devastating	No	Yes
Chesapeake Bay Bridge Tunnel	Wind, Flooding, Ice	Entire Eastern Shore	Devastating	No	Yes
Riverside Shore Memorial Hospital	Wind	Entire Eastern Shore	Devastating	Yes	Yes
Cape Charles VORTAC Beacon	Wind, Flooding, Ice Coastal Erosion	Transcontinental air traffic	Inconvenience		
Schools	Wind	Entire County	Major Disruption	Yes	Yes
County Courthouse Complex Water Tower	Wind, Ice	500	Devastating	No	No
County Courthouse Complex Waste Water Treatment Plant	Wind	500	Disruption	No	Yes
Oyster, Willis Wharf Harbors	Flood, Wind, Ice		Disruption	No	Yes
Cell Phone/Communication Towers	Wind, Ice	Entire County	Devastating	No	Yes
Broadband Network	Flooding, Wind	Entire County	Disruption	No	No
Bayview Waste Water Treatment Plant	Wind	81 Residential Connections	Disruption	No	Yes

TABLE 19.1 Critical facilities in Northampton County.

Construction of a new courthouse facility was completed in January 2006. The new building houses the Circuit, General District, and Juvenile & Domestic Relations Courts, as well as the Clerks for each court and the Commonwealth Attorney's Office. The courthouse is connected to the Regional Jail, which serves both Accomack and Northampton Counties. The jail was designed to accommodate 325 beds; however, at this time it is being operated at the Phase I level of 145 beds. At this writing, a new Judicial Court Services building is under construction and the county administration offices in Eastville are being renovated; completion of both projects is anticipated by the end of September 2011. None of these facilities is located in a Special Flood Hazard Area; compliance with International Building Code standards with respect to wind loads has been required.

FIGURE 19.8 The Northampton County water tower in Eastville serves the County Courthouse Complex and is vulnerable to wind and ice damage *Photo by Curt Smith*

Review.

The *Northampton County 2006 Comprehensive Plan Update* (Amended in 2007, 2008, 2009) identifies natural features and conditions that have bearing not only on quality of life and lifestyle, but also on planning for hazard mitigation. These features and conditions include coastal erosion, flooding, locations of Carolina bays, and reliance on the Eastern Shore's sole source aquifer for potable water supplies. Carolina bays are geomorphic features that are bowl-like depressions where storm water

accumulates, and storm events may result in significant flooding in areas where these land features are located. The twin nor'easters in 1998 created major flooding in the Cheapside vicinity due to poor drainage where Carolina bays exist. Goals articulated in the comprehensive plan with respect to preservation of natural features such as beaches and primary and secondary sand dunes and forest buffers also serve to advance hazard mitigation goals of reducing coastal flooding and erosion.

Trends. Although there are some subdivisions and existing villages in the southern part of the county, that area remains predominantly agricultural and undeveloped, and significant acreage has come under conservation easement or been purchased for conservation purposes in recent years. As a result, concern that the lower end of the County would become essentially a bedroom community for the Virginia Beach-Norfolk area has largely abated. The northern part of the County is now the most populated area of Northampton and most of the recent development activity has occurred in and around Exmore. The recently reactivated Public Service Authority is considering two potential projects, one in the Exmore-Nassawadox area and one in the Cape Charles-Cheriton vicinity. It appears unlikely, however, that the projects will come to fruition in the immediate future. Waterfront development continues to occur in the County, although at a slower pace than was experienced in the early-to-mid 2000s. Many platted but vacant lots exist along the bay front and creek fronts, particularly in the northern portion of Northampton.

Findings.

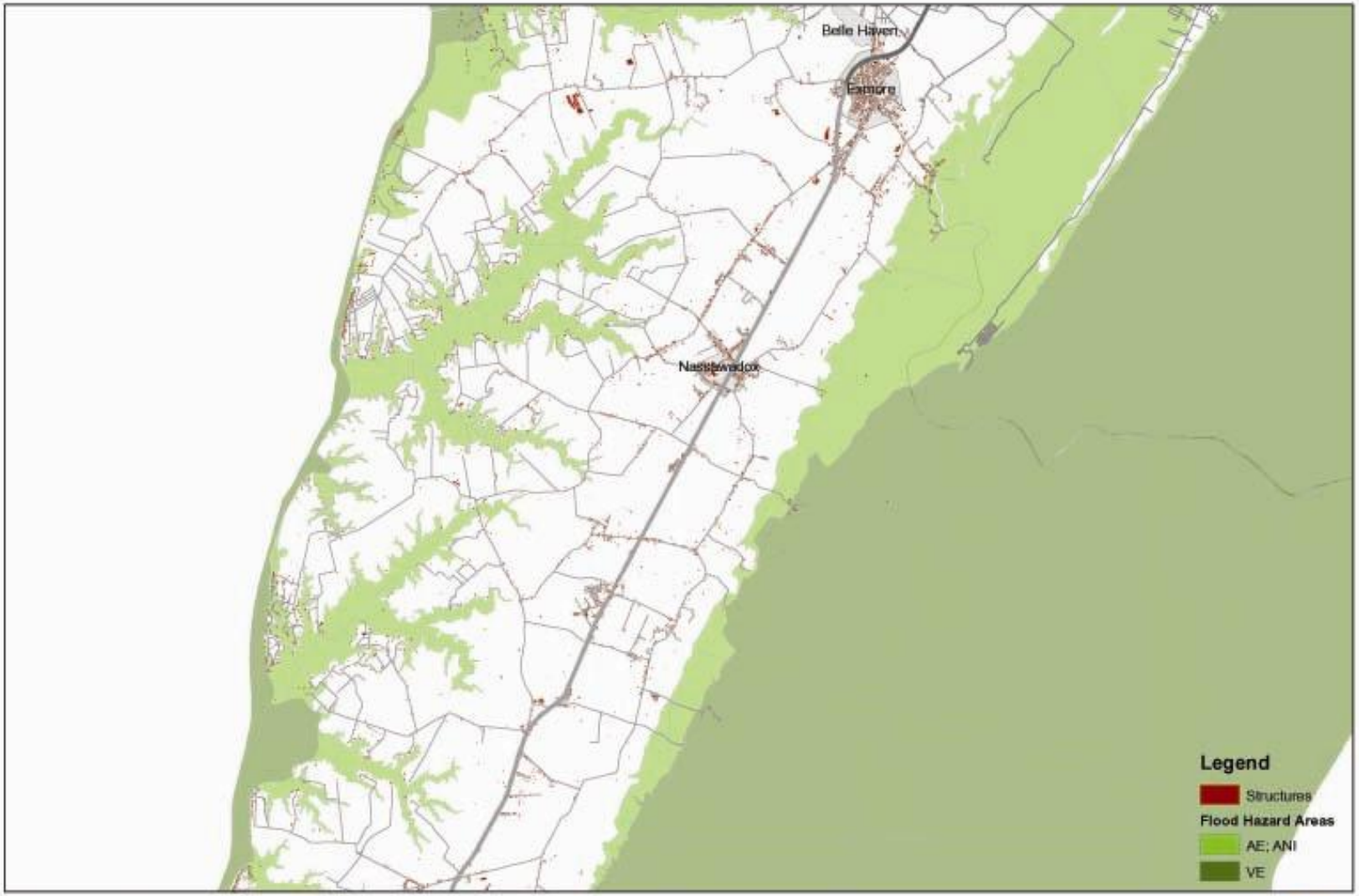
1. The greatest threats to Northampton County are coastal flooding and erosion. Storm water flooding, high wind events, winter storm events, and droughts also pose significant threats to the County.
2. A strong wind event would be the most far-reaching event that Northampton could experience. Many more homes lie in the wind-borne debris hazard area than Special Flood Hazard Area or erosion hazard area.
3. Established neighborhoods in the County are at great risk to damage in a wind event, not solely from wind, but from wind-damaged trees and other airborne debris.
4. Three hundred and forty-four homes were within 100 feet of the shoreline and 72 of these were within 50 feet of the shoreline in

2006 (Eastern Shore of Virginia Coastal Erosion Vulnerability Assessment, 2006). These homes are vulnerable to coastal erosion and are also the homes that will likely receive some of the worst flooding.

5. Northampton County's vulnerability is increasing due to loss of land from coastal erosion and new construction near shorelines. Many of the homes being built are on the waterfront and therefore lie in the Special Flood Hazard Area and the wind borne debris hazard area.
6. Isabel in 2003 proved to be an extremely damaging event for Northampton County despite being a Tropical Storm that did not make direct landfall within the County. The storm caused approximately $10 million and $3 million to the County's agricultural and aquaculture industries, respectively; widespread damage to trees; extensive coastal flooding; and destroyed the Ocean Cove Seafood building in Magotha that had withstood the great hurricane of 1933. Storms of similar or greater magnitude are likely to occur in the future and Isabel should serve as a great lesson for the County.
7. The Chesapeake Bay Bridge Tunnel is a critical facility that affects the local economy, communications, and emergency response capabilities.
8. It is expected that a bayside-focused disaster would be worse than a similar seaside disaster considering current pattern of development in the County and the greater exposure to storm-related hazards on the bayside.
9. The 80-year old Ocean Cove Seafood building in the Hamlet of Magotha that withstood the August 1933 hurricane was destroyed during Hurricane Isabel in September 2003. Approximately 5 people were employed at the time.
10. Private flood insurance policies for homes within Special Flood Hazard Areas are becoming increasingly difficult to attain within the County.

Northampton County Hazard Maps

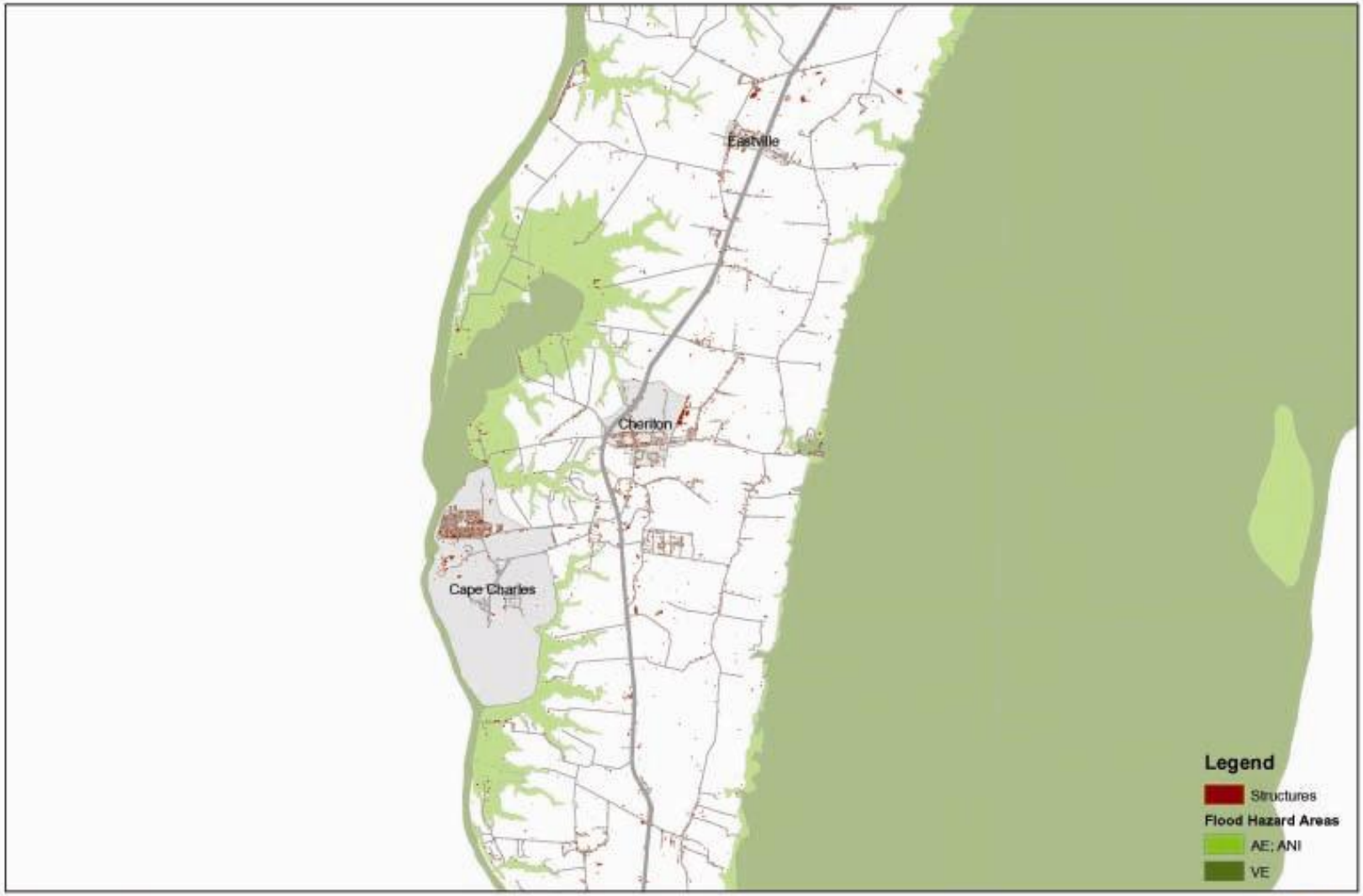
The following maps illustrate coastal flooding and wind hazard areas for the unincorporated areas of Northampton County and its incorporated towns. Hazard maps for Accomack County and the Town of Chincoteague can be found at the end of Chapters 8 and 9, respectively. Three coastal flooding maps are included for the County and are oriented geographically from north to south. Descriptions of locations at risk to coastal erosion and storm water flooding are described in detail within each locality's profile chapter.



Coastal Flood Hazard Map
Northampton County

Map 1 of 3
Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11



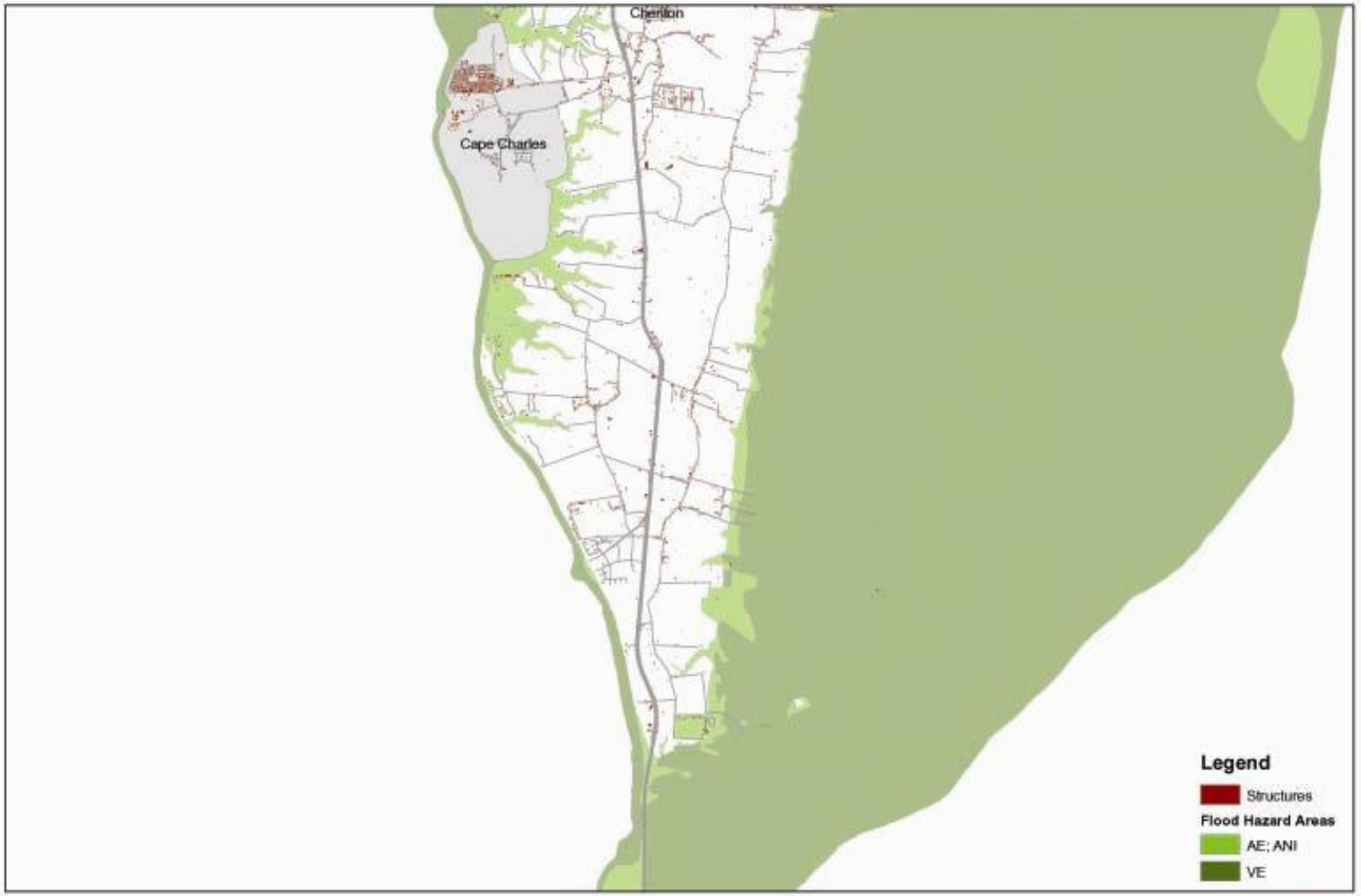
Coastal Flood Hazard Map
Northampton County

Map 2 of 3

Eastern Shore of Virginia Hazard Mitigation Plan 2011

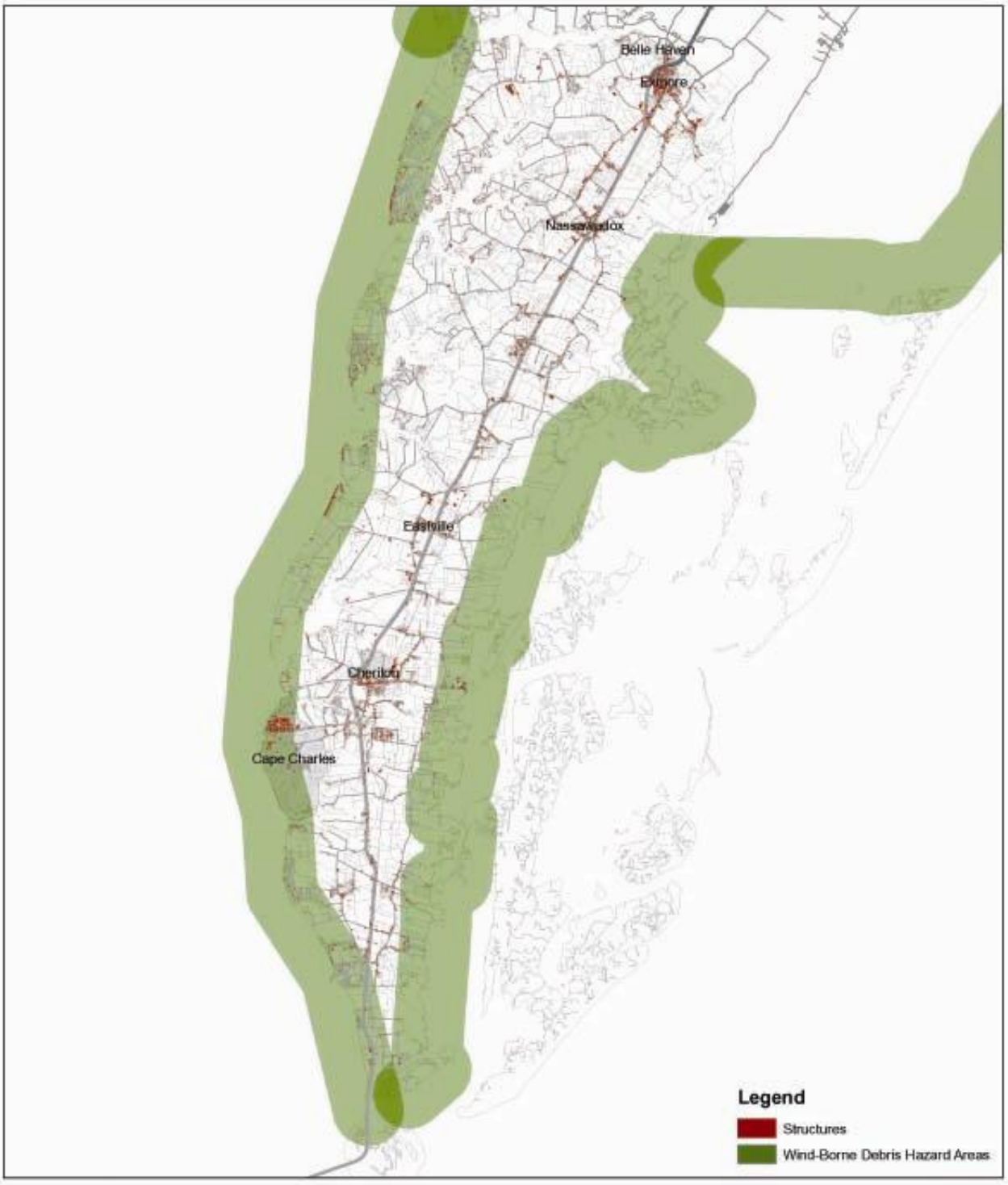
A-NPDC

EM 8-12-11



Coastal Flood Hazard Map
Northampton County
Map 3 of 3
Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11



Wind Hazard Map
Northampton County

Eastern Shore of Virginia Hazard Mitigation Plan 2011

A-NPDC
EM 8-12-11

Chapter

20

Town of Exmore Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Exmore is located near the central spine of the Eastern Shore in the northernmost part of Northampton County and encompasses approximately 518 acres of which approximately half drains to the Chesapeake Bay and half drains to the Atlantic Ocean. The Town, like a number of other Eastern Shore towns, developed around a railroad station built following the construction of the railroad in 1884. The railroad spurred residential development and a thriving downtown with many commercial businesses. The Town was incorporated in 1950. Even though the railroad is no longer the primary focal point of the Town's economy, the Town currently has one of the largest concentrations of commercial activity in Northampton County. Commercial activity is still present in the downtown business district and is readily developing along the Route 13 highway corridor. The Town continues to remain largely residential (*Exmore Town Plan*, 2000).

Demographics. The Town's population ranged from 1,300 to 1,566 from 1950 to 1980 with a maximum population in 1960 (U.S. Census, 1950, 1960, 1970, 1980). The population dropped slightly to 1,115 in 1990 and remained relatively stable at 1,136 in 2000 (U.S. Census, 1990, 2000). The 2010 Census indicated that the Town experienced a population growth in the last decade as the population was 1,460 in 2010. The median age for residents in Exmore in 2010 was 44.4 years, which is an increase from the 2000 average of 38.6 years, signifying a population older than the national average.

According to the 2008 Zip Code Business Pattern data, the Town had 96 business establishments that employed 1,065 people. Town Staff indicated that business activity within the Town has increased to approximately 125 businesses in 2011. This was a significant increase

from the 2001 Zip Code Business Patterns data, which indicated the Town had 94 business establishments that employed 922 people.

Exmore has three hotels in Town that support a substantial transient population of travelers/tourists which is much greater during the summer season.

Coastal and Storm Water Flooding. Elevations in Exmore range from approximately 27 to 43 feet above mean sea level. There are no perennially flowing surface water bodies in the Town. Drainage ditches on the eastern half of Town drain towards Parting Creek and ultimately to the Atlantic Ocean. Drainage ditches on the western side of Town drain towards Occohannock or Nassawadox Creeks and ultimately to the Chesapeake Bay. No portions of the Town lie within a Special Flood Hazard Area. The entire Town is located within the X zone, which is the 500-year floodplain. The threat of coastal flooding within the Town is considered to be minimal.

Storm water flooding poses the greatest risk to the Town and has the most frequent impact. The majority of the Town contains hydric soils that are unsuitable for drainage and readily retain rainwater. The *Exmore Town Plan* indicates that the hydric soils are located on the eastern, southern, and western sides of the Town with a smaller area of highly permeable soils located in the northern and central areas of Town. The depth to ground water in the areas comprised of hydric soils is typically less than three feet. The hydric soils within Exmore are a major limiting factor for development as there are severe limitations with respect to their capacity to support on-site septic systems. A majority of residents in Exmore utilize on-site septic systems for residential waste disposal. A secondary hazard from standing water associated with poorly drained hydric soils is the potential for mosquito-borne diseases that could impact the health of residents.

The Town relies on the Virginia Department of Transportation to perform maintenance on the main drainage ditches within the Town limits. The *Exmore Town Plan* identifies several areas that experience drainage issues following heavy rain events. These areas are summarized in Table 20.1.

Exmore Areas Experiencing Storm Water Issues
Monroe Avenue between Madison Avenue and Jefferson Street
Westfield Avenue
Virginia Street
Main Street between Hadlock Road and Bright Street
Poplar Avenue
Broad Street in the vicinity of the grading shed
Bright Avenue between Broad Street and Main Street
Main Street between Commercial Street and Bright Avenue

TABLE 20.1 Areas in Exmore with storm water flooding problems (*Exmore Town Plan*, 2000; Personal Communication with Town Staff, July 2011).

FIGURE 20.1 Storm waters backed up along the railroad tracks in Exmore. *Photo from Town of Exmore*

The Town wishes to work closely with the Virginia Department of Transportation to alleviate the storm water problems within Town.

The November Northeaster of 2009 caused extensive storm water flooding along Virginia Street and impacted the Town's waste water treatment system with large amounts of inflow and infiltration. The Town applied and received FEMA funding to mitigate these storm water flooding issues in Town by replacing failed equipment in the waste water system and controlling inflow to pump stations. Town Staff indicated that the downtown business district experiences flooding into the commercial

businesses approximately once every year during extreme rain events (Personal Communication with Town Staff, July 2011).

FIGURE 20.2 Storm water flooding in a business located in the downtown business district in Exmore. *Photo from Town of Exmore*

NFIP Community Participation. Exmore is classified as a No Special Flood Hazard Area Participating Community since the Town has no identified Special Flood Hazard Areas. The Town joined the NFIP on February 8, 2001. The Town has one NFIP policy covering $35,000 in damages FEMA NFIP Insurance Report, May 2011). There have been two claims since the Town joined the NFIP in 2001 totaling $5,982 (FEMA NFIP Insurance Report, July 3003 and May 2011). These claims are likely the result of storm water flooding problems that exist within the Town.

HMGP Participation. Exmore has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the coast. The Town lies in the 110 mph design wind zone (Northampton County Building Code).

Most of the residential areas are older and have mature trees in and around the homes. During a high wind event falling branches or trees may damage some structures and damage power lines. Town Staff

indicate that hurricane-force winds will be extremely damaging to residences, Town facilities, trees and electrical infrastructure.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several sources including failed septic systems within Town, leaks and spills of petroleum based products from underground storage tanks, and major industrial facilities within the area. In Exmore, approximately 25% of residences and commercial businesses are served by the Town's waste water treatment system and the remainder of residences and businesses are served by on-site septic systems. The Town has a public water supply that is protected according to state-mandated wellhead protection regulations. Town Staff indicated that there are approximately 20 individual residential wells in Town that could potentially be impacted. Major ground water withdrawers in the area are Shore Memorial Hospital and Virginia Landing Campground (*Exmore Town Plan*, 2000). According to the *Ground Water Supply Protection and Management Plan for the Eastern Shore of Virginia*, no ground water problems currently exist in the vicinity of the Town, but increased water supply demand within the region could pose a future threat to ground water supply quantity and quality.

The Town is currently implementing water conservation efforts to conserve the limited ground water supply including increased rates for the larger water users in Town and adopting a Town Water Conservation Ordinance in May 2011.

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines and also forced local businesses to close for several days. Residents also had no electricity for several days. Emergency energy generation filled the needs for drinking water during the time of outage. Extreme cold weather events have historically caused damages to the Town's water distribution system. During these events, pipes froze and burst and the Town's water supply was at risk of contamination.

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Exmore Town Office/Police Department Building	Storm water flooding, Wind	1,460	Major Disruption	Yes	Yes
Exmore Water Tower	Wind	1,460	Devastating	Yes	No
Exmore Municipal Wells	Storm water flooding, Contamination	1,460	Major Disruption	Yes	No
Exmore Water Distribution System	Storm water flooding, Cold snaps	1,460	Major Disruption	No	Yes
Exmore Public Sewer Systems (2)	Storm water flooding	1,460	Major Disruption	No	Yes
Exmore Volunteer Fire & Rescue Department	Storm water flooding, Wind	1,460	Major Disruption	No	Yes
Exmore Town Park	Storm water flooding, Wind	1,460	Inconvenience	No	Yes
Exmore Railroad Museum	Storm water flooding, Wind	1,460	Major Disruption	Yes	Yes

TABLE 20.2 Critical Town Facilities in Exmore.

FIGURE 20.3 The Exmore Municipal Building is home to the Town Office and Police Department. *Photo by Curt Smith.*

FIGURE 20.4 The Exmore Water Supply Tower supplies potable water to the Town's residents and businesses. *Photo by Curt Smith.*

FIGURE 20.5 Exmore has two public sewer systems. The one shown was recently constructed in 2006 to serve Town residents and businesses. *Photo by Curt Smith.*

Review.

Exmore Town Plan –Amended June 5, 2000. The *Town Plan* was amended to include the *Land Use and Water Quality Protection Plan* that was adopted in 2000. The plan identifies storm water flooding and ground water contamination as the greatest hazards threatening the Town. Strategies associated with hazard mitigation included in the plan are continuing implementation of the Town's Chesapeake Bay Preservation Act program, supporting implementation of Best Management Practices with regards to nutrient reduction, educating Town residents with Chesapeake Bay Act-related materials, promoting water conservation, protecting ground water resources by participating in Northampton County planning policies that advocate County-wide land use management techniques, reducing existing pollution sources in Town, cooperating with the State Water Control Board in the regulation of underground storage tanks, and prohibiting future siting of major polluting activities in Town.

Town Zoning Ordinance of the Town of Exmore, Virginia – Adopted August 3, 1994; Amended November 6, 1995. The ordinance regulates areas that are impacted by the identified hazards in the following ways. The Town has set up a Chesapeake Bay Preservation Area Overlay District that includes a Resource Management Area (RMA), which consists of all land in Exmore located within the Chesapeake Bay watershed. The purpose of the RMA area is to minimize erosion and sedimentation potential, reduce land application of nutrients and toxics, and maximize rainwater infiltration.

Trends. Exmore is largely built-out and its primary land use is residential. Approximately 80% of the land in Town consists of residential development (*Exmore Town Plan*, 2000). There are vacant residential and commercially-zoned lots in Town that can be developed if sewer and water infrastructure can be made available to them. In 2011, the Town is currently experiencing a lull in commercial development. The Town has revitalized a portion of its downtown business district and intends to continue and this revitalization project. It is also expected that commercial development along the Route 13 corridor is expected to increase in the future. As commercial development of the land in and around Exmore increases, storm water drainage will become an increasingly important hazard issue. The Town's water system infrastructure is also aging and it is expected that the system will be increasingly vulnerable as it ages.

Findings.

1. The hazards expected to have the greatest impact on the Town are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are ground water contamination, ice storms, drought, tornadoes, and mosquito-borne disease.

2. Residential areas are older with older construction and many mature trees around homes and churches in the Town. During a wind event, branches and trees may come down causing secondary wind damage and power outages.

3. The Town has no Special Flood Hazard Areas, but residents are purchasing flood insurance likely to protect their homes from potential impacts from storm water damages.

4. The Town has identified undersized drainage pipes in the Downtown Business District of Town that cannot handle large of amounts of rain water and cause flooding in the area.

5. The Town's water distribution system is aging and becoming increasingly fragile and vulnerable to storm water flooding events.

Chapter

21

Town of Eastville Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. Eastville is located near the central spine of the Eastern Shore in the central region of Northampton County and encompasses approximately 160 acres of which approximately 60% drains to the Chesapeake Bay and 40% drains to the Atlantic Ocean. The Town has a rich history dating back to its establishment in 1677 when the community was known as "the Hornes" and was the site for colonial court. Eastville was incorporated in 1897 and has a wealth of 18th century buildings in Town. Eastville is the Northampton County seat and the Courthouse houses the oldest continuously documented court records in the nation. The Town has developed and changed modestly over time with the construction of the railroad and U.S. Route 13, which bisect the Town. The Town's predominant land-use is residential with a relatively smaller commercial district (*Eastville Comprehensive Town Plan*, 2005).

Demographics. The 2010 Census indicated that the Town has a population of 305, which is a 33.4% increase from the 203 people that lived in the Town during the 2000 Census. The current population is the Town's greatest since 1960 when the population was 261 (U.S. Census, 1960-2010). The median age for residents in Eastville in 2010 is 37.4 years and signifies a population similar to the state and national average and younger than the Northampton County average (U.S. Census, 2010).

According to 2009 Zip Code Business Pattern data, the Town had 44 business establishments that employed 224 people. This was a significant increase from the 2001 Zip Code Business Patterns data, which indicated the Town had 36 business establishments that employed 151 people.

Coastal and Storm Water Flooding. Elevations in Eastville range from approximately 22 feet above mean sea level in the westernmost part of Town to 40 feet above mean sea level in the eastern portion. There are no

perennially flowing surface water bodies in the Town. Drainage ditches on the eastern half of Town drain towards Indiantown and Taylor Creeks and ultimately to the Atlantic Ocean. Drainage ditches on the western side of Town drain towards the Gulf and ultimately to the Chesapeake Bay. No portions of the Town lie within a Special Flood Hazard Area. The entire Town is located within the X zone, which is the 500-year floodplain. The threat of coastal flooding within the Town is considered to be minimal.

Storm water flooding poses the greatest risk to the Town and has the most frequent impact. The Town relies on the Virginia Department of Transportation to perform maintenance on the main drainage ditches within the Town limits. Drainage issues are commonly experienced along the southern boundary of Town along Courthouse Road, Willow Oak Road east of Route 13, and at the northwestern side of the intersection of Route 13 and Willow Oak Road where the ditches are not maintained as regularly. Willow Oak Road receives flood waters from the Holland Court area and the Town has needed to fund the maintenance of drainage ditches here in the past.

The vast majority of soils in Eastville are relatively well drained. There are very sparse areas of poorly drained soils which are mainly used for farmland and woodlands in Town (*Eastville Comprehensive Town Plan*, 2005).

Eastville experienced extensive flooding from a large thunderstorm on September 3, 2003 just prior to Hurricane Isabel that brought heavy rains that impacted several areas in Town. It was suspected that clogged ditches in the area were the main factors in the flooding that occurred during this storm. In addition to thunderstorms, rains from northeasters and hurricanes have historically impacted the Town.

NFIP Community Participation. The Town does not participate in the NFIP.

HMGP Participation. Eastville has not participated in the HMGP.

High Wind Events. No parts of Town lie in the wind borne debris hazard area. This area extends 1-mile inland from the coast. The Town lies in the 110 mph design wind zone (Northampton County Building Code).

The vast majority of homes were constructed prior to the 1970s and are now over 40 years old. The Town's aging building stock is at greater risk to damage from high wind events. Most of the residential areas are older and have mature trees around the homes. During a high wind event falling branches or trees may damage some structures and damage power lines. Town Staff indicated that hurricane-force winds will be extremely damaging to residences, Town facilities, trees and electrical infrastructure.

Hurricane Gloria in 1985, Hurricane Isabel in 2003, and Tropical Storm Ernesto in 2006 all impacted the Town with high winds and saturated soils resulting in damaged and up-rooted trees. Downed trees are very hazardous to power lines and can cause extensive power outages. The Town's power grid serves Northampton County's Emergency Services including the regional jail, Northampton County Sheriff's Office, Emergency Operations Center, and the only emergency shelter in Northampton County. In August 2011, power was lost during Hurricane Irene for nearly a day and many County facilities were impacted.

Coastal Erosion. No structures are at immediate risk to coastal erosion.

Other Local Hazards. The Town faces a threat of ground water contamination from several sources including failed septic systems within Town and leaks and spills of petroleum based products from underground and aboveground storage tanks. In Eastville, residents and commercial businesses rely on on-site septic systems for waste disposal. The Town has a public water supply that is protected according to state-mandated wellhead protection regulations. The Town's water supply serves 169 hook-ups, 98 of which were within Town limits in 2005. The Town purchased a generator to serve as a backup power supply for the water pump serving the public water supply wells (*Eastville Comprehensive Town Plan*, 2005). No ground water problems currently exist in the vicinity of the Town, but increased water supply demand within the region could pose a future threat to ground water supply quantity and quality.

Winter snow and ice storms impacted the Town in the late 1990s and in 2010. These storms downed tree limbs and power lines and also forced local businesses to close for several days. Residents also had no electricity for several days. Emergency energy generation filled the needs for drinking water during the time of outage. Extreme cold weather events

have historically caused damages to the Town's water distribution system. During these events, pipes froze and burst and the Town's water supply was at risk of contamination.

The Town has significant agricultural lands that are impacted during droughts.

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Eastville Town Office/Police Department	Wind	13,000	Major Disruption	No	Yes
Eastville Water Tower	Wind, Ice	500	Devastating	No	Yes
Eastville Water Distribution System	Wind	500	Devastating	Yes	Yes
Eastville Municipal Wells	Contamination, Storm Water Flooding	500	Major Disruption	Yes	No
Eastville Volunteer Fire Department	Flooding, Wind	13,000	Devastating	No	Yes

TABLE 21.1 Critical Town Facilities in Eastville.

FIGURE 21.1 Water tower for the Town of Eastville. *Photo by Elaine Meil*

FIGURE 21.2 The Eastville Town Hall building serves as the Town's Office and Police Department Headquarters. *Photo by Curt Smith*

The Town funded the improvement of drainage at the Volunteer Fire Department to mitigate storm water issues at the facility. Ditches adjacent are commonly clogged and the Town performs maintenance as needed.

The Town purchased land adjacent to the water distribution system to provide space for potential upgrades and improved maintenance access. These actions were taken to mitigate hazards facing the facility.

Review.

Town of Eastville Comprehensive Plan – Adopted March 7, 2005. The *Comprehensive Plan* identifies storm water flooding and ground water contamination as the greatest hazards threatening the Town. Strategies associated with hazard mitigation included in the plan are continuing implementation of the Town's Chesapeake Bay Preservation Act program, supporting implementation of Best Management Practices with regards to minimizing storm water runoff, promoting water conservation, and agreeing to manage flood hazard areas by adopting minimum standards such that it can participate in the National Flood Insurance Program.

Trends. The primary land use in Eastville is residential. There were 87 housing units in Town in 2005 with very few vacant residences. Current zoning in Town will permit over 200 additional housing units (*Eastville Comprehensive Plan*, 2005). The Town has revitalized a portion of its downtown business district and intends to continue this revitalization project. As development of the land in and around Eastville increases, storm water drainage will become an increasingly important hazard issue.

The downtown area experiences daily increases in traffic due to the County Courthouse and Government Complex.

Findings.

1. The hazards expected to have the greatest impact on the Town are storm water flooding and high wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are ground water contamination, ice storms and drought.

2. Residential areas are older with older construction and many mature trees around homes and churches in the Town. During a wind event, branches and trees may come down causing secondary wind damage and power outages.

3. The Town has no Special Flood Hazard Areas, but does experience significant storm water flooding. The Town has expressed interest in joining the National Flood Insurance Program so that residents can purchase flood insurance.

4. The Town is interested in continuing to cooperate with VDOT to maintain drainage ditches in and around the Town. In the past and currently the Town has needed to provide funding and perform maintenance on state ditches.

5. The Town's water distribution system is aging and becoming increasingly fragile and vulnerable to storm water flooding events and extreme cold weather events.

Chapter

22

Town of Cape Charles Profile

Terminology

100-Year Flood – A flood that has a 1% chance of being equaled or exceeded in any single year

A zone – areas where the 1% probability flood, 100-year flood, would inundate with waves less than 3 feet.

V zone – areas where the 1% probability flood, 100-year flood, would inundate with waves greater than 3 feet.

NFIP – National Flood Insurance Program

Pre-FIRM – Built before the FIRM(Flood Insurance Rate Map) was adopted by a community

History. The Town of Cape Charles is located in southern Northampton County on the Chesapeake Bay. The Town was created in 1884 as a planned community at the southern terminus of the railroad. The Town was incorporated in 1886. In 1909 the area to the west of the Town on the Bay was incorporated into the Town. This area is called the Sea Cottage Addition. In the early 1900s, the Eastern Shore entered a quiet time, storm wise, and it is during this time that the Sea Cottage Addition was added to the Town. In 1990, the entire southern and northern portions of the neck that Cape Charles is located on were annexed into the Town. All of this land had belonged to Brown and Root and is now being developed as a Planned Unit Development.

Demographics. The 2010 Census indicated that the Town has a population of 1,009, which is a 11.1% decline from the 1,134 people that lived in the Town during the 2000 Census. The median age for residents in Cape Charles in 2010 was 52.4 years, signifying a population older than the national average. The Town has become a popular destination for retirees in the past ten years and is experiencing a greater influx of seasonal residents. Both residents and tourists increase the population of the Town during the warm weather season. This trend is expected to continue to grow in the future and the Town is planning accordingly.

Coastal and Storm Water Flooding. The Flood Insurance Study identifies that the greatest threat of flood inundation comes from hurricanes and northeasters. The Flood Insurance Study was completed in 1982 and does not include the recent annexation of the southern portion of the Town. Two-thirds of the old Town are under 8 feet in elevation. The stillwater elevation of the 100-year flood is 8 feet and the wave crest elevation is 12 feet. In 1935, a wooden bulkhead was constructed to protect the Town from surge water. Many times this bulkhead had to be

refurbished or repaired. Dunes now protect the area of old Town from Washington Avenue to Mason Avenue from smaller floods while large flood heights can still inundate the area.

With an estimated 450 structures located within the Special Flood Hazard Area, it is estimated that the 100-year event would generate an estimated $52.9 million in structure and content damages (2011 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment). This estimated loss for the Town is greater than the potential loss for the remainder of Northampton County. Furthermore, in 2006 the potential loss estimate for the Town was $31.1 million (2006 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment) and the potential loss has increased by $21.8 million in the past five years. According to the May 2011 FEMA NFIP insurance report, the Town has 266 flood insurance policies located in the Special Flood Hazard Area, all of which are located in A-zones. It is estimated that a 100-year flood event in the Town will have $37.7 million in uninsured losses (2011 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment). In 2006, the estimate for uninsured loss was at $25.5 million indicating an increase of $12.2 million in uninsured damage in the past five years. The portion of the Town annexed in 1990 also receives flooding. A great deal of the land is located in the 500-year flood plain with some portions in the 100-year flood plain.

The Army Corps of Engineers produced *Flood Plain Information – Coastal Flooding Cape Charles* in May 1970 to assess flooding problems in the Town. The report indicates that the stillwater elevation in the 100-year event would be 8 feet. This assessment is in agreement with the Flood Insurance Study for the Town. The Corps also defined the Standard Project Tidal Flood as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved, excluding extremely rare combinations. In other words, the Standard Project Tidal Flood is the most reasonable large event. First a Standard Project Hurricane was developed that had a central pressure of 27.6 inches and wind speeds of 112 miles per hour moving 52 miles in a west-northwest direction. This is a weak Category 3 hurricane just slightly stronger than Hurricanes Floyd and Isabel as they struck land in North Carolina. In Cape Charles, this storm would produce a stillwater elevation of 12 feet. According to the FEMA Coastal Construction Manual, this

water depth can generate waves up to 9.4 feet high (0.78 x 12 feet) over the stillwater elevation. This does not mean that a greater storm could not occur, but defines the most reasonable large event.

Almost all of the commercial area of Cape Charles is located within the 100-year flood plain. Besides direct damage most of these buildings would be damaged in a 100-year event causing other indirect damage such as lost income to employees. In 2011, the Town had 70 business establishments that employed about 650 people (Verbal Communication with Town Staff, August 2011). It is expected that many of these employees do not live within the Town. The 2000 Census showed that only 176 residents also work within the Town.

Several factors cause the Town of Cape Charles storm water system to be prone to flooding during significant rain events. The Town's storm water drains from east to west, ending at the Chesapeake Bay. The curb and street inlets on Bay Avenue are at elevation 4.5 feet and the Flood Elevation in this area is 9 feet. The southern half of the Town has surface drainage only while the northern half of Town has an underground drain system. The Town continues to work with VDOT on maintenance but mitigation would be preferred. The streets are maintained by VDOT within the Town limits (Verbal Communication with Town Staff, August 2011).

Storm water flooding occurs during significant rain events at the intersection of Plum Street and Madison Avenue. During a northeaster in 2007, storm water completely inundated the streets of the western portion of the Town due to floodwaters being unable to drain at the time of the storm. Some homes experienced minor flooding during this event (Verbal Communication with Town Staff, 2010).

NFIP Community Participation. The Town joined the NFIP on February 2, 1983. The May 2011 FEMA NFIP insurance report shows that the Town has 316 flood insurance policies. This is an increase of 133 new policies since 2003 (FEMA NFIP insurance report, July 2003). Of the 316 policies in Town, 50 of these are not in the Special Flood Hazard Area (SFHA) and may indicate persons who have storm water flooding issues. The number of non-SFHA policies has also increased by 35 policies since 2003 (FEMA NFIP Insurance Report, July 2003). Since the

Town joined the NFIP, there have been nine flood insurance claims totaling $25,304 with an average claim of $2,812. (FEMA NFIP Insurance Report, May 2011). There have been three flood insurance claims filed since 2003 (FEMA NFIP Insurance Report, July 2003 and May 2011).

According to the 2000 Census, there were only 93 mortgages within the Town. Some persons have purchased flood insurance even though it is not mandatory. However, it is estimated that 70% of structures at risk are insured in 2011. In 2003, only 41% of structures at risk in the Town were insured, which indicates that the Town is successfully encouraging residents to purchase flood insurance.

Cape Charles participates in the Community Rating System (CRS) program, which provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When a community completes specified activities, the insurance premiums of these policyholders in communities are reduced. The Town received an initial score of nine as a new participant meaning that residents receive a five percent discount on flood insurance. The Town is working diligently to improve its CRS rating to earn its residents an even greater discount in the future.

HMGP Participation. The Town has not participated in the HMGP.

High Wind Events. Portions of the Town are located in the wind borne debris hazard area, which is defined as the area extending 1-mile inland from the shoreline. In 2003, it was estimated that there were 687 structures in this area. Assuming a 110 mph (3 second wind gust) event, which is the 100-year event, Cape Charles could expect approximately $8.3 million in wind damages (2003 Eastern Shore of Virginia Wind Vulnerability Assessment).

In addition to direct wind damage, much of the old Town has mature trees that are a potential secondary hazard to the structures in that area. As seen during Hurricane Isabel in 2003, historic northeasters, and other high wind events, structures are vulnerable to being damaged by large trees that come down.

There are many mature trees within the Town that are vulnerable during a high wind event. Massive tree damage could potentially

damage structures that could trigger the NFIP requirement to elevate structures above the Base Flood Elevation. The Cape Charles building stock in the older part of Town consists of larger historic homes. The vast majority of these homes were built with the first floor living space above the Base Flood Elevation.

Coastal Erosion. During the past eight years the Town of Cape Charles has had an aggressive plan to mitigate erosion along its entire shoreline and harbor area. Twenty (20) offshore breakwaters have been built to protect the northern Marina Village, Town Beach, Harbor entrance and the Bay Creek Beach on the south. These have been built with both private and public funds. There are three more breakwaters planned at the mouth of the Harbor to protect it from incoming swells and more breakwaters are required on the northern and central sections of the coastline. Mitigation could continue but has been halted due to lack of funding both public and private.

In 2003, the Town had 20 structures within 100 feet of the shoreline that were at risk to coastal erosion. This represented approximately $5.6 million in damages (2003 Eastern Shore of Virginia Coastal Erosion Vulnerability Assessment). Four of those structures were located within 50 feet of the shoreline. In 2011, Town staff indicated that only seven structures were located within 100 feet of the shoreline and the potential loss would be significantly less than what was estimated for 2003. Additionally, Town staff indicated that in 2011 five of the seven structures were located within 50 feet of the shoreline. Bay Shore Concrete has some structures in this area. Since this is a large parcel it inflates the average of the value of the structures lying within the potential erosion area. During Hurricane Isabel in 2003 and November Northeaster of 2009, portions of lots in the northern section of the Town were eroded.

FEMA's post-storm inspections show that most privately funded erosion control structures fail during storm events. FEMA notes in the Coastal Construction Manual that some communities choose to distinguish between erosion control structures that protect existing development and those that are constructed to create a buildable area on an otherwise unbuildable site. Buildings destroyed by erosion are not covered under a NFIP flood insurance policy.

Other Local Hazards. One other local hazard is the lack of accessibility. There are two roads leading into the area. Accidents have closed the main road leaving only one route accessible. Both roads have mature trees that could also close the road in a wind event. Ice and snow events occasionally threaten accessibility to the Town on both roads.

Critical Facilities. The following table lists the critical facilities and their relative importance to the Town.

Facility	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Volunteer Fire & Police Departments/Municipal Building	Wind, Flooding	Entire Town	Devastating	Yes	Yes
Medical Center	Wind, Flooding	Entire Town	Inconvenience	No	No
Pharmacy	Wind, Flooding	Entire Town and Southern Northampton County	Major Disruption	No	No
Wastewater Treatment Plant	Wind, Flooding	Entire Town	Devastating	Yes	Yes
Water Treatment Plant & Tower	Wind, Flooding	Entire Town	Devastating	Yes	Yes
Harbor & Coast Guard Station	Wind, Flooding	Entire Town and Chesapeake Bay Region	Major Disruption	No	Yes
Religious Sites (Potential Post Disaster Works)	Wind, Flooding	Entire Town	Major Disruption	No	No

TABLE 22.1 Critical Town Facilities in Cape Charles.

FIGURE 22.1 Bay Avenue is the western Boundary of the Cape Charles Historic Area. This is also part of the Sea Cottage Addition and will be one of the first to feel the brunt of any flooding. *Photo by Elaine Meil.*

Review.

Cape Charles Town Plan – Revised 1999, 2009. The Town Plan identifies the 100-year flood plain and some coastal erosion issues. Several goals identified for other reasons than flooding or erosion could potentially include some mitigation options or deal with recovery issues. The list below describes some of these goals.

- Public acquisition of additional land in the vicinity of the harbor.
- Ensure adequate enforcement of building maintenance codes of the Town and state.
- Eliminate storm water from sanitary sewer collection system.
- Identify funding sources and options for renovation and/or replacement of community facilities, Cape Charles School and Municipal Building.
- Expand and improve public harbor and marina facilities including bulkhead replacement
- Maintain and improve the public beach through beach restoration activities.
- Continue to enforce the Chesapeake Bay Preservation Area Overlay District.

- Implement the use of storm water Best Management Practices within the Town's Chesapeake Bay Preservation Overlay District
- Locate development away from sensitive environmental features.
- Build offshore breakwater or parallel breakwaters at the north end of the public beach to work in conjunction with existing storm water outfall.
- Place beach sand along the mid to northern half of the public beach in the area of severe erosion as part of the breakwater project.
- Raise the channel jetty to mean high water at the shoreward end and place a small spur on the north side to prevent sand losses through the jetty.
- Pursue funding from Corp of Engineers and Department of Conservation and Recreation to carry out shoreline erosion strategies.
- Expand and protect the Town's tree cover through the development of an ordinance that would establish standards for tree preservation and planting.
- Discourage the demolition of historically significant buildings. Consider the adoption of a demolition ordinance to protect buildings in the commercial area.
- Promote harbor-related land uses in the Cape Charles harbor area. Discourage uses that do not require waterfront locations in the harbor area.
- Develop and improve public waterfront harbor properties to enhance their recreation and economic potential and to magnify the attraction of Cape Charles as a tourist destination.
- Limit the height and intensity of new development along the waterfront areas to preserve visual access and the natural beauty of the waterfront for the broader public.
- Develop a long-range master plan for the harbor area.
- Protect special environments and open spaces from incompatible development by limiting the type and intensity of land development in those areas.
- Encourage acquisition of special environments by public agencies or nonprofit conservancy organizations for the purposes of preservation.
- Public acquisition of waterfront lands especially in the vicinity of the beach and northern Chesapeake Bay shoreline.
- Review and refine regulations of the PUD zoning designation.

- Site planning should be responsive to natural features and ecological considerations, such as topography, woodlands, wetlands, stream buffers and storm drainage.
- Study the impact of a new entrance into Town.

Trends. The Town has two areas of new development and on area of redevelopment. The northern portion of Town, Bay Creek Marina Villages, is being developed and is subject to high winter winds and shore erosion. The southern portion, Bay Creek Golf Resort, has two 18-hole golf courses as well as residential development. However, the vast majority of this area lies outside the 100-year floodplain. A high wind event is probably the most devastating natural hazard that could affect this large area. These two areas are expected to add an additional 3,000 residential units to the Town. The area of redevelopment is the Historic District and the Sea Cottage Addition with 14 empty lots fronting on Bay Avenue. This is the area of most risk to coastal flooding and could suffer direct damage from high winds. The street is below the 100-year flood level.

FIGURE 22.2 Lots for sale on Bay Avenue. *Photo by Elaine Meil.*

Findings.

1. The Sea Cottage Addition was built on filled marsh land before 1909.
2. The Town is protected from low level flooding due to the dunes and bulkhead but these may not be effective in a 100-year flood. There could be a false sense of security in the Town about flooding.
3. The 100-year flood could cause significant losses in the Town. Four Hundred and forty-nine buildings lie within the flood area and many of the retail employees would be unemployed temporarily.
4. The most reasonable worst-case scenario for the Town is a slow moving Nor'easter of the magnitude of the November Nor'easter in 2009. These storms, unlike hurricanes, push water toward Cape Charles and increase the tidal elevation. Hurricanes tend to push water to the western shore of the Bay and present a wind hazard over a flood hazard.
5. Fifty-nine percent of the structures at risk to flooding do not have flood insurance.
6. The older historic homes were built with "basements" where the boiler was housed. Due to the high water table these basements could not be very deep and therefore the first floor above grade is generally above the flood level.
7. Cape Charles is a National Historic District and during a disaster historic buildings could be damaged. The older historic homes in the flood zone were built so that the first floor above grade is above the flood level. While a flood would be devastating it would not require most of the homes to be raised only the be repaired and utilities to be moved from the basements.

8. Some property owners are not heeding the warning of Hurricane Isabel's recent flooding and erosion. They are going ahead with plans to construct homes in the risk areas. In some cases, these homes cannot be insured from the damage that could destroy them.
9. Cape Charles is located on a peninsula with only two roads entering or leaving town. If evacuation prior to a hurricane is delayed, A blocked road could preclude persons in hazard areas from taking refuge outside the Town. The official evacuation route is to the north parallel to the coast with at least 90 miles before an inland access is available. Early evacuation could be across two bridge-tunnel complexes and westward to higher ground.
10. Most critical facilities are subject to flooding and high wind.
11. The Town's vulnerability is increasing as the population grows. Some new development is going in hazardous areas.

Chapter

23

Mitigation Strategies Development

The Eastern Shore Hazard Mitigation Committee met in November 2004 to discuss the mitigation plan. At that time, members determined the Committee's vision of the Eastern Shore during and after a natural hazard event. In May 2011, the Committee revisited the original vision, updated the status of past strategies, and developed new goals and projects.

Vision Statement

As a result of planning and mitigation actions, damage and disruption will be minimized during natural hazard events. Federal and state agencies cooperate with the local government and guide necessary resources to the governments for recovery activities. To the extent possible, residents will be self-sufficient and will have taken responsibility for their own economic and physical protection. Infrastructure smoothly functions throughout the event and the recovery period following.

Goal Development

The Committee's goals were informed by several sources of information listed below.

- **Eastern Shore Hazard Identification and Risk Assessment (ESHIRA) Findings**
- **Previous Products from ESHIRA development**
- **Lessons of other Natural Hazard Events such as Hurricane Floyd, 1999; Hurricane Isabel, 2003; the Twin Northeasters, 1998; winter storms, 2004-2005; Tropical**

Depression Ernesto, 2006; and November Northeaster, 2009.

- **Current Initiatives such as the regional Eastern Shore Disaster Preparedness Coalition**

Identified Issues

Several issues confront the Eastern Shore in a time of disaster. Representatives from the localities identified several issues. These are included below.

The Eastern Shore Hazard Identification and Risk Assessment showed that not all residences at risk to flooding have a flood insurance policy on them. In addition, those residences that have a policy do not appear to have contents coverage. The most common type of residential flood damage on the Eastern Shore is contents damage.

The Eastern Shore Hazard Identification and Risk Assessment identified numerous areas where storm water flooding occurs. It is not clearly understood what the problem is at all of these sites, and the lack of information hinders drainage and stormwater management projects.

There is a shortage of shelter space during natural hazard events due to a lack of manpower and availability of safe structures to safely operate the shelters.

After the natural hazard event, the counties' limited staff are overwhelmed by administrative requirements for the disaster.

Mitigation Goals

The Eastern Shore Hazard Mitigation Committee identified the following goals to work toward.

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program Including Public Education and On-going Hazard Assessments.

Goal 2 - Residents, Businesses and Local Governments Will Work to Minimize Community Disruption Through Residential and Commercial Mitigation Activities.

Goal 3 - Local Governments Encourage Self-sufficiency among Residents and Personal Responsibility for Managing Their Own Risk.

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a Natural Hazard Event.

Goal 5 - Local Governments Will Make Efforts to Reach Special Needs Populations.

Mitigation Project Development

The Eastern Shore of Virginia Hazard Mitigation Planning Committee collectively identified specific mitigation projects that would benefit the entire region and these projects are included in the table at the end of this chapter. Accomack County, Northampton County, and the Town of Chincoteague developed specific mitigation strategies to address each of the five regional mitigation goals described above. In order to implement the identified strategies, each locality developed mitigation projects specific to their locality. Each county considered mitigation projects for the respective non-participating towns in their jurisdictions. Participating towns identified mitigation projects that are included in their respective county's mitigation strategy chapter.

Adoption

Adoption Resolutions of this plan are included at the end of the plan in **Appendix C**.

Regional Mitigation Projects – Eastern Shore of Virginia

The Hazard Mitigation Committee agreed on several regional projects. They are listed below and are included in each locality's mitigation plan.

Priority Rank	Description of Projects	Responsible Department	Start Timeline	Status as of 2011
2006 - 2011 HMP Identified Mitigation Projects				
---	Produce Responder Bilingual Cards with English on one side. An example of the type of message to be included is "Do not drink the water."	Health Dept. and the Eastern Shore Disaster Preparedness Coalition (ESDPC)	2006	Complete*
---	Set a regional compatibility standard for emergency communications	ESDPC	2006	Funding attained, Pending
---	Obtain additional changeable warning signs	VDOT	2006	Complete
---	Upgrade communications systems and provide for backup in the event of a communication failure	ESDPC	2009	Complete
---	Obtain funding for a generator hookup for the Eastern Shore Community College	Eastern Shore Community College	Post-declared disaster	Not Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Develop an interoperable communications system for all emergency responders for the Eastern Shore	ES 911 Commission	2011	Ongoing
2	Mitigation of flood prone properties (to include, but not limited to acquisition, elevation, relocation, dry and wet flood proofing of flood prone structures, mitigation reconstruction for NFIP defined Severe Repetitive Loss (SRL) properties only), and drainage infrastructure improvements.	A-NPDC & localities	Post-declared disaster	Ongoing
3	All counties and towns participating in the Hazard Mitigation Planning process incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Comprehensive Plan for their respective locality.	Eastern Shore of Virginia Counties & Towns	Ongoing	Ongoing
4	NFIP participating localities will continue to participate and comply with the NFIP by completing the following strategies: 1. Adoption and enforcement of floodplain management requirements, including regulating all and substantially improved construction in the Special Flood Hazard Area; 2. Perform floodplain identification and mapping, including any local requests for map updates, if needed; 3. Description of community assistance and monitoring activities; 4. Including freeboard requirement to local floodplain ordinances.	A-NPDC &localities	Ongoing	Ongoing

5	Develop Emergency Evacuation Plans for incorporated Towns on the Eastern Shore.	Eastern Shore Towns	2011	Not Started
6	Implementation of LiDAR data in planning and public education activities on the Eastern Shore	A-NPDC	2011	Not Started
7	Evaluate and develop a priority list of residential and commercial properties that qualify for the HMGP including repetitive loss properties	A-NPDC & localities	Ongoing	Ongoing
8	Verify addresses of properties on the Severe Repetitive Loss and Repetitive Flood Claim Claims lists and report findings to VDEM.	A-NPDC & localities	Ongoing	Not Started
9	Obtain funding for a generator hookup for the Eastern Shore Community College	Eastern Shore Community College	Post-declared disaster	Not Started
10	Hold public education outreach activities at public events to raise awareness of hazard mitigation planning	A-NPDC &localities	2011	Ongoing
11	Produce County-specific emergency information in Spanish	ESDPC	2011	Not Started
12	Continue to cooperate with the local Hispanic radio station.	ESDPC	Ongoing	Ongoing

*Spanish Health and Emergency Preparedness informational brochures have been produced and are available to the Hispanic population through a variety of outlets.

Chapter

24

Accomack County Mitigation Strategies

Accomack County is the largest county with respect to area and population on the Eastern Shore of Virginia. There are 14 incorporated towns within the County. These towns include: Accomac, the majority of Belle Haven, Bloxom, Chincoteague, Hallwood, Keller, Melfa, Onancock, Onley, Painter, Parksley, Saxis, Tangier, and Wachapreague. The Town of Chincoteague's mitigation projects are found in its own plan section in Chapter 26. The other towns were invited to contribute to the Eastern Shore of Virginia Hazard Identification and Risk Assessment (ESHIRA) and Eastern Shore of Virginia Hazard Mitigation Plan. Representatives from several towns did participate in the ESHIRA development.

Project Prioritization

The Committee ranked the various projects and actions, according to the project's unique elements and the County's risk assessment, and assigned a start date for that project to be considered. The Committee suggested a wide range of projects, discussed the costs and benefits, removed projects that were not feasible and did not make economic sense for the locality, and ranked all the projects. The project lists were prepared according to their suggestions and at the July 26, 2011 Committee meeting the members voted that the project list should be included in the Plan. Projects for each specific Mitigation Goal were prioritized numerically, with the highest priority project given the number one. The Director of Emergency Management, County Administrator, and the Emergency Management Coordinator will consider economic costs and the benefits

of the various projects and present that information to the County Board of Supervisors when the time comes to act.

Plan Maintenance

The Emergency Management Coordinator will review the Hazard Mitigation Plan every year prior to the July 1 deadline for the Local Capability Readiness Assessment (LCAR). The Coordinator will evaluate the plan and review progress made during the previous years on the goals and projects in the plan for all of Accomack County and the incorporated towns within the County. The Coordinator will use the LCAR criteria for hazard mitigation to evaluate the hazard mitigation program. Progress will be reflected in the LCAR. The Coordinator will also recommend any revisions to the Board of Supervisors. By July 1, 2015, the Coordinator will assemble a Committee or represent Accomack County on a Committee to update the plan. Towns will have an opportunity to be represented on the Committee. The Committee will work to complete the updates by the fifth year anniversary of the adoption of the plan. During the plan maintenance process, the community will have opportunity, through advertised public hearings, to comment on plan revisions and updates prior to the Board of Supervisors approving them.

Accomack County and the incorporated towns have a Comprehensive Plan. The Emergency Management Coordinator will provide input and plan materials to the planning group responsible for updating the Comprehensive Plan and any other relevant planning efforts. During updates of the Comprehensive Plan and other relevant planning efforts, the Hazard Mitigation Plan will be reviewed and appropriate material incorporated into the updates.

Identified Mitigation Projects – Accomack County

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program Including Public Education and On-going Hazard Assessments.				
	Strategy 1.1 - Train County staff for mitigation duties. ***Strategy 1.2 – Promote mitigation programs throughout the County.***			
Priority Rank	***Accomack County – Goal 1: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Produce Responder Bilingual Cards with English on back. An example of the type of message to be included is "Do not drink the water."	Health Dept. and the Eastern Shore Disaster Preparedness Coalition (ESDPC)	2006	Complete*
---	Set a regional compatibility standard for emergency communications	ESDPC	2006	Funding attained, Pending
---	Obtain more changeable warning signs	VDOT	2006	Complete
---	Upgrade communications systems and provide for backup in the event of a communication failure	ESDPC	2009	Not Complete
---	Obtain funding for a generator hookup for the Eastern Shore Community College	Eastern Shore Community College	Post-declared disaster	Not Complete
---	Research allowed reimbursement under a Presidentially Declared Disaster and offer to train staff to take on emergency response tasks for pay during disaster events	Accomack Co. Administration	2007	Ongoing
---	Offer county staff free CERT training during office hours in the late afternoon or early morning with the employees using personal time one Saturday to complete the training.	Accomack Co. Administration	2007	Complete
---	Institute a recruitment program for volunteer firefighters. Publicize details on how to volunteer on the County website.	Accomack Co. Administration	2007	Not Complete
---	Send a letter to the Town of Keller Council recommending the Town join the National Flood Insurance Program so that federal mitigation funds can become available for use within the flood zones in the Town in case of disaster.	Accomack Co. Building & Zoning (ACB&Z)	2007	Not Complete

Accomack County **Mitigation Projects (continued)**

---	Send letters to Town Councils of Accomac, Bloxom, Melfa, Onley, Painter, and Parksley advising the Towns that joining the National Flood Insurance Program will allow residents with stormwater flooding problems to purchase flood insurance.	AC B&Z	2007	Ongoing
2011 – 2016 HMP Identified Mitigation Projects				
1	Formalize and maintain the Residential Mitigation Project Waiting List	AC B&Z	Ongoing	Ongoing
2	Promote Hazard Mitigation at local community events and meetings.	Accomack Co. Emergency Management (ACEM)	Ongoing	Ongoing
3	Emergency radio communications within the region are to be interoperable.	ES 911 Commission	2011	Funding attained, Pending
4	Assess and define County staff emergency response responsibilities during disaster events and incorporate these duties into their job descriptions.	Accomack Co. Administration	2012	Not Started
5	Send letters to incorporated towns suggesting hazard mitigation promotion via town utility bills.	ACEM	2013	Not Started
6	Offer county staff CERT training.	Accomack Co. Administration	2013	Not Started

*Spanish Health and Emergency Preparedness informational brochures have been produced and are available to the Hispanic population through a variety of outlets.

Goal 2 - Residents, Businesses and Local Governments Will Work to Minimize Community Disruption Through Residential and Commercial Mitigation Activities				
	Strategy 2.1 - Reduce damages from flooding. ***Strategy 2.2 – Reduce damages from non-flooding natural disasters, if that type of event occurs.***			
Priority Rank	***Accomack County – Goal 2: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Formalize and maintain the Residential Mitigation Project Waiting List	Accomack Co. Building & Zoning (ACB&Z)	2006	Ongoing
---	Amend the future land use map and zoning ordinance to direct high density development away from critically eroding shorelines identified as high erosion areas (loss of greater than one foot per year) in the VIMS Shoreline Situation Report for Accomack County.	Accomack Co. Planning	Ongoing	Complete*
---	Develop programs to encourage conservation of barrier islands, marsh land, forested areas, and creek corridors. When consistent with habitat conservation goals, alternatives to fee-simple ownership, such as conservation easements or lease-back agreements should be encouraged to keep property on the tax rolls and in productive use.	Accomack Co. Administration	Ongoing	Ongoing
---	Manage a Residential Elevation and Mitigation Project, using benefit-cost analysis provided by FEMA to target structures at risk to flooding.	Accomack Co., Towns of Onancock, Tangier, Wachapreague, Saxis and Belle Haven	Post-declared disaster	Complete**
---	In the Town of Belle Haven, dig ditches along King Street near the ESO to improve drainage.	VDOT, Accomack Co. Public Works	2008	Complete.
---	Drainage Survey of Nelsonia, north of Fisher Corner and Route 13	Accomack Co. Public Works	2008	Not Complete
---	Produce a comprehensive drainage plan that identifies specific projects to improve drainage.	Accomack Co. Public Works	2008	Complete
---	After any presidentially declared disaster, manage Residential and Commercial Mitigation Projects that address the most critical damage that has occurred.	ACB&Z	Post-declared disaster	Ongoing

Accomack County Mitigation Projects (continued)

2011 – 2016 HMP Identified Mitigation Projects				
1	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Accomack County Comprehensive Plan.	Accomack Co. Planning	During next Comp. Plan update	Not Started
2	Continue a comprehensive drainage plan that identifies specific projects to improve drainage.	Accomack Co. Public Works, VDOT	Ongoing	Ongoing
3	Amend the future land use map and zoning ordinance to direct high density development away from critically eroding shorelines identified as high erosion areas (loss of greater than one foot per year) in the VIMS Shoreline Situation Report for Accomack County.	Accomack Co. Planning	Ongoing	Ongoing
4	Mitigate public infrastructure against damage caused by natural disasters. For example, hurricane shutters, flood-proofing, etc.	Accomack Co. Public Works	Post-declared disaster	Ongoing
5	Mitigation of flood prone properties (to include, but not limited to acquisition, elevation, relocation, and dry and wet flood proofing of flood prone structures, and mitigation reconstruction for NFIP defined SRL properties only).	ACB&Z	Post-declared disaster	Not Started
6	Develop programs to encourage conservation of barrier islands, marsh land, forested areas, and creek corridors. When consistent with habitat conservation goals, alternatives to fee-simple ownership, such as conservation easements or lease-back agreements should be encouraged to keep property on the tax rolls and in productive use.	Accomack Co. Administration, the Nature Conservancy, Eastern Shore of Virginia Land Trust	Ongoing	Ongoing
7	Maintain the Residential Mitigation Project Waiting List	ACB&Z	Ongoing	Ongoing

*The Future Land Use Map was updated in 2008. The Zoning Ordinance has not been amended as the County needs the submittal of a rezoning application from the public prior to initiating a rezoning.

** 2011 – 2016 Project Status included in each town's mitigation project list

Goal 3 - Local Governments Encourage Self-sufficiency among Residents and Personal Responsibility for Managing Their Own Risk.				
Strategy 3.1 - Educate the public about their responsibility to respond safely and effectively during a disaster. ***Strategy 3.2 - Educate the public about their responsibility in reducing and insuring their own risks.***				
Priority Rank	***Accomack County – Goal 3: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Send out information encouraging residents to purchase contents and structure flood insurance to all homes and businesses located in the County's regulated flood zones.	Accomack Co. Public Safety	Yearly	Disseminated 2007-2009
---	Investigate the potential for an increased CRS rating to reduce flood insurance premiums.	Accomack Co. Planning	2007	Complete
---	Put out an education brochure on tree plantings and benefits from burying property power lines. Consider using the information developed by VDEM for Hurricane Isabel.	Accomack Co. Public Safety	2007	Not Complete
---	Annual Press Release about Preparedness	Accomack Co. Public Safety	Yearly	Complete, Ongoing
---	Create a Surge Inundation Map and identify evacuation zones and the nearest shelter for distribution on the County's website and in local schools and libraries	Accomack Co. Public Safety	2006	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Disseminate information encouraging residents and businesses to purchase contents and structure flood insurance.	ACEM	2012	Ongoing
2	Maintain an Emergency Management website that contains emergency preparedness information for residents and businesses.	ACEM	Ongoing	Ongoing
3	Include details of volunteer opportunities on the County website.	Accomack Co. Admin.	2012	Not Started
4	Produce an emergency preparedness brochure that includes local information to be mailed to residents and businesses.	ACEM	2013	Not Started
5	Publish an Annual Press Release about Emergency Preparedness	Accomack Co. Emergency Management (ACEM)	Yearly	Complete, Ongoing

Accomack County Mitigation Projects (continued)

6	Disseminate information on wind-protection systems (hurricane shutters, etc.) to residents and businesses.	ACEM	2012	Not Started
7	Provide FEMA mitigation-related publications to residents and businesses via the public library.	ACEM	2012	Started
8	Disseminate educational brochures on tree plantings and benefits from burying property power lines. Consider using the information developed by VDEM.	ACEM	2012	Not Complete

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a Natural Hazard Event				
	Strategy 4.1 - Maintain safe traffic flow in case of wide scale power loss. ***Strategy 4.2 - Maintain emergency service functions in case of wide-scale power loss.***			
Priority Rank	***Accomack County – Goal 4: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	After consultation with the Hazard Mitigation Planning Committee, that included input from the Accomack Sheriff's Office, the following traffic lights should be retrofitted to have backup power installed in order of importance: 1. Four Corners Traffic Light (Rt. 13 and Rt. 179), T's Corner Traffic Light (Rt. 13 and Rt. 175), Traffic Light on Chincoteague Road (Rt. 175) 2. Rt. 13 and Rt. 176 in Parksley 3. Rt. 13 and Rt. 187 in Nelsonia 4. Rt. 13 and Rt. 626 in Melfa 5. Rt. 13 and Rt. 182 in Painter	VDOT	2007	#2,4, & 5 Complete; #1 & 3 Pending
---	Have all the Accomack County Fire Stations wired for generator hookup.	Accomack Co. Public Safety	Post-declared disaster	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	The following traffic lights should be retrofitted to have backup power installed in order of importance: 1. Four Corners Traffic Light (Rt. 13 and Rt. 179), T's Corner Traffic Light (Rt. 13 and Rt. 175), Traffic Light on Chincoteague Road (Rt. 175) 2. Rt. 13 and Rt. 187 in Nelsonia 3. Rt. 13 & Rt. 180, Wachapreague Rd. 4. Rt. 13 & Madigan Way at Wal-Mart in Onley 5. Rt. 13 & entrance to Food Lion Shopping Center at T's Corner	VDOT	2011	Pending
2	Obtain funding for a generator hookup for the Eastern Shore Community College.	ESCC	Post-declared disaster	Not Started
3	Encourage implementation of emergency generator power serving public water and wastewater systems.	Accomack Co. Public Works	2013	Not Started

Goal 5 - Local Governments Will Make Efforts to Reach Special Needs Populations				
	Strategy 5.1 – Define and identify special needs populations in the County. ***Strategy 5.2 - Assure migrant population has access to County emergency response efforts.*** ***Strategy 5.3 - Assure Tangier Island residents have access to County emergency response efforts.***			
Priority Rank	***Accomack County – Goal 5: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	All public buildings that are slated for renovation or construction will be evaluated for designation of Red Cross Shelter or refuge of last resort status	Accomack Co. Public Safety	Ongoing	Complete
---	Coordinate with Town Staffs to man town shelters	Accomack Co. Administration	2007	Not Complete
---	Investigate a paid reservist program to man up to 7 emergency shelters.	Accomack Co. Administration	2008	Not Complete
---	Produce County-specific emergency information in Spanish	Accomack Co. Administration & Public Safety	2007	Complete
---	Approach local growers thru the Migrant Council to ask for tax-deductible donations to support and offset sheltering costs for migrants during natural disasters.	Accomack Co. Administration	2008	Not Complete
---	Approach local growers thru the Migrant Council to educate them about appropriate measures to take when a disaster is threatening the area while migrants are working.	Accomack Co. Administration	2007	Complete
---	Provide busing for evacuated Tangiermen from Crisfield, Maryland to shelters in Somerset County or bring them to Accomack County shelters. Prepare Tangier residents before any storms on where and how this system will work.	Accomack Co. Public Safety	2006	Not Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Define special needs populations in the County.	ACEM	2012	Not Started
2	Develop an emergency coordination plan for defined special needs populations in the County.	ACEM	2013	Not Started
3	Provide a mass notification system for relay of emergency information to residents and visitors.	Accomack Co. Administration	Post-declared disaster	Not Complete

Accomack County Mitigation Projects (continued)

4	Assure that the residents of Tangier Island have access to emergency shelters on the mainland during a disaster.	ACEM	Ongoing	Ongoing
5	Produce County-specific emergency information in Spanish	ESDPC	Ongoing	Ongoing
6	Disseminate Spanish language emergency preparedness information to the Hispanic community via camps, churches, Telemon, and other primarily Hispanic outlets.	ESDPC	Ongoing	Ongoing
7	Develop a plan for sheltering of household pets.	ACEM	2013	Not Started

Identified Mitigation Projects – Accomack County Towns

Towns Participating in the Hazard Mitigation Planning Process Include Saxis, Hallwood, Bloxom, Parksley, Tangier, Wachapreague, Onley, Onancock, and Keller. (Note: Town of Chincoteague Mitigation Projects are included in Chapter 26)

Accomack County Towns: Description of Projects	*Strategy*	*Start Timeline*	*Status as of 2011*
Town of Saxis			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Saxis Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Retrofit the Saxis Town Office and Firehouse to protect against wind and flood hazards.	2.1, 2.2	Post-declared disaster	Not Started
Obtain funding to construct an erosion control structure along the western shoreline of the Town.	2.1	Post-declared disaster	Not Started
Retrofit harbor infrastructure to mitigate against coastal flooding and wind.	2.1	Post-declared disaster	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started
Town of Hallwood			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Hallwood Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate flooding and wind hazards in Hallwood.	2.1, 2.2	Post-declared disaster	Ongoing
Retrofit the undersized box culverts in Hallwood to mitigate storm water flooding problems.	2.2	Post-declared disaster	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started
Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	3.1	2011	Ongoing
Work with residents to ensure that they are paying the appropriate amount for their NFIP flood insurance policies, since there are residents paying higher than necessary premiums in Town.	3.1	2011	Ongoing
Provide educational information to residents about the burn permit process.	3.1	2011	Ongoing
Investigate the use of large drainage ditches as fuel breaks to mitigate wildfires.	2.2	2011	Not Started
Encourage water conservation among residents during droughts.	3.2	2011	Ongoing

Accomack County Towns' Mitigation Projects (continued)

Town of Bloxom			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Bloxom Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate against natural disaster	2.1, 2.2	Ongoing	Ongoing
Join the National Flood Insurance Program.	1.1	2011	Not Started
Retrofit the undersized box culverts in Bloxom to mitigate storm water flooding problems.	2.1	Post-declared disaster	Not Started
Obtain funding for a backup generator hookup for the Town of Bloxom Police Department	2.2	Post-declared disaster	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started
Town of Parksley			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Parksley Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Retrofit the undersized box culverts in Parksley to mitigate storm water flooding problems.	2.2	Post-declared disaster	Not Started
Town of Tangier			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Tangier Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate erosion, flooding, and wind hazards in Tangier.	2.1, 2.2	Post-declared disaster	Ongoing
Retrofit the undersized box culverts in Tangier to mitigate storm water flooding problems.	2.1	Post-declared disaster	Not Started
Retrofit critical facilities in Tangier with backup power supplies.	4.2	2011	Not Started
Obtain funding to purchase an emergency boat for the Tangier Fire Department to better protect residents and structures from fire damage during flood events	4.2	2011	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started

Accomack County Towns' Mitigation Projects (continued)

Town of Wachapreague			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Wachapreague Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate the Town's Infrastructure against flooding and wind.	2.1, 2.2	Post-declared disaster	Ongoing
Manage a Residential Elevation and Mitigation Project, using benefit-cost analysis provided by FEMA to target structures at risk to flooding.	2.1	Post-declared disaster	Ongoing
Attain "High Water" and "Flooding" signs to be used primarily along Atlantic Ave. during flood events.	4.1	Post-declared disaster	Not Started
Cooperate with VDOT to mitigate storm water drainage in Wachapreague.	2.2	2011	Not Started
Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	3.1	2011	Ongoing
Conduct public education and outreach efforts within Town to raise awareness of hazard mitigation.	3.1	2011	Ongoing
Town of Onley			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Onley Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate the Town's Infrastructure against flooding and wind.	2.1, 2.2	Post-declared disaster	Ongoing
Join the National Flood Insurance Program.	1.1	2011	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started
Take the necessary actions to satisfy pre-requisites for mitigation funding (i.e. maintain storm water event log)	1.1	2011	Not Started
Cooperate with VDOT to mitigate storm water drainage in Onley.	2.1	2011	Not Started
Town of Onancock			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Onancock Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Mitigate the Town's infrastructure against flooding and wind.	2.1, 2.2	Post-declared disaster	Ongoing
Retrofit Town sewage pump station and manholes to prevent damages from flooding and maintain continuous operation during flood events.	4.2	Post-declared disaster	Not Started
Retrofit the Onancock Town Office and Police Dept for generator hookups.	4.2	Post-declared disaster	Not Started

Accomack County Towns' Mitigation Projects (continued)

Town of Keller			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Keller Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Promote Hazard Mitigation at local community events and meetings.	3.1	2011	Not Started
Join the National Flood Insurance Program.	1.1	2011	Not Started
Cooperate with Accomack County to implement the Emergency Operations Plan to put residents at less risk during an emergency.	1.1	2011	Not Started
Maintain and ensure adequate drainage ditches to mitigate storm water flooding problems in Keller.	2.2	Ongoing	Ongoing

Chapter

25

Northampton County Mitigation Strategies

Northampton County is the southern most county on the Eastern Shore of Virginia. There are 6 towns within the County. These towns include: parts of Belle Haven, Cape Charles, Cheriton, Eastville, Exmore and Nassawadox. The Towns were invited to contribute to the Eastern Shore of Virginia Hazard Identification and Risk Assessment (ESHIRA) and Eastern Shore of Virginia Hazard Mitigation Plan. Representatives from Exmore, Eastville, and Cape Charles participated in the ESHIRA development.

Project Prioritization

The Committee has ranked the various projects and actions, according to the project's unique elements and the County's risk assessment, and assigned a start date for that project to be considered. The project lists were prepared according to their suggestions and at the July 26, 2011 Committee meeting the members voted that the project list should be included in the Plan. Higher ranked projects have the earliest start dates. The County Administrator and the Deputy Coordinator of Emergency Services will consider economic costs and the benefits of the various projects and present that information to the Board.

Plan Maintenance

The Coordinator of Emergency Services will review the Hazard Mitigation Plan every year prior to the July 1 deadline for the Local Capability Readiness Assessment (LCAR). The Coordinator will evaluate the plan and review progress made during the previous years on the goals and projects in the plan. The Coordinator will use the LCAR criteria for

hazard mitigation to evaluate the hazard mitigation program. Progress will be reflected in the LCAR. The Coordinator will also recommend any revisions to the Board of Supervisors. By July 1, 2015, the Director of Emergency Services will assemble a Committee or represent Northampton County on a Committee to update the plan. Towns will also have an opportunity to participate in the Plan update. The Committee will work to complete the updates by the fifth year anniversary of the adoption of the plan. The community will have opportunity to comment on plan revisions and updates prior to the Board of Supervisors approving them.

Northampton County and the incorporated Towns have Comprehensive Plans. The Coordinator of Emergency Services will provide input and plan materials to the planning group responsible for updating the County Comprehensive Plan and any other relevant planning efforts, such as the Town's comprehensive planning. During updates of the Comprehensive Plan and other relevant planning efforts, the Hazard Mitigation Plan will be reviewed and appropriate material incorporated into the updates.

Identified Mitigation Projects – Northampton County

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program Including Public Education and On-going Hazard Assessments				
	Strategy 1.1 - Increase the capacity of Northampton mitigation program through training and coordination with federal, state and local governments			
Priority Rank	***Northampton County – Goal 1: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Produce Responder Bilingual Cards with English on back. An example of the type of message to be included is "Do not drink the water."	Health Department and the Eastern Shore Disaster Preparedness Coalition (ESDPC)	2006	Complete*
---	Set a regional compatibility standard for emergency communications	ESDPC	2006	Funding Acquired, Pending
---	Obtain more changeable warning signs	VDOT	2006	Complete
---	Upgrade communications systems and provide for backup in the event of a communication failure	ESDPC	2009	Not Complete
---	Obtain funding for a generator Hookup for the Eastern Shore Community College	E.S. Community College	Post-declared disaster	Not Complete
---	Hire a Public Safety Director	North. Co. Admin.	2007	Not Complete
---	Offer County staff free CERT training during office hours in the late afternoon or early morning with the employees using personal time one Saturday to complete the training.	Northampton Co. Admin.	2007	Not Complete
---	Institute a recruitment program for volunteer firefighters. Publicize details on how to volunteer on the County website.	Northampton Co. Admin.	2007	Ongoing
---	Prepare a letter and package of information to encourage the towns without identified floodzones (Nassawadox, Eastville, Cheriton) to join the National Flood Insurance Program allowing residents with storm water flooding problems to purchase flood insurance.	Northampton Co. Planning & Zoning	2007	Not Complete
---	Recommend that the Town of Cape Charles identify potential shelter locations within the town in case the town becomes isolated during an emergency.	Northampton Co. Emergency Services	2006	Not Complete
---	Create a formal waiting list of residential and commercial projects for the Hazard Mitigation Grant Program.	Northampton Co. Admin.	2006	Complete

Northampton County Mitigation Projects (continued)

2011 – 2016 HMP Identified Mitigation Projects				
1	Prepare a letter and package of information to encourage the towns without identified floodzones to join the National Flood Insurance Program allowing residents with storm water flooding problems to purchase flood insurance.	Northampton Co. Planning & Zoning	2012	Not Started
2	Evaluate and develop a priority list of residential and commercial properties that qualify for the HMGP	A-NPDC & localities	2011	Ongoing
3	Upgrade communications systems to provide for interoperability and redundancy	ES 911 Commission	2011	Ongoing
4	Offer free CERT training courses.	Northampton Co. Emergency Services	2012	Not Started
5	Recommend that the Town of Cape Charles identify potential shelter locations within the town in case the town becomes isolated during an emergency.	Northampton Co. Admin.	2011	Not Started

*Spanish Health and Emergency Preparedness informational brochures have been produced and are available to the Hispanic population through a variety of outlets.

Goal 2 - Residents, Businesses and Local Governments Will Work to Minimize Community Disruption Through Residential and Commercial Mitigation Activities				
	Strategy 2.1 - Retrofit housing to reduce risk of coastal flooding ***Strategy 2.2 - Protect new housing by reducing the risk of damage from natural hazards*** ***Strategy 2.3 - Retrofit commercial and residential structures to reduce risk of the most critical natural hazard damage***			
Priority Rank	***Northampton County – Goal 2: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Conduct a drainage survey of Cheapside	Northampton Co. Planning & Zoning	2007	Complete
---	The Town of Exmore has expressed interest in solving their drainage issues in their downtown. Produce a drainage and storm water study of the Town of Exmore's flooding issues in downtown.	Mayor of Exmore/Town Manager	2006	Not Complete
---	Conduct a drainage survey of areas East and South of Eastville and the Town of Eastville	Northampton Co. Planning & Zoning	2008	Not Complete
---	Conduct a drainage survey of countywide drainage issues	Northampton Co. Planning & Zoning	2009	Not Complete
---	Install storm shutters to withstand hurricane winds on the EOC building.	Northampton Co. Emergency Services Coordinator	2009	Complete
---	Maintain a Conservation Preservation Zoning District encompassing coastal areas.	Northampton Co. Admin.	Ongoing	Ongoing
---	Enforce the primary dune ordinance.	Northampton Co. Planning & Zoning	Ongoing	Ongoing
---	Consider incentives in the zoning ordinance for developers who reserve land or take other measures to preserve both primary and secondary sand dunes.	Northampton Co. Planning & Zoning	Ongoing	Not Complete

Northampton County Mitigation Projects (continued)

---	Enforce buffer zone widths set forth in the zoning ordinance along the bayside and seaside waterfront.	Northampton Co. Planning & Zoning	Ongoing	Ongoing
---	Manage a Residential Mitigation Project	Northampton Co. Emergency Services Coordinator	Post-declared disaster	Complete
---	After any presidential declared disaster, manage Residential and Commercial Mitigation Projects that address the most critical damage that has occurred.	Northampton Co. Emergency Services Coordinator	Post-declared disaster	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Revise floodplain management regulations in accordance with new FEMA guidance	Northampton Co. Planning & Zoning	2012	Not Started
2	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Accomack County Comprehensive Plan.	Northampton Co. Planning & Zoning	During next Comp. Plan update	Not Started
3	Mitigation of flood prone properties (to include, but not limited to acquisition, elevation, relocation, and dry and wet flood proofing of flood prone structures, and mitigation reconstruction for NFIP defined SRL properties only).	Northampton Co. Planning & Zoning, A-NPDC	Post-declared disaster	Not Started
4	Develop a comprehensive drainage plan that identifies specific projects to improve drainage.	Northampton Co. Planning & Zoning	2013	Not Started
5	Maintain a Conservation Preservation Zoning District encompassing coastal areas.	Northampton Co. Admin.	Ongoing	Ongoing
6	Enforce the primary dune ordinance.	Northampton Co. Planning & Zoning	Ongoing	Ongoing
7	Enforce buffer zone widths set forth in the zoning ordinance along the bayside and seaside waterfront.	Northampton Co. Planning & Zoning	Ongoing	Ongoing

Goal 3 - Local Governments Encourage Self-sufficiency among Residents and Personal Responsibility for Managing Their Own Risk				
	Strategy 3.1 - Increase resident preparedness in the County ***Strategy 3.2 - Educate residents about flood insurance available and encourage participation in the National Flood Insurance Program***			
Priority Rank	***Northampton County – Goal 3: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Send out information encouraging residents to purchase contents and structure flood insurance to all homes and businesses located in the County's regulated flood zones.	Northampton County Planning	Yearly	Not Complete
---	Investigate whether Northampton should pursue a better CRS rating to reduce flood insurance premiums in the County.	Northampton Co. Admin.	2008	Complete
---	Provide preparedness information on the County's website.	Northampton Co. Emergency Services Coordinator	2007	Complete, Ongoing
2011 – 2016 HMP Identified Mitigation Projects				
1	Provide updated preparedness information on the County's website to include materials for the Hispanic population.	Northampton Co. Emergency Services	2007	Complete, Ongoing
2	Send out information encouraging residents to purchase contents and structure flood insurance to all homes and businesses located in the County's regulated flood zones.	Northampton County Planning	Yearly	Not Started

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a Natural Hazard Event				
	Strategy 4.1 - Maintain traffic flow after a natural hazard event ***Strategy 4.2 – Ensure continuity of public water and wastewater systems*** ***Strategy 4.3– Provide for adequate sheltering during an emergency***			
Priority Rank	***Northampton County – Goal 4: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Retrofit three lights for backup power to facilitate traffic movement during a large power outage. 1. The light serving the hospital at Rogers Drive (Rt. 606) and Route 13 in Nassawadox 2. A light at the following intersections, Rt. 13 and Rt. 178 in Belle Haven 3. The light at Stone Road (Rt. 184) and Route 13 serving the Town of Cape Charles.	VDOT	2009	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Assess and identify emergency generator power serving public water and wastewater systems for adequacy.	Northampton Co. Public Works Dept.	2011	Started
2	Retrofit existing emergency shelters against flooding and wind including backup power supplies.	Northampton Co. Emergency Services	2012	Not Started
3	Identify and mitigate drainage problems at major intersections along Route 13 in Northampton County.	VDOT	2012	Not Started

Goal 5 - Local Governments Will Make Efforts to Reach Special Needs Populations				
Strategy 5.1 – Improve communications with special needs residents before and after hazard events				
Priority Rank	***Northampton County – Goal 5: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2011 – 2016 HMP Identified Mitigation Projects				
1	Acquire and implement an updated communications system that can be used for citizen notifications.	Northampton Co. Emergency Services	2011	Not Started
2	Work with the Department of Social Services, the Eastern Shore Area Agency on Aging, home health agencies and other organizations to identify special-needs residents and ensure that responsible parties are notified of potentially hazardous situations.	Northampton Co. Emergency Services	2012	Not Started
3	Establish and maintain a list of seasonal migrant housing locations.	ESDPC & Northampton Co. Emergency Services	2012	Not Started
4	Consider plan for sheltering of domestic pets.	Northampton Co. Emergency Services	2012	Not Started

Identified Mitigation Projects – Northampton County Towns

Towns Participating in the Hazard Mitigation Planning Process Include Exmore, Eastville, and Cape Charles

Northampton County Towns: Description of Projects	Strategy	Start Timeline	Status as of 2011
Town of Exmore			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Exmore Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	3.2	2011	Not Started
Replace the Town's aging public water supply wells.	4.1	2011	Not Started
Cooperate with VDOT to mitigate storm water drainage in Exmore.	2.2	2011	Not Started
Produce a drainage and storm water study of Exmore's flooding issues in downtown.	2.2	2011	Not Started
Upgrade aging water distribution lines in Exmore.	4.1	2011	Not Started
Town of Eastville			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Eastville Town Plan.	2.1, 2.2	During next Town. Plan update	Not Started
Adopt minimum standards such that the Town can participate in the National Flood Insurance Program.	1.1	2011	Not Started
Cooperate with VDEQ to ensure adequate water supply and quality.	2.2	2011	Started
Upgrade aging water distribution lines in Eastville.	4.1	2011	Not Started
Cooperate with VDOT to mitigate storm water drainage in Eastville.	2.2	2011	Not Started
Promote Hazard Mitigation at local community events and meetings.	1.1	2011	Ongoing
Town of Cape Charles			
Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Cape Charles Town Plan.	2.1, 2.2	next Town Plan update	Not Started
Mitigate the Town's Infrastructure against flooding and wind.	2.2	Post-Declared Disaster	Ongoing
Maintain records of storm water flooding events.	2.2	2011	Ongoing
Take actions to improve Community Rating System ranking in order to decrease residents' flood insurance rates.	2.2	2011	Ongoing
Mitigate risk to Town water supply by constructing new water tower on south side of Town.	2.3	Unknown	Not Started
Implement coastal erosion mitigation actions into the Town's Beach Management Plan.	2.2	2011	Ongoing
Promote Hazard Mitigation at local community events and meetings.	1.1	2011	Ongoing

Chapter

26

Town of Chincoteague Mitigation Strategies

The Town of Chincoteague, located on Chincoteague Island, lies off of the northeast coast of Accomack County. The town is known as a gateway to Assateague Island National Seashore and the Chincoteague National Wildlife Refuge that has an economy reliant on both its natural resources and seasonal tourism. In addition, the community provides housing and visitor support for the neighboring Wallops Flight Facility. Chincoteague Island's unique location and economy has directed a set of mitigation strategies that specifically address the coastal hazards facing the town.

Project Prioritization

The Town has ranked the various projects and actions, according to the project's unique elements and the Town's risk assessment. Start dates for each project were established. Town Staff presented proposed mitigation projects to the Town Council on August 18, 2011. The Director of Planning, Emergency Management Coordinator, and the Town Manager will consider economic costs and the benefits of the various projects and present that information to the Council for adoption.

Plan Maintenance

The Emergency Management Coordinator will review the Hazard Mitigation Plan every year prior to the July 1 deadline for the Local Capability Readiness Assessment (LCAR). The Coordinator will evaluate the plan and review progress made during the previous years on the goals and projects in the plan. The Coordinator will use the LCAR criteria for

hazard mitigation to evaluate the Town's hazard mitigation program. Progress will be reflected in the LCAR. The Coordinator will also recommend any revisions to the Town Council. By July 1, 2015, the Coordinator will assemble a Committee or represent the Town of Chincoteague on a Committee to update the plan. The Committee will work to complete the updates by the end of the calendar year of the fifth anniversary of the adoption of the plan. During the plan maintenance process, the community will have opportunity through advertised public hearings to comment on plan revisions and updates prior to the Town Council approving them.

The Town of Chincoteague has a Town Plan. The Emergency Management Coordinator will provide input and plan materials to the planning group responsible for regular updates to the Town Plan and any other relevant planning documents. During updates of the Town Plan and other relevant planning efforts, the Hazard Mitigation Plan will be reviewed and appropriate material incorporated into the updates.

Identified Mitigation Projects – Town of Chincoteague

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program Including Public Education and On-going Hazard Assessments				
	Strategy 1.1 - Ensure emergency management and government operations can continue during and after a hazard event ***Strategy 1.2 – Complete hazard assessment mapping and Storm Water Master Plan to better inform Town Council decisions and public outreach efforts***			
Priority Rank	***Town of Chincoteague – Goal 1: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Produce Responder Bilingual Cards with English on back. An example of the type of message to be included is "Do not drink the water."	Health Department and the Eastern Shore Disaster Preparedness Coalition (ESDPC)	2006	Complete*
---	Set a regional compatibility standard for emergency communications	ESDPC	2006	Funding attained, Pending
---	Obtain more changeable warning signs	VDOT	2006	Complete
---	Upgrade communications systems and provide for backup in the event of a communication failure	ESDPC, Tow	2009	Complete
---	Obtain funding for a generator Hookup for the Eastern Shore Community College	Eastern Shore Community College	Post-declared disaster	Not Complete
---	Investigate potential tertiary locations for a Chincoteague Emergency Operation Center located off the island and in northern Accomack County	Emergency Services Coordinator	2009	Ongoing
2011 – 2016 HMP Identified Mitigation Projects				
1	Conduct a Phase 2 Storm Water Study to improve drainage infrastructure for the Town and mitigate flooding hazards.	Chincoteague Dept. of Public Works	Ongoing	Phase 1 Complete
2	Perform GIS mapping project to evaluate incremental flooding issues.	Chincoteague Planning & Zoning	2012	Not Started
3	Study and map critical infrastructure including new FEMA wave analysis.	Chincoteague Planning & Zoning	2013	Not Started, awaiting FEMA map updates
4	Coordinate studies and maps with Emergency Operations Plan and Comprehensive Plan	Chincoteague Planning & Zoning	Annually	Ongoing

*Spanish Health and Emergency Preparedness informational brochures have been produced and are available to the Hispanic population through a variety of outlets.

Goal 2 - Residents, Businesses and Local Governments Will Work to Minimize Community Disruption Through Residential and Commercial Mitigation Activities				
Strategy 2.1 - Retrofit housing to withstand a 100-year flood event ***Strategy 2.2 - Utilize mitigation funds made available following a natural hazard event to retrofit commercial and residential structures to withstand flooding or other hazard events***				
Priority Rank	***Town of Chincoteague – Goal 2: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Increase the safety of residents and visitors on the island by replacing the existing bridge.	VDOT	2006	Complete
---	Investigate the possibility of shoulders or enlarging pull offs on the causeway to aid traffic control during evacuations.	VDOT	2008	Complete
---	Manage a home elevation project on Chincoteague. Using a cost-benefit analysis, focus on reducing risk to the most vulnerable primary housing.	Chincoteague Building & Zoning	Post-declared disaster	Not Complete, Ongoing
---	Use hazard mitigation funds to retrofit commercial and residential structures.	Chincoteague Building & Zoning	Post-declared disaster	Complete, Ongoing
---	Protect new construction by continuing to enforce the building code provisions protecting structures from flooding and wind events.	Chincoteague Building & Zoning	Ongoing	Complete, Ongoing
2011 – 2016 HMP Identified Mitigation Projects				
1	Partner with federal agencies to perform beach nourishment on Assateague Island to mitigate erosion and flooding hazards in Town.	NPS, NFWS, & USACE	Unknown	Not Started
2	Mitigation of flood prone properties (to include, but not limited to acquisition, elevation, relocation, dry and wet flood proofing of flood prone structures, mitigation reconstruction for NFIP defined Severe Repetitive Loss (SRL) properties only), and drainage infrastructure improvements.	A-NPDC & Chincoteague	Post-declared disaster	Ongoing
3	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Chincoteague Town Plan.	Chincoteague Planning	During next Town. Plan update	Not Started
4	Prepare plan for mitigation of coastal erosion along the southern shoreline of Chincoteague Island	Chincoteague Planning	2012	Not Started
5	Flood proof commercial buildings along Main Street to mitigate flooding hazards.	Chincoteague & Main Street Merchant's Assoc.	2012	Not Started
6	Use hazard mitigation funds to retrofit commercial and residential structures.	Chincoteague Building & Zoning	Post-declared disaster	Ongoing

Goal 3 - Local Governments Encourage Self-sufficiency among Residents and Personal Responsibility for Managing Their Own Risk				
Strategy 3.1 - Promote the benefits of flood insurance from the National Flood Insurance Program ***Strategy 3.2 – Educate residents and businesses on potential natural hazards***				
Priority Rank	***Town of Chincoteague – Goal 3: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Start a public information campaign on the benefits of flood insurance with a focus on Chincoteague's local needs.	Chincoteague Administration	2007	Complete, Ongoing
2011 – 2016 HMP Identified Mitigation Projects				
1	Implement a public information campaign on the benefits of flood insurance with a focus on Chincoteague's local needs.	Chincoteague Administration	Annually	Ongoing
2	Protect new construction by continuing to enforce the building code provisions protecting structures from flooding and wind events.	Chincoteague Building & Zoning	Ongoing	Ongoing
3	Review FEMA Region III Coastal Analysis Risk Map and amend Town ordinances, if required.	Chincoteague Planning	2012	Not Started
4	Develop and provide residents and businesses with hazard risk assessment maps and response plan.	Chincoteague Planning	2012	Not Started

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a Natural Hazard Event				
	Strategy 4.1 - Retrofit the causeway and bridge to maintain connection to the mainland ***Strategy 4.2 - Ensure adequate water resources will be available during and after hazard events*** ***Strategy 4.3 – Maintain beach access to the Assateague Island National Seashore following hazard events***			
Priority Rank	***Town of Chincoteague – Goal 4: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Obtain and install a generator on the high rise water tower in the Town	Chincoteague Public Works	2008	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Develop a cooperative agreement between Chincoteague and the National Fish and Wildlife Service and incorporate a short-term response plan to ensure access to the Assateague Island National Seashore following a hazard event	Chincoteague & NFWS	2011	Started
2	Perform a storm water infrastructure improvement project on Maddox Boulevard at the traffic circle to reduce frequent flooding of access corridor to National Seashore and Wildlife Refuge	Chincoteague Public Works	2012	Not Started
3	Develop enforceable standards for fill and drainage to mitigate flooding hazards.	Chincoteague Administration	2012	Not Started
4	Widen the Route 175 Causeway including expansion of shoulders, construction of an emergency lane/bike lane, and construction of a center safety barrier to maintain a safe corridor.	VDOT and other state agencies	Unknown	Not Started

Goal 5 - Local Governments Will Make Efforts to Reach Special Needs Populations				
Strategy 5.1 - Identify locations of seasonal housing including mobile homes, campgrounds, etc.				
Priority Rank	***Town of Chincoteague – Goal 5: Description of Projects***	***Responsible Department***	***Start Timeline***	***Status as of 2011***
2006 – 2011 HMP Identified Mitigation Projects				
---	Identify and map tourist lodging for use in emergency	Chincoteague Administration	2008	Complete
2011 – 2016 HMP Identified Mitigation Projects				
1	Identify locations of special needs populations using 2010 U.S. Census data.	Chincoteague Planning	Annually	Not Started
2	Coordinate special needs assessment into Chincoteague Emergency Operations Plan.	Chincoteague Planning & EMS	Annually	Not Started
3	Study and propose mitigation actions for increased exposure of special needs populations to coastal erosion and storm surge at south end of Chincoteague Island.	Chincoteague Planning & EMS	2012	Not Started

Chapter

27

Mitigation Funding Options

There are a variety of well-established federal hazard mitigation funding programs available to localities that can be used to implement the future mitigation projects identified in Chapters 23 through 26. In addition, there are other sources of mitigation funding regularly made available through state and federal agencies. These are not included in the following table since the program names, funding amounts, and eligibility criteria commonly vary over time.

Hazard Mitigation Funding Options			
Grant Name	***Agency***	***Purpose***	***Contact***
Pre-Disaster Mitigation Program (PDM)	U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)	To provide funding for States and communities for cost-effective hazard mitigation activities which complement a comprehensive hazard mitigation program and reduce injuries, loss of life, and damage and destruction of property.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Hazard Mitigation Grant Program (HMGP)	U.S. Department of Homeland Security, FEMA	Provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster declaration.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Flood Mitigation Assistance Program (FMA)	U.S. Department of Homeland Security, FEMA	To help States and communities plan and carry out activities designed to reduce the risk of flood damage to structures insurable under the NFIP.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Homeland Security Grant Program (HSGP)	U.S. Department of Homeland Security, Office of Domestic Preparedness	To enhance the ability of states, territories, urban areas, and local agencies to prevent, deter, respond to, and recover from threats and incidents of terrorism. The HSGP integrates the State Homeland Security Program (SHSP), the Urban Areas Security Initiative (UASI), the Law Enforcement Terrorism Prevention Program (LETPP), the Citizen Corps Program (CCP), the Emergency Management Performance Grants (EMPG), and the Metropolitan Medical Response System (MMRS) Program Grants into a single funding program.	ODP 810 Seventh Street, N.W. Washington, DC 20531 Phone: (800) 368-6498 www.ojp.usdoj.gov/odp/

Grant Name	Agency	Purpose	Contact
Buffer Zone Protection Program (BZPP)	U.S. Department of Homeland Security, Office of Domestic Preparedness	To provide funding for the equipment, management, and administration of actions, to protect, secure, and reduce the vulnerabilities of identified critical infrastructure and key resource (CI/KR) sites.	ODP 810 Seventh Street, N.W. Washington, DC 20531 Phone: (800) 368-6498 www.ojp.usdoj.gov/odp/
Transit Security Grant Program (TSGP)	U.S. Department of Homeland Security, Office of Domestic Preparedness	To provide funding for security and preparedness enhancements for designated transit systems. Funding is allowed for planning, organizational activities, equipment acquisitions, training, exercises, and management and administrative costs	ODP 810 Seventh Street, N.W. Washington, DC 20531 Phone: (800) 368-6498 www.ojp.usdoj.gov/odp/
Public Assistance Program (PA)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To provide supplemental assistance to States, local governments, and certain private nonprofit organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President. Under Section 406, Public Assistance funds may be used to mitigate the impact of future disasters.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Flood Control Works / Emergency Rehabilitation	U.S. Department of Defense, Army Corps of Engineers	To assist in the repair and restoration of public works damaged by flood, extraordinary wind, wave, or water action.	USACE 20 Massachusetts Ave., N.W. Washington, DC 20314 Phone: (202) 761-0001 www.usace.army.mil
Community Development Grant Program (CDBG)	U.S. Department of Housing and Urban Development	To develop viable urban communities by providing decent housing, a suitable living environment, expanding economic opportunities or meeting other community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community where other financial resources are not available. Principally for persons of low and moderate income.	HUD 451 7th Street, S.W. Washington, DC 20410-7000 Phone: (202) 708-3587 www.hud.gov
Emergency Watershed Protection	U.S. Department of Agriculture, Natural Resource Conservation Service	To provide emergency technical and financial assistance to install or repair structures that reduces runoff and prevents soil erosion to safeguard life and property.	NRCS PO Box 2890 Washington, DC 20013 Phone: (202) 720-3527 www.nrcs.usda.gov
Watershed Protection and Flood Prevention	U.S. Department of Agriculture, Natural Resource Conservation Service	To provide technical and financial assistance in planning and executing works of improvement to protect, develop, and use land and water resources in small watersheds.	NRCS PO Box 2890 Washington, DC 20013 Phone: (202) 720-3527 www.nrcs.usda.gov
Land and Water Conservation Fund Grants	U.S. Department of the Interior, National Park Service	To acquire and develop outdoor recreation areas and facilities for the general public, to meet current and future needs.	NPS PO Box 37127 Washington, DC 20013-7127 Phone: (202) 565-1200 www.nps.gov
Disaster Mitigation and Technical Assistance Grants	U.S. Department of Commerce, Economic Development Administration	To help States and localities to develop and/or implement a variety of disaster mitigation strategies.	EDA Herbert C. Hoover Building Washington DC, 20230 Phone: (800) 345-1222 www.eda.gov

Grant Name	Agency	Purpose	Contact
Pre-Disaster Mitigation Loan Program	U.S. Small Business Administration	To make low-interest; fixed-rate loans to eligible small businesses for the purpose of implementing mitigation measures to protect business property from damage that may be caused by future disasters.	SBA 1110 Vermont Avenue, N.W., 9th Floor Washington, DC 20005 Phone: (202) 606-4000 www.sba.gov
Watershed Surveys and Planning	U.S. Department of Agriculture, Natural Resource Conservation Service	To provide planning assistance to Federal, State, and local agencies for the development of coordinated water and related land resources programs in watersheds and river basins.	NRCS PO Box 2890 Washington, DC 20013 Phone: (202) 720-3527 www.nrcs.usda.gov
National Earthquake Hazards Reduction Program (NEHRP)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To mitigate earthquake losses that can occur in many parts of the nation providing earth science data and assessments essential for warning of imminent damaging earthquakes, land-use planning, engineering design, and emergency preparedness decisions.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Assistance to Firefighters Grant Program	U.S. Department of Homeland Security, Federal Emergency Management Agency, U.S. Fire Administration	Competitively awarded project grants to provide direct assistance, on a competitive basis, to fire departments for the purpose of protecting the health and safety of the public and firefighting personnel against fire and fire-related hazards.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Fire Management Assistance Grants	U.S. Department of Homeland Security, Federal Emergency Management Agency, U.S. Fire Administration	To provide project grants and the provision of specialized services for the mitigation, management, and control of fires that threatens such destruction as would constitute a major disaster.	FEMA 500 C Street, S.W. Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Emergency Streambank and Shoreline Protection	U.S. Department of Defense, Army Corps of Engineers	To prevent erosion damages to public facilities by the emergency construction or repair of streambank and shoreline protection works.	USACE 20 Massachusetts Avenue, N.W. Washington, DC 20314 Phone: (202) 761-0001 www.usace.army.mil
Small Flood Control Projects	U.S. Department of Defense, Army Corps of Engineers	To reduce flood damages through small flood control projects not specifically authorized by Congress.	USACE 20 Massachusetts Avenue, N.W. Washington, DC 20314 Phone: (202) 761-0001 www.usace.army.mil
Clean Water Act Section 319 Grants	U.S. Environmental Protection Agency	To implement non-point source programs, including support for non-structural watershed resource restoration activities.	EPA Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 Phone: (202) 272-0167 www.epa.gov

Appendix A

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Appendix

B

Eastern Shore of Virginia Coastal Flood Vulnerability Assessment

The Coastal Flood Vulnerability Assessment involved an analysis of multiple parameters to estimate potential structural and contents losses as result of a 100-year flood event on Accomack and Northampton Counties and the Eastern Shore towns that contain Special Flood Hazard Areas. The Coastal Flood Vulnerability assessment is describe in detail in the following sections and presented in the table at the end of this appendix.

Parameters

The following parameters were involved in the assessment:

Parameters Included in the Eastern Shore of Virginia Coastal Flood Vulnerability Assessment		
Parameter	***Description***	***Data Source***
Total PREFIRM	Number of Pre-FIRM houses (built before adoption of the official FIRM and floodplain ordinance)	U.S Census, 2000
Total POSTFIRM	Number of Post-FIRM houses (built after adoption of the official FIRM and floodplain ordinance)	U.S Census, 2000
Total Houses	Number of houses in the entire locality	ACS 5-Year Estimates, 2005-2009
Total Estimated SFHA	The estimated number of houses in the Special Flood Hazard Areas (SFHA)	GIS Structure Data for Chincoteague and Accomack and Northampton Cos.
Value	Average value of housing units in the locality	ACS 5-Year Estimates, 2005-2009
Policies	Number of NFIP flood insurance policies in the locality	FEMA NFIP Flood Insurance Report, May 2011
SFHA Policies	Number of NFIP flood insurance policies located within a SFHA in the locality	FEMA NFIP Flood Insurance Report, May 2011
Coverage	Amount of NFIP coverage	FEMA NFIP Flood Insurance Report, May 2011
SFHA Coverage	Amount of NFIP coverage in the SFHA in the locality. Calculated as (COVERAGE/POLICIES) x SFHA POLICIES	N/A
Mortgages	Number of mortgages in the locality	ACS 5-Year Estimates, 2005-2009
Damage Percent Structure	Percentage of structure damage estimated using the estimated flood level in relation to the first floor.	FEMA Depth-Damage Tables
Damage Percent Contents	Percentage of contents damage estimated using the estimated flood level in relation to the first floor.	FEMA Depth-Damage Tables

Methodology

The following steps were taken to calculate potential structural and contents losses:

1. The ratios of pre-FIRM and post-FIRM structures in the locality were determined by using:
   Pre-FIRM Percent = (Total PREFIRM / Total Houses) x 100%
   Post-FIRM Percent = (Total POSTFIRM / Total Houses) x 100%

2. The number of pre-FIRM and post-FIRM structures in the SFHA were then estimated using:
   SFHA Pre-FIRM = Pre-FIRM Percent x Total Estimated SFHA
   SFHA Post-FIRM = Post-FIRM Percent x Total Estimated SFHA

3. The total number of pre-FIRM houses were multiplied by their value to determine the total structure value. The total structure value was then multiplied by 70%* to determine the value of the contents.
   PreFIRM SFHA Structure Value = SFHA PreFIRM x Value
   PreFIRM SFHA Contents Value=PreFIRM SFHA Structure Value x 70%

   **An assessment of private insurance agencies showed that values ranging from 65%-70% were used to determine the amount of contents coverage needed on a homeowner's policy*

4. The sustained loss to the structure was then estimated by using:
   Structure Loss = PreFIRM SFHA Structure Value x Damage Percent Structure

5. The sustained contents loss was then estimated using:
   Contents Loss =(PreFIRM SFHA Value x 70%) x Damage Percent Contents

6. The total potential losses for the locality were the sum of the structure and contents losses sustained.
   Total Loss = Structure Loss + Contents Loss

7. It was assumed that many people with flood insurance will have it because they also have a federally backed mortgage and in many cases will not have contents insurance, as was seen following Hurricanes Floyd and Isabel. As result, much of the contents loss may not be covered. Therefore, the number of policies on pre-FIRM structures in the SFHA was estimated using:
   PreFIRM SFHA Policies = PreFIRM Percent x SFHA Policies

8. The average amount of insurance per policy in the SFHA was then calculated using:
   Average Insurance Amount = Coverage/SFHA Policies

9. The uninsured value of homes with and without insurance was then determined using:
   If Average Insurance Amount > Damage Percent Structure x Value,
   Then Uninsured Value Structure = PreFIRM Value – (PreFIRM SFHA Policies x Value)

10. The potential uninsured structure losses for the locality were then determined using:
    Uninsured Structure Loss = Uninsured Value Structure x Damage Percent Structure

11. The potential uninsured structure losses were then determined using:
    If Average Insurance Amount > Value,
    Then Average Damage=PreFIRM SFHA Contents Value/SFHA PreFIRM
    And
    Uninsured Contents Loss = Contents Loss – ((Average Insurance Amount or Average Damage, whichever is less, - Value) x PreFIRM SFHA Polcies
    Else
    Uninsured Contents Loss = PreFIRM SFHA Value x 70% x Damage Percent Contents

12. The uninsured potential losses were then totaled by using:
    Total Uninsured Loss = Uninsured Structure Loss + Uninsured Contents Loss

Note: A locality's Community Rating System (CRS) rating was not considered in the assessment methodology because the CRS value may not have been consistent with the ages of the parameter data used in the assessment. It would be likely that loss estimates for communities participating in the CRS would be over-estimated and the actual amount would be less.

2011 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment								
Flood:	***One-Story 2 ft flood***	***Two-Story 6 ft flood***	***Two-Story 4 ft flood***	***Two-Story 2 ft flood***	***Two-Story 2 ft flood***	***Two-Story 2 ft flood***	***Two-Story 3 ft flood***	***One-Story 2 ft flood***
Locality:	***Accomack***	***Cape Charles***	***Chincoteague***	***Northampton***	***Onancock***	***Saxis***	***Tangier***	***Wachapreague***
TOTAL PREFIRM	14019	619	2016	4670	818	159	202	213
TOTAL POSTFIRM	7212	167	2464	2796	131	62	142	47
TOTAL HOUSES	21231	786	4480	7466	949	221	344	260
TOTAL ESTIMATED SFHA	3550	450	4480	981	5	150	225	200
VALUE	$145,600	$303,700	$221,900	$202,119	$190,400	$92,300	$86,800	$169,900
POLICIES	2908	316	819	421	30	48	96	111
SFHA POLICIES	2724	266	819	252	5	46	80	104
COVERAGE	$577,667,100	$73,723,000	$159,316,400	$106,673,300	$8,660,200	$5,913,000	$10,562,600	$21,158,000
SFHA COVERAGE	$541,115,949	$62,057,968	$159,316,400	$63,851,952	$1,443,367	$5,666,625	$8,802,167	$19,823,712
MORTGAGES	4057	93	635	1170	179	35	72	35
DAMAGE PERCENT STRUCTURE	22.0%	24.0%	20.0%	13.0%	13.0%	13.0%	18.0%	22.0%
DAMAGE PERCENT CONTENTS	33.0%	36.0%	30.0%	19.5%	19.5%	19.5%	27.0%	33.0%
Pre-FIRM Percent	66.0%	78.8%	45.0%	62.6%	86.2%	71.9%	58.7%	81.9%
Post-FIRM Percent	34.0%	21.2%	55.0%	37.4%	13.8%	28.1%	41.3%	18.1%
SFHA PreFIRM	2344	354	2016	614	4	108	132	164
SFHA PostFIRM	1206	96	2464	367	1	42	93	36
PreFIRM SFHA Structure Value	$341,286,400	$107,509,800	$447,350,400	$124,101,066	$761,600	$9,968,400	$11,457,600	$27,863,600
PreFIRM SFHA Contents Value	$238,900,480	$75,256,860	$313,145,280	$86,870,746	$533,120	$6,977,880	$8,020,320	$19,504,520
Structure Loss	$75,083,000	$25,802,000	$89,470,000	$16,133,000	$99,000	$1,296,000	$2,062,000	$6,130,000
Contents Loss	$78,837,000	$27,092,000	$93,944,000	$16,940,000	$104,000	$1,361,000	$2,165,000	$6,436,000
Total Loss	$153,920,000	$52,894,000	$183,414,000	$33,073,000	$203,000	$2,657,000	$4,227,000	$12,566,000

2011 Eastern Shore of Virginia Coastal Flood Vulnerability Assessment (continued)								
Pre-FIRM SFHA Policies	1799	209	369	158	4	33	47	85
Average Insurance Amount	$198,648	$233,301	$194,526	$253,381	$288,673	$123,188	$110,027	$190,613
Uninsured Value Structure	$79,352,000	$44,036,500	$365,469,300	$92,166,264	$0	$6,922,500	$7,378,000	$13,422,100
Uninsured Structure Loss	$17,457,000	$10,569,000	$73,094,000	$11,982,000	$0	$900,000	$1,328,000	$2,953,000
Uninsured Contents Loss	$18,330,000	$27,092,000	$93,944,000	$12,581,000	$0	$945,000	$2,165,000	$4,675,000
Total Uninsured Loss	$35,787,000	$37,661,000	$167,038,000	$24,563,000	$0	$1,845,000	$3,493,000	$7,628,000
TOTAL PREWAVE			609	52				
Pre-Wave Percent			13.6%	0.7%				
DAMAGE PERCENT STRUCTURE			9.0%	9.0%				
DAMAGE PERCENT CONTENTS			13.5%	13.5%				
Structure Loss			$12,162,000	$946,000				
Contents Loss			$12,770,000	$993,000				
Total Loss	$153,920,000	$52,894,000	$208,346,000	$35,012,000	$203,000	$2,657,000	$4,227,000	$12,566,000
Pre-Wave SFHA Policies			111	2				
Average Insurance Amount			$194,526	$253,381				
Uninsured Structure Loss			$9,939,000	$914,000				
Uninsured Contents Loss			$12,770,000	$959,689				
Total Uninsured Loss	$35,787,000	$37,661,000	$189,747,000	$26,436,689	$0	$1,845,000	$3,493,000	$7,628,000
Note: Community Rating System (CRS) ratings were not considered in the assessment methodology because the CRS value may not have been consistent with the ages of the parameter data used in the assessment. It would be likely that loss estimates for communities participating in the CRS would be over-estimated and the actual amount would be less.								

Potential Loss Summary			
	SFHA	***Total Loss***	***Total Uninsured Loss***
Accomack Co. & Incorporated Towns	8641	$382,963,000	$239,544,000
Northampton Co. & Incorporated Towns	1430	$87,906,000	$64,097,689
Eastern Shore of Virginia	10,071	$470,869,000	$303,641,689

Appendix

C

Adoption Resolutions

Resolutions adopting the *2011 Eastern Shore of Virginia Hazard Mitigation Plan* for the following localities that participated in the 2011 planning process:

- **Accomack County**
- **Chincoteague**
- **Saxis**
- **Hallwood**
- **Bloxom**
- **Parksley**
- **Tangier**
- **Wachapreague**
- **Onley**
- **Onancock**
- **Keller**
- **Northampton County**
- **Exmore**
- **Eastville**
- **Cape Charles**

COUNTY OF ACCOMACK

BOARD OF SUPERVISORS

RESOLUTION
2011 HAZARD MITIGATION PLAN
COUNTY OF ACCOMACK, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance: and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Accomack County; and

WHEREAS, the efforts of Accomack County, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Accomack, Virginia, that the sections pertaining to Accomack County in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the County of Accomack, Virginia.

Donald L. Hart, Jr., Chair
Accomack County Board of Supervisors

12-27-2011
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF CHINCOTEAGUE, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Chincoteague; and

WHEREAS, the efforts of the Town of Chincoteague, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Chincoteague, Virginia, that the sections pertaining to Chincoteague Island in the Eastern Shore Hazard Mitigation Plan dated December 2011, are hereby approved and adopted for the Town of Chincoteague, Virginia.

Robert G. Ritter, Jr.
Town Manager

12/15/2011
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF SAXIS, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Saxis; and

WHEREAS, the efforts of the Town of Saxis, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Town council of Saxis, Virginia, that the sections pertaining to the Town of Saxis in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Saxis

[redacted]
Mayor – Town of Saxis

12-15-11
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF HALLWOOD, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Hallwood; and

WHEREAS, the efforts of Hallwood, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Hallwood Town Council, Hallwood, Virginia, that the sections pertaining to Hallwood in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for Hallwood, Virginia.

Tim Raynor, Mayor
Town of Hallwood

12-31-11
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF BLOXOM, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Bloxom; and

WHEREAS, the efforts of the Town of Bloxom, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Bloxom, Virginia, that the sections pertaining to the Town of Bloxom in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Bloxom, Virginia.

Kimberly E. Cathell
Mayor, Town of Bloxom

12-21-11
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF PARKSLEY, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Parksley; and

WHEREAS, the efforts of the Town of Parksley, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Parksley, Virginia, that the sections pertaining to Parksley in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Parksley , Virginia.

Rick Chase

Rick Chase, Mayor
Town of Parksley

12-16-11

Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TANGIER, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Tangier; and

WHEREAS, the efforts of the Town of Tangier, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Tangier, Virginia, that the sections pertaining to Tangier in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for Tangier, Virginia.

James W. Eskridge, Mayor
Town of Tangier

12-20-11
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
WACHAPREAGUE, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Wachapreague.

WHEREAS, the efforts of Wachapreague, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of Wachapreague, Virginia, that the sections pertaining to Wachapreague in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Wachapreague, Virginia.

Daniel Robert Bilicki, Mayor
Town of Wachapreague, Virginia
December 15, 2011

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF ONLEY, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Town of Onley; and

WHEREAS, the efforts of Town of Onley, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Onley, Virginia, that the sections pertaining to the Town of Onley in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Onley, Virginia.

Billye D. Custis, Mayor

December 28, 2011

Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF ONANCOCK, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Onancock; and

WHEREAS, the efforts of the Town of Onancock, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town of Onancock, Virginia, that the sections pertaining to Onancock in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Onancock, Virginia.

Russell Jones, Interim Mayor
Town of Onancock

23 Jan 2012
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
TOWN OF KELLER, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Town of Keller; and

WHEREAS, the efforts of Town of Keller, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town of Keller Town Council, Virginia, that the sections pertaining to Town of Keller in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Keller, Virginia.

Ginny Mueller,
Mayor of Keller

12-30-2011
Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
COUNTY OF NORTHAMPTON, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including Northampton County; and

WHEREAS, the efforts of Northampton County, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Northampton, Virginia, that the sections pertaining to Northampton County in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the County of Northampton, Virginia.

Katherine H. Nunez, Administrator
Northampton County

December 13, 2011

Date

RESOLUTION
2011 HAZARD MITIGATION PLAN
EXMORE, VIRGINIA

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the Town's risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the Town; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Exmore; and

WHEREAS, the efforts of the Town of Exmore, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Exmore, Virginia, that the sections pertaining to the Town of Exmore in the Eastern Shore Hazard Mitigation Plan dated December 2011, are hereby approved and adopted for the Town of Exmore, Virginia.

William M. Moore, Jr., Mayor
Town of Exmore

12-19-11
Date

Town of Eastville
P. O. Box 747
Eastville, Virginia 23347

2011 Hazard Mitigation Plan
Resolution No. 2012-001

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the Counties' risks from and vulnerabilities to natural hazard, and to make recommendations on mitigating the effects of such hazard on the Counties; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Eastville; and

WHEREAS, the efforts of the Town of Eastville, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED by the Town of Eastville, Virginia that the sections pertaining to Eastville in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Eastville, Virginia.

Adopted: February 6, 2012

Attest: _____ Mayor

Attest: _____ Clerk

Voting in Favor: John Crockett, Eleanor Gordon, R. Todd Simpson, Edgar S. Sturgis, III

Voting Against: None

TOWN OF CAPE CHARLES, VIRGINIA
RESOLUTION 20111208A

TO ADOPT THE 2011 EASTERN SHORE HAZARD MITIGATION PLAN

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance; and

WHEREAS, an Eastern Shore Hazard Mitigation Planning Committee comprised of members of the business community and non-profit organizations, and local officials was convened in order to study the County's risks from and vulnerabilities to natural hazards, and to make recommendations on mitigating the effects of such hazards on the County; and

WHEREAS, the Accomack-Northampton Planning District Commission updated a regional Hazard Mitigation Plan including the Town of Cape Charles; and

WHEREAS, the efforts of the Town of Cape Charles, the Eastern Shore of Virginia Hazard Mitigation Planning Committee members, and the Accomack-Northampton Planning District Commission have resulted in an update of a regional Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Cape Charles, Virginia, that the sections pertaining to the Town of Cape Charles in the Eastern Shore Hazard Mitigation Plan dated December 2011, is hereby approved and adopted for the Town of Cape Charles, Virginia, subject to final approval by the Federal Emergency Management Agency.

BE IT FURTHER RESOLVED by the Town Council of the Town of Cape Charles, Virginia, that Mayor Sullivan is authorized to sign this adoption resolution upon notice of final approval of the Eastern Shore Hazard Mitigation Plan by the Federal Emergency Management Agency.

Adopted by the Town Council of Cape Charles on December 8, 2011.

By: _____
Mayor

Date: December 27, 2011

ATTEST:

_____
Assistant Town Clerk