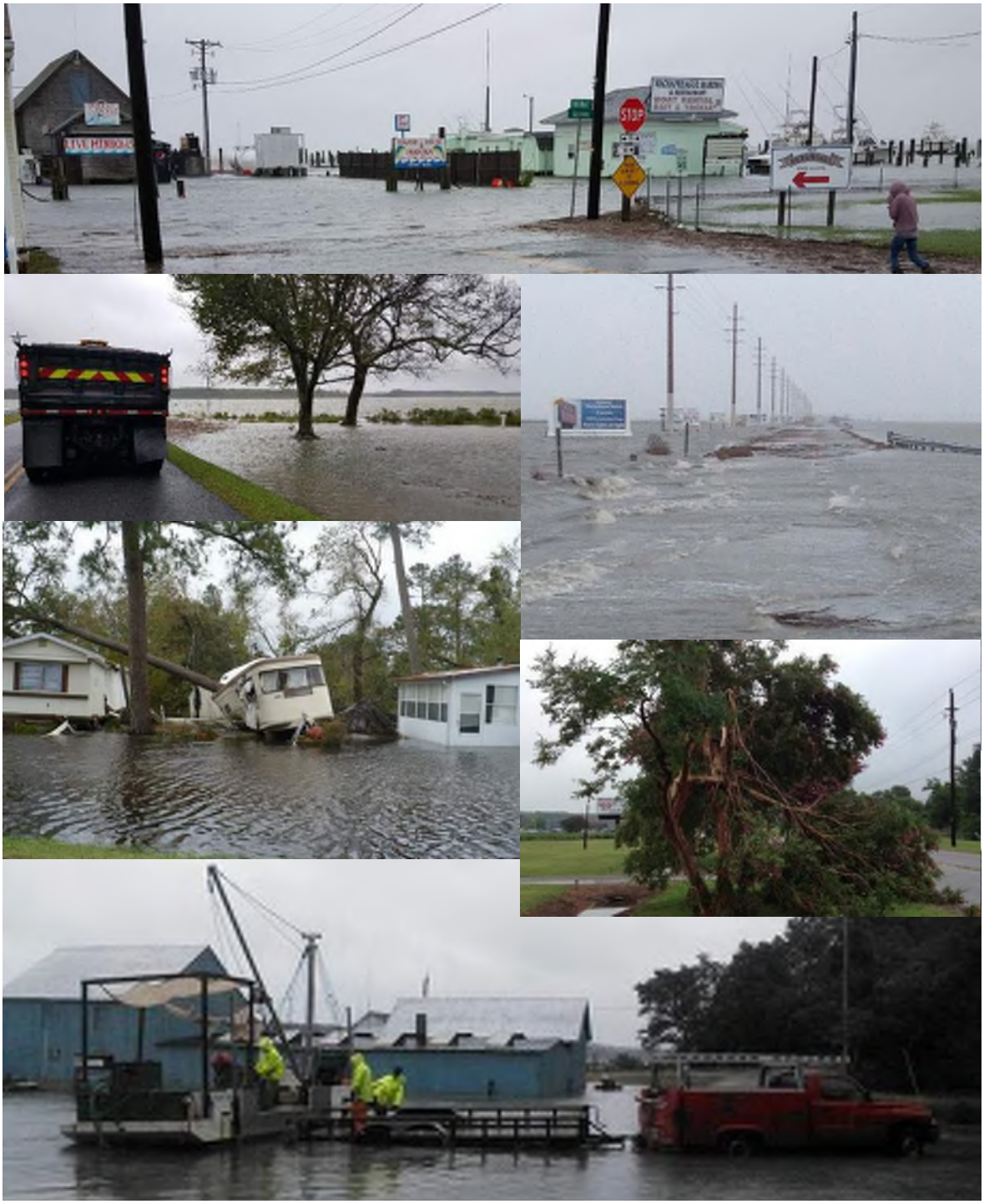


The Eastern Shore of Virginia HAZARD MITIGATION PLAN

2021

Eastern Shore Hazard Mitigation Steering Committee
Accomack-Northampton Planning District Commission

THE EASTERN SHORE OF VIRGINIA
2021
Hazard Mitigation Plan

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Cover photos, clockwise from top: Wachapreague flooding Oct. 2015, Connie Morrison; Chincoteague Causeway closure Jan. 2016, VDOT; Cheriton tornado, Jul. 2014, Connie Morrison; Bayford flooding Apr. 2014, Curt Smith; Chincoteague Sandy damage, VDEM; Quinby bridge Oct. 2015, Connie Morrison

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TABLE OF CONTENTS

INTRODUCTION 1

Introduction 1
Background 1
Purpose 2
Plan Organization 2
List of Acronyms 4
Mitigation Terms – Definitions 5
Land Use Category Descriptions 7

CHAPTER 1: HAZARDS ON THE SHORE 8

Introduction 1.1
Description of Conditions 1.1
Geographic and Geologic Setting 1.1
Chronology of Hazard Events on the Shore 1.2
The 20th Century 1.2
The 21st Century 1.7
Modern Storm Tracking 1.15

CHAPTER 2: PLANNING PROCESS 23

Plan development Process Overview 2.1
2021 Hazard Mitigation Plan Participation 2.1
Participating Jurisdictions 2.2
Hazard Mitigation Plan Steering Committee Members 2.3
Hazard Mitigation Plan – Other Participants 2.4
Public Planning Process and Outreach Efforts 2.5
Continued Plan Maintenance 2.7
Documents and Resources 2.8

CHAPTER 3: RISK ASSESSMENT 31

Risk Assessment Process 3.1

CHAPTER 4: HIGH WIND 34

Introduction 4.1
Natural Forces and Conditions 4.1
Causes of High Wind 4.1
Type, Location, and Extent 4.6
Damages 4.6
Exposure and Potential Loss 4.6
Secondary Hazards 4.7
Human Systems 4.7
Warning Announcements 4.7
Construction Standards 4.7
Personal Responsibility 4.7

CHAPTER 5: COASTAL EROSION 41

Introduction 5.1
Natural Forces and Conditions 5.2
Causes of Erosion 5.2

Table of Contents

Erosion and Underlying Geology *5.4*
Sea-Level Rise and Erosion *5.5*
HUMAN SYSTEMS 5.6
Human Interventions *5.7*
Erosion Prevention Laws and Programs *5.12*

CHAPTER 6: COASTAL FLOODING 54

INTRODUCTION 6.1
NATURAL FORCES AND CONDITIONS 6.5
Tropical Cyclones: Hurricanes, Tropical Storms, and Tropical Depressions *6.5*
Nor'easters *6.7*
Astronomical Tides *6.8*
Storm Surge *6.10*
Sea-Level Rise and Coastal Flooding *6.11*
Elevation *6.14*
TYPE, LOCATION, AND EXTENT 6.15
Flood Zones *6.15*
Secondary Flood Hazards *6.17*
HUMAN SYSTEMS 6.18
National Flood Insurance Program *6.18*

CHAPTER 7: STORMWATER 73

INTRODUCTION 7.1
NATURAL FORCES AND CONDITIONS 7.2
Stormwater and Underlying Geology *7.2*
Stormwater and Soil Composition *7.3*
Causes of Stormwater *7.5*
Storm Potential *7.5*
Sea-Level Rise and Stormwater *7.10*
TYPE, LOCATION, AND EXTENT 7.13
Damages *7.13*
Exposure and Potential Loss *7.15*
Secondary Hazards *7.17*
HUMAN SYSTEMS 7.17
Fresh Water Impoundments *7.17*
Stormwater Flooding Prevention Laws and Programs *7.17*

CHAPTER 8: PANDEMIC 91

INTRODUCTION 8.1
IMPACTS 8.3
Health and Safety of Persons in the Affected Area at the Time of the Incident *8.3*
Continuity of Operations and Delivery of Services *8.4*
Infrastructure *8.4*
Economic and Financial Conditions *8.4*

CHAPTER 9: THE REGION 95

INTRODUCTION 9.1
Region Profile *9.2*
Socio-economic *9.2*
Built Infrastructure *9.10*
Natural Environment *9.21*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 9.22
Previous Hazard Mitigation Plans *9.22*

National Flood Insurance Program & Hazard Mitigation Grant Program *9.25*
HAZARD PROFILE 9.28
High Wind *9.28*
Coastal Erosion *9.28*
Coastal Flooding *9.32*
Storm Water Flooding *9.33*
Hazards of Local Significance *9.33*
Critical Facilities *9.34*

CHAPTER 10: ACCOMACK COUNTY 129

COUNTY PROFILE 10.1
Socio-economic *10.2*
Built Infrastructure *10.4*
Natural Environment *10.11*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 10.12
Previous Hazard Mitigation Plans *10.12*
National Flood Insurance Program & Hazard Mitigation Grant Program *10.13*
HAZARD PROFILE 10.15
Pandemic Response and Readiness *10.15*
High Wind *10.15*
Coastal Erosion *10.17*
Coastal Flooding *10.19*
Storm Water Flooding *10.21*
Hazards of Local Significance *10.22*
Critical Facilities *10.23*
FINDINGS 10.24

CHAPTER 11: TOWN OF ACCOMAC 154

TOWN PROFILE 11.1
Socio-economic *11.2*
Built Infrastructure *11.4*
Natural Environment *11.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 11.8
Previous Hazard Mitigation Plans *11.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *11.9*
HAZARD PROFILE 11.9
Pandemic Response and Readiness *11.9*
High Wind *11.9*
Coastal Erosion *11.9*
Coastal Flooding *11.9*
Storm Water Flooding *11.9*
Hazards of Local Significance *11.10*
Critical Facilities *11.10*
FINDINGS 11.11

CHAPTER 12: TOWN OF BLOXOM 165

TOWN PROFILE 12.1
Socio-economic *12.2*
Built Infrastructure *12.4*
Natural Environment *12.8*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 12.9
Previous Hazard Mitigation Plans *12.9*
National Flood Insurance Program & Hazard Mitigation Grant Program *12.10*

HAZARD PROFILE 12.10
Pandemic Response and Readiness 12.10
High Wind 12.10
Coastal Erosion 12.10
Coastal Flooding 12.11
Storm Water Flooding 12.11
Hazards of Local Significance 12.13
Critical Facilities 12.14
FINDINGS 12.15

CHAPTER 13: TOWN OF CHINCOTEAGUE 180

TOWN PROFILE 13.1
Socio-economic 13.2
Built Infrastructure 13.5
Community Facilities 13.8
Natural Environment 13.12
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 13.14
Previous Hazard Mitigation Plans 13.14
National Flood Insurance Program & Hazard Mitigation Grant Program 13.15
HAZARD PROFILE 13.18
Pandemic Response and Readiness 13.18
High Wind 13.19
Coastal Erosion 13.20
Coastal Flooding 13.21
Storm Water Flooding 13.24
Hazards of Local Significance 13.24
Critical Facilities 13.25
FINDINGS 13.27

CHAPTER 14: TOWN OF HALLWOOD 207

TOWN PROFILE 14.1
Socio-economic 14.2
Built Infrastructure 14.4
Natural Environment 14.6
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 14.7
Previous Hazard Mitigation Plans 14.7
National Flood Insurance Program & Hazard Mitigation Grant Program 14.8
HAZARD PROFILE 14.8
Pandemic Response and Readiness 14.8
High Wind 14.8
Coastal Erosion 14.9
Coastal Flooding 14.9
Storm Water Flooding 14.10
Hazards of Local Significance 14.10
Critical Facilities 14.11
FINDINGS 14.11

CHAPTER 15: TOWN OF KELLER 218

TOWN PROFILE 15.1
Socio-economic 15.2
Built Infrastructure 15.4
Natural Environment 15.7
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 15.8

Previous Hazard Mitigation Plans *15.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *15.9*
HAZARD PROFILE 15.9
Pandemic Response and Readiness *15.9*
High Wind *15.9*
Coastal Erosion *15.9*
Coastal Flooding *15.10*
Storm Water Flooding *15.10*
Hazards of Local Significance *15.11*
Critical Facilities *15.12*
FINDINGS 15.12

CHAPTER 16: TOWN OF MELFA 230

TOWN PROFILE 16.1
Socio-economic *16.2*
Built Infrastructure *16.4*
Natural Environment *16.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 16.8
Previous Hazard Mitigation Plans *16.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *16.9*
HAZARD PROFILE 16.9
Pandemic Response and Readiness *16.9*
High Wind *16.9*
Coastal Erosion *16.9*
Coastal Flooding *16.10*
Storm Water Flooding *16.10*
Hazards of Local Significance *16.10*
Critical Facilities *16.11*
FINDINGS 16.11

CHAPTER 17: TOWN OF ONANCOCK 241

TOWN PROFILE 17.1
Socio-economic *17.2*
Built Infrastructure *17.4*
Natural Environment *17.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 17.8
Previous Hazard Mitigation Plans *17.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *17.9*
HAZARD PROFILE 17.9
Pandemic Response and Readiness *17.9*
High Wind *17.10*
Coastal Erosion *17.11*
Coastal Flooding *17.11*
Storm Water Flooding *17.14*
Hazards of Local Significance *17.14*
Critical Facilities *17.15*
FINDINGS 17.16

CHAPTER 18: TOWN OF ONLEY 257

TOWN PROFILE 18.1
Socio-economic *18.2*
Built Infrastructure *18.4*
Natural Environment *18.8*

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 18.9
Previous Hazard Mitigation Plans 18.9
National Flood Insurance Program & Hazard Mitigation Grant Program 18.10
HAZARD PROFILE 18.10
Pandemic Response and Readiness 18.10
High Wind 18.10
Coastal Erosion 18.10
Coastal Flooding 18.10
Storm Water Flooding 18.10
Hazards of Local Significance 18.11
Critical Facilities 18.12
FINDINGS 18.13

CHAPTER 19: TOWN OF PAINTER 270

TOWN PROFILE 19.1
Socio-economic 19.2
Built Infrastructure 19.4
Natural Environment 19.7
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 19.8
Previous Hazard Mitigation Plans 19.8
National Flood Insurance Program & Hazard Mitigation Grant Program 19.9
HAZARDS PROFILE 19.9
Pandemic Response and Readiness 19.9
High Wind 19.9
Coastal Erosion 19.9
Coastal Flooding 19.9
Storm Water Flooding 19.9
Hazards of Local Significance 19.10
Critical Facilities 19.11
FINDINGS 19.11

CHAPTER 20: TOWN OF PARKSLEY 281

TOWN PROFILE 20.1
Socio-economic 20.2
Built Infrastructure 20.4
Natural Environment 20.8
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 20.9
Previous Hazard Mitigation Plans 20.9
National Flood Insurance Program & Hazard Mitigation Grant Program 20.10
HAZARD PROFILE 20.10
Pandemic Response and Readiness 20.10
High Wind 20.11
Coastal Erosion 20.11
Coastal Flooding 20.11
Storm Water Flooding 20.11
Hazards of Local Significance 20.13
Critical Facilities 20.14
FINDINGS 20.15

CHAPTER 21: TOWN OF SAXIS 296

TOWN PROFILE 21.1
Socio-economic 21.2
Built Infrastructure 21.5

Natural Environment *21.10*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 21.11
Previous Hazard Mitigation Plans *21.11*
National Flood Insurance Program & Hazard Mitigation Grant Program *21.12*
HAZARD PROFILE 21.13
Pandemic Response and Readiness *21.13*
High Wind *21.13*
Coastal Erosion *21.14*
Coastal Flooding *21.14*
Storm Water Flooding *21.17*
Hazards of Local Significance *21.18*
Critical Facilities *21.19*
FINDINGS 21.20

CHAPTER 22: TOWN OF TANGIER 316

TOWN PROFILE 22.1
Socio-economic *22.2*
Built Infrastructure *22.4*
Natural Environment *22.10*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 22.11
Previous Hazard Mitigation Plans *22.11*
National Flood Insurance Program & Hazard Mitigation Grant Program *22.12*
HAZARD PROFILE 22.13
Pandemic Response and Readiness *22.13*
High Wind *22.13*
Coastal Erosion *22.14*
Coastal Flooding *22.16*
Storm Water Flooding *22.18*
Hazards of Local Significance *22.18*
Critical Facilities *22.20*
FINDINGS 22.22

CHAPTER 23: TOWN OF WACHAPREAGUE 338

TOWN PROFILE 23.1
Socio-economic *23.2*
Built Infrastructure *23.4*
Natural Environment *23.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 23.8
Previous Hazard Mitigation Plans *23.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *23.9*
HAZARD PROFILE 23.11
Pandemic Response and Readiness *23.11*
High Wind *23.11*
Coastal Erosion *23.13*
Coastal Flooding *23.14*
Storm Water Flooding *23.17*
Hazards of Local Significance *23.18*
Critical Facilities *23.19*
FINDINGS 23.20

CHAPTER 24: NORTHAMPTON COUNTY 359

COUNTY PROFILE 24.1
Socio-economic *24.2*

Built Infrastructure *24.4*
Natural Environment *24.10*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 24.11
Previous Hazard Mitigation Plans *24.11*
National Flood Insurance Program & Hazard Mitigation Grant Program *24.12*
HAZARD PROFILE 24.14
Pandemic Response and Readiness *24.14*
High Wind *24.14*
Coastal Erosion *24.15*
Coastal Flooding *24.16*
Storm Water Flooding *24.18*
Hazards of Local Significance *24.18*
Critical Facilities *24.19*
FINDINGS 24.20

CHAPTER 25: TOWN OF CAPE CHARLES 379

TOWN PROFILE 25.1
Socio-economic *25.2*
Built Infrastructure *25.4*
Natural Environment *25.8*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 25.9
Previous Hazard Mitigation Plans *25.9*
National Flood Insurance Program & Hazard Mitigation Grant Program *25.10*
HAZARD PROFILE 25.11
Pandemic Response and Readiness *25.11*
High Wind *25.11*
Coastal Erosion *25.12*
Coastal Flooding *25.13*
Storm Water Flooding *25.14*
Hazards of Local Significance *25.14*
Critical Facilities *25.15*
FINDINGS 25.16

CHAPTER 26: TOWN OF CHERITON 395

TOWN PROFILE 26.1
Socio-economic *26.2*
Built Infrastructure *26.4*
Natural Environment *26.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 26.8
Previous Hazard Mitigation Plans *26.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *26.9*
HAZARD PROFILE 26.9
Pandemic Response and Readiness *26.9*
Coastal Flooding *26.9*
Coastal Erosion *26.9*
High Wind *26.10*
Storm Water Flooding *26.10*
Hazards of Local Significance *26.10*
Critical Facilities *26.11*
FINDINGS 26.11

CHAPTER 27: TOWN OF EASTVILLE 406

TOWN PROFILE 27.1

Socio-economic *27.2*
Built Infrastructure *27.4*
Natural Environment *27.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 27.8
Previous Hazard Mitigation Plans *27.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *27.9*
HAZARD PROFILE 27.9
Pandemic Response and Readiness *27.9*
High Wind *27.9*
Coastal Erosion *27.10*
Coastal Flooding *27.10*
Storm Water Flooding *27.10*
Hazards of Local Significance *27.11*
Critical Facilities *27.12*
FINDINGS 27.13

CHAPTER 28: TOWN OF EXMORE 419

TOWN PROFILE 28.1
Socio-economic *28.2*
Built Infrastructure *28.4*
Natural Environment *28.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 28.8
Previous Hazard Mitigation Plans *28.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *28.9*
HAZARD PROFILE 28.10
Pandemic Response and Readiness *28.10*
High Wind *28.10*
Coastal Erosion *28.11*
Coastal Flooding *28.11*
Storm Water Flooding *28.11*
Hazards of Local Significance *28.12*
Critical Facilities *28.13*
FINDINGS 28.14

CHAPTER 29: TOWN OF NASSAWADOX 433

TOWN PROFILE 29.1
Socio-economic *29.2*
Built Infrastructure *29.4*
Natural Environment *29.7*
HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES 29.8
Previous Hazard Mitigation Plans *29.8*
National Flood Insurance Program & Hazard Mitigation Grant Program *29.9*
HAZARD PROFILE 29.9
Pandemic Response and Readiness *29.9*
High Wind *29.9*
Coastal Erosion *29.10*
Coastal Flooding *29.10*
Storm Water Flooding *29.10*
Hazards of Local Significance *29.10*
Critical Facilities *29.11*
FINDINGS 29.11

CHAPTER 30: MITIGATION STRATEGIES DEVELOPMENT 444

Table of Contents

Vision Statement 30.1
Goal Development 30.1
Identified Issues *30.1*
Mitigation Goals *30.2*

CHAPTER 31: ACCOMACK COUNTY MITIGATION STRATEGIES 446

Introduction 31.1
Plan Maintenance *31.1*
Identified Goals & Strategies – Accomack County 31.2
Identified Mitigation Projects – Accomack County 31.3
Identified Mitigation Projects – Accomack County Towns 31.12

CHAPTER 32: TOWN OF CHINCOTEAGUE MITIGATION STRATEGIES 466

Plan Maintenance 32.1
Identified Goals & Strategies – Town of Chincoteague 32.2
Identified Mitigation Projects – Town of Chincoteague 32.3

CHAPTER 33: NORTHAMPTON COUNTY MITIGATION STRATEGIES 473

Plan Maintenance 33.1
Identified Mitigation Goals & Strategies – Northampton County 33.2
Identified Mitigation Projects – Northampton County 33.3
Identified Mitigation Projects – Northampton County Towns 33.8

APPENDIX A: REFERENCES 484

Hazard Mitigation Plan References A.1

APPENDIX B: HAZUS® RISK ANALYSIS 494

Hazus® Risk Analysis B.1
Hazus® Methodology *B.2*
Hazus® Software *B.3*
Data and Modeling Issues *B.6*

APPENDIX C: MEETINGS & OUTREACH 500

Jurisdiction Meetings C.1
Steering Committee Meetings C.2

APPENDIX D: RESOLUTIONS OF ADOPTION 544

INTRODUCTION

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

- Background
- Purpose
- Organization

BACKGROUND

Since the 1960's, 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 for these types of disasters. It was during the 1960's that the National Flood Insurance Program (NFIP) was created in order to shift costs of disasters to those who choose to live in an area at risk. In the 70's, 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. The Stafford Act was passed in the 80's with the intent to standardize federal response and institute programs to decrease disaster vulnerability for the United States. In the early 1990's, 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 80's-early 90's saw some of the largest disasters the country had ever experienced. This included multiple billion-dollar events, such as Hurricane Hugo, the Loma Prieta Earthquake, the Northridge Earthquake, Oakland Wildfires, the Midwest Floods of 1993, Hurricane Andrew, and Hurricane Iniki.

In October of 2000, the United State 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 on the Eastern Shore of Virginia and the Accomack-Northampton Planning District Commission (A-NPDC) to undertake this work 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 2021, with the adoption occurring in 2022.

As these plans continue to evolve across the county, 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 damaged and economic losses that result from hazards;
- Make local communities safer places to live, work, and play;
- Assist localities in meeting the criteria for grant funding prior to and following disasters;
- Expedite the recovery and redevelopment process following disasters;
- Exhibit a commitment from localities for 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 Eastern Shore of Virginia.

Chapter 2: Planning Process

Narrates a complete description of the process used to prepared the Plan, including how the public and other stakeholders were involved and who participated on the Hazard Mitigation Plan Steering Committee.

Chapter 3: Risk Assessment

Identifies and analyzes hazards, assesses the risks associated with each hazard threatening 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 – 8: Hazards

Profile the five hazards that were given the highest priority ranking: High Wind, Coastal Erosion, Coastal Flooding, Storm Water Flooding, and Pandemic. Each chapter provides background information, historical accounts, explanations of potential damages, and vulnerability overviews regarding each of the four high-priority hazards.

Chapter 9: The Region

Provides insight to the potential impacts of hazards on the regional level. As rural, low-populated, and isolated counties in Virginia, many entities must operate at a regional level to be successful and efficient with resources. This was a new chapter added at the adoption of the 2016 Plan and provides a significant level of detailed information.

Chapters 10 – 23: Accomack County and its Localities

Profile Accomack County and participating incorporated towns within the County. Communities are ordered alphabetically and provide a general description including geographic, physical, demographic, and economic characteristics. In addition, land-use patterns, general historical disaster data, and building characteristics are discussed. These profiles assist County officials and residents by providing baseline information on concerning environmental and economical characteristics that play a role in determining hazard vulnerability.

Chapters 24 – 29: Northampton County and its Localities

Profile Northampton County and incorporated towns within the County. Communities are ordered alphabetically and provide a general description including geographic, physical, demographic, and economic characteristics. In addition, land-use patterns, general historical disaster data, and building characteristics are discussed. These profiles assist County officials and residents by providing baseline information on concerning environmental and economical characteristics that play a role in determining hazard vulnerability.

Chapters 30 – 34: Regional Visions & Goal Statements

Guides the identification and prioritization of specific mitigation projects for the region and for each local government jurisdiction participating in the planning process and funding options for implementation. 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 31, 32, and 33 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 34 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 functions through the identification of short-term and immediate actions that will guide daily decision making and project implementation.

LIST OF ACRONYMS USED THROUGHOUT THE PLAN

ACS – American Community Survey
ANEC – A & N Electric Cooperative
A-NPDC – Accomack-Northampton Planning District Commission
ANRHA – Accomack Northampton Regional Housing Authority
ANTDC – Accomack Northampton Transportation District Commission
BFE – Base Flood Elevation
CBBT – Chesapeake Bay Bridge Tunnel
CBPA – Chesapeake Bay Preservation Area
CDBG – Community Development Block Grant
CRS – Community Rating System
ESCC – Eastern Shore Community College
ESHD – Eastern Shore Health District
ESVA – Eastern Shore of Virginia
ESVBA – Eastern Shore of Virginia Broadband Authority
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
HMP – Hazard Mitigation Plan
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
RL – Repetitive Loss
RMA – Resource Management Area
RPA – Resource Protection Area
SFHA – Special Flood Hazard Area
SLR – Sea Level Rise
SRL – Severe Repetitive Loss
USACE – United States Army Corps of Engineers
USGS – United States Geological Survey
UVA LTER – University of Virginia Long Term Ecological Research
VCZM – Virginia Coastal Zone Management
VDEM – Virginia Department of Emergency Management
VDEQ – Virginia Department of Environmental Quality
VDOF – Virginia Department of Forestry
VDOT – Virginia Department of Transportation
VIMS – Virginia Institute of Marine Science
WFF – Wallops Flight Facility
WWTP – Waste Water Treatment Plant

MITIGATION TERMS – DEFINITIONS

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 Nation Flood Insurance Program.

Capability Assessment
An assessment that provides a description and analysis of a community or state's capability 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.

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 communities complete specified activities, the insurance premiums of policyholders in the community 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, emergency shelters, police stations, fire departments, hospitals, etc.

Debris
The scattered remains of assets broken or destroyed in a hazard event. Debris transported by a wind or flood hazard event can cause additional damage to other assets.

Disability
ACS: Covers six different disability types including heading, vision, cognitive, ambulatory (serious difficulty walking or climbing stairs), self-care (difficulty bathing or dressing), and/or independent living.

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 BFE 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 geological 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 or 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 Seal Level.

Flood Insurance Rate Map (FIRM)
Map of a community prepared by FEMA that shows both the SFHAs 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.

LAND USE CATEGORY DESCRIPTIONS

The following table describes land use categories mentioned throughout the plan and their descriptions.

Table 1: Land Use Category Descriptions

Land Use Category	Description
Developed	Areas characterized by a high percentage (30% or greater) of constructed materials. e.g., asphalt, concrete, buildings, etc.
High	Includes infrastructure (e.g., roads, railroads, etc.) and all highly developed areas.
Medium	Includes highly developed areas where people reside in high numbers. e.g., apartment complexes, row houses, etc. Vegetation accounts for less than 20% of the cover. Constructed materials account for 80-100% of the cover.
Low	Includes areas with a mixture of constructed materials and vegetation. Constructed materials account for 30-80% of the cover. Vegetation may account for 20-70% of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high-intensity residential areas.
Open	Includes areas that have approximately 100% vegetative cover. These areas could be large grass yards, recreational fields, golf courses, etc.
Planted/Cultivated	Areas characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber, or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75-100% of the cover.
Cultivated Crops	Areas used for the production of crops such as corn, soybeans, vegetables, rice, etc.
Hay/Pasture	Areas of grasses, legumes, pr grass-legume mixtures planted for livestock grazing or the production of seed of hay crops.
Natural	Areas where the vegetative cover is in balance
Forest Uplands	Areas characterized by tree cover (natural or semi-natural woody vegetation, generally greater than 6 meters tall); tree canopy accounts for 25-100% of the cover.
Deciduous Forest	Areas dominated by trees where 75% or more of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	Areas dominated by trees where 75% or more of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	Areas dominated by trees where neither deciduous nor evergreen species represent more than 75% of the cover present.
Low Vegetation	
Herbaceous	Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25%, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.
Shrub/Scrub	Areas dominated by shrub; shrub canopy accounts for 25-100% of the cover. Shrub cover is generally greater than 25% when tree cover is less than 25%. Shrub cover may be less than 25% in cases when the cover of other life forms (e.g., herbaceous or tree) is less than 25% and shrubs cover exceeds the cover of the other life forms.
Wetlands	Areas where the soil or substrate is periodically saturated with or covered with water, or may be present at or near the surface all year, seasonally, or varying periods.
Woody Wetlands	Areas where forest or shrubland vegetation accounts for 25-100% of the cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetations accounts for 75-100% of the cover and the soil or substrate is periodically saturated with or covered with water.

CHAPTER 1: HAZARDS ON THE SHORE

INTRODUCTION

It is believed that the worst disaster the Shore ever experienced in recorded history was the Great September Gust of 1821. 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. Its destruction was so complete 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, nor'easter, and tropical storms has proven to be the greatest natural hazard to people and property on the Eastern Shore of Virginia.

Coastal erosion, high coastal winds, and storm water flooding, in addition to several other secondary risks, have caused substantial damage to the communities and environments 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, as seen in Figure 1. The highest elevation on the Shore is near the Town of Melfa in Accomack County at 60 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 200,000 years. Sea level fluctuations during this time have created the landforms seen on the Eastern Shore today.

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. Nine of the islands still have development in some manner: Assateague, Chincoteague, Wallops, Cedar, Hog, Smith, and Fisherman's Islands in the Atlantic and Tangier and Saxis Islands in the Chesapeake Bay.

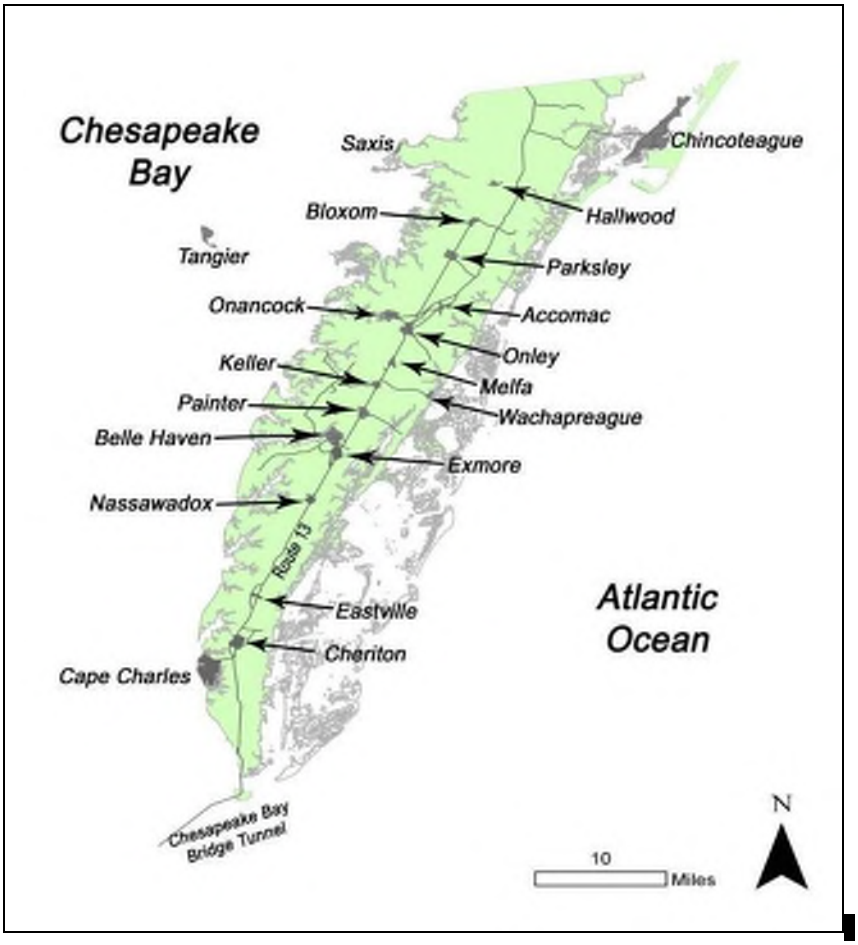


Figure 1: Vicinity Map of the Eastern Shore of Virginia

CHRONOLOGY OF HAZARD EVENTS ON THE SHORE

It is no surprise that four risks consistently rise to the top during the risk assessment process for the Eastern Shore: high winds, coastal flooding, coastal erosion, and storm water flooding. All four of these risks are typically embodied in the fierce, frequent, and familiar coastal storms known to area residents: hurricanes, tropical storms, tropical depressions, and nor'easters.

THE 20TH CENTURY

Major storms continued to pose hazards to life and property 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.

Table 1 outlines the major storms of the 20th century, and their lasting impacts on the Eastern Shore.

Table 1: Major 20th Century Storms affecting the Eastern Shore of Virginia

20th Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack/Northampton	8/23/1933	Chesapeake-Potomac Hurricane	-	-	The deadly Chesapeake-Potomac Hurricane of 1933, also called the August Storm, was a Category 1 storm that claimed the lives of six Eastern Shore residents. On Chincoteague, Main Street was flooded, and 25' waves broke over Assateague Island. The Towns of Cape Charles, Chincoteague, and Wachapreague, and the Villages of Willis Wharf and Kiptopeake all experienced flooding. Much of Tangier Island was inundated, and children jumped from second floor windows to swim. When the water receded, parts of the island were done.	*The Great Hurricane of 1933,* Assateague Naturalist, www.assateague.com; *God's Island: The History of Tangier*, Kirk Mariner.
Accomack/Northampton	9/18/1936	-	-	-	This seaside hurricane was transitioning from Category 2 to Category 1 when it crossed from North Carolina to Virginia, causing heavy damage to agriculture and aquaculture. Late crops were destroyed and some 60,000 broiler chickens were killed. 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 already been decimated by widespread disease, and the succession of storms in the 1930s was likely the main factor in wiping out the remaining eel grass population and crippling the industries associated with hard-shellfish varieties.	*God's Island: The History of Tangier,* Kirk Mariner; NOAA Historical Hurricane Tracks, https://coast.noaa.gov/hurricanes
Accomack/Northampton	8/14/1953	-	-	-	Category 1 hurricane that produced record rain on Tangier Island, 10.62" in Onley, and 10.43" in Accomack County.	NOAA Historical Hurricane Tracks, https://coast.noaa.gov/hurricanes

20th Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack/Northampton	10/15/1954	Hazel			Hurricane Hazel's eye tracked through the center of Virginia bringing damaging winds and 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 NOAA Historical Hurricane Tracks, https://coast.noaa.gov/hurricanes
Accomack/Northampton	10/1/1957	-	-	-	The nor'easter caused tides in the Town of Wachapreague four feet above normal and sank many boats. The storm also caused gusts of 70 mph and brought a great deal of rain.	*Flood Reports of the 1962 Ash Wednesday Storm,* USACE
Accomack/Northampton	9/12/1960	Donna	-	-	Donna was a Category 2 with 105 mph gusts as it swept past the Eastern Shore, but much of the damage was concentrated on the bay side. Flooding occurred in Cape Charles, Bayford, Onancock, and other areas on the Chesapeake Bay. Donna was considered the most destructive storm since accurate weather records began in 1840.	*Flood Reports of the 1962 Ash Wednesday Storm,* USACE
Accomack Co.	3/6/1962	Ash Wednesday Storm	$9,438,765	-	The islands of Chincoteague and Assateague were completely submerged. Hundreds of thousands of chickens died, along with Chincoteague's poultry industry. Dead chickens posed an extreme health hazard causing the health department to ask all women, children, and elderly to evacuate. A million dollars in damage was done to NASA's Wallops Island Launch facility. One hundred Assateaugue ponies were killed, five homes destroyed, and 1,000 inundated by stormwater. Ninety percent of Chincoteague's automobiles were flooded.	*Flood Reports of the 1962 Ash Wednesday Storm,* USACE,

20th Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack Co.	3/28/1984	-	-	-	Nor'easter of March 1984 took a track over the lower Chesapeake Bay. The storm hit Accomack County especially hard, with the worst tidal flooding since the Ash Wednesday Storm of 1962. Saxis and Onancock were flooded up to 5' of water while Tangier had water over 75% of the island. East Point, Chesconnessex, Mears, and Sanford were all flooded.	Accomack Community Rating System Application
Accomack Co.	9/27/1985	Gloria	-	-	Hurricane Gloria brushed past the Eastern Shore causing $2 million in damage to Accomack Co. The storm was a Category 2 that caused wind gusts and rain, but did not directly strike the area.	Accomack Community Rating System Application
Accomack / Northampton	10/31/1991	Halloween Nor'easter	-	-	Halloween Nor'easter hit unexpectedly, stranding residents, damaging barrier islands, and destroying piers and a motel.	Accomack Community Rating System Application
Northampton Co.	8/28/1992	Andrew	-	-	Winds associated with Hurricane Andrew remnants blew down trees. No wind speed estimate available.	NOAA, National Climatic Data Center
Accomack / Northampton	9/6/1996	Fran	-	-	Hurricane Fran was downgraded to tropical storm status as it arrived in Virginia, but still brought damaging winds.	Accomack Community Rating System Application
Accomack / Northampton	1/27/1998	Twin Nor'easter #1	-	-	Nor'easter Jan. 27-28. Slow storm movement combined with high astronomical tides created moderate coastal flooding. Two-4" of rain caused widespread flooding on streets and in poorly drained areas in both counties.	NOAA, National Climatic Data Center

20th Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	2/3/1998	Twin Nor'easter #2	-	-	Nor'easter Feb. 3-5. Slow movement with extended period of gale-force winds resulted in moderate to severe coastal flooding. Rainfall totals of 5-7" also brought widespread storm water flooding and 46 mph winds.	NOAA, National Climatic Data Center
Accomack / Northampton	9/1/1999	Dennis	$10,218	-	Hurricane and Tropical Storm Dennis, Aug. 30-Sep. 5. One of the most prolonged periods of tropical cyclone conditions across eastern Virginia on record. Moderate coastal flooding and 46 mph winds.	NOAA, National Climatic Data Center
Accomack Co.	9/5/1999	Floyd	$5,194,081	$19,808,110	Hurricane Floyd was a Category 1 Hurricane when it impacted the Eastern Shore. Ten to 20" of rain brought flash floods along with 7' storm surge, which damaged 300 buildings in both counties.	Accomack Community Rating System Application
Accomack / Northampton	10/17/1999	Irene	$1,522,088	$3,657,775	Hurricane Irene brushed by the Eastern Shore bringing gusty winds, locally heavy rainfall, and widespread flooding and road closures. Highest sustained wind of 45 mph, with a peak gust of 66 mph, was recorded at Wachapreague; sustained wind of 49 mph, with gusts to 63 mph, recorded at Kiptopeke. Rainfall totals ranged from 5-9.5". Storm tides generally 4-5' above astronomical tides in Accomack; 3-4' in Northampton. The tide level at Wachapreague reached 9.30'; 6.46' in Kiptopeke. Irene spawned a tornado near Chincoteague.	NOAA, National Climatic Data Center



Figure 2: Flooding during the Ash Wednesday Storm of 1962. Photo printed in the Army Corp of Engineers Flood Plain Report for Wachapreague

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.

Table 2 summarizes the major storms affecting the Eastern Shore of Virginia since year 2000. The eight storms detailed in the table resulted in over $87 million* in damages from Eastern Shore residents, businesses, and farmers.

Table 2: Major 21st Century Storms Affecting the Eastern Shore of Virginia

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack/Northampton	4/10/2003	-	$30,839	-	A spring nor'easter produced strong gusts up to 55 mph. The winds also downed some trees and utility poles, as well as produced minor structural damage.	*NOAA, National Climatic Data Center*
Accomack/Northampton	9/18/2003	Isabel	-	$15,419,348	Hurricane Isabel made landfall over Ocracoke, NC, and continued overland toward Richmond. ESVA communities of Wachapreague, Oyster, Tangier, and Saxis all had significant coastal flooding. Farmers reported crop loss due to salt spray. Storm surge inundated communities on seaside and bayside. Wachapreague, Tangier, and Saxis all experienced significant coastal flooding. Wachapreague's tide monitor was swept away. Salt spray coated power lines causing outages until precipitation washed lines clean. Rainfall totaled 1-2". Winds reached 74 mph.	NOAA, National Climatic Data Center, local oral accounts of the storm, NOAA Isabella Post-Storm Summary
Northampton Co.	8/14/2004	Charley	-	-	Tropical Storm Charley involved sustained winds of 45 mph at CBBT, 51 mph estimated gusts. Rain measured 3.17" at Wallops	NOAA National Hurricane Center

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack/Northampton	9/1/2006	Ernesto	$45,034,284	$0	Tropical Depression Ernesto interacted with a strong weather front to produce a tight pressure gradient resulting in high winds that caused numerous downed trees and power outages, along with significant structural damage. Tides were 4-5' above normal, and 6-8' waves caused significant damage to homes, piers, bulkheads, boats, and marinas. Sustained winds of 34 mph and gusts to 51 mph at Kiptopeke; 44 mph at Wallops. Delmarva Power reported 49,000 residents without power in MD and the Eastern Shore of VA.	NOAA, National Climatic Data Center; Tropical Storm Ernesto Post-Storm Report, NWS, 2006
Accomack/Northampton	9/6/2008	Hanna	$672,055	$0	Tropical Storm Hanna produced heavy rain and gusty winds across much of the county. Few trees were downed. Rainfall amount of 1.16 inches was recorded near Onancock.	NOAA, National Climatic Data Center
Accomack Co.	11/12/2009	Nor'Ida	$5,303,146	$0	An intense nor'easter formed from the remnants of Hurricane Ida and produced heavy rain across much of central and eastern Virginia. Rainfall amounts ranged from three to as much as thirteen inches over the area, with the highest totals between seven and thirteen inches occurring over southeast Virginia.	NOAA, National Climatic Data Center

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	8/27/2011	Irene	$1,702,757	$3,657,775	Hurricane Irene moving northward over the outer banks of North Carolina and just off the Virginia and Maryland coasts produced heavy rains which caused widespread flooding across most of central and eastern Virginia Saturday afternoon, August 27th into early Sunday morning, August 28th. Storm total rainfall generally ranged from three to as much as eleven inches. Widespread low-land flooding was reported across the area, including roadways which were washed out or closed. Tornado spawned from Irene downed trees and caused minor roof damage.	NOAA, National Climatic Data Center

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	10/28/2012	Sandy	$15,962,366	$0	Hurricane/Superstorm Sandy caused widespread coastal flooding and erosion, storm water flooding, and brought very strong winds that downed numerous trees and power lines and produced minor structural damage. Water levels reached 3.0 feet to 5.0 feet above normal adjacent to the Chesapeake Bay and Atlantic Ocean resulting in moderate to severe coastal flooding. Wachapreague reached a tide height of 8.40 feet MLLW. The towns of Chincoteague, Saxis, and Sanford received the most significant damage, with estimated losses near two million dollars in Chincoteague alone.	NOAA, National Climatic Data Center

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	9/2/2016	Hermine	$5,985	-	Tropical Storm Hermine moving northeast along the Southeast Coast then off the Mid Atlantic Coast produced tropical storm force winds, minor to moderate coastal flooding, and locally heavy rainfall across portions of Hampton Roads, the Middle Peninsula, and the Virginia Eastern Shore from Friday afternoon, September 2nd into Saturday night, September 3rd. Rain bands associated with Tropical Storm Hermine produced generally 0.5 inch to 1.75 inches of rainfall across the county. Cape Charles (5 ENE) reported 1.35 inches of rain. Cape Charles (5.8 NNE) reported 0.83 inch of rain. Wind gust of 38 knots was measured at Kiptopeke State Park. Tropical storm wind gusts caused minor tree and structural damage. Coastal storm tides of 2 to 3 feet above astronomical tide levels were common, with only minor beach erosion reported. The maximum storm tide reached 5.46 feet MLLW at Kiptopeke, which resulted in moderate coastal flooding Saturday morning into Saturday afternoon.	NOAA, Storm Events Database

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	10/8/2016	Matthew	$598,514	-	The combination of a cold front moving through the Mid-Atlantic and Post Tropical Cyclone Matthew tracking northeast just off the North Carolina and Virginia coasts, produced heavy rain which caused flooding across portions of the Virginia Eastern Shore from Saturday night, October 8th into early Tuesday evening, October 11th. Heavy rain caused an extended period of significant flooding across portions of the counties. Several roads were impassable or closed for a couple of days, and some homes and businesses were impacted.	NOAA, Storm Events Database
Accomack / Northampton	10/20/2019	Nestor	-	-	Remnant low pressure of Tropical Storm Nestor tracked northeast across eastern North Carolina and off the southeast Virginia coast. This storm produced heavy rain which caused some minor flooding across portions of central and eastern Virginia. Rainfall totals ranged from 1.5 inches to near 4.5 inches.	NOAA, Storm Events Database
Accomack / Northampton	9/17/2020	Sally	-	-	Post Tropical Cyclone Sally tracking northeast across the Southeast United States and off the Mid Atlantic Coast produced heavy rain across portions of Central and Eastern Virginia. Rainfall totals were between 1 and 4 inches.	NOAA, Storm Events Database

21st Century Storms						
County	**Date**	**System Name**	***Property Damage ($)**	***Crop Damage ($)**	**Description**	**Source**
Accomack / Northampton	10/11/2020	Delta	-	-	Post Tropical Cyclone Delta tracking east northeast across the Middle Atlantic region produced heavy rain across portions of central and eastern Virginia. Rainfall totals generally ranged between two inches and four inches across the county.	NOAA, Storm Events Database

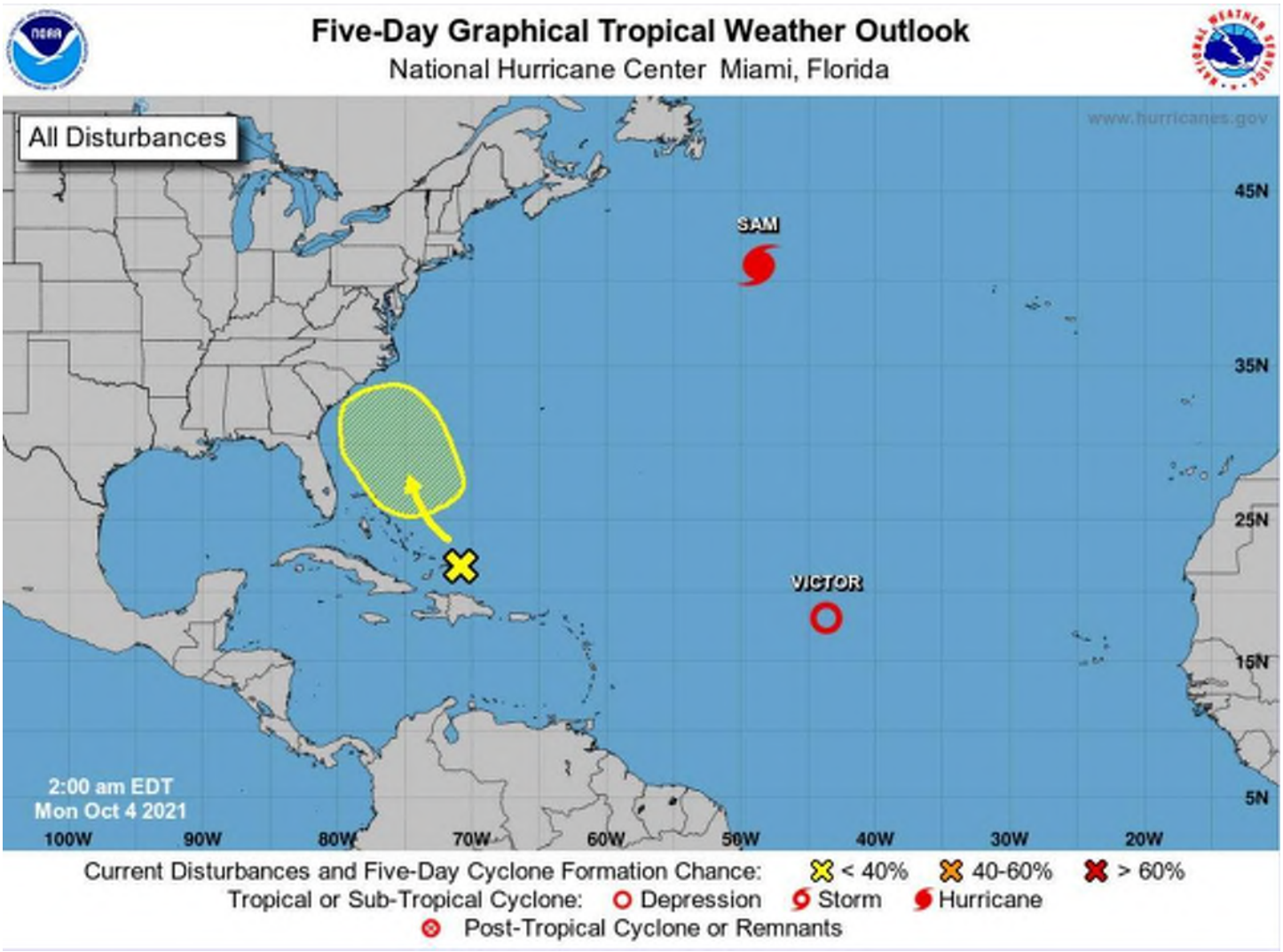
*All figures have been adjusted for inflation to 2022 dollars

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, radio, internet, and mobile phone alerts (including CodeRED alert system) 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 (the other is in Alaska) (Figure 3). This facility provides accurate weather data to the entire nation and also has a global reach, monitoring natural phenomena around the world such as sea surface temperatures, forest fires, icebergs in shipping lanes, hurricanes, tsunamis, and earthquakes, among others.

Figure 3: An example of modern storm tracking data issued by the National Hurricane Center (NHC) Courtesy of NOAA



CHAPTER 2: PLANNING PROCESS

PLAN DEVELOPMENT PROCESS OVERVIEW

The Eastern Shore's first Hazard Mitigation Plan was completed in 2006, a hallmark in Shore-wide planning for the protection of citizens, businesses, and visitors alike. The 2011 update built off that initial success, bringing in additional towns and new technology. Technological improvements between 2011 and 2016 spurred a complete rewrite of the plan.

The update to the 2021 plan began during the COVID-19 pandemic. Though traditional hazard planning is still an integral piece of the update process, the pandemic brought new challenges and a greater focus for developing plans to address pandemics. This focus can be seen by the inclusion of a new chapter in this plan, focused entirely on pandemics. The COVID-19 pandemic moved in-person meetings onto a virtual format, with the committee joining meetings via web link or through phone call. The Berkley Group, a consulting firm, worked with A-NPDC to manage meetings and to update the plan's contents.

2021 HAZARD MITIGATION PLAN PARTICIPATION

A-NPDC endeavored to engage all 19 towns, along with both counties, on the Eastern Shore. All but one community joined the planning process, with the towns of Accomac and Painter joining for the first time. A total of 18 jurisdictions participated in the planning process, plus Accomack and Northampton Counties.

Participating towns and counties were invited to join the plan's Steering Committee and to designate their own representatives. Additional stakeholders were identified and invited to join the Steering Committee as well. The 2020-21 plan update did not include a distinction between the Steering Committee and the Planning Council, as the 2016 plan did. All members of the Steering Committee were invited to participate in all meetings and to receive all agendas and other meeting materials.

More than 30 agencies and organizations were invited to join the Steering Committee, from local historical and cultural nonprofits, social services, and neighboring county governments across the state line in Maryland. All received the same agenda and packet materials and were invited to attend all meetings, but not all were regular participants. Some that were not regular participants were called upon by A-NPDC staff when their expertise was needed, whether for a particular meeting, or while drafting materials to take before the committees.

Monthly meetings were held via the online video conference tool, Zoom. Committee members received a link to the meeting and a phone number to dial in, if needed. These meetings, which were open to the public, were held on the third Tuesday of each month. Email blasts and website posts encouraged participation from the public; however, social distancing guidelines and the attempt to reduce the spread of COVID-19 led the Committee to hold all meetings virtually. The COVID-19 pandemic provided for limited public outreach opportunities, compared to the 2016 Plan. The kickoff meeting with the committee was held on December 1, 2020. Email invitations were distributed to the Steering Committee and meeting dates and log-in information was posted on the A-NPDC web site.

An iterative process was used, with A-NPDC staff assembling information and presenting the information to the combined committees at regular meetings. Additionally, A-NPDC staff met with each local government to discuss their individual chapters of the plan.

During the 2016 planning process, a chairperson, James Eichelberger, and vice chairperson, Peter Stith, had been elected by the committee. Due in part to the pandemic, the 2020-21 Steering Committee chose to move ahead with the planning process without electing a chair and vice-chair.

2021 HAZARD MITIGATION PLAN – PARTICIPATING JURISDICTIONS

Jurisdiction	2006	2011	2016	**2021**
A-NPDC	X	X	X	**X**
Accomack County	X	X	X	**X**
Chincoteague	X	X	X	**X**
Saxis	X	X	X	**X**
Hallwood	-	X	X	**X**
Bloxom	-	X	X	**X**
Parksley	-	X	X	**X**
Tangier	X	X	X	**X**
Accomac	-	-	-	**X**
Onley	-	X	X	**X**
Onancock	X	X	X	**X**
Melfa	-	-	X	**X**
Wachapreague	X	X	X	**X**
Keller	-	X	X	**X**
Painter	-	-	-	**X**
Belle Haven	-	-	-	**-**
Northampton County	X	X	X	**X**
Exmore	-	X	X	**X**
Nassawadox	-	-	X	**X**
Eastville	-	X	X	**X**
Cheriton	-	-	X	**X**
Cape Charles	X	X	X	**X**

2021 HAZARD MITIGATION PLAN – STEERING COMMITTEE MEMBERS

First	Last Name	Jurisdiction	Position
Kerri	Atkinson	Painter	Town Clerk
Thomas	Beasley	Bloxom	Mayor
Mark	Bowden	Chincoteague	Building and Zoning Administrator
Jeb	Brady	Cape Charles	Code Official
Tom	Brockenbrough	Accomack County	Floodplain Administrator/GIS Coordinator
Connie	Campbell	Painter	Mayor
Laurie	Chamberlain	Onley	Town Administrator
Donna	Croushore	Saxis	Town Council Member
Jackie	Davis	Cheriton	Mayor
Sarah	Dickey*	Accomack County	Deputy Coordinator of Emergency Management
Denise	Drewer	Saxis	Mayor
Robert	Duer	Exmore	Town Manager
Taylor	Dukes	Wachapreague	Director of Utilities and Zoning
Jeanette	Eby*	Bloxom	Town Clerk
David	Eder	Eastville	Chief of Police
Kim	Fitzpatrick	Nassawadox	Town Council Member
Andrea	Fox	Nassawadox	Town Council Member
Keith	Greer	Parksley	Chief of Police
Chris	Guvernator*	Accomack County	Director of Environmental Programs
Teresa	Guy	Keller	Vice Mayor
Greg	Hardesty	Cheriton	Town Council Member
Sharon	Hart	Keller	Mayor
Arthur	Leonard	Chincoteague	Mayor
Lauren	Lewis	Parksley	Town Clerk
Susan	McGhee	Northampton County	Director of Planning
Billie J.	Miles*	Accomack County	Department of Public Works
Jackie	Poulson	Hallwood	Mayor
Charles	Pruitt	Accomack County	Director of Public Safety
Bryan	Rush	Chincoteague	Director of Emergency Services
Jayme	Salazar	Onley	Town Manager
Danny	Shrieves	Hallwood	Town Clerk
Danny	Siegert	Parksley	Zoning & Floodplain Administrator
Pat	Smith	Accomac	Mayor
John	Spivery	Onley	Chief of Police
Matt	Spuck	Onancock	Town Manager
Patsy	Stith	Nassawadox	Mayor
Jim	Sturgis	Eastville	Mayor
Laurie	Thomas	Tangier	Town Manager
Michael	Tolbert	Chincoteague	Town Manager
Charles	Wilbur	Melfa	Mayor
Robert	Williams	Wachapreague	Floodplain Admin./CRS Coordinator

*Hazard Mitigation Steering Committee Alternate

2021 HAZARD MITIGATION PLAN – OTHER PARTICIPANTS

First	Last Name	Jurisdiction	Position
Shannon	Alexander	A-NPDC	Director of Planning
Ashley	Mills	A-NPDC	Regional Planner
Thomas	Hicks	The Berkley Group	Planning Director
Jonathan	McCoy	The Berkley Group	Planner
Aaron	Berryhill	The Berkley Group	Planner
Harrison	Bresee	VDEM	All Hazards Planner
Bruce	Sterling	VDEM	Region V Coordinator

Figure 1: Steering Committee Members Participating in a Virtual Meeting



PUBLIC PLANNING PROCESS AND OUTREACH EFFORTS

A combination of strategies was used to generate interest and participation both in the plan and issues addressed in the plan. The 30+ organizations and agencies represented in the stakeholder's group were selected both for their expertise and the individuals and interests they represent, so that our reach would be broad and deep.

The following section 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

The public were invited to attend all meetings of the Hazard Mitigation Steering Committee, which were publicly posted and held via Zoom and by dial-in. The A-NPDC used the A-NPDC website and Facebook page and sent email blasts to encourage public attendance. Following the FEMA review and prior to HMP adoption the A-NPDC used the same process to advertise to the public. Several attempts at public participation were made; however, there was a lack of public attendance at the Steering Committee meetings. The A-NPDC had some members of the public reach out regarding information about the plan, concerns of hazards in their community, and grant program information.

BUSINESS

The Eastern Shore of Virginia Chamber of Commerce, the Northampton County Chamber of Commerce, and the Chincoteague Chamber of Commerce were invited to appoint a representative to the Planning Committee. Evelyn Shotwell of the Chincoteague Chamber of Commerce participated in some virtual meetings throughout the planning process, including hazard identification and prioritization.

ACADEMIA

Wie Yusuf, Professor in the Strome College of Business at Old Dominion University and Program Lead of the ODU/Virginia Sea Grant Climate Adaptation and Resilience Program, attended the April meeting. Professor Yusuf delivered a presentation on the Resilience Adaptation Feasibility Tool (RAFT). This tool was developed to help Virginia's coastal localities improve resilience to flooding and other coastal storm hazards while remaining economically and socially viable (RAFT Mission & Goals, n.d.).

Scott Hall, Workforce and Business Solutions Officer, attended several meetings on behalf of Eastern Shore Community College.

Schools in both counties were invited to participate, although no participants joined the meetings.

GOVERNMENT AGENCIES

At the state level, Amy Howard, Hazard Mitigation Coordinator for Virginia Department of Emergency Management (VDEM), provided guidance throughout the process and participated in some meetings. Harrison Bresee, All Hazards Planner with VDEM, attended several meetings and worked closely with A-NPDC and Berkley Group staff in the update to the plan.

The Virginia Departments of Historic Resources, Forestry, and Conservation and Recreation were invited to participate in meetings. The Department of Social Services in both counties, the Virginia Department of Game and Inland Fisheries, and the Eastern Shore Soil and Water Conservation District (ESSWCD) were unable to attend meetings but were sent all meeting packets.

In addition to the Hazard Mitigation committees, the A-NPDC briefed the Eastern Shore Disaster Preparedness Coalition (ESDPC). This regional body is made up of federal, state, regional, and local government officials with any type of role in preparing for, or responding to, disasters, so there is some overlap between the two groups. The coalition also includes representatives of businesses, physical and mental health services, communication providers, education, and private environmental providers. As a result of Covid-19 the A-NPDC staff did not participate in the coalition during the HMP plan development.

NON-PROFIT INTERESTS

Non-profit organizations were invited to participate in the update to the 2020-21 plan. These organizations include:

- Barrier Islands Center,
- Chincoteague Museum,
- Eastern Shore Amateur Radio Club.
- Eastern Shore Area Agency on Aging,
- Eastern Shore Center for Independent Living,
- Eastern Shore Coalition Against Domestic Violence,
- Eastern Shore Community Services Board,
- Eastern Shore Historical Society,
- Food Bank of Southeast Virginia, Eastern Shore,
- NAACP,
- Riverside Shore Memorial Hospital,
- Saxis Island Museum,
- The Nature Conservancy (TNC),
- Watermen's Museum, and
- Wetlands Watch

TNC provided support in several ways. In addition to participating in several meetings, TNC provided technical support to A-NPDC staff and the committees in the area of storm surge modeling and sea level rise, through its Coastal Resilience tool.

Seventeen hypothetical storms were modeled in building the Coastal Resilience tool, along with Nor'Ida, a nor'easter that formed from the remnants of Hurricane Ida in 2009. The model was calibrated using measured water depths from that storm. The depth grids, paths, and data from these hypothetical storms (before sea level rise factors were applied) were shared with A-NPDC staff for use in the storm surge analysis.

NEIGHBORING JURISDICTIONS

Somerset County, Maryland and Worcester County, Maryland are the only two Maryland Counties that border Accomack County. Both were added to the Steering Committee so that they would receive all development material and could participate in any discussions. Neither chose to participate in the plan development phase, however.

CONTINUED PLAN MAINTENANCE

Since the development of the 2016 plan, the participating towns and both counties have used the plan to develop other local plans. Accordingly, each town will keep a copy of their respective Chapter in their town hall and each county a copy of the entire plan in their respective planning offices for convenient reference. With these copies, there will also be a comment area provided for written comments and the contact information for A-NPDC staff in order to provide comment by email or phone.

In addition, the plan will be referenced in the event of funding availability and/or a disaster event. Mitigation actions will be revisited at least annually in an effort to track completions and add newly discovered potential mitigation actions.

All the mitigation actions for each jurisdiction were compiled into a master spreadsheet. This allows mitigation actions to be easily compared and tracked. The format also allows for easy updating and reference within the 5-year cycle.

The entire plan will remain indefinitely available on the A-NPDC website and in the A-NPDC office located in the Town of Accomac for stakeholder reference and use and for public comment.

PLAN EVALUATION

In addition to the Emergency Management Coordinator (EMC) evaluating the Plan annually according to Local Capability Readiness Assessment (LCAR) criteria, the A-NPDC staff will work together with the EMC to address the following concerns to evaluate if:

- The Plan offers mitigation actions that protect property, promote public awareness, aid emergency services, suggest preventative land use, structural controls, and protect natural mitigation features.
- Goals and objectives address current and expected conditions.
- The magnitude or nature of the risks have changed.
- Current resources are appropriate for implementing the Plan.
- Additional or different resources are now available.
- Implemented actions were cost effective.
- There were any implementation challenges.
- Changes in county/town resources impacted Plan implementation.
- Changes in programming or government structure have created a need to change the Plan.
- New agencies/departments/staff/organizations should be included.

DOCUMENTS AND RESOURCES

The Committee and A-NPDC staff drew on many written resources throughout all phases of plan development, referenced in Appendix A. Among the resources are local historical books and articles, U.S. Army Corps of Engineer Flood Reports of storms that struck the Eastern Shore, FEMA's 2011 Coastal Construction Manual, NOAA and USGS data, historical information, and technical information available through various government websites such as the Chincoteague National Wildlife Refuge on Assateague Island and VDEM, and local town and county plans. Staff also listened to local accounts of various hazard events.

Historic severe weather events data were extracted from the NOAA's National Climatic Data Center Severe Weather Events database and compiled as the basis for weather-related hazard information. Data from January 2000 through May 2021 are reflected in the Plan.

The Berkley Group used FEMA's multi-hazard Hazus® model to estimate flood losses for the one percent annual chance flood and hurricane wind losses. Complete documentation of the Hazus® modeling process can be found in Appendix C.

The Nature Conservancy's Coastal Resilience tool allows users to view storm surge under various sea level rise scenarios. The storm modeling that underlies that tool was used to model storm surge for the coastal flood risk assessment.

CHAPTER 3: RISK ASSESSMENT

RISK ASSESSMENT PROCESS

The process of risk assessment began with a collaborative discussion on January 19, 2021, via a zoom call. The Eastern Shore had a diverse group of attendees participate in the risk assessment representing local and state government, non-profits, and education interests. Together, they learned about historic hazards that have affected the Shore, the expected effect of sea-level rise on the frequency and intensity of tropical storms, and the role of hazard mitigation planning in protecting lives and property.

Participants also received information which identified risks in the last two hazard mitigation plans, and then participated in an Esri Survey123 to prioritize those hazards based on their own experiences, as well as new knowledge they had acquired from presentations. Participants also added to the hazard list if they judged there were any missing items.

A comprehensive list of hazards that were evaluated included:

Table 1: Types of Potential Hazards in the Eastern Shore of Virginia

Hazard Category	Hazard Type
Agriculture & Food Emergency	Invasive Environmental Species and Diseases
	Plant Disease or Infestation
	Food Contamination
	Farm Animal Disease
	Fish Kill
Environmental	Hurricane
	Coastal Flooding
	High Wind
	Storm Surge
	Coastal Erosion
	Non-Coastal Flooding
	Tornado
	Extreme Heat
	Thunderstorm
	Drought or Low Water
	Winter Weather
	Erosion- Not Coastal
	Land Subsidence
	Lightning
	Wildland Fire
	Extreme Cold
	Fog
	Earthquake
Extraterrestrial	Space Weather
	Space Object/Debris Crash
Hazardous Materials	Chemical
	Oil or Natural Gas
	Radiological

	Nuclear
Health	Pandemic
	Water Quality
	Infectious Disease
	Substance Use and Overdose
Public Safety	Active Threat
	Cyber Attack
	Civil Disorder
	Chemical, Biological, Radiological, Nuclear, and high yield Explosives
	Crowd Disaster
	Geopolitical Pressures
	Sabotage
	Electromagnetic Pulse
Structural	Fire/Explosion
	Building or Structural Failure
	Mine or Underground Structure Emergency
Supply & Distribution	Communications Failure
	Electrical Energy Failure
	Water or Wastewater Disruption
	Food Shortage
	Medical Drug, Blood Product or Supplies Shortage
	Petroleum Product Shortage
Transportation	Road and Highway
	Marine
	Public Transportation
	Aviation
	Rail

Participants were asked to rank and score each of the hazards based on the following:

- *Probability*
- *Affected Communities*
- *Primary / Secondary Impacts*

The scores were compiled and averaged by A-NPDC staff and shared with the Steering Committee members. Hazards were reviewed and then divided into three priorities: high, medium, and low.

The resulting prioritization was presented at the next meeting on February 16, 2021. At that meeting, the prioritization of hazards was slightly revised, and similar categories from previous HMP documents were combined. The high priority hazards – coastal flooding, wind, coastal erosion, and storm water flooding – did not change, and remained consistent with the previous hazard mitigation plans (Table 2). Although hazards such as ice/snow, drought, and wildfire were ranked as low or medium in previous plans, Steering Committee members elected to not rank these hazards for the current update in order to focus on hazards that impact the region more frequently. These hazards are still included and described in some locality chapters, however, as each locality has special circumstances surrounding their infrastructure, emergency response capabilities, and ability to recover following a hazard. Scoring results were clearly indicative of these five hazards being the most probable, most frequent, and affects the most communities in the region – by far. Each of these five identified priority hazards and their impacts are described in each respective locality chapter, as well as identified secondary, local hazards for each jurisdiction. Hazards identified in these chapters are to be reassessed annually and amended in the plan as needed.

Table 2: Eastern Shore of Virginia Hazard Prioritization

Hazard	2006	2011	2016	2021
High Wind	High	High	High	High
Coastal Erosion	High	High	High	High
Coastal Flooding	High	High	High	High
Storm Water	High	High	High	High
Pandemic	-	-	-	High*
Well Contamination (Water Quality)	Medium	Unranked	Medium	Medium
Ice-Snow	Medium	Medium	Medium	Unranked
Biological Hazards (Infectious Disease)	Medium	Unranked	Medium	Medium
Drought	Medium	Medium	Medium	Unranked
Sewage Spills	Medium	Medium	Medium	Unranked
Storm Surge	-	-	-	Medium*
Non-Coastal Flooding	-	-	-	Medium*
Road and Highway	-	-	-	Medium*
Wildland	Low	Medium	Low	Unranked
Hazardous Materials Incidents	Low	Low	Low	Unranked
Heat Wave	Low	Low	Low	Unranked
Fish Kills	Low	Unranked	Low	Unranked
Invasive Environmental Disease	Low	Unranked	Low	Unranked
Earthquake	Low	Unranked	Low	Unranked
Substance Use and Overdose	-	-	-	Low*
Communications Failure	-	-	-	Low*
Active Threat	-	-	-	Low*
Electrical Energy Failure	-	-	-	Low*
Tornado	-	-	-	Low*

*New Priority Identified in the 2021 Plan

With the hazards identified, the group began the risk analysis for the five priority hazards: coastal flooding, wind, coastal erosion, storm water flooding and pandemic. The first step was to thoroughly document their histories, to understand the causes, and to look at the human systems that have been put in place to attempt to mitigate their effects. This work can be found in Chapter 4: High Wind; Chapter 5: Coastal Erosion; Chapter 6: Coastal Flooding; Chapter 7: Storm Water; and Chapter 8 Pandemic

The extent and vulnerability of each of the four high priority environmental hazards, are documented in each of the locality chapters, beginning with Chapter 9: The Region. Structures insured by the National Flood Insurance Program (NFIP) that have been repetitively damaged by floods are addressed in the appropriate local chapters.

CHAPTER 4: HIGH WIND

INTRODUCTION

The Eastern Shore's location between two coastal bodies, the Chesapeake Bay and the Atlantic Ocean, makes it vulnerable towards high wind events. Hurricanes, coastal spouts, tornadoes, tropical storms, and nor'easters are some of the high wind events that cause the shore to be designated as within the 110 to 120 mph zone. This means that structures built should be able to withstand 110 mph per building code standards. This is consistent with a strong Category 1 hurricane whose 3 second gusts could be anywhere from 93 to 119 mph. High wind events on the Eastern Shore are identified in Table 1. These events were sourced from the NOAA Storm Events Database and do not reflect all high wind events on the Eastern Shore.

NATURAL FORCES AND CONDITIONS

CAUSES OF HIGH WIND

HURRICANES, TROPICAL STORMS, AND TROPICAL DEPRESSIONS

Tropical cyclone storms are reviewed in detail in Chapter 6 – Coastal Flooding, but that discussion centers on coastal flooding, not wind speed, which is the key measure of hurricane intensity as shown in the Saffir-Simpson Wind Scale. However, wind speed is also used to differentiate tropical depressions, tropical storms, and post-tropical depressions.

NOR'EASTERS

Nor'easters, or Northeasters, usually occur in the mid-latitudes over the winter months from September to April. These storms are generally very large and slow moving and can cause severe and widespread damage at the same level as their stronger summer counterpart, the hurricane (USGS, St. Petersburg Coastal and Marine Science Center).

TORNADOES

"We got an emergency message on a cellphone and within 30 seconds, the thing hit and it blew down 40, 50 trees in the park." That's how one man described the early morning EF1 tornado that struck Cherrystone Campground on July 24, 2014, killing three and injuring 36. The popular summertime destination on the Chesapeake Bay near Cheriton, Virginia was packed with 1,328 adults and children and 40 staff members at the time. A New Jersey couple was killed instantly when a tree fell on their tent. Their son, who was in a neighboring tent, died days later from a head injury, also from a fallen tree.

The tragedy brought into sharp focus the dangers posed by tornadoes. The July 24 twister was one of Virginia's deadliest, and although the National Weather Service Office issued a tornado warning 20 minutes before it hit, campers were caught off guard, forcing early risers to scramble for cover and catching others completely unaware.

The catastrophe made national news, and since then the Eastern Shore Disaster Preparedness Coalition has been working cooperatively with campgrounds on preparing materials to be provided to campers at check-in about where to seek shelter during storms and other camper safety information.

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.

Table 1: High Wind Events Recorded in NOAA Storm Events Database, 2011-2021 (Excluding Tropical Cyclones and Nor'easters)

County	Date	Event Category	Property Damage ($, not adjusted for inflation)	Crop Damage ($, not adjusted for	Source	Narrative
Accomack Co.	2/25/11	High Wind	2000	0	ASOS	Wind gust of 61 mph was measured at Wallops Flight Facility Airport (WAL). Very strong gradient winds produced wind gusts to around 60 mph over portions of eastern Virginia.
Accomack Co.	8/27/11	Tornado	25000	0	Emergency Manager	Weak tornado (EF0) downed trees and caused minor roof damage. Hurricane Irene moving northward over the outer banks of North Carolina and just off the Virginia coast produced two tornadoes across portions of eastern and southeast Virginia during Saturday, August 27th.
Northampton Co.	6/1/12	Tornado	3000	0	NWS Storm Survey	The tornado was spawned from the same supercell which produced a tornado just east of the Monitor Merrimac Bridge Tunnel and moved across the city of Hampton before moving over the Chesapeake Bay. The tornado produced damage consistent with an EF-0, tossing around kayaks and shearing off the tops of several trees. The tornado occurred at the Savage Neck Dunes Natural Area Preserve.
Accomack Co.	7/14/12	Tornado	15000	0	NWS Storm Survey	A slow-moving tornado made a short narrow path through rural portions of Accomack County just east of Onley. The tornado first touched down in a small residential development just southwest of the intersection of Custis Neck Road and Drummondtown Road. Numerous trees were damaged or brought down by the tornado with one tree falling on an unoccupied vehicle. The tornado then continued slowly southwest through a wooded area with the last visible tree damage seen just southwest of Accawmacke Elementary School.

County	Date	Event Category	Property Damage ($, not adjusted for inflation)	Crop Damage ($, not adjusted for	Source	Narrative
Accomack Co.	10/29/12	High Wind	10000	0	911 Call Center	The very strong winds downed trees, produced minor structural damage, and caused scattered power outages. Wind gust of 59 knots (68 mph) was measured at WAL. Wind gust of 55 knots (63 mph) was measured at Accomack County Airport (MFV). Intense low pressure moving from off the northern Mid Atlantic Coast northwest into extreme southern New Jersey produced very strong west to northwest winds across eastern Virginia. The very strong winds downed numerous trees, produced minor structural damage, and caused scattered power outages.
Northampton Co.	10/29/12	High Wind	10000	0	911 Call Center	The very strong winds downed trees, produced minor structural damage, and caused scattered power outages. Intense low pressure moving from off the northern Mid Atlantic Coast northwest into extreme southern New Jersey produced very strong west to northwest winds across eastern Virginia. The very strong winds downed numerous trees, produced minor structural damage, and caused scattered power outages.
Accomack Co.	3/6/13	High Wind	3000	0	ASOS	Wind gust of 55 knots (63 mph) was measured at WAL. Intense low pressure moving off the Mid Atlantic Coast produced very strong northeast winds across southeast Virginia. The very strong winds downed trees, produced minor structural damage, and caused scattered power outages.
Accomack Co.	6/18/13	Funnel Cloud	0	0	Public	A funnel cloud was reported over Tasley. A cold front produced scattered showers and thunderstorms across central Virginia. Isolated severe weather produced strong winds, heavy rainfall, and a funnel cloud.
Northampton Co.	7/24/14	Tornado	200000	0	NWS Storm Survey	The tornado began in the Chesapeake Bay, a few miles west of Cherrystone Campground. The tornado then tracked eastward affecting the northern portions of Cherrystone Campground. The tornado then continued eastward across Old Cherrystone Road and Route 13 before lifting near Seaside Road close to the Northampton Landfill. Many trees were downed or snapped off. Numerous camping trailers were damaged, and several were destroyed. Several trees were downed on cabins.

County	Date	Event Category	Property Damage ($, not adjusted for inflation)	Crop Damage ($, not adjusted for	Source	Narrative
Accomack Co.	8/4/15	Tornado	2000	0	Public	A weak tornado was reported by several people near and east southeast of Saxis. Large limbs were downed in the road. Other debris was blown around. Scattered severe thunderstorms in advance of a cold front produced damaging winds, large hail, and one weak tornado across portions of the Virginia Eastern Shore.
Accomack Co.	1/23/16	High Wind	75000	0	ASOS	Wind gust of 61 knots (70 mph) was measured at WAL. Wind gust of 50 knots (58 mph) was measured at MFV. Numerous trees were downed on Chincoteague Island, with a few trees falling on homes. Strong Low Pressure moving from the Southeast United States northeast and off the Mid Atlantic Coast produced very strong wind gusts across portions of Eastern Virginia.
Northampton Co.	10/8/16	High Wind	75000	0	Emergency Manager	Post Tropical Cyclone Matthew tracking northeast just off the North Carolina and Virginia coasts, produced very strong northeast or north winds across portions of southeast Virginia from Saturday, October 8th into Sunday, October 9th. The very strong winds downed numerous trees, some onto homes, and caused some power outages.
Northampton Co.	8/7/17	Funnel Cloud	0	0	911 Call Center	Funnel cloud was reported near Birdsnest.
Accomack Co.	3/2/18	High Wind	25000	0	Emergency Manager	Wind gusts of 61 knots (70 mph) were measured at Chincoteague (1 WSW). Wind gust of 56 knots (64 mph) was measured at WAL. Intense low pressure spinning off the southern New England coast produced very strong northerly winds across portions of central and eastern Virginia. The very strong winds downed numerous trees, produced structural damage, and caused power outages.
Northampton Co.	3/2/18	High Wind	25000	0	Emergency Manager	Wind gust of 57 knots (66 mph) was measured at Kiptopeke State Park. Intense low pressure spinning off the southern New England coast produced very strong northerly winds across portions of central and eastern Virginia. The very strong winds downed numerous trees, produced structural damage, and caused power outages.

County	Date	Event Category	Property Damage ($, not adjusted for inflation)	Crop Damage ($, not adjusted for	Source	Narrative
Northampton Co.	10/11/18	High Wind	15000	0	Emergency Manager	Tropical Cyclone Michael tracked from South Carolina northeast and off the Mid Atlantic Coast from Thursday morning, October 11 into early Friday morning, October 12. Very strong northwest winds on the back side of the storm produced damaging wind gusts across portions of south central, eastern, and southeast Virginia. Numerous trees were downed and there was minor structural damage. Several campers were overturned or damaged at Cherrystone campground.
Accomack Co.	10/11/18	High Wind	5000	0	Law Enforcement	Tropical Cyclone Michael tracked from South Carolina northeast and off the Mid Atlantic Coast from Thursday morning, October 11 into early Friday morning, October 12. Very strong northwest winds on the back side of the storm produced damaging wind gusts across portions of south central, eastern, and southeast Virginia. Numerous trees were downed and there was minor structural damage.
Northampton Co.	5/29/19	Thunderstorm Wind	5000		Emergency Manager	Isolated severe thunderstorm in advance of a trough of low pressure produced damaging winds across portions of the Virginia Eastern Shore. Several trees were downed and there was some light damage to weak structures in Eastville.
Accomack Co.	12/25/20	Thunderstorm Wind	2000	0	Utility Company	Scattered severe thunderstorms in advance of a strong cold front produced damaging winds and two tornadoes across portions of eastern and southeast Virginia. Trees were downed at Indian Trail Road and Scarboroughs Neck Road.

TYPE, LOCATION, AND EXTENT

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*, 2011).

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*, 2011).

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

EXPOSURE AND POTENTIAL LOSS

The building code requires all structures to withstand 110 mph winds, the equivalent of a Category 2 hurricane. However, a community shelter on the Eastern Shore must be built to withstand 160 mph winds, due to the Shore's categorization as a Zone II wind zone (ASCE 7-98). With these standards, a community shelter should withstand a F2 tornado and a Category 4 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*, 2011).

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 can be a factor in wind damage. 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*, 2011).

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*, 2011).

SECONDARY HAZARDS

Auxiliary hazards of high wind are salt spray and soil erosion. High winds can gather salt from the ocean and spread it 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. According to local oral accounts, these winds can cause significant soil erosion to fields in the winter, stripping critical nutrients from fields and depositing them in local waterways.

HUMAN SYSTEMS

There are various ways that property damage and personal injury can be minimized. Preparation is one of the most important of these. Resilient construction is key to this, as discussed previously in the Exposure and Potential Loss section above. Early warnings are also vital to ensuring that people can move to shelter prior to the onset of a high wind event.

WARNING ANNOUNCEMENTS

The National Weather Service provides warnings for high winds through their Land-based Wind Hazard Announcements and Water-based Wind Hazard Announcements. These warnings are available to the residents of the Eastern Shore via several delivery methods: television, radio, internet, and mobile phone alerts (including CodeRED alert system).

CONSTRUCTION STANDARDS

The 2011 FEMA Coastal Construction Manual lays out very specific design standards for wind, flooding, fire, and more. Design for wind loads is essentially the same whether the winds are due to hurricanes, thunderstorms, or tornadoes, and both Counties (and subsequently their respective incorporated Towns), go by these standards for building and zoning codes.

PERSONAL RESPONSIBILITY

Even if structures are built to the proper standard, regular maintenance to ensure their stability and resilience are important. FEMA has produced a guide to protecting property from high winds, available online in PDF format. Some of the recommendations include documenting the contents of the home for insurance purposes, building a safe room for sheltering during storm events, using storm shutters for windows and glass doors, reinforcing garage doors and double-entry doors, fortifying the roofs, securing objects outside the home, and more.

CHAPTER 5: COASTAL EROSION

INTRODUCTION

Standing on the pristine beach of Cobb Island in Northampton County, one would never know that the now-tranquil barrier island was a bustling recreational center in its prime where a harpist once entertained guests in the island's grand resort hotel (Figure 1: Advertisement for Cobb's Island Hotel).


COBB'S ISLAND HOTEL

ATLANTIC OCEAN.

OPEN ALL THE YEAR.

TERMS

Figure 1: Advertisement for Cobb Island Hotel

The Cobb's Island Hotel might have been lost in a single storm, but the setup came over the course of a couple of decades as the hotel went from being 500 yards from the surf to within 50 feet, according to authors of "A Short History of the Virginia Barrier Islands" (Barnes and Truitt, 1997). Erosion from a series of late century storms had made the hotel easy pickings for a nor'easter-hurricane double-punch in 1897.

Over the course of the subsequent 100 years, Tangier Island would see more than half of its land mass recede into the Chesapeake Bay, but officials are working to make sure that Cobb Island's history is not Tangier Island's future. The Town received a commitment from the Commonwealth and the Corps of Engineers in 2012 to build a seawall and jetty to protect the Town harbor. A contract to build the seawall and jetty was awarded to a Virginia-based firm in May 2020.

There are other factors that differentiate Cobb and Tangier Islands. For example, the conditions and energy to which they are subjected are vastly different. Cobb Island is part of a long chain of barrier islands subjected to a constant barrage of plunging ocean waves breaking onto the beach, while Tangier Island is within the Chesapeake Bay where wave energy is less intense and erosion is augmented primarily by sea-level rise and subsidence.

Erosion itself can be simply described as energy moving sediment. It can happen so incrementally that it goes almost unnoticed in the short-term and is best measured in years, or so dramatically that what was there one day is gone the next. Erosion becomes problematic when it threatens lives or property. With sea-level rise, that threat has become more prevalent.

On a peninsula, water and waves come to mind as primary drivers of erosion, but wind is also a powerful sculptor of land. The rate of erosion is also greatly influenced by underlying geology, and sometimes by man-made interventions in those natural processes - like the seawall and jetty proposed for Tangier. Those interventions can also have negative effects, like accelerating erosion in other locations, or destruction of natural bottom in front of the structure from reflected wave energy.

FEMA's 2011 Coastal Construction Manual describes the following ways that erosion can threaten coastal buildings:

- Destroying dunes or other natural protective features,
- Destroying erosion control devices,
- Lowering ground elevations,
- Undermining shallow foundations and reducing penetration depth of pile foundations,
- Transporting beach and dune sediments landward, where they can bury roads, buildings, and marshes,
- Breaching low-lying coastal barrier islands exposing structures on the mainland to increased flood and wave effects, and
- Eroding coastal bluffs that provide support to buildings outside the floodplain itself.

This chapter succinctly reviews the forces at work that cause erosion, how erosion changes the coastline and adjacent landforms over time, and erosion control measures that have attempted to redirect—at least temporarily—water's capacity to reshape land.

The focus of this chapter is to review changes to portions of the Eastern Shore landscape over time. Risk assessment is not found in this chapter but may be found in each locality chapter beginning with Chapter 8.

NATURAL FORCES AND CONDITIONS

CAUSES OF EROSION

Large tropical and extratropical storms are associated with three of the major causes of erosion: Water, wind, and waves. A list of major storms affecting the region can be found in Chapter 1: Hazards on the Shore.

WATER

Water picks up and transports sediments as it moves over land. Surface erosion by water will depend on the volume of water, the speed at which it is moving, the surface characteristics (vegetative cover, permeability, sediment grain size), and its slope. Coastal floods (discussed more thoroughly in Chapter 6 – Coastal Flooding) can be sources of coastal erosion as they pick up and move large quantities of water-borne sediment to be deposited elsewhere. Erosion from water can degrade coastal bluffs and tidal marshes, causing them to slump into adjacent water bodies.

Localized scour—the removal of sediment from around a fixed structure—can result from water moving at high velocity. Scour can undermine slabs or other at-grade foundations, causing them to fail, or expose other structural elements (FEMA Coastal Construction Manual, 2011).

Regardless of the source, sediment transported by water is left somewhere, and even experienced boaters have been caught on shoals that were not there the previous fall. Shoaling in some stretches of the Virginia Inside Passage, once a continuous seaside water passage buffered from the sea by the mainland to the west and the barrier islands to the east, has now rendered sections impassable, and others passable only at high tide.

WIND

Exposed soil is susceptible to wind erosion, and in coastal areas, sandy areas are prevalent. This same wind can remove sand around coastal buildings. This exposes buildings in velocity zones to higher-than-anticipated forces,

putting them at risk to these velocity flow hazards. Like water, wind can also scour sand from around structural supports (FEMA Coastal Construction Manual, 2011).

Wind contributes to wave height—another erosional force—through the interaction of three factors: wind speed, duration, and fetch - the distance over water that wind blows in a single direction. Slow wind speed will produce small waves, regardless of duration and fetch. Strong winds lasting only a few minutes will not produce large waves, and strong winds over a long period, but over a short stretch, will not result in large waves. All three factors must be present to produce significant wave height (NOAA, n.d.).

WAVES

Away from shore, waves do not have much forward motion. As they approach the shore, friction with the ocean bottom gives the top of the waves forward momentum, causing the waves to break. The mass of forward-moving water breaking into the shore gives waves their erosive power (Hyndman and Hyndman, 2011).

With perpendicular or near-perpendicular waves, sand is pushed onto the beach by breaking waves, and pulled back as the wave washes back into the ocean. Longshore drift is a phenomenon created by waves striking the shore at an angle and water being pulled back into the ocean perpendicular to the shore. This drift generally moves sand southward along the Atlantic coast of the Eastern Shore (Hyndman and Hyndman, 2011). This pattern moves sediment grain-by-grain to build long stretches of beach, a pattern that is repeated within zones along the entire Atlantic coastline. The general pattern of transport in the Eastern Shore area is southward along the Atlantic Coastline into the Chesapeake, and southward within the bay to the lower Chesapeake where it is deposited either in the bay or tributaries of lower bay rivers, as shown in Figure 2 (USACE, 2015).



Figure 2: Net sediment transport pathways for Chesapeake Bay and Atlantic area off the Virginia Cost. Source: "North Atlantic Coast Comprehensive Study Report (USACE, 2015).

EROSION AND UNDERLYING GEOLOGY

The rate of erosion of a given area is largely dependent on its underlying geology. Figure 3 depicts the mid- and northern Atlantic's coastal geology, with the Chesapeake Bay side of the Eastern Shore characterized as "drowned river valley" and the ocean side as "barrier coast."

Drowned river valley coastlines are commonly characterized by low banks, marshes, and beaches fronting the mainland. Bayside dunes are extant in both counties, with 4.9 miles of dune shoreline in Accomack County and 10.2 miles of dune shoreline in Northampton County, including those reaching 20-50 feet at Savage Neck Dunes Natural Area Preserve. In addition to the dunes, natural resiliency features include submerged aquatic vegetation beds, oyster reefs, tidal marsh beds, and tidal creeks. Primary drivers of erosion are wave action, wave height, and wind strength and direction, which can direct water into normally dry shore areas.

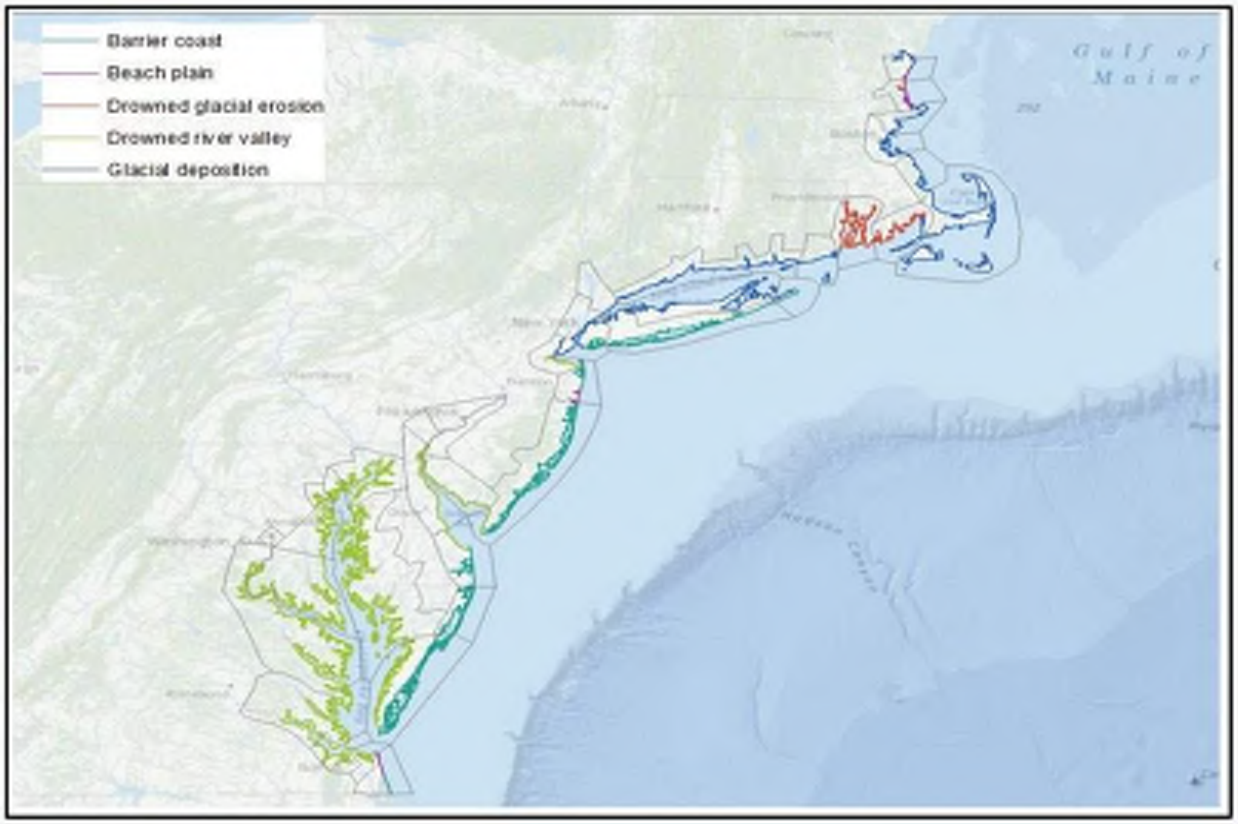


Figure 3: Atlantic Coastal Geology. Source: "North Atlantic Coast Comprehensive Study Report" (USACE, 2015).

Atlantic barrier coastlines consist of long and narrow barrier islands, with beach on the seaward side and one or more bays on the land-facing side that support complex tidal marsh systems. Natural resiliency features include beaches, wash over fans, extensive tidal marshes with tidal flats and tidal creeks, mollusk reefs, and submerged aquatic vegetation beds.

The Eastern Shore's seaside includes the longest expanse of coastal wilderness remaining on the Atlantic seaboard and is comprised of thousands of acres of pristine tidal marshes, vast tidal mudflats, shallow lagoons, and navigable

tidal channels that support thriving seafood and recreational tourism industries. This unique environment carries the designation of World Biosphere Reserve from United Nations Educational, Scientific and Cultural Organization.

Biodiversity of the barrier island ecosystem may be globally recognized, but it is only one benefit the island chain affords. Barrier islands take the brunt of ocean energy, protecting the habitats and structures behind them. This makes barrier islands important in times of hurricanes, tropical storms, and destructive nor'easters. The low wave energy environments allow for thousands of acres of tidal marshes to thrive in the coastal bays behind the islands, increasing their flood mitigation benefits.

Sediment in this environment is moved by both longshore drift, which requires an adequate supply of sediment and "rollover," where high tides erode sand from the ocean side of the island and carry it toward the center or back side of the island as seen in Figures 4 and 5. Another factor of barrier island erosion is the interruption of the supply of sand by up-stream interventions such as jetties or groins. Storms are unable to remobilize this trapped sediment, and downstream islands erode as a result (USACE, 2015).

Sections of the barrier islands are changing rapidly, with segments of islands disappearing and moving into the back barrier channels and marshes. This is especially true for areas adjacent to active inlets and as shown in Figure 4. The home that is the subject of the photos no longer exists.

Tidal marshes are also subject to erosion. Some of the worst erosion occurs when winds pick up during mid-tide or from wake generated by motorized vessels. During low tide, the water is not high enough for waves to lap against the land edge, and during high tide, it is buried. However, at mid-tide the water is pushed against the marsh edge and wears away at the edge.

SEA-LEVEL RISE AND EROSION

Sea-level rise threatens both seaside and bayside marshes, which afford the mainland with protection from both floods and erosion. As sea-level rises, barrier islands will respond by migrating landward, disintegrating if sediment supply is insufficient, or drowning in place (Moore, List, et al., 2011).

Changes to vegetation can also occur, as seen on Assateague Island, where "ghost forests" - stands of dead and dying loblolly pines - are succumbing to saltwater intrusion caused by a combination of sea-level rise and barrier island processes and have been impacted by the Southern Pine Beetle. Vegetation serves as a stabilizing force for shorelines and loss of vegetation increases a shoreline's vulnerability to erosion.

Changes in inundation levels can cause shifts in habitat types. For example, irregularly flooded marshes may become regularly flooded marshes, eventually turning from mud flats to open water. This change in habitat type is not only detrimental to the wildlife that resides there, but also increases coastal exposure to wind and wave action, most often leading to increases in erosion rates.



Figure 4: Changes to the southern end of Cedar Island, 2006-2014. Source: Gordon Campbell, At Altitude Photograph. Copyright protected, used with permission.

Because the Eastern Shore barrier islands are largely in their natural states and without erosion control mechanisms, the process of rollover is readily observed. In Figure 5, images of a section of Assateague Island, taken before and after Hurricane Sandy, illustrate how waves washing over the island carried sand toward the mainland. This phenomenon provides critical width for islands and establishes a back-barrier platform which the island can continue to roll onto, thereby increasing the long-term viability of the island.



Figure 5: Aerial photographs of a section of Assateague Island before and after Hurricane Sandy. Photo Credit: USGS

HUMAN SYSTEMS

When natural processes threaten lives and investments, it is commonplace to look for ways to redirect nature's course or lessen its impacts. To slow coastal erosion and stabilize shorelines, structural interventions such as groins, jetties, and seawalls, are often employed. Other options include soft interventions, such as living shorelines or beach nourishment. These erosion control responses must be considered and selected based on conditions of the particular location and surrounding environs. Measures that are employed on the Eastern Shore are described in the following

sections. A complete listing, along with benefits, impacts, and costs, can be found in Appendix C of the 2015 USACE North Atlantic Coast Comprehensive Study.

HUMAN INTERVENTIONS

GROINS AND JETTIES

Groins and jetties are engineered structures placed perpendicular to the shoreline to interrupt longshore drift. Both kinds of structures extend out into the water, but jetties are generally used to protect inlets and harbor entrances (Figure 6), while groins can be used to protect any stretch of shoreline.

Groins and jetties interrupt the natural drift of sand, causing sediment to build, or accrete, on the up-drift side of the structures. These structures accelerate erosion on the immediate down-drift side because the area is robbed of the natural sediment it would have received from longshore drift (Barnard, T., VIMS Self-Taught Education Unit, Coastal Shoreline Defense Structures). The VIMS Self-Taught unit on Coastal Shoreline Defense Structures contains additional information on groins and jetties.

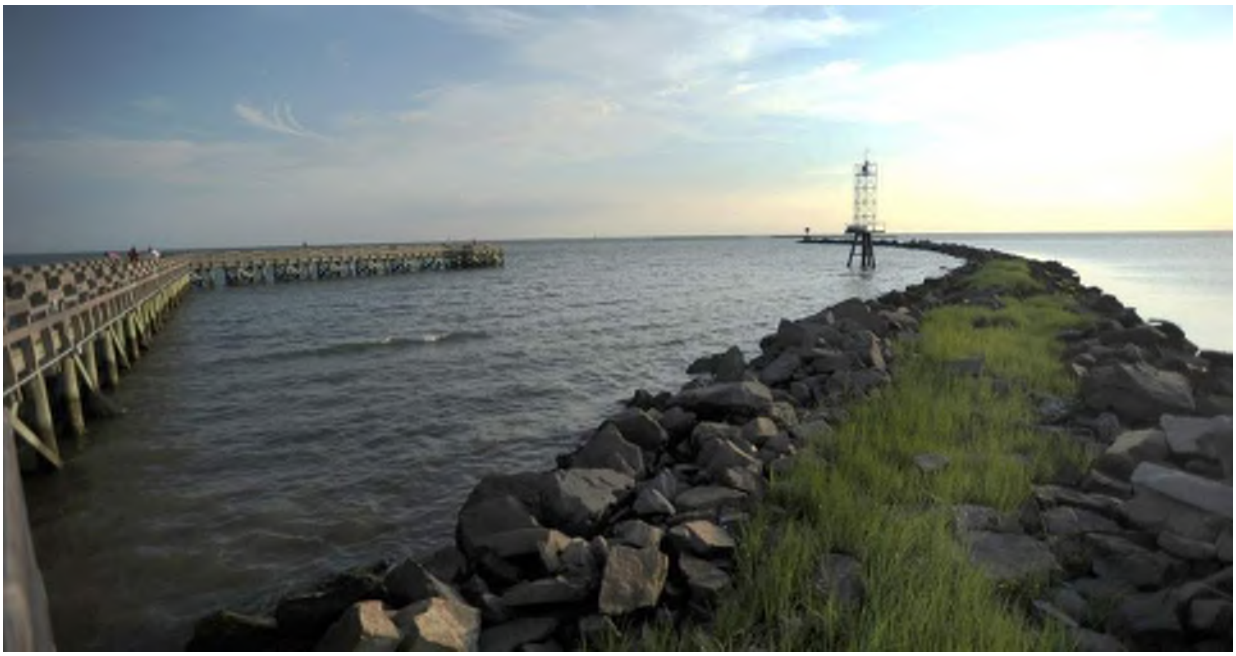


Figure 6: Jetty at Cape Charles Harbor. Photo Credit: Jay Diem, Eastern Shore News. Used with permission.

PARALLEL STRUCTURES – SEAWALLS, BULKHEADS, AND REVETMENTS

Seawalls are built parallel to shorelines to inhibit erosion by intercepting waves. They are designed with sufficient height and heft to prevent being overrun by storm surge or undermined by powerful waves.

Seawalls are not perfect solutions. New sea wall prices can run into the tens of millions of dollars and they can also be undermined by scour, causing wall failure (Reuters, “Water’s Edge: The Crisis of Rising Sea Levels,” September 4, 2014). Seawalls can also obstruct scenic views and negatively impact wildlife (USACE, 2015).

Bulkheads, also built parallel to shorelines, are meant to keep land from eroding into the sea. They can be anchored or cantilevered sheet piles, or gravity structures; but they, too, can be undermined by scour.

Both seawalls and bulkheads can have detrimental effects on neighboring shorelines and nearshore environments. When these structures work as designed, they protect the property where they are installed, but the deflected wave energy has to go somewhere. Neighboring properties and the near-shore environment in front of parallel shoreline protection structure usually receive the brunt of that energy, which creates not only scour conditions for the structure, but scours the ocean bottom of marine life (Barnard, T., VIMS Self-Taught Education Unit, Coastal Shoreline Defense Structures).

REVETMENTS

Revetments are hardening or reinforcement of a surface exposed to waves or strong currents to prevent erosion. Typical construction consists of a filter layer overlain with stone or concrete (Figure 7). Revetments can be used alone or in combination with other structures. For example, a seawall can be capped with a revetment.

Revetments tend to reflect less wave energy because they are more sloped but are still subject to the same erosion impacts as other parallel structures. Accessibility to the shoreline can be a drawback of using revetments (USACE, 2015).



Figure 7: Revetment at the beach of Wallops Flight Facility. Photo Credit: NASA

Figure 8 below shows the locations of all type of shoreline erosion control structures for the northern two-thirds of Northampton County, including bulkheads. As increasing numbers of property owners install these structures, and with lifespans of 20-25 years, long-term financial commitments will be needed to maintain them (Barnard, Thomas, VIMS Self-Taught Education Unit, Coastal Shoreline Defense Structures).

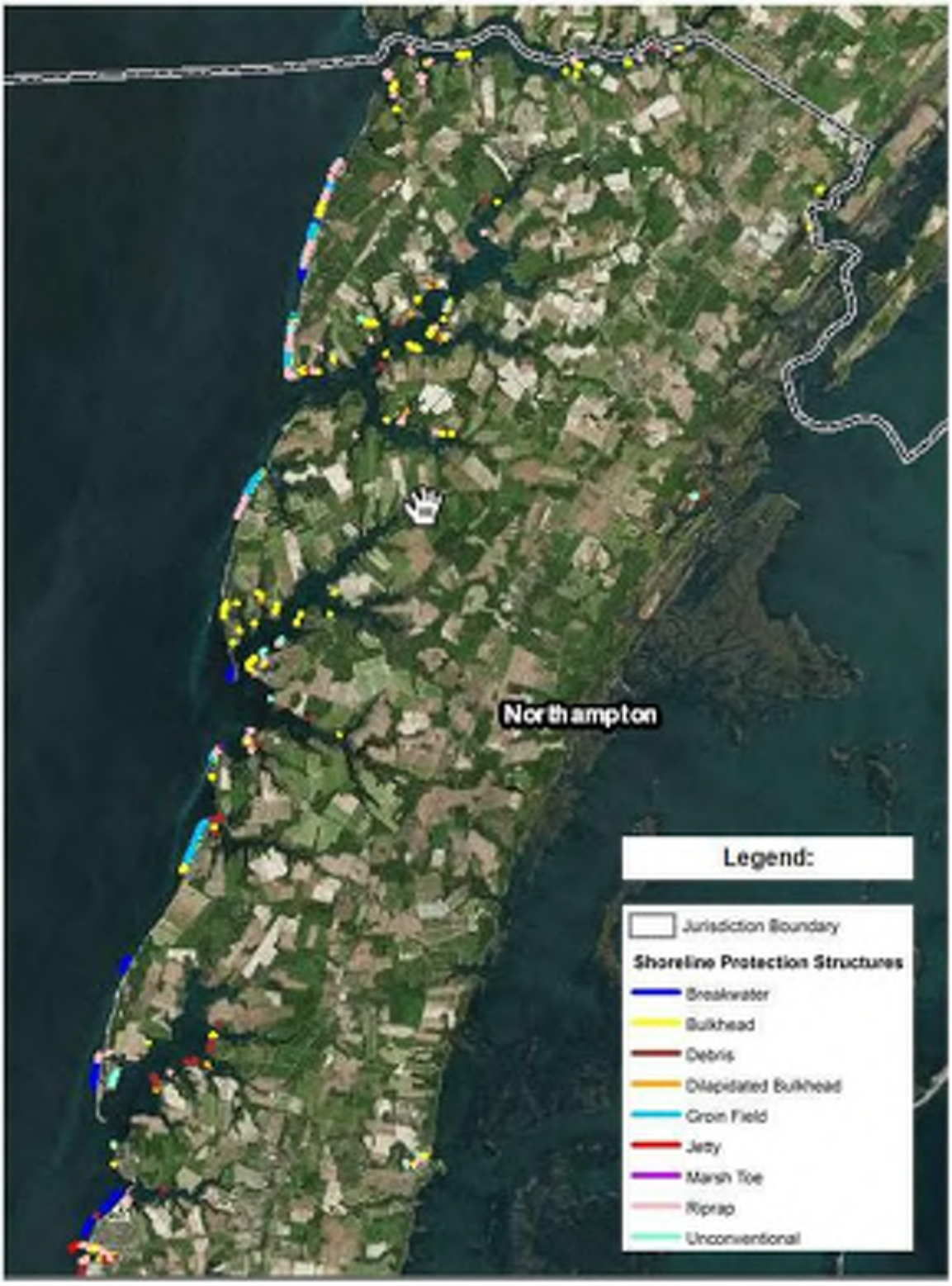


Figure 8: Northampton County Shoreline Protection Structures. Source: VIMS Center for Coastal Resource Management

BEACH NOURISHMENT

The placement of sand on an eroded beach is known as beach nourishment. It can be used alone as a beach restoration tool or in combination with other tactics, such as breakwaters. Beach nourishment does not change the rate at which erosion is occurring, and in fact, can accelerate erosion under certain conditions (USACE, 2015).

Beach nourishment is not a long-term fix. It requires periodic renourishment, typically every four to five years on average, and following major storms. NASA found it had good news and bad news to report about its completed beach protection project at the Wallops Flight Facility in the aftermath of Hurricane Sandy in 2012. The $43 million investment in a revetment and beach nourishment – completed three months before the storm - had worked to protect $1.2 billion in state and federal space program-related assets and launch infrastructure. The bad news was that another $11 million would be needed to replace 650,000 cubic yards of sand taken from the beach by the storm (Figure 10).

In February 2020, the U.S. Army Corps of Engineers awarded a $23.7 million contract to a Florida-based company to conduct beach renourishment at Wallops Island, including "construction of breakwaters and placing 1.3 million cubic yards of sand along a four-mile stretch of the facility's waterfront." (US Army Corps of Engineers, Norfolk District Website, 2020).



Figure 9: Beach Erosion at Wallops Flight Facility. Left: The completed beach nourishment project at WFF in August 2012. Right: The same stretch of beach is extensively eroded less than three months later, following Hurricane Sandy. Photo Credit: NASA

INTERVENTIONS ON BARRIER ISLANDS

In their natural states, conventional wisdom holds that barrier islands are best left to manage themselves. Such conventional wisdom may offer little consolation to communities like Wachapreague and Chincoteague, which are closely watching the year-by-year changes to Cedar Island and Assateague Island – barrier islands that have long afforded storm protection to their communities.

The USACE North Atlantic Coast Comprehensive Study acknowledges that some barrier islands may require management and intervention if the islands are to continue to provide such protections, and in fact, the USACE did intervene at the Assateague Island National Seashore.



Figure 10: Locations of Manually-Constructed Oyster Reefs in Waters off Virginia's Eastern Shore. Source: VCZMP



Figure 11: Oyster Reef under Construction Photo Credit: © Bowdoin Lusk/ The Nature Conservancy. Used with permission.

BREAKWATERS

Offshore structures placed parallel to the shoreline to soften the impact of waves are called breakwaters. Because wave energy is slowed by the structures, sand and sediment may settle in the area behind the breakwater, which can form an inviting environment for the growth of marsh grasses, an added protection against future erosion. Breakwaters can also disrupt supply of sand to down-drift beaches (USACE, 2015).

Oyster reefs can serve as natural breakwaters and once established, continue to grow vertically over time with sea-level rise, improving their ability to resist storms and mitigate erosion. Figure 11 shows the locations of oyster reefs that have been installed for long-term water quality and coastal resilience benefits, and Figure 12 is a photograph of an oyster reef under construction. Since oyster reefs are limited in elevation by the depth of the water column at a normal high tide, they provide excellent protection from relatively smaller waves and storm surge events; however, they can only provide minimal protection from wave action riding atop that is above average high tides or storm surge.

LIVING SHORELINES

One approach that is being employed in low wave-energy areas on the Eastern Shore is the construction of living shorelines. These shorelines re-establish the natural vegetative, nutrient, and slope characteristics of healthy shorelines so that they naturally dissipate wave energy.

Large-scale living shorelines have been established in Oyster and at Camp Occohannock. In both locations, large granite rocks were brought in and piled parallel to the shore. Sand was added between the rock barriers and the shoreline to create salt marshes sloping upward to meet the previous shore edges. Marsh grasses were planted to stabilize the newly created areas between the open waters and the uplands.

EROSION PREVENTION LAWS AND PROGRAMS

COASTAL ZONE MANAGEMENT ACT

The federal Coastal Zone Management Act (CZMA) of 1972 put into statute the recognition of the "national interest in the effective management, beneficial use, protection, and development of the coastal zone."

The CZMA established three national programs, the National Coastal Zone Management Program, the National Estuarine Research Reserve System, and the Coastal and Estuarine Land Conservation Program (CELCP). The National Coastal Zone Management Program aims to balance competing land and water issues through state and territorial coastal management programs, the Reserves serve as field laboratories that provide a greater understanding of estuaries and how humans impact them, and the CELCP provides matching funds to state and local governments to purchase threatened coastal and estuarine lands or obtain conservation easements.

The CZMA connects with coastal erosion prevention through its many programs, including Coastal Zone Enhancement Grants, technical assistance grants, and research.

VIRGINIA COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Zone Management Program, established through Executive Order, administers enforceable laws, regulations, and policies that protect coastal resources and foster sustainable development. Relevant laws, regulations, and policies on the Coastal Zone Management Program are described below.

WETLANDS MANAGEMENT

The tidal wetlands program is administered by the Marine Resources Commission under Code of Virginia § 28.2-1301 thru § 28.2-1320. It is intended to preserve and protect tidal wetlands and accommodate economic development in a manner consistent with wetlands preservation. Oversight is provided by the Virginia Marine Resources Commission and local wetlands boards.

The Virginia Water Protection Permit Program is administered by the Department of Environmental Quality (DEQ) and includes protection of tidal and non-tidal wetlands. This program is authorized by the Code of Virginia § 62.1-44.15:20 and the Water Quality Certification requirements of Section 401 of the Clean Water Act of 1972.

DUNES AND BEACHES MANAGEMENT

Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes. This program is administered by the Marine Resources Commission (Code of Virginia § 28.2-1301 thru 28.2-1320).

COASTAL LANDS MANAGEMENT

Coastal Lands Management is a state-local cooperative program administered by DEQ's Water Division and 84 localities that regulates activities in Chesapeake Bay Resource Management Areas and Resource Protection Areas in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:79) and Chesapeake Bay Preservation Area Designation and Management Regulations (Virginia Administrative Code 9 VAC 25-830-10 et seq.).

EROSION AND SEDIMENT CONTROL

Three state laws apply to land disturbance activities in Virginia: The Stormwater Management Act, Erosion and Sediment Control Law, and the Chesapeake Bay Preservation Act. For more information on these three laws, see "Storm Water Flooding Prevention Laws and Programs" in Chapter 7 – Storm Water.

CHAPTER 6: COASTAL FLOODING

INTRODUCTION

Hurricanes and Tropical Storms are often the most well documented causes of coastal flooding along the Eastern Shore of Virginia. Hurricane Sandy, in October 2012, grazed the Eastern Shore of Virginia causing significant damage and flooding although the storm had not yet reached its full strength and remained nearly 100 miles offshore. Sandy went on to be one of the largest Atlantic storms on record, and Eastern Shore residents were fortunate that Sandy did not follow a course up the Chesapeake Bay or stall off the coast as originally forecasted, which would have led to widespread damage and flooding across the Eastern Shore. If Sandy had tracked closer to the Eastern Shore, the results for the Chesapeake Bay, the local economy, and area residents could have been tragically different ("Ecological impacts of Hurricane Sandy on Chesapeake & Delmarva Coastal Bays," 2012). If the nine-foot storm surge caused by Sandy in the Northeast had occurred on the Eastern Shore, it would have been destructive to both the land and the Chesapeake Bay, since the flow of sediment from the land into the Chesapeake Bay would have impacted aquaculture and other water-based economic sectors (ibid).

Flooding poses a major risk to communities across the country and collectively accounts for more than 70 percent of federally declared disasters (FEMA, 2021). In the Eastern Shore of Virginia, coastal flooding is the most hazardous form of flooding. However, hurricanes and tropical storms are not the only source of coastal flooding. Different types of storms and storms paths, in addition to tide cycles and low-lying elevations, can all affect the extent of coastal flooding. Also, global and relative sea level rise combined with traditional causes of coastal flooding further complicates the risk of coastal flooding.

Chapter 1 provided a review of major storms in the Eastern Shore's history including all tropical cyclones and nor'easters, many of which have caused significant coastal flooding. However, other storms and events can cause coastal flooding, and the causes are not always as easily identifiable. Strong onshore winds, offshore low-pressure systems, changes to ocean currents, and high astronomical tides, or any combination of these, can also cause coastal floods that disrupt schools, local businesses, and transportation routes. For example, in October 2015 when Hurricane Joaquin's center was still near the Bahamas, a "cut-off low aloft" developed over the southern U.S. fed by a steady stream of moisture from Joaquin. Gales blowing in from New England, and the already occurring perigean spring tide (a period of extra-high tide) helped to contribute to local flooding (seen in Figure 1) as swell from Joaquin moved northward to the Eastern Shore. (Hurricane Joaquin, 28 September – 7 October, 2015) Recorded storm surge on Oct. 2 at Wachapreague was 3.9 feet; Kiptopeke recorded a storm surge of 3.2 feet.

This chapter examines in detail the natural forces and conditions that cause flooding, and the human systems used to gauge their impacts and protect against harm to lives and property. The quantitative assessment of risks posed by flooding will be found in the local chapters, beginning with Chapter 10.

Table 1 provides a recent history of coastal flooding events that were not included in the Chapter 1 list. The events were taken from the NOAA National Climatic Data Center storm events database. This data reinforces that while hurricanes and other tropical cyclones (tropical storms and depressions) are the predominant storm types causing coastal flooding, other conditions, such as coastal low-pressure systems, tide cycles, and rapidly moving cold fronts also can cause coastal flooding.





Figure 1: Flooding on Atlantic Ave. (above) and Drummondtown Rd. (right), Oct. 2, 2015. Photo Credit: A-NPDC staff

Table 1: Coastal Flooding Events Recorded in NOAA Storm Events Database, 2000-2021)

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage	Source	Narrative
Accomack Co.	12/21/12	Coastal Flood	150000	0	911 Call Center	A rapidly deepening low-pressure system drove a strong southeast wind with frequent gale force gusts over the Chesapeake Bay, which allowed water to flow up the Bay. Due to the very strong winds, moderate to severe coastal flooding was observed across portions of Accomack County.
Accomack Co.	3/6/13	Coastal Flood	10000	0	Park/Forest Service	A low-pressure system produced coastal flooding. Rising water levels resulted in moderate coastal flooding along the coastal side of Accomack County. The Chincoteague Causeway (Highway 175) was impassable due to two feet of water over the roadway.
Accomack Co./ Northampton Co.	10/2/15	Coastal Flood	0	0	River/Stream Gage	A combination of Hurricane Joaquin near the Bahamas and strong high pressure over New England produced strong onshore winds over the Mid-Atlantic. The strength and duration of the onshore winds produced a tidal departure of 3 to 4 feet resulting in moderate flooding.
Accomack Co./ Northampton Co.	1/23/16	Coastal Flood	0	0	C-MAN Station	A combination of low pressure moving from the southeast United States northeast and just off the Atlantic Coast, and high pressure over southeast Canada produced very strong onshore winds across the Mid-Atlantic. The strength and duration of the onshore winds produced moderate to major coastal flooding along the Atlantic Coast and Chesapeake Bay.
Accomack Co./ Northampton Co.	2/9/16	Coastal Flood	0	0	C-MAN Station & River/Stream Gauge	Strong winds behind a cold front caused minor to moderate coastal flooding along central and southern portions of the Chesapeake Bay region. Minor to low end moderate flooding occurred in bay side sections of the Eastern Shore.

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage	Source	Narrative
Northampton Co.	10/8/16	Coastal Flood	10000	0	Emergency Manager	Post Tropical Cyclone Matthew, tracking northeast just off the North Carolina and Virginia coasts, produced very strong northeast or north winds over and the Virginia Eastern Shore. These winds helped to cause moderate coastal flooding over portions of the area. Coastal storm tides of 2 to 3.5 feet above astronomical tide levels were common, with only minor beach erosion reported.
Northampton Co.	9/6/19	Coastal Flood	0	0	C-MAN Station & River/Stream Gauge	Hurricane Dorian tracking northeast along the North Carolina coast and just off the Virginia coast produced very strong northeast to north winds which caused moderate to major coastal flooding across portions of the southern Chesapeake Bay. It produced tidal anomalies between 2.5 and 3.0 feet causing major coastal flooding over portions of southern Northampton County.
Northampton Co.	10/10/19	Coastal Flood	0	0	Emergency Manager	The combination of low pressure sitting off the New Jersey coast and strong high pressure over southeast Canada resulted in persistent north or northeast winds over the Chesapeake Bay. These persistent north or northeast winds, along with high waves, allowed water levels to rise throughout the bay, producing tidal anomalies between 2.0 and 3.0 feet.
Northampton Co.	11/17/19	Coastal Flood	0	0	C-MAN Station	The combination of high pressure over northern New England and low pressure just off the Middle Atlantic Coast resulted in very strong northeast to north winds over the southern Chesapeake Bay, which caused minor to moderate coastal flooding.
Accomack Co.	8/4/20	Coastal Flood	0	0	River/Stream Gage	The center of Tropical Storm Isaias tracked north just inland off the Middle Atlantic Coast. Winds associated with the tropical storm caused moderate (tidal) coastal flooding across portions of the Virginia Eastern Shore adjacent to the Chesapeake Bay.

NATURAL FORCES AND CONDITIONS

TROPICAL CYCLONES: HURRICANES, TROPICAL STORMS, AND TROPICAL DEPRESSIONS

Hurricanes and tropical storms occupy a memorable place in the memories of those whose lives and ancestry are tied to the Eastern Shore of Virginia. Accounts of the tempests date back to the mid-1600s, recording sinking ships, scattered cargo, demolished settlements, and re-carved landscapes. Shipwrecks themselves testify to some of these "dreadful" and "tremendous" storms, as they were colorfully named.

Hurricanes are simply one type of tropical cyclones, which are organized, rotating systems of clouds and thunderstorms originating in tropical or subtropical waters. They typically form during the months of June through November and feed off of the warm tropical waters present in the ocean during this period.

Categories of tropical cyclones are distinguished by wind speed.

- **Tropical depressions** have a maximum wind speed of 38 mph.
- **Tropical storms** have a wind speed between 39 – 74 mph.
- **Hurricanes** have a wind speed 75 mph or higher.

Hurricanes are further rated by the Saffir-Simpson Wind Scale from 1 to 5 based on the hurricane's sustained wind speed (Table 2). This tool helps to estimate potential property damage and threat to human life from winds.

Table 2: Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Winds
1	74-95 mph 64-82 kt 119-153 km/hr	**Very dangerous winds will produce some damage**: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/hr	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/hr	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.

Category	Sustained Winds	Types of Damage Due to Winds
4 (major)	130-156 mph 113-136 kt 209-251 km/hr	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/hr or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

The scale, however, is not an indicator of the extent of flood damage that can be expected, but winds do affect flooding in two ways. First, they drive wave action and push waters onshore. Secondly, with larger tropical storms, the storm's low pressure elevates the water and then pushes it ahead creating an elevated storm surge at the leading edge of the storm.

Figure 2 is a compilation of the tropical cyclones that have tracked within 75 miles of Painter, Virginia (generally the center point of the Eastern Shore) from 2000-2021 as catalogued by NOAA and identified by category.

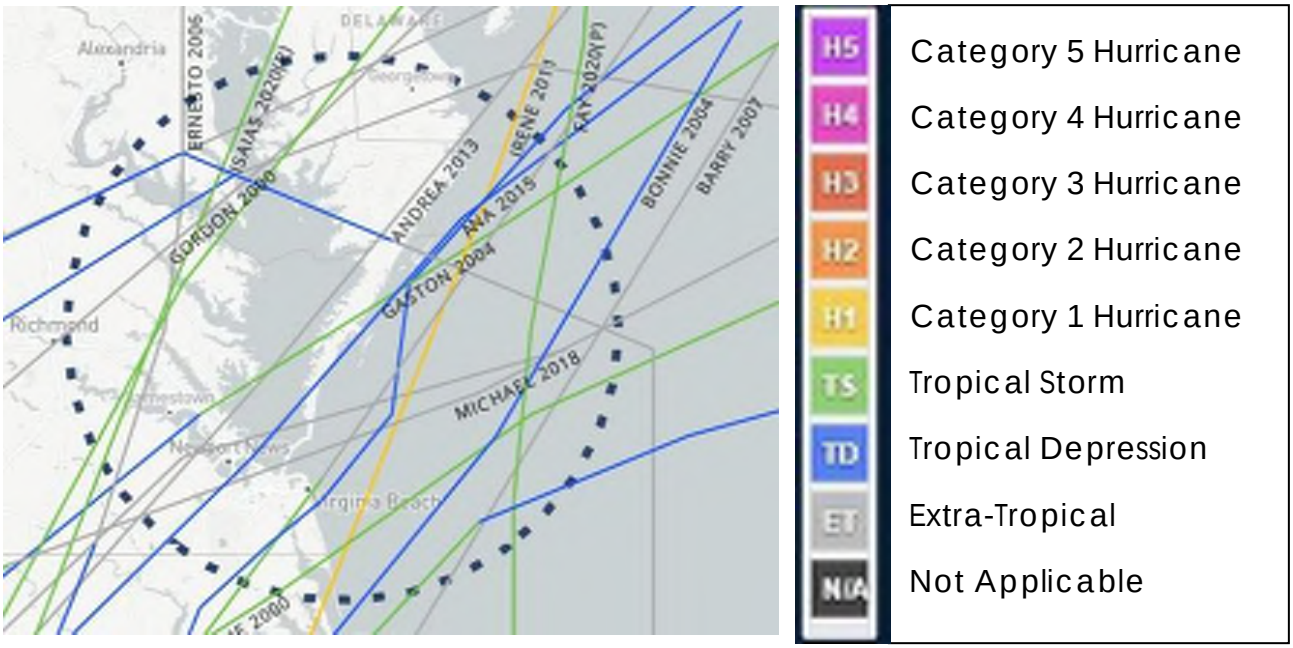


Figure 2: Paths of tropical and extra-tropical systems with 75 statute miles of Painter, Virginia, 2000-2021. Source: NOAA Digital Coast, Historical Hurricane Tracks

The proximity of storm centers to the Eastern Shore does not always demonstrate the storm threats from tropical cyclones with massive scales located farther offshore. One notable absence from Figure 2 is Hurricane Sandy; its storm-force winds extended over 1,000 miles in diameter, yet it did not register in Figure 2, as it only depicts tropical cyclones that passed within 75 miles of Painter. At its nearest point, the eye of Sandy was more than 100 miles away- and that was near Chincoteague after Sandy had begun to turn west and was no longer a hurricane.

Yet Sandy managed to cause more than $6 million in damage across the Eastern Shore, including significant damage in Cape Charles, Saxis, Sanford, Tangier, and other bayside locations, in addition to losses on Chincoteague. Although sustained winds did not reach a tropical storm strength on the Eastern Shore, the flow of the existing wind and impact on tides, similar to a severe nor'easter, is responsible for the damage from Sandy.

Likelihood of Recurrence: The timeframe of Figure 2 does not provide an accurate sense of the frequency of tropical cyclones over the short term. In its study of recurrent flooding in Tidewater Virginia, the Virginia Institute for Marine Science (VIMS), citing a NOAA report, asserts that a tropical storm, or its remnants can be expected to affect Virginia every year, with hurricanes every 2.3 years.

NOR'EASTERS

Nor'easters are cyclonic storms that form along the Atlantic Coast of North America when the polar jet stream reaches the Atlantic and meets warmer air pushed up from the Gulf of Mexico and southern Atlantic. They typically develop within 100 miles of the coastline between Georgia and New Jersey and are strongest and most frequent between September and April (NOAA).

Some of the most damaging floods the Eastern Shore has experienced have been from nor'easters, which tend to move more slowly than hurricanes, lasting through multiple tide cycles. Additionally, these storms can further exacerbate flooding since they can sometimes occur in pairs, with one flood not fully receding before the next nor'easter flooding begins.

Some Eastern Shore residents remember nor'easters as much as or more so than hurricanes. Such storms like the devastating Ash Wednesday storm of 1962 and the nor'easters of November and December 2009. With the exception of "The Perfect Storm," nor'easters do not tend to receive the same public attention as hurricanes, but they can pack the same winds, catastrophic flooding, and severe coastal erosion. Other notorious nor'easters, including the so-called "Nor-Ida" nor'easter of November 2009, which formed from the remnants of Hurricane Ida, and during which tides exceeded levels experienced during Hurricane Isabel.

Likelihood of Recurrence: Nor'easters occur with sufficient frequency to provide a high level of confidence they will continue to be a significant coastal flooding threat.

ASTRONOMICAL TIDES

Note: Information in this section sourced from NOAA Ocean Service

Independently, astronomical tides rarely cause more than nuisance flooding, but high astronomical tides combined with storms can worsen coastal flooding. Astronomical tides result from the gravitational pull of the sun and the moon on the earth's oceans, causing the oceans to bulge. Because the moon is closer to the earth than the sun, its effect on tides is greater. As the moon makes its monthly orbit around the earth, and the earth makes its yearly orbit around the sun, the oceans are pulled back and forth as the bodies' positions relative to one another change, causing tides go in and out.

Table 3: Tidal Ranges at Eastern Shore Tidal Stations

	Mean Tidal Range (feet)	Great Diurnal Change (feet)*
Seaside		
Wachapreague	3.99	4.47
Bayside		
Chesapeake Bay Bridge Tunnel	2.66	3.02
Kiptopeke	2.6	2.94
*Difference between highest and lowest tides of the day **Tidal gauges deployed by USGS in 2015		

Source: NOAA Tides and Currents

In the normal course of a day, the NOAA official tide stations record tidal differences between high and low tide of about three feet on the bayside and four and a half feet on the seaside (Table 3). During new and full moons, the earth, moon, and sun are nearly in full alignment, and the gravitational pull of the moon and sun are working together to cause the oceans to bulge more than usual. New and full moons cause high tides to be slightly higher and low tides to be slightly lower than average. These are known as spring tides.

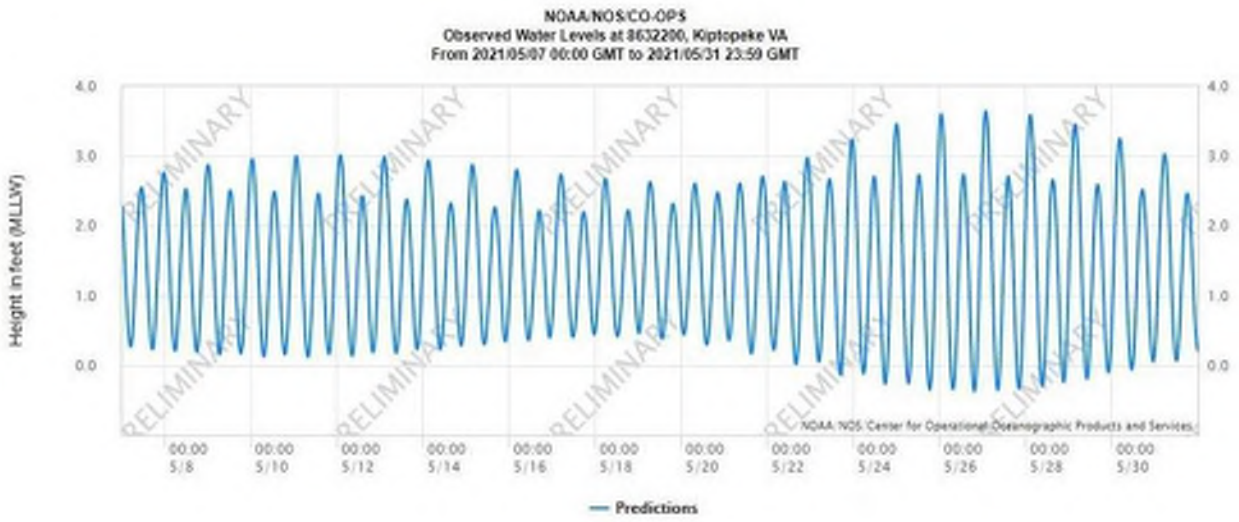


Figure 3: Perigean Spring Tide at Kiptopeke Tide Gauge. Source: NOAA Tides and Currents

Every 28 days, the moon reaches its closest point to the earth, known as a perigee, which also causes a larger tide. When perigee coincides with a spring tide, three or four times each year, it is referred to as a perigean spring tide and the effect is to expand the tidal range, as illustrated in Figure 3. Notice how the length of line representing the

difference between low tide and high tide at the Kiptopeke tidal gauge is elongated approaching the perigean spring tide on February 18.

The converse of the perigee is the apogee – the point in the earth's elliptical orbit where the earth is farthest from the sun and the sun's gravitational pull on the earth is the weakest. Table 4 demonstrates some of these effects with the moon and tide phases on the landfall approach for some of the Eastern Shore's historic storms.

Table 4: Moon/Tide Phases Coinciding with Historic Eastern Shore Storms

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		

STORM SURGE

Note: information in this section is sourced from the National Hurricane Center.

The high tide generated by a storm that is above the predicted astronomical tide is known as storm surge. The surge is produced by the force of the cyclone winds pushing the water ahead, along with the lesser force of the low pressure. Figure 4 illustrates this effect.

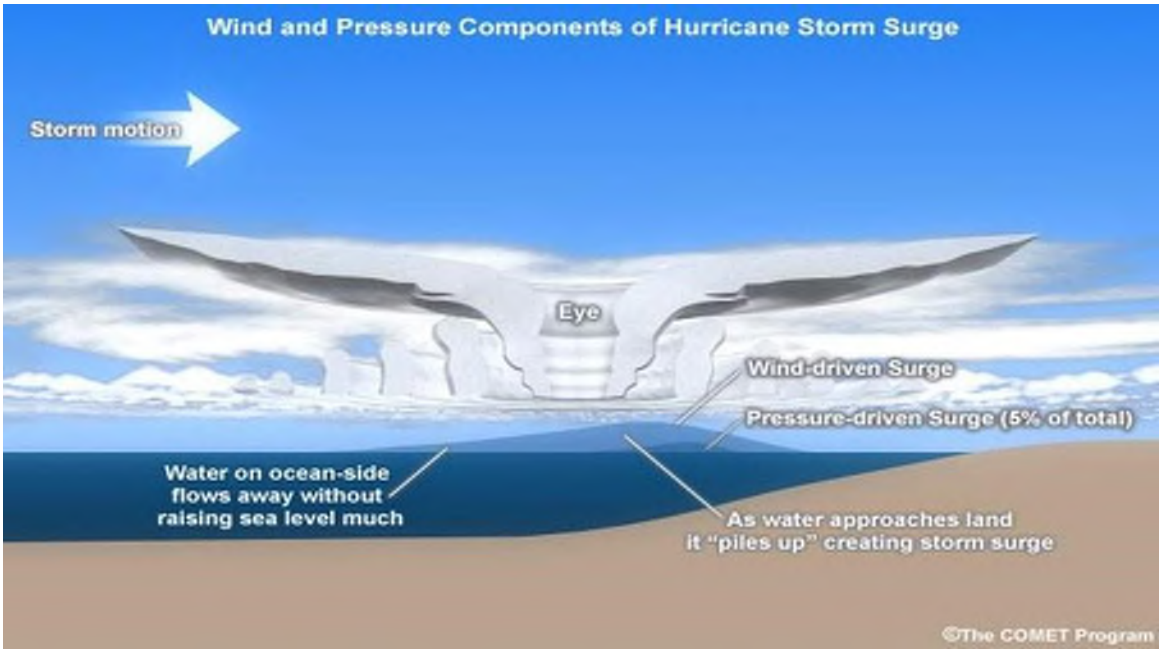


Figure 4: Wind and Pressure Components of Hurricane Storm Surge. Source: The Comet Program. ©1997-2021 University Corporation for Atmospheric Research. All Rights Reserved.

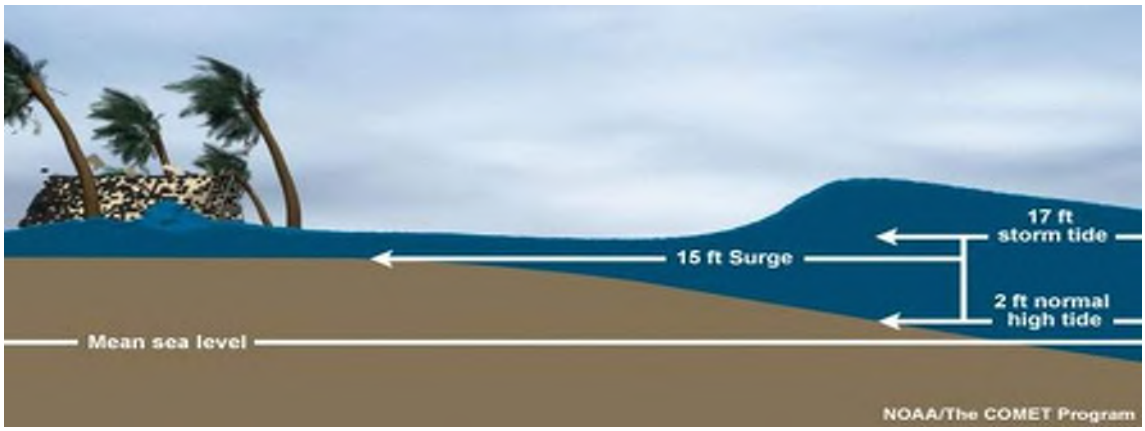


Figure 5: Storm Surge vs. Storm Tide. Source: NOAA/The COMET Program. ©1997-2015 University Corporation for Atmospheric Research. All Rights Reserved.

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. For example, a Category 1 hurricane may cause four to five feet of surge. The shape of the Chesapeake Bay "pinches" the water and thereby makes the surge grow in height on the bayside. Storm surge is not the same as storm tide, however. Storm tide refers to the water level rise attributable to the astronomical tide plus the effects of the storm surge, as illustrated in Figure 5.

SEA LEVEL RISE AND COASTAL FLOODING

The Virginia Institute of Marine Science (VIMS) tracks sea level data and produces "report cards" highlighting sea level change at local levels. Using annual tide-gauge data, VIMS can also project sea-level height to the year 2050 (VIMS "U.S. Sea Level Report Cards. N.d.). Figure 6 below provides the sea-level report card for Norfolk, the nearest point to the Eastern Shore that VIMS tracks. This figure displays the Mean Sea Level (MSL) beginning in 1970 and projected through the year 2050. The quadratic trend line indicates the average projected rise in MSL, while "QHi95" and "QLo95" represent the 95% confidence interval. The "QHi95" indicates that MSL could be as high as 2.2 ft above current levels.

There is ample scientific evidence that sea level rise is occurring and is projected to continue quadratically into the future.

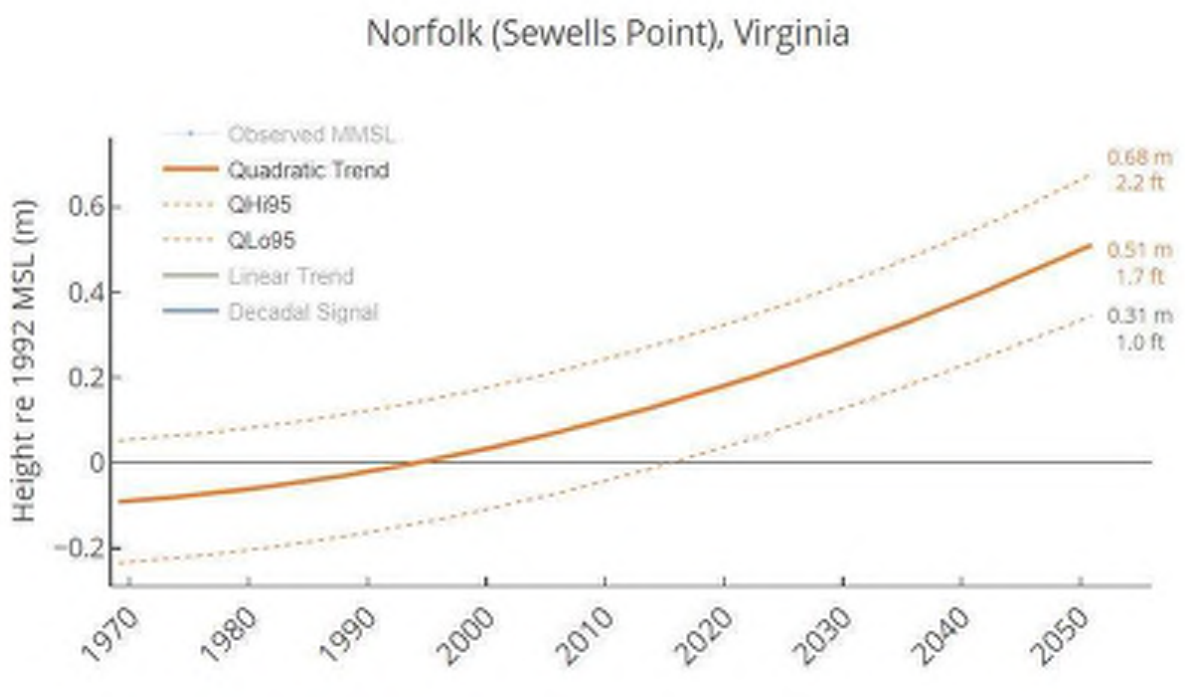


Figure 6: Sea Level Rise Scenarios. Source: VIMS Sea-Level Report Cards

RELATIVE SEA LEVEL RISE

Relative sea level is the perceived water level as it relates to the level of land. The discussion of relative sea level rise in the lower Chesapeake region begins approximately 35.5 million years ago when a bolide, or object from space, two to three miles in diameter, struck near the area that is now Cape Charles, creating an impact crater roughly twice the size of Rhode Island (Figure 7). 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 (USGS Fact Sheet 049-98).

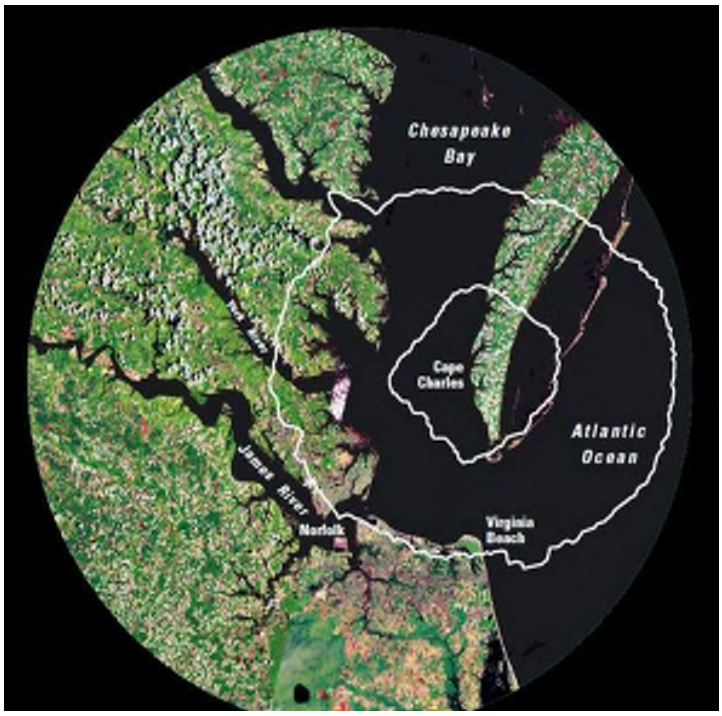


Figure 7: A Bolide Bulls-Eye. Source: USGS

A second cause of subsidence is rebound of the earth's crust from glaciers. Even though the Laurentide ice sheet did not reach the lower Delmarva Peninsula, the weight of the ice as it pressed down caused the earth's crust to bulge in adjacent areas. As the ice retreated, and the pressure it exerted was relieved, the earth's crust began to rebound, the bulging areas began gradually sinking, and in fact are still trying to achieve a state of equilibrium (USGS Circular 1392).

Two other factors that affect relative sea level rise to a lesser degree on the Eastern Shore are groundwater withdrawal and tectonic changes. Subsidence from all sources range from 1.2 millimeters of subsidence per year at Kiptopeke to 2 millimeters per year at southern Assateague (Holdahl and Morrison, 1974).

GLOBAL SEA LEVEL RISE

The increasing volume of water in the ocean is a global cause of sea level rise. As water trapped in glaciers and ice sheets melts into the earth's oceans, and water already in the ocean expands as the temperature increases, the volume of water in the ocean increases, causing sea level to rise (VIMS).

Scientists posit that another contributor to sea level rise could be changes to the Gulf Stream brought on by warmer polar regions. A smaller difference in temperature between the Atlantic coast and the polar region slows the cycle in which waters sink and move south as they are cooled, which in turn slows the rate at which they are replaced by warmer waters drawn north (VIMS). The result of the sluggish cycle is higher tides in the mid-Atlantic, as illustrated in Figure 8.

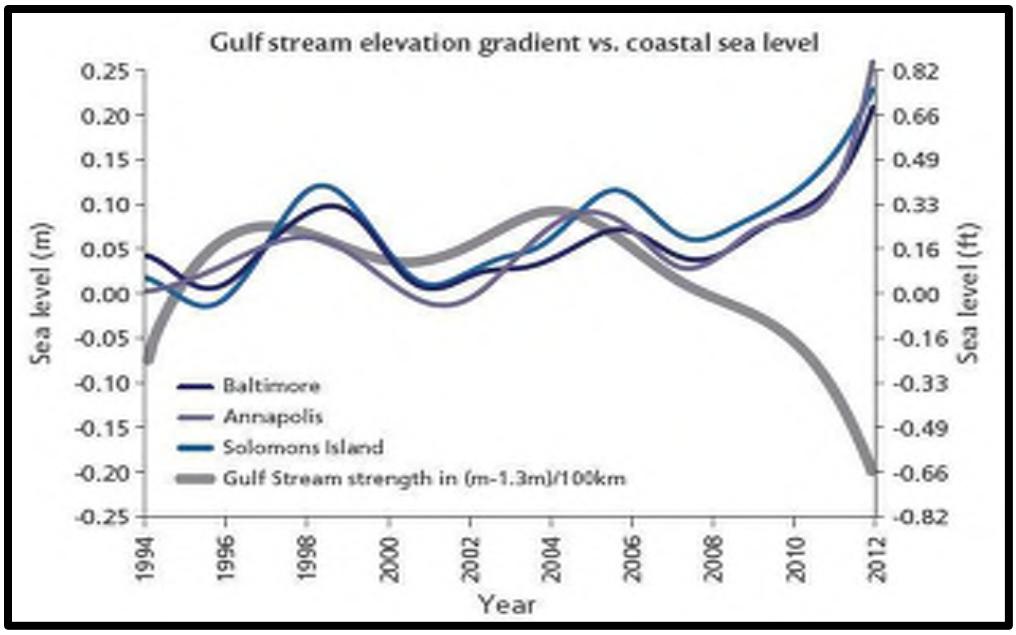


Figure 8: Sea level at elevation vs. Gulf Stream strength. Source: Ezer et al., 2013

The result of sea level rise ultimately raises the base flood elevation. The same VIMS study estimates 208 square miles of land in Accomack County is vulnerable to sea level rise over the next century, and another 186 square miles is vulnerable in Northampton County, along with increased threats from erosion and infrastructure flooding. A study conducted by the A-NPDC during 2015 examined the implications of future sea level rise upon roads within the region and the communities they serve. The study found that just one foot of inundation – a threshold that could be reached in the next 10 years – could put the majority of Tangier's roads completely under water, disrupt access to eight more communities, and limit access to two more. More about the study results can be found in local chapters, beginning with Chapter 10.

Vulnerability of Virginia's Eastern Shore to Sea Level Rise

"Several communities in Accomack are considered vulnerable to sea level rise. The natural resource-based agriculture and seafood industries of the region are being impacted as farmlands are experiencing increased inundation and salt contamination and local seafood industries are experiencing problems created by stormwater runoff and changing coastal dynamics. Accomack has three developed islands, Tangier, Saxis, and Chincoteague. In Tangier, approximately 90% of structures are in the 100-year flood plain, the entire island is below the 5-ft contour, and severe shoreline erosion threatens the island. Saxis Island also has severe erosion problems, and the northern portion of the island is very low-lying land. The evacuation route, a causeway through the marsh, is at risk from both potential compaction of the roadbed and erosion of the surrounding marshes as well as recurrent flooding and sea level rise. Chincoteague is somewhat less vulnerable to erosion, because it is located in the wave attenuated Chincoteague Bay but is vulnerable to recurrent flooding and sea level rise.

"Overall, the risk to communities in Northampton County is lower than those in Accomack County. This is due in a large part to topography; even the lowest lying town (Town of Cape Charles) is mostly above the 5-ft elevation. However, it is still vulnerable to storm surges and stormwater flooding as drainage ditches become tidal, reducing their capacity to handle stormwater. The lowest lying lands (the barrier islands) are largely undeveloped. The primary impact from sea level rise is expected to be increased shoreline erosion."

"Recurrent Flooding Study for Tidewater Virginia," Virginia Institute of Marine Science, 2013.

ELEVATION

The elevation of land in relation to water levels must also be considered as a contributing factor in flooding. Northampton and Accomack Counties are low-lying areas with the highest elevation in the town of Melfa at 60 feet above mean sea level.

In 2011, LiDAR (Light Detection and Ranging) elevation data was acquired for all of the Eastern Shore. LiDAR data is collected by flying aircraft using light pulses to measure distance to earth. The data is the most accurate comprehensive elevation data collected for the Eastern Shore of Virginia, accurate to within about six inches. In 2015, a second set of LiDAR elevation data was collected and further enhanced the region's planning capacity.

The 2013 VIMS study considered anything under 4.5 feet to be potential recurrent flood zones (Figure 9).

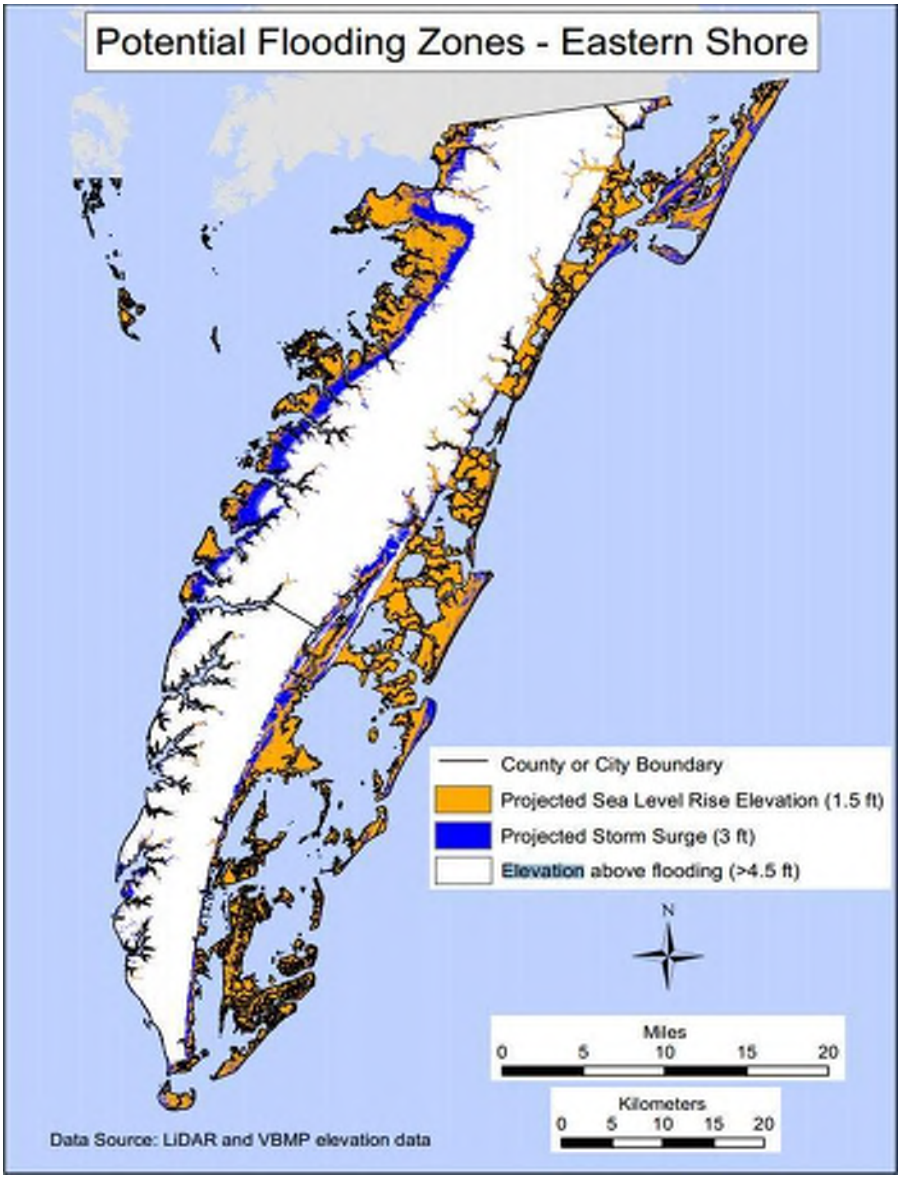


Figure 9: Potential Recurrent Flood Zones

TYPE, LOCATION, AND EXTENT

FLOOD ZONES

A flood is a general and temporary condition where two or more acres of normally dry land or two or more properties are inundated by water or mudflow. To identify a community's risk, FEMA conducts a flood insurance study, which is then used as the basis for maps that identify flood risk areas, called Special Flood Hazard Areas (SFHA). The maps are known as Flood Insurance Rate Maps or FIRMs.

It should be pointed out that FIRMs and flood zones are regulatory tools used to set construction standards and flood insurance rates and are based on a flood that has a one percent chance of occurring in any given year. Although storm surge is a factor in determining the extent of the flood zones depicted on FIRMs, a storm surge map issued for a given storm is not the same, and a FIRM should not be counted on to determine potential storm surge from a storm event.

V ZONES

V zones are the portion of the Special Flood Hazard Area (SFHA) that extends from offshore to the inland limit of a primary frontal dune along an open coast, and any other area subject to high-velocity wave action. Within these zones, 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 as 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 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.

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, six-ton 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.

(Source for this section: FEMA Coastal Construction Manual, 2011; local oral accounts from Hurricane Isabel)

A ZONES

A zones are areas where the one-percent-annual-chance flood would inundate, but waves would not exceed three feet. A-zone construction must have the lowest floor positioned at or above the base flood elevation, and foundation walls must be equipped with openings that allow floodwaters to enter and exit to equalize hydrostatic pressure (Figure 10).

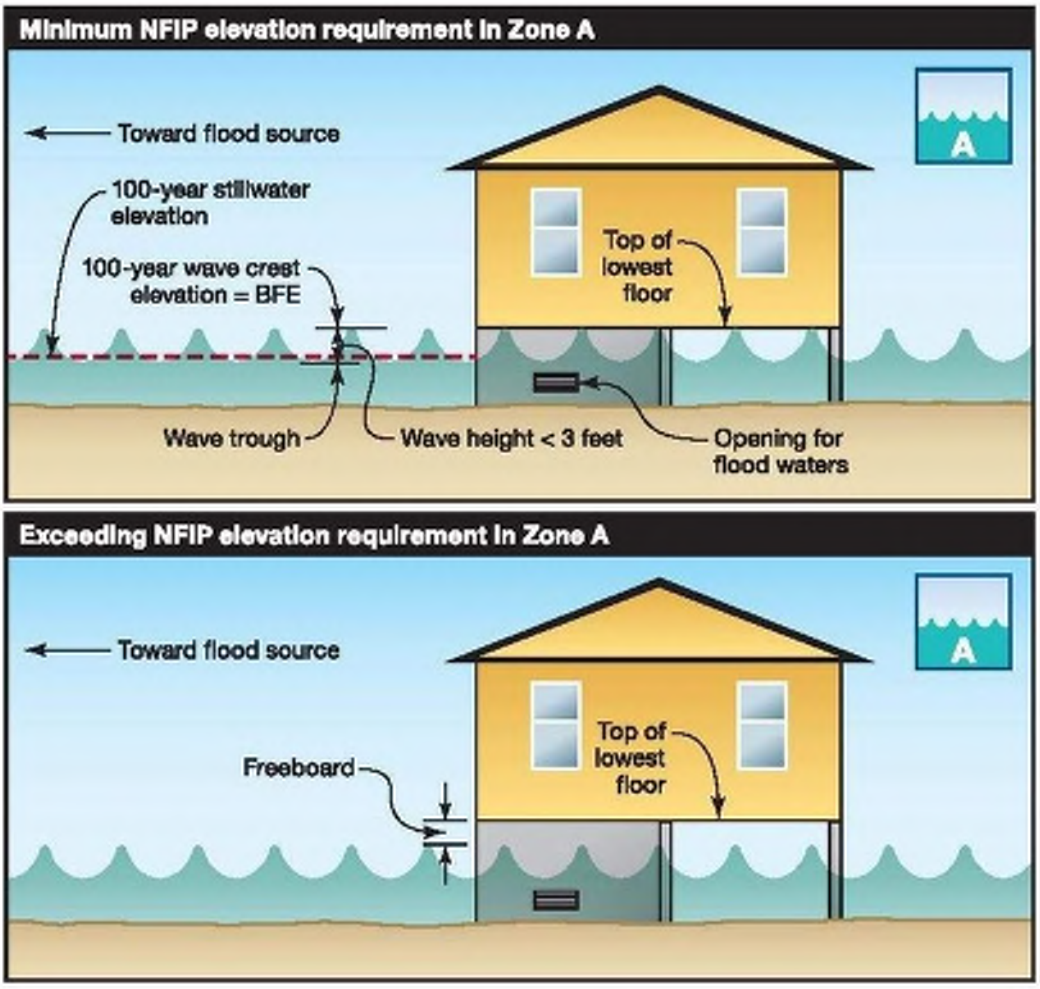


Figure 10: Recommended Elevation for Buildings in Zone A Compared to Minimum Requirements Source: FEMA Coastal Construction Manual, 2011

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.

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 black water. In addition, building materials may wick up floodwater to higher areas not directly inundated (FEMA Coastal Construction Manual, 2011). All new construction must address these issues and meet the Virginia Uniform Statewide Building Code.

Damages from flooding increase rapidly with water depth. The National Flood Insurance Program provides an online interactive flood damage estimation tool at floodsmart.gov. Based on estimates from this tool, just 1 inch of water in a 1,000-square-foot home built on a slab with average furnishings would cause an estimated $10,600 of damage – most of it in finished floors and carpet. At 6 inches of water, the damage estimates roughly doubles.

Former flood zone maps used still water to establish base flood elevations, not taking into account wave height associated with storm surge. FIRM maps effective in early 2015 incorporated this information, along with the line of moderate wave action (LIMWA) – a line that delineates the approximate edge of 1.5-foot wave height, which although not in a velocity zone, can still pose a significant hazard to properties constructed to A-zone standards (Accomack County Flood Insurance Study, 2015).

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 render it unusable until the water is treated and in agreement with state and federal health standards. Wells 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, private well owners are responsible for tracking the water quality of their wells. 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, that were drilled prior to the 1970s, were 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. 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 (Written communication, Jon Richardson, Eastern Shore Health District, May 10, 2016).

In most cases, 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. (Written communication, Jon Richardson, Accomack and Northampton Health Department, May 10, 2016). 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 an NFIP flood policy. When a flood is in the area of a septic tank, the water will backflow from the drain field 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 drain field. 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 drain field (Written communication, Jon Richardson, Eastern Shore Health District, May 10, 2016).

Alternative sewage systems are much more susceptible to flood waters than conventional septic tank and drain field (STE) systems because they, in most instances, rely on an above grade mound to dispose of wastewater. All of the mound, or portions, could erode away during a flood event. Alternative systems also produce a higher quality (cleaner) effluent than STE systems. In addition, they include electrical components to operate pumps and pre-treatment tanks which can malfunction if exposed to flood waters. A pump malfunction would render the system

incapable of receiving wastewater from the home once that tank filled with wastewater. A failure of the pre-treatment tank operation would result in wastewater of lesser quality to be dispersed to the mound which would foul the distribution piping in the mound and could lead to premature mound failure. Pre-treatment tanks are also susceptible to flooding (Written communication, Jon Richardson, Eastern Shore Health District, May 10, 2016).

HUMAN SYSTEMS

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

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 38 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 completely destroyed (local oral accounts).

The federal government requires that all improved property in a SFHA with a federally backed mortgage be covered with flood insurance. Content coverage is not required unless it is part of the security of the mortgage. Many 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 costly consequences of this decision.

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 51% 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 still water 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 still water depth in Chincoteague Bay ranges from 4.8 – 6.0'.

Over time, buildings become more susceptible to hazards, so 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. The 2011 FEMA Coastal Construction Manual recommends an annual inspection of foundation, exterior walls, porches, walls, floors, windows and doors, roof, and attic using a checklist provided in the manual.

COMMUNITY RATING SYSTEM

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 a 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.

Accomack County, plus the towns of Cape Charles, Chincoteague, and Wachapreague participate in the Community Ratings System. Information about savings through their participation in the program can be found in Table 5.

Communities participating in CRS are rated A, B, or C based on the number of repetitive losses. Each category carries specific steps that must be taken, with C requiring a plan or repetitive loss analysis. Accomack County is the only community currently participating in CRS that must take this step. As a Category A, Cape Charles is required only to submit information as needed to update the repetitive loss list. Chincoteague and Wachapreague are both Category B communities, and must take steps to identify the repetitive loss areas and properties, but not in the level of detail required for Category C communities. Several other localities in the region have expressed interest in joining the program but have not done so to date due to staff limitations.

Table 5: Regional Participation in the Community Rating System

CRS Jurisdiction	CRS Class	Number of Policies	Total NFIP Premium	CRS Discount SFHA	CRS Discount Non-SFHA
Accomack County	6	1,230	$872,839	20%	10%
Town of Cape Charles	8	170	$92,992	10%	5%
Town of Chincoteague	8	1,710	$1,299,222	10%	5%
Town of Wachapreague	8	72	$56,723	10%	5%

Source: FEMA Community Status Book Report, 2021

REPETITIVE LOSS PROPERTIES

An insured property with two or more NFIP losses (occurring more than 10 days apart) of at least $1,000 each during any 10-year period since 1978 is known as a repetitive loss property. A 2004 report of the U.S. Government Accountability Office found 38 percent of NFIP claim costs were the result of repetitive loss properties. Between the two counties, 103 repetitive loss properties have seen 304 losses with payments from the NFIP totaling nearly $5.5 million for both structures and contents (FEMA NFIP Data Report, 2022). More information on RL/SRL properties can be found in Chapter 9: The Region.

CHAPTER 7: STORMWATER

INTRODUCTION

While the section does look at changes to portions of the Eastern Shore landscape over time, risk assessment is not found in in this chapter, but can be found in Chapter 3: Risk Assessment.

Stormwater flooding on the Eastern Shore is often a very sudden and unpredictable occurrence. For example, on September 3, 2003, a massive thunderstorm produced heavy rains, dropping 6 to 8 inches of rain in a very short period across northern Accomack County (NOAA Climate Data Center Severe Weather Events Database). In Bloxom, floodwaters reached a depth of at least 2 feet; in some areas the flooding was greater. Railroad tracks blocked drainage in some directions in town, contributing to extensive stormwater flooding that impacted several homes. An afternoon rainstorm had saturated the soils earlier in the day, a common contributor to stormwater flooding on the Shore. The drainage ditches were inundated from high tides that accompanied the storm, and deferred maintenance leading up to the storm event meant the ditches could not accommodate the large amounts of water the storm produced. Compounding the problem in Bloxom was that many acres of tomato fields in the area were covered in plastic, greatly increasing the number of impervious surfaces and increasing stormwater runoff. This practice is still in use across the Eastern Shore, which can exacerbate runoff in areas where it is used.

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 at 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 Table 1 below.

Table 1: Recurrence Intervals of 24-hour Rainfall Totals

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 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	

Source: The National Weather Service 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.

NATURAL FORCES AND CONDITIONS

STORMWATER AND UNDERLYING GEOLOGY

Surface features characteristic of the Coastal Plain of the Eastern Shore include terraces, stream channels, drowned valleys, Carolina bays, swamps and marshes, remnant dunes, and bar-like features formed during the Pleistocene time. The central portion of the Eastern Shore peninsula forms a broad, low ridge which trends northeast-southwest and stands at an elevation ranging from about +25 to +50 feet mean sea level. This central highland area is the principal fresh ground water recharge area for the peninsula and is referred to as the "recharge spine" of the Eastern Shore. The terrace has maintained the same strand line for almost the entire length of the Atlantic Coastal Plain and is divided into a lower and upper terrace which directs the drainage of the Eastern Shore.

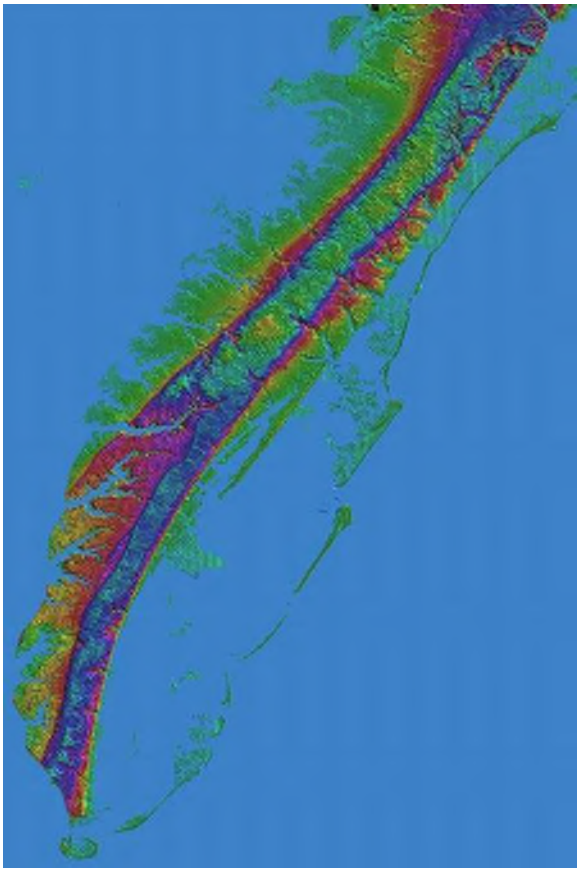


Figure 1: Created with LiDAR data, this "bayShore" overlay reveals the hundreds of ellipsoidal Carolina Bays. Prior to the advent of LiDAR, using aerial imagery only about 100 bays were identified, but now there are 700. Source: Michael Davias, www.cintos.org

The lower terrace, generally located west of Route 13, consists of broad flats broken by large meandering tidal creeks, and bordered by tidal marshes. The topography of the upper terrace, typically thought of as more complex than the lower terrace, is characterized by shallow sand-rimmed depressions known as Carolina bays. These bays, predominantly oval in shape, exert an influence on the infiltration, retardation of runoff, and movement of surface and ground water, often due to the associated Nimmo series soil types. Between the mainland and the barrier islands are extensive tidal marshes flooded regularly by saltwater and drained by an extensive system of creeks (Hulme, 1955). These systems accept ground and surface water discharge.

Numerous drainage basins exist on the Shore ranging in size from approximately four to six square miles. These basins consist of several small creeks and interconnected ditches. Primary drainage basins of the Eastern Shore of Virginia are Gargathy Creek, Folly Creek, Finney Creek, Occohannock Creek, and Pungoteague Creek basins in Accomack County; and Mattawoman Creek and Nassawadox Creek basins in Northampton County. The Pocomoke River basin borders Worcester County, Maryland and Accomack County, Virginia and serves as a major drainage divide for this area.

STORMWATER AND SOIL COMPOSITION

The Eastern Shore exists entirely within the Atlantic Coastal Plain Physiographic Province, which consists of unconsolidated sediments deposited by marine and fluvial processes. The three most abundant soil types on the mainland of Accomack and Northampton Counties are the Bojac, Munden, and Nimmo series (Table 2, Figures 2 and 3). These soil types have distinct characteristics that affect the way that they either contribute towards or help alleviate stormwater impacts (ESVA Land Use & Ground Water Resources Report, 2010).

Table 2: Predominant Soil Types, Eastern Shore of Virginia

Soil Series	Description	Drainage	Suitability for Septic	Water Table
Bojac	Primarily loamy sands found on undulating surfaces and rims of Carolina bays	Moderately to excessively well drained	Considered most suited for septic drainage	Water table more than 4' below surface
Munden	Sandy loam found in nearly level surfaces of coastal plain uplands and stream terraces	Not well drained	Not as well suited for septic drainage	Water table 18"-30" below surface
Nimmo	Sandy loam found in flats, depressions, and drainageways of coastal plain uplands and stream terraces	Poorly drained	Not suited for septic drainage	Water table 0-12" below surface

Source: USDA Natural Resource Conservation Service Soil Survey, 1994

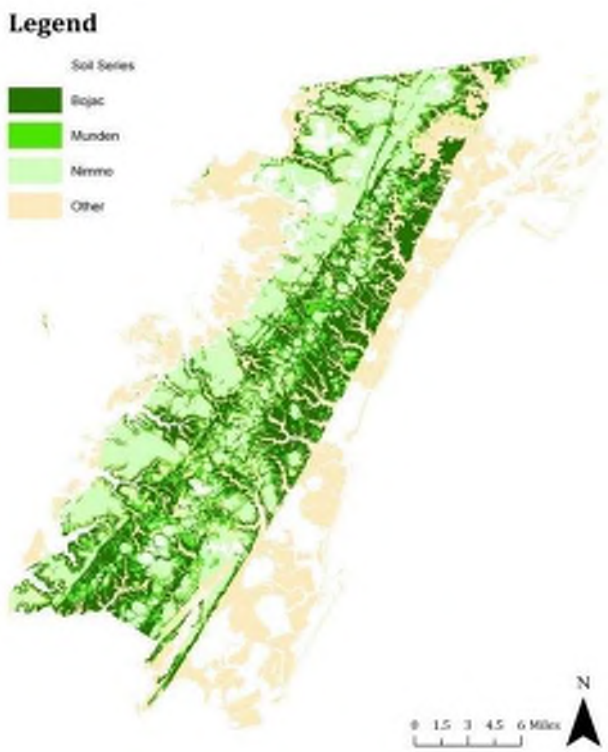


Figure 2: Accomack County Soils Map showing the distribution of the three predominant soil types



Figure 3: Northampton County Soils Map showing the distribution of the three predominant soil types

CAUSES OF STORMWATER

Stormwater flooding is unlike coastal flooding in that it is caused by intense downbursts of rain or from rainwater accumulation in low-lying or poorly drained areas, or 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.

STORM POTENTIAL

Extratropical storms including hurricanes and nor'easters represent the greatest threat of catastrophic stormwater flooding that can occur on the Eastern Shore. The 2009 storm known as Nor'Ida is one such example. It was a major nor'easter, producing moderate to severe coastal flooding. Peak tide at Kiptopeke was 7.04 feet above MLLW, which was a higher reading than during Hurricane Isabel, which was a storm of record for much of the larger Chesapeake Bay region. Chincoteague recorded 13" of rain, and rainfall across the rest of the Eastern Shore averaged 4"-8". The National Weather Service recorded stormwater flooding in both counties on roadways and in poorly drained areas.



Figure 4: Common scene of flooded roadways following intense rainfall on the Eastern Shore. Photo by Jay Diem, Eastern Shore News.

The chapter of this report on Coastal Flooding details tropical storms and nor'easters, most of which were also stormwater events for the region. Downbursts of rain from thunderstorms also have the potential to create stormwater 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.

Table 3 below lists storm events that have caused stormwater flooding on the Eastern Shore, not including tropical cyclones and nor'easters, which were covered in Chapter 1.

Table 3: Storms that have generated intense rainfall on the Eastern Shore, 2000 – 2021

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage *($, not adjusted for inflation)*	Source	Narrative
Accomack Co.	8/4/2000	Flash Flood	0	0	Law Enforcement	Heavy rain caused flooding on Route 13 near Mappsville and Nelsonia.
Northampton Co.	7/30/2003	Flash Flood	0	0	Emergency Manager	Extensive flooding to secondary roads, as well as portions of Route 13.
Accomack Co.	9/3/2003	Flash Flood	0	0	Law Enforcement	Several inches of water on Route 13 in the areas of Nelsonia and Mappsville. Some parts impassable. Many roads closed, under 6 to 8 inches of water.
Accomack Co.	7/28/2004	Flash Flood	0	0	NWS Employee	One foot of water across Route 175 in town of Chincoteague. Six inches of water to 1.5 feet of water across northbound and southbound lanes of Route 13. Southbound lanes of Route 13 were closed for a time. Standing water of 1.5 feet alongside northbound Route 13 was threatening houses along the road.
Accomack Co./ Northampton Co.	10/24/2007	Heavy Rain	0	0	ASOS	The combination of low pressure over the Southeast United States and a nearly stationary frontal boundary across the Middle Atlantic Region helped to produce heavy rain. The storm system brought an average of three to four inches of rainfall to the area. Locally heavier amounts over six inches were reported with some in excess of 7 inches.
Accomack Co./ Northampton Co.	12/10/2008	Heavy Rain	0	0	ASOS	The combination of a frontal boundary laying across the area and low pressure moving through the region, produced rainfall amounts between two and five inches over much of eastern Virginia.
Accomack Co.	7/27/2009	Flash Flood	0	0	Trained Spotter	Scattered thunderstorms in advance of a cold front produced heavy rain which caused flash flooding across portions of the Virginia Eastern Shore. Four and a half inches of rain was reported in some locations.
Accomack Co.	3/13/2010	Heavy Rain	0	0	Trained Spotter	Low pressure over the area produced heavy rain across portions of the Virginia Eastern Shore. Rainfall amount in the area was estimated to be 1.20 inches.
Accomack Co./ Northampton Co.	3/28/2010	Heavy Rain	0	0	COOP Observer	Showers and thunderstorms associated with low pressure and a cold front produced one to three inches of rain across eastern Virginia.

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage *($, not adjusted for inflation)*	Source	Narrative
County	**Date**	**Event Category**	**Property Damage** *($, not adjusted for inflation)*	**Crop Damage** *($, not adjusted for inflation)*	**Source**	**Narrative**
Accomack Co.	6/19/2011	Flash Flood	0	0	Law Enforcement	Isolated thunderstorms associated with low pressure produced heavy rains which caused flash flooding across portions of the Virginia Eastern Shore. High water was covering Routes 316 and 182.
Accomack Co.	7/14/2012	Flash Flood	0	0	911 Call Center	Isolated thunderstorm along a frontal boundary caused heavy rain which produced flash flooding across portions of the Virginia Eastern Shore.
Accomack Co.	8/25/2012	Heavy Rain	0	0	State Official	Low pressure along the Mid Atlantic Coast produced scattered thunderstorms with heavy rain across portions of central and eastern Virginia. Rainfall amounts were reported between 2 and 6 inches.
Accomack Co.	6/7/2013	Flash Flood	0	0	911 Call Center	The combination of the remnants from Tropical Storm Andrea and a frontal boundary draped over the region caused heavy rain which produced flash flooding across portions of central and eastern Virginia. Several roads were impassable due to high water.
Northampton Co.	8/12/2014	Flash Flood	0	0	Emergency Manager	Slow moving thunderstorms in advance of a cold front produced 3 to 5 inches of rain in a small area around Cape Charles, VA. Flooding was reported on many streets in Cape Charles. Several cars were flooded by 2 to 3 feet of water.
Northampton Co.	9/8/2014	Heavy Rain	0	0	COOP Observer	Showers and scattered thunderstorms associated with low pressure along the North Carolina Coast produced locally heavy rainfall across portions of southeast and south-central Virginia. Storm total rainfall amounts generally ranged from three inches to as much as twelve inches.
Accomack Co./ Northampton Co.	11/9/2015	Heavy Rain	0	0	COOP Observer	Low pressure moving up along the East Coast produced rainfall amounts between 1.5 inches and 3.5 inches across much of eastern and southeast Virginia.

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage *($, not adjusted for inflation)*	Source	Narrative
Accomack Co.	7/1/2016	Heavy Rain	0	0	Mesonet	Scattered showers and thunderstorms in advance of a cold front produced heavy rain and caused flash flooding across portions of eastern and southeast Virginia. Rainfall totals ranged from five to as much as eleven inches in areas where flash flooding occurred.
Accomack Co.	7/18/2016	Heavy Rain	0	0	911 Call Center	Scattered thunderstorms in advance of a cold front produced heavy rain and minor flooding across portions of the Virginia Eastern Shore.
County	**Date**	**Event Category**	**Property Damage** *($, not adjusted for inflation)*	**Crop Damage** *($, not adjusted for inflation)*	**Source**	**Narrative**
Accomack Co./ Northampton Co.	9/19/2016	Heavy Rain	0	0	Mesonet	The combination of a stalled frontal boundary and the remnant low pressure area that was Tropical Storm Julia, produced heavy rain across much of eastern and central Virginia ranging from 2 to 8 inches.
Accomack Co.	9/28/2016	Heavy Rain	0	0	CoCoRaHS	Waves of low pressure moving along a stalled frontal boundary over the Mid-Atlantic region produced periodic showers and thunderstorms with heavy rain across much of the Virginia Eastern Shore. Totals ranged from 1 to 8 inches.
Accomack Co./ Northampton Co.	10/8/2016	Heavy Rain	0	0	ASOS	The combination of a cold front moving through the Mid-Atlantic and Post Tropical Cyclone Matthew tracking northeast just off the North Carolina and Virginia coasts, produced heavy rain across the Virginia Eastern Shore. Rainfall totals generally ranged from 4 to 13 inches.
Northampton Co.	6/5/2017	Heavy Rain	0	0	Mesonet	Scattered thunderstorms well in advance of a cold front produced heavy rain and minor street flooding across portions of southeast Virginia. Rainfall totals around 4 inches.
Accomack Co.	7/29/2017	Heavy Rain	0	0	CoCoRaHS	Scattered thunderstorms in advance of and along a frontal boundary produced heavy rain and flash flooding across portions of central and eastern Virginia. Rainfall totals around 2-3 inches.
Accomack Co./ Northampton Co.	8/8/2017	Heavy Rain	0	0	CoCoRaHS	Scattered severe thunderstorms associated with low pressure and a cold front produced damaging winds, one tornado, and heavy rain across portions of eastern Virginia. Rainfall totals between 3-5 inches.

County	Date	Event Category	Property Damage *($, not adjusted for inflation)*	Crop Damage *($, not adjusted for inflation)*	Source	Narrative
Accomack Co./ Northampton Co.	8/29/2017	Heavy Rain	0	0	Trained Spotter	Low pressure moving northeast off the Mid Atlantic Coast produced heavy rain which caused minor flooding across portions of central and eastern Virginia. Rainfall totals between 3 and 7 inches.
Northampton Co.	9/9/2018	Flash Flood	0	0	911 Call Center	Scattered showers and thunderstorms along a stationary boundary produced heavy rain which caused flash flooding across portions of the Virginia Eastern Shore. Numerous homes were flooded, and water rescues were reported in Exmore. Radar estimates indicated that up to three to four inches of rain had fallen in the area.
County	**Date**	**Event Category**	**Property Damage** *($, not adjusted for inflation)*	**Crop Damage** *($, not adjusted for inflation)*	**Source**	**Narrative**
Accomack Co./ Northampton Co.	10/20/2019	Heavy Rain	0	0	ASOS	Remnant low pressure of Tropical Storm Nestor tracked northeast across eastern North Carolina and off the southeast Virginia coast. This storm produced heavy rain which caused some minor flooding across portions of central and eastern Virginia. Rainfall totals ranged from 1.5 inches to near 4.5 inches.
Accomack Co./ Northampton Co.	9/17/2020	Heavy Rain	0	0	CoCoRaHS	Post Tropical Cyclone Sally tracking northeast across the Southeast United States and off the Mid Atlantic Coast produced heavy rain across portions of Central and Eastern Virginia. Rainfall totals were between 1 and 4 inches.
Accomack Co./ Northampton Co.	10/11/2020	Heavy Rain	0	0	CoCoRaHS	Post Tropical Cyclone Delta tracking east northeast across the Middle Atlantic region produced heavy rain across portions of central and eastern Virginia. Rainfall totals generally ranged between two inches and four inches across the counties.

Source: NOAA, National Climatic Data Center, Storm Events Database: http://www.ncdc.noaa.gov/stormevents/

SEA-LEVEL RISE AND STORMWATER

Since 1933, the relative sea-level rise measured at Sewell's Point has risen by 14.5 inches, and the rate of rise is shown to be steadily increasing. Because of the Chesapeake Bay impact crater, the Eastern Shore is also subsiding. The combination of the sinking and the sea-level rise is considered the relative sea-level rise and is an even greater threat.

With issues associated with climate change, recurrent flooding, and/or increased storm frequency, the frequency of heavy precipitation events (or proportion of total rainfall from heavy storms) is expected to increase in the Eastern United States. Although the average total annual precipitation isn't predicted to change significantly in our region, the timing and intensity of storm events is expected to change (ICPP, 2007), with increased precipitation extremes leading to increases in stormwater flooding.

Changes to vegetation can also occur and depending on the ecosystems' ability to migrate and their ability to retain flood waters, the impacts on stormwater flooding will vary greatly. An example of natural flood mitigation through vegetation can be seen in Figure 5. Overall, it is predicted that there will be a decrease in dry land (developed and undeveloped), irregularly flooded salt marsh, and other nontidal wetlands, but an increase in the expanse of regularly flooded and transitional salt marshes. Figure 6 reveals these changes, as shown by the Future Habitat application of the Coastal Resilience mapping tool. Vegetation serves as a stabilizing force for shorelines and a water retention resource on the shoreline and inland, and thus a loss of vegetation increases inland areas' susceptibility to flooding.



Figure 5: One of the ecosystem services of freshwater wetlands is flood mitigation. Shifting habitats can alter the ability of an area to help absorb flood waters. Photo By: Shannon Alexander

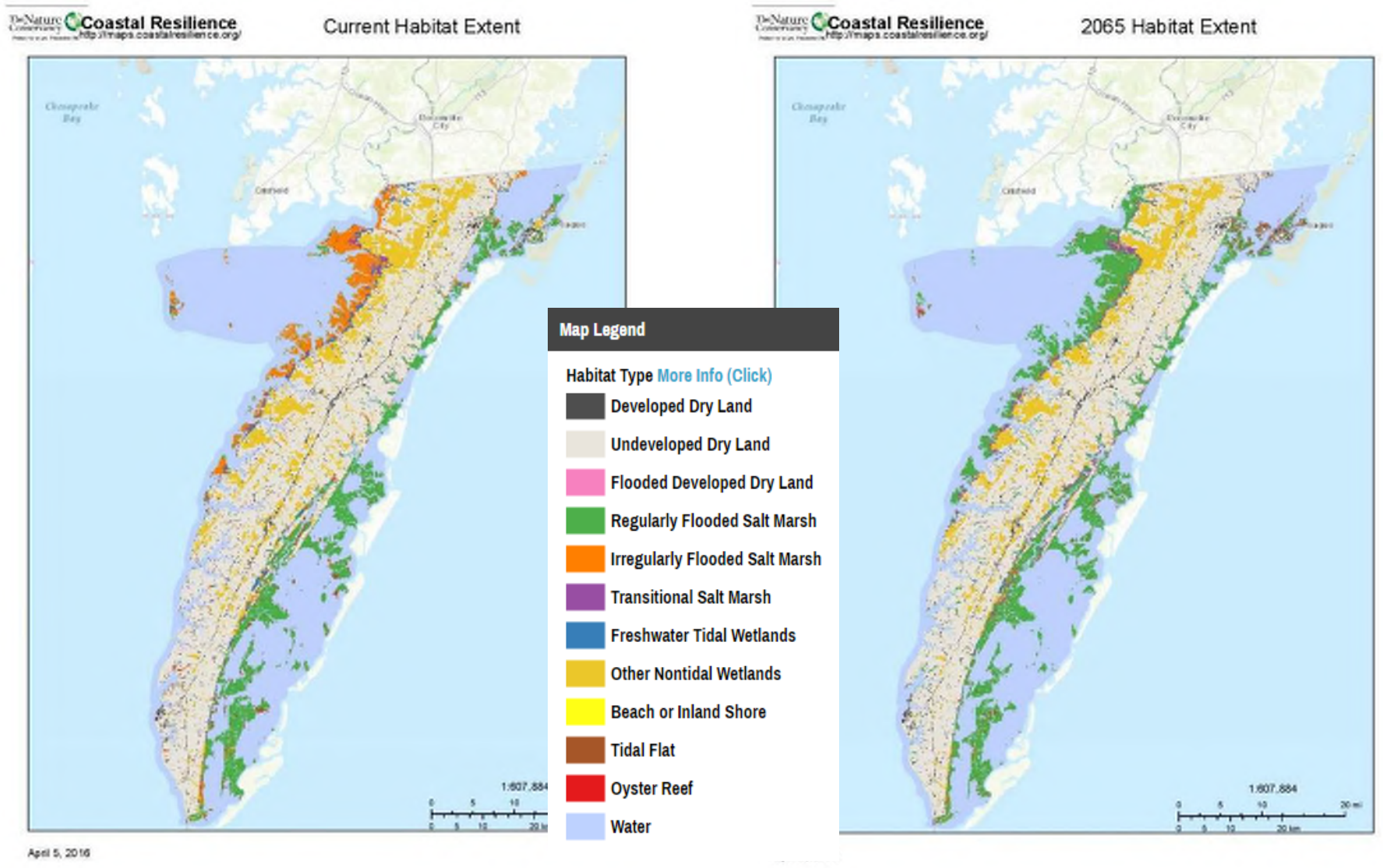
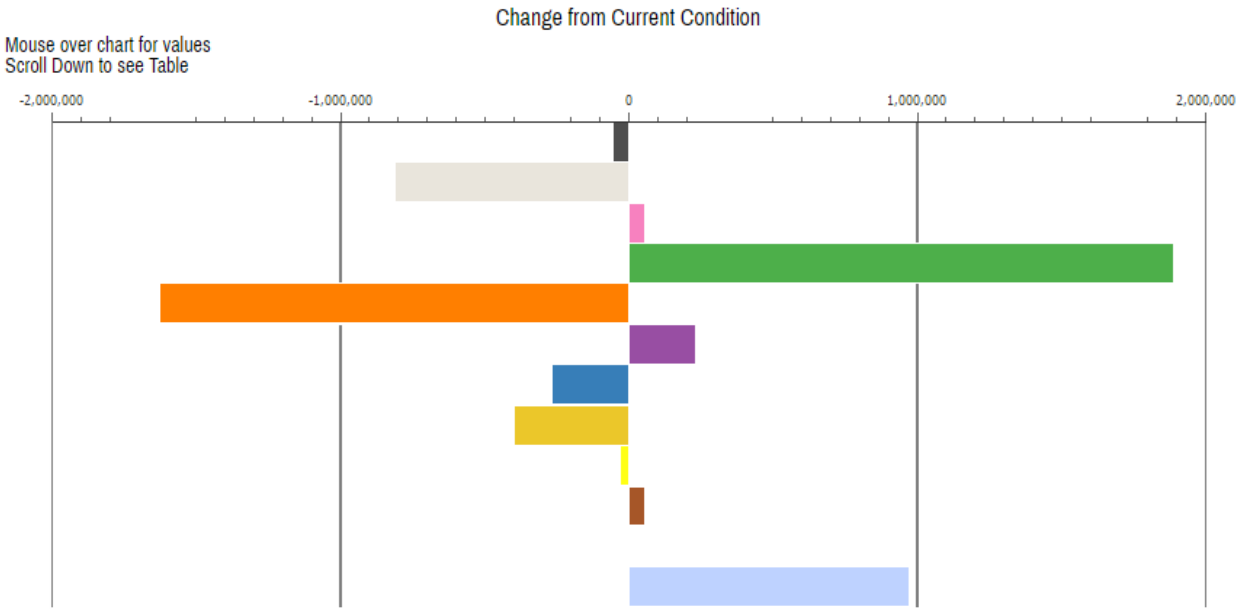


Figure 6: Coastal Resilience Mapping Tool; Future Habitat Application Source: The Nature Conservancy

Figure 7: Habitat Change from Current Condition (Acres)



Code	Name	Total (Acres)	Change (Acres)	Change (%)
1	Developed Dry Land	782,370	-57,509	-6
2	Undeveloped Dry Land	15,189,164	-811,377	-5
3	Flooded Developed Dry Land	57,508	57,508	NaN
4	Regularly Flooded Salt Marsh	5,795,452	1,889,253	48
5	Irregularly Flooded Salt Marsh	235,928	-1,629,778	-87
6	Transitional Salt Marsh	619,368	232,417	60
7	Freshwater Tidal Wetlands	184,504	-266,523	-59
8	Other Nontidal Wetlands	3,636,670	-400,878	-9
9	Beach or Inland Shore	29,391	-33,096	-52
10	Tidal Flat	497,880	55,801	12
11	Oyster Reef	649	-8,538	-92
12	Water	20,804,538	972,720	4
	Totals	47,833,422	6,415,398	13

TYPE, LOCATION, AND EXTENT

DAMAGES

Flash flooding from stormwater can be quite hazardous to humans. Since conditions develop rapidly, people can become trapped before even realizing they are in danger. In September 2018, heavy rains related to Hurricane Florence washed away a portion of Hillsborough Drive in Belle Haven and closed several other roads in Accomack and Northampton Counties. Flooding like this creates safety hazards and takes time, money, and resources to repair.



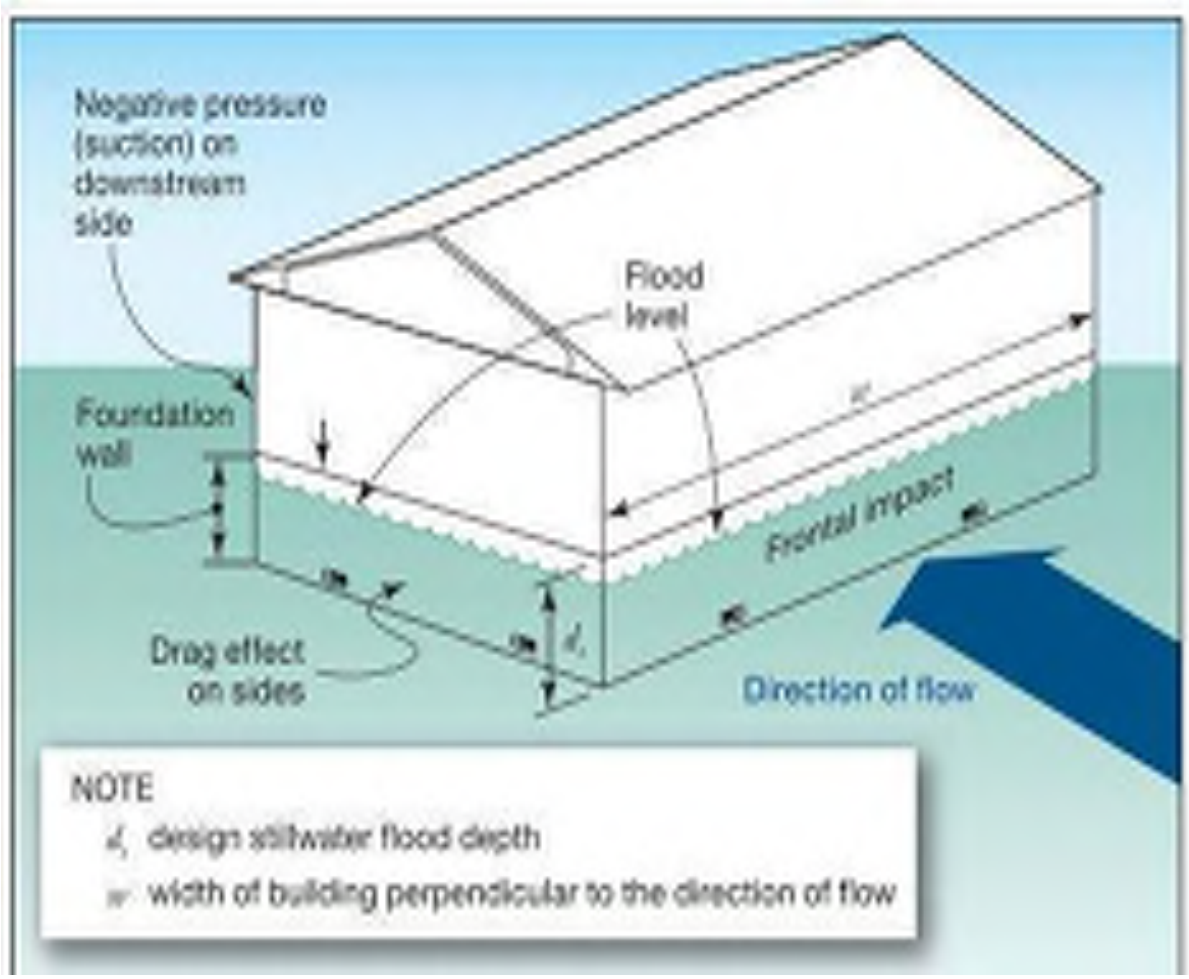
Figure 8: Hillsborough neighborhood in Belle Haven Monday Morning September 10, 2018. Photo Credit: Phillip Spohn

Buildings are in danger from hydrostatic loads, which occur when flood waters come into contact with a building, its foundation, or a building element. The hydrostatic load can be lateral or vertical. In order for lateral forces to cause displacement of a building or element, there must be a substantial difference in water elevation on opposite sides of the wall. The purpose of flood vents is to allow water to flow freely through a crawl space area to equalize hydrostatic pressure on either side of the foundation wall (*FEMA Coastal Construction Manual*, 2011).

Inadequately elevated buildings on shallow foundations are most in danger from vertical hydrostatic forces (buoyancy or flotation). Such buildings are vulnerable to uplift from flood and wind forces because the weight of a foundation or building element is much less when submerged than when not submerged. (*FEMA Coastal Construction Manual*, 2011).

Stormwater floods that move faster than 10 feet per second are generating hydrodynamic loads in addition to the hydrostatic loads (Figure 7). Hydrodynamic loads are a function of flow velocity and structural geometry, including frontal impact on the upstream face, drag along the sides, and suction on the downstream side. These loads can destroy walls, push structures off foundations, and carry sediment and debris (*FEMA Coastal Construction Manual*, 2011).

Figure 9: Hydrodynamic Building Loads



Source: FEMA Coastal Construction Manual, 2011

Table 4: Locations Identified as Flooded Following Rain Events

County	Town	Intersection / Road	Intensity/Effect
Accomack	Bloxom	Between Bull St & Bayside Dr	No homes, recreational area for the Town
Northampton	Cape Charles	Historic district; Intersection of Plum St & Madison Ave	Residential and commercial; primarily road flooding, hindering travel
Northampton	Cheriton	Mill St, Cherrystone Rd; Drainage an issue Town-wide	Residential, saturated soils, higher risk of wind damage to trees
Northampton	Eastville	Courthouse Rd, Willow Oak Rd east of Rt 13, northwestern side of the Rt 13 & Willow Oak Rd intersection. Willow Oak Rd receives water from the Holland Court area.	Residential, commercial, and access to County seat buildings and jail
County	**Town**	**Intersection / Road**	**Intensity/Effect**
Northampton	Exmore	Town-wide except along the railroad tracks and New Road's housing area (west of Rt 13 & south of Occohannock Neck Rd)	Damage to buildings and other personal property, affects mobility of non-automobile travelers, erosion cutting away parking lots, can impact public water/sewer
Accomack	Hallwood	Town-wide; particularly adjacent to the railroad past Bethel Church Rd, Main St	Hinders travel, saturated soils, damage to personal property
Accomack	Keller	Central & northern part of Town, intersection of Center Ave w/ West St & Lee St, northern end of West St	Town Office & PO susceptible
Accomack	Melfa	Woodland Ave – entire street (culvert pipe needed)	Residential and Shore Engineering
Northampton	Nassawadox	Woodstock residential area, Hospital Ave (even next to Rayfield 's Pharmacy)	Hinders travel, residential, commercial, medical
Accomack	Onancock	Lilliston Ave, North St area including the Police Station/Town Office	Residential, Town facilities
Accomack	Onley	Town-wide, particularly east of Rt 13 (hydric soils)	Primarily commercial
Accomack	Parksley	Intersection of Dunn Ave & Adelaide St, in front of Jaxon's, perennial ditch on south side	Some residential, but primarily the downtown business district

Source: See local Chapter personal communication reference

Bloxom and Melfa have had some success mitigating stormwater flooding through aggressive ditch maintenance programs.

EXPOSURE AND POTENTIAL LOSS

In some interior areas of the Shore, the Base Flood Elevation (BFE) is 4 feet. However, the AE Zones identified are associated with creeks, the ocean, or a bay. For example, there is no identified Special Flood Hazard Area in Bloxom. Flood Insurance Rate Maps (FIRMs) were updated in 2015, but some still miss many areas with recurring stormwater flooding.

There are two main hazards to residential construction associated with falling rain itself. One is the penetration of the building envelope during high-wind events and the other is the vertical weight load due to rainfall ponding on a roof (*FEMA Coastal Construction Manual*, 2011).

To look at potential losses it is necessary to observe what a flood would do to a structure. The average 2,000 ft^2 home, built on a slab, and with typical household items would suffer from $52,220 in total losses with a one-foot flood and $74,580 in total losses under a four-foot flood (NFIP The Cost of Flooding App).

Since so many areas of stormwater 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. There are current efforts to recapture the LiDAR data to create an even more accurate data set. This will provide the resolution needed to map and analyze stormwater flooding issues on the Eastern Shore. The data has already been used in the Eastern Shore of Virginia Transportation Infrastructure Inundation Vulnerability Assessment and subsequently in the Coastal Resilience 2016 mapping portal for 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 246 and 173 non-Special Flood Hazard Area (SFHA) NFIP flood insurance policies in the unincorporated portions of Accomack County and Northampton County, respectively. These numbers represent the percent of all policies in Accomack County and 11.9 percent in Northampton County. There was an increase in the total number of policies, both SFHA and non-SFHA policies, and in the percentage of non-SFHA policies in both Counties from 2003 to 2011, but then a decline from 2011 to 2016, although the number of policies remains higher than in 2003 (FEMA NFIP Insurance Reports, July 2003, May 2011, and January 2016). Table 5 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, but that perhaps the new FEMA flood zone maps has prompted some homeowners to discontinue their policies.

Table 5: Summary of flood insurance policies for the unincorporated areas of Accomack and Northampton Counties.

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	2016	2060 (88.1%)	246 (11.9%)	2306
	2011	2724 (93.7%)	184 (6.3%)	2908
	2003	2457 (95.8%)	107 (4.2%)	2564
Northampton County	2016	161 (48.2%)	173 (51.8%)	334
	2011	252 (59.9%)	169 (40.1%)	421
	2003	213 (73.2%)	78 (26.8%)	291

*Source: FEMA NFIP Insurance Reports, May 2011, July 2003, and January 2016

SECONDARY HAZARDS

There are secondary hazards from stormwater flow as well. 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 than other areas in Virginia that have much larger watersheds. Unlike most places in Virginia and the nation, Accomack and Northampton are not impacted by stormwater coming from other jurisdictions.

Intense rainfalls increase the number of contaminants in the water. When the water flows over agricultural land, residential yards, roads, and commercial parking lots, contaminants are picked up and carried into the streams. Larger overland flows also erode streams and if this erosion is severe, property damage can ensue. The excess nutrients that are introduced into our coastal creeks and bays following heavy rain events can cause algal blooms followed by eutrophication, depleting the dissolved oxygen levels to a level that kills aquatic animals. Additional steps need to be made to ensure that areas storing materials with high levels of nutrients are not built in the flood plain or very close to tidal tributaries.

Often the saturated soils and standing water cause septic system and drain field failures. In some flooding instances, alternative system tanks have become dislodged and subsequently floated out of the ground. When this occurs, additional contaminants that pose immediate risk to human health are introduced into the flood waters. Without proper education about these dangers, residents often wade through, and children often play in the remaining waters once the storm system has passed.

HUMAN SYSTEMS

FRESH WATER IMPOUNDMENTS

An important source of water for agricultural and other irrigation needs is from farm ponds or impounded creeks and streams. Most of the impounded creeks and streams are historical, many created before 1980, and the majority of the ponds post-date 1980. These impoundments often act as a holding area for water for irrigation, however, the source of water is a combination of both stormwater and groundwater recharge from the Columbia aquifer (Eastern Shore Ground Water Management Plan, 2013).

STORMWATER FLOODING PREVENTION LAWS AND PROGRAMS

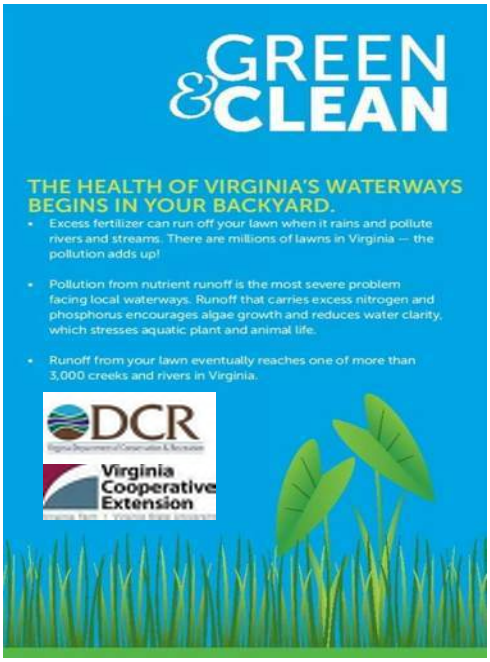
When managed well, stormwater can recharge groundwater and protect land and streams from erosion, flooding, and pollutants.

An EPA study released in December of 2015 supports long-term benefits of green infrastructure and low impact development. This modeling study used the FEMA Hazus ® model and national-scale datasets to estimate the flood loss avoidance benefits from application of small storm retention practices for new development and redevelopment nationwide. According to the study, the use of green stormwater infrastructure can save hundreds of millions of dollars in flood losses when applied to new development and redevelopment, and if retrofitting were to occur, the avoided losses would be even more significant (Atkins, 2015).

The lead agency for developing and implementing statewide Stormwater management and nonpoint source pollution control programs in the Commonwealth is the Virginia Department of Environmental Quality (DEQ). The Clean Water Act (CWA), properly titled the Federal Water Pollution Act, was essentially established in 1972, and is Stormwater managed by the U.S. Environmental Protection Agency (EPA). This is the origin of Virginia's Total

Maximum Daily Loads (TMDLs). These are important values developed by DEQ to assess state waters and causes of impairment. The development process of the TMDL and the Implementation Plan (IP), often result in a need to reduce the amount of runoff. On the Eastern Shore this is frequently due to nutrients associated with the runoff, and the resulting eutrophication, elevated bacteria levels, and reduced dissolved oxygen (DO).

At this point in time, there are three Commonwealth of Virginia laws that apply to land disturbance activity in Virginia, however, the Stormwater Stakeholder Advisory Group (SAG) is currently brainstorming ways to streamline these programs. These laws include the Stormwater Management Act (§ 62.1-44.15:24 et seq.), Erosion and Sediment Control Law (§ 62.1-44.15:51 et seq.), and Chesapeake Bay Preservation Act (§ 62.1-44.15:67 et seq.), all three of which were incorporated into the State Water Control Law (§62.1-44.2 ET SEQ.) in 2013. For counties and towns, these laws are important in the creation of zoning and subdivision ordinances, in setting out the way in which these laws are followed. From the restricting of where new development can occur, to the frequency of septic pump-outs, these regulations affect the local municipalities and residents, with the intent to improve water quality.



In rural areas, the volume of water that is discharged following a storm event has an increased flow rate due to the combined effects of subdivisions, roads, and buildings. Historically the aim of stormwater management was to quickly drain water away to the seaside and bayside creeks and bays. Not only can this lead to erosion and nutrient loading, but it is also eliminating the opportunity for that rainwater to recharge aquifers or be retained for irrigation and agricultural use.

Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by DEQ (Virginia Code §62.1-44.15:51 *et seq.*).

Coastal Lands Management is a state-local cooperative program administered by the DEQ Water Division and 84 localities that regulates activities in the Chesapeake Bay Resource Management Areas and Resource Protection Areas in Tidewater, Virginia. It was established pursuant to the Chesapeake Bay Preservation Act (Virginia Code §§62.1-44.15:67 through 62.1-44.15:79) and the Chesapeake Bay Preservation Area Designation and Management Regulations (Virginia Code 9 VAC 25-830-10 *et seq.*).

The Department of Conservation and Recreation (DCR) has 47 Soil and Water Conservation Districts (SWCDs), who work closely with districts, landowners, and other land managers to control and decrease harmful runoff. The Eastern Shore Soil and Water Conservation District offers technical assistance in shoreline erosion control, soil surveys, and animal waste management. More information can be found on their web site at http://esswcd.org/.

The United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) also provides technical and financial assistance to farmers, private landowners, conservation districts, tribes, and other types of organizations through the Farm Bill.

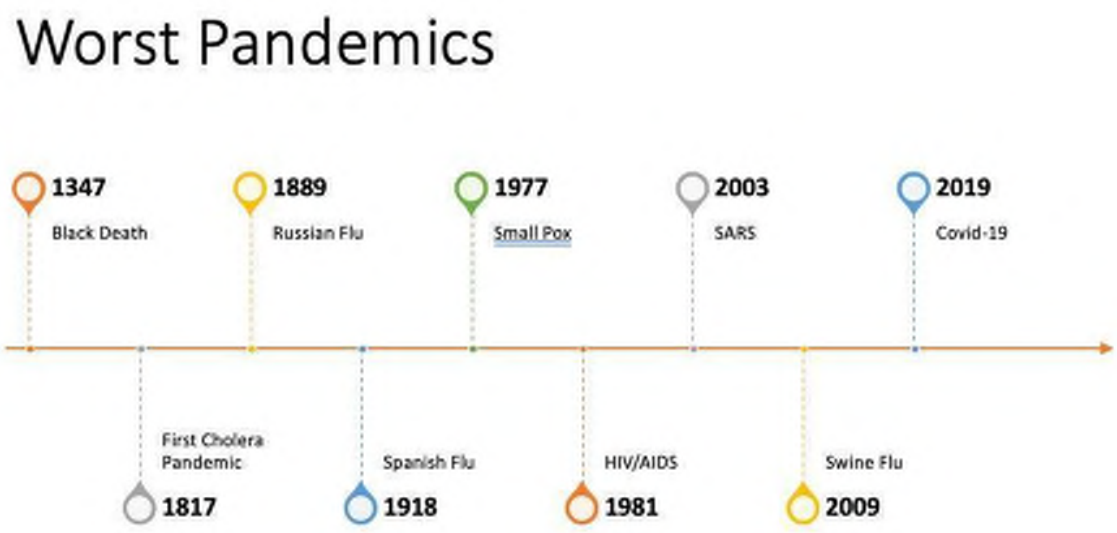
CHAPTER 8: PANDEMIC

INTRODUCTION

An epidemic is a disease that spreads rapidly throughout a region's or country's population. Pandemic refers to an epidemic that has spread throughout a larger geographic area impacting multiple countries or continents.

Throughout history no other event has killed more human beings than infectious diseases. A review of the major pandemics illustrates the frequency, and now with the COVID-19 pandemic, nearly 3 million deaths have occurred worldwide at time this document is published. Figure 1 below gives a basic timeline of some of the deadliest pandemics recorded in human history.

Figure 1: Timeline of Worst Pandemics



The challenge with the transmission of disease is the variety of ways a person can become infected. A look at just a few major pandemics illustrates the different paths to infections and their sources:

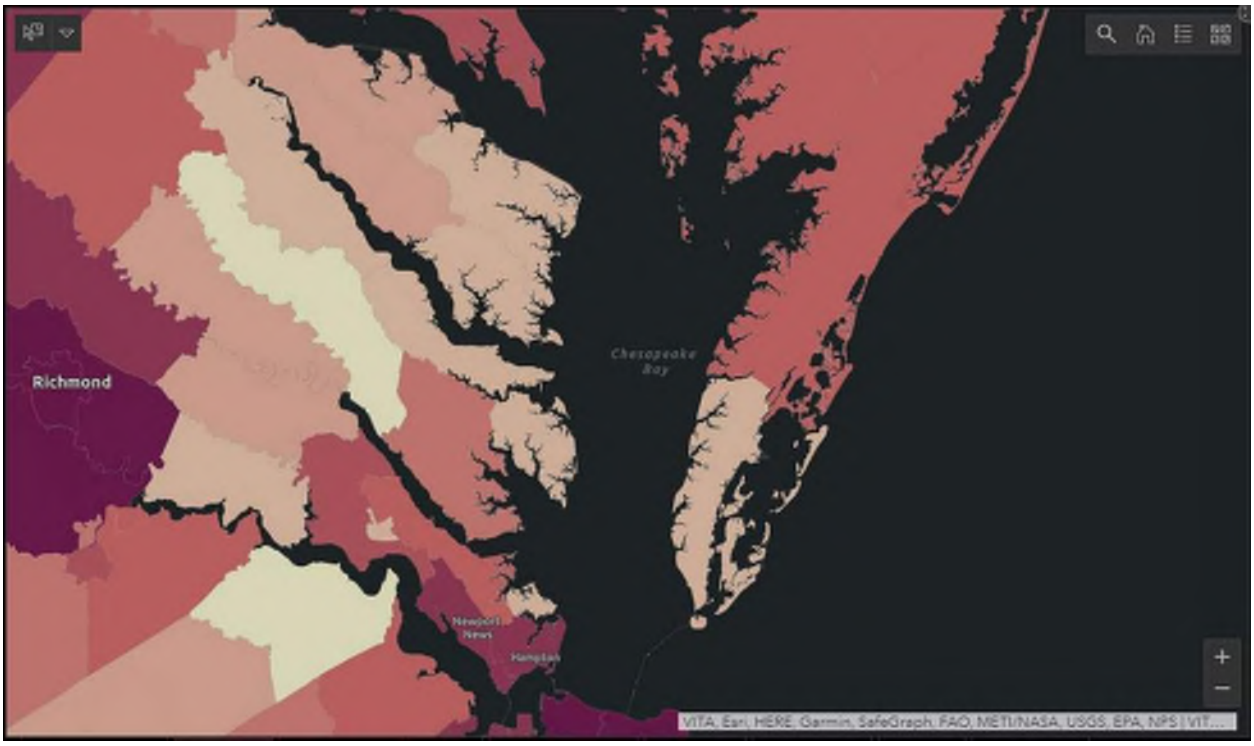
Table 1: Pandemics and Infection Paths

Pandemic	Path of Infection
1918 & 2009 Influenza (H1N1)	Respiratory droplets, infected surfaces Zoonotic influenza virus from swine
Avian Influenza A (H5N1 & H7N9)	Spread occurs by contact with infected living or dead poultry and birds Zoonotic influenza virus from birds and poultry
Bubonic Plague	Flea bites Zoonotic bacteria found in fleas and small mammals
Ebola	Contact with infected blood or body fluids Zoonotic Ebola virus from bats
COVID-19, MERS-CoV, SARS-CoV	Respiratory droplets Zoonotic coronavirus, possibly from bats

History has shown that the best-known types of pandemics are Influenza pandemics. Currently the world is being impacted by COVID-19 which is a new strain of coronavirus. COVID-19 causes an outbreak of respiratory illness that was first detected in Wuhan, Hubei province, China. Coronaviruses are a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS).

COVID-19 has resulted in the estimated death of 3 million people worldwide at the time of writing this chapter. The true number is likely higher, but unknown. The United States has recorded the greatest number of deaths of any country, at just over 600,000 fatalities. Vaccine efforts are ongoing, with multiple options available to the public. These vaccines carry some side effects but have largely been proven to be safe and effective against the Coronavirus. The image below is a map produced by Johns Hopkins University displaying the number of confirmed cases of COVID-19 for Accomack County and Northampton County. The darker colors indicate a higher confirmed case count. As of August 3, 2021, Accomack County has 2,928 confirmed cases and Northampton County has 811.

Figure 2: Cases of COVID-19 by County. Source: Johns Hopkins University https://coronavirus.jhu.edu/us-map



During the COVID outbreak on The Eastern Shore, officials came together to support testing and vaccinations. Locally, the Virginia Department of Health's Eastern Shore Health District (ESHD) partnered with Eastern Shore Rural Health System, Inc. (ESRHS) and Riverside Medical Group (Riverside). Virginia's emergency declaration on March 12, 2020, also allowed the Virginia National Guard to be deployed across the state. In the town of Melfa, the Virginia National Guard assisted ESHD with running a testing site at the Eastern Shore Community College. As seen in Figure 3, below.

There are several factors which contribute to an outbreak, and the result is often demonstrated by more cases than would be normally expected, often suddenly, of an infectious disease in a community or facility. These factors include:

- Time of the year
- Weather
- Environment
- Origin



Figure 3: U.S. National Guard. Photo by Cotton Puryear

In addition to the factors which influence an outbreak of a pandemic, epidemiologists are concerned with both the frequency and pattern of health events that might impact a population. Frequency is the number of health events and its relationship to the size of a population. One simple example is comparison of the impact of diabetes across different populations. Patterns refer to how often an event happens as it relates to time, place, and person. Because of patterns, geospatial data has been critical in capturing the impact of COVID-19. Geospatial data now informs patterns to help draw correlations between:

- Time: annual, seasonal, weekly, daily, hourly, weekday versus weekend
- Place: urban/rural differences, and location of work sites or schools
- Demographic: age, sex, marital status, and socioeconomic status

These data sets can demonstrate how serious a disease is to the individual and using the example of the annual flu, which usually impacts 5-15 percent of the population; the Eastern Shore may have between 2,200 to 6,600 people become sick.

IMPACTS

HEALTH AND SAFETY OF PERSONS IN THE AFFECTED AREA AT THE TIME OF THE INCIDENT

Healthcare and safety workers are affected by the spread of a pandemic. Transmission can be anticipated in the workplace not only from patients to workers, but also among co-workers and between members of the public and workers in other types of workplaces. The employer needs to proactively engage in clear communications and training, provide the appropriate personal protective equipment, and implement effective control measures. The following table indicates the estimated level of risk for various types of employment.

Table 2: Risk Type by Employment

Very High & High Exposure Risk	Medium Exposure Risk	Lower Exposure Risk (Caution)
Healthcare workers, particularly those working with known or suspected pandemic patients.	Workers with high-frequency interaction with the public (e.g., those working in schools, restaurants and retail establishments, travel and mass transit, or other crowded environments).	Workers who have minimal contact with the public and other coworkers (e.g., office workers).

CONTINUITY OF OPERATIONS AND DELIVERY OF SERVICES

According to FEMA, "Continuity of operations (COOP) during a pandemic requires using existing plans in more adaptive ways to address unique requirements, to include employee health, social distancing, and widespread absenteeism." (COVID-19 Best Practice Information: Continuity of Operations, n.d.).

FEMA recommends the following best practices for jurisdictions and communities:

- Review and/or assess your organization's essential functions and personnel
- Establish and practice your telework ability in advance. Employers should regularly check in with staff to see what is and is not working during teleworking to assess where new processes and procedures are needed to communicate with and support staff
- As organizations implement expanded telework to maintain business operations, companies should examine IT practices and procedures, and security risks that may arise from a remote workplace
- Identify essential workers needed to maintain the critical infrastructure services and functions that the community depend on daily
- Key critical infrastructure sectors should consider procuring supplies to include cots, sleeping bags, and food if essential workers need to shelter-in-place at work to ensure continued reliable service while avoiding exposure to the virus
- Local governments should aim to conduct business remotely while continuing to make time-sensitive decisions
- Use technology to expand virtual options to engage citizens in public meetings to maintain momentum on critical planning efforts

INFRASTRUCTURE AND ECONOMIC

Impacts to infrastructure are often limited except for increased demand on public health facility and care. Other areas of concern in a prolonged pandemic relate to the lack of maintenance or arability of resources because the supply chain is interrupted. One simple example is the loss of heat in the winter months in a school and resources are not available to place the systems back online.

ECONOMIC AND FINANCIAL CONDITION

The need to alter or prevent the normal social contacts, called "social distancing," or a lockdown will lead to a temporary decrease in the financial condition of the community. Recovery is often measured in the amount of time the economy is impacted by the pandemic.

CHAPTER 9: THE REGION

INTRODUCTION

The Eastern Shore of Virginia is a two-county peninsula situated between the Chesapeake Bay and the Atlantic Ocean (Figure 1). Along the Eastern Shore's approximately 70-mile length lie 19 incorporated towns and the longest expanse of coastal wilderness remaining on the Atlantic seaboard. The region is unique compared to neighboring regions in the Commonwealth in that three of its incorporated communities and several key economic drivers are located on islands in the Chesapeake Bay and Atlantic Ocean.



Figure 1: Eastern Shore of Virginia Location Map

REGION PROFILE

On the seaside of the Eastern Shore are thousands of acres of pristine salt marshes, tidal mudflats, shallow lagoons, and navigable tidal channels that support thriving seafood and recreational tourism industries. These environments are bound on the east by a barrier island chain that is largely undeveloped and on the west by the mainland. The bayside, though more developed, also has near-shore islands (that are not the same as barrier islands), with its own salt marshes and brackish marshes.

Together, the area is an important stopover and wintering ground for migratory waterfowls. Coastal marshes provide food and nesting for birds, mammals, reptiles, and amphibians. Some of the very qualities that make the Eastern Shore more attractive for other animal species have long drawn humans to live and work, and later to recreate, on the peninsula's shores and in between.

First American populations tended to be mobile and in concert with nature's inconsistencies; however, with European systems of extracting wealth from natural resources and patterns of permanent settlement tending to be near water, naturally occurring phenomena became a threat to life and property and a risk to be managed and mitigated. Primary hazards are coastal flooding, coastal erosion, storm water flooding, and wind. Secondary hazards are groundwater/well contamination, snow and ice, drought, and sewage spills.

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

Population for the two-county region has seen a net decrease of about 1,600 since 1960; however, this does not paint a fair picture of how the population on the Eastern Shore has changed. As Figure 2 shows, population has shifted from Northampton to Accomack County, with Northampton seeing a net loss of approximately 4,714 residents in the 60-year period from 1960 to 2020, with another slight decline of 102 residents within the last decade. Accomack County, however, after experiencing a small initial decline in population between 1960 and 1970, saw its population grow to a high of 38,305 by 2000. The population fell again by 2010, but still netting an increase of more than 3,048 and a growth rate of 0.17% over the past 60 years (U.S. Census 2020). Population projections for 2030 and beyond have not been made available yet by the Cooper Center for Public Service as of December 2021.

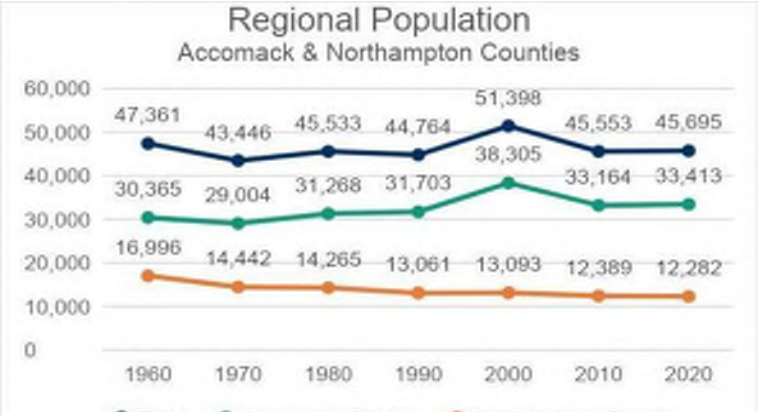


Figure 2: Regional Population

The 2020 U.S. Census shows both Counties have White/Caucasian alone as the largest race/ethnicity, which has grown by 0.8% since 2010. The Black/African American population has decreased throughout the region from 30.2% in 2010 to 27.2% in 2020, and the Hispanic/Latino population has increased from 8.2% to 9.8%, respectively.

Not only is the overall population not growing, it is aging in place. As reflected in Table 1 below, the median age for Accomack County residents has increased from 39.4 years old in 2000 to 45.9 in 2020, an increase of about 6 years. Similarly, Northampton County has also experienced an aging population, with the median age increasing from 42.4 in 2000 to 49 in 2020. In 2019, 89% of the region spoke only English at home, with 11.9% of the region's population speaking another language. Spanish was the most common second-language for both counties.

Table 1: Regional Demographic Data

	2020			2010			2000		
	Accomack	Northampton	Region	Accomack	Northampton	Region	Accomack	Northampton	Region
Population	33,413	12,282	45,695	33,164	12,369	45,533	38,305	13,093	51,398
Median Age	45.9	49	n/a	44.7	47.8	n/a	39.4	42.4	n/a
Median Household Income	$46,073	$47,227	n/a	$41,372	$35,760	n/a	$30,250	$28,276	n/a
Poverty	6,141	2,079	8,220	5,258	2,311	7,569	6,788	2,633	9,421
% In Poverty	18.4%	17.3%	18.9%	15.9%	18.7%	17.0%	18.0%	20.1%	18.5%
Disability	4545	1811	6356	4408	n/a	n/a	n/a	n/a	n/a
% Disabled	14.0%	15.6%	14.0%	13.3%	n/a	n/a	n/a	n/a	n/a

Sources: U.S. Census 2020, 2010, 2000; American Community Survey Five-Year Estimates 2019

Approximately 14% of residents in both counties identified having some sort of disability in 2020. That compares to about 12% nationally, and 12% for Virginia as a whole. There are a range of disabilities reflected in this statistic, and those disabilities can affect everything from a person's ability to receive and process information about hazards and actions to take to protect themselves and their property in the event of a hazard, to their physical ability to carry out such actions. The disability demographic does not include individuals living in group settings, such as nursing homes.

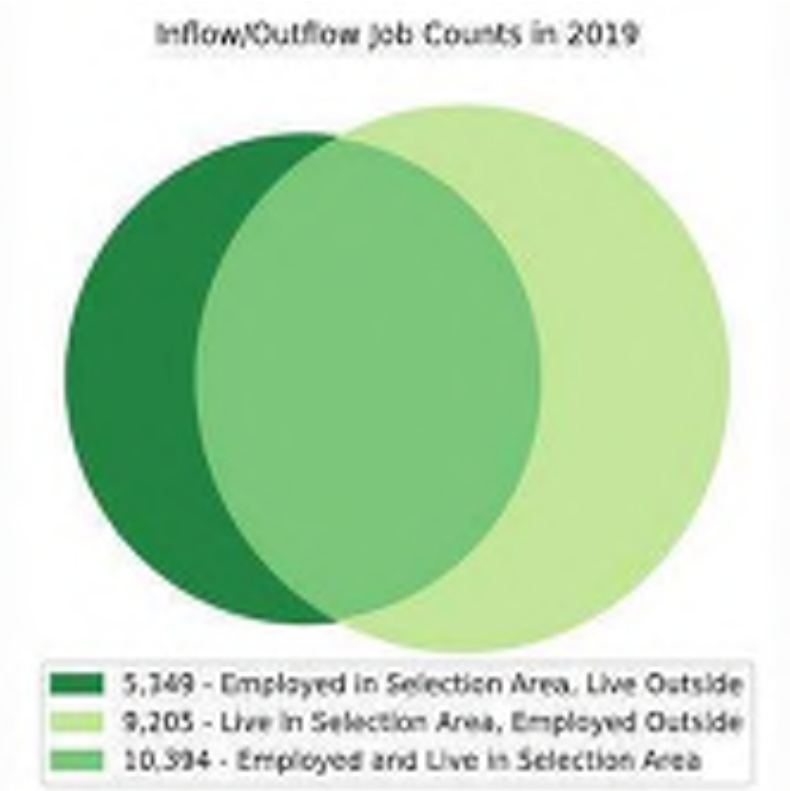
Poverty can be another factor that limits an individual's ability to receive or respond to information about hazards. For example, many hurricane preparedness campaigns presuppose availability of $50-$100 required to assemble the basic items recommended for an emergency kit for a family of two to four. Moreover, families struggling with food security are not likely to stash three days' worth of food when day-to-day meals are uncertain. The rate of poverty throughout the region has remained relatively the same since 2000, with 18.9% of residents in the region under the poverty threshold in 2020. Northampton County has seen a slight decrease of those under the poverty threshold by approximately 3%. Compared to the United States poverty average of 13.4% and Virginia at 10.6%, both counties and the region overall have higher rates of poverty.

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

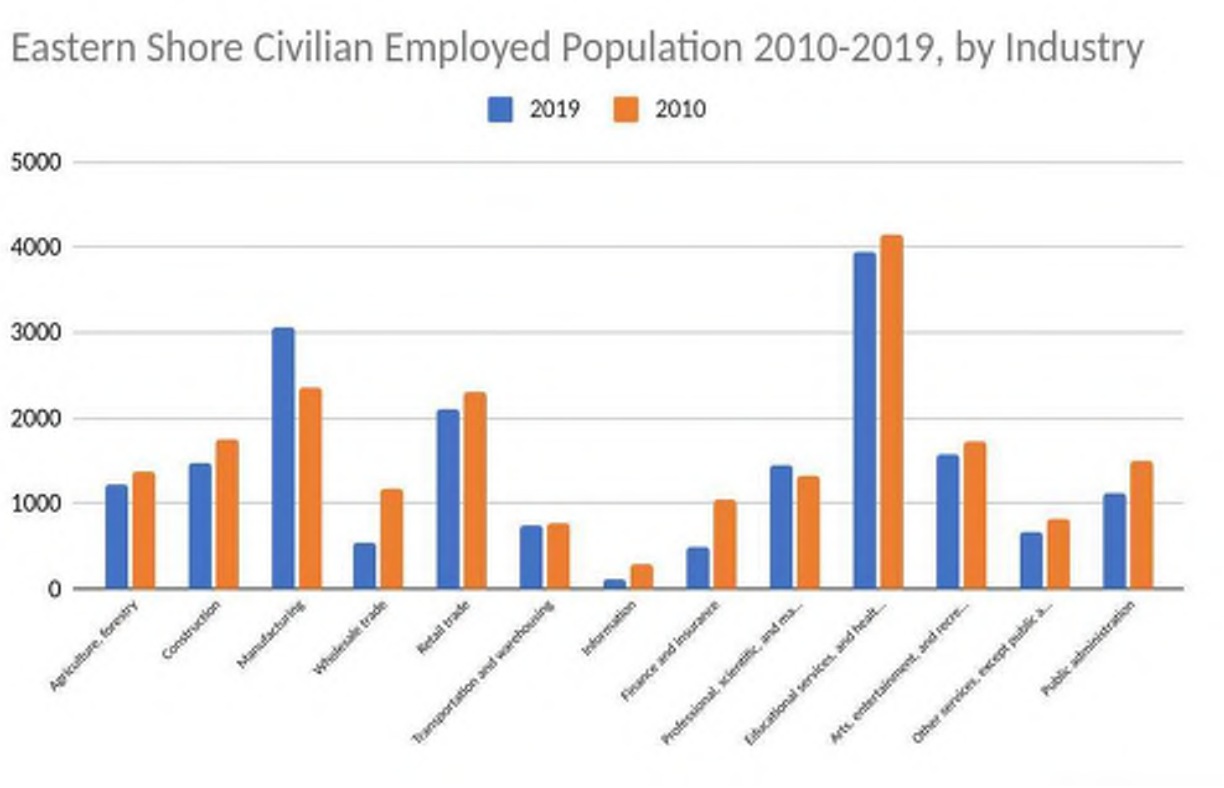
The size of the workforce in the two-county region has declined by approximately 0.4% from 2010 to 2019 according to estimates from the U.S. Census Bureau's American Community Survey. Two primary contributors to the dwindling workforce include the shrinking population and the population as a whole aging out of the workforce. On the whole, there is a net outflow of jobs, meaning the workforce is larger than the number of jobs available (Figure 3).

Figure 3: Inflow/Outflow Job Counts in 2019



Source: U.S. Census Bureau. 2019. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/.

Figure 4: Civilian Employed Population 2010-2019 (US Census 2010, ACS 2019)



The category of educational and health care services dominates the work in which regional employees are engaged, followed by manufacturing, retail trade, and the employment grouping of arts, entertainment, recreation, and food services (Figure 4).

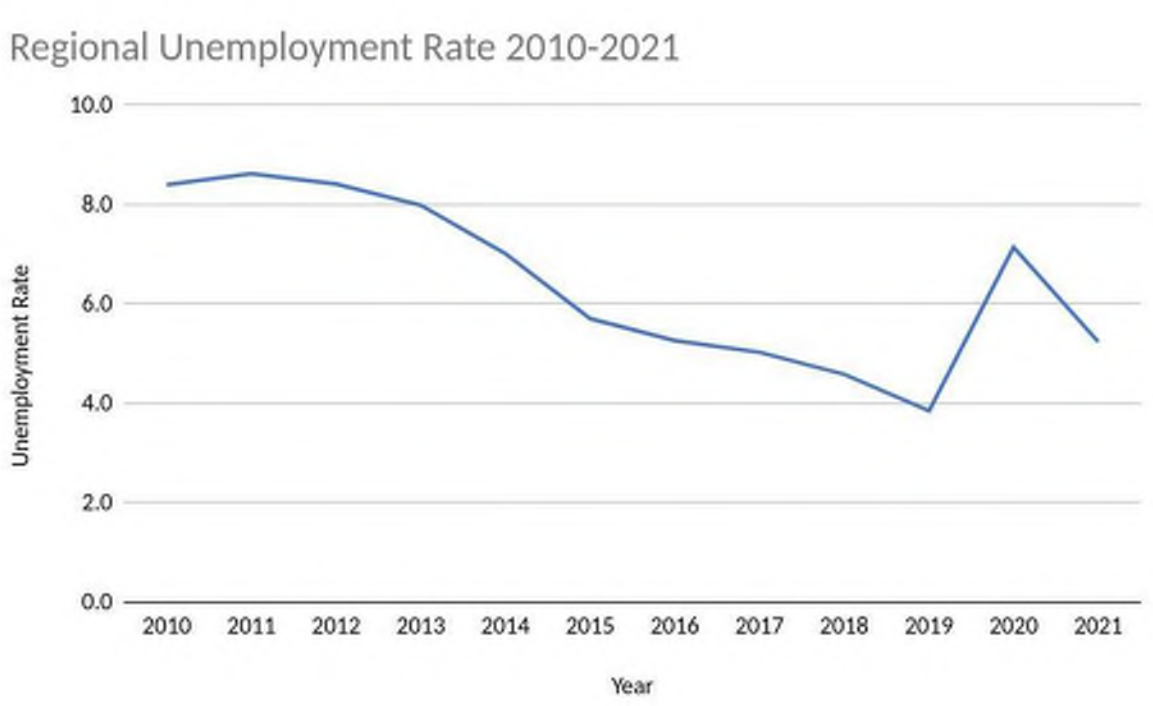
Table 2: Regional Local Workforce Industry

Civilian Employed Population					
Industry	**2019**		**2010***		**Regional Change**
	Count	Percent	Count	Percent	Percent Change
Agriculture, forestry, fishing/hunting, or mining	1,215	6.5%	1,367	6.4%	-1.2%
Construction	1,476	8.0%	1,756	9.0%	-1.8%
Manufacturing	3,062	16.5%	2,366	11.5%	3.3%
Wholesale trade	558	3.0%	1,172	6.1%	-5.8%
Retail trade	2,119	11.4%	2,302	11.2%	-0.9%
Transportation and warehousing, and utilities	748	4.2%	770	3.7%	-0.3%
Information	124	0.7%	300	1.5%	-6.5%
Finance, insurance, real estate, and rentals	502	2.7%	1,047	5.1%	-5.8%
Professional, scientific, waste management	1,446	7.9%	1,323	6.4%	1.0%
Educational, health care, social services	3,960	20.1%	4,149	20.2%	-0.5%
Arts, entertainment, recreation, food	1,571	3.6%	1,720	8.4%	-1.0%
Public Administration	1,117	6.0%	1,494	7.3%	-2.8%
Other	674	3.6%	819	4.0%	-2.0%
TOTAL CIVILIAN EMPLOYED POPULATION	18,572	-	20,585	-	-1.1%

Source: ACS, 2019, *U.S. Census 2010

Because many of the major employment categories are tied to seasons, such as agriculture and tourism, there are observable seasonal employment patterns which are easily observed unemployment rates, as shown in Figure 5 below.

Figure 5: Regional Average Unemployment Rate, Not Seasonally Adjusted, 2010-2021 (BLS Unemployment Statistics)



There is also a migrant labor workforce that appears seasonally for agricultural work, typically under H-2A work visas. That workforce was once estimated to be near 13,000 (*Virginia Pilot*, 2006), but is now believed to hover closer to 1,000 or more (*New York Times*, 2020).

In addition to knowing the type of work in which people are engaged, it is helpful to examine commuting patterns at a regional level to ascertain the scales of hazards that may create large-scale unemployment based on where people work. Figure 6 shows the most common work locations of Eastern Shore residents. Outside of the two-county region, the City of Virginia Beach and Fairfax County are the top two places outside of the region where residents work. Only about half of the approximate 16,000 workers in the region are employed in one of the two counties. Approximately 5,000 of the region's workers commute at least 25 miles or more to work in the southwest direction (Figure 7). While there is no way to know how many telecommute, or how frequently, it is safe to assume that many cross the Chesapeake Bay Bridge Tunnel (CBBT). A hazard that disrupts travel on the CBBT could be economically challenging for the region.

Figure 6: Job Counts by County: Where Eastern Shore Residents are Employed

Jobs Counts by Counties Where Workers are Employed - All Jobs

	2019 Count	2019 Share
All Counties	19,599	100.0%
Accomack County, VA	7,641	39.0%
Northampton County, VA	2,753	14.0%
Virginia Beach city, VA	619	3.2%
Fairfax County, VA	547	2.8%
Worcester County, MD	495	2.5%
Wicomico County, MD	464	2.4%
Norfolk city, VA	462	2.4%
Chesapeake city, VA	423	2.2%
Newport News city, VA	368	1.9%
Henrico County, VA	342	1.7%
All Other Locations	5,485	28.0%

Source: U.S. Census Bureau. 2019. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/

Figure 7: Distance and Direction for Eastern Shore Residents' Commute to Work



Jobs by Distance - Work Census Block to Home Census Block

	2019 Count	2019 Share
Total All Jobs	15,743	100.0%
Less than 10 miles	6,171	39.2%
10 to 24 miles	4,125	26.2%
25 to 50 miles	2,081	13.2%
Greater than 50 miles	3,366	21.4%

Source: U.S. Census Bureau. 2019 OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/

BUSINESSES

Business data provides basic information used in projecting potential capital, rent, and income losses for businesses, as well as lost wages for employees. An inventory of businesses can also serve as an indicator of community recovery resources. Finally, business data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

The uniqueness of the Eastern Shore is not limited to its geography. Its business profile is anchored in traditional land and sea-based pursuits of commercial seafood and agriculture, but boosts high technology as well, with the NASA Wallops Complex, including the Virginia Space and Mid-Atlantic Regional Spaceport at Wallops Island, and related industries and employers supplying another component of the area's economy. Tourism is also a driving component of the economy on the Eastern Shore. Chincoteague Island, with its proximity to the Chincoteague National Wildlife Refuge and Assateague Island National Seashore, combined with the herd of wild ponies auctioned every July following the annual Pony Swim, has the largest share of the tourism market. Other towns in the region, such as Tangier, Cape Charles, Onancock, and Wachapreague, have found their followings as well.

Even the more traditional sectors have incorporated high technology, with aquaculture becoming an increasingly important and reliable means of seafood production, GPS systems that ensure straight lines in crop fields, and complete computerization of the poultry industry with everything from metered watering and feeding of chicks, to the separation of chicken parts on the processing line. All of these improvements, while improving production, also boost the potential capital losses from disasters.

According to County Business Patterns, the number of business establishments in the region has declined by 127 from 2009 to 2019 (Table 3). The number of people employed in those establishments has decreased during that time period as well, by 564 individuals. In 2019, 20.9% of all the establishments in the region belonged to the Retail Trade industry, which was the most prominent industry in both 2009 and 2019. Retail Trade was followed by Accommodation and Food Services at 13.3% and Construction at 9.8%. Other Services (except Public Administration) accounted for 12.7% of the region's industry in 2019.

Table 3: Region Business Types

Industry Code Description	Total Establishments			
	2019		2009	
	Count	Percent	Count	Percent
Agriculture, Forestry, Fishing, and Hunting	13	1.3%	9	0.8%
Utilities	5	0.5%	-	-
Construction	101	9.8%	138	11.9%
Manufacturing	30	2.9%	25	2.2%
Wholesale Trade	36	3.5%	46	4.0%
Retail Trade	215	20.9%	246	21.3%
Transportation and Warehousing	16	1.6%	27	2.3%
Finance and Insurance	49	4.8%	52	4.5%
Information	18	1.8%	18	1.6%
Real Estate and Rental and Leasing	59	5.7%	50	4.3%
Professional, Scientific, and Technical Services	67	6.5%	92	8.0%
Administrative, Support, and Waste Management	36	3.5%	35	3.0%
Education Services	6	0.6%	-	-
Health Care and Social Assistance	85	8.3%	109	9.4%
Arts, Entertainment, and Recreation	21	2.0%	25	2.2%
Accommodation and Food Services	137	13.3%	140	12.1%
Other Services (Except Public Administration)	131	12.7%	144	12.5%
Total, All Establishments	1,029	-	1,156	-
Total Employees	12,070	26.4%	12,635	27.7%*

Source: American Community Survey 5-Year Estimates 2009, 2019

*Calculated using the 2010 U.S. Census Population and ACS 2009 Industry Data

CULTURAL RESOURCES

Long before the first European colonists arrived on the land now known as the Eastern Shore of Virginia, the Accawmacke, part of the larger Powhatan confederacy, lived there subsisting on diets based around food availability in five culturally defined seasons. European colonists arriving on the Eastern Shore were some of the earliest in North America. The courthouse records in Northampton County, the oldest continuous courthouse records in the Country dating back to 1632, document not only court proceedings, but many aspects of life throughout the time of recorded history of the Shore. The courthouse records in Accomack County date to 1663. In Northampton County, records are stored in a climate-controlled room to protect them from deterioration. Accomack County does not have this protection for their records.

The Virginia Department of Cultural Resources catalogs known historic sites. Some of that information is shared widely through public designations such as historic road markers, historic districts, and properties on the national register of historic places. Other sites are examined as a part of environmental clearance processes, and because they may be private properties, the sharing of information about those sites is more sensitive.

Working closely with the Virginia Coastal Zone Management Program (VCZMP), the Accomack-Northampton Planning District Commission was able to interview residents of the Eastern Shore and document their accounts of coastal changes over the last several decades and more recent years. These can be accessed on the VCZMP Coastal Gems website (www.coastalgems.org) in the “Coastal Land” data category.

BUILT INFRASTRUCTURE

Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave for those seeking safer conditions.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by quantifying the exposure. According to the U.S. Census Bureau, the Region's housing stock has grown by 2,979 units from 2000 to 2020, with almost all of that occurring between 2000 and 2010 (Table 4).

Table 4: Housing in the Region

	2020	**2020**		**2010**	**2000**
	Region	Accomack	Northampton	**Region**	**Region**
Total Housing Units	29,076	21,703	7,373	28,303	26,097
Occupied	19,759	14,302	5,457	19,121	20,620
%	*68%*	*66%*	*74%*	*67.6%*	*79%*
Vacant	9,317	7,401	1,916	9,182	5,377
%	*32%*	*34%*	*26%*	*32.4%*	*21%*
	2019**	**2019****		**2010**	**2000**
	Region	Accomack	Northampton	**Region**	**Region**
Owner-Occupied	12,333	8,977	3,356	13,516	14,131
%	*62.4%**	*62.8%**	*61.5%**	*70.7%**	*68.5%**
Renter-Occupied	6,253	4,461	1,792	5,605	5,489
%	*31.6%**	*31.2%**	*32.8%**	*29.3%**	*26.6%**
	2019**		**2010**		**2000**
	Accomack	Northampton	Accomack	Northampton	Accomack	Northampton
Median Housing Value	$171,800	$176,800	$149,800	$199,600	$79,300	$78,700

Source: U.S. Census 2000, 2010, 2020; **American Community Survey 2019

*Percentage calculated using ACS 2019 owner/renter-occupied data and U.S. Census 2020 total occupied units

The region has been experiencing an increase of renter-occupied units and a decrease of owner-occupied units over the past two decades. The amount of occupied housing units has decreased by 11% since 2000, paralleling the 11% increase of vacant units. This is likely due to an influx of individuals purchasing second homes near popular tourist destinations on the Eastern Shore, such as Cape Charles in Northampton County and Chincoteague in Accomack County. The unit is considered vacant if it is not the owner's primary residence. Vacant structures often lack year-round maintenance, therefore increasing the potential for loose, hazardous debris during high-wind events. According to American Community Survey five-year estimates, the median housing value in 2019 was relatively similar in both counties and has increased roughly $100k since 2000. This amount is likely to increase even more due to a recent surge in the housing market. According to the Eastern Shore Association of REALTORS® Home Sales Report, the median sales price in the region was $243,000 in the first quarter of 2021, up 35% from the previous year. Northampton County saw a 54% increase in median sales prices, while Accomack County observed a 29% spike (ESAR 2021-Q1 Housing Market Report).

TRANSPORTATION

Transportation availability before a disaster is a major determinant of the ability of individuals to remove themselves from harm's way and to get aid and support into an area following a hazardous event.

AUTOMOBILE

The primary form of transportation for most Eastern Shore residents is a personal automobile. Approximately 90% of households have at least one automobile available for use (Table 5). Rates of automobile availability have stayed relatively stable from 2000-2019, with three or more automobiles available growing the most in the 19-year period.

Table 5: Vehicles Available per Household in the Region

Vehicles Available	2019**			2010	2000
	Region	Accomack	Northampton	**Region**	**Region**
None	1,771	1,222	549	1,850	2,119
%	*9%**	*8.5%**	*10.1%**	*9.7%*	*10.3%*
One	5,870	4,142	1,728	6,283	7,558
%	*29.7%**	*29%**	*31.7%**	*32.9%*	*36.7%*
Two	6,678	4,916	1,762	7,357	7,584
%	*33.8%**	*34.4%**	*32.3%**	*38.5%*	*36.8%*
Three or more	4,267	3,158	1,109	3,683	3,359
%	*21.6%**	*22.1%**	*20.3%**	*19.3%*	*16.3%*

Source: U.S. Census 2000, 2010, 2020; **American Community Survey 2019

*Percentage calculated using ACS 2019 vehicles available data and U.S. Census 2020 total occupied units

The roadway system consists of 464 miles of public highways. U.S. Route 13 is a four-lane divided highway that runs down the peninsula's spine and is the primary north-south route. It serves as the region's designated hurricane evacuation route. This evacuation route is northbound only due to the fact that the 17.6-mile-long Chesapeake Bay Bridge Tunnel (CBBT), which connects the Eastern Shore peninsula to the Hampton Roads area, is not acceptable for use in the event of a hurricane or other hazard evacuation and is frequently forced to restrict travel due to high winds as well as other hazardous conditions. Further attesting to its importance in the highway system, Route 13 is also part of the Department of Defense Strategic Highway Network (STRAHNET), the Federal Highway Administration (FHWA) National Highway System, and is designated by the Virginia Department of Transportation (VDOT) as a Corridor of Regional Significance.

Tourists and residents alike rely on two major bridges and two causeways, including the CBBT, the Chincoteague Causeway and Draw Bridge, and, to a lesser extent in regional context, the Saxis Causeway. The CBBT opened to traffic in 1965 as a two-lane facility, which was later expanded into two lanes in each direction in 1999 – except where traffic merges into a single lane in both directions while passing through the two tunnels. Capacity plays a factor in the CBBT not being a designated evacuation route; however, as previously mentioned, wind restrictions stand as the primary cause. These restrictions operate on six different levels: (CBBT: Travel and Weather).

- Level 1: Wind speeds of 40 mph – Restricts campers, trailers, anything being towed, exterior cargo, etc.
- Level 2: Wind speeds of 47 mph – Restricts motorcycles, empty tractor trailers, moving vans, school buses, etc.
- Level 3: Wind speeds of 55 mph – The only vehicles allowed to cross are cars and pick-up trucks without exterior cargo, mini vans, SUVs, tractor trailers without trailers, empty flatbed trailers, commercial buses, and heavily-laden tractor trailers and tankers.

- Level 4: Wind speeds of 60 mph – Only cars, pick-up trucks, SUVs, and mini vans are allowed to cross at a maximum speed of 45 mph.
- Level 5: Wind speeds of 65 mph – Only cars without exterior cargo at 45 mph can cross.
- Level 6: Unforeseen weather conditions or other safety concerns – Closed to all traffic.

Furthermore, the CBBT faces the risk of closure as a result of other hazardous conditions, such as vessels and large trucks striking the facility. In the late 1960's and early 70's, three ship accidents forced extensive closures. In December of 1967, a coal barge struck the bridge's roadbed, prompting a two-week closure. Just over two years later, the CBBT shut down for 42 days after the Yancey, a Navy attack cargo ship, rammed into the bridge while dragging anchor in a gale. Two more years later, the facility faced another two-week closure when a runaway barge shattered a section of the bridge (Washington Post, 1984). In more recent years, the bridge-tunnel was shut down on more than one occasion after a tractor trailer drove off the side of the bridge and plunged into the Chesapeake Bay. In 2018, an oversized work truck struck the ceiling of a tunnel, leading to a 17-hour closure and traffic nightmare. Lastly, a three-vehicle head-on crash inside one tunnel caused northbound and southbound lanes to close for just over one hour in the summer of 2021.

The Chincoteague Causeway and Draw Bridge, part of Virginia State Route 175, is the only route to and from Chincoteague Island. It has been subject to closure from several different storms and has been forced to close on multiple occasions, primarily due to flooding and extreme high tides; however, car crashes have also forced lengthy closures. In May of 2021, the Causeway was forced to close for nearly 7 hours as a result of a fatal head-on collision. What is likely a result of COVID-19, a recent increase in tourism and travel to more remote destinations, such as Chincoteague, has again sparked conversations regarding the safety of the Causeway leading to the resort island. The small bridge allowing vehicular traffic across the Assateague channel connects Chincoteague to Assateague Island, home of the famous wild ponies as well as the Chincoteague National Wildlife Refuge and Assateague Island National Seashore; thus, it is vital to the economy for the Town of Chincoteague in addition to Accomack County and the region as a whole. The Saxis Causeway is also the only route to and from the Town of Saxis. Although it is less exposed to open water than the Chincoteague Causeway, it has closed at least twice since 2000 as a result of flooding from storms. Another major causeway and bridge that is not as well known, though also extremely important to the region's economy, is the Wallops Island Causeway leading to NASA's only owned and operated launch range, the Wallops Flight Facility (WFF), as well as the Mid-Atlantic Spaceport and Navy Combat Systems Center. The WFF is at the core of an industry that supports over 5,800 jobs and impacts the U.S. economy by an estimated $829.3 million (NASA Wallops Flight Facility).

PASSENGER TRANSIT

STAR Transit provides public transit service for approximately 86,000 (Accomack Northampton Transportation District Commission (ANTDC) Minutes) passengers annually; however, an evident decrease in ridership was prompted by the COVID-19 pandemic in early 2020. Operations typically span from roughly 6:00 AM to 6:00 PM Monday through Friday and extend from the Town of Cape Charles in Northampton County up to the Town of Chincoteague in Accomack County with a transfer point connecting northern and southern routes in the Town of Onley. Passengers are responsible for a $0.50 ride fare and an additional charge for on-demand services and deviations from routes. STAR Transit would generally be available to assist in the event of an evacuation prior to an approaching hazard, though services would cease upon the arrival of dangerous conditions. Shore Ride, the Eastern Shore's only currently available ride sharing service, is also available for residents and visitors; nonetheless, this private service lacks the capacity needed for evacuations or high-demand service.

RAIL

Prior to 2018, Bay Coast Railroad operated 68 miles of track running along the elevated central spine of the Eastern Shore, paralleling U.S. Route 13 for approximately 41 miles. In 2018, however, 49.1 miles of the line, extending from

the Town of Hallwood south to the Town of Cape Charles, was abandoned under the approval of the Surface Transportation Board (STB). Subsequently, this portion of the corridor has been preserved via railbanking, a method approved by the National Trails Act. Operated by Delmarva Central Railroad as of 2018, the line north of Hallwood remains active, often serving NASA and the Wallops Flight Facility in Northern Accomack County. The remaining 49.1-mile stretch of rail has been sold and is currently being removed from the corridor in preparation for construction and development of the prospective Eastern Shore of Virginia Rail Trail. Provided funds are awarded or allocated for construction and other costs, the Eastern Shore Rail Trail would supply opportunities for economic development throughout the region in addition to providing safe access to outdoor recreation and exercise, towns up and down the Eastern Shore, local services, businesses, schools, churches, and more. The overall improvement of health for residents on the Eastern Shore is anticipated subsequent of trail development. Additionally, long-term maintenance of the trail is likely to encourage continuous maintenance of nearby drainage ditches, which could, in-turn, potentially alleviate impacts that often result from storm water flooding along portions of U.S. Route 13.

AVIATION

Although the closest scheduled air passenger services are located in Salisbury, MD to the north of the region and Norfolk, VA to the south, a number of other airports are located on the Eastern Shore. Most of these are small, private general aviation airports with turf runways. Airports open to the public with paved runways include the Accomack County Airport and the Tangier Island Airport. Additionally, the privately owned Campbell Field's two turf runways are located in Northampton County and open to the public.

The Accomack County Airport is located 0.7 mile east of the Town of Melfa and is accessible by vehicle from U.S. Route 13 through the Accomack County Industrial Park. According to the Accomack County Website, the public airport is home to 25 based aircraft and two businesses that lease space from the Airport in addition to the 5,000 x 100-foot asphalt runway, automated weather observation, open lobby, pilot lounge, conference room, weather and flight briefing room, and a terminal area with a modern terminal building, self-serve and 100LL fuel service, Jet-A-Fuel services, 18 T-hangars and T-hangar taxiway, a partial parallel taxiway, wireless internet access, an aircraft parking apron, and an automobile parking lot. Navigational aids include runway lights, rotating beacon, lighted windsock, an automated weather observation system (AWOS), localizer approach, and GPS. Current planned and ongoing projects for the Accomack County Airport include runway rehabilitation, apron expansion, and obstruction removal.

The public Tangier Island Airport has a 2,426 x 75-foot asphalt runway with AWOS and no lights for navigation aid. Tie-downs are available, but there are no hangars or fuel sales. Although there is no terminal building, there are restrooms available for use in an on-site trailer (Personal communications, Renee Tyler, Town Manager (former), April 1, 2016; confirmed January 19, 2022, AIR NAV).

Wallops Flight Facility (WFF) is a secure facility owned and operated by NASA. Landings there are for businesses with the federal government at NASA or related facilities and by permission only. A control tower operates 10 hours daily, Monday through Friday. Wallops boasts two crosswind runways, both exceeding 8,000 x 150 feet. Both have precision approach path indicators (PAPI), high intensity runway edge lights, runway end identifier lights (REILS), rotating beacon, AWOS, and GPS approaches. A third 4,808 x 150-foot concrete/asphalt runway intersects the other two runways and has the same navigational features as well as Jet A fuel availability (www.aopa.org). While Wallops is not open to the general public, its governmental ownership, large runways, and hangar space make it an ideal location for receiving cargo planes and supplies in the aftermath of a disaster. Airport officials have made space available in the past to Coast Guard officials for storing boats and other assets when hurricanes have threatened the Coast Guard Station on Chincoteague (Personal communications, Ed Sudendorf, WFF Airport Manager, April 8, 2016).

COMMERCIAL AREAS

Commercial areas can be assets in times of disasters, but can also be areas of high economic vulnerability due to the higher investment, relative to residential areas. This is especially true in waterfront areas on the Eastern Shore. Large commercial parking areas can be useful for emergency response – some designated as points of distribution following disasters. Additional parking areas could be designated points of distribution as well, should the usual points be unavailable or unusable.

Many of the commercial areas are clustered in the region's nineteen incorporated towns, ten of which are along the Route 13 corridor and six waterfront communities. Other non-incorporated places dot the landscape, where churches, post offices, and remaining commercial enterprises hint at their once-bustling pasts. These unincorporated areas are well-known to the region's residents and include Atlantic, New Church, Willis Wharf, Quinby, Oyster, Pungoteague, Mappsville, and Tasley, to name a few.

REGIONAL SERVICES AND FACILITIES

Regional facilities are required to support the services and functions on a regional level, whether by government alone or in cooperation with other public and private entities. These facilities enhance the overall quality of life for the area and its citizens. It is important to note the facilities that are available in the event of a hazard, and to make an inventory of facilities that could be affected by a hazard. Regional facilities include such assets as public safety offices, public water and sewer systems, regional parks, and recreational facilities.

PUBLIC SAFETY

Accomack County, Northampton County, the Town of Chincoteague, and Wallops Island all have departments of public safety with lead responsibility for coordination of public safety and emergency planning and response in conjunction with the numerous public safety entities across the two-county region. They also may open emergency operations centers that are activated at different levels contingent upon the seriousness of the situation and in accord with the Emergency Operations Plan (EOP) of each entity. Available EOP's can be accessed through the following links:

- Accomack County
- Northampton County
- Town of Chincoteague
- Wallops Island

LAW ENFORCEMENT

According to the FBI's Crime Data Explorer, there are an estimated 163 police officers for the region employed by Accomack County Sheriff's Department, Northampton County Sheriff's Department, Cape Charles, Chincoteague, Eastville, Exmore, Onancock, Onley, and Parksley Police Departments; however, this number is not entirely inclusive of the region. Though the number of police officers not included is low, the following agencies and departments were not reported to the Uniform Crime Reporting (UCR) Program or included in FBI crime data: U.S. Fish and Wildlife, National Park Service, U.S. Navy, U.S. Coast Guard, NASA, State Police, Virginia Marine Resource Officers (VMRC), Game Wardens, Chesapeake Bay Bridge-Tunnel Police, and Eastern Shore Community College Police. In addition, the Bloxom and Hallwood Police Departments each have one full-time police officer not included in the previously stated figure.

Saxis and Tangier Police Departments are currently without any officers. The incorporated towns of Accomac, Belle Haven, Cheriton, Keller, Melfa, Nassawadox, Painter, and Wachapreague do not have their own police force and instead rely on the local Sheriff's Departments and Virginia State Police (VSP) for police protection. Many of these

towns, like Keller and Nassawadox, contract an officer from VSP or their respective County for additional traffic enforcement. The Town of Tangier currently relies on a VMRC officer that lives on the Island. Bloxom, Cape Charles, Chincoteague, Eastville, Exmore, Hallwood, Onancock, Onley, and Parksley all maintain a police force, though the size of the force varies from one to ten or more officers.

The Chincoteague Police Department is the only agency in the region with State Accreditation through the Virginia Law Enforcement Professional Standards Commission (VLEPSC), and the only town agency with a dispatch center. In 2017, Chincoteague's communication officers responded to approximately 6,000 calls, while ten sworn officers made nearly 200 arrests and issued over 1,000 uniform summonses (Chincoteague Police Department). Between July 2020 and September 2021, officers conducted 953 stops (Virginia Data Open Portal).

Accomack County Sheriff's Department in the Town of Accomac and Northampton County Sheriff's Department in Eastville provide general law enforcement services for the two counties. With an estimated total of 75 personnel, Accomack responded to more than 9,600 calls and conducted 1,104 stops/arrests in 2020 (Personal communications, Accomack County Sheriff's Department, July 27, 2021). The department's communication officers monitor exterior security for the Accomack County Jail, a maximum-security jail with an average daily population of 95 inmates, in addition to receiving and dispatching calls. Northampton's Department consists of an estimated 85 employees, 53 of which are employed at the Eastern Shore Regional Jail, a 248-bed facility housing both male and female minimum and maximum offenders. Virginia State Police (VSP) provide traffic enforcement, crash response, drug task force initiatives, drug education, and crime prevention activities from Post 31 in the Town of Melfa. Additionally, they provide disaster response resources following extreme hazards, such as the deadly 2014 tornado that hit Cherrystone Campground. The Eastern Shore of Virginia 9-1-1 Communications Center serves both Accomack and Northampton Counties and receives all 9-1-1 calls. Police calls are transferred to Accomack County Sheriff's Department, Northampton County Sheriff's Department, Chincoteague Police Department, or Virginia State Police. Fire and EMS calls are dispatched directly to the appropriate fire and EMS agency.

No police facilities are located within a Special Flood Hazard Zone (SFHA).

FIRE, RESCUE, AND EMS

When the alarms are sounded, career employees and hundreds of volunteers at 23 different stations are available to answer the call, from New Church in Northern Accomack County to Cape Charles in Southern Northampton County. Some stations provide a full-range of response – Fire, Rescue, and Emergency Medical Services (EMS) – while others are not fully arrayed. Mutual aid, a system of reciprocal assistance with neighboring departments, is imperative and allows all stations to provide the best coverage and life-saving services. Table 6 below provides a summary the capabilities of all Fire, Rescue, and EMS services on the Shore.

Table 6: Regional Fire Company Capabilities

Station Number	Agency Name	Fire	Rescue	EMS
1	New Church Volunteer Fire & Rescue	X	X	
2	Greenbackville Volunteer Fire Co.	X	X	X
3	Chincoteague Volunteer Fire Co.	X	X	X
4	Atlantic Volunteer Fire & Rescue Co.	X	X	
5	Saxis Volunteer Fire Co.	X	X	X
6	Bloxom Volunteer Fire Co.	X	X	X
7	Parksley Volunteer Fire Co.	X	X	X
8	Tasley Volunteer Fire Co.	X	X	
9	Onancock Volunteer Fire Department	X	X	X
10	Melfa Volunteer Fire & Rescue Co.	X	X	X
11	Wachapreague Volunteer Fire Co.	X	X	
12	Painter Volunteer Fire Co.	X	X	X
13	(Exmore) Community Fire Co.	X	X	X
14	Cheriton Volunteer Fire Co.	X	X	
15	Cape Charles Volunteer Fire Co.	X	X	
16	Northampton Volunteer Fire & Rescue	X	X	
17	Eastville Volunteer Fire Co.	X	X	
19	Cape Charles Rescue Service			X
20	Oak Hall Rescue			X
21	Tangier Volunteer Fire Co.	X	X	X
25	NASA WFF Fire (Main Base)	X	X	X
26	NASA WFF Fire (Wallops Island)	X	X	X
31	Northampton County EMS			X

Source: Eastern Shore of Virginia 911 Communications Center

When requested, the Virginia Department of Forestry responds to assist in fighting wildfires, bringing its bulldozers equipped with specially designed plows to make a fire line and two pick-up trucks equipped for firefighting.

Through the Eastern Shore Regional Fire Training Facility in Melfa, firefighters can receive training locally. A plan to upgrade and expand the facility to EMT accreditation standards is under review. This would allow EMT trainees to complete the entire process locally.

The majority of the Shore's Fire and EMS stations are located outside of special flood hazard areas (SFHA), with the exceptions of the Tangier, Chincoteague, Saxis, Wachapreague, and NASA WFF (Island) stations. None of the stations in a SFHA are mutual aid to each other. Although Tangier may seem more vulnerable due to its isolated location preventing mutual aid, Chincoteague and Saxis share its vulnerability during major storms. As flooding frequently causes both causeways to become impassable, Chincoteague and Saxis are left isolated without mutual aid as well.

Street flood patterns must be considered for all Fire and EMS stations. For example, using The Nature Conservancy's Coastal Resilience Mapping Tool to look at hypothetical storm scenarios shows that although the Greenbackville Fire Station remains elevated out of the flood zone during a moderate hurricane, the streets surrounding the station

could be covered under 4 to 8 feet of water. In such an instance, pre-storm evacuation of equipment would be needed in order to assist in post-storm recovery operations. A similar concern exists for Wachapeague, where the model shows that every route in and out of town would be inundated, even with a low-intensity hurricane. Chincoteague has plans with Wallops Island to evacuate equipment to the mainland in the face of a major storm.

WATER SUPPLY

The one thing all residents and businesses of the Eastern Shore have in common is that they rely on ground water for their drinking water – and much of their other water needs. In order to protect the water so many rely upon, both counties have adopted water supply plans and jointly manage a Regional Ground Water Resource Protection and Preservation Plan.

There are four major aquifers present in both counties. In order of the increasing depth below ground surface, the four major aquifers present in both counties are the Columbia (unconfined), and the Upper, Middle, and Lower Yorktown-Eastover (confined) aquifers. Aquifers deeper than the lower Yorktown-Eastover contain brackish and salt water, effectively limiting their use without additional treatment, and are not currently used as a source of drinking water. The entire two-county region, and therefore its aquifers, is located within the Eastern Shore Groundwater Management Area (ESGWMA) as defined by the Virginia Ground Water Management Act of 1992, which requires a permit from the Department of Environmental Quality (DEQ) for any person or entity wishing to withdraw in excess of 300,000 gallons per month from a declared Groundwater Management Area.

The majority of drinking water needs in the region are met through withdrawals from wells screened in the confined Yorktown-Eastover aquifers, while the rest is met through withdrawals from wells screen in the surficial Columbia aquifer. Ground water availability in the Columbia aquifer is characterized by relatively large recharge rates, lower aquifer storage, and a higher susceptibility to contamination; conversely, ground water availability in the Yorktown-Eastover aquifer is characterized by relatively low recharge rates, higher aquifer storage, and a lower susceptibility to contamination.

The Virginia Department of Health (VDH) records 135 public water systems on the Eastern Shore that use groundwater as their source of potable water. These systems include 68 transient non-community water systems (TNCWS), 46 non-transient non-community water systems (NTNCWS), and 21 community water systems (CWS). The TNCWS are principally small commercial systems such as gas stations, restaurants, fast-food services, campgrounds, and small agricultural systems. The NTNCWS are larger and include commercial office buildings, shopping malls, and industrial sites (Personal communications, Britt McMillan, Hydrogeologist Consultant, Eastern Shore Ground Water Committee, January 25, 2022). These systems may also serve vulnerable populations, such as schools, nursing homes, hospitals, and other health care facilities.

CWS provide water to permanent residents and include mobile home parks, subdivisions, and towns. Of the 21 CWS, 7 are municipal water systems serving a total population of 8,716 (U.S. Census 2020) in the towns of Cape Charles, Eastville, and Exmore in Northampton County and Chincoteague, Onancock, Parksley, and Tangier in Accomack County. Other community systems are privately operated and may serve areas such as Captain's Cove in Northern Accomack County with a population of 1,544 (U.S. Census 2020).

Despite the number of public wells, most residential dwellings in both counties are not connected to those public supplies and rely on private, individual wells for well water – many of which are within the SFHA and subject to periodic flooding. Wells permitted for public use are required to be tested regularly and after hazardous events to determine if the water is safe for public use. Thousands of private wells, however, are the responsibility of the owner; therefore, they may not be aware of the need to test or unable to afford the necessary sampling.

SOLID WASTE DISPOSAL

Solid waste pick-up is determined by each individual town. For a fee, some private providers will provide service to areas outside of towns where the population is sufficiently concentrated to make it economically feasible. In other areas, it is the responsibility of the resident to take their household refuse and recycling to a convenience center for collection. There are 13 convenience centers in the region as well as a transfer station is each county.

PARKS AND RECREATION

There are several public parks and recreation areas located in the region. In addition to the information provided below, more details can be found in each locality's section, Chapters 10-29.

BOAT LAUNCHES

Access to both the Chesapeake Bay and the Atlantic Ocean is one of the greatest assets of life on the Eastern Shore. With 36 public launch sites, many with multiple slips, there are endless recreational opportunities afforded by the waters around the peninsula and its creeks.

Unfortunately, these launch sites and other working waterfront infrastructure frequently experience flooding of grounds and dryland facilities, wave damage to docks or difficulty using docks due to recurrent flooding, flood impacts to buildings and equipment, and shoreline erosion with scouring and backwashing of bulkheads as a result of hazardous storms, particularly hurricanes and nor'easters. Snow and ice storms have also caused damage to working waterfront infrastructure, though it is not a significant concern for most facilities.

NATURE PRESERVES

The Eastern Shore has many ecologically sensitive locations that have been set aside in public and private nature preserves and easements. Many are located along the seaside and bayside coastlines and benefit hazard mitigation through their ability to buffer the effects of coastal flooding and erosion.

The Department of Conservation and Recreation (DCR) manages five Eastern Shore natural preserves totaling almost 2,000 acres. Magothy Bay, 516 acres, and Mutton Hunk, 286 acres, are located on the seaside, while Cape Charles, Savage Neck Dunes, and Parkers Marsh are located on the bayside and encompass 29 acres, 298 acres, and 759 acres, respectively. In addition, The Nature Conservancy (TNC) owns 12 barrier islands and portions of two others that comprise its Virginia Coast reserve and form the longest expanse of coastal wilderness remaining on the eastern seaboard. Through this initiative, TNC protects some 40,000 acres of barrier islands, marshlands, and uplands (The Nature Conservancy).

DRAINAGE DITCHES

Drainage ditches are a component of infrastructure that often goes unnoticed by the public when functioning properly. There is no single regional body to manage storm water drainage; as a result, maintenance of drainage ditches and storm drains is a shared responsibility among VDOT, Accomack and Northampton Counties, and the incorporated towns.

In Accomack County, there are county funds for drainage projects with prioritization sometimes described as "complaint driven". Once problems are identified, easements must be obtained from property owners. If one property owner is not inclined to cooperate, it can be to the detriment of multiple other residents in the area. Northampton County does not have a county drainage system. Unless there is a connection with some other policy objective, such as the Chesapeake Bay Act, relief is rare.

SCHOOLS

Northampton and Accomack County together house 15 public schools, as shown in Figure 8. A total of seven elementary schools are located in the region and include Chincoteague, Kegotank, Metompkin, Accawmacke, Pungoteague, Occohannock, and Kiptopeke. There are two middle schools, two high schools, and three combined schools: Arcadia Middle, Arcadia High, Nandua Middle, Nandua High, Northampton Combined (6-12), Chincoteague Combined (6-12), and Tangier Combined (K-12). The entirety of Tangier Combined School is located in the SFHA as well as a portion of Chincoteague Combined School. There are several private schools in the region including Cape Charles Christian School, Shore Christian Academy in Exmore, Central Baptist Academy in Onley, Broadwater Academy in Exmore, and the Montessori Children's House in Franktown. Additionally, both counties operate Head Start programs. Pre-schools and day care programs in the region have dwindled in recent years, causing issues for many parents. Unsurprisingly, this has only gotten worse with the onset of COVID-19 and the protective measures that followed.

Figure 8: Public Schools in the Region



High school graduates who wish to continue their education have the option to enroll at the Eastern Shore Community College (ESCC) in the Town of Melfa. Many students pick a focus of study in the fields of Applied Science, Technology, and Nursing, while others may enter dual enrollment programs, transfer programs, or career programs. Other nearby colleges include Norfolk State and Old Dominion University, located across the Chesapeake Bay Bridge Tunnel (CBBT), and University of Maryland Eastern Shore in Princess Anne and Salisbury University – both out of state universities located on the Eastern Shore of Maryland.

If students choose to commute, most would likely head north into Maryland to attend classes; however, those that choose to commute south may face delays in the event of wind restrictions and/or closures to the CBBT. As previously mentioned under "Transportation", the CBBT is at risk from additional hazards as well.

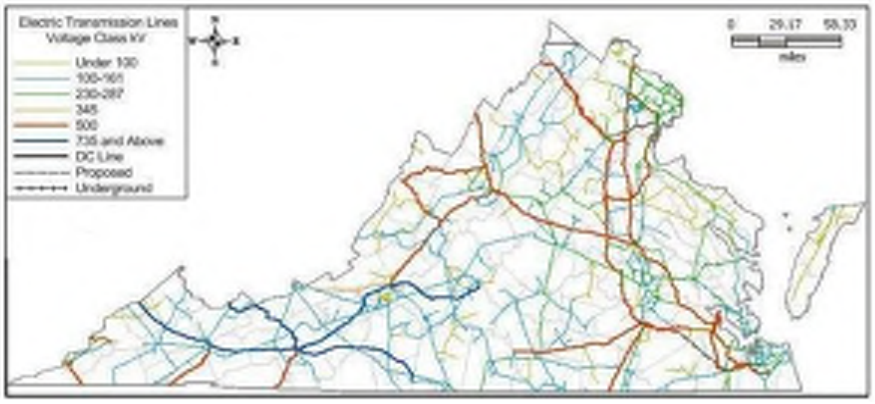
The University of Virginia and William and Mary operate coastal research facilities in the region. Each has approximately a dozen member universities and has been educating students of all ages for nearly 50 years. The University of Virginia's Anheuser-Busch Coastal Research Center in Oyster supports research activities in coastal bays, salt marshes, and barrier islands. Furthermore, the center carries a permanent field staff, laboratories, classrooms, and a dormitory capable of housing up to 30 individuals. William and Mary's Virginia Institute of Marine Science (VIMS) Eastern Shore Laboratory is located in the Town of Wachapreague and supports field research in coastal ecology and aquaculture. This facility has a permanent field staff, dry and saltwater labs, classrooms, and dormitory space capable of housing 42 individuals. Due to the saltwater lab's location in a VE (velocity) flood zone, special flood proofing standards were applied. The building was constructed with an elevated foundation that brings the flood to 9 feet above mean sea level and a waterproof envelop that provides flood protection up to 14 feet above mean sea level.

ELECTRICAL DISTRIBUTION

Electricity is provided by A&N Electrical Cooperative (ANEC), a member-owned cooperative that serves the entire Eastern Shore. As shown in Figure 9, all Eastern Shore transmission lines are less than 100 kilovolts, except a small stretch extending from the "peaker plant" in the northern part of Accomack County.

The peaker plant is a diesel-powered plant with 350-megawatt capacity that kicks in during periods of peak demand. It is the largest electrical producer on the Shore, but several smaller generators are placed throughout both counties. Old Dominion Electric Cooperative (ODEC) owns six sites in Accomack County, each with two 4-megawatt generators that run on ultra-low sulfur diesel fuel stored on-site. According to the ODEC Website, these generators are utilized in the event of electrical transmission problems. Other locations with generating capacity include Tasley, Bayview, Tangier, and Accomack County.

Figure 9: Electrical Transmission Lines in Virginia



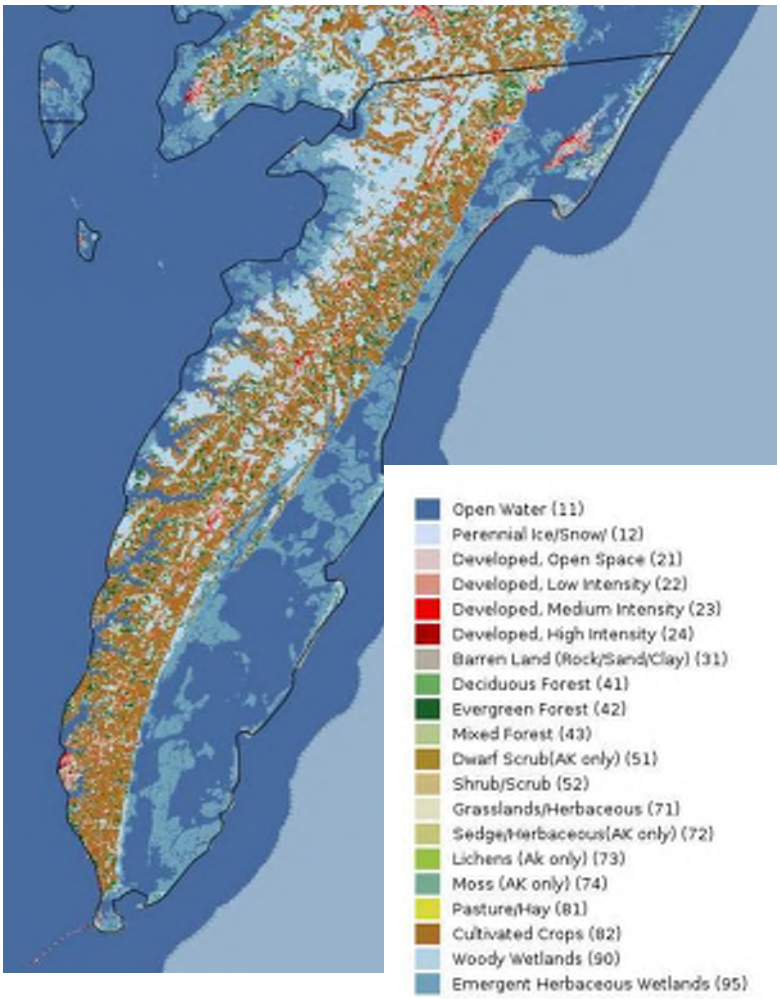
Source: Virginia Department of Mines, Minerals, and Energy. "Energy Assurance Plan", 2012

NATURAL ENVIRONMENT

Below is a description of the region's natural environment. A detailed discussion and break down of geology and soils on the Eastern Shore of Virginia can be found in Chapter 7: Storm Water.

LAND COVER

As shown in the Figure 10 land cover map with associated acreage, the two categories of wetlands account for nearly half of the region's land cover. The animal and aquatic habitat, recreational, and economic resources in the region's largely unspoiled wetlands are of the highest order and central to the lives and livelihoods of the Eastern Shore's residents and businesses. Additionally, wetlands provide great coastal resilience benefits and help to blunt the effects of storm surge by absorbing wave energy, storing storm water, and slowing erosion. All developed land uses account for 8.1% of the total land cover on the Eastern Shore.



Land Cover	Acres	Percent
Barren Land	41,812	1.89%
Cultivated Crops	472,787	21.38%
Deciduous Forest	42,486	1.92%
Developed, High Intensity	2,793	0.13%
Developed, Medium Intensity	11,301	0.51%
Developed, Low Intensity	34,275	1.55%
Developed, Open Space	130,562	5.91%
Emergent Herbaceous Wetland	587,339	26.56%
Evergreen Forest	109,082	4.93%
Hay/Pasture	189,483	8.57%
Herbaceous	9,049	0.41%
Mixed Forest	44,361	2.01%
Shrub/Scrub	50,010	2.26%
Woody Wetland	485,687	21.97%
Totals	2,211,027	100.00%

Figure 10: Land Use Land Cover Map with Associated Acreage*

Source: National Land Cover Data Set, 2019.
*Associated Acreage 2011 data

GROUNDWATER

The Eastern Shore of Virginia depends entirely on ground water for potable water supplies as well as most non-potable water supplies, such as irrigation water. Because the peninsula is surrounded by large bodies of saltwater, ground water becomes brackish at relatively shallow depths, generally less than 350 feet, in most areas, and the total available ground water supply is more limited than on the mainland. The Eastern Shore of Virginia is one of six EPA-designated sole source aquifers in the Mid-Atlantic region.

Threats to ground water in the region may be placed into three general categories:

- Saltwater Intrusion
- Hydraulic Head Depression
- Contamination

Intrusion of saltwater into fresh ground water aquifers can be cause by wells that are screened too close to the fresh water/saltwater interface, are too close to the shoreline, and/or pump at an excessive rate. Depression of the hydraulic head occurs around every pumping well, but if pumping rates are too high or if wells are too close to one another, water levels in wells can drop so low that well yields are reduced. In extreme cases the head may fall so low that the aquifer is partially dewatered, potentially resulting in consolidation and a permanent loss of transmissivity – which will also reduce well yield (Eastern Shore of Virginia Ground Water Resource Protection and Preservation Plan, 2013).

The State Water Control Board included the Eastern Shore of Virginia in the consolidated Eastern Virginia Ground Water Management Area after observing declining levels of ground water and interference between wells in two areas of Accomack County as well as contamination in the confined water table aquifer and the possibility of over-withdrawal if not monitored closely. This designation allows the Virginia Department of Environmental Quality (VDEQ) to regulate ground water withdrawals that equal or exceed 300,000 gallons per month.

Recognizing the importance of protecting the vital resource, the Accomack County Board of Supervisors and the Northampton County Board of Supervisors formed the Ground Water Committee in 1990. The Committee includes elected officials, citizens, and local government to help promote understanding, awareness, and responsible management practices and prepare all necessary ground water studies and plans. Ground water withdrawal applications submitted to VDEQ are also reviewed by the Ground Water Committee.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

The Eastern Shore of Virginia has participated in the hazard mitigation process since 2006. The region's primary risks identified by the Hazard Mitigation Steering Committee include coastal flooding, coastal erosion, high-wind, and storm water flooding. A list of additional risks identified by the Steering Committee can be found in Chapter 3: Risk Assessment. The locality sections of the Plan, Chapters 10-29, also provide details on how specific secondary hazards have, or could potentially, affect their local community and the region as a whole.

Table 7: Regional Hazard Mitigation Resources

Resource	Participating Agencies & Members	Mission	Updated
Eastern Shore of Virginia Hazard Mitigation Plan	A-NPDC, FEMA, VDEM; Accomack & Northampton Counties, 18 incorporated towns; federal, state, & local representatives of emergency management, health, & disaster preparedness	Provides details on hazard mitigation analysis and preparedness	2021
Virginia Hurricane Evacuation Guide	VDEM	Provides education & guidance on hurricane preparation and evacuation zones & routes; Provides recovery resources & emergency information	2019
All Hazards Emergency Preparedness Z-Card	Northampton County	Provides information & resources on preparing for disasters	2016
All Hazards Preparedness Guide Brochure	Eastern Shore Disaster Preparedness Coalition (ESDPC)	Focuses on All Hazards; Provides information & resources on emergency planning, emergency supply kits, shelters, evacuation routes, & returning safely	2017
Transportation Infrastructure Inundation Vulnerability Assessment	A-NPDC, VDOT	Identifies various scenarios of inundated roadways from storm surge, tides, and SLR	2015
Emergency Operations Plan	Accomack County; Northampton County; Town of Chincoteague; Wallops Flight Facility	Provides a comprehensive review of actions for large scale emergencies; Details lines of responsibility, procedures, & response time	AC - 2018 NC - 2012 CH - 2021
Mutual Aid Agreements & Documents	Accomack County; Northampton County; Town of Chincoteague; Wallops Flight Facility; Accomack-Northampton Firemen's Association; Worcester County, MD	Ensures that resources are available when another EMS company's resources are insufficient for an incident or rendered unable to respond	Varies
Eastern Shore Oil and HazMat Response Plan	Departments of Public Safety, Eastern Shore Hazardous Materials Response Team, responding fire departments	Details steps for hazmat emergencies	2014; Reviewed annually
Eastern Shore of Virginia Hazardous Material Commodity Flow	Accomack County Department of Public Safety	Identifies the types of hazardous materials to ensure the proper response to hazmat incidents	2014
Eastern Shore Health District Pandemic Influenza Plan	VDH, Eastern Shore Health District	Ensures the continuation of public health services while providing for emergency needs during a pandemic	2009
FEMA Coastal Construction Manual	FEMA	Provides a comprehensive approach to planning, siting, designing, constructing, and maintaining homes located in a coastal environment	2011
Virginia Coastal Resilience Master Plan	Department of Conservation and Recreation; Local government, state agencies, federal partners, regional PDC's, Secure & Resilient Commonwealth Panel, VIMS, partner universities in Virginia Sea Grant Program, Commonwealth Center for Recurrent Flooding	Builds on 2020 Framework; Addresses concerns of flood exposure, vulnerability, & associated risks tied to socioeconomical, historical, & physical context; A call to action for the Commonwealth	Phase 1 Completed Dec. 2021

Table 8: Regional Hazard Mitigation Resource Committees & Programs

Committees & Programs	Participating Agencies & Members	Mission	Established
Eastern Shore Disaster Preparedness Coalition	Accomack & Northampton Counties; VDEM, FEMA, VDH – Ranges from emergency services organizations, health departments, and schools to church-based disaster relief groups, mayors, and volunteer amateur radio operators	To form local & regional partnerships; Promote regional planning & coordination	2003
Climate Adaptation Working Group	Lead agency: A-NPDC Local, state, and federal representatives of government, aquaculture, agriculture, and community organizations	To better plan & mitigate risks associated with climate change & SLR; Provide educational outreach & develop planning tools	2012
Eastern Shore Ground Water Committee	Accomack & Northampton County Board of Supervisors, A-NPDC	To assist local governments and residents in understanding, protecting, and managing ground water resources; Maintain plans & studies; Serve as an educational resource	1990
Eastern Shore Navigable Waterways Committee	Accomack & Northampton County Board of Supervisors, A-NPDC, USACE	To study & advise respective Boards on condition & status of navigable waterways; List & prioritize navigation needs; Provide possible solutions	2015
Eastern Shore Health District (ESHD)	Accomack County Health Department, Northampton County Health Department	To prevent illness & disease, protect the environment, & promote optimal health and emergency preparedness	-
Eastern Shore Health District Emergency Preparedness & Response Program	State, regional, and local emergency response partners, local health care providers, volunteer groups; CDC, NACCHO	To effectively respond to any emergency impacting public health through preparation, collaboration, education, and rapid intervention	-
Eastern Shore Community Emergency Response Team (CERT) Program	Regional and local volunteers; Currently 250 members	To educate the public and distribute emergency preparedness public education materials to citizens and visitors, participate in training exercises, and to assist ESHD and LE to quickly distribute prophylactic medication to the entire region during a public health emergency	2004
Eastern Shore Medical Reserve Corps (MRC)	Volunteer medical and non-medical health care professionals, trained staff	To respond and assist local emergency responders and public health professionals	2004

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

Table 9 below displays each jurisdiction's participation in the hazard mitigation planning process, the National Flood Insurance Program (NFIP), and the Community Rating System (CRS). Within the region, 18 jurisdictions including both counties have joined the NFIP, with the Town of Cheriton the most recent to join in 2020. Accomack County and the Towns of Chincoteague, Wachapreague, and Cape Charles are the only four jurisdictions in the CRS.

Table 9: Program Participation by Jurisdiction

Jurisdiction	HMP Participation	NFIP Participation	CRS Participation
Accomack County	2006	06/01/1984	10/01/1992
Town of Accomac	2021	08/23/2017	NO
Town of Belle Haven	NO	02/08/2001	NO
Town of Bloxom	2011	10/16/2012	NO
Town of Chincoteague	2006	03/01/1977	10/01/2000
Town of Hallwood	2011	05/01/2000	NO
Town of Keller	2011	NO	NO
Town of Melfa	2016	NO	NO
Town of Onancock	2006	12/15/1981	NO
Town of Onley	2011	02/01/2012	NO
Town of Painter	2021	NO	NO
Town of Parksley	2011	12/22/2008	NO
Town of Saxis	2006	11/17/1982	NO
Town of Tangier	2006	10/15/1982	NO
Town of Wachapreague	2006	09/02/1982	10/01/1996
Northampton County	2006	08/11/1976	NO
Town of Cape Charles	2006	02/02/1983	05/01/2010
Town of Cheriton	2016	07/08/2020	NO
Town of Eastville	2011	05/08/2007	NO
Town of Exmore	2011	09/04/2008	NO
Town of Nassawadox	2016	05/08/2007	NO

Source: FEMA Community Status Book Report, 2021

The Town of Belle Haven is the only jurisdiction that has not yet participated in the hazard mitigation plan; however, they did join the NFIP in 2001 and currently have two active policies in place. Table 10 summarizes each participating locality's active NFIP policies, total losses/claims, total premiums, and the total amount paid as of February 2022. Even though both counties have joined the NFIP, citizens residing in incorporating towns are not eligible to purchase flood insurance under the program unless the town in which they reside has joined. The Towns of Keller, Melfa, and Painter in Accomack County have not joined the NFIP.

Table 10: Summary of the Region's NFIP Participation

Jurisdiction	NFIP Participant	Active Policies	Total Losses	Total Premium	Total Paid	RL	SRL	Level of NFIP Regulations Required*
Accomack County	Y	1,230	778	$923,105	$9,168,322.97	-	1	60.3(e)
Town of Accomac	Y	2	0	$1,038	$0	-	0	60.3(a)
Town of Belle Haven	Y	2	0	$908	$0	-	0	60.3(c)
Town of Bloxom	Y	0	1	$0	$0	-	0	60.3(a)
Town of Chincoteague	Y	1,710	141	$1,299,222	$959,295.19	-	2	60.3(e)
Town of Hallwood	Y	0	1	$0	$4,922.75	-	0	60.3(a)
Town of Keller	NO	-	-	-	-	-	0	60.3(a)
Town of Melfa	NO	-	-	-	-	-	0	60.3(a)
Town of Onancock	Y	30	3	$18,645	$16,423.82	-	4	60.3(c)
Town of Onley	Y	1	0	$415	$0	-	0	60.3(a)
Town of Painter	NO	-	-	-	-	-	0	60.3(a)
Town of Parksley	Y	2	0	$1,004	$0	-	3	60.3(a)
Town of Saxis	Y	38	37	$39,231	$572,258.50	-	0	60.3(e)
Town of Tangier	Y	49	107	$50,468	$1,218,918.29	-	2	60.3(e)
Town of Wachapreague	Y	72	29	$56,723	$430,385.37	-	2	60.3(e)
ACCOMACK TOTAL	-	*3,136*	*1,097*	*$2,390,759*	*$12,370,526.89*	*92*	*14*	-
Northampton County	Y	222	78	$177,672	$949,284.61	-	0	60.3(e)
Town of Cape Charles	Y	170	14	$92,992	$95,059.05	-	0	60.3(e)
Town of Cheriton	Y	-	-	-	-	-	0	60.3(c)
Town of Eastville	Y	-	-	-	-	-	1	60.3(a)
Town of Exmore	Y	6	6	$2,836	$82,677.52	-	0	60.3(a)
Town of Nassawadox	Y	2	1	$905	$4,214.26	-	0	60.3(a)
NORTHAMPTON TOTAL	-	*400*	*99*	*$274,405*	*$1,131,235.44*	*11*	*1*	-
REGION TOTAL	**-**	**3,536**	**1,196**	**$2,665,164**	**$13,501,762.33**	**103**	**15**	**-**

Source: FEMA NFIP Data Report, 2022

*60.3(a)-FEMA has not defined SFHAs within community; 60.3(c)-FEMA has provided FIRM with BFEs; 60.3(e)-FEMA has provided FIRM showing coastal high-hazard areas

The NFIP tracks a category of high-risk structures called repetitive loss (RL) properties. These properties are defined as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP more than ten days apart, within any rolling 10-year period since 1978[1]. Repetitive loss structures account for approximately 1% of NFIP policies, but 25-35% of flood insurance claims. Throughout the region, 103 repetitive loss properties have seen 304 losses with payments from the NFIP totaling over $5.5 million for both structures and contents (FEMA NFIP Data Report, February 2022). A further classification is for severe repetitive loss (SRL) properties. These properties have incurred four or more separate flood-related claim payments exceeding $5,000 for buildings and contents under flood insurance coverage or cumulative amounts exceeding $20,000, OR for which the total of at least two separate building loss claim payments exceed the market value of the insured property. As of 2022, there are 15 total SRL properties in the region, with all but one located in Accomack County.

[1] Note that FEMA's Flood Mitigation Assistance Program defines repetitive loss differently: A structure that has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the time of each flood event, and at the time of the second incidence the contract has increased cost of compliance coverage. See FEMA Flood Insurance Manual for details. http://www.fema.gov/media-library/assets/documents/115549

HMGP

The region's participation in the Hazard Mitigation Grant Program (HMGP) dates back to 1999 and the major disaster declaration following Hurricane Floyd. Accomack County received funds for a project to elevate 29 homes, while Northampton County received funds for utility proofing in addition to the elevation of 3 homes.

To date, a total of 24 homes in Northampton County and nearly 100 in Accomack County have been elevated out of the floodplain. No houses have been razed or relocated under the programs. The Accomack-Northampton Planning District Commission (A-NPDC) manages the HMGP for the Eastern Shore and intends to submit an application for another round of funding to elevate a number of additional homes, particularly on Tangier Island.

HAZARDS PROFILE

The top four hazards identified by the Hazard Mitigation Steering Committee were high wind, coastal erosion, coastal flooding, and storm water flooding. Additionally, the Committee included pandemic as a new hazard for the 2021 Plan, which was also ranked as a high-priority hazard. Medium-priority hazards include well contamination and biological hazards, as well as the three newly identified hazards, storm surge, non-coastal flooding, and road and highway. Substance use and overdose, communications failure, active threat, electrical energy failure, and tornado were all new hazards and ranked as low-priority. Further details can be found in Chapter 3: Risk Assessment.

It is important to note that these are region-wide rankings. Rankings decided upon by each individual locality vary according to the risk assessments performed for that locality. Information on these hazards can be found in each locality's respective chapter.

HIGH WIND

High-winds on the Eastern Shore of Virginia primarily stem from hurricanes and tropical storms, off-shore low pressure systems like nor'easters, rotating cells in thunderstorms that produce tornadoes and waterspouts, and straight-line winds associated with fast-moving thunderstorms.

Large storms, such as hurricanes and nor'easters, typically affect the entire region; however, localized events often carry regional impacts as well. Damage or destruction to one localized area could impact the economy of the entire Eastern Shore as well as hinder available emergency response resources. When a deadly tornado struck Cherrystone Campground in 2014, units from across the region were called on to respond and were not available to the rest of the region for several hours.

Additional details on historic wind events in the region, the causes of high-winds, regional exposure, and attempts to manage loss, see Chapter 4: High Wind.

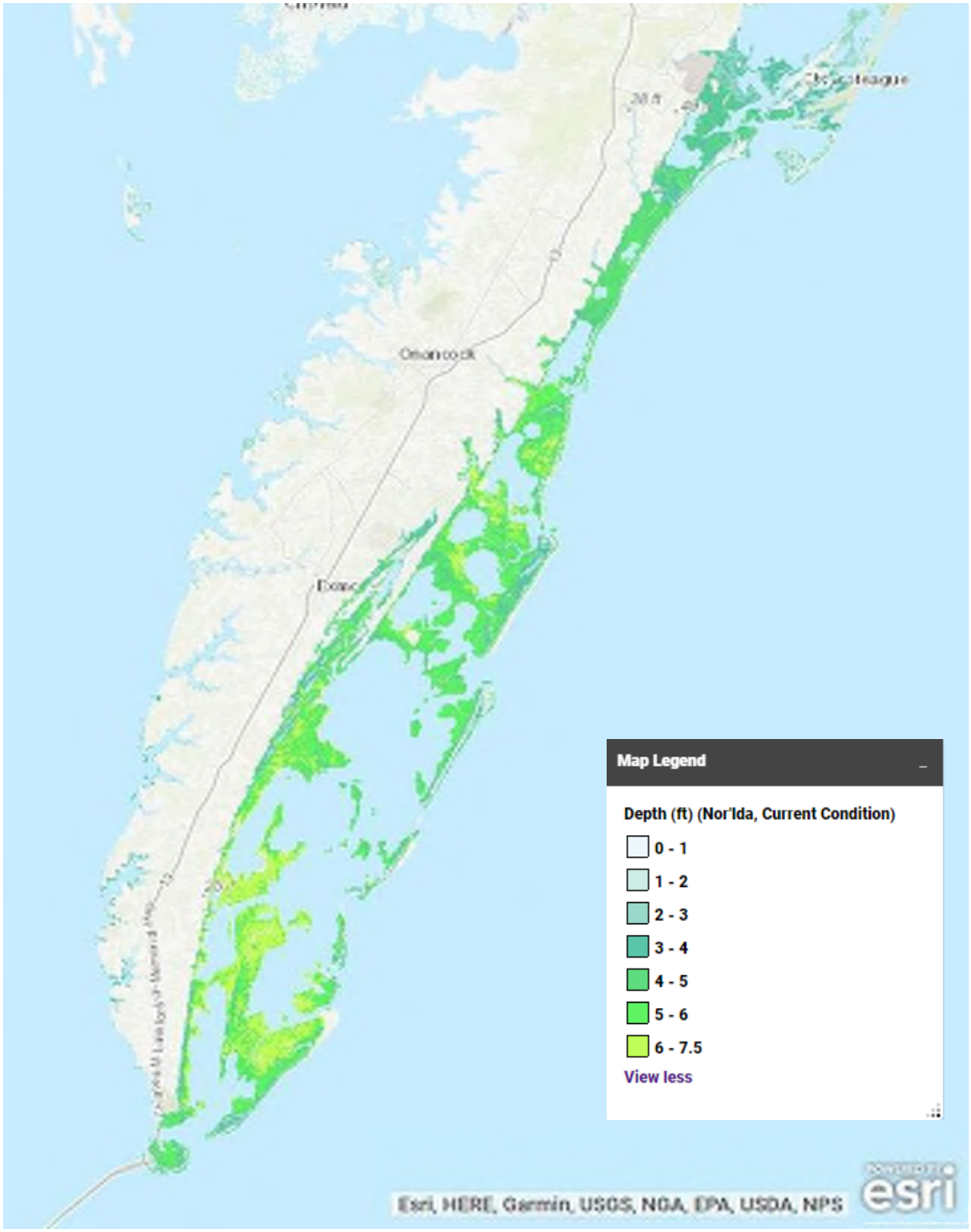
COASTAL EROSION

All areas of the Eastern Shore are susceptible to coastal erosion, whether from water, wind, or waves. The barrier island ecosystem on the seaside, with its expanses of tidal marshes, mudflats, and lagoons, buffer the mainland from the worst of storm impacts, dissipating wave energy and mitigating floods. Natural low banks and marshes on the bayside are subject to direct wave action erosion from wind, storms, and motorized watercraft. Mitigating erosion of the barrier islands and marshlands surrounding the Eastern Shore is critical to the region's well-being as we know it.

Figures 11, 12, and 13 were created using The Nature Conservancy's (TNC) Coastal Resilience Mapping Tool. Figure 11 demonstrates the storm surge that occurred from Nor'Ida in November of 2009, while Figure 12 shows the potential storm surge from a high-intensity storm, which would be completely devastating for the region as the shoreline continues to experience a great deal of erosion, therefore increasing the region's vulnerability to coastal storms. In fact, as shown in Figure 13, 82% of the Eastern Shore's coastline is currently eroding (TNC Coastal Resilience Mapping Tool, 2021).

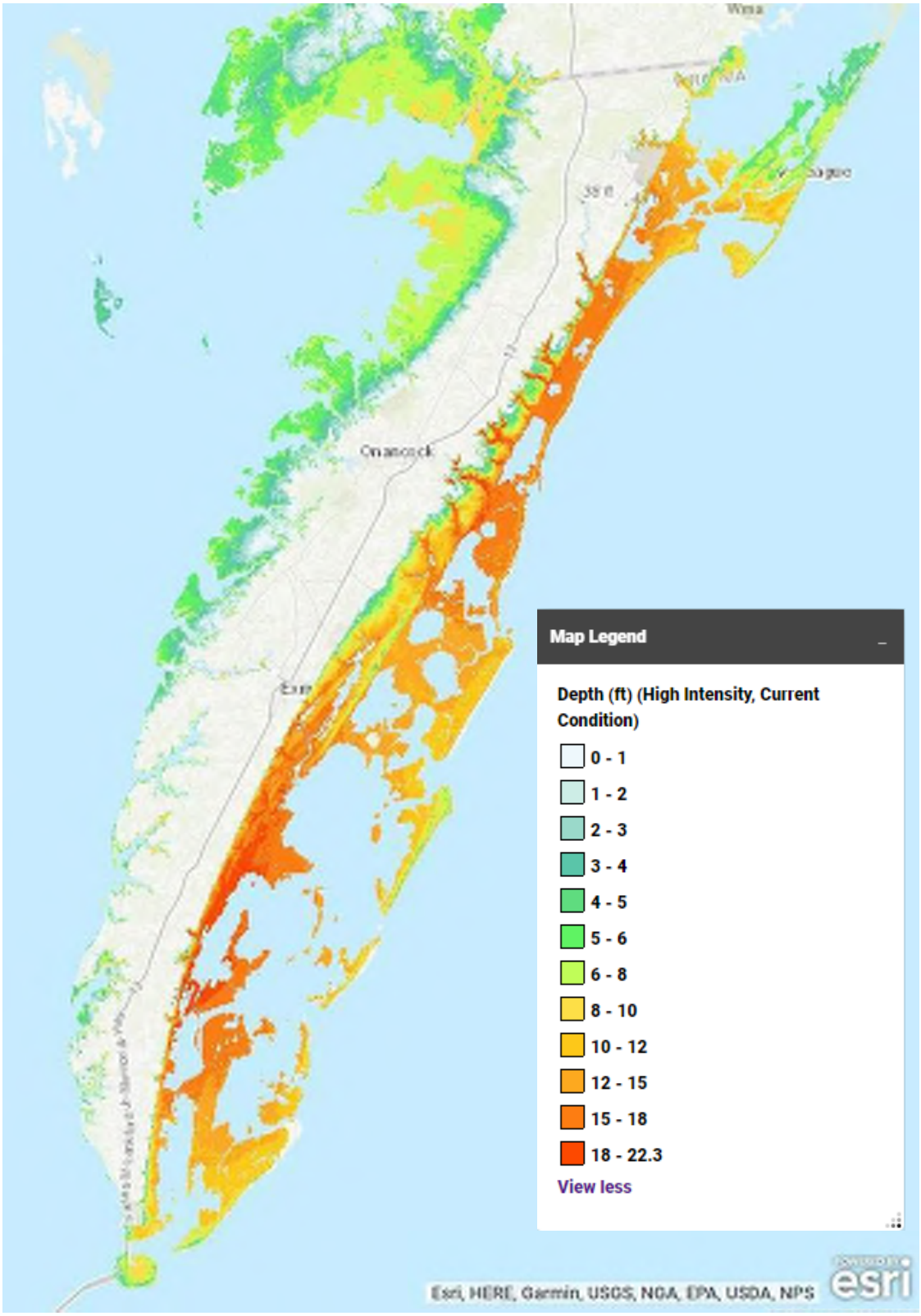
For a more detailed look into the causes of erosion for the bayside and seaside, see Chapter 5: Coastal Erosion.

Figure 11: Nor'Ida Storm Surge on the Eastern Shore of Virginia



Source: Coastal Resilience Mapping Tool by The Nature Conservancy, 2021

Figure 12: High-Intensity Storm Surge



Source: Coastal Resilience Mapping Tool by The Nature Conservancy, 2021

Figure 13: Eastern Shore of Virginia Coastline Change Rate

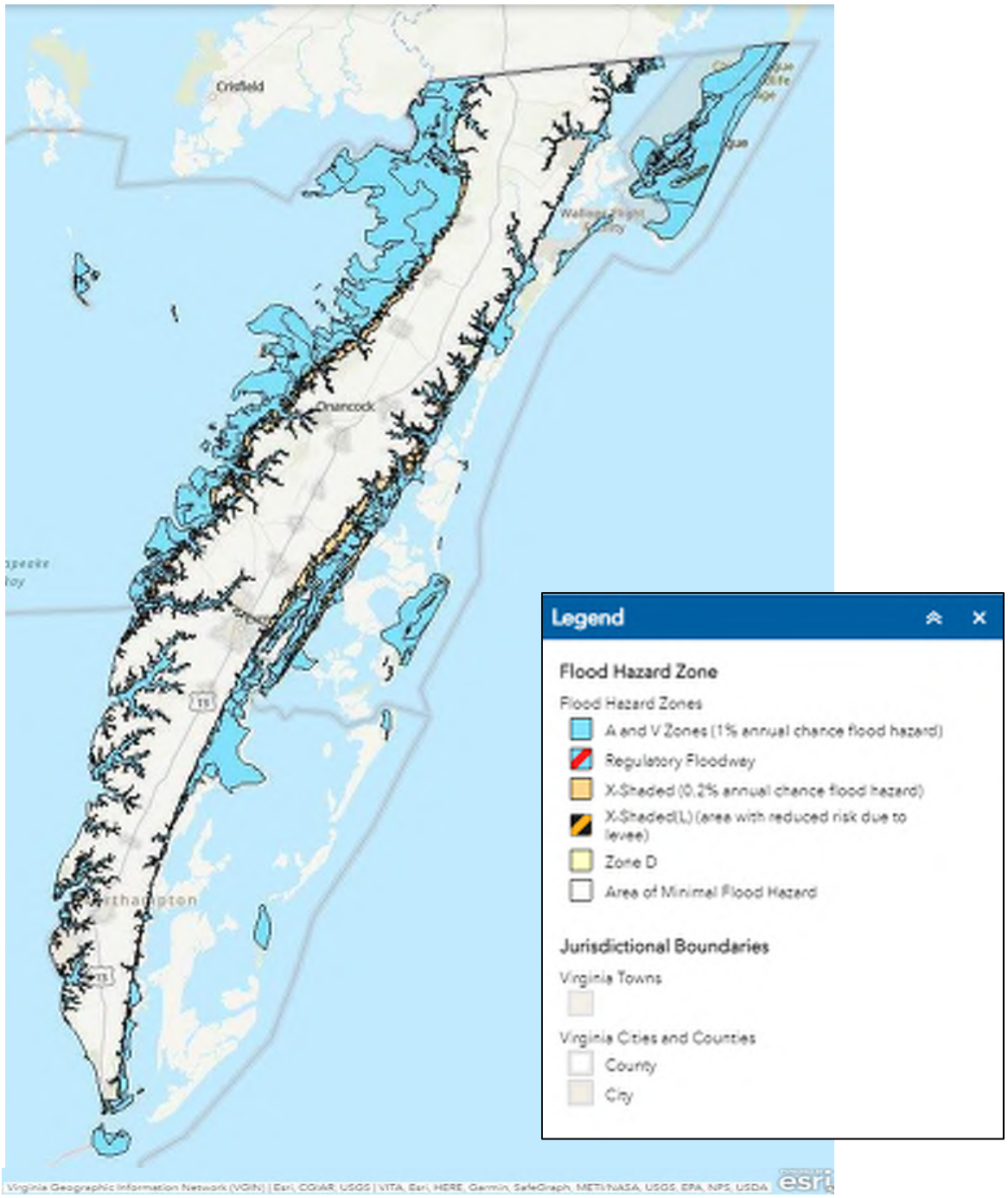


Source: Coastal Resilience Mapping Tool by The Nature Conservancy, 2021

COASTAL FLOODING

As detailed in Chapter 6: Coastal Flooding, hurricanes and nor'easters have dominated the Eastern Shore severe weather headlines for centuries, bringing with them floods from torrential rainfall, wind-driven high tides, and storm surge. Further information on these storm events can be found in Chapter 1: Hazards on the Shore.

Figure 14: Eastern Shore of Virginia Flood Hazard Zones



Source: Virginia Flood Risk Information System (VFRIS), 2021

Figure 15: Accomack & Northampton County, 2040 Conditions

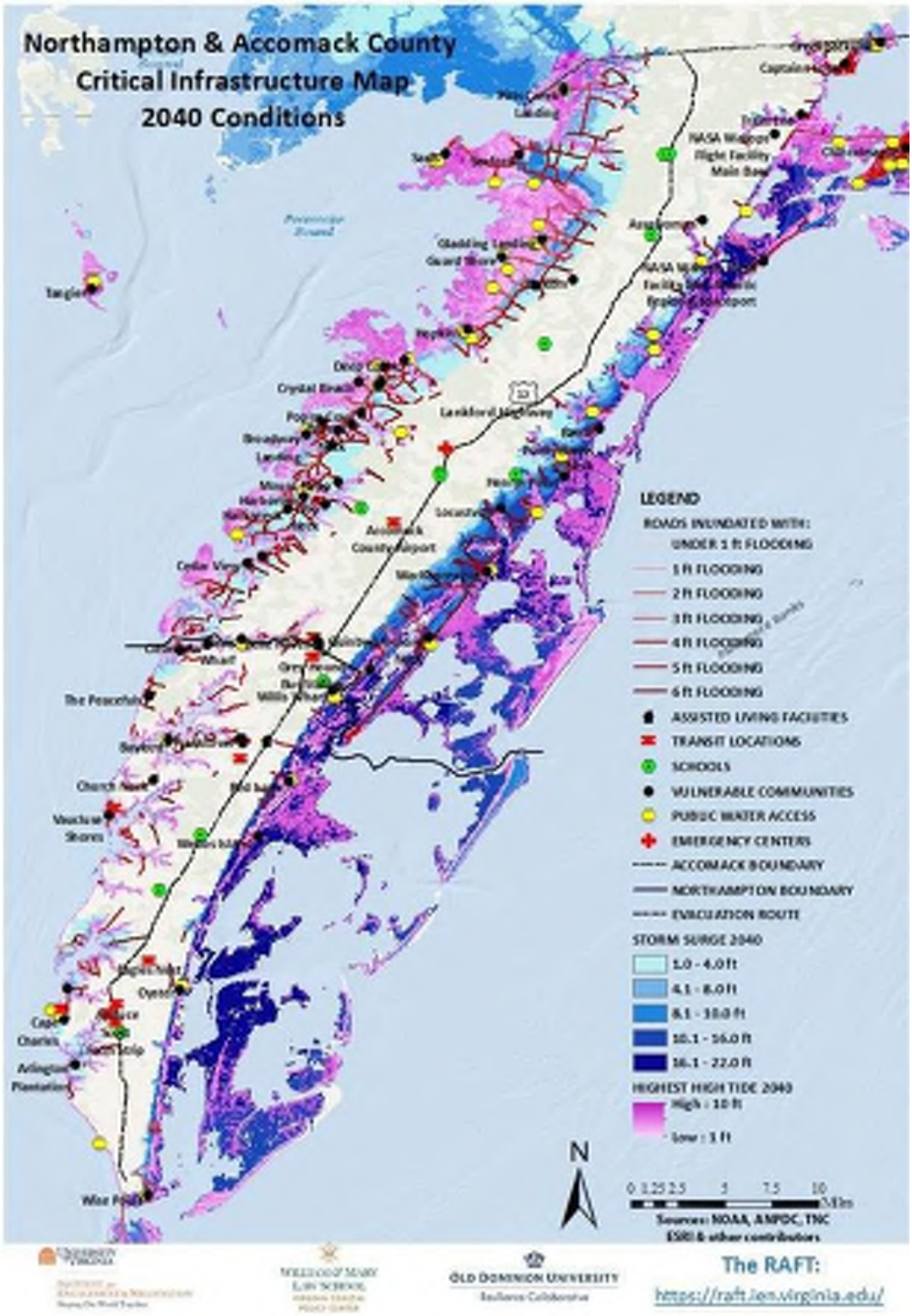
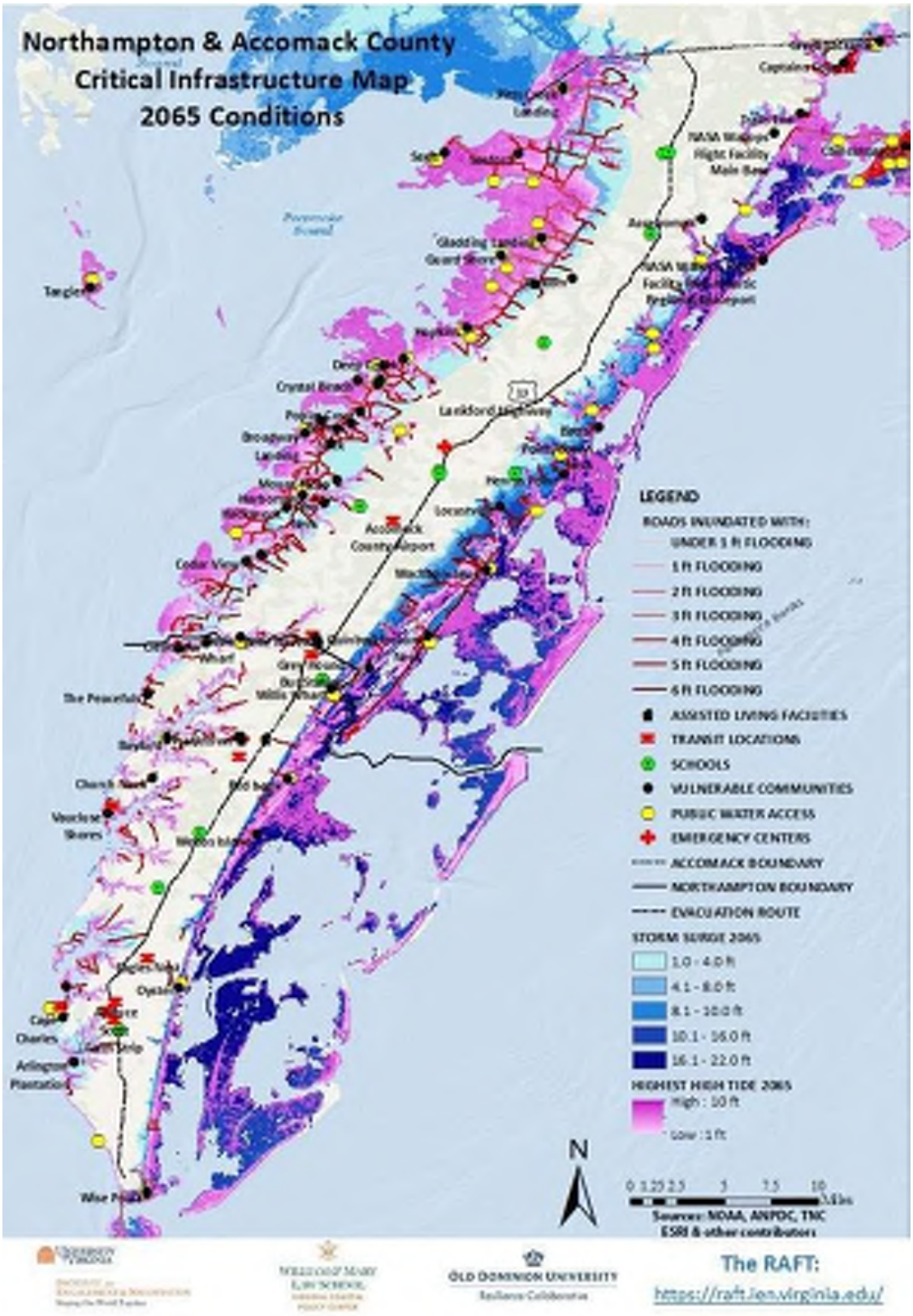


Figure 16: Accomack & Northampton County, 2065 Conditions



STORM WATER FLOODING

Storm water flooding has frequent impacts on the region and can affect the entire region at once, as with a tropical cyclone or nor'easter. This type of flooding can be very localized and intense as well, as with thunderstorms that frequently occur on the Shore, particularly during the warmer months.

Several inland towns reported persistent storm water flooding problems that threaten not only motorist safety, but personal property as well. Many towns have frequent drainage issues that are mostly contributed to the lack of proper maintenance of drainage ditches by the responsible party. This responsibility generally falls on Virginia Department of Transportation, one of the two counties, or the town in which the drainage ditch is located. Drains clogged with debris and the Eastern Shore's flat topography combined with poorly drained soils also play a large contributor to storm water flooding issues.

More information regarding storm water flooding events as well as the cause, exposure, recurring flood locations, and attempts to manage loss can be found in Chapter 7: Storm Water.

HAZARDS OF LOCAL SIGNIFICANCE

Other hazards identified by the Hazard Mitigation Steering Committee, but ranked below high priority, are included in Table 11 below. More information on identified hazards can be found in Chapter 3: Risk Assessment and each localities respective chapter.

Table 11: Regionally Identified Hazards

Hazard	2006	2011	2016	2021
Well Contamination	Medium	Unranked	Medium	Medium
Ice and Snow	Medium	Medium	Medium	Unranked
Biological Hazards	Medium	Unranked	Medium	Medium
Drought	Medium	Medium	Medium	Unranked
Sewage Spills	Medium	Medium	Medium	Unranked
*Storm Surge**	-	-	-	Medium
*Non-Coastal Flooding**	-	-	-	Medium
*Road and Highway**	-	-	-	Medium
Wildfire	Low	Medium	Low	Unranked
Hazardous Material Incidents	Low	Low	Low	Unranked
Heatwaves	Low	Low	Low	Unranked
Fish Kills	Low	Unranked	Low	Unranked
Invasive Environmental Disease	Low	Unranked	Low	Unranked
Earthquakes	Low	Unranked	Low	Unranked
*Substance Use and Overdose**	-	-	-	Low
*Communications Failure**	-	-	-	Low
*Active Threat**	-	-	-	Low
*Electrical Energy Failure**	-	-	-	Low
*Tornadoes**	-	-	-	Low

*New priority identified for 2021

CRITICAL FACILITIES

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

Table 12: Regional Critical Facilities

Facility	HMP 2006*	HMP 2011*	HMP 2016	HMP 2021	Hazards	People Affected	Loss Potential	Relocation Potential	Retrofit Potential
U.S. Route 13	-	-	X	X	Wind, Erosion, Storm Water Flooding, Ice/Snow, HazMat	20,000+ per day	Devastating	No	No
Chesapeake Bay Bridge Tunnel	-	-	X	X	Wind, Erosion, Coastal Flooding, Storm Water Flooding, Ice/Snow, HazMat	9,000+ per day	Devastating	No	No
Chincoteague Causeway	-	-	X	X	Wind, Erosion, Coastal Flooding, Storm Water Flooding, Ice/Snow, HazMat	7,000+ per day	Devastating	No	Yes
Saxis Causeway	-	-	X	X	Wind, Erosion, Coastal Flooding, Storm Water Flooding, Ice/Snow	900+ per day	Major Disruption	No	Yes
Wallops Island Causeway/Bridge	-	-	X	X	Wind, Erosion, Coastal Flooding, Ice/Snow, HazMat	45,000+	Devastating	No	Yes
Emergency Shelters	-	-	X	X	Wind, Ice/Snow, Pandemic, Infectious Disease, Biological Hazards	45,000+	Major Disruption	Yes	Yes
Emergency Communications	-	-	X	X	Wind, Ice/Snow, Fire	45,000+	Devastating	No	Yes
U.S. Coast Guard Stations	-	-	X	X	Wind, Erosion, Coastal Flooding, Fire, Infectious Diseases	45,000+	Devastating	Yes	Yes
911 Communications Center	-	-	X	X	Wind, Ice/Snow, Fire	45,000+	Devastating	Yes	Yes
ANEC Power Stations	-	-	X	X	Wind, Ice/Snow, Fire	45,000+	Devastating	Yes	Yes
Riverside Shore Memorial Hospital	-	-	X	X	Wind, Pandemic, Ice/Snow, Infectious Diseases, Biological Hazards	45,000+	Devastating	Yes	Yes
Health Centers	-	-	X	X	Wind, Storm Water Flooding, Pandemic, Ice/Snow, Infectious Diseases, Biological Hazards	45,000+	Major Disruption	Yes	Yes
Fire and EMS Companies	-	-	X	X	Wind, Storm Water Flooding, Pandemic, Infectious Diseases, Biological Hazards	45,000+	Devastating	Yes	Yes
Public Schools	-	-	X	X	Wind, Coastal Flooding, Storm Water Flooding, Pandemic, Infectious Diseases	45,000+	Major Disruption	Yes	Yes
Eastern Shore Community College	-	-	X	X	Wind, Pandemic, Ice/Snow, Infectious Diseases,	45,000+	Major Disruption	Yes	Yes
Regional Fire Training Facility	-	-	X	X	Wind, Pandemic, Snow/Ice, Fire	45,000+	Minor Disruption	Yes	Yes

CHAPTER 10: ACCOMACK COUNTY

COUNTY PROFILE

There are 14 incorporated towns in the County: Accomac, Belle Haven (portion located in Northampton County also), Bloxom, Chincoteague (most populated town), Hallwood, Keller, Melfa, Onancock, Onley, Painter, Parksley, Saxis, Tangier, and Wachapreague. The following information is for the unincorporated areas of Accomack and the incorporated Town of Belle Haven. Information for the other incorporated towns in Accomack is located in their respective chapters. These Towns include Accomac, Bloxom, Chincoteague, Hallwood, Keller, Melfa, Onancock, Onley, Painter, Parksley, Saxis, Tangier, and Wachapreague.

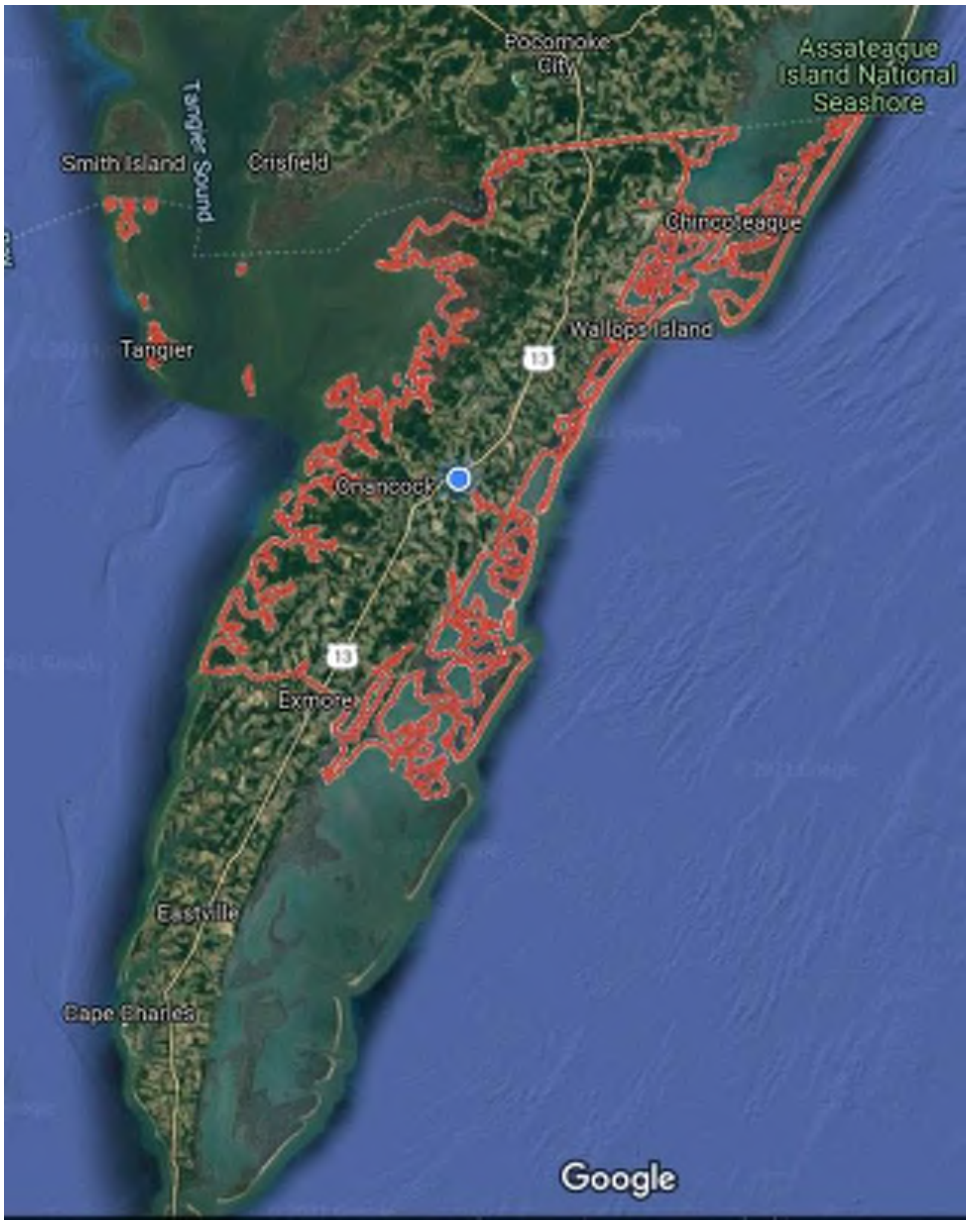


Figure 1: Accomack County Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The 2019 American Community Survey estimate indicated the County had a population of 32,673, which would indicate that the population is remaining more or less steady and has not declined much since 2000. The median age for residents in Accomack County in 2019 was indicated to be 45.9, which is about 7 years higher than that of both the state and nation, and is an increase from 2000. Often, individuals in a higher age bracket require additional assistance, particularly in the case of an emergency.

Table 1: Accomack County Demographic Information

	2019*	2014**	2010***	2000****
Population	32,673	33,165	33,164**	34,488*****
Median Age (Years)	45.9	44.9	44.7**	39.4
Disability	14.1%	12.1%	3.2%	19.9%
Income				
Median Household Income	$46,073	$38,389	$41,372*	$30,130
Poverty Level	19.0%	20.5%	34.7%*	18.0%
Language				
Only English	88.5%	89.6%	91.3%*	93.3%
Other	11.5%	10.4%	8.7%*	6.7%
Spanish	8.1%	8.3%	6.9%*	5.7%
Ind-Euro	2.7%	1.9%	1.4%*	0.7%
Asian	0.6%	0.2%	0.3%*	0.2%
Other	0.1%	-	-	-

Source: *ACS 2014-2019, **ACS 2009-2014, ***US Census 2010, ****US Census 2000, *****Accomack County Comprehensive Plan

As illustrated in Table 1, poverty levels returned to only slightly higher than those indicated in the 2000 Census. Values from Table 1 also indicate that the non-English speaking population is increasing. County representatives also indicated that there has been an increase in non-English speaking residents, particularly, an increase in residents speaking Creole and Spanish. Populations living in poverty and populations that do not speak English are often at a disadvantage in their ability to receive imperative information for preparing for and recovering from hazards.

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. Additionally, they can identify where disruptions in employment and income might occur in the aftermath of a disaster.

The County's two largest industries are manufacturing and educational and health care services. The vast majority of individuals in the manufacturing industry are most likely employed at either Tyson Foods or Perdue Farms. These companies often have policies in place to mitigate the economic impact of a hazard for both the company and the employees; however, long-term closures would have strong negative impacts on the County. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local

shops, nor family necessities. Other dependent agricultural businesses would be at a loss as well, particularly noting the increasing trend of individuals in the agricultural industry within the County. Although it may take some time for the industry to recover following a hazard, the United States Department of Agriculture (USDA) Farm Service Agency provides assistance for natural disaster losses, which enables farmers to rebound more easily following severe weather events. Other large employers in the County include the County of Accomack, Accomack County School Board, NASA, Eastern Shore Community Services, and Riverside Shore Memorial Hospital, to name a few.

Although a respectively smaller group of the employed population work in fishing and aquaculture, it is a culturally invaluable trade. In the year 2000, there were 599 commercial licenses and zero aquaculture permits issued by the Virginia Marine Resources Commission (VMRC). In 2010 VMRC issued 475 commercial licenses, but also 153 oyster aquaculture permits and 116 clam aquaculture permits, revealing an increase in the number of individuals who make their living working on the waterways of the Eastern Shore. There is an observation that many of the individuals who were previously employed as migrant workers are staying on the Eastern Shore year-round and working in the aquaculture industry. Because clam and oyster aquaculture are long-term investments, with oysters typically taking about three years to reach suitable size for market, and because the equipment can be costly, this important industry could take years to rebound following a damaging storm event.

Table 2: Accomack County Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010*****		**2000******	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	961	7.0%	669	4.6%	740	4.9%	1,050	5.8%
Construction	1,092	7.9%	873	6.0%	1,283	8.6%	1,357	7.5%
Manufacturing	2,686	19.6%	2,276	15.8%	1,960	13.1%	2,945	16.4%
Wholesale trade	331	2.4%	785	5.4%	860	5.7%	697	3.9%
Retail trade	1,472	10.7%	1,619	11.2%	1,770	11.8%	2,963	16.5%
Transportation and warehousing, and utilities	585	4.3%	310	2.1%	470	3.1%	581	3.2%
Information	75	0.5%	137	0.9%	259	1.7%	19	0.1%
Finance, insurance, real estate, and rentals	356	2.6%	299	2.1%	729	4.9%	702	3.9%
Professional, scientific, waste management	1,188	8.7%	1,339	9.3%	1,067	7.1%	940	5.2%
Educational and health care services	2,641	19.3%	2,922	20.2%	2,879	19.2%	2,696	15.0%
Arts, entertainment, recreation, food	1,013	7.4%	1,575	10.9%	1,183	7.9%	1,567	8.7%
Public Admin	834	6.1%	1,105	7.7%	1,257	8.4%	1,181	6.6%
Other	447	3.3%	524	3.6%	512	3.4%	740	4.1%
TOTAL CIVILIAN EMPLOYED POPULATION	13,681	-	14,433	-	14,972	-	17,983	-

Source: *ACS 2015-2019, **ACS 2010-2014; ***US Census 2010, ****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as in indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard. According to Table 3, the County has seen a steadily declining business presence over the last ten years, and the total civilian employed population has also declined, respectively. Retail Trade and Accommodation and Food

Services are the two industries with the most establishments in the County, which is reflective of the tourism-based economy in many of the Eastern Shore towns.

Table 3: Accomack County Business Establishment Types

Industry Code Description	Total Establishments			
	2018	2014	2012	2010
Agriculture, Forestry, Fishing, and Hunting	5	4	4	3
Utilities	5	4	4	2
Construction	78	78	81	96
Manufacturing	21	19	17	21
Wholesale Trade	21	24	28	31
Retail Trade	147	168	173	168
Transportation and warehousing	16	17	23	22
Finance and insurance	32	31	15	16
Information	14	13	32	35
Real Estate and Rental and Leasing	42	37	38	39
Professional, Scientific, and Technical Services	46	59	64	71
Management of Companies and Enterprises	-	3	3	3
Administrative, Support, Waste Management	27	26	25	27
Education Services	3	3	2	2
Health Care and Social Assistance	50	55	57	61
Arts, Entertainment, and Recreation	17	17	15	20
Accommodation and Food Services	96	97	101	106
Other Services (except Public Administration)	92	86	92	103
Industries not Classified	-	1	-	-
Total, All Establishments	714	742	774	826

Source: Census Zip Code Business Patterns, 2019, 2014, 2012, 2010

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Vehicles available to households is one indicator of a household's ability to evacuate when necessary.

As Table 4 reveals, there has been little change in the number of housing units in the County with a slow but steady increase since 2000. The table also indicates that over a quarter of the total housing units are vacant. As of December 2020, approximately a third of the parcels identified as potentially having a residential use were owned by entities outside of Accomack County. While it is possible some of these units are rented to individuals residing in them, the number of these units that are second homes, used seasonally, as well as hotels, seasonal campgrounds, and migrant housing, indicates the local population tends to increase during the summer months (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). The high influx of seasonal residents account for a large portion of what the US Census classifies as vacant housing units; however, there are still several vacant

dilapidated units in the unincorporated areas of Accomack County that are not accounted for in each incorporated Town's chapter and a large number of manufactured homes in the County as well. Dilapidated structures pose a threat and can cause additional debris hazards during high-wind events due to lack of maintenance. Manufactured homes are typically more susceptible to storm damages incurred from winds and flooding.

Table 4: Accomack County Housing

	2019*	2014**	2010***	2000****
Total Housing Units	21,319	21,054	21,002	19,550
Occupied	13,438	14,289	13,798	15,299
Vacant	7,881	6,765	7,204	4,251
Owner-Occupied	8,977	10,053	9,963	11,482
Renter-Occupied	4,461	4,236	3,835	3,817
Median Housing Value	$171,800	$152,500	NA	NA

Source: *ACS 2014-2019, **ACS 2010-2014, ***US Census 2010, ****US Census 2000

TRANSPORTATION

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. As of 2019, it is estimated that about 9% of the County's occupied residences are without even a single vehicle. This is a slight decrease from previous years. This can be assumed to be due to the fact that the owners of the new residences since 2000 most likely have at least one vehicle.

Table 5: Accomack County Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	1,222	1,470	1,287	1,447
One	4,142	4,664	4,372	5,570
Two	4,916	5,263	5,647	5,686
Three or more	3,158	2,892	2,779	2,596

Source: *ACS 2014-2019, **ACS 2010-2014, ***ACS 2006-2010, ****US Census 2000

Star Transit provides substantial, daily services up and down the Eastern Shore. The Greyhound bus line typically offers travel from the Eastern Shore across the Chesapeake Bay Bridge Tunnel; however, it does not have a stop in Accomack County, but rather right at the County line with Northampton in the Town of Belle Haven. The cost is not very high (about $20 each way to either Norfolk or Salisbury); however, this service would probably not run during an emergency and does not have the capacity to evacuate all residents without a vehicle. Star Transit is available to assist in the event of an evacuation, although this service would cease upon the arrival of hazardous conditions. Additionally, Shore Ride, a private ride-sharing company, serves the region and offers long-distance transportation.

Prior to the construction of the railroad in 1884, water-based transportation dominated the region. Water-transportation is still vital in Accomack County. Used both commercially and recreationally for enjoyment and fishing activities, the waterways are essential to the economy of the County. The Island of Tangier relies upon personal vessels and the ferries to gain access to the mainland and its essential commodities. Dredging of these channels is vital not only for safe transportation, but also for the local economy. The Regional Dredging Needs Assessment was completed in Fall of 2016 and provides details about the condition of navigable waterways in the region.

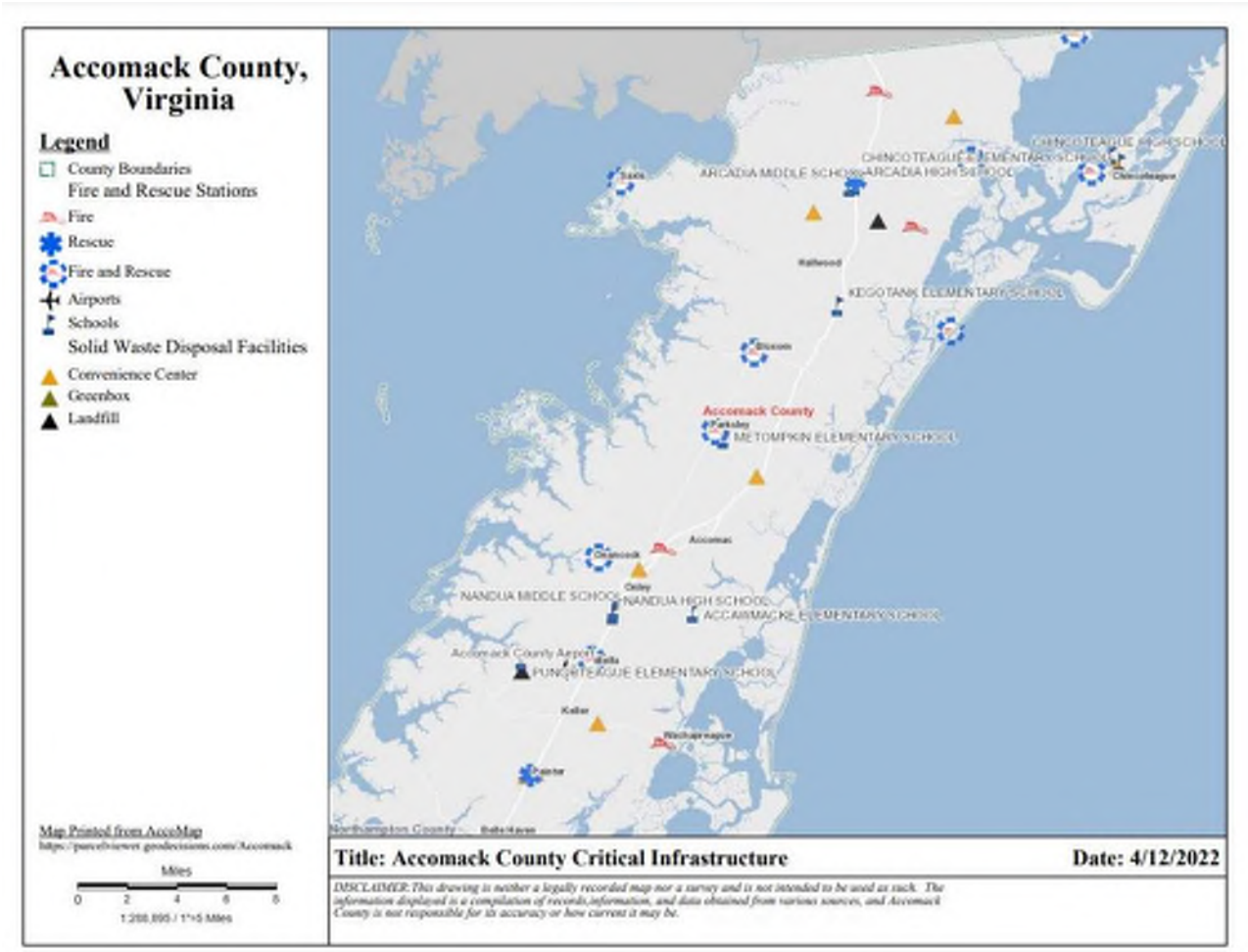
The Accomack County Airport (MFV) sits on 410 acres and is the only public airport on the Eastern Shore of Virginia. The runway is lit and is 100' wide and 5,000' long. The airport also has 18 hangars and jet fueling services. This is also the location of the Automated Weather Observation System AWOS III.

Train service south of Hallwood in the County was discontinued in 2018; however, there are ongoing plans to turn the abandoned railroad corridor into a multi-use bike and pedestrian path.

COMMUNITY SERVICES AND FACILITIES

Community facilities support the services and functions provided by the County government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the County and its citizens. It is important to note what facilities are available in the case of a hazard and to make an inventory of facilities that could be affected by a hazard.

Figure 2: Accomack County Critical Infrastructure



PUBLIC SAFETY

Emergency Services in Accomack County are provided by 60 career personnel and over 600 volunteer members (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). Services are delivered from 13 independent volunteer fire and/or rescue companies. Crews respond to an estimated 7,000 calls annually. In addition to emergency response, the Department of Public Safety personnel provide a free smoke detector program, disaster preparedness presentations, Emergency Response Training (CERT), community CPR training, and staff serve on regional committees to advance emergency services within the County and Region (Accomack County Public Safety).

Several of the volunteer fire departments in the County are struggling to obtain an adequate amount of funding and number of volunteers. A lack of fire and EMS volunteers create additional demand on County resources. Since 2016, EMS services transitioned from the Wachapreague Station to the Painter Station, which strengthened the effectiveness and decreased the EMS response time in the southern reaches of the County. In 2017, the Onley Volunteer Fire and Rescue Company was dissolved (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

With 30 deputies, the Accomack County Sheriff's Department responded to more than 9,600 calls and 1,104 arrests in 2020 (Personal communications, Accomack County Sheriff's Department, July 27, 2021). The Sheriff's Department is not located within the Special Flood Hazard Zone Area (SFHA).

During a 1-percent-annual-chance flood event, Hazus® estimates that out of the 13 total fire stations in the County, one would be completely lost and two would be at least moderately damaged. According to Hazus®, all of the police and fire stations are to be unaffected by a 1-percent-annual-chance wind event, although this statement is not supported by local representatives (County Staff, personal communications, July 14, 2016, 2021).

MEDICAL SERVICES

Riverside Shore Memorial Hospital relocated from Nassawadox to between Onley and Onancock. The County has just hired 12 EMS personnel, as many of the fire companies also provide EMS services (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). There are five Eastern Shore Rural Health (ESRH) Community Health Centers (CHC) located in Accomack County that provide medical and dental services; however, Onley and Chincoteague CHC's are solely medical, while Pungoteague Elementary and Metompkin Elementary are dental. The Atlantic CHC provides both medical and dental services and is located in the unincorporated area of New Church.

PARKS AND RECREATION

The Accomack County Department of Parks and Recreation maintains three parks and a gold driving range at Pungoteague Elementary School (35 acres). Arcadia Park (25 acres) and Nandua Middle Park are used extensively for picnics, reunions, family gatherings, and excursions. Accomack County's new Sawmill Park located at the former Jones Lumber property adjacent to the Town of Accomac opened in 2018 (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). The 35-acre site includes a baseball/softball field and a soccer field as well as concessions, a playground, a walking trail, a pavilion, and picnic tables. A football field and dog park are planned for this location in the future (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

The County maintains twenty-seven water access sites of varying infrastructure, only two of which (Greenbackville and Quinby Harbors) incur any fee for use. As of July 1, 2021, a boating facilities parking permit is required at 15 of these sites. The permit is available free-of-charge to Accomack County tax payers and is offered to all others for a fee (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). A list of these access

points with their location and facility types can easily be found on the Accomack County website. There is extremely limited access to beaches in Accomack County. The beach on Assateague Island at the Chincoteague National Wildlife Refuge and Assateague Island National Seashore is accessible for a fee of $10/day. Longer permits are also available for purchase. There are two other water access sites, Guard Shore and Burton's Shore, which have a limited amount of sand and even more limited parking. Mutton Hunk is the only Natural Area Preserve in the County with public access, and although there are two walking trails and seaside bay views, there is no water access. Saxis and Greenbackville beaches are also quite small with limited sand and parking; however, those with pets visit these beaches quite frequently.

WATER SUPPLY AND WASTEWATER

Most residents rely on private wells and septic systems for their water supply and wastewater disposal. The only public Waste Water Treatment Plants (WWTP) in the County for residential sewage treatment are located in the Town of Tangier and just outside Onancock Town limits (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). There are several private sewage treatment plants, including NASA Wallops Flight Facility (WFF), that serves Chincoteague and is designed for 800,000 GPD, and Captain's Cove in Greenbackville, which currently serves over 1,500 residents and has the capability to serve over 200 homes. The Captain's Cove facility has two lagoons for onsite effluent treatment and in 2016 updated their VDEQ permit to allow for infiltration polishing basins. In the past, poor soils limited development on some vacant parcels of land in the County, but above-ground septic technologies have made some previously undevelopable parcels available for development; however, these systems are much more expensive to build and to maintain than traditional systems.

There are ongoing plans for Hampton Roads Sanitation District (HRSD) to provide services up and down the Eastern Shore. Phase 1 of the project would connect Nassawadox in Northampton County to the Town of Onancock's WWTP in Accomack County, while allowing several towns to connect along the way. Future phases would provide several other localities in both Accomack and Northampton County the option to connect to the sewer system, which would allow for a significant increase in development on the Eastern Shore and would assist in the mitigation of groundwater contamination.

The largest industries which discharge waste directly into surface waters are Perdue Farms, Tyson Foods, NASA Wallops Flight Facility, the Town of Onancock's WWTP, and several seafood facilities. Although surface water in the County is not used for human consumption, it is important for recreation and shellfish harvesting, thus water quality must be protected in accordance with the State Water Control Law. According to the 2014 VDEQ Water Quality Assessment Integrated Report, almost all of the creeks in the County are considered impaired due to various causes such as pH, Enterococcus, Fecal Coliform, benthic-macroinvertebrate bioassessment, E. Coli, dissolved oxygen, etc. There are many causes for the various impairments, including wildlife; however, it is worth noting that there are an estimated 200 to 400 homes Shore-wide lacking any plumbing. This is a source of contamination that could be avoided, while at the same time directly improving the quality of life of individuals living in these conditions.

Due to the sole source aquifer designation of the Eastern Shore's water supply, Accomack County has revised its zoning ordinance to require that groundwater protection be considered in all major site plan reviews. The primary concern is not quantity of water in the York-Eastover aquifer, but rather, quality, as saltwater intrusion has already been documented in some coastal areas.

SOLID WASTE

The County operates seven Convenience Centers, all of which are closed one day each week (staggered) and offer recycling, tire, and used oil disposal. Some offer disposal of scrap metal including appliances, but none accept commercial waste. There is one landfill and one landfill transfer station which meet the disposal needs for commercial operations, construction companies, and households.

POWER AND COMMUNICATIONS INFRASTRUCTURE

Old Dominion Electric Cooperative (ODEC) in cooperation with Accomack and Northampton Electric Cooperative (ANEC) replaced the main transmission line between Tasley and Exmore. This project extended the redundant line from the state line to Tasley that was installed several years ago (Janelle Dawkins, ANEC, personal communication, July 28, 2016). There are plans to add more redundant lines, which will help ensure that long-term power outages are not a wide-spread concern on the Eastern Shore. Maintaining and advancing our infrastructure is key to increasing our resiliency in the occasion of a hazard. In 2016, the Amazon Solar Farm Virginia, an 80-megawatt project, came online in the Withams area. This was a new land use, that required rezoning and additional permits as well as decreases in acreage available for agriculture, as currently, there are no designated joint land uses for these operations (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

In 2019, an Information Technology (IT) Disaster Recovery Plan was prepared by Accomack County to develop, implement, and maintain the ability to recover its information technology systems. This Plan complies with the County Security Standards, meeting the requirements of CJIS, HIPAA, and PCI DSS. The Plan has been distributed internally within the County and with external organizations that might be affected by its implementation. Training exercises for all IT staff are completed on an annual basis (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

It is important to note that the IT DR Plan is a supporting component of Accomack County's Continuity Plan, which has also been in the process of development since late summer of 2020. The Continuity Plan provides direction and documentation as it relates to the response, recovery, resumption, restoration, and return to normal operations after a severe business disruption, which can also include an IT disaster; therefore, these plans must be developed and maintained together to ensure consistency in the County's response to incidents. Finalization of the Continuity Plan and subsequent training exercises for all County leadership were scheduled for completion by the end of March 2021 (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

The Eastern Shore of Virginia Broadband Authority (ESVBA) network of fiber cable stretches from Virginia Beach to the Maryland border and serves as the electronics 'backbone', providing high-speed internet to both Counties. The majority of service is provided along Route 13 as well as every incorporated Town in Accomack and Northampton Counties; however, there are still a high number of underserved households in Accomack County that are not located along Route 13 or an incorporated Town. Wide-spread high-speed internet provides residents with the capability to take advantage of educational opportunities, work from home, etc.

DRAINAGE DITCHES

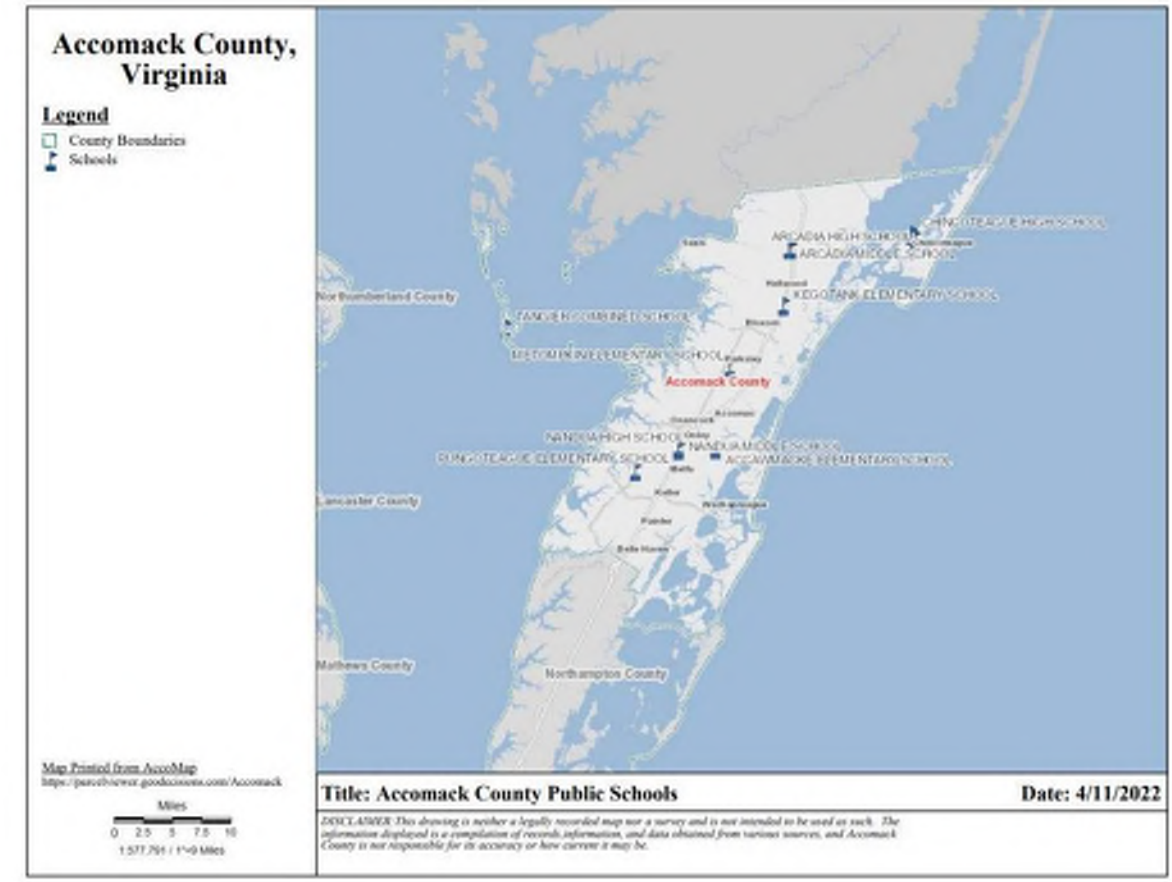
The County relies on VDOT for the maintenance of ditches along state-maintained roadways but is responsible for maintenance of all ditches along County roads and between properties that drain state ditches. There are approximately 1,516 miles of primary and secondary roads in Accomack and Northampton Counties (Virginia Base Mapping Program Road Centerline Data, 2014).

SCHOOLS

Schools are important to consider for disaster readiness and during an actual emergency. Schools offer an opportunity to teach children and adults how to effectively and efficiently respond to many emergency situations. They are also areas of concentrated high-risk individuals, particularly primary schools with young students. The Accomack County Public School Division is responsible for such planning. Each school has a Crisis Response Team, an emergency radio to receive updates on weather situations, two-way radios, a Crisis Management Plan for all bus drivers, and a pre-recorded warning message system.

There are five elementary schools, five secondary schools, and one K-12 combined school in the Accomack County school system, with locations of these schools displayed in Figure 2. Central Baptist Academy in the Town of Onley is the only private school in Accomack County (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). According to FEMA estimates using Hazus®, of the 11 total schools, damage would be incurred by both Chincoteague Elementary School and Tangier Combined School during a 1-percent-annual-chance flood event. The remaining nine schools are not expected to incur damages from this event.

Figure 3: Accomack County Public School Locations



According to the Virginia Department of Social Services (DSS), there are 7 licensed and 7 unlicensed daycare facilities in the County, with locations in Accomac, Atlantic, Hallwood, Horntown, Keller, Onancock, Onley, Painter, and Parksley (Virginia DSS). Arcadia Middle School and Nandua Middle School are the emergency shelters for the County. The County has previously expressed willingness to open their shelters and, if necessary, additional schools to Northampton County residents, considering they are currently without a shelter. Six of the County's schools are designated emergency shelters and can easily be found on Accomack County's Website. Additionally, the Eastern Shore Community College in Melfa has been used as a base of operations during times of declared emergencies.

CULTURAL RESOURCES

Although the County has several building museums, Kerr Place, Locustville Academy, the Debtors Prison, the Railway Museum, Tangier Island Museum, etc., there is no interpretive center or readily available materials that comprehensively teach the history of the Eastern Shore culture. The Historical Society of the Eastern Shore is based in Onancock, maintains three properties there, and offers a range of educational programs.

Only 25 buildings in Accomack County are registered with the Virginia Department of Historic Resources (VDHR) as official Historic Places. In 2001, the VDHR completed the archaeological survey of the Chesapeake Bay shorelines and in 2003, the Atlantic coast shorelines associated with both Eastern Shore Counties. The latter was updated in April of 2016.

NATURAL ENVIRONMENT

Accomack County, entirely within the Atlantic Coastal Plain, is relatively flat with elevation ranging from sea level to about 50-feet above mean sea level. The majority of slopes are under 1%, but in a few sections, the slope reaches up to 15%. The average depth of the water table is about 18 inches. Flat areas are typically more prone to flooding problems, particularly where the water table is high and hydric soils dominate.

There are approximately eighteen major tidal creeks on the seaside and twelve on the bayside, according to FEMA reports. The Regional Dredging Needs Assessment inventoried 34 seaside creeks and 24 bayside creeks in Accomack County.

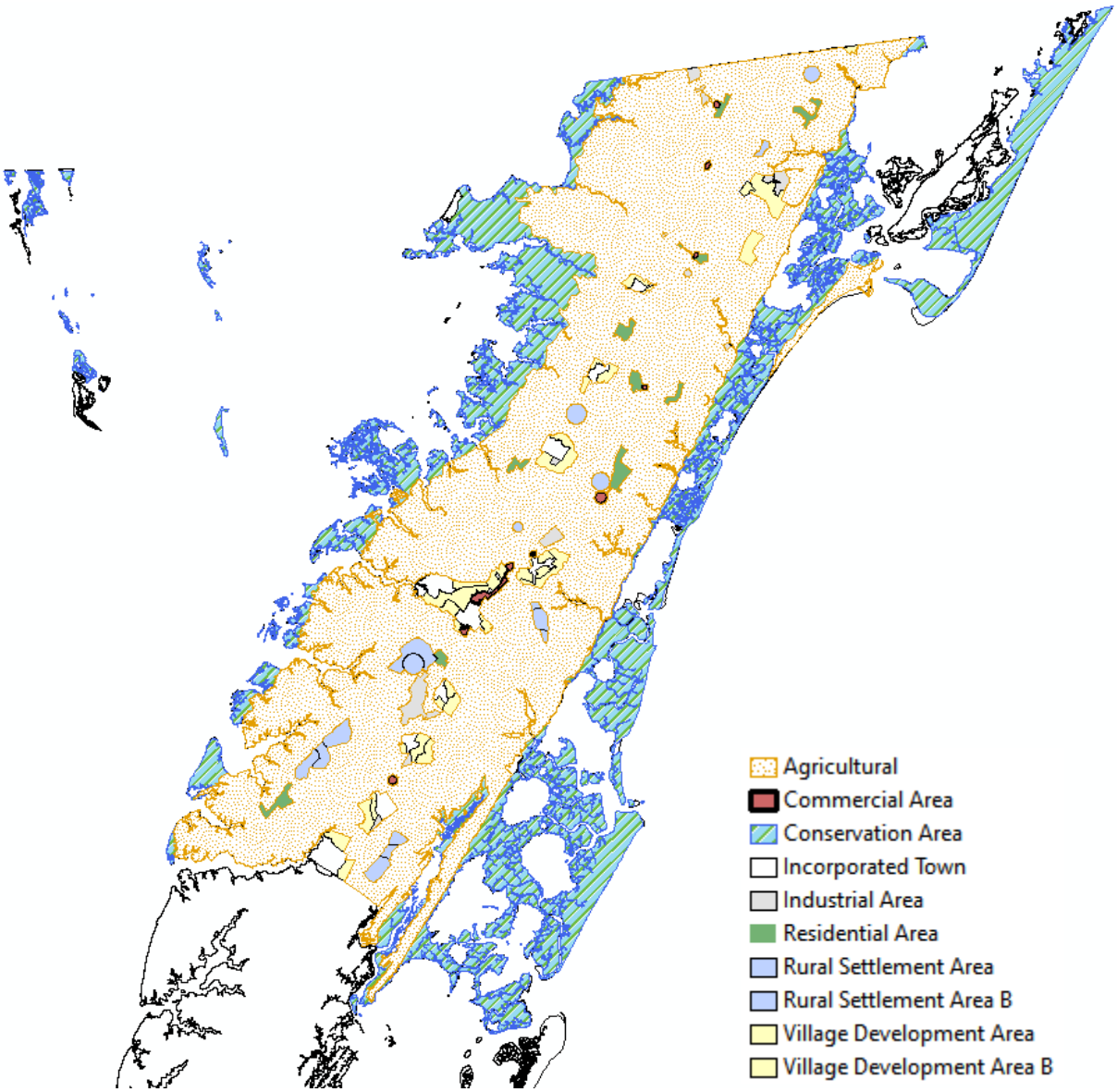
LAND USE LAND COVER

The total land and water area of Accomack County is approximately 602 square-miles, 476 of which is comprised of uplands and the adjacent wetland areas. The majority of land use consists of farms, forests, and marshlands, dotted with towns, villages, and hamlets.

According to the Census of Agriculture, there were 239 farms in 2017. Despite an increase of 13 farms since 2012, the total acreage and average size of farms has decreased. There has been a downward trend in the number of farms, the total acreage of farms, and the acreage of land in the agricultural and forest districts dating back to at least 1992. Although there was a boom in subdivision activity which peaked between 2004 and 2006, many of those areas were never developed after the downturn in the economy. The larger decrease in farm acreage cannot be largely attributed to these subdivisions, but rather the result of various causes. A 2009 publication indicated that 47 acres of wetlands are created annually from the inundation of low-lying farms (Titus, 2009), which could be part of the cause in the continuing decrease of farmlands. Around the time of the 2012 Census, one of the major vegetable growers was going through bankruptcy. They owned and leased a large quantity of land. In 2013, another company bought the majority of their operations at auction and now most of the land is back in production. It was expected that the 2017 Census would show a rebound in the number of farms; however, this was dependent on the expansion rate of solar energy production areas and other operations. It is possible this could affect numbers in the 2022 Census.

Water and wetlands originally made up approximately 65% collectively of land use, and the terrestrial, upland land cover is more relevant for management purposes. According to the NOAA C-CAP Land Cover Atlas, between 1996 and 2010 there was a net increase of 4.75% and 8.27% in developed areas and in impervious surfaces respectively. Still, Accomack County only has a total of 4% of its upland areas classified as developed and the percent of the County that is wetland has remained fairly constant for the past two decades (C-CAP NOAA, 2016).

Figure 4: Accomack County Future Land Use



GIS data retrieved from Accomack County Virginia Open Data Portal, 2022.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(d)(3) Accomack County has participated in the hazard mitigation planning process since 2006. The County's primary risk is associated with coastal and storm water flooding. Although the County's Comprehensive Plan was updated in 2018, much of the content refers to dated data from the early 2000's. The comprehensive plan further emphasizes the need to protect groundwater, open space, historic resources, agricultural lands, National Aeronautics and Space Administration (NASA) Wallops Flight Facility (WFF), and to strengthen existing towns and communities.

Table 6: Accomack County Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Viginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climage Adaptation Working Group	ES Disaster Preparedness Coalition
County	*		*		*	*													
Regional				*				*	*	*	*	*		*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

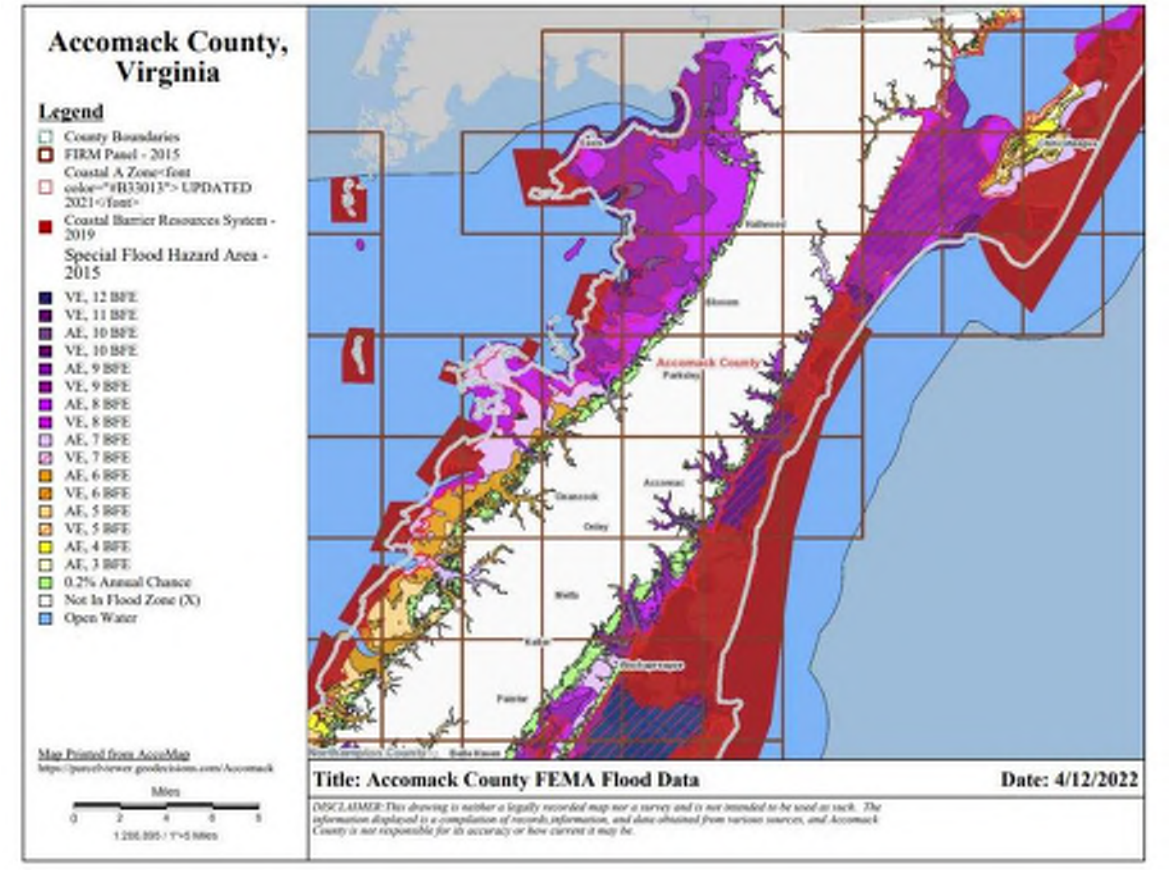
NFIP

§201.6(d)(3) Since 1953, there have been 14 Federal Disaster Declarations for hurricanes, flooding, and severe storms in the County, three of which occurred in the past five years (FEMA Disaster Declarations, 2022). There are 14 severe repetitive loss (SRL) properties and 92 NFIP-recognized repetitive loss (RL) properties in the County (FEMA NFIP Data Report, 2022), which has increased substantially since 2015. According to the FEMA Flood Risk Report in 2015, there were only 3 SRL and 37 RL properties, which was 12 more than there were in 2003 (FEMA Flood Risk Report 2015, FEMA NFIP Report December 2003). There has been a steady decrease in the total number of active insurance policies for the County, as more homeowners learn of the changes to the Flood Insurance Rate Map (FIRM).

With the 2015 updates to the FIRM, there were changes to the associated Special Flood Hazard Area (SFHA) for the County. The total area of the SFHA increased by 12 square miles and decreased by 16.6 square miles for a net decrease of 4.6 square miles including 1,111 buildings. The area within the V zone increased by 3.6 square miles and decreased by 44.8 square miles for a net decrease of 41.2 square miles including 300 buildings. This is extremely important as 1,411 structures that previously were required to have flood insurance under a mortgage are no longer required to have even basic flood insurance coverage. Flood insurance is cost prohibitive for many residents in the County. Without insurance, should there be flooding, the recovery time for residents, businesses, and the overall community will be much longer.

The County participates in the Community Rating System (CRS) program in order to provide a policy discount to residents and businesses in the unincorporated areas of the County. Since 2016, Accomack County's CRS rating has dropped from 8 to 6, now providing residents a 20% discount for insurance (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021). More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 5: Accomack County FIRM Base Flood Elevation (BFE)



HMGP

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 for homes located in the unincorporated portions of the County and in the Town of Tangier. See Table 7 for more details. As of 2016, a total of almost 100 homes in Accomack County have been elevated out of the floodplain and no houses have been relocated or razed under the program. These grants are regularly utilized in the County, particularly in coastal Towns such as Tangier and Saxis.

HAZARD PROFILE

PANDEMIC RESPONSE AND READINESS

Accomack County responded to the COVID-19 pandemic in several ways. The County offices were forced to shut down from mid-March of 2020 to June 8, 2021 (Personal communications, Tom Brockenbrough, Floodplain Administrator, July 23, 2021). The majority of meetings were held virtually and some held with limited parties in the meeting room. The public was required to make an appointment to go into the Administrative Building with the exceptions of going to the Commissioner of Revenue Office or the Treasurer's Office.

Staff only attended meetings that were held outside or were socially distanced and alternated between working in the office and working remotely. Masks were required at all times unless working in an office that was not shared with any other staff and high-touch surfaces were cleaned and sanitized frequently. Upon returning to work, some staff were relocated to different offices in an attempt to maintain social distancing of crowded work areas and many offices were reconfigured with plexiglass shields. Additional hand sanitizer dispensers, social distancing floor schedules, flexible work schedules, and arrangements to work remotely to ensure social distancing and to assist those with who had children going to school virtually at home were put in place. The County also assisted employees who were interested in receiving one of the COVID-19 vaccinations (Personal communications, Tom Brockenbrough, Floodplain Administrator, July 23, 2021).

The County used CARES Act and other COVID-19 related funds to purchase any needed PPE and technology to hold virtual meetings. The County used funds for Broadband proliferation and collaborated with Accomack County Schools and the Eastern Shore of Virginia Broadband Authority to create public access hotspots in areas with concentrations of students without internet services. Funds were also used for safety-related facility improvements, hazard pay, grants for small businesses, watermen, and charter/passenger boats, mortgage and rental assistance programs, and more (Personal communications, Tom Brockenbrough, Floodplain Administrator, July 23, 2021). Every incorporated town in the County was also allocated funds according to the town's population; however, a few of the towns left their allotment with the County.

HIGH WIND

The peak wind gusts predicted by Hazus® during a 1-percent-annual-chance wind event are evidenced in Figure 3. The building-related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business due to damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those individuals displaced from their homes as a result of hurricane damages.

The total property damage losses were $72 million, with 5% of the estimated losses related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, making up over 95% of the total loss.

Hazus® estimates that approximately 230 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 16 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus® Hurricane technical manual.

The model also estimates that a total of 265,278 tons of debris will be generated. Of the total amount, 234,643 tons (88%) is Other Tree Debris. Of the remaining 30,635 tons, Brick/Wood comprises 14%, Concrete/Steel comprises 0%, and the remainder is Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 173 truckloads at 25 tons/truck to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 26,317 tons are collected and processed. The volume of tree debris generally ranges from approximately 4 cubic yards per ton for chipped or compacted tree debris, to approximately 10 cubic yards per ton for bulkier, uncompacted debris.

The County's Building Code is currently based on the 2012 Virginia Uniform Statewide Building Code (USBC). The USBC is periodically updated and the County updates their code respectively. Our region lies within the 110-mph wind zone; thus, the County requires structures be built to withstand winds of at least this strength (Personal communications, Bruce Herbert, (Former) Building Inspector, August 1, 2016; confirmed Bruce Herbert, A-NPDC Community Development Coordinator, July 19, 2021). These standards affect many aspects of the construction, from the quality of the shear walls to the number of nails used to secure shingles.

Hazus® estimates the number of households that are expected to be displaced from their homes due to a 1-percent-annual-chance wind event as well as the number of displaced individuals that will require accommodations in temporary public shelters. For Accomack County, the model estimates 21 households to be displaced. Of these, 14 individuals, out of a total population of 33,164, will seek out temporary public shelters.

Additional wind hazards, which are described in Chapter 4, are straight line winds, tornados, and nor'easters. Manufactured homes are the most susceptible to wind damages.

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. That said, the shifting and erosion of the barrier islands and loss of marshes to habitat migration and rising seas, may leave the inland seaside shoreline in a more exposed position in the future.

The erosion rates on the barrier islands range from 7- to 17-feet per year on average; however, a single high intensity nor'easter or hurricane could erode more than that in just a few days. The Accomack County Comprehensive Plan emphasizes the importance of consulting with the VIMS Shoreline Situation Report to prevent building in high erosion areas or those areas indicated to have a loss of greater than one foot per year. The Coastal Resilience Tool finalized an application that shows historic positions of the seaside barrier islands. This tool is now available to the public.

Table 8 reveals the areas in the County identified by the 2002 VIMS *Shoreline Situation Report* and updated information from local County representatives. According to the VIMS Center for Coastal Resources Management 2016 Accomack County Shoreline Inventory, 46 of the 708 miles of shoreline surveyed are defended in some way, the majority of which (26.6 miles) are bulkheads.

Assateague Island, an area vital to the economy in Accomack County, has experienced severe erosion. Decisions are still currently being made for the long-range plan for the Chincoteague National Wildlife Refuge and Assateague Island National Seashore on Assateague Island, with regards to new locations for parking, beach access, interpretive structures, facility buildings, etc.

Just to the south of Assateague is Wallops Island, which is owned by the federal government and home to the NASA WFF, a major economic driver for the County. In June of 2016, the United States Army Corps of Engineers (USACE) completed the Wallops Island beach nourishment, which cost almost $36 million (about $10 /$yd^3$ of sediment).

The restrictions within the Resource Protection Areas identified in the Chesapeake Bay Act typically prevent new construction within 100-feet of our waterways and thus reduces increased exposure to erosion; however, erosion does cause additional problems for our navigable waterways, as the eroded sediments can fill channels and create a hazard for water-based transportation and businesses.

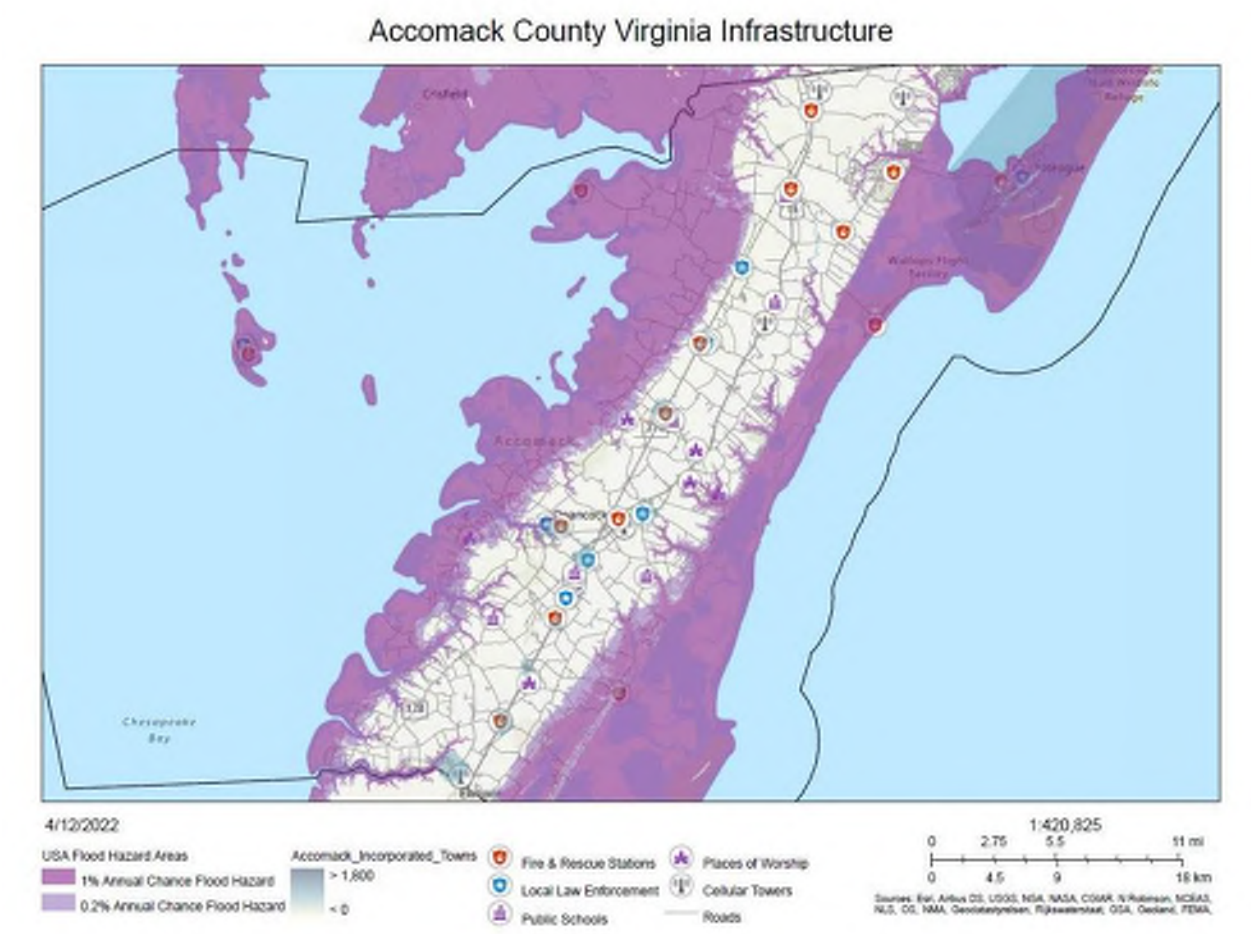
Table 7: Accomack County - Areas Experiencing Coastal Erosion

Area	Location Description	Erosion Rate (feet/year)	Mitigation Strategy	Other
Critically Eroding Areas				
Tangier Island, & Uppards	All coastlines, western shore of Tangier least in danger due to existing seawall	10+	Jetties, Seawalls, Enhancing the Uppards, Reinforcement of the eastern shoreline, Extend seawall on eastern shoreline	
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				
Saxis			Beach nourishment, Groynes, Jetty, Breakwater	
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 lowdensity 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 lowdensity 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

COASTAL FLOODING

According to the 2015 FEMA Flood Risk Report, 311.5 square miles of Accomack County are in the SFHA and 144.6 square miles are in the V zone. This is approximately 68% and 31% respectively of land area (excluding marsh or emergent wetlands) using the land cover data from NOAA. The three largest landholders are the Commonwealth of Virginia, the Federal Government, and The Nature Conservancy (TNC). Of non-federal land in the SFHA, over 70% is maintained in open space (Personal communications, Tom Brockenbrough, Floodplain Administrator, March 2, 2021).

Figure 6: Accomack County Flood Hazards to Infrastructure



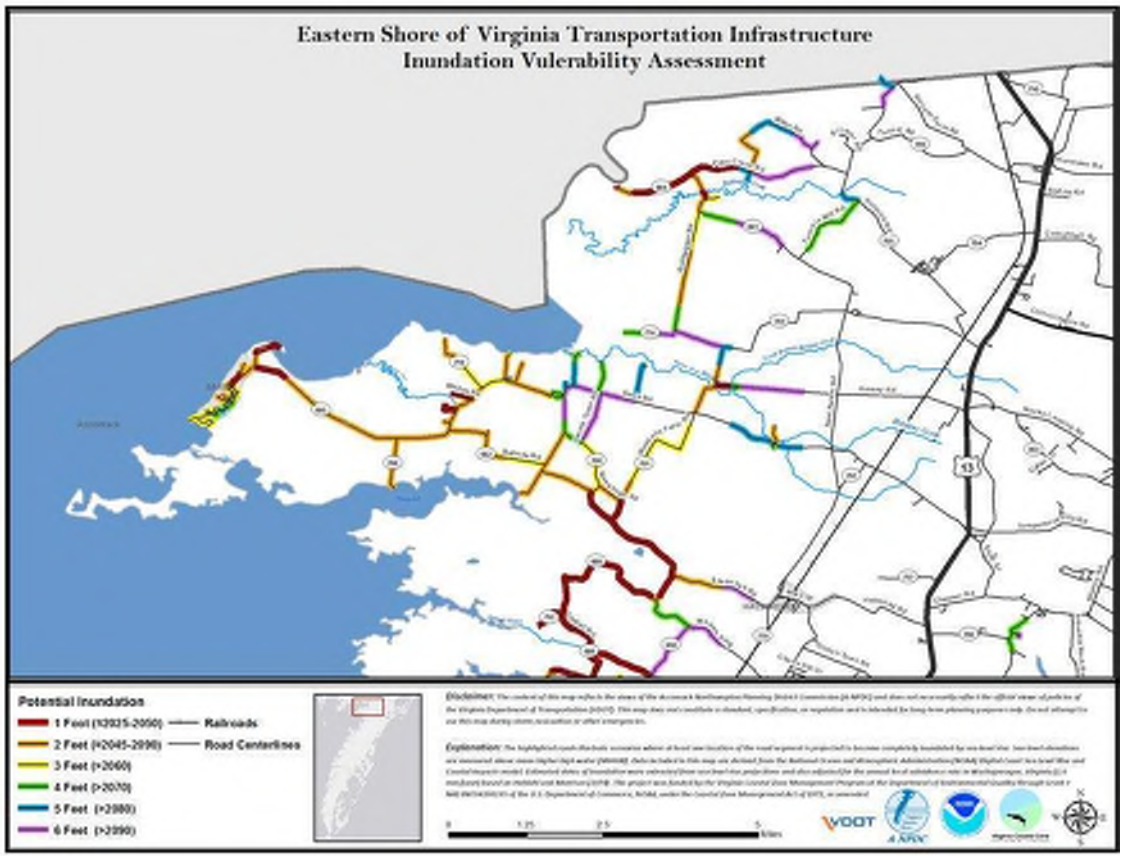
The total economic loss estimated by Hazus® for a 1-percent-annual-chance flood event is $145.54 million, which represents 10.06% of the total replacement value of the scenario buildings. The Hazus® model indicates that over 65,000 tons of debris would be generated during such flooding event. The quantity of generated debris will likely create accommodation challenges for the landfill, consequently forcing trucks inland for debris processing and disposal. Hazus® estimates the number of households expected to be displaced from their homes and the associated potential evacuation in the event of a 1-percent-chance flood. Additionally, Hazus® estimates the number of those displaced individuals that will require accommodations in temporary public shelters. The model indicates approximately 767 households, or 2,301 individuals, will be displaced due to the flood event. Displacement includes households evacuated from within or very near the inundated area. Of these, 382 out of the County's 33,164 total

population will seek out temporary public shelters. Following Hurricane Sandy in 2012, there were over 200 reported home damages in the County; however, within two weeks, roughly half of these had already been repaired and a quarter were being processed with their respective insurance companies. Between 15 and 20 homes received volunteer assistance for their repairs and two residents from two homes relocated off of the Eastern Shore.

SEA LEVEL RISE

Based on 2010 U.S. Census data, 4,623 people in the County are on land below 3-feet elevation and 6,957 people are below 5 feet. In 2010, Accomack County had 33,164 people in total. Of the County's 1,014 miles of roads, 31 miles (3.1%) will be inundated with 1-foot of sea level rise (SLR) (estimated year 2025-2050), 115 miles (11.3%) with 2 feet (2045-2090), and 183 (18%) with 3 feet (post-2060) (*ESVA Transportation Infrastructure Inundation Vulnerability Assessment*, 2015). Another study by VIMS estimated 326 miles of roads in Accomack County were vulnerable to 1.5 feet of relative SLR when combined with a storm surge of 3 feet. Even small amounts of sea level rise make rare floods more common by adding to tides and storm surge. With 3 feet of sea level rise, there are many towns, unincorporated communities, and economically critical facilities (including NASA WFF and various working waterfront areas) that would be disconnected, inaccessible, or have the majority of the roads inundated with 3 feet of relative SLR. Without significant engineering solutions in the coming years, it should be expected that the livelihood and safety of communities and the integrity of the roadways in the County will largely decline. Figure 5 shows a map from the *Transportation Infrastructure Inundation Vulnerability Assessment* of one of the most susceptible areas to SLR effects in the County. According to a 2014 report prepared by Climate Central, the County has 41,816 acres of land below 5 feet MHHW.

Figure 7: Northwestern Accomack County Transportation Infrastructure Inundation Vulnerability Assessment



STORM WATER FLOODING

Local officials identified various areas in the unincorporated portions of the County that have stormwater flooding problems. These areas include, but are not limited to:

- New Church; Rt. 13 & Rt. 175
- Sanford
- Especially Neil Parker Rd (Sanford)
- Pastoria
- Mappsville
- Bayside Rd between Shields and Craddockville
- Family Dollar Store in Tasley
- Intersection of Locustville Rd & Drummondtown Rd
- Clam
- Messongo
- Belinda

The causes are typically from soil type, elevation, lack of proper ditch design and maintenance, or any combination of these.



Figure 8: Accomack County Storm Water Flash Flooding - July 1, 2016. Photo by Shannon Alexander

Intense rain events, such as that on Friday July 1, 2016, can come without warning and have serious impacts to travel and safety, as shown in Figure 6. Slow moving storms that moved over Accomack County brought nine inches of rain by evening in the Parksley area, where southbound U.S. 13 was forced to close. Throughout the County, homes were surrounded by and often inundated by water. The gauge in Onley measured 8.58-inches of rain. Ambulances and fire rescue vehicles struggled to reach individuals in need of aid. Luckily, there are alert systems in place that, if signed up for, will send alerts when such a flash flood warning is in effect; however, often times waters are already rising by the time these alerts are issued.

Educating residents about the risks associated with storm water flooding and standing water, such as septic contaminants and mosquito-borne illnesses, is an important step in mitigating potential negative impacts to the population.

HAZARDS OF LOCAL SIGNIFICANCE

Other hazards for Accomack County are described in the Regional Chapter and include, but are not limited to, above and underground storage tanks, snow and ice, fire and drought, fish kills, and biological hazards.

WATER QUALITY

Since many people in the County rely on the fisheries and aquaculture industries, fish kills and the declining health of the Chesapeake Bay can severely impact the residents and the economics of the entire Region. In addition, bacterial impairments can discourage tourism and recreational use of our beaches and waters.

MOSQUITOS

Mosquito-borne illnesses, such as West Nile and Zika Virus, pose a potential risk, especially with standing water from intense rain events and subsequent stormwater flooding.

SNOW AND ICE STORMS

With snow and ice storms, there are often school closures, power outages, isolated communities (by water – Tangier, and roads to many locations), and economic issues from damages to agriculture, water lines, etc.

FIRE AND SMOKE

According to ACS estimates, in 2019, 2,369 (17.6%) of Accomack County houses are heated with fuel oil, kerosene, etc., another 2,905 (21.6%) with bottled, tank, or LP gas, and 227 (1.7%) use utility gas as the primary house heating source. In times of low humidity and high winds, the County is susceptible to field and forest fires as well.

CRITICAL FACILITIES

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

Table 8: Accomack County Critical Facilities

Facility	Hazards	People Affected	Loss Potential	Relocation Potential	Retrofit Potential
County-Owned Properties					
Public Schools: Tangier Combined, Chincoteague Combined, Arcadia Middle & High, Nandua Middle & High, and Pungoteague, Accawmacke, Metompkin, Kegotank, and Chincoteague Elementary	Storm Water, Coastal Flooding (Tangier & Chincoteague), Wind, Fire, Ice	20,000+	Major Disruption	Yes	Yes
911 Communications	Wind, Fire, Ice	45,000+	Devastating	Yes	Yes
Sheriff's Office & Jail Complex	Wind, Fire, Ice	33,000+	Devastating	No	Yes
Health Department	Wind, Fire, Ice	33,000+	Major Disruption	Yes	Yes
Social Services	Wind, Fire, Ice	20,000+	Major Disruption	Yes	Yes
Administration Building	Wind, Fire, Ice	33,000+	Minor Disruption	Yes	Yes
Public Safety Building	Storm Water, Wind, Fire, Ice	33,000+	Major Disruption	Yes	Yes
Fire Training Center/Emergency Operation Center	Wind, Fire, Ice	33,000+	Major Disruption	No	No
Building & Grounds Maintenance Shop	Storm Water, Wind, Fire, Ice	33,000+	Minor Disruption	Yes	Yes
Veteran's Affairs Office	Wind, Fire, Ice	5,000+	Minor Disruption	Yes	Yes
County Garage	Storm Water, Wind, Fire, Ice	33,000+	Major Disruption	Yes	Yes
Industrial Parkway, Service Rd, & Atlantic Dr	Storm Water, Wind, Fire, Ice	20,000+	Minor Disruption	No	Yes
Airport Complex	Storm Water, Wind, Fire, Ice	3,000+	Major Disruption	No	Yes
North & South Landfills	Storm Water, Coastal Flooding, Wind, Fire, Ice	33,000+	Major Disruption	No	Yes
Mappsville Communications Tower	Wind, Fire, Ice, Lightning	33,000+	Major Disruption	Yes	Yes
Planning Office	Wind, Fire, Ice	33,000+	Minor Disruption	Yes	Yes
Lumber Mill Complex (Joynes Neck Rd)	Storm Water, Wind, Fire, Ice	33,000+	Inconvenience	No	Yes
Convenience Centers: Chincoteague, Fisher's Corner, Horntown, Makemie Park, Grangeville, Painter, Tasley	Storm Water, Coastal Flooding, Wind, Fire, Ice	33,000+	Major Disruption	Yes	Yes
County-Owned & Operated Public Utilities					
Industrial Park Water & Wastewater Systems	Wind, Fire, Ice, Flooding	33,000+	Major Disruption	No	Yes
Leachate Treatment Plant	Wind, Fire, Ice, Flooding	33,000+	Major Disruption	No	Yes
Accomac Water System	Wind, Fire, Ice, Flooding	2,000+	Major Disruption	No	Yes
Health Dept. Water System	Wind, Fire, Ice, Flooding	33,000+	Major Disruption	No	Yes
Court Systems Buildings Complex	Wind, Fire, Ice, Flooding	10,000+	Major Disruption	No	Yes
DSS Water & Wastewater Systems	Wind, Fire, Ice, Flooding	3,000+	Major Disruption	No	Yes

FINDINGS

1. During a 1-percent-annual-chance flood event, the total economic losses are estimated at approximately $145.54 million. During the same chance wind event, the total property damage loss equals roughly $72 million. If these Hazus® estimates are combined, which is a likely scenario during a hurricane, the damages are over $217 million. A high-wind storm system that also produced 1-percent-annual chance flooding is a significant threat to the County.

2. During a 1-percent-annual-chance flood event, 767 households, or 2,301 individuals, would be displaced from their homes. An estimated 382 of these individuals would be forced to seek out temporary public shelter. Coastal flooding is the greatest threat to the County.

3. With the 2015 updates to the FIRM, 4.6 square miles, including 1,111 buildings, were removed from the SFHA and 41.2 square miles, including 300 buildings, were removed from the V zone. From April of 2011 to January of 2016, there has been a decrease of 602 policies in the unincorporated areas. This number is estimated to continue to increase as more residents learn that flood insurance is no longer required. The changes in the FIRM are thought to create a sense of decreased vulnerability to flooding, and the resulting drops in policies may increase the rebound time for the County and its residents following a flood event.

4. According to 2016 NFIP data, there are 38 repetitive loss properties and 3 severe repetitive loss structures in the County. It is possible both of these numbers have increased over the last five years.

5. As of 2021, the Towns of Keller, Melfa, and Painter do not participate in the NFIP but experience stormwater flooding. Many areas of stormwater flooding are not identified by the current FIRMs. Residents and business owners in these areas cannot currently purchase flood insurance or be eligible for some loan opportunities. Often, drainage ditches are the culprit behind storm flooding, thus maintenance and re-evaluation of many systems may be needed to address this hazard.

6. High winds from a 1-percent-annual-chance event are predicted to cause at least moderate damage to 230 buildings and completely destroy 16. Property damages and economic losses would total approximately $72 million. Although this is significant, it is not even half of the damage incurred by a 1-percent-annual-chance flooding event. The majority of these damages are to residential structures.

7. Most of the worst coastal erosion in Accomack County has occurred on the bay shoreline. Erosion also causes shoaling of channels and creeks, thus hindering waterway navigation and increasing maintenance dredging needs and costs.

8. There have been several factors that have increased the risk in the County since 2011. These include an increase in the number of vacant homes, an increase in the number of manufactured homes, an increase in the number of homes with no vehicle available, and an increase in the number of non-English speaking residents.

9. 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. Of concern for wildfire and structure fire is the increasing difficulty with which the fire companies are having in securing sufficient volunteers to offer complete services.

CHAPTER 11: TOWN OF ACCOMAC

TOWN PROFILE

The Town of Accomac is known for its historic architecture and is the County seat for the County of Accomack. Before settlers first arrived in what is now Virginia, Native Americans called the Eastern Shore "Accawmacke", meaning "across the water place". The original shire of Accomac was created in 1634 and was made up of the entire Eastern Shore. The name was changed to "Northampton" in 1642, and over 20 years later, the area was divided into two counties-Northampton and Accomac. In 1940, the County of "Accomac" officially became "Accomack" (Accomac – Virginia). In 1786, Virginia officially established the Town as Drummondtown and was renamed Accomac in 1893, which came as a result of a petition to the Virginia General Assembly for a town to exist at the courthouse site (*Town of Accomac Comprehensive Plan*, 1989). The Town of Accomac was incorporated in 1944 and includes just 250 acres, 0.4 square miles (Accomac – Virginia).

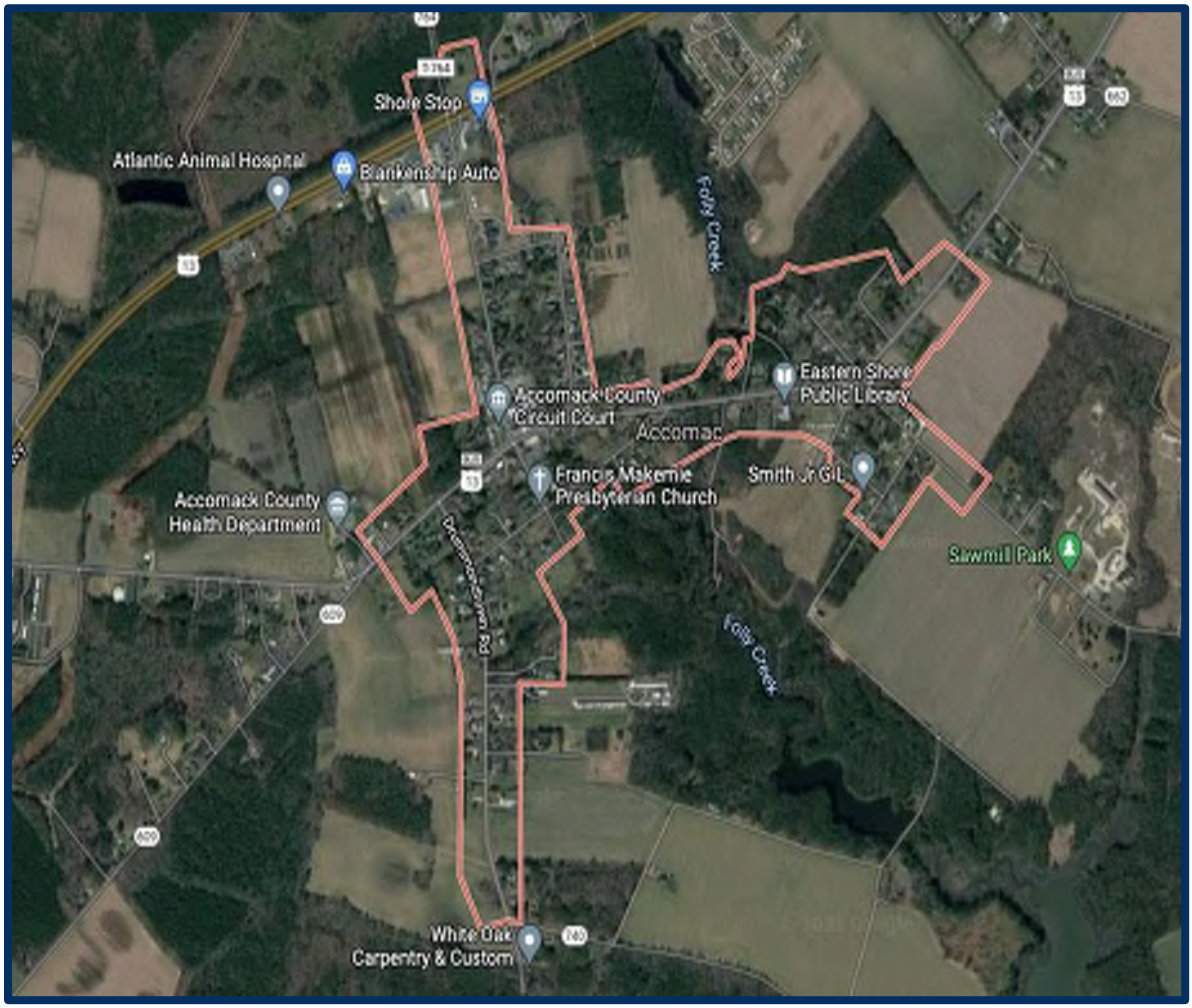


Figure 1: Accomac Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to the American Community Survey five-year estimates, Accomac had a population of 479 in 2019. The median age is 48.1, about ten years higher than the median age for the nation. This is indicative of an older population, with over 25% of the population above the age of 62. About 20% of the population speak a language other than English, with the other languages being primarily Spanish. This is important to consider in the event of a potential hazard in order to ensure all citizens are able to access important safety information.

Table 1: Accomac Demographic Information

	2019	2014	2010*
Population	479	485	519**
Median Age	48.1	43.1	44.0
Disability	69	46	NA
Income			
Median Household Income	$50,625	$41,750	NA
Poverty Level	12.6%	5.5%	NA
Language			
Only English	80.1%	81.0%	95.8%
Other	19.9%	19.0%	4.2%
Spanish	16.3%	16.7%	3.4%
Indo-Euro	3.6%	2.3%	0.8%
Asian	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%

Source: ACS, 2014-2019, *ACS, 2010, **U.S. Census, 2010

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

According to Table 2, the majority of Town residents work in the Educational and Health Care Services industry (22.7%), followed by the Manufacturing industry (16.7%). The high percentage in the Manufacturing industry is likely due to nearby poultry processing plants, such as Perdue Farms and Tyson Foods. These companies often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts on the Town. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local shops, nor family necessities. Other dependent agricultural businesses would be at a loss as well, particularly noting the increasing trend of individuals in the agricultural industry. The Town of Accomac hosts an abundance of local government entities, which may employ residents of Accomac as well.

Table 2: Accomac Local Workforce Industry

Civilian Employed Population						
Industry	2019		2014		2010*	
	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	10	5.1%	6	3.4%	0	0.0%
Construction	11	5.6%	5	2.8%	19	11.6%
Manufacturing	33	16.7%	28	15.8%	21	12.8%
Wholesale trade	0	0.0%	7	4.0%	0	0.0%
Retail trade	12	6.1%	21	11.9%	17	10.4%
Transportation and warehousing, and utilities	11	5.6%	0	0.0%	4	2.4%
Information	0	0.0%	0	0.0%	3	1.8%
Finance, insurance, real estate, and rentals	5	2.5%	6	3.4%	10	6.1%
Professional, scientific, waste management	20	10.1%	10	5.6%	35	21.3%
Educational and health care services	45	22.7%	48	27.1%	31	18.9%
Arts, entertainment, recreation, food	23	11.6%	32	18.1%	2	1.2%
Public Admin	13	6.6%	11	6.2%	16	9.8%
Other	15	7.6%	3	1.7%	6	3.7%
TOTAL CIVILIAN EMPLOYED POPULATION	198	-	177	-	164	-

Source: ACS, 2014-2019, *ACS, 2010

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. They can also serve as an indicator of community recovery resources. Finally, data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

The Town of Accomac hosts an abundance of local government establishments, i.e., the Health Department, Accomack County School Board, Eastern Shore Public Library, Planning District Commission, Accomack County Circuit Court, Accomack County General District Court (Juvenile, Magistrate), Accomack County Jail and Sherriff's Office, as well as several law and financial offices. Accomac also has a gas station, auto repair shops, and a lunch café.

Table 3: Accomac Business Establishment Types

	Total Establishments
Industry Code Description	**2021**
Agricultural, Forestry, Fishing, and Hunting	-
Construction	3
Manufacturing	-
Wholesale Trade	-
Retail Trade	-
Transportation and Warehousing	-
Information	-
Finance and Leisure	-
Real Estate and Rental and Leasing	3
Professional, Scientific, and Technical Services	-
Administrative and Support and Waste Management Remediation Services	-
Health Care and Social Assistance	2
Arts, Entertainment, and Recreation	-
Accommodation and Food Services	2
Other Services (Except Public Admin)	-
Total, All Establishments	10
Total Employees	-

Source: Personal Communications, Mayor Pat Smith, July 15, 2021

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

As shown in Table 4, Accomac had a total of 215 total housing units in 2019. Nearly 23% of these units are vacant, which is important as unoccupied homes pose more of a threat during a hazard due to lack of maintenance or unsecured yard debris.

Table 4: Accomac Housing

	2019	2014	2010*
Total Housing Units	215	238	198
Occupied	166	179	158
Vacant	49	59	40
Owner-Occupied	121	114	131
Renter-Occupied	45	65	27
Median Housing Value	$152,500	NA	NA

Source: ACS, 2014-2019, *ACS, 2010

TRANSPORTATION

The Town of Accomac corporate limits cross over Route 13 Highway, but the majority of the Town is located about a half-mile from the highway. Business 13 runs through the Town and connects back to the main highway. Drummond Town Road splits off of Business 13 and runs through several seaside towns. Church Road also connects Accomac directly to the Town of Onley, which hosts several fast-food restaurants, gas stations, a Walmart and Food Lion, and several other services.

According to the 2019 five-year estimates by the American Community Survey, there are nine occupied housing units without a vehicle. The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. Star Transit and Shore Ride are available for residents; however, it is highly unlikely these services would operate during a hazard.

Table 5: Accomac Vehicles Available per Household

Vehicles Available	2019
None	9
One	74
Two	45
Three or more	38

Source: ACS, 2014-2019

COMMERCIAL AREAS

The majority of Accomac is made up of Accomack County administrative offices, the Accomack County Public School administration, the regional Planning District Commission, and the Eastern Shore Public Library along with several attorney offices. These buildings are all located in the center of the Town, off Courthouse Avenue and Front Street.

Commercial areas in Accomac are limited. There is a gas station off the highway within Town limits as well as a farm, lunch café, and an auto repair shop.

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

Aside from the several government offices previously noted, the Town has many other community facilities. The Accomac Town Hall is located next to the Accomack County Courthouses along with the Accomack County Police Department. The Town of Accomac does not have its own police department or fire and rescue services.

PUBLIC SAFETY

Police protection is provided by the Accomack County Sheriff's Department, stationed in the center of the County administration offices, and the Virginia State Police. Fire protection and EMS services are provided by Accomack County and surrounding towns.

WATER SUPPLY & SEWAGE DISPOSAL

The Town currently relies on groundwater wells and septic systems. Accomac is located in Wellhead Protection Area C-Perdue Area. Other major withdrawers from the area include the Town of Accomac, Perdue, Riverside, and the Towns of Onancock and Parksley. Additional large withdrawals could have an impact on water quality from saltwater intrusion and deterioration of water quality.

SOLID WASTE DISPOSAL

The Town contracts with Davis Disposal for weekly residential trash collection, which is transported to a county transfer station.

PARKS AND RECREATION

Saw Mill Park, located on Joynes Neck Rd, is equipped with a baseball/softball field, concession stand, playground equipment, picnic tables, and a hiking trail. Public Wi-Fi is also available (https://www.co.accomack.va.us/). The Accomack County Parks and Recreation Department office is also located within Town.

CULTURAL RESOURCES

Accomac is a designated State Historic District and features restored colonial architecture (About the County | Accomack County). The Eastern Shore Public Library is currently located here, but will be moving north to the Town of Parksley.

DRAINAGE DITCHES

Maintenance of drainage ditches and storm drains in Town is the responsibility of VDOT and the County. Due to the low, flat terrain in the Town, localized flooding during heavy rains is often an issue. Drainage is provided by ditches along the roads which provide adequate drainage, except during heavy rains (*Town of Accomac Comprehensive Plan*, 1989). More than likely, this could be mitigated with the regular and proper maintenance of drainage ditches and possibly replacement culverts.

SCHOOLS

Accawmacke Elementary School is located in Town as well as all of the Accomack County School Administration offices. There are also approximately 2-3 private day cares in Accomac.

NATURAL ENVIRONMENT

The Town of Accomac is relatively flat with slopes between 0-2% and in some areas, 0-6% (*Town of Accomac Comprehensive Plan*, 1989[1]). Elevation is approximately between 35-40 feet. Suitability and limitations of the soils have a significant impact on the chances of future development. Due to septic issues all over the region, Hampton Roads Sanitation District plans to run pipes into the Town of Accomac as well as several other Towns on the Eastern Shore; however, it will likely be several years before this project is complete.

LAND USE LAND COVER

Primary land use in the Town of Accomac is residential. Residential land use in the Town comprised approximately 83% of total acreage within corporate limits in 1989 (*Town of Accomac Comprehensive Plan*, 1989[1]); however, this has absolutely changed since then. The other largest areas of land use in the Town include vacant use and public use. It is likely that public use is much higher than the Town's most recent comprehensive plan states, as the most recent plan was adopted in 1989. There is very little agricultural land use in Accomac.

GROUNDWATER

The Town of Accomac is completely reliant on groundwater as its source of potable water. Coarse sand deposits underneath the ground called aquifers store the water and exist up to 300-feet below ground, with salt water occupying 300+ feet below ground. The balance between withdrawal and recharge is maintained through the continuous observation of water levels and water quality (*Town of Accomac Comprehensive Plan*, 1989).

The Town has previously experienced issues with groundwater due to the amount of groundwater usage by Perdue, causing shallow wells in the Town to become dry. Since this instance, Perdue has begun to more closely monitor their groundwater usage, stabilizing the water table (*Town of Accomac Comprehensive Plan*, 1989).

[1] Due to the age of the Town's most recent comprehensive plan and the lack of additional resources, a good portion of the information provided in this section is likely out of date. The Town of Accomac has expressed interest in updating their plans. We hope to include more accurate and up-to-date information as it becomes available.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) This is the first year the Town of Accomac has participated in the hazard mitigation planning process. The Town has not updated their Comprehensive Plan since 1989.

Table 6 : Town of Accomac Hazard Mitigation Resources

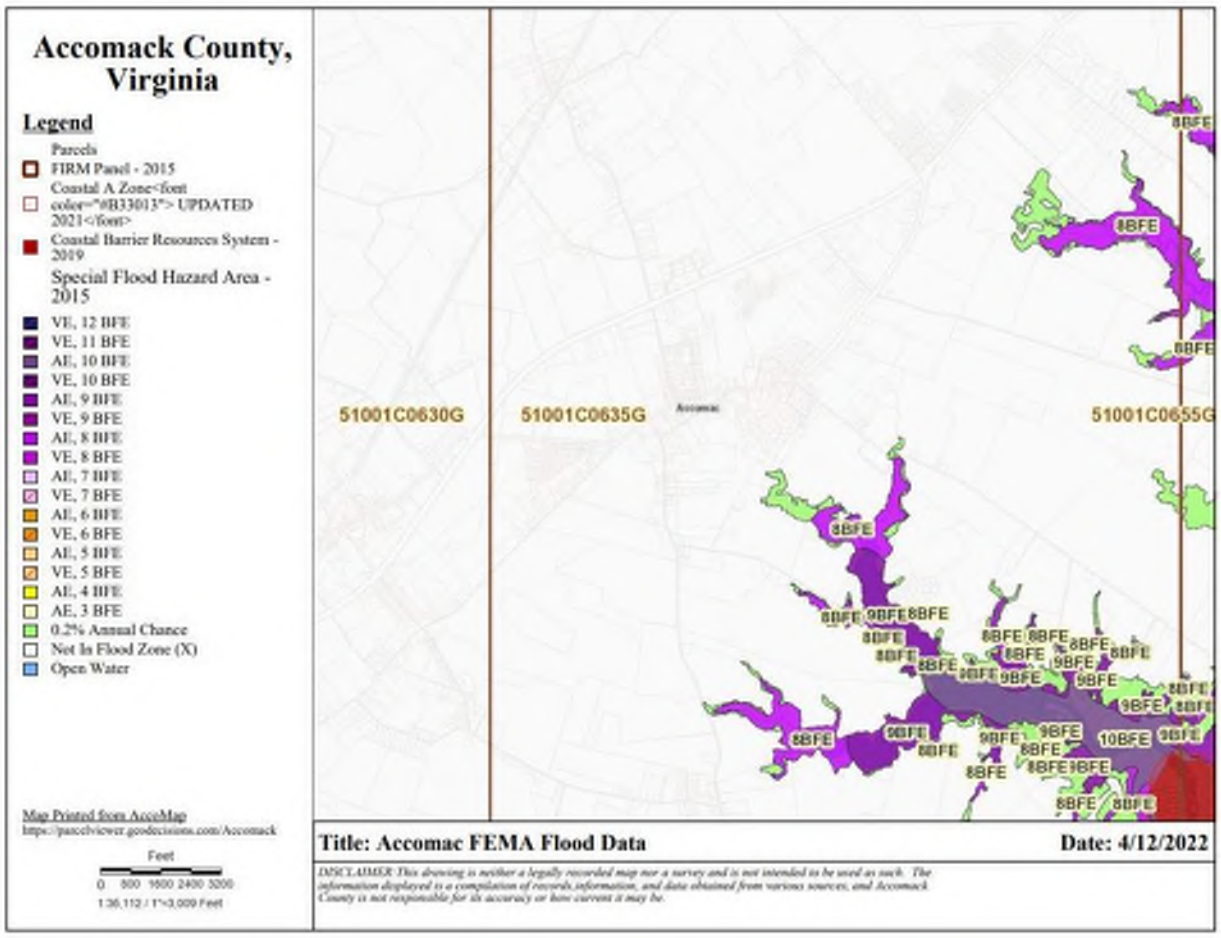
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Viginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on March 16, 2009. There are no identified Special Flood Hazard Areas in the Town. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 2: Town of Accomac FIRM Base Flood Elevation (BFE)



HMGP

The Town has not participated in the HMGP.

HAZARDS PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Mayor for the Town of Accomac stated the Town did not see many effects from the COVID-19 pandemic (Personal communications, Pat Smith, July 15, 2021). The Town did not accept CARES Act funds; therefore, those funds remained with the County. The Town will be better prepared in the event of another similar hazard in the future by providing informational leaflets (Personal communications, Mayor Pat Smith, July 15, 2021).

HIGH WIND

No part of the Town lies in the wind-borne debris area. This area extends 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. Falling branches or trees may cause damage to structures or power lines during high-wind events.

STORM WATER FLOODING

Stormwater flooding has the greatest and most frequent impact on the Town. The Town is underlain by some soils that are unsuitable for drainage and rainwater. A secondary hazard from standing water is the potential for mosquito-borne diseases that could impact the health of residents. Maintenance of drainage ditches are the responsibility of VDOT and the County. Drainage issues are commonly experienced where the ditches are not maintained as regularly.

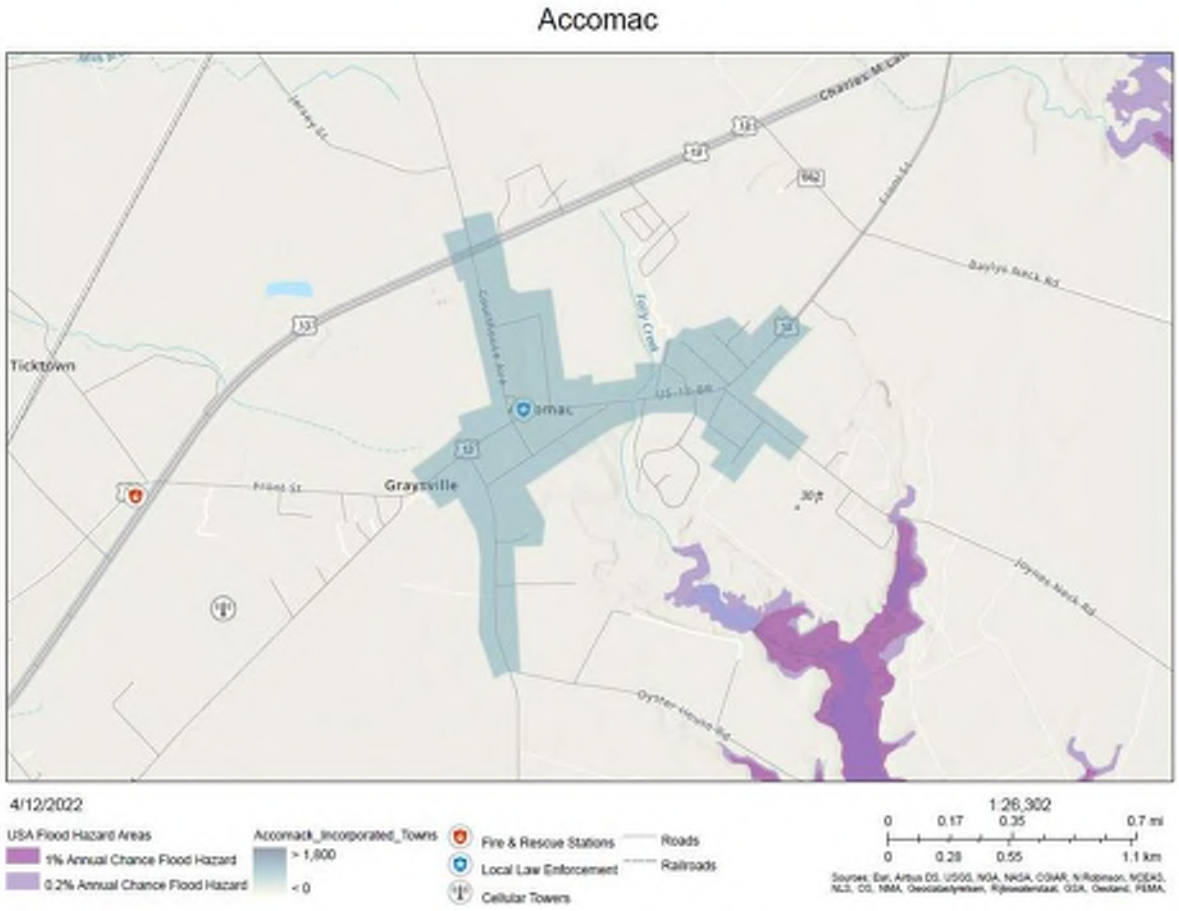
COASTAL EROSION

No structures are at immediate risk to coastal erosion.

COASTAL FLOODING

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.

Figure 3: Town of Accomack Flood Hazards to Infrastructure



HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

The Town faces a threat of ground water contamination from several sources including failed septic systems within the Town, leaks and spills of petroleum-based products from underground storage tanks, and major industrial facilities within the area. Major ground water withdrawers in the area are Perdue, Tyson 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.

ICE & SNOW STORMS

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines in the region and severely limited travel.

TORNADOES

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town and are a relevant concern.

CRITICAL FACILITIES

The following table lists the critical facilities and their relative importance to the Town. The only Town-owned building is currently vacant and dilapidated. Plans for renovations and future use are unknown. The Public Library currently located in Accomac is being relocated to the nearby Town of Parksley in the near future.

Table 7: Town of Accomac Critical Facilities

Facility	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities							
Town Hall (Vacant, dilapidated)	-	X	Storm Water Flooding, Wind, Fire	479+	Inconvenience	Yes	Yes
Other Facilities (Not Town-Owned)							
Eastern Shore Public Library	-	X	Storm Water Flooding, Wind, Fire	1,000+	Minor Disruption	Yes	Yes

FINDINGS

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

2. Although no part of the Town lies within any flood zone, due to soil types, topography, and inadequate drainage system, stormwater flooding is the most common hazard experienced by the Town.

3. The Town joined the NFIP on March 16, 2009.

4. Older construction and mature trees in residential areas increase risk from damages from wind and snow events, as branches are likely to come down causing secondary wind/snow damages and power outages.

CHAPTER 12: TOWN OF BLOXOM

TOWN PROFILE

Bloxom is located west of the central spine of the Eastern Shore in Accomack County. The Town was established in the early 1800s 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 (*Town of Bloxom Comprehensive Plan*, 2000).



Figure 1: Bloxom Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

In 2014, the community reached the highest population since 1980 at 422 (ACS, 2009-2014) with the minimum of 357 in 1990 (*Town of Bloxom Comprehensive Plan*, 2000). According to the American Community Survey five-year estimates, the 2019 population is at 392, which signifies a slight decrease since the previous estimates; however, the population has remained fairly stable over the last several decades. The median age for residents in Bloxom in 2019 was 39.3, which is just slightly over a year more than the national median age (ACS 2014-2019); however, the Town believes that number should be higher, as there are very few minors residing in the Town and over 20% of the population is over the age of 65 (ACS 2019; Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

In 2016, former Mayor Callander pointed out that Table 1 does not reflect the increase in the Haitian population in the Town, which he estimates to be approximately 1%, and the Town's Haitian and Latino year-round population is increasing as well (Personal communications, Mayor Callander, January 25, 2016). This is now reflective according to ACS 2019 estimates and is important, as different language (Spanish, French and/or Creole) outreach materials need to increasingly be made available. Most households in Bloxom have at least one non-English speaking resident and the number of individuals who do not speak English should be about 5-10% higher than what is represented in Table 1 (Personal communications, Police Chief Tittermary, March 16, 2021).

Town representatives also pointed out that the estimated median household income level indicated in Table 1 is most likely too high (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021). Typically, the lower a household income the less able they are to mitigate hazards by installing, updating, or renovating their properties.

Table 1: Bloxom Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	392	422	406	387	395
Median Age	39.3	35.5	35.0	36.4	37.7
Disability	78	15	14	NA	NA
Income					
Median Household Income	$48,438	$39,091	$38,068	$37,188	$25,000
Poverty Level	13.8%	10.9%	14.5%	13.3%	NA
Language					
Only English	78.9%	91.7%	86.7%	92.8%	89.4%
Other	21.1%	8.3%	13.3%	7.2%	10.6%
Spanish	16.8%	8.3%	13.3%	7.2%	10.6%
Ind-Euro	2.7%	0.0%	0.0%	0.0%	0.0%
Asian	0.0%	0.0%	0.0%	0.0%	0.0%
Other	1.6%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

The town is primarily a residential community with the majority of employed residents commuting out of Town to work. NASA, Accomack County Public Schools, the seafood industry, and Tyson and Perdue poultry processing plants are several major employers located near Bloxom (*Town of Bloxom Comprehensive Plan*, 2000); these are reflected in Table 2 below, primarily in the manufacturing and educational industries. The Retail industry employs the highest percentage of the workforce in Bloxom at 21.6% (ACS 2014-2019). Companies like Tyson and Perdue often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts on the Town. Town representatives believe the total number of the Civilian Employed Population is too low and about 75-80% of residents in Bloxom are employed either full- or part-time (Personal communications, Chief Tittermary, March 16, 2021).

Table 2: Bloxom Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	3	1.6%	7	3.7%	25	10.3%	12	4.3%	15	8.8%
Construction	14	7.4%	7	3.7%	16	6.6%	14	5.0%	17	10.0%
Manufacturing	30	15.8%	23	12.2%	27	11.1%	10	3.6%	17	10.0%
Wholesale trade	1	0.5%	20	10.6%	18	7.4%	24	8.6%	9	5.3%
Retail trade	41	21.6%	36	19.1%	28	11.5%	48	17.1%	34	20.0%
Transportation and warehousing, and utilities	14	7.4%	13	6.9%	14	5.8%	21	7.5%	9	5.3%
Information	5	2.6%	0	0.0%	0	0.0%	19	6.8%	2	1.2%
Finance, insurance, real estate, and rentals	5	2.6%	0	0.0%	0	0.0%	6	2.1%	14	8.2%
Professional, scientific, waste management	7	3.7%	1	0.5%	4	1.6%	9	3.2%	8	4.7%
Educational, health care, social services	26	13.7%	19	10.1%	43	17.7%	71	25.4%	15	8.8%
Arts, entertainment, recreation, food	22	11.6%	13	6.9%	26	10.7%	40	14.3%	11	6.5%
Public Administration	17	9.0%	27	14.4%	19	7.8%	12	4.3%	13	7.6%
Other	5	2.6%	22	11.7%	23	9.5%	13	4.6%	6	3.5%
TOTAL CIVILIAN EMPLOYED POPULATION	190	-	188	-	243	-	280	-	170	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census, 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Bloxom has stayed relatively stable with the small number of businesses located in the town, keeping 10 establishments between 2009 and 2013. As shown in Table 3 below, the Town has seen some growth in employees. Knowing the number of people employed here aids rescue workers in the estimate of the dispersal of persons within the Town. The Town estimates they give out only 7-8 business licenses per year (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021). Some of the businesses in Bloxom include an auto shop, a convenience store/gas station, a thrift store, and a cellular shop.

The auto shop in Town experiences regular storm water flooding. The shop is located near the main ditch in Town where the railroad tracks have previously washed out due to flooding (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

Table 3: Bloxom Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013*	2011*	2009*
Construction	1	2	1	2
Wholesale Trade	1	2	2	2
Retail Trade	2	1	2	2
Transportation and warehousing	1	0	0	1
Professional, Scientific, and Technical Services	-	1	1	1
Health Care and Social Assistance	-	2	1	1
Other Services (Except Public Admin)	2	2	1	1
Total, All Establishments	7-8	10	10	10
Total Employees	-	44	30	29

Source: Personal Communications, Jeanette Eby, Town Clerk, *Census Zip Code Business Patterns, 2013, 2011, 2009

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

Bloxom is predominantly residential. According to the American Community Survey five-year estimates in 2019, there are 188 total housing units in Bloxom; however, the Town Clerk believes the number from 2010 is more accurate, at 184 (Personal communications, Jeanette Eby, March 16, 2021). Out of these housing units, 31 were vacant in 2019 (ACS, 2014-2019); however, Chief Tittermary estimates the number of vacant units is way too high and the number is actually closer to 5 (Personal communications, March 16, 2021). The majority of homes in Bloxom are in good condition, with the exception of some areas on the west side of Town (*Town of Bloxom Comprehensive Plan*, 2000).

Table 4: Bloxom Housing

	2019*	2014**	2010***	2000****
Total Housing Units	188	198	184	175
Occupied	157	170	156	160
Vacant	31	28	28	15
Owner-Occupied	99	118	112	119
Renter-Occupied	58	52	44	41
Median Housing Value	$102,500	$91,800	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Bloxom is served by a sufficient road system. Route 316 and 770 provide north-south access for the Town, and Route 187 provides east-west access. U.S. Route 13 is located two miles east of the Town and provides regional access (*Town of Bloxom Comprehensive Plan*, 2000). The former Bay Coast Railroad runs through the Town of Bloxom, although the rail is no longer in use today. There are ongoing plans to convert the abandoned railroad into a rail-to-trail as a multi-use path.

Vehicles available to households is one indicator of a household's ability to evacuate when necessary. American Community Survey five-year estimates indicate that about three households in Bloxom are without a single vehicle, which was confirmed by Police Chief Tittermary (Personal communications, March 16, 2021). For those in need of public transportation, Star Transit serves the Town on their silver, orange, gold, and blue lines and would assist in the event of an evacuation. Shore Ride also offers trips up and down the Eastern Shore.

Table 5: Bloxom Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	3	1	9	13
One	52	72	94	61
Two	62	66	74	52
Three or more	40	31	59	28

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2000

COMMERCIAL AREAS

The majority of commercial land is located along Bayside Drive and Shoremain Drive. Commercial land uses have previously included a florist shop, a grocery store, a go-cart racetrack, a used furniture store, a nursery, and a deli, but now are limited to the Mini-Mart, two auto shops, a thrift store, post office, and a hair stylist. The furniture business was destroyed by a fire in March of 2009, the go-cart track is now a soccer field, and the others have closed and not relocated (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard. Bloxom has a Police Department, a Town Hall located within the Police Department, a Fire and Rescue Department, and a Post Office. The Town of Bloxom does

not have its own Public Works Department, but rather, relies on the County and private facilities in regards to water, drainage and road systems, parks, and boating facilities.

PUBLIC SAFETY

Police protection is provided by the Bloxom Police Department which currently has one car and one full-time police officer. The Bloxom Volunteer Fire Company provides fire and EMS and is equipped with two full-time employees, several volunteers, four bays, two engines, one tanker, one brush truck, and three ambulances (Personal communications, Tyler Marshall, Fire Medic, 3/16/2021). All of these are capable of sourcing water from the refill pond behind the Firehouse. The Town Firehouse is equipped with a generator to supply back-up power in the event power is lost during a storm event and also houses two HazMat vehicles.



Figure 2: Bloxom Fire and Rescue Department. Photo by Ashley Mills

Use of the Bloxom Town Hall pictured to the left in Figure 3 has been discontinued and the Town has been operating out of the Police Department. The intent is to remodel the Police Department building, converting one bay into the Town Council chambers (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).



Figure 3: Bloxom Town Hall (Forefront) and Police Department (Behind).

WATER SUPPLY & SEWAGE DISPOSAL

Bloxom residents rely on private wells for potable water supply. In the past several years, there have been about 8 wells drilled to a deeper aquifer level than the existing wells, which is due to the thought that the water level could be lowering. See the Natural Environment, Groundwater section for more information.

Bloxom does not have a public sanitary sewer system, so sewage disposal is by septic systems. In addition, residential water supplies can be threatened by failing septic systems, which the majority of residences operate for waste disposal. Under the Chesapeake Bay Preservation Act, septic tanks are required to have pump-out service at least every five years. They are currently in the process of being updated (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).

SOLID WASTE DISPOSAL

The Town contracts David Disposal for weekly household disposal of solid waste; however, businesses are responsible for their own solid waste disposal and can take their refuse to an Accomack County convenience center. The closest convenience centers to Bloxom are located at Fisher's Corner to the south and Makemie Park to the north (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).

POWER AND COMMUNICATIONS INFRASTRUCTURE

The Town is serviced by multiple substations, none of which are located within Town limits, and thus are less likely to lose electric services. A Broadband tower and Neubeam were installed at the Town Hall/Police Station, which will improve information access options for residents. There are three separate providers offering service in Town (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).

PARKS AND RECREATION

Although there are no Town-owned parks, the Town has a 99-year lease for the Town Square area from Canonie Atlantic, Co. and uses this area along the railroad for the annual Bloxom Family Fun Festival, which took place last in 2018 due to flooding of the property and the COVID-19 pandemic. The Bloxom Town Square is also used for car shows, and the Town intends to host a circus in the near future (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

STORM WATER DRAINAGE

In 2010, the Town petitioned the County to have the drainage ditches dredged. They had to have notarized permission from every homeowner along the drainage, then the appropriate permits from the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) were obtained. The ditches were finally serviced in 2012, with payment being made by Accomack County. Since that time, there has been very little problem with drainage and the roads no longer have rushing water during and following rain events. A nor'easter in November of 2013 and Hurricane Matthew in September of 2016 are the main two events that caused some minimal flooding in the recent years (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021). It is crucial for drainage ditches to be frequently and properly maintained in order to continue mitigating stormwater flooding.

SCHOOLS

There are no schools or daycares within the Town of Bloxom.

NATURAL ENVIRONMENT

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. The elevation ranges from 15-feet to 35-feet with an average slope of 1%. This results in flooding due to poor drainage. Adding to the drainage problems are the soil types in Bloxom being largely hydric (*Town of Bloxom Comprehensive Plan*, 2000).

LAND USE LAND COVER

Bloxom is mainly composed of low-density residential land uses. There is minimal agricultural land use and a small portion of wetlands within the Town. These non-tidal wetlands are located on the banks of Muddy Creek and Guildford Church Branch. There is also an area of non-tidal wetlands located to the east of Route 316. Wetlands are important to protect due to assisting with flood control and serving as groundwater discharge and recharge areas (*Town of Bloxom Comprehensive Plan*, 2000). In the past, Bloxom has been limited in its development due to most of the soils being unsuitable for septic tank filter fields (*Town of Bloxom Comprehensive Plan*, 2000); however, new technologies in alternative (above ground) septic systems may help to change this.

GROUNDWATER

The Town does not provide public water services, so all residents rely on individual private wells for their potable water supply. Most of the Town's water supply is withdrawn from the upper Yorktown aquifer. The Town lies slightly west of the important spine recharge area. Bloxom is located in Wellhead Protection Area C – Perdue Area. Major water withdrawers in this area are Perdue, the towns of Onancock and Parksley, and the Riverside Shore Rehabilitation Center (*Town of Bloxom Comprehensive Plan*, 2000), now known as Saber Shore Health and Rehabilitation Center. There have been a few times when the water has been too low and the wells have "sucked up sand", which most likely spurred the drilling of deeper wells in the last (ten) years (Personal communications, Mayor Callander, January 25, 2016).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) The Town of Bloxom has participated in the hazard mitigation planning process since 2011. Bloxom has not updated their comprehensive plan since 2000.

Table 6: Town of Bloxom Hazard Mitigation Resources

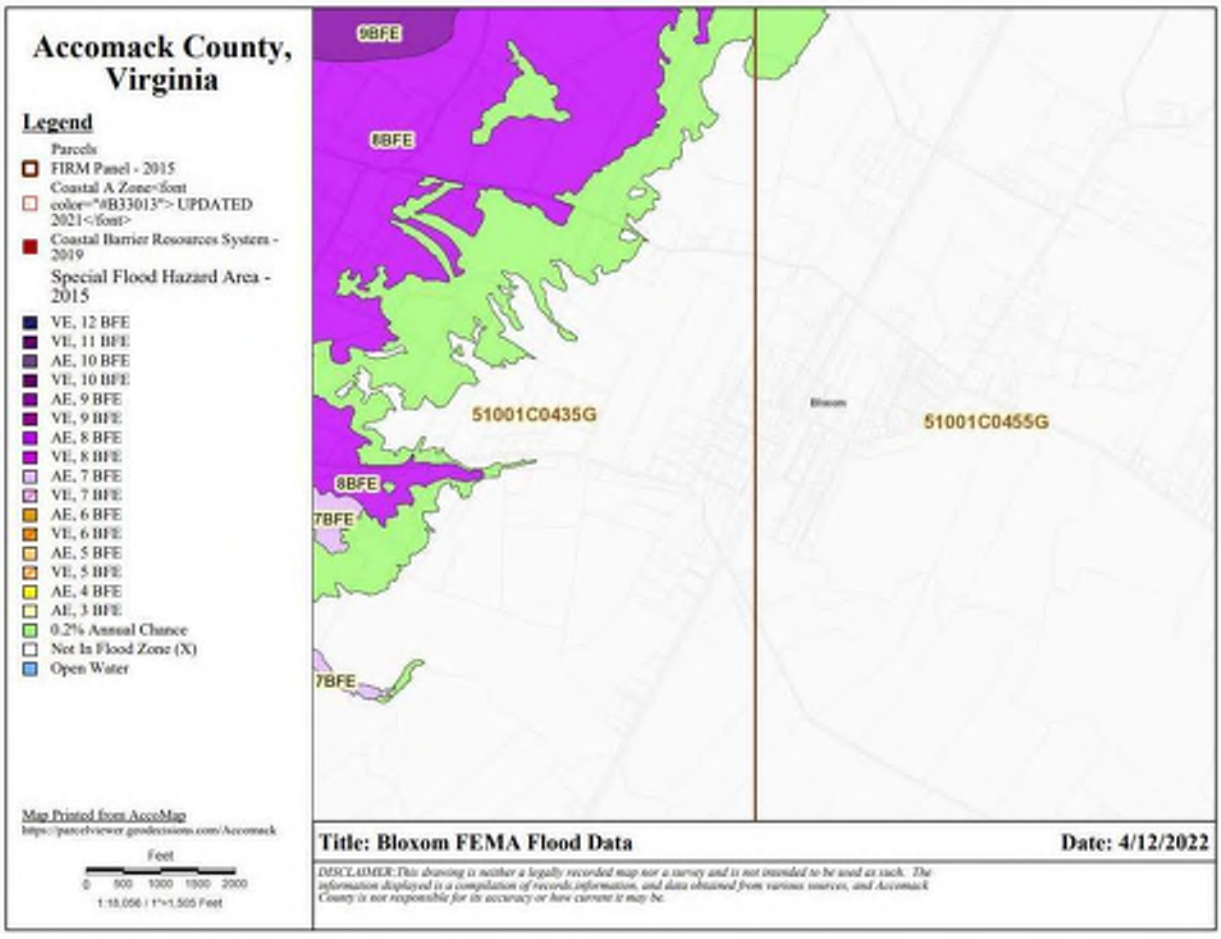
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning/Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) Although there are no policies in the Town, Bloxom joined the NFIP on October 16, 2012. There is no identified Special Flood Hazard Area in the Town. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 4: Town of Bloxom FIRM Base Flood Elevation (BFE)



HMGP

The Town of Bloxom has not participated in the HMGP.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Storm water flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Bloxom responded to the COVID-19 pandemic in several ways. The Town was able to provide new equipment for their police station in order to increase response and preparedness and used CARES Act and other federal funds to purchase personal protective equipment (PPE), such as masks, hand sanitizers, disinfectants, cleaning products, and more. The Town also purchased plexiglass and rearranged the Town Hall meeting room in order to abide by social distancing guidelines. Virtual technology was utilized to continue Town meetings and other business when unable to meet in-person (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

HIGH WIND

No parts of Town lie in the wind-borne debris hazard area near the shoreline, but lies in the area that can have 84-mph sustained winds during a 1%-annual-chance storm event and in the 110-120-mph design wind zone (Accomack County Building Code). Because its elevation is slightly higher than the surrounding areas, it is slightly more susceptible to higher winds. Although there is no record of tornadoes affecting the Town, there is always a possibility of these unpredictable storms and residents should be knowledgeable about the best course of action to take should conditions demand so. Most of the residential areas, particularly east of the railroad tracks, 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 was constructed in 2011 and was designed to withstand gusts of at least 110-mph.

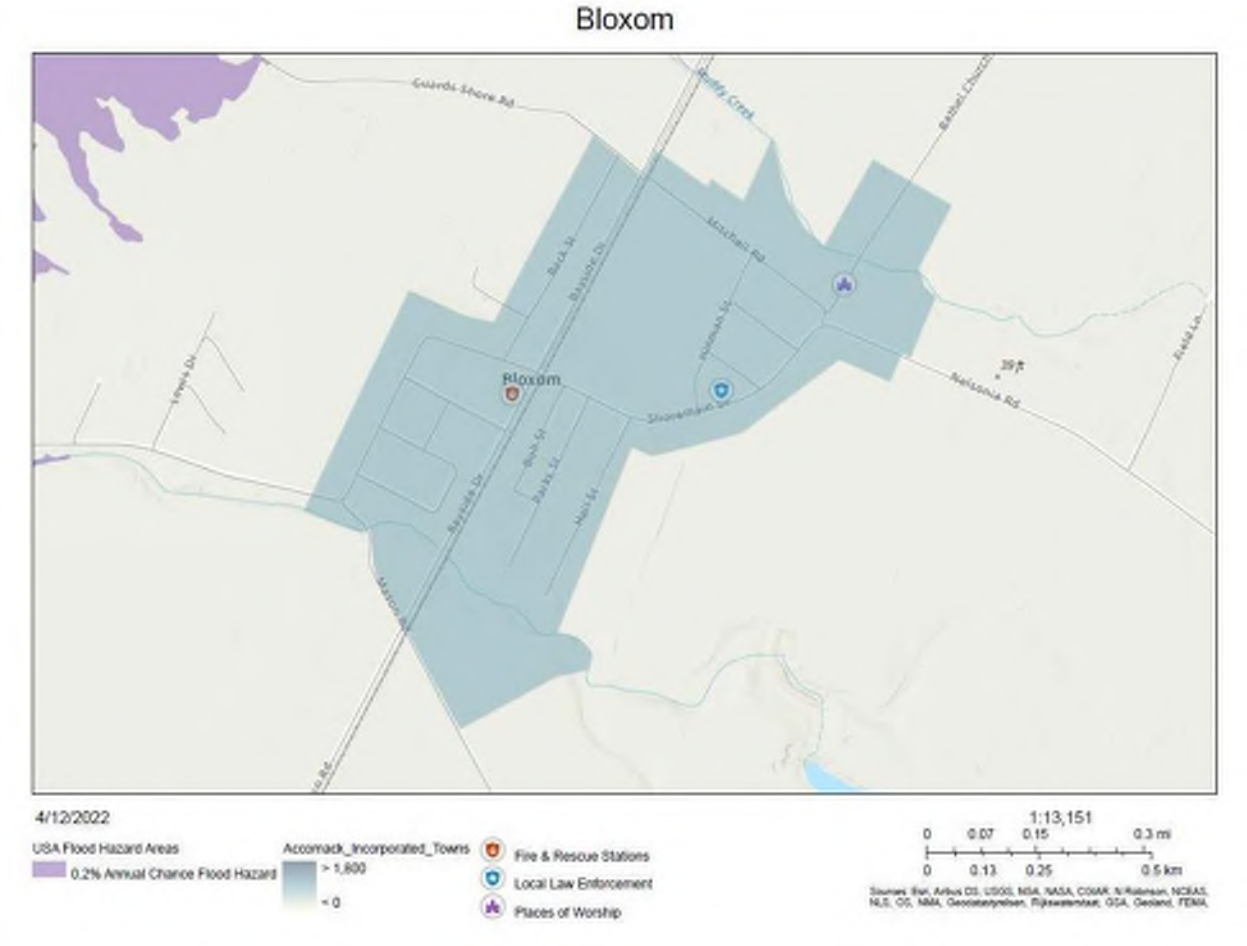
COASTAL EROSION

No areas of the Town are at immediate risk of coastal erosion.

COASTAL FLOODING

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 (*Town of Bloxom Comprehensive Plan*, 2000).

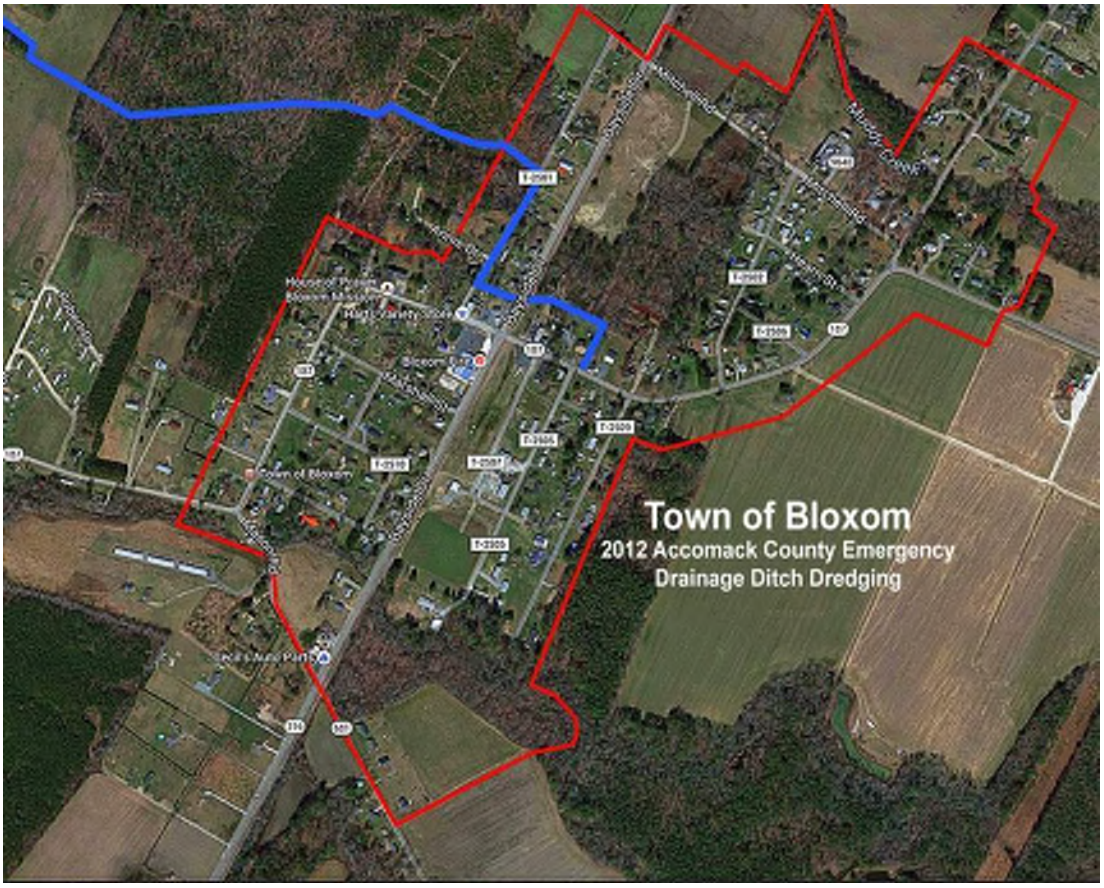
Figure 5: Town of Bloxom Flood Hazards to Infrastructure



STORM WATER FLOODING

Storm water flooding has traditionally had the greatest and most frequent impact on the Town. The Town lies on unsuitable soil for drainage and retains rainwater. During heavy rains, the Town's roads historically flooded and floodwaters have rushed down the main street in Town causing damage to property (*Town of Bloxom Comprehensive Plan*, 2000); however, this has not happened since the 2012 ditch maintenance described in the Storm Water Drainage section. The location of the emergency ditch construction efforts is indicated by the blue line in Figure 5, which leads first to Guilford and Muddy Creeks and ultimately to the Beasley Bay and then Chesapeake Bays. The Town does not finance the annual maintenance of ditches along roadways and relies on Accomack County and the Virginia Department of Transportation for ditch maintenance (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

Figure 6: Town of Bloxom Emergency Ditch Dredging (Town boundary is red, Ditch is blue). Photo Provided by Former Mayor Callander



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. Figure 6 reveals some of the damage incurred. Although the storm is called the Great Bloxom Flood of 2003, several areas were flooded including Bloxom, Clam, Guilford, Hallwood, and Nelsonia. 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.



Figure 7: Greenhouse Flooded in the Town of Bloxom on September 3, 2003. Photo by Franklin Kreisl

In 2006, the railroad was actually washed out at Bayside Road close to the Mason Road intersection. Luckily, since 2012, there has been very little flooding, although the ditches require maintenance on a regular basis in order to maintain this state. The area between Bull and Bayside at Marshall Street still floods where the old railroad station and grainery were located (Former Mayor Callander, personal communications, January 25, 2016). Due to lingering standing water from Hurricane Matthew, the Bloxom Family Fun Festival scheduled for the first weekend of October had to be canceled (see Figure 7). None of the ditches in the Town have year-round standing water.

Having reduced the chances of stormwater flooding reduces the risk to residents for well contamination, mosquito-borne illnesses, and property damages.



Figure 8: Town Square Flooding October 1, 2016

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

Bloxom faces a threat of ground water contamination from several major facilities in the vicinity. Major ground water withdrawers in the area are Perdue, Tyson Foods, and the Towns of Onancock and Parksley. 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 (*Town of Bloxom Comprehensive Plan*, 2000; Verified; Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

The residential wells in the Town are also potentially at risk of contamination from aboveground and underground petroleum storage tanks (AST and UST). Over 25% of homes in the Town are heated by oil (ACS, 2019), 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 drain field 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 (Personal communications, Jeanette Eby, Town Clerk, March 16, 2021).

SNOW AND ICE STORMS

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 and extensive snow drift 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 and the Town has expressed interest in a generator for the Town Hall/Police Station (Personal communications, Jeanette Eby, Town Clerk, 3/16/2021).

DROUGHT

Droughts have historically impacted the agricultural areas in and around the Town of Bloxom and creates conditions susceptible to fires.

HEAT

Agricultural lands and employees in processing plants may be impacted by excessive heat. Employees may face hazardous conditions in processing plant facilities, construction businesses, farming agricultural lands, and other jobs requiring employees to work outside for an extended period of time.

CRITICAL FACILITIES

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

Table 7: Town of Bloxom Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Bloxom Town Hall and Police Station	-	X	X	X	Stormwater Flooding, Wind	392+	Major Disruption	No	Yes
Other Facilities (Not Town-Owned)									
Bloxom Fire and Rescue Department	-	X	X	X	Stormwater Flooding, Wind	32,742+	Devastating	No	Yes
Bloxom Post Office	-	X	X	X	Stormwater Flooding, Wind	600+	Major Disruption	Yes	Yes
Bloxom Gas Station	-	-	X	X	Stormwater Flooding, Wind	392+	Inconvenience	No	Yes
Bloxom Town Square	-	-	X	X	Stormwater Flooding, Wind	600+	Inconvenience	No	Yes

FINDINGS

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

2. Although no part of the Town lies within any flood zone and there are no flood policies in the Town, representatives have expressed interest in joining the NFIP so that residents may obtain flood insurance in case of severe storm water flooding.

3. Emergency maintenance and ditching in 2012 along with ongoing maintenance has alleviated the majority of stormwater flooding in the Town; however, if regular maintenance does not continue, severe stormwater flooding will occur. Some ditches in Town are currently in need of maintenance.

4. Older construction and mature trees in residential areas increase risk from damages from wind and snow events, as branches are likely to come down causing secondary wind/snow damages and power outages.

CHAPTER 13: TOWN OF CHINCOTEAGUE

TOWN PROFILE

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.



Figure 1: Chincoteague Context and Google Map

The Town's economy has always been closely tied to natural resources and scenic beauty. Prior to the mid to late 1800's, the inhabitants of the island primarily subsisted by farming and raising cattle and sheep. As the demand for oysters grew throughout the 1800's, the seafood industry became the Town's main source of income. The seafood industry expanded to include clams, crabs, and fish during the 1900's and Chincoteague became widely known as a seafood capital (*Town of Chincoteague Comprehensive Plan*, 2020).

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 Chincoteague National Wildlife Refuge and Assateague Island National Seashore, as well as the small coastal town atmosphere (*Town of Chincoteague Comprehensive Plan*, 2020). In the 1950's, the tourist accommodations included rooming houses and small hotels. The island now includes approximately 20 hotels and motels, four campgrounds, and various vacation/rental homes (Personal communications, Michael Tolbert, Town Manager, April 7, 2021) to support the tourism industry during the 21st century and contributes approximately 80% of Accomack County's tourist-related tax revenue (*Town of Chincoteague Comprehensive Plan*, 2020).

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The Town has experienced a significant population growth over the last several decades as it has become an increasingly popular tourist destination. The first significant population gain occurred leading up to the 1990's 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 decrease in population from 2000 to 2010, but the Town has appealed this count and estimates 3,600 as the full year resident population, which will also affect the ACS estimates for subsequent years.

Since the 2000 Census, the Town's population has been on a slight decline, as shown in Table 1; however, there has been significant increases in transient populations with second homes or rental homes during the summer months (Personal communications, Bryan Rush, Director of Emergency Services; Michael Tolbert, Town Manager; and Mark Bowden, Building and Zoning Administrator, April 7, 2021). The population for 2019 according to ACS five-year estimates is likely too low and is more accurate to the 2014 estimates (Personal communications, Town Officials, April 7, 2021). The median age for residents in Chincoteague in 2019 was 56.5 years, 18.4 years above the national median age, indicating an older population with 37.4% over the age of 62. This population may require additional assistance during a hazard. The Town and Police Department are aware of residents that may require assistance in the case an evacuation is ordered for the Town. Table 1 also indicates a growing non-English speaking population, which is important to consider when providing information regarding an emergency.

Chincoteague is a gateway community providing a single point of access to the Chincoteague National Wildlife Refuge and Assateague Island National Seashore in Virginia. Chincoteague National Wildlife Refuge is one of the most visited refuges in the country, with over one million visitors each 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 (*Town of Chincoteague Comprehensive Plan*, 2020). Planning for hazards with regards to such a significant seasonal population change is a challenge that Chincoteague has taken many steps to address. The Town utilized the Delmarva Evacuation Plan and the Virginia Hurricane Evacuation Study to determine evacuation timing during the summer months versus the off-season (Personal communications, Bryan Rush, Director of Emergency Services, April 7, 2021).

Table 1: Chincoteague Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	2,899	2,933	2,965	3,600 2,941 (US Census)	4,317
Median Age	56.5	52.1	49.5	52.0	46.1
Disability	477	156	191	NA	NA
Income					
Median Household Income	$52,848	$45,430	$38,036	$33,109	$28,514
Poverty Level	9.7%	11.4%	16.5%	18.9%	NA
Language					
Only English	91.9%	96.6%	97.0%	93.0%	96.0%
Other	8.1%	3.4%	3.0%	7.0%	4.0%
Spanish	3.7%	1.5%	0.4%	4.2%	2.1%
Ind-Euro	2.8%	2.0%	2.6%	2.8%	0.8%
Asian	0.4%	0.0%	0.0%	0.0%	0.9%
Other	1.3%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Chincoteague shows a great deal of work force surrounding the tourism market in arts, recreation, food, and entertainment. The highest percentage of the Chincoteague workforce is employed in the education and health care industry. A large portion of the population is also employed in professional, scientific, and waste management industries, which reflects upon the location of NASA Wallops Flight Facility (WFF) as well as the Surface Combat Systems Center, both located on Wallops Island and just over 5 miles from Chincoteague Island. There is also a trend of new mobile businesses, primarily restaurants/food trucks, that are increasingly opening along the main commercial strip on Maddox Boulevard. These food trucks are able to evacuate their business, thus are able to bounce back much faster following a storm. Unlike these mobile businesses, many of the restaurants, hotels, and entertainment industries are much more susceptible to flooding and would take longer to recover following a storm.

Table 2: Chincoteague Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010*****		**2000******	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	14	1.2%	58	4.3%	51	3.7%	72	5.3%	122	5.8%
Construction	39	3.3%	96	7.0%	87	6.3%	62	4.5%	285	13.6%
Manufacturing	133	11.4%	25	1.8%	20	1.5%	64	4.7%	103	4.9%
Wholesale trade	13	1.1%	14	1.0%	16	1.2%	30	2.2%	54	2.6%
Retail trade	139	11.9%	142	10.4%	87	6.3%	56	4.1%	333	15.9%
Transportation and warehousing, and utilities	125	10.7%	19	1.4%	0	0.0%	17	1.2%	56	2.7%
Information	23	2.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Finance, insurance, real estate, and rentals	21	1.8%	84	6.2%	77	5.6%	103	7.6%	116	5.5%
Professional, scientific, waste management	106	9.0%	226	16.6%	201	14.6%	187	13.7%	88	4.2%
Educational, health care, social services	246	21.1%	183	13.4%	296	21.5%	277	20.3%	210	10.0%
Arts, entertainment, recreation, food	162	13.9%	350	25.7%	339	24.6%	251	18.4%	431	20.6%
Public Administration	124	10.6%	99	7.3%	133	9.7%	173	12.7%	163	7.8%
Other	20	1.7%	66	4.8%	69	5.0%	71	5.2%	131	6.3%
TOTAL CIVILIAN EMPLOYED POPULATION	1,165	-	1,362	-	1,376	-	1,363	-	2,092	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

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 a result of coastal flooding. Storm events have historically had adverse impacts on the local seafood industry 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 nor'easter 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 cause functional losses. Although the NASA facility is a large employer and the NASA launches at Wallops can be a tourist attraction, they also can influence tourism and fisheries by forcing beach and waterway closures at the time surrounding scheduled launches (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021).

The majority of businesses on Chincoteague consist of food and accommodation services as well as retail businesses. There are several restaurants, hotels, motels, rental and real estate agencies, souvenir shops, seafood stands, ice cream parlors, coffee shops, and even a large waterpark on the Island. The majority of these businesses are susceptible to coastal flooding and high-winds. The Town has currently issued over 1,000 business licenses and officials stated the total number of establishments is likely too low, particularly the number of food and accommodation establishments (Personal communications, Michael Tolbert, Town Manager, April 7, 2021).

Table 3: Chincoteague Business Establishment Types

Industry Code Description	Total Establishments			
	2019*	2013	2011	2009
Agriculture, Forestry, Fishing, and Hunting	-	-	-	-
Construction	-	11	17	15
Manufacturing	-	1	1	1
Wholesale Trade	-	0	1	3
Retail Trade	31	33	30	31
Transportation and Warehousing	-	1	1	1
Information	-	4	5	4
Finance and Leisure	-	3	3	3
Real Estate and Rental and Leasing	8	12	13	12
Professional, Scientific, and Technical Services	4	4	5	5
Administrative and Support and Waste Management and Remediation Services	4	3	3	1
Educational Services	-	-	-	-
Health Care and Social Assistance	7	7	7	6
Arts, Entertainment, and Recreation	5	4	5	6
Accommodation and Food Services	50	50	44	46
Other Services (Except Public Admin)	-	12	14	15
Total, All Establishments	-	145	149	152
Total Employees	757	707	701	747

Source: *ACS, 2019, Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Though Chincoteague supports a substantial residential population, there is also a large portion of housing available as seasonal rentals for the warmer summer months. Table 4 shows over 65% of the housing units as vacant, which is indicative of the abundance of second homes and rental properties. These properties provide an important economic vitality to the community of Chincoteague and are typically well kept and do not create additional hazards typical of vacant, dilapidated structures. There are four campgrounds and many mobile homes or trailers that are coastal and prone to damages from storms, with 14.3% of occupied housing units being a mobile home or other type of housing (ACS, 2019). There are no campgrounds on Chincoteague that offer sites year-round; however, there are several transient residents that own lots with permanent campers during the months of March-November. These permanent campers and trailers are primarily along the coast and surrounded by pine trees, which could result in substantial damage to property during flooding and high-wind events.

Town officials state that there are five structures currently looking to be demolished, two of these structures being mobile homes (Personal communications, Town Officials, April 7, 2021). Since April, one of these structures has already been demolished and the lot cleared in order to begin new construction. The number of total housing units in 2019 estimated by the American Community Survey is likely too low and should be higher. There are approximately 18-24 new homes on Chincoteague each year (Personal communications, Town Officials, April 7, 2021).

Table 4: Chincoteague Housing

	2019*	2014**	2010***	2000****
Total Housing Units	4,444	4,371	4,517	3,970
Occupied	1,539	1,427	1,417	2,068
Vacant	2,905	2,944	3,100	1,902
Owner-Occupied	1,135	1,160	1,070	1,639
Renter-Occupied	405	267	347	429
Median Housing Value	$235,100	$244,000	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Vehicles available to households is one indicator of a household's ability to evacuate when necessary; however, the high count reflected in Table 5 is closer to 105-110 (Personal communications, Michael Tolbert, Town Manager, April 7, 2021) and is likely due to second homes for which the owner's vehicle is registered to their primary address. For those that do not have access to a vehicle, the Island Trolley provides regular, seasonal transportation around the Island for a fare of only $0.25. In the Town's Emergency Operations Plan, the Trolley would be used to evacuate those who required assistance from a selected point on the Island to Arcadia High School in Oak Hall, as there are no shelters located on the Island (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). The Island Trolley and busses are often utilized during large spectator events, such as the Pony Swim and the Fireman's Carnival, to transport individuals from parking lots to viewing or event areas. Star Transit's Blue (North) and Silver (North Loop) routes connect the Island to the rest of the Eastern Shore of Virginia and will also assist in the event of an evacuation. Shore Ride and other individual drivers also provide services to residents in the region. Residents who live and work on the island often ride bicycles, walk, or rent/buy mopeds or golf carts.

Table 5: Chincoteague Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	160	141	112	177
One	576	405	482	721
Two	578	697	809	945
Three or more	225	184	190	225

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

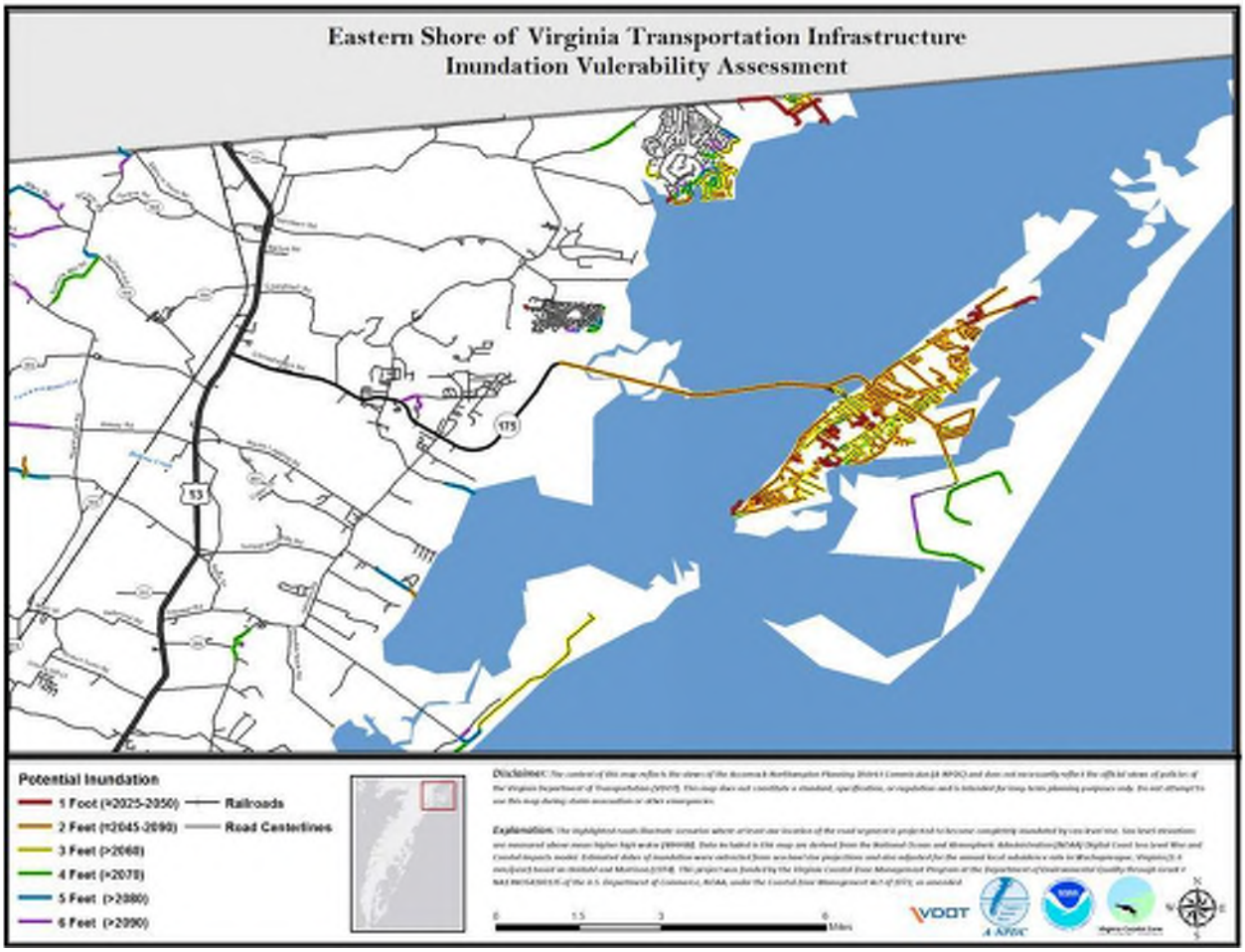
Chincoteague Island is served by paved public streets that include 21 miles of roadway. There is also another 21 miles of private roadway and access easements that are in various states of private owner maintenance. At the time of Hurricane Sandy, the majority of the roads were inundated, some under three feet of water (Personal communications, Bryan Rush, Emergency Management Coordinator, confirmed April 7, 2021). Flood waters were so high on the Town's main commercial strip, Maddox Boulevard, that a vehicle floated into Eel Creek, which is located next to the popular restaurant, AJ's on the Creek.

Originally built in 1922, the causeway was updated with a 3/4-mile-long Chincoteague Bridge built over Black Narrows and Lewis Creek Channel and a 729-foot long, low profile Connector Bridge to Marsh Island that were completed by VDOT in April 2010 at a cost of $68.7 million (*Town of Chincoteague Comprehensive Plan,* 2020). The Town is completely reliant on State Route 175, which includes approximately 5 miles of causeway over tidal marshland in addition to several bridges. Shown in Figure 2 from the *ESVA Transportation Infrastructure Inundation Vulnerability Assessment*, at least part of this causeway is subject to inundation with either 2 feet of sea level rise or with 2 feet of storm water flooding at mean high tide in 2015. This holds true for the majority of the roads on the Island, some of which are subject to flooding with only one foot

of water. In October of 2012, Hurricane Sandy left approximately 3,500 people trapped on the Island, as the causeway, as well as several other roads on the Island, were impassable. Causeway closures of the sort have occurred at least eight more times since Hurricane Sandy and have lasted anywhere from 1-5 hours.

The Chincoteague causeway is now being crossed by visitors and residents more frequently than ever before, as the area has become more and more popular for vacationers and second home buyers, and more residents are finding employment off the island at Wallops Flight Facility as well as other growing industries in the Region. The Town has concerns over the safety of the causeway and has been communicating with VDOT for potential improvements, such as additional signage, shoulders, reflectors, etc. In mid-May of 2021, a fatal vehicle accident closed the causeway for nearly 7 hours as both lanes were impassable. Many residents who live, work, or have children in school on the Island were trapped on either side of the causeway, forcing businesses and schools in the Town to close for the day.

Figure 2: Town of Chincoteague Transportation Infrastructure Inundation Vulnerability



COMMUNITY FACILITIES

Community facilities are facilities required to support the services provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard. Community facilities in Chincoteague include the Chincoteague Police Department, the Chincoteague Volunteer Fire Company, Chincoteague Combined and Chincoteague Elementary Schools, the Town Office, and several recreational entities. The Public Works Department manages the daily operations related to the Town's water, drainage and road systems, parks, and boating facilities.

PUBLIC SAFETY

Fire and emergency services are provided by the Chincoteague Volunteer Fire Company, a combination of paid EMS and volunteer firemen supported by the Town. The Company owns three pumper engines, a rescue truck, a ladder truck and several ambulances that are stored in the fire house (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). The Fire Company has no shortage of volunteers and the Town has increased EMS personnel in order to reduce support needed from the County, as causeway traffic, delays, or closures can increase response times from Fire and EMS services not located on the Island. The Fire Company's new Fire House, shown in Figure 3, has six bays in the front, two in the back, and was completed in 2019.



Figure 3: The New Chincoteague Volunteer Fire Company Station. Photo by Ashley Mills

The Chincoteague Police Department is the Island's primary law enforcement agency and employs 10+ full-time officers as well as several full-time and part-time dispatchers, bicycle patrol officers, and traffic control officers. Personnel is increased during the summer months with part-time employees to assist with traffic, events, and other ordinances around the Town. Chincoteague Police and other EMS services often work with Federal Law Enforcement Officers at nearby Chincoteague National Wildlife Refuge and Assateague Island National Seashore. Chincoteague is the only accredited police department on the Eastern Shore of Virginia.

There is no shelter located on the Island. When the causeway floods and residents are unable to evacuate, as they were for a short time during Hurricane Sandy in 2012, they must shelter in place. The Chincoteague Volunteer Fire Company, EMS, and Police must be able to provide rescue services throughout the entire Town during storms and must remain on the Island during Town evacuations. Additional emergency vehicles able to tread through high waters are utilized for rescues during hazardous events, such as Hurricane Sandy.

MEDICAL SERVICES

The Chincoteague Community Health Center, run by Eastern Shore Rural Health, provides the primary health services for the Island. There is also the Island Chiropractic Center and two dentist offices serving the Island.

PARKS AND RECREATION

There are a variety of recreational facilities available on the Island. There are a number of boat landings maintained by the Town. The Robert N. Reed Downtown Waterfront Park serves approximately 1,500 visitors annually. The Park also contains 10 boat slips available for rent to transient boats. The Donald J. Leonard Park has over one acre of waterfront land left in its natural state with picnic tables to view the sunset. The Chincoteague Veteran's Memorial Park includes two age-appropriate playgrounds, a basketball court, a tennis court, a baseball field, a hiking/biking trail, a pavilion, grills, restroom facilities, boat ramps, fishing piers, and kayak launches. This area is heavily utilized throughout the year and the docks, ramps, and parking lots frequently flood, just from higher-than-average high tides. Located next to Curtis Merritt Harbor is the Waterman's Park and Chincoteague Island Waterman's Memorial that overlooks the inlet and features a walking pathway, benches, sunset views, and a large cross dedicated to those lost at sea, which can be seen from the water and up close on land. With help from the Town, businesses, and community groups on Chincoteague, funds are steadily being raised to put towards a new park located on Smith and School Streets and is to be named "The Brianna Kindness Park". The Park is expected to feature sensory playground equipment, multi-use sports fields, a pavilion, restroom facilities, an exercise trail, and additional parking.

Several hiking and biking trails exist on the Island. The Island Nature Trail is located between the Elementary School and the Combined School on Hallie Whealton Smith Drive. There is both a paved and unpaved trail available as well as two dog parks, separated by the size of the dogs. A new bike trail was completed in recent years allowing easier and safer access to main points located on and around Maddox Boulevard. The Town is in the process of creating safer multiuse paths around the Island.

The Chincoteague Center, located in the Chincoteague Municipal Complex across from the Town Office and Police Station, is used for special events such as graduations, fundraisers, school functions, weddings, etc. and meets most of the needs of the Island's civic and volunteer organizations. Located just past the Municipal Complex is the North Accomack Little League Complex with three lighted baseball and softball fields, concessions, and bleachers. The non-profit Island Community House hosts and rents out space for small events, meetings, etc. as well.

The Chincoteague Volunteer Fireman's Carnival is located off Main Street and Willow Street and is one of the largest sources of funds for the Volunteer Fire Company. The carnival boasts rides, games, food, bingo, live music, fireworks, and other fun activities that residents and visitors from all over come to attend each year. The carnival is also home to the famous Chincoteague Pony Auction and is the location the ponies are kept after the famous Annual Pony Swim, during health

checks, and any other instances deemed necessary (young foals, safety protocols, etc.). The location of the carnival grounds near the coast and the several large, tall pine trees in the area put the infrastructure at significant risk of damage and the Fire Company, as well as other businesses in the Town, at risk for immense financial losses. During the month of July, the carnival is open every Friday and Saturday night and the last week of the month. There is a high chance of a dangerous thunderstorm to occur while hundreds of visitors are in the carnival grounds with little to no shelter. Volunteers monitor weather and radar and announce closures due to impending storms; however, fast moving storms may still put hundreds of volunteers, visitors, and residents at risk.

CULTURAL RESOURCES

The Museum of Chincoteague Island provides cultural and historical resources and activities for the Island. The Chincoteague Island Library provides recreational, educational, and job research opportunities, as well as free public Wi-Fi. The Captain Timothy Hill House and the Captain Chandler Cemetery are just a couple of significant historical aspects in the Town that could face possible damage from flooding and high-wind events.

WATER SUPPLY AND WASTEWATER

Chincoteague Island residents are dependent on underground wells on the mainland for drinking water. Eight separate well fields, all located on land owned by the Town of Chincoteague or within a perpetual easement located on NASA property, serve the pumping station. There are currently 4 deep wells and 6 shallow wells for public water supply (Personal communications, Town Officials, April 7, 2021), with a total capacity of the working wells of approximately 1.5 million gallons per day (MGD). Depths vary from 63 feet to 256 feet. The GAC plant is located at Pumphouse Turn and is owned and operated by NASA (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). This filtration system filters the water from the Mainland for the Town. While the danger of contamination is considered minimal, vigilant monitoring activities on land near the wells is critical. In 2017, NASA found toxic chemicals in Chincoteague's wells from the aqueous film-forming foam (AFFF) used to smother fires at Wallops Flight Facility. Although the Town immediately disconnected from the contaminated wells, it is important to test for contaminants regularly and provide water quality reports, which the Town does on an annual basis.

There are approximately 70 miles of Town-owned and maintained water mains on the Island. Pumped water is chlorinated at the well site and then pumped five miles to the Island via transmission lines. Proper maintenance of these transmission lines is vital to the success and safety of the Town. The water reaches the filtration system and then enters a 200,000-gallon elevated storage tank. It is then distributed to the Town's 3,582 water customers (Personal communications, Mike Tolbert, Town Manager, April 7, 2021). The town has considered installing an additional 1,000,000-gallon tank or two high-rise tanks to meet demand (*Town of Chincoteague Comprehensive Plan,* 2020; Personal communications, Town Officials, April 7, 2021).

In the 1980's, the Town updated the length of the transmission line to a larger capacity pipe, while maintaining the smaller pipe for use during peak demand and during maintenance to the newer line. Having two separate pipes capable of bringing fresh water to the Island is a positive step; however, both pipes are at risk to salt water contamination and/or damages which would jeopardize the water for all residents on the Island. Of additional concern is the limited storage capacity of water on the Island, which is about a one-day supply during peak tourism season (*Town of Chincoteague Comprehensive Plan,* 2020; Personal communications, Town Officials, April 7, 2021).

There is no central sewage collection and treatment on the Island. Wastewater is disposed of by discharge directly into seepage pits, cesspools, holding tanks/septic tanks and drain fields, or one of a few new engineered, residential sewer systems. The maintenance of these sewage systems is provided by periodic pumping by private firms (*Town of Chincoteague Comprehensive Plan*, 2020).

The Town has revisited the idea several times of a centralized wastewater treatment system, as health codes require expensive individual lot septic systems that were required to meet advanced technology standards (*Town of Chincoteague Comprehensive Plan*, 2020). There are currently plans for a "Phase 3" of the Hampton Roads Sanitation District (HRSD) project that would allow the Town to connect to a treatment system; however, this would likely not occur for several years.

SOLID WASTE

The Town provides weekly pick up of regular household waste through a private hauling company, a bulk trash service, and the County provides a recycling center. The Town public work trucks are used for this service. So long as the trucks are not damaged during a hazard event, then the Town will be able to serve their own community in the removal of debris. The Chincoteague Convenience Center is located on the Island off Deep Hole Road and is closed on Tuesdays. There are two other County Convenience Centers nearby as well located in the Horntown and Makemie Park areas. The Town typically contracts out for debris removal; however, Town trucks are utilized in the event removal of debris is needed immediately, e.g., debris blocking roadways or causing additional safety hazards.

POWER AND COMMUNICATIONS INFRASTRUCTURE

Power is brought to the Island in large lines suspended by concrete utility poles, then contained in the new bridge infrastructure to Marsh Island where they are submerged below the highly trafficked Chincoteague Channel. These lines were recently reinforced and new footers were installed for the poles. The five miles of lines and inability to access them during extreme flooding is a vulnerability for the Town. During Hurricane Irene, the combination of salt-accumulation and sustained winds in the 60-mph range, caused an island-wide power outage for eight hours. The lines had to be cleaned with fresh water prior to power being restored. Town officials stated that after much needed updates to this infrastructure, salt-accumulation is no longer an issue for the Town (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). The Town of Chincoteague, as well as all incorporated towns in Accomack and Northampton Counties, are now able to access Virginia Broadband Authority. The Town has several other options for internet and communications as well.

DRAINAGE DITCHES

The Town maintains drainage ditches and storm drains on the Island (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). Due to the fact that the majority of the development in the Town is within 3-7 feet of sea level, often times water must await lower tides to flow from the drainage ditches on the Island into the surrounding water.

SCHOOLS

Two public schools are located in the Town of Chincoteague: Chincoteague Elementary School and Chincoteague Combined School, which includes grades 6-12.

NATURAL ENVIRONMENT

Many believe that Chincoteague is an ancient barrier island that was formed approximately 4,000 years ago as wind and waves deposited sand parallel to the Eastern Shore mainland (*Town of Chincoteague Comprehensive Plan*, 2020). Due to erosion, the rising sea was able to break through barrier islands and flood the flatlands behind Chincoteague Island. These flats are now the marshes, channels, and bay between the Island and the mainland. Assateague Island joined the north end of Chincoteague Island around 2,000 to 4,000 years ago; however, an inlet formed which separated the two Islands and sand deposits cause a spit to build southward from the Assateague side of the Inlet, eventually forming a "south neck". This neck continues to provide protection to Chincoteague as a barrier island and has become Tom's Cove Hook. "The Hook" on Assateague Island is following a much similar pattern as the one that formed Chincoteague. How these interactions continue to occur will have an impact on Chincoteague's ability to prepare for hazards, especially in relation to coastal erosion and hurricanes.

Above the shoreline, the land is typically flat with elevations on the Island rarely exceeding 10 feet. The upland ridges of the island are composed of well-sorted sand particles, and as a result, are high in strength, low in compressibility, and highly permeable and porous (*Town of Chincoteague Comprehensive Plan*, 2020). This means that as long as these areas are protected from wind and waves, they can bear heavy rainfall and drain water quickly.

LAND USE LAND COVER

Most of Chincoteague Island's shorelines consists of tidal and non-tidal wetlands. There are also artificially stabilized shorelines made up of bulk heading and riprap along the commercial waterfronts and privately owned areas. In many of these places, the shoreline has been built or filled in and many piers extend out into the water. The marshlands surrounding Chincoteague have high value for wildlife and waterfowl and are closely associated with the fish spawning and nursery areas. They also help prevent erosion and help keep the shoreline stable. There is a large area of vacant land seen in the northern parts of Chincoteague, which serves to drain storm water. The Town includes about 37 square miles of total area, only about a quarter of which (9 square miles) is land.

GROUND WATER

Due to a high ground water table and storm water drainage limitations, the Town is susceptible to periodic flooding. The resulting standing water increases the risk of insect borne diseases, such as West Nile and Zika Virus. High ground water and saturated soil conditions increase the risk of downed trees, decrease the functionality of septic systems, and can move pathogens and excess nutrients hundreds of feet much more quickly than under normal conditions. In order to mitigate the risk of insect-borne diseases, the Town sprays for mosquitoes on a daily basis, generally through the months of April through September, but may begin earlier and continue later if the need persists. The Town also contracts a plane to spray for mosquitoes on an as-needed basis; however, this mitigation technique is extremely costly since the Town must purchase the chemicals and insurance (Personal communications, Mike Tolbert, Town Manager; Mark Bowden, Building and Zoning Administrator; and Bryan Rush, Emergency Management Coordinator, April 7, 2021).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Chincoteague has participated in the hazard mitigation planning process since 2006 and has just updated their comprehensive plan in 2020.

Table 6 : Town of Chincoteague Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan (updated 2020)	Zoning (updated 2020) &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Viginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*			*	*	*				*	*								
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) 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, and 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.

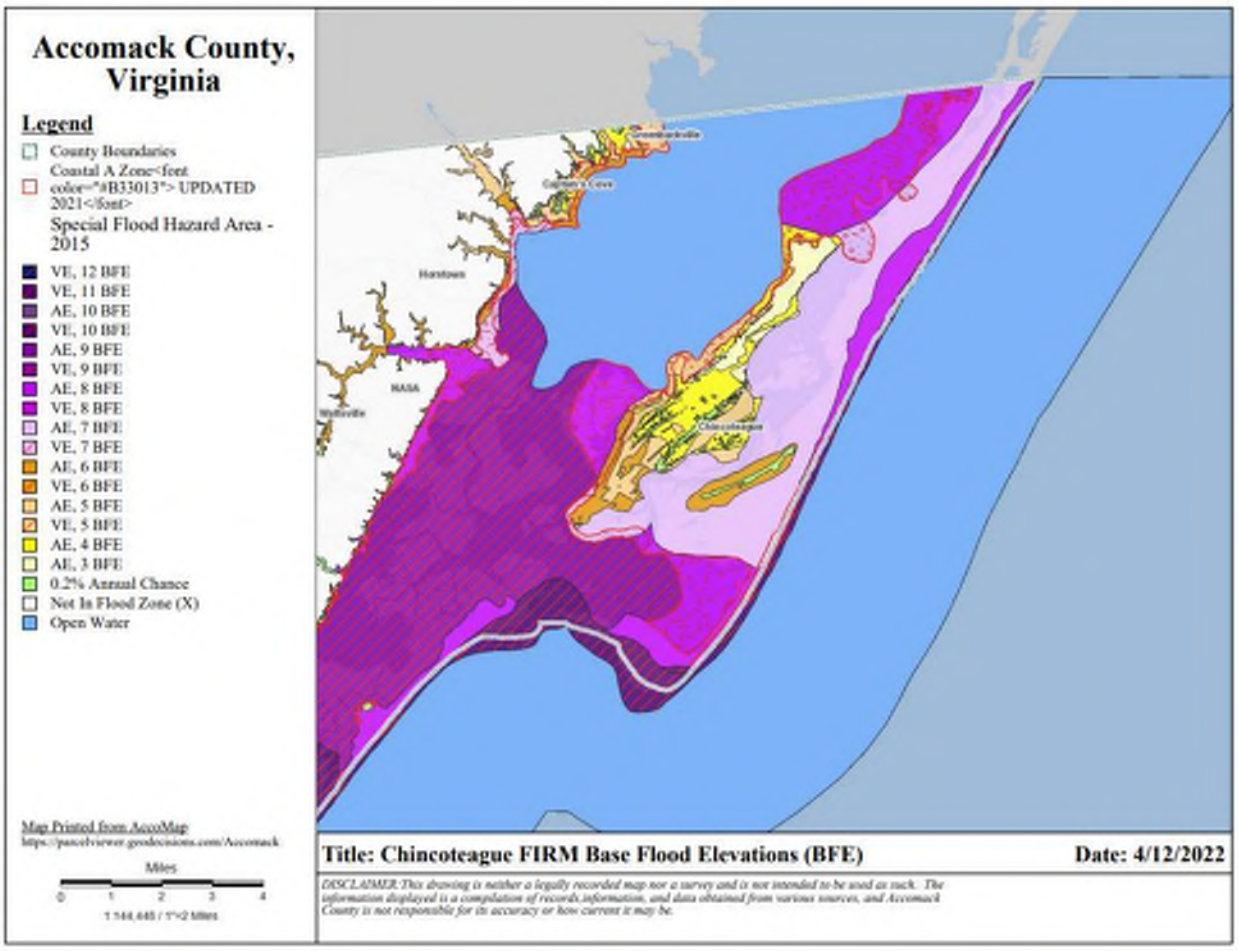
In 2003, Chincoteague improved its rating to Class 8, entitling the community to a 10% discount on flood insurance premiums. Chincoteague's current rating is still Class 8; however, the Town has been actively putting measures in place in hopes to lower the Class rating to 7 (Personal communications, Mike Tolbert, Town Manager and Bryan Rush, Emergency Management Coordinator, April 7, 2021). The Town currently has 1,710 policies according to the 2022 FEMA NFIP Data Report. 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 increased 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 increased to approximately $208.3 million (*Eastern Shore of Virginia Coastal Flood Vulnerability Assessment*, 2006 and 2011).

Chincoteague has three Flood Insurance Rate Maps (FIRMs) as of the most recent 2015 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. 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.

The 2015 FIRM removed 0.6 square miles from the SFHA, which removed 1,167 buildings from the SFHA, such that they are no longer required to have insurance if they are under a mortgage. Couple this with the increase in rates, and the conditions for decreases in the number residents choosing to maintain insurance coverage. Previously all properties were at the Base Flood Elevation (BFE) of 7, 8 or 9 feet, but the new FIRM has the majority of the commercial and most densely populated area at 4 feet BFE, with the highest BFE now at 6 feet. Construction standards are focused around this FEMA value, and so, if an under estimate, buildings are typically not built high enough, and mitigation moneys to raise buildings would only cover costs to construct to BFE. This can decrease the ability of the residents and the community to rebound following a large flooding event that may vary from the FIRM reflected exposure risk. The new FIRM is represented in Figure 5. The FIRM does not take into account any changes in relative sea-level rise or increases in storm frequency.

More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 4: Town of Chincoteague FIRM Base Flood Elevation (BFE)



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 (Code of Federal Regulations, 2012). 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; 2004-2009 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, etc., and other necessary costs such as cleanup. For medium sized states, the average amount of this assistance is $2,106 (Code of Federal Regulations, 2012). 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).

HMGP

The Town has participated in the HMGP through A-NPDC and the adoption of an approved Hazard Mitigation Plan for Chincoteague in 2006, 2011, 2016, and 2021. Within in the last few years, the Town and A-NPDC completed 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 that would not be eligible for HMGP and Pre-Disaster Mitigation funding.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) The primary hazard for Chincoteague has been coastal flooding associated with hurricanes and nor'easters, as identified in the *Flood Insurance Study* for Chincoteague.

PANDEMIC RESPONSE AND READINESS

The Town of Chincoteague responded to the COVID-19 pandemic in several ways. The Town purchased plexiglass, sanitizer, masks, touchless kits, and PPE to help mitigate the spread of COVID-19. Officials stated that streaming equipment and a new server were purchased in order for the Town to continue Council meetings and other operations as normal as possible. Remote display message boards were used to remind residents and visitors of mask mandates and social distancing guidelines. CARES Act funding was also used to backfill positions and to provide hazard pay to police officers, EMS, and public works employees (Personal communications, Town Officials, April 7, 2021). Public facilities were cleaned and sanitized every two hours and included Curtis Merritt Harbor, Memorial Park, and the Downtown area. The Town also added a Pandemic section to the Emergency Operations Plan in order to be prepared for any similar situations in the future (Personal communications, Bryan Rush, April 7, 2021).

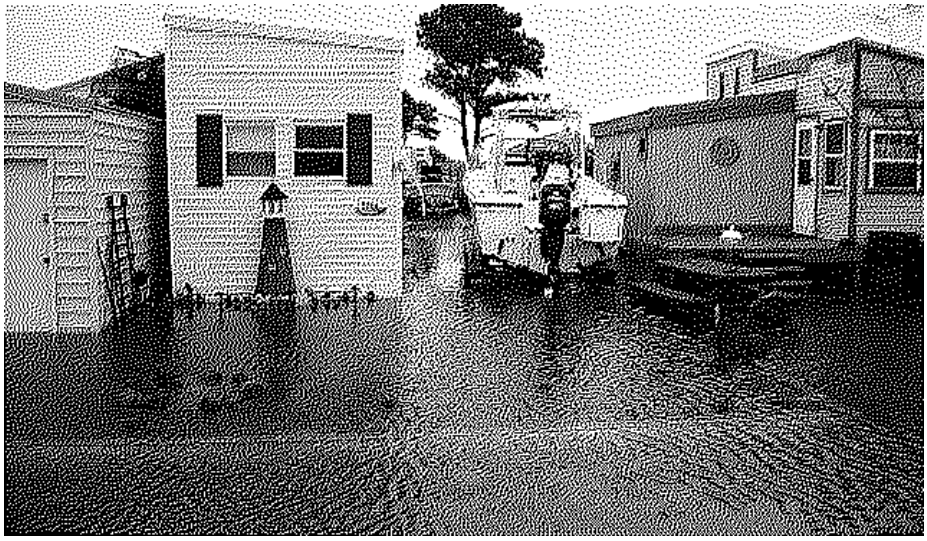
Businesses were modified in order to adjust to new guidelines and regulations set forth by the State of Virginia. Several restaurants in the Town provided pick-up and delivery options and many were eventually able to create temporary outdoor seating where regulations allowed, as indoor seating was extremely limited. When the Town began to open in June/July, visitors began to pour in and were still able to enjoy a new way to vacation on Chincoteague Island. Chincoteague National Wildlife Refuge and Assateague Island National Seashore remained open throughout the pandemic, drawing in visitors from all over, and were free to visit until the first week of July; however, visitor centers remained closed to the public. As occupancy restrictions began to ease, restaurants and other businesses began to experience a lack of employees due travel restrictions and the loss of temporary worker visas that would normally be abundant during the summer season. Due to these circumstances, many businesses were forced to operate limited hours, which is still the case for the 2021 summer season. Between Chincoteague and Accomack County, 14 working waterman grants were provided around the Island (Personal communications, Town Officials, April 7, 2021).

The Chincoteague Volunteer Fireman's Carnival was canceled in 2020 and again in 2021, along with the traditional Chincoteague Annual Pony Swim and Auction, which had only been canceled under one other circumstance - WWII. Annual Fourth of July fireworks put on by the Fire Company were also canceled for both years. Although there was no in-person Pony Auction, the Fire Company held virtual auctions in 2020 and 2021. Profits from the Auction for the Chincoteague Volunteer Fire Company were record-breaking for both 2020 and 2021, despite adjustments and cancelations due to the COVID-19 Pandemic.

HIGH WIND

The American Society of Civil Engineers (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-second 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, one of which is featured in Figure 6. There are approximately 180 units in the park most threatened, worth approximately $6.8 million in 2015. Assuming a 110-mph event, which is the 1%-annual-chance 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 5: Mobile Home Park in Ocean Breeze, on the Southern Tip of Chincoteague Island; Photo Courtesy of Captain Bob's Marina.



The buildings in census blocks on the central eastern coast of the Island are anticipated to have the highest number of damages, as shown in Figure 7. In addition to man-made vulnerabilities, natural areas, particularly on Assateague Island, are substantial. Where the pine beetle has killed or weakened many of the pines, they are more susceptible to wind damage and do not form as substantial a wind barrier for the Town.

The total property damage losses were 14 million dollars, where 8% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 95% of the total loss.

The Hazus® model estimates that a total of 6,897 tons of debris will be generated. Of the total amount, 2,648 tons (38%) is Other Tree Debris. Of the remaining 4,249 tons, Brick/Wood comprises 28% of the total, Reinforced Concrete/Steel comprises 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 47 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane for a 1%-chance event. The number of Eligible Tree Debris truckloads will depend on how the 3,069 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

COASTAL EROSION

Currently, the Town itself 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, although this is changing as the shape and extent of Assateague Island shifts. Assateague Island serves as a barrier protecting Chincoteague from coastal erosion. Natural changes to 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 southern tip of the Island.

With the erosion of islands and marsh areas adjacent to the Town, there is subsequent siltation and filling of the surrounding waterways. For both the fishing and tourism industries, safely navigable waterways with sufficient depth are vital to the economy and the way of life.

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 (AccoMaps GIS).

A 50-year shoreline restoration project was completed for Wallops Island approximately 5 miles to the south of Chincoteague. The beach replenishment was almost negated by Hurricane Sandy in 2012; however, a follow-up renourishment project and the extension of a seawall protects significant federal property investments and may impact sand movement in the vicinity of the Chincoteague Inlet. The Town is working to secure funding regarding a proposed 3-year study of the Chincoteague Inlet by the U.S. Army Corps of Engineers (USACE) and is hoping for solutions (Personal communications, Town Officials, April 7, 2021; *Eastern Shore Post*, May 20, 2021).

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. The Town has submitted priority requests to VDOT to raise the Causeway from the bridge to pumphouse turn by NASA and to raise the area of Main Street where the bridge meets the intersection in an effort to mitigate flooding (Personal communications, Mike Tolbert, Town Manager, April 7, 2021).

COASTAL FLOODING

Almost the entire Town is located within the 100-year floodplain. Most areas are designated as an A zone, with only a slim edge of the southern shore of the Town located in a V 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 1%-annual-chance flood. This poses additional risk above ordinary A-zones and is included in the adoption of Base Flood Elevations (BFE) by FEMA. The BFE ranges from three feet to six feet for the Town. See the National Flood Insurance Program & Hazard Mitigation Grant Program section for additional information about the FIRM and Town coverage.

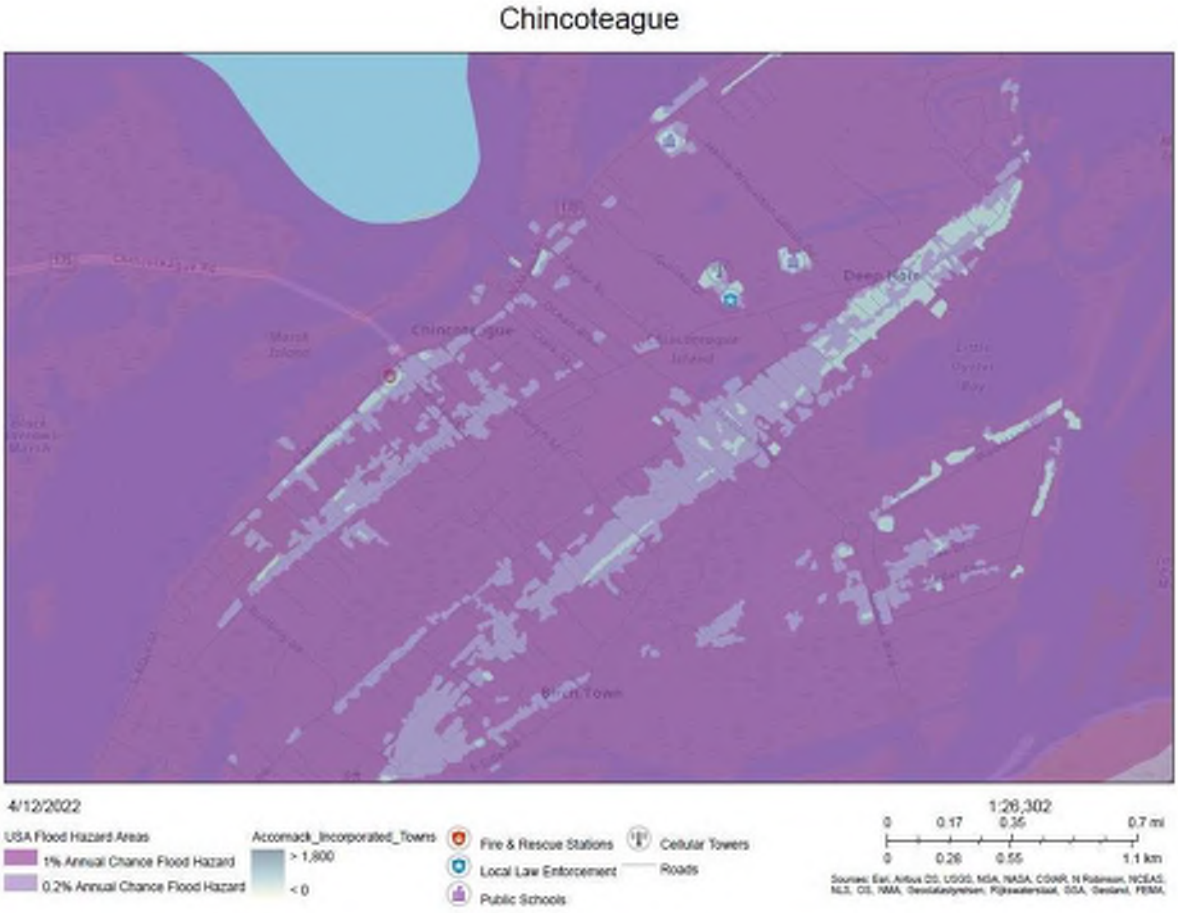
Representations of estimated flooding and damages are featured in Figures 8 and 9. Where Figure 8 shows the estimated damages in dollars, Figure 9 shows the percentage of the building anticipated to be destroyed, which is obvious in the high percent of damage to the buildings on the south end of the Island where there are two mobile home parks.

Although the Town has been proactive in improving for flood standards, 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 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.

The Hazus® model estimates that over half of the properties in the Town would incur damages to the building and/or contents with an aggregate total replacement value of the general building stock value of $774 million.

Hazus® estimates the number of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made due to the different types of material handling equipment required to handle the debris. The model estimates that a total of 50,779 tons of debris will be generated. Of the total amount, Finishes comprises 45%, Structure comprises 25%, and Foundation comprises 31%. If the debris tonnage is converted into an estimated number of truckloads, it will require 2032 truckloads (@25 tons/truck) to remove the debris generated by the flood during a 1%-chance event.

Figure 6: Town of Chincoteague Flood Hazards to Infrastructure



For Hurricane Sandy, the Town's cumulative initial damage assessment found that there were $1.8M in losses to homes and businesses. Of these, 80% of single-family homes, 90% of multi-family homes, 80% of mobile homes, and 70% of businesses had flood insurance policies. In addition, public properties (including public buildings, utilities, and equipment) losses were estimated to total $267,000, the majority of which ($250,000) from debris removal. Considering Hurricane Sandy was not a direct hit, had worse effects on the Bayside of Accomack County, and was not even close to the magnitude of a 1%-annual-chance flooding event, these are substantial damages.

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 the A Zone and for the most part lie below 5 feet in elevation. In April 2021, there were 1,240 business licenses within the Town. Many of these licenses are for home-based businesses and vacation rental homes since U.S. Census Zip Code Business Patterns data for Chincoteague indicated less business establishments employing 757 persons in 2019.

In addition to damages to typical building structures, intensive flooding can such saturate the ground that beyond impacting ability of a septic system to function, they can actually be extremely damaged. In May of 2016, Jon Richardson from the Virginia Department of Health on the Eastern Shore recalls his experience, "During Sandy, we actually had mounds that completely washed away along Main Street on Chincoteague and a few tanks floated out of the ground and had to be re-installed." This is not only a fiscal cost, but also a human health risk. All of the risks associated with coastal flooding, coastal erosion, and stormwater flooding can be anticipated to intensify with the increases in relative sea-level that have been observed and are estimated to continue.

STORM WATER FLOODING

Chincoteague produced a Storm Water Master Plan in 2011, which assessed locations in the Town vulnerable to storm water flooding and prioritized improvements for specific drainage issues. Many recommendations set forth in the Plan have already been implemented by the Town (*Town of Chincoteague Comprehensive Plan*, 2020). Recommendations regarding new development, open ditches over underground drainage pipes, controlling the filling in of the remaining drainage channels, and the filling of private parcels are listed in the Town's most recent Comprehensive Plan.

Like many coastal areas on the Eastern Shore, much of the localized flooding that occurs during rainfall events is the result of inadequate storm drainage systems and flat topography. In addition, the Island is subject to tidal flooding which can exacerbate flooding from a rain event, particularly if it coincides with a prolonged high tide even after the weather system has passed.

HAZARDS OF LOCAL SIGNIFICANCE

The Town's other hazards include, but are not limited to, the following:

OFF-SHORE SHIPPING

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, oil tarballs began to wash up in Delaware and approximately 3 miles south of the Virginia and Maryland State line (Personal communications, Bryan Rush, Emergency Management Coordinator, April 7, 2021). 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 with the adjacent shipping channel and so much of its economy reliant on 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.

GROUNDWATER CONTAMINATION

In October 2007, there was a reported leak at the Chincoteague Delmarva Substation. Tank related leaks and spills are caused by mismanaged or poorly designed underground and aboveground (this Substation has both) and containers designed to hold a variety of potential polluters. They may pose a risk to human health and/or the environment.

In 2017, it was reported that three shallow wells were contaminated with PFOS and PFAS from Aqueous Film Forming Foam (AFFF) used as a fire suppressant agent at Wallops Flight Facility. Supply to these wells were immediately shut off and none of the deep wells were contaminated (Personal communications, Town Officials, April 7, 2021). NASA plans to establish a treatment system to filter water from these shallow wells.

In addition, drought conditions would increase the demand of water for irrigation, but decrease the amount of aquifer recharge, increasing the Town (and region) susceptibility to salt water intrusion contaminating the drinking water supply (*Water Supply Plan*, 2010).

There are three active Non-National Priorities List (NPL) and one archived superfund sites near the Town. The archived site is the Chincoteague Landfill, which was inspected and archived in the late 1980's, as it poses no threat and requires no clean up action. The other three sites, Nasa Wallops Island, Chincoteague Naval Auxiliary Air Station, and Naval Aviation Ordinance Test Station, are considered active non-NPL, which means that they may still pose some health risks to the surrounding community, but they are not considered the most hazardous waste sites by the Environmental Protection Agency (EPA).

LAUNCHES

The NASA Wallops Flight Facility 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.

On October 28, 2014, the Antares rocket exploded upon liftoff; however, no one was killed, there were few injuries, and no hazardous materials were found on Chincoteague Island. Despite the fact that this kind of incident could have had much more severe consequences, the program was stalled for almost two years, with the next Antares rocket launching successfully on October 17, 2016. It also brought attention to the hazards associated with the launches and the economic repercussions associated with a possible closure of the facility. A rocket lab with a large rocket lift that may eventually produce man and commercial flights may also produce additional hazards (Personal communications, Mike Tolbert, Town Manager, April 7, 2021). Economic and traffic impacts should also be noted during the larger Antares launches due to closures on Assateague Island and other areas around Chincoteague.

THUNDERSTORMS

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 held the last full 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. Thunderstorms frequently bring heavy rain, strong winds, and excessive lightning to the area. Additionally, there storms may often produce damaging hail, tornadoes, and/or waterspouts.

WEATHER EXTREMES – SNOW/ICE & HEAT WAVES

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.

TORNADOES

In August of 2011, there was a tornado that spawned from Irene, which downed trees and caused roof damage. In July of 2000, there were three waterspouts reported by on-duty Coast Guard just off-shore. In September of 2015 several beach-goers captured images of waterspouts and funnel clouds just off the Assateague Island beaches near Chincoteague (WMAR Baltimore, 2015). Tornado warnings were issued in July of 2016 after several waterspouts and funnels clouds were reported in the areas of Assateague Island and Chincoteague Bay (Delmarva Now, 2016). Having storm shelters in place and information regarding these is very important. Distribution of educational materials could mitigate potential life loss during such events, as well as signing up for the Town of Chincoteague's Code Red Alert System and other national alert systems from the National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA).

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 and are listed in Table 8 on the following page. In May of 2019, the Chincoteague Volunteer Fire Company moved into their newly built fire station located across the street from the Chincoteague Police Department, Town Offices, and Community Center on Chicken City Road. The old Fire House on Cropper Street stores Town vehicles and other equipment. The old Fire House on Main Street has been re-purposed for community use.

Table 7: Town of Chincoteague Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Municipal Complex & Public Works	X	X	X	X	Wind, Storm Water Flooding, Fire	4,000+	Major Disruption	No	Yes
Re-purposed Chincoteague Fire House (Main St)	X	X	X	X	Wind, Erosion, Coastal Flooding	4,000+	Inconvenience	No	Yes
Old Fire House (Cropper St)	-	-	-	X	Wind, Flooding	4,000+	Minor Disruption	No	Yes
Chincoteague Police Dept.	X	X	X	X	Wind, Storm Water Flooding, Fire	16,000+	Devastating	No	Yes
Town Office	X	X	X	X	Wind, Storm Water Flooding, Fire	4,000+	Major Disruption	No	Yes
Curtis Merritt Harbor	X	X	X	X	Wind, Erosion, Coastal Flooding	45,000+	Devastating	No	Yes
Water Supply & Distribution	X	X	X	X	Wind, Erosion, Flooding, Power Loss	16,000+	Devastating	No	Yes
Town Docks	-	-	-	X	Erosion, Coastal Flooding	16,000+	Major Disruption	No	Yes
Other Facilities (Not Town-Owned)									
Medical Centers	X	X	X	X	Wind, Flooding	4,000+	Major Disruption	Yes	Yes
New Fire House	-	-	-	X	Wind, Storm Water Flooding	33,000+	Devastating	Yes	Yes
ANEC Substation	X	X	X	X	Wind, Erosion, Flooding	4,000+	Devastating	No	Yes
Banks	X	X	X	X	Wind, Storm Water Flooding	4,000+	Major Disruption	No	Yes
Hotels, Motels, Restaurants	X	X	X	X	Wind, Erosion, Flooding	33,000+	Devastating	No	Yes
Coast Guard Station	-	X	X	X	Wind, Erosion, Flooding, Fire	45,000+	Devastating	Yes	Yes
Route 175 Causeway	-	X	X	X	Wind, Erosion, Coastal Flooding	30,000+	Devastating	No	Yes
Collector Streets	-	X	X	X	Wind, Flooding	4,000+	Major Disruption	No	Yes
Communications Network	-	X	X	X	Wind, Flooding	4,000+	Major Disruption	Yes	Yes
Drainage System	-	X	X	X	Erosion, Flooding	4,000+	Devastating	No	Yes
Post Office	-	-	X	X	Wind, Flooding	4,000+	Inconvenience	Yes	Yes
Schools	-	-	X	X	Wind, Flooding, Fire	4,000+	Major Disruption	Yes	Yes
Gas Stations	-	-	X	X	Wind, Flooding, Fire	4,000+	Major Disruption	Yes	Yes

FINDINGS

1. The 2015 FIRM removed 1,167 buildings from the SFHA and lowered the BFE for the entire Island, which may lead to underinsured residents and businesses and a false sense of security in the Town regarding flooding vulnerability.

2. The 2015 FIRM lowers the BFE for many buildings. This may be an inaccurate assessment of flood water levels during a 1-percent-annual-chance storm event. The result is that homes obtaining assistance through HMGP may not be adequately improved to mitigate the true risk of flooding in the Town.

3. Post-FIRM buildings built with solid walls in A-zones that are affected by wave action could be damaged or destroyed though in compliance with the NFIP regulations.

4. Chincoteague is highly dependent on the tourist industry. A nor'easter or a hurricane, causing a 100-year flooding event, could be devastating for the Town's economy if the tourist industry was partially shut down through the summer season. Government funds helped to mitigate this issue during the height of the COVID-19 pandemic, when several tourism-based businesses were forced to close or limit operating hours and services.

5. The water distribution system is dependent on power on both the Island and the mainland. Without power, water cannot be pumped to the Island and fire suppression becomes a concern. There are no dry hydrants on the Island, as they do not work well in a saltwater 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 portion of Route 175 called the "Chincoteague Causeway" are critical infrastructure at risk from major storm events.

6. Potential damages are becoming more likely due to increased storm and tidal exposure from expansion of the Chincoteague Inlet. The Town is looking to secure funding for a 3-year study of the Inlet by the USACE.

7. The Storm Water Master Plan Phase 1 and 2 were completed in 2011 and 2013, respectively, and provide efficient flood mitigation plans for Town implementation.

8. The Town updated their Comprehensive Plan in 2020.

CHAPTER 14: TOWN OF HALLWOOD

TOWN PROFILE

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 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 began to decline in the early 1960s (*Town of Hallwood Comprehensive Plan,* 2002).


St Paul Lutheran Church
Hallwood United Methodist Church
United States Postal Service
Hallwood Thrift Store
Main St
679
679
679

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The 2019 American Community Survey five-year estimates indicated the Town had a population of 226, which has increased slightly since the 2010 Census. The median age for residents in Hallwood in 2019 was 42.0, which signifies a slightly older population compared to state and national estimates (ACS, 2014-2019). According to Table 1 below, 18.6% of residents in Hallwood are over the age of 62 and nearly 20% of the population has a disability. The 15.6% of residents that speak Spanish is likely an over-estimate, and is probably closer to 2% (Personal communications, Danny Shrieves, Town Clerk, May 24, 2021).

Table 1 : Hallwood Demographic Information

	2019*	2010**	2000***
Population	226	206	290
Median Age (Years)	42.0	40.5	32.0
Disability	43	NA	NA
Income			
Median Household Income	$41,250	$21,250	$29,861
Poverty Level	18.2%	53.6%	NA
Language			
Only English	84.4%	91.4%	NA
Other	15.6%	8.6%	NA
Spanish	15.6%	4.6%	NA
Ind-Euro	0.0%	0.4%	NA
Asian	0.0%	3.5%	NA

Source: *ACS, 2014-2019, **U.S. Census 2010, ***U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. Additionally, they can identify where disruptions in employment and income might occur in the aftermath of a disaster.

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 Public Schools, and Tyson and Perdue poultry processing plants. The decrease of residents employed in the educational and health care services industry shown in Table 2 is likely not accurate, as several Town residents are still employed in this industry (Personal communications, Mayor Jackie Poulson, May 24, 2021). Over half of the work force in Hallwood works in the manufacturing industry (ACS 2014-2019), which is likely dominated by poultry processing positions at Tyson and Perdue. These companies often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts on the Town. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local shops, nor family necessities, and other dependent agricultural businesses would be at a loss as well.

Table 2 : Hallwood Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010****		**2000*****	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	0	0.0%	5	4.7%	4	2.9%	14	10.6%
Construction	5	7.1%	10	9.3%	5	3.7%	4	3.0%
Manufacturing	37	52.9%	18	16.8%	41	30.1%	22	16.7%
Wholesale trade	2	2.9%	6	5.6%	3	2.2%	10	7.6%
Retail trade	8	11.4%	16	15.0%	12	8.8%	16	12.1%
Transportation and warehousing, and utilities	0	0.0%	3	2.8%	3	2.2%	7	5.3%
Information	0	0.0%	0	0.0%	0	0.0%	9	6.8%
Finance, insurance, real estate, and rentals	0	0.0%	0	0.0%	0	0.0%	2	1.5%
Professional, scientific, waste management	6	8.6%	16	15.0%	11	8.1%	10	7.6%
Educational and health care services	1	1.4%	17	15.9%	30	22.1%	20	15.2%
Arts, entertainment, recreation, food	5	7.1%	2	1.9%	8	5.9%	6	4.5%
Public Admin	5	7.1%	2	1.9%	11	8.1%	2	1.5%
Other	1	1.4%	12	11.2%	8	5.9%	10	7.6%
TOTAL CIVILIAN EMPLOYED POPULATION	70	-	107	-	136	-	136	-

Source: *ACS, 2014-2019, **ACS, 2010-2014; ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

According to Table 3, the Town has seen a steadily declining business presence over the last five years, but the number of employees has remained somewhat constant. Economic activity within the Town includes a post office, a welding shop, a day care, a repair garage, and two retail businesses (Personal communications, Mayor Jackie Poulson, Danny Shrieves, Town Clerk, May 24, 2021).

Table 3 : Hallwood Business Establishment Types

Industry Code Description	**Total Establishments**			
	2021	**2013***	**2011***	**2009***
Construction	0	1	2	3
Retail Trade	2	2	1	1
Transportation and warehousing	1	0	0	1
Finance and insurance	0	0	0	1
Health Care and Social Assistance	1	1	2	2
Other Services (Except Public Admin)	1	1	1	1
Total, All Establishments	5	5	6	9
Total Employees	-	39	32	35

Source: Personal Communications, Mayor Jackie Poulson & Town Clerk Danny Shrieves 2021; *Census Zip Code Business Patterns, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Vehicles available to households is one indicator of a household's ability to evacuate when necessary.

The estimates of housing units from the American Community Survey in 2014 should be ignored as gross over estimates. Town representatives indicated that there are 84 occupied housing units and a few unoccupied structures that need to be demolished. There has been one demolition since 2016, and although the Town has expressed interest in removing more, neither the Town nor the residents have the necessary resources to do so (Personal communications, Mayor Jackie Poulson, May 24, 2021). Often, these structures can cause additional debris hazards due to lack of maintenance and loose debris in yards.

Table 4: Hallwood Housing

	2019*	2014**	2010***	2000****
Total Housing Units	114	170	108	121
Occupied	88	130	74	100
Vacant	26	40	34	21
Owner-Occupied	49	87	49	75
Renter-Occupied	39	43	25	25
Median Housing Value	$135,900	$104,800	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

State Route 692 provides east-west access, and State Route 779 provides north-south access to the Town, which is located less than two miles west of U.S. Route 13. The abandoned Eastern Shore Railroad corridor runs through town, but is no longer in use and is the potential future site for a new bike and pedestrian trail. A railroad siding owned by the Railroad Company is located within Hallwood's corporate limits (*Town of Hallwood Comprehensive Plan*, 2002). Star Transit has a scheduled stop in Town at the Hallwood Post Office and Shore Ride is also available to the entire Eastern Shore. Star Transit will assist in the event an evacuation is needed; however, services would cease upon the arrival of hazardous conditions.

Table 5: Hallwood Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	3	3	11	6
One	41	51	95	43
Two	35	47	41	37
Three or more	9	29	17	18

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***ACS, 2006-2010, ****U.S. Census 2000

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. As of 2019, American Community Survey five-year estimates show only 3 of the Town's occupied residences are without a vehicle, however, Town officials stated there was only one (Personal communications, Mayor Jackie Poulson, May 24, 2021).

COMMUNITY SERVICES AND FACILITIES

Community facilities support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It is important to note what facilities are available in case of a hazard, and it is important to make an inventory of facilities that could be affected by a hazard. Community facilities include a public recreation facility, The Hallwood Town Park. There is also a Town Hall that doubles as the Police Station and Post Office (Personal communications, Danny Shrieves, Town Clerk, May 24, 2021).

PUBLIC SAFETY

As previously stated, the Town Hall doubles as the local Police Station and the Town has one officer. The Bloxom Volunteer Fire Company provides fire protection and EMS for the Town (see Town of Bloxom chapter for equipment inventory). The Accomack County Sheriff's Department and the Virginia State Police provide police protection (Personal communications, Mayor Jackie Poulson, May 24, 2021).

PARKS AND RECREATION

The Hallwood Town Park was built in 1984 and includes a playground, picnic pavilion, and a black top tennis court (Personal communications, Mayor Jackie Poulson, May 24, 2021). It is the only public recreational facility in the Town.

SCHOOLS

There are no schools in the Town of Hallwood; however, there is one private day care at the Lutheran church that operates Monday-Friday and contains a playground (Personal communications, Mayor Jackie Poulson, May 24, 2021).

WATER SUPPLY AND WASTEWATER

Residents rely on private wells and septic systems for their water supply and wastewater disposal (Personal communications, Mayor Jackie Poulson, May 24, 2021). In the past, poor soils limited development on vacant parcels of land in Hallwood, but above-ground septic technologies have made some previously undevelopable parcels available for development. Hallwood is located in Wellhead Protection Area B – Tysons Foods Area. Major water withdrawers from this area are Tyson Foods and the NASA Wallops Flight Facility. This wellhead protection area contains Accomack County's Northern Landfill and an unlined septage lagoon, which constitute the greatest visible contamination threats (*Town of Hallwood Comprehensive Plan*, 2002).

SOLID WASTE

There are no solid waste facilities in the Town. The Town contracts with Davis Disposal for weekly residential trash collection, which is transported to a county landfill (Personal communications, Mayor Jackie Poulson, May 24, 2021).

POWER AND COMMUNICATIONS INFRASTRUCTURE

The electric power substation just south of Town and the northern location of Hallwood may contribute the very low occurrences of power outages and the fast response of repair efforts. The longest recent outage recollected was during Hurricane Sandy, but only affected a small number of homes and only lasted about four hours (Personal communications, Town Council, June 2, 2016).

NATURAL ENVIRONMENT

Hallwood is relatively flat with the elevation ranging from 15-feet above mean sea level to 25-feet above mean sea level with a general downward slope from east to west. Slopes are under 2% for the majority of the Town, which can lead to flooding problems due to poor drainage. Adding to these flooding problems are the presence of hydric soils which are characteristically wet and poorly drained. The soils are not suitable for septic systems due to the hydric, highly permeable soils and have a shallow to ground water table, between 0-18 inches (*Town of Hallwood Comprehensive Plan*, 2002).

LAND USE LAND COVER

The total land area of Hallwood is 234 acres, with the majority of development being residential. Developed areas are scattered throughout the Town. Agricultural land use is prevalent in the north and northeast parts of the Town. Cultivated crops include tomatoes, soybeans, grains, and cover crops. Land adjacent to the Town is predominantly agricultural (*Town of Hallwood Comprehensive Plan*, 2002).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Hallwood has participated in the hazard mitigation planning process since 2011. The Town's primary risk is associated with storm water flooding. Hallwood's comprehensive plan has not received a major update since 2002, and the zoning ordinance was adopted in 2007. The comprehensive plan further emphasizes the need for storm water management practices, and also emphasizes a concern for failing septic systems, underground and aboveground storage tanks, and contamination of wells.

Table 6: Town of Hallwood Hazard Mitigation Resources

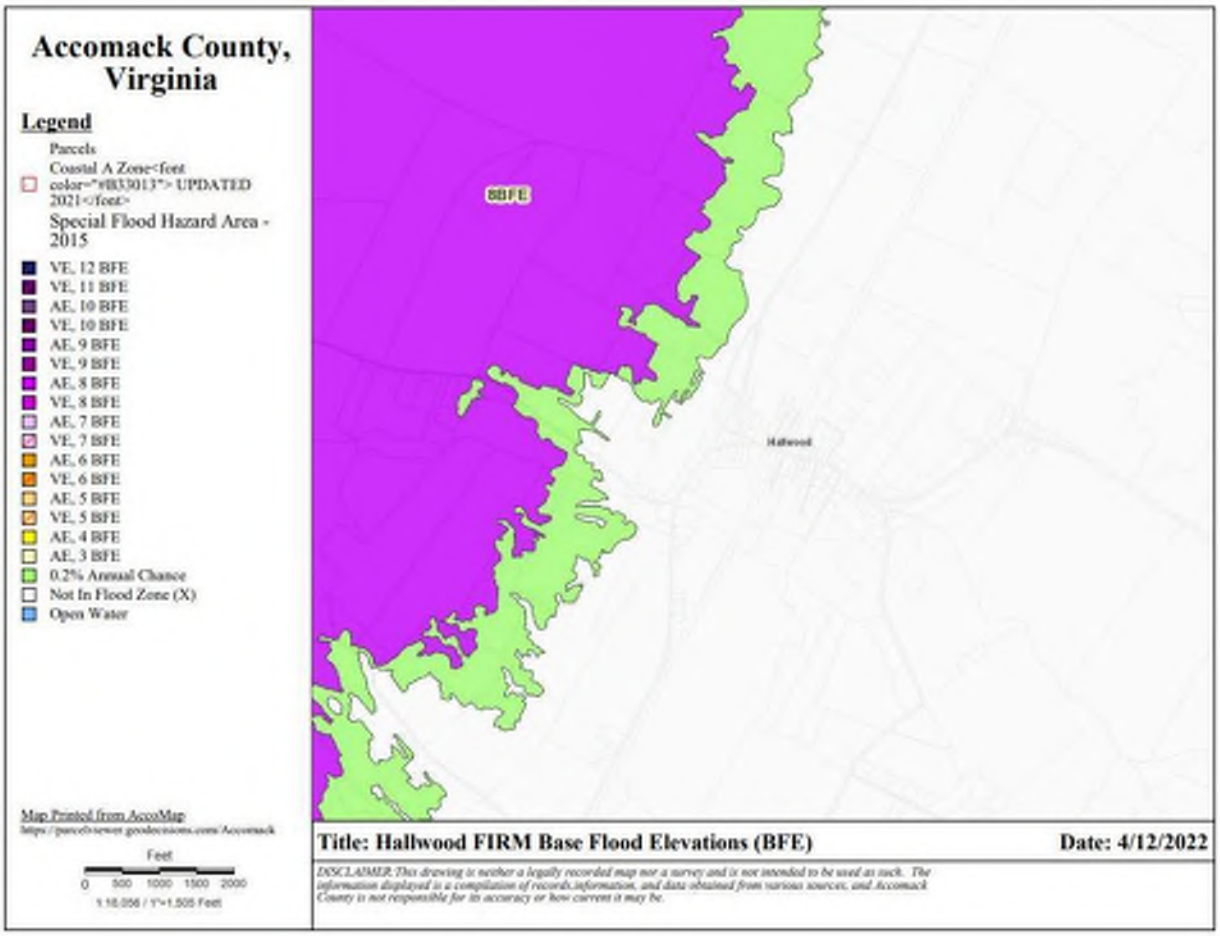
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Local					*	*													
County	*		*																
Regional								*	*	*	*	*		*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) 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 are no longer in an A zone. In 2016, Hallwood had only 1 NFIP policy, for a property not located within a flood zone, totaling $350,000.00 in coverage (FEMA NFIP Insurance Report, 2016). There are currently no active policies in the Town (FEMA NFIP Data Report, 2022). The Town has had only one claim that was rewarded $4,923 since joining the NFIP in 2000 (FEMA NFIP Data Report, 2022). This claim was the result of storm water flooding from a thunderstorm in 2003. The Town does not participate in the Community Ranking System (CRS). More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 2: Town of Hallwood FIRM Base Flood Elevation (BFE)



HMGP

The Town has not participated in the Hazard Mitigation Grant Program.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Storm water flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Hallwood implemented several policies to ensure the safety of residents during the COVID-19 pandemic. Residents received two rounds of care packages containing gloves, masks, sanitizer, and other items to help keep residents safe and protected. The Town police officer delivered medications and other supplies to elderly and at-risk residents of the Town. Only one council meeting was canceled and then continued with social distancing and mask mandates in place. The Town also hired a cleaning crew and had one volunteer to sanitize surfaces and other areas after meetings (Personal communications, Mayor Jackie Poulson, May 24, 2021).

HIGH WIND

No parts of the 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 structures or power lines. Figure 2 shows the 2016 Hazus® estimates by Census block for wind damages during a 100-year storm. Total losses from buildings, contents, wages, incomes, rentals, and inventories are estimated to be over $170,000, the vast majority of this sum being derived from the building and content damages.

During a high-wind event, abandoned dilapidated buildings pose a threat, as they add to the debris that can become wind-borne and inflict severe property damages. Town representatives estimate that the rusty, no-longer used water tower on the property of the old fishery canning facility is over 80 years old, and thus poses an additional hazard (Personal communications, Danny Shrieves, Town Clerk, May 24, 2021).

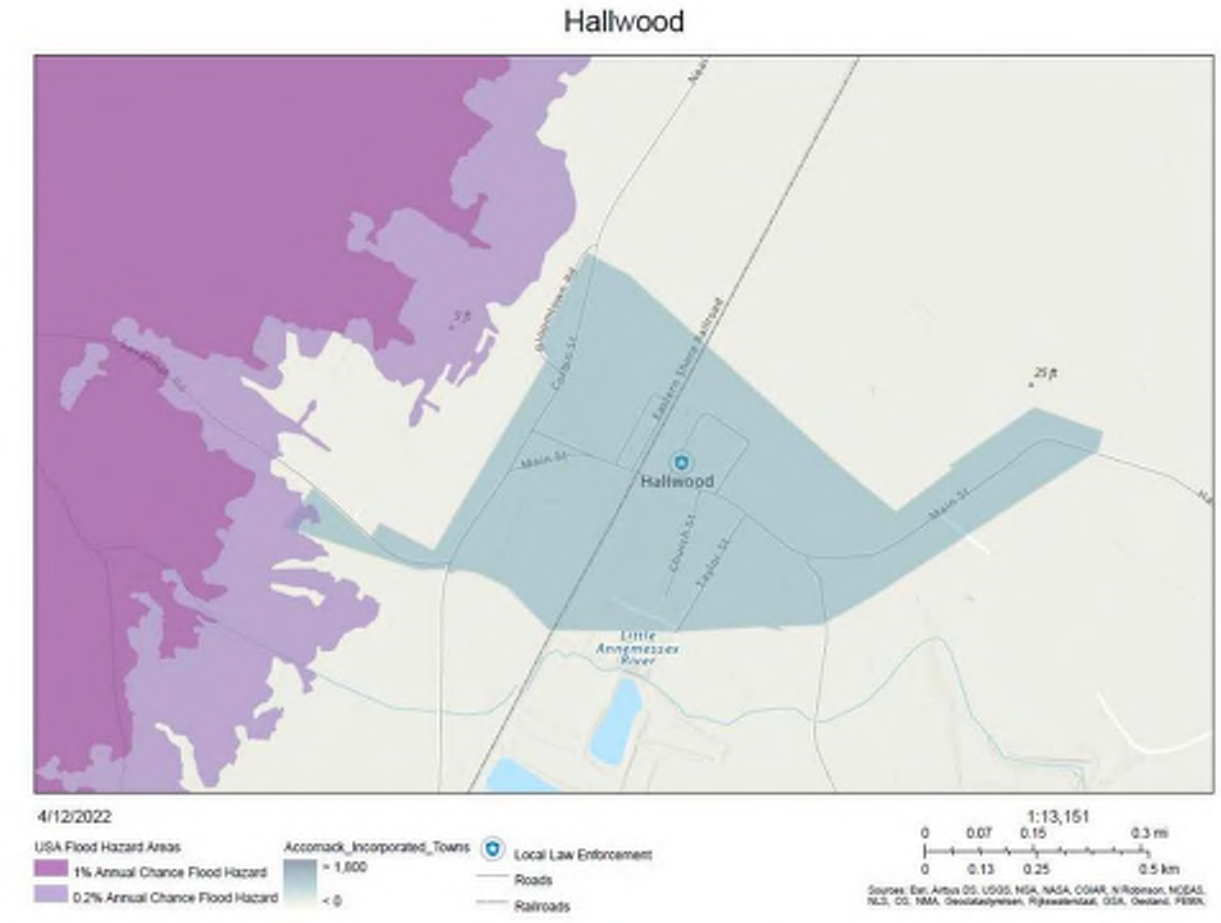
COASTAL EROSION

No structures or areas within the Town are at immediate risk to coastal erosion.

COASTAL FLOODING

No portions of the Town lie within a Special Flood Hazard Area. One very small area in the southwestern corner of the Town is located within the 500-year floodplain (*FEMA Flood Insurance Rate Map*, 2015). Previous FIRMs included the western two-thirds of the Town within the 500-year floodplain. While a significant portion of the Town is no longer included in the 500-year floodplain according to the 2015 FIRMs, the threat of coastal flooding is still considered to be minimal.

Figure 3: Town of Hallwood Flood Hazards to Infrastructure



STORM WATER FLOODING

Storm water flooding has the greatest and most frequent impact on the Town. The Town sits on poorly drained soils which retain rainwater. 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 (*Town of Hallwood Comprehensive Plan*, 2002). The Town relies on VDOT for the maintenance of ditches along roadways throughout the Town. If drainage ditches are not properly maintained, flooding will occur throughout the Town's roads and other areas (Personal communications, Mayor Jackie Poulson and Danny Shrieves, Town Clerk, May 24, 2021). During Hurricane Sandy, one home at the junction of Fitzgerald and Main suffered from storm water flooding to the extent that the furnace was ruined. Educating residents about the risks associated with storm water flooding and standing water, such as septic contaminants and mosquito-borne illnesses, is an important step in mitigating potential negative impacts to the Town residents.

Table 7: Hallwood Storm Water Flooding Tracking

	HMP 2006	HMP 2011	HMP 2016	HMP 2021
Cause of Hazard	NA	Unsuitable soil for drainage and retains rainwater	Culverts running beneath VDOT roadways are too small; Soil type	*Work on ditches and culverts has mitigated previous flooding*
Where is the flooding?	NA	Throughout the Town	Adjacent to the abandoned RR corridor, past Bethel Church Rd, particularly on Main St	When drainage ditches are not properly maintained, flooding occurs throughout the Town

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

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 (Personal communications, Mayor Jackie Poulson, May 24, 2021).

SNOW AND ICE

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 2010 creating blizzard-like whiteout conditions and extensive snow drifting that blocked roadways and prevented accessibility to and from the Town (Personal communications, Mayor Jackie Poulson and Danny Shrieves, Town Clerk, May 24, 2021).

FIRE AND SMOKE

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 the Town (Personal communications, Mayor Jackie Poulson and Danny Shrieves, Town Clerk, May 24, 2021).

CRITICAL FACILITIES

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

Table 8 : Town of Hallwood Critical Facilities

Facility	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities					
Town Hall/Police Station	Storm Water Flooding Wind	226+	Major Disruption	No	Yes
Post Office	Storm Water Flooding Wind	226+	Major Disruption	No	Yes
Town Park	Wind	226+	Inconvenience	No	No

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, fires, and snow or ice storms.

2. Hallwood's residential areas are typically older and contain older construction and many mature trees around homes and churches in the Town. In addition, there are some dilapidated buildings and a water tower that are no longer in use. High wind events bringing down branches and trees pose a significant threat in the form of secondary wind damage and power outages and unmaintained structures provide a source of wind-borne debris.

3. Without continuous proper maintenance to draining ditches and culverts, roads throughout the Town will experience stormwater flooding.

CHAPTER 15: TOWN OF KELLER

TOWN PROFILE

Keller is located near the central spine of the Eastern Shore in south central Accomack County and comprises 218 acres. The town was originally called Pungoteague Station and was established around a railroad station, which was the center of economic activity for the Town. Once Keller was no longer used as a rail station, economic conditions began to change (*Town of Keller Comprehensive Plan*, 2006). The Town of Keller was incorporated in 1951.

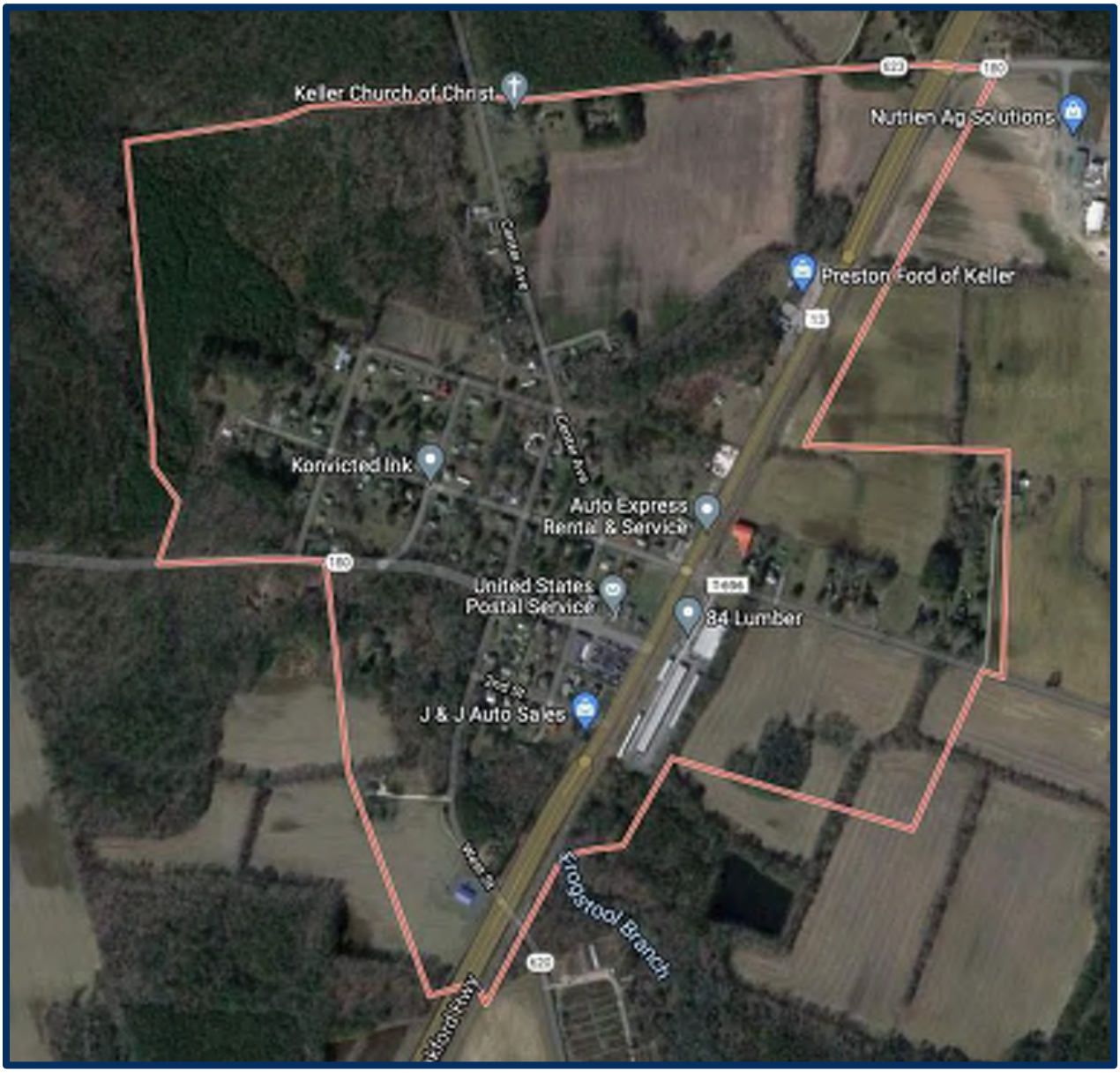


Figure 1: Town of Keller Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to Table 1, the population in the Town of Keller has remained relatively stable over the last couple decades. The median age for the Town is 53.9, indicating an older population that would typically need additional assistance during a hazard. The high median age, poverty levels, and number of individuals with a disability are also important factors to consider when planning for a hazard.

There has been an influx of Spanish-speaking households moving into the area, so it is likely the data in Table 1 below indicating languages spoken is inaccurate (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). Town Officials point to the 2010 Census figures as being anomalous and inconsistent with their knowledge of the Town (Personal communications, Town Council, November 4, 2015). Although the population may be accurate, the median household income and the languages spoken are likely not.

Table 1: Keller Demographic Data

	2019*	2014**	2013**	2010***	2000****
Population	151	178	151	178	173
Median Age	53.9	37	37.9	47.5	40.2
Disability	24	NA	NA	NA	NA
Income					
Median Household Income	$28,906	$18,875	$15,625	$49,375	$25,500
Poverty Level	28.5%	NA	47.7%	NA	NA
Language					
Only English	99.3%	100%	100%	75%	97.6%
Other	0.7%	0.0%	0.0%	25%	2.4%
Spanish	0.0%	0.0%	0.0%	9.6%	2.4%
Ind-Euro	0.7%	0.0%	0.0%	0.0%	0.0%
Asian	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***US Census 2010, ****US Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

The local workforce primarily consists of Retail Trade and Arts, Entertainment, Recreation, and Food. Construction and Wholesale Trade industries dominate the employed population in Keller as well (ACS, 2014-2019). This is reflecting of Keller being primarily a residential, white-collar community (*Town of Keller Comprehensive Plan*, 2006). The workforce saw a significant drop between 2010 and 2014, but increased back to previous numbers in 2019 (ACS, 2014-2019).

Table 2: Keller Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Construction	10	15.6%	5	13.9%	5	20.8%	18	27.7%	5	8.3%
Manufacturing	4	6.3%	10	27.8%	0	0.0%	0	0.0%	13	21.7%
Wholesale trade	10	15.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Retail trade	15	23.4%	4	11.1%	0	0.0%	12	18.5%	10	16.7%
Transportation and warehousing, and utilities	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	6.7%
Information	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	3.3%
Finance, insurance, real estate, and rentals	4	6.3%	2	5.6%	2	8.3%	2	3.1%	1	1.7%
Professional, scientific, waste management	0	0.0%	0	0.0%	0	0.0%	4	6.2%	4	6.7%
Educational and health care services	8	12.5%	9	25.0%	10	41.7%	18	27.7%	16	26.7%
Arts, entertainment, recreation, food	12	18.8%	0	0.0%	3	12.5%	7	10.8%	3	5.0%
Public Admin	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other	1	1.6%	6	16.7%	4	16.7%	4	6.2%	2	3.3%
TOTAL CIVILIAN EMPLOYED POPULATION	64	-	36	-	24	-	65	-	60	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census, 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Keller is primarily a residential community, which is reflective upon the low number of businesses within the Town. An antique shop, storage units, 84 Lumber, OrthoFit, and two automotive dealerships, J&J Auto Sales and Preston Ford, are located in Town (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). There is also a non-profit homeless shelter and a post office. The Town has been having zoning and ordinance issues relating to "back-yard" businesses and are currently working to resolve these problems while also promoting economic development (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

Table 3: Keller Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013	2011	2009
Agriculture, Forestry, Fishing, and Hunting	0	0	0	0
Construction	0	0	0	0
Manufacturing	0	0	0	0
Wholesale Trade	0	0	0	0
Retail Trade	2	3	3	4
Transportation and Warehousing	1	0	1	1
Information	0	0	0	0
Finance and Insurance	0	1	1	1
Real Estate and Rental and Leasing	0	1	0	0
Professional, Scientific, and Technical Services	3	1	2	2
Administrative and Support and Waste Management and Remediation Services	0	0	0	0
Health Care and Social Assistance	1	2	2	2
Accommodation and Food Services	0	0	0	0
Other Services (Except Public Admin)	2	1	1	1
Industries not classified	0	0	0	0
Total, All Establishments	9	9	10	11
Total Employees	-	63	64	52

Source: Personal Communications, Mayor Beth Hart and Vice Mayor Teresa Guy, May 4, 2021, Census Zip Code Business Patterns, 2013, 2011, 2009

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety. Keller's soils and their inability to support on-site septic systems prevent the Town from developing more housing or commercial areas (*Town of Keller Comprehensive Plan*, 2006).

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

There are 86 total housing units in Keller (Personal communications, Mayor Beth Hart and Vice Mayor Teresa Guy, May 4, 2021) and the housing market is relatively stable, consisting primarily of single-family housing (ACS, 2014-2019). There are 20 vacant units in Town, one of which is being used as a vacation home (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). Many of these vacant structures are in poor condition due to owners not living in the area and being unable to maintain their properties. Vacant units can be dangerous during a hazard due to lack of year-round maintenance and loose yard debris. Town officials stated that they have proposed an incremental tax increase and auctions will soon take place in an attempt to negate the issue. In the last five years, there has only been one demolition; however, the Town is taking steps to complete more (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

Table 4: Keller Housing

	2019*	2014**	2010***	2000****
Total Housing Units	88	76	87	90
Occupied	67	54	68	72
Vacant	21	22	19	18
Owner-Occupied	42	42	47	47
Renter-Occupied	25	12	21	21
Median Housing Value	$108,800	$129,200	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

U.S. Route 13 is Keller's most visible transportation feature, bisecting the town with 18,000 vehicles per day. The four-lane principal arterial is part of the national defense Strategic Highway Network (STRAHNET), a national system of highways necessary to support U.S. military operations, part of the National Highway System, and the Eastern Shore's only hurricane evacuation route. The abandoned and preserved railroad corridor parallels U.S. Route 13. The intent is to convert this 49.1-mile stretch into a multi-use shared path that will become the Eastern Shore Rail Trail. There are no scheduled Star Transit stops in Keller; however, Shore Ride is available and operates up and down the Eastern Shore.

Vehicles available to households is one indicator of a household's ability to evacuate when necessary, and Table 5 reveals no risk from this status. Speeding has been an issue in the Town and there have been several accidents at the intersection of Route 13 and Second Street. The Town now has a contracted deputy from the Accomack County Sheriff's Department to monitor speeding (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

Table 5: Keller Vehicles Available per Household

Vehicles Available	*2019	2014**	2010**	2000***
None	0	1	0	9
One	32	20	25	18
Two	19	20	28	40
Three or more	16	13	16	5

Source: *ACS, 2014-2019, **ACS, 2010-2014; ***U.S. Census, 2000

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

PUBLIC SAFETY

Keller does not have its own police department; however, an off-duty contractual Accomack County deputy patrols the Town at random. Police protection is provided by the Accomack County Sheriff Department and the Virginia State Police. Fire protection is provided by the Melfa and Painter Volunteer Fire and Rescue Companies (Personal communication, Mayor Beth Hart and Vice Mayor Teresa Guy, May 4, 2021). Information regarding equipment inventory and capabilities can be found in the Town of Melfa and Town of Painter respective chapters.

WATER SUPPLY & SEWAGE DISPOSAL

All residential treatment of wastewater is done through on-site septic systems. The Town has no public water supply and residents and commercial users are solely reliant on private wells. The Town is interested in connecting to the new HRSD line that will run through the Town (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

SOLID WASTE DISPOSAL

The Town contracts Davis Disposal to provide weekly solid waste disposal and periodic junk and debris removal (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). There are two free Accomack County convenience centers located nearby, the Grangeville center on Wachapreague Road, and the Painter center on Wayside Drive. The County landfill is also only about 2.5 miles from the Town, just west on Route 620.

POWER AND COMMUNICATIONS INFRASTRUCTURE

The Town's location on Route 13 typically allows for ease of access for any repairs to the power line system. This location also provides access to the broadband optic cable which runs on Route 13. Keller has been working with ANEC to ensure the proper function of street lights in Town (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

PARKS AND RECREATION

There are no Parks within the Town. There is interest in turning the Town Hall parking lot in a recreational area (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

STORM WATER DRAINAGE

The County and VDOT are responsible for the majority of the ditch maintenance in the Town. There have been many issues regarding settling water and storm water drainage. The Town has been working with the County and VDOT to resolve these issues. In 2018-2019, VDOT signed off on an easement aquifer and the County has continued to work to clean the main ditch. A few ditches in Town have been removed and underground drainage lines installed (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). Due to frequent storm water flooding and the reliance of individual wells and septic systems, this is of the utmost importance to purse and complete.

SCHOOLS

There are no schools within the Town of Keller.

NATURAL ENVIRONMENT

Keller encompasses 218 acres. Elevations in the Town range from approximately 30- to 40-feet, with a local high spot of 44-feet above mean sea level, and slopes are typically less than 2%. Most of the soils in Keller are not ideal for development due to the majority soil type being unsuitable for individual land-based waste water treatment facilities, like septic systems (*Town of Keller Comprehensive Plan*, 2006). There have been large amounts of forest land purchased recently within Town limits. The area has been cleared, but it is unclear if there are any plans in place for the land (Personal communications, Vice Mayor Guy, April 16, 2021).

LAND USE LAND COVER

Forests, development, and agriculture are the three highest uses of land for the Town.

GROUND WATER

The Town of Keller is completely reliant on groundwater and faces a threat of contamination from several sources, including failed septic systems within the Town, leaks and spills of petroleum-based products from underground storage tanks, and major industrial facilities within the area (*Town of Keller Comprehensive Plan*, 2006).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Keller has participated in the hazard mitigation planning process since 2011. The Town's primary risk associated with hazards is storm water flooding. Keller's comprehensive plan has not been updated since 2006. The Town is interested in pursuing an updated comprehensive plan. The plan from 2006 does emphasize drainage problems within the Town.

Table 6: Town of Keller Hazard Mitigation Resources

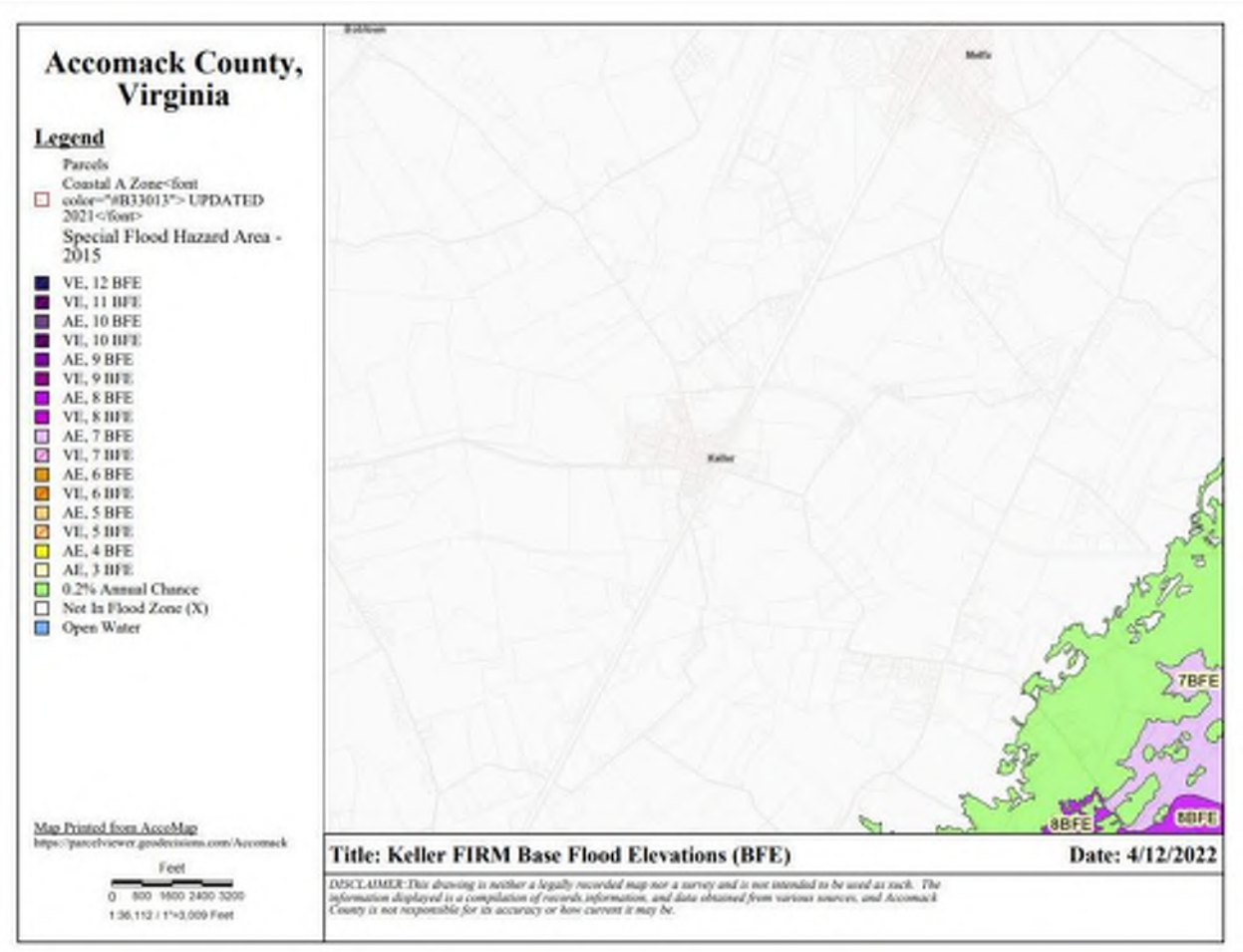
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Local					*	*												
County	*		*															
Regional				*				*	*	*	*			*	*	*	*	*
State		*					*						*					
Federal		*																

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town does not currently participate in the NFIP, but has expressed interest in potentially joining the program. No areas of the Town lie within a Special Flood Hazard Area. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 2: Town of Keller FIRM Base Flood Elevation (BFE)



HMGP

Keller has not participated in the HMGP.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding poses the greatest risk to the Town and has the most frequent impact.

PANDEMIC RESPONSE AND READINESS

The Town of Keller was able to make several necessary changes in response to the COVID-19 pandemic. The Town Hall was revamped to include plexiglass shields, sanitizer stations, and a walk-up cashier window for the public to utilize. Residents were provided two rounds of Care packages in reusable hand totes, which included sanitizer, toilet paper, paper towels, disinfectant, and masks. CARES Act funding also provided the Town Council, Town Clerk, and the Mayor new laptops and equipment needed to meet virtually. A new hot water heater was also purchased as the Town Hall was previously without hot water for proper hand-washing. Social distancing and mask signage were placed in necessary locations and the outside deck was extended to provide room for social distancing (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

The Town has the ability to store an abundance of supplies and revert back to COVID-19 mandates, if ever needed for a similar, future event.

HIGH WIND

No parts of the 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 nor'easters that have damaged trees and power lines in Town. The Town Hall sustained roof damage during one of the many nor'easters that hit the region. The Town also has a number of derelict buildings, which may pose a danger of flying debris or even collapse during high wind events (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

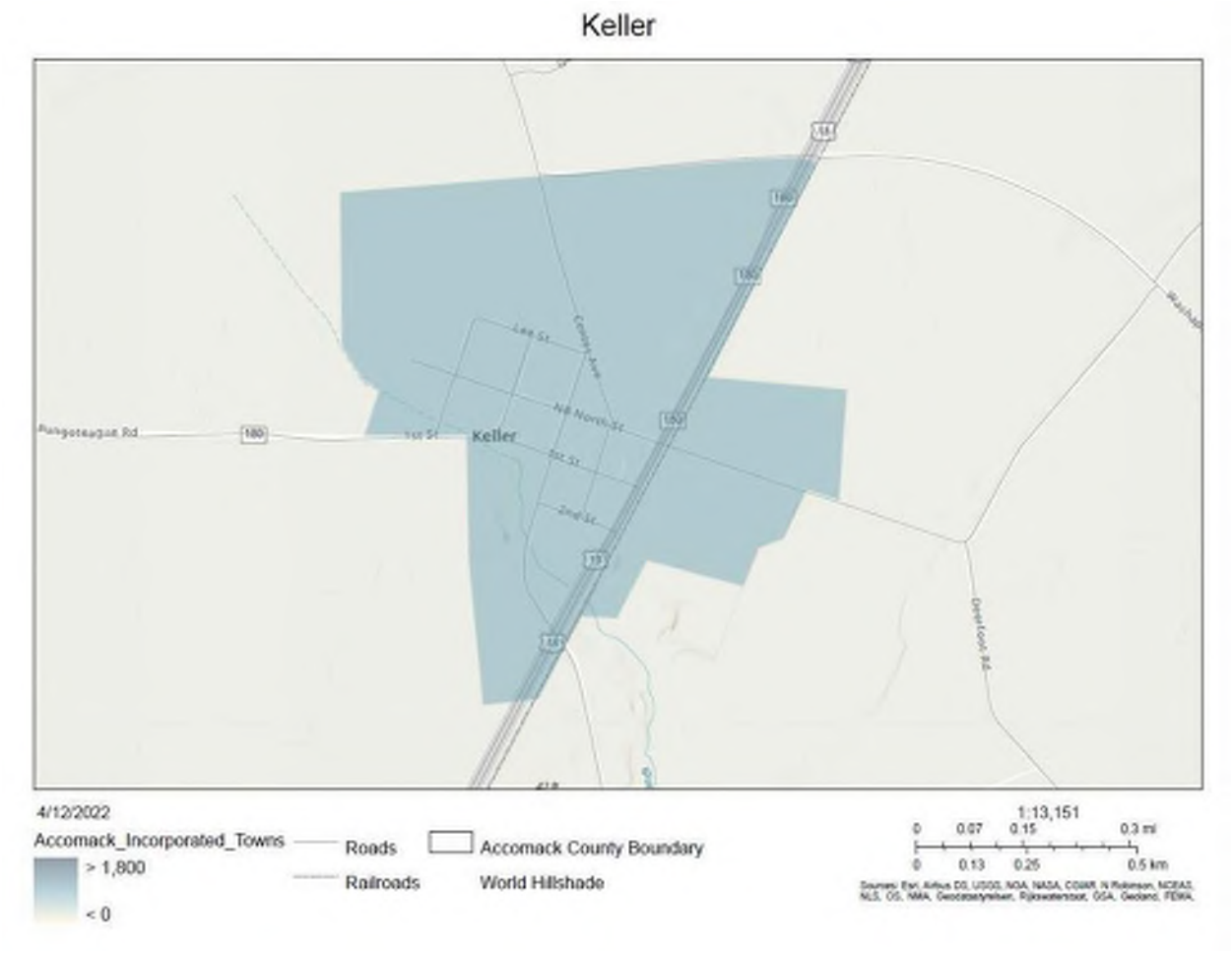
COASTAL EROSION

No structures are at immediate risk to coastal erosion.

COASTAL FLOODING

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 in the Town is considered to be minimal.

Figure 3: Town of Keller Flood Hazards to Infrastructure



STORM WATER FLOODING

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. The intersection where N.R. North Street and H. West Avenue meets at Center Avenue is prone to frequent flooding as well as where H. West Avenue meets Second Street near the Methodist Church. VDOT and the County have been working to resolve these issues (Personal communication, Vice Mayor Teresa Guy, April 16, 2021).

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 Town relies on the Virginia Department of Transportation and Accomack County to perform maintenance on the main drainage ditches within the Town limits (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

Drainage issues were previously experienced at the intersection of Center Avenue, H. West Avenue, and Lee Street and the northern end of H. West Avenue. These areas have poorly maintained ditches that have silted with sediment and become overgrown with vegetation. The ditch near the intersection of Lee Street and Center Avenue has been

removed and underground drainage has helped to mitigate storm water flooding in this area (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). Town officials indicate that there has been no residential or commercial property damage within Town as a result from 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 experiences flooding today. These flood waters remained for approximately 24 hours. The Town experienced severe storm water flooding again throughout the Fall and Winter in both 2019 and 2020 (Personal communications, Vice Mayor Teresa Guy, April 16, 2021). The majority of houses in Town are elevated and Town officials do not remember structures being inundated during these flood events.

Table 7: Stormwater Problem Areas in Keller

	HMP 2011, 2016, 2021
Flooding Problem Areas	Central and northern parts of the town. Intersection of Center Avenue H. West Street Lee Street Northern end of West Street
Critical Facilities Identified	Keller Town Hall Keller Post Office
Cause of Hazard	Soils poorly drain and tend to retain rainwater Lack of sufficient topography for drainage Lack of maintenance to existing drainage culverts

HAZARDS OF LOCAL SIGNIFICANCE

FIRE AND SMOKE

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 are located in close proximity to one another.

ICE AND SNOW

The Town historically has 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 residences are at a greater risk during these events. Additionally, the Town relies on VDOT to maintain the roads during these events, and often takes some time for roads to be cleared (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

HAZARDOUS MATERIALS

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 (Personal communications, Vice Mayor Teresa Guy, April 16, 2021).

TORNADOES

Tornadoes have not historically hit within the Town of Keller; however, it was suspected that a tornado destroyed a commercial building and damaged another commercial building in Town in 1998.

Figure 4: U.S. Route 13 and the Former Railroad in Keller. Photo by Curt Smith



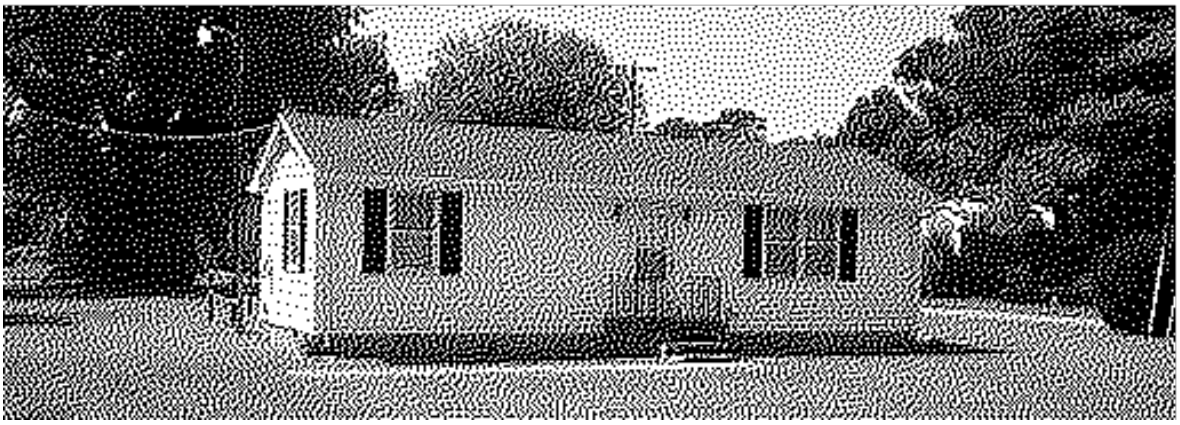
CRITICAL FACILITIES

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

Table 8 : Town of Keller Critical Facilities

Facility	Hazards	HMP 2006	HMP 2011	HMP 2016	HMP 2021	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Keller Town Office	Storm Water Flooding Wind	-	X	X	X	151+	Major disruption	No	Yes
Keller Post Office	Storm Water Flooding Wind	-	X	X	X	151+	Major disruption	No	Yes

Figure 5: The Keller Town Office. Photo by Curt Smith



FINDINGS

1. Stormwater 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, groundwater contamination, drought, and fire.

4. The Town has identified areas that have poorly maintained drainage ditches that regularly cause stormwater flooding hazards. The Town has been and will continue to mitigate these problems.

CHAPTER 16: TOWN OF MELFA

TOWN PROFILE

The Town of Melfa encompasses 165 acres along the south-central spine of Accomack County (Figure 1). Melfa developed around a railroad station in 1884. In the early 1900s Melfa was a site of industries, including a canning factory, bottling company, three sawmills, two dairies, a barrel factory, and two hatcheries. Presently, Melfa is largely residential. The Town became incorporated in 1951 with the purchase of a fire engine (*Town of Melfa Comprehensive Town Plan*, 1997).

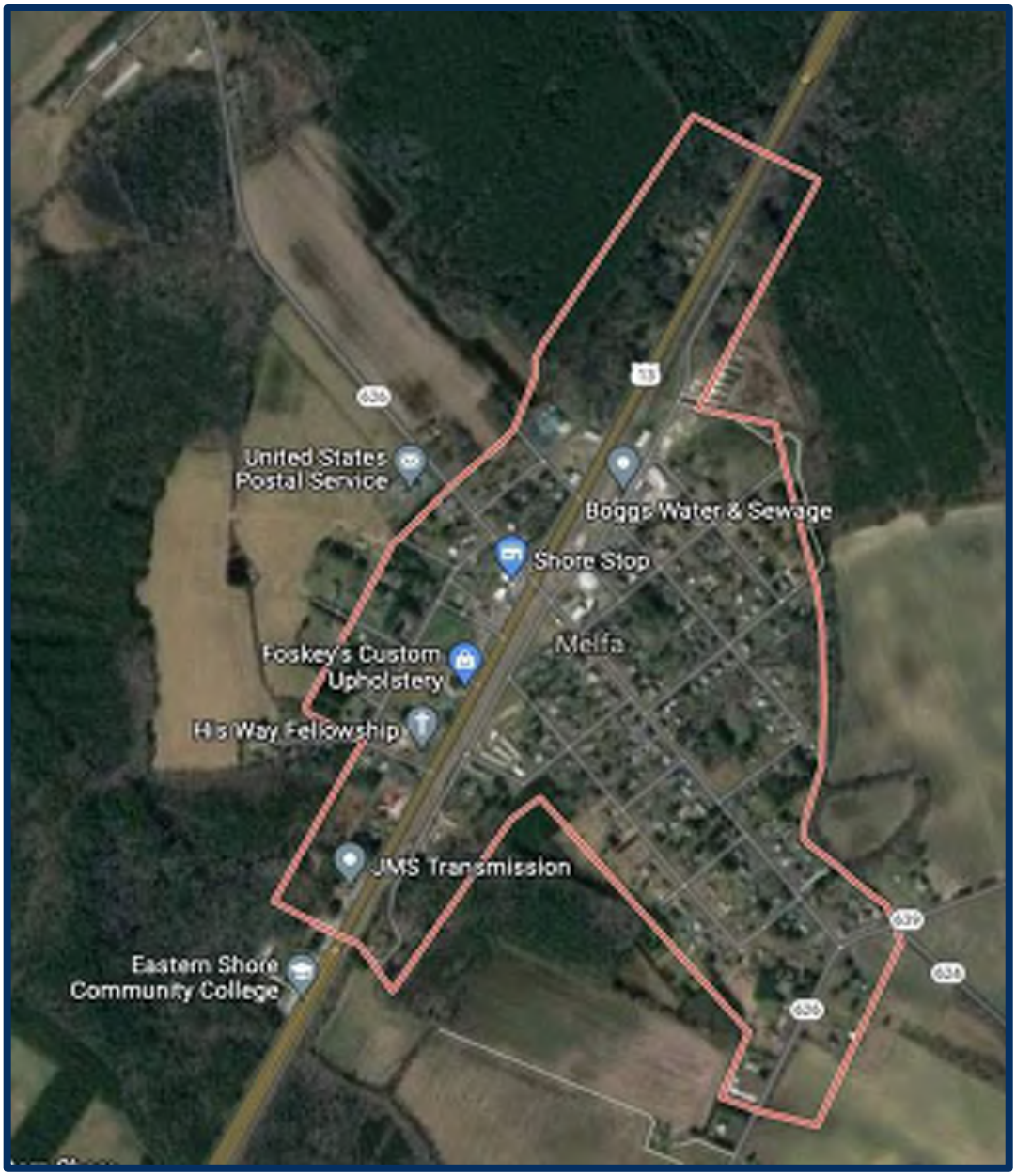


Figure 1: Melfa Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

American Community Survey (ACS) five-year estimates for 2019 show a population decline in the Town of Melfa; however, this is believed to be an underestimate and the population is likely closer to the 2010 Census figures displayed in Table 1 (Personal communications, Mayor Charles Wilbur, June 8, 2021). ACS data also shows a steady increase in the median age, which is currently about 17 years higher than the national median age. An older population may need additional assistance in the event of a hazard. The majority of residents speak English and would be able to access information about potential hazards or other safety information.

Table 1: Melfa Demographic Information

	2019*	**2014****	**2013*****	**2010******	**2000*******
Population	320	411	383	408	450
Median Age	55.1	44.9	48.3	43.0	38.0
Disability	38	NA	12	NA	NA
Income					
Median Household Income	$46,250	NA	$38,684	$34,097	$37,361
Poverty Level	12.5%	NA	15.4%	29.2%	NA
Language					
Only English	96.8%	100%	100%	96.1%	94.2%
Other	3.2%	0.0%	0.0%	3.9%	5.8%
Spanish	1.3%	0.0%	0.0%	1.6%	4.4%
Indo-Euro	1.9%	0.0%	0.0%	2.3%	1.3%
Asian	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2009-2013, ****US Census 2010, *****US Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Melfa is primarily a residential community, where the majority of employed residents commute to work outside of Town. According to Table 2, the majority of the workforce (34.1%) in Melfa are in the education and health care services industry, which is likely due to the Eastern Shore Community College being located just outside of Town limits and Riverside Shore Memorial Hospital in the nearby Town of Onancock.

Another industry that dominates the area is manufacturing, which is most likely made up of poultry processing positions at Perdue Farms and Tyson Foods. These companies often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts

on the Town. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local shops, nor family necessities, and other dependent agricultural businesses would be at a loss as well.

The number of the total civilian employed population has greatly decreased in 2019 according to the American Community Survey five-year estimates. This number is likely not accurate, as Town officials state there is no large population retiring or not working (Personal communications, Mayor Charles Wilbur, June 8, 2021). This decrease in the civilian employed population is likely due to the decrease of the total population (Table 1) that was also deemed inaccurate by the Town Mayor.

Table 2: Melfa Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	13	7.1%	25	10.2%	31	12.8%	4	1.8%	3	1.3%
Construction	11	6.0%	7	2.8%	20	8.2%	15	6.9%	14	6.0%
Manufacturing	12	6.6%	19	7.7%	12	4.9%	19	8.7%	32	13.7%
Wholesale trade	13	7.1%	13	5.3%	16	6.6%	0	0.0%	16	6.9%
Retail trade	17	9.3%	28	11.4%	25	10.3%	43	19.7%	43	18.5%
Transportation and warehousing, and utilities	10	5.5%	8	3.3%	13	5.3%	18	8.3%	10	4.3%
Information	2	1.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Finance, insurance, real estate, and rentals	2	1.1%	9	3.7%	5	2.1%	17	7.8%	8	3.4%
Professional, scientific, waste management	12	6.6%	21	8.5%	5	2.1%	13	6.0%	5	2.1%
Educational and health care services	62	34.1%	54	22.0%	69	28.4%	69	31.7%	47	20.2%
Arts, entertainment, recreation, food	10	5.5%	22	8.9%	10	4.1%	8	3.7%	17	7.3%
Public Admin	13	7.1%	22	8.9%	14	5.8%	10	4.6%	27	11.6%
Other	5	2.7%	18	7.3%	23	9.5%	2	0.9%	11	4.7%
TOTAL CIVILIAN EMPLOYED POPULATION	182	-	246	-	243	-	218	-	233	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. They can also serve as an indicator of community recovery resources. Finally, data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Table 3 presents business information for the entire zip code (23410) area, not just the incorporated Town. The Town itself only has approximately 15 establishments (Personal communications, Mayor Charles Wilbur, June 8, 2021) which include a hair salon, Boggs Water & Sewage, an antique store, tax services, a furniture store, a construction company, storage units, contractors, Shore Stop, and CGR Firearms.

Table 3: Melfa Business Establishment Types

Industry Code Description	Total Establishments			
	2021*	2014	2012	2010
Agriculture, Forestry, Fishing, and Hunting	-	-	-	-
Construction	~2	4	6	6
Manufacturing	-	3	3	4
Wholesale Trade	-	5	5	3
Retail Trade	~4+	8	8	7
Real Estate and Rental and Leasing	-	0	0	1
Information	-	-	-	-
Finance and Insurance	~1	-	-	-
Transportation and Warehousing	~1	3	4	4
Professional, Scientific, and Technical Services	-	5	4	5
Administrative and Support and Waste Management Remediation Services	~2+	4	3	3
Health Care and Social Assistance	-	1	1	0
Arts, Entertainment, and Recreation	-	1	1	2
Accommodation and Food Services	~1+	2	2	4
Other Services (Except Public Admin)	~1	5	5	5
Total, All Establishments	~15	41	42	44
Total Employees	-	-	-	-

Source: *Personal Communications, Mayor Charles Wilbur, 2021; Census Zip Code Business Pattern, 2013, 2011, 2009

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. ACS 2019 five-year estimates show approximately 190 total housing units in the Town with approximately 7% being vacant. There is a trailer park containing several double-wide and single-wide trailers that sits just outside of Town limits and smaller structures in need of repair located on Main Street off Route 13 (Personal communications, Mayor Charles Wilbur, June 8, 2021). There are a few derelict homes within the Town that remain vacant, with one in the process of being repaired. Often times, vacant homes pose a threat during a hazard due to lack of maintenance and loose debris.

Table 4: Melfa Housing

	2019*	2013**	2010***	2000****
Total Housing Units	190	218	202	205
Occupied	177	170	179	183
Vacant	13	48	23	22
Owner-Occupied	133	143	179	144
Renter-Occupied	44	27	42	39
Median Housing Value	$146,100	$143,500	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2013, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

U.S. Route 13 and the abandoned railroad corridor run parallel northeast to southwest through the Town and are two of the Town's most dominant features. Ongoing efforts intend to convert the abandoned railroad corridor into a Rail-to-Trail to provide multi-use access from the southern Town of Cape Charles in Northampton County up to the Town of Hallwood in Accomack County. The segment of the Eastern Shore Rail Trail that will run from the Town of Onley and through Melfa aims to provide safe, multimodal access to the Eastern Shore Community College. Route 13 is designated as part of several essential highway networks, including the national defense Strategic Highway Network (STAHNET), the National Highway System, and the Eastern Shore's only hurricane evacuation route. Furthermore, the State of Virginia has named U.S. Route 13 a "Corridor of Statewide Significance," which emphasizes the long-distance movement of goods and people.

Average daily traffic in the Melfa section of Route 13 was about 15,000 in 2020, with approximately 92% consisting of 2-axle vehicles, 6% tractor-trailers, and the remaining a mix of heavy multi-axle trucks, buses, and other vehicle configurations (*VDOT Daily Traffic Volume Estimates*, 2020).

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary or obtain essential supplies to make hazard mitigation preparations. The number of households with no vehicle is relatively low according to 2019 ACS data displayed in Table 5. There is confidence that all of these residents without a vehicle have family or friends that would be able to assist in the event an evacuation or hazard mitigation preparation is needed (Personal communications, Mayor Charles Wilbur, June 8, 2021).

Table 5: Melfa Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	5	2	7	7
One	88	49	78	78
Two	43	67	102	102
Three or more	41	52	28	28

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

Melfa is on Star Transit's purple and red routes. Although there are not regularly scheduled stops in Town, it is part of the deviated route system and drivers will stop at Vance's Furniture and Tienda Manuel Store with advance notice. The service has regular stops at the Eastern Shore Community College, located just outside of Town limits. Shore Ride also provides services up and down the Eastern Shore.

COMMERCIAL AREAS

The traditional "Town Center" is located on the east side of the abandoned railroad tracks. Businesses include Vance's Furniture, Bogg's Water and Sewage, CGR Firearms, Affordable Septic Solutions, and more (Personal communications, Mayor Charles Wilbur, June 8, 2021).

As with many small towns on the Eastern Shore, and as business becomes more oriented to the highway, new businesses have chosen to locate directly along Route 13. Since the abandoned Bay Coast Railroad and future Eastern Shore Rail-to-Trail prevents development directly on the east side of Route 13, Melfa's highway-oriented development is all on the west side, which includes two gas stations/convenience stores.

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

PUBLIC SAFETY

Police protection is provided by the Accomack County Sheriff's Department and Virginia State Police. The State Police post for the Eastern Shore of Virginia is located about one-mile northeast of Melfa.

The Melfa Volunteer Fire and Rescue Company was organized in May 1950 in the aftermath of the "Easter Sunday Fire." Presently, the Fire Company operates a fleet of six apparatus, including two advanced life support ambulances, two engines, a 2,500-gallon tanker, and a brush truck. Additionally, there are three trailers that are kept on the station's property. The Melfa Fire Station was built in 2002 and includes three bays, a community room, bunk rooms, restrooms, station watch room, laundry room, offices, and storage areas. In addition to serving Melfa, the Melfa Volunteer Fire and Rescue Company serves portions of Bobtown, Boston, Hacks Neck, Harborton, Keller, Texacotown, Savageville, and various outlying areas.



Figure 2 : Melfa Volunteer Fire and Rescue Company Station on Hatton Avenue

WATER SUPPLY AND WASTEWATER

Melfa residents rely on private wells for their water supply and private septic systems for disposal. These residential wells are potentially at risk of contamination from aboveground and underground petroleum storage tanks (AST and UST). Most homes in the Town are heated by oil (ACS, 2019), which is stored in these tanks. If not properly maintained, ASTs and USTs and gas station storage tanks can pose a significant water quality risk to the Town.

SOLID WASTE DISPOSAL

The Town has a trash truck and offers pick up every Monday, which is then delivered to the Accomack County Landfill located in Town. Additionally, residents can take their refuse to a County Convenience Center, of which the closest is the Grangeville facility on Wachapreague Road. The Town also offers free spring and fall clean-up opportunities within the Town.

PARKS AND RECREATION

The Melfa Town Park located at the end of Woodland Avenue offers a lit baseball field, picnic area, playground equipment, a hiking trail, soccer field, benches, grills, and pet friendly areas (Personal communications, Mayor Charles Wilbur, June 8, 2021).

DRAINAGE DITCHES

The Town enlists the services of a private contractor to complete ditch cleaning for litter and brush removal in the spring and fall seasons. VDOT and Accomack County also maintain several ditches in the Town. In the summer of 2015, the Town paid the County to replace the culvert pipe by the Town Hall. This effort has considerably prevented street flooding in the Town; however, there is also significant flooding on Woodland Avenue and near Vance's Furniture on Railroad Avenue. The Town is currently looking into the replacement of the culvert near Vance's Furniture (Personal communications, Mayor Charles Wilbur, June 8, 2021).

SCHOOLS

Although there are no schools within Melfa Town limits, the Eastern Shore Community College is less than a mile south of the Town and Pungoteague Elementary School is located approximately 4 miles southwest of the Town on Bobtown Road. Both schools are located within Melfa's 23410 zip code.

HISTORIC OR CULTURAL RESOURCES

There is a plaque located in the Town of Melfa indicating the tallest point on the Eastern Shore within the Town boundaries. The Town Hall is located in a historic store building.

NATURAL ENVIRONMENT

Melfa lies within the Chesapeake Bay watershed. The Town itself is relatively flat, with most of the Town ranging in elevation from 45 to 54-feet above sea level, although the highest point on the Shore is located west of Route 13 and is 54-feet in elevation. Melfa is not located within the 100-year or 500-year floodplain.

LAND USE LAND COVER

Melfa has a land area of 160 acres. Approximately 60% of the land area is developed with residential land use being the predominant land use category. The majority of the developed land use areas surround Route 13 and there is very little in the way of forest or shrub habitats. Like many towns along the Eastern Shore, the Town of Melfa is surrounded by an abundance of agricultural lands.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) The Town of Melfa began participating in the hazard mitigation planning process in 2016 and the last update to the Town's comprehensive plan was in 1997. The Town's primary risk is associated with storm water flooding.

Table 6 : Town of Melfa Hazard Mitigation Resources

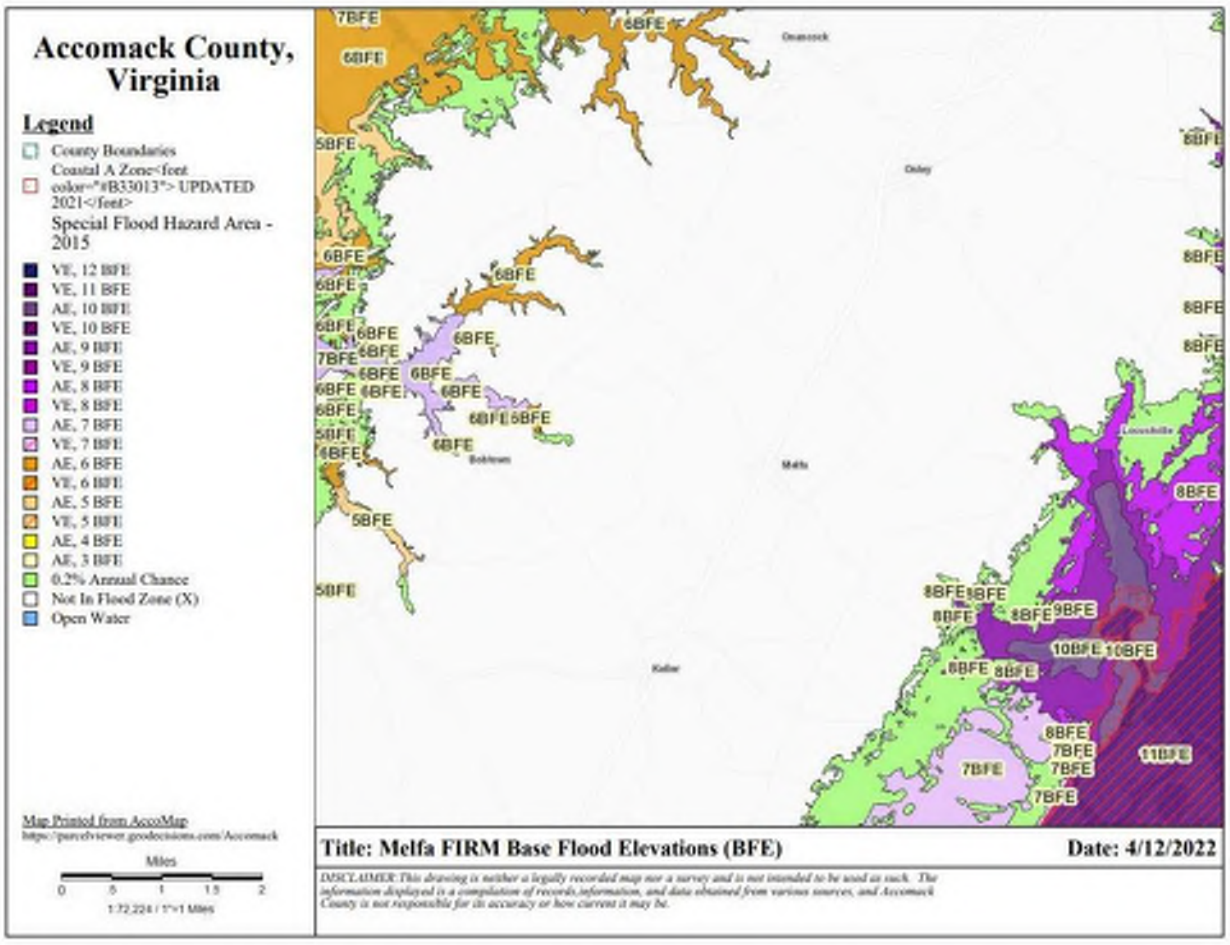
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOODING INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) Melfa does not participate in the NFIP program. No areas within the Town lie in a Special Flood Hazard Area. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 3: Town of Melfa FIRM Base Flood Elevation (BFE)



HMGP

Melfa has not participated in the HMGP.

DISASTER ASSISTANCE

Following severe flooding of the Melfa Town Park and the area around the storage units, a FEMA grant allowed for the installation of culvert piping that has vastly improved the stormwater flooding situation in that area.

HAZARDS PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Melfa responded to the COVID-19 Pandemic by following mask mandates, social distancing guidelines, and any other regulations set forth by the State of Virginia. CARES Act and other federal funding remained with Accomack County.

WIND

No parts of Melfa lie in the wind-borne debris hazard area. This area extends one mile inland from the coast. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code). Most of the Town's residential areas are older and have mature trees around the homes. Falling trees or branches may cause damage to personal property and infrastructure during a high-wind or ice event.

Although there are no records of any tornado damage in the Town, there have been tornadoes touch down just outside of the Town and in other areas in the Region. In July of 2012, the National Weather Service confirmed a tornado touched down approximately 6.5 miles northeast of Melfa in the unincorporated area of Daugherty. Although there were no injuries reported, the storm brought down numerous trees with one tree falling on an unoccupied vehicle. Preparation is vital in order to stay safe and minimize the impacts of such a hazard.

STORMWATER FLOODING

Melfa is underlain by some soils that are unsuitable for drainage and rainwater. Arapahoe mucky loam (very poorly drained) and Nimmo sandy loam (poorly drained) are the dominant soil types, along with Munden sandy loam (moderately well drained) and Bojac sandy loam (well drained). Installation of culvert pipes has lessened the stormwater flooding in the Town; however, Woodland Avenue and around the area of Vance's Furniture on Railroad Avenue are still in need of a culvert, as ditches are currently just draining into the street (Personal communications, Mayor Charles Wilbur, June 8, 2021). The lower portion of Main Street is mostly impacted by stormwater flooding and lower portions of the Town still have drainage issues even several days after heavy rains (Personal communications, Mayor Charles Wilbur, June 8, 2021).

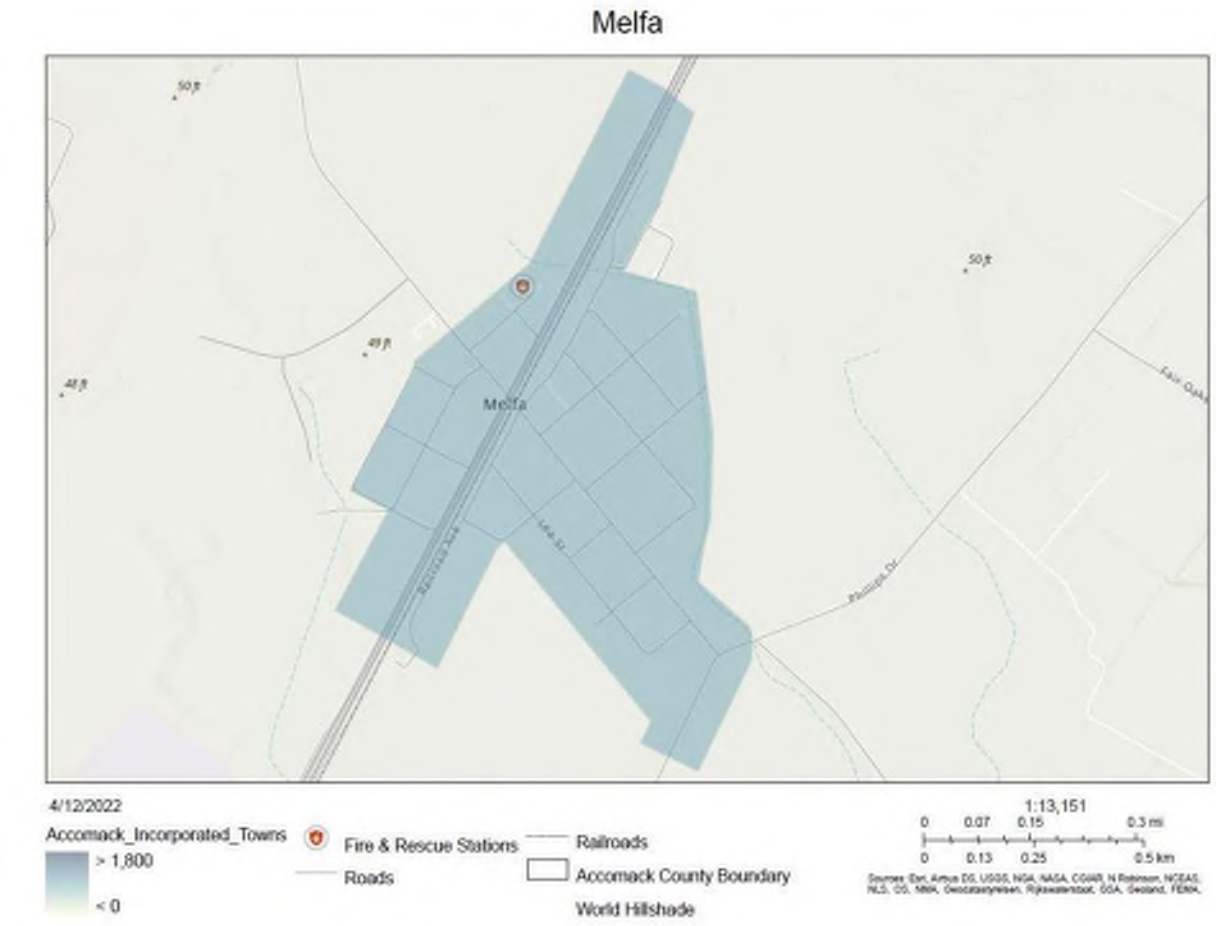
COASTAL EROSION

No structures in Melfa are at immediate risk to coastal erosion.

COASTAL FLOODING

No portions of the Town lie within the Special Flood Hazard Area. The threat of coastal flooding within the Town is considered to be minimal.

Figure 4: Town of Melfa Flood Hazards to Infrastructure



HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

The Town faces a threat of ground water contamination from failed septic systems within the Town as well as leaks and spills of petroleum-based products from underground storage tanks.

ICE & SNOW STORMS

Ice and snow storms, particularly coupled with strong winds, have historically caused damages to properties in Town in the past. It is not uncommon for these storms to cause power outages and secondary streets to become impassable.

HAZARDOUS MATERIALS

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.

TORNADOES

Although there are no records of a tornado touching down in Melfa, there have been instances of tornadoes nearby the Town and elsewhere in the Region, therefore, it is important to be prepared in the event one of these hazardous storms were to occur.

CRITICAL FACILITIES

The following table lists the critical facilities and their relative importance to the Town. Nandua High School, not in the Town or any incorporated area, is critical, as it serves as the shelter of last resort for residents. Additionally, the State Police Office and the Eastern Shore Community College, although outside of the Town limits, are also critical facilities to the Town.

Table 7: Town of Melfa Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Melfa Town Office	-	-	X	X	Stormwater, Wind, Fire	400+	Major Disruption	Yes	Yes
Town Park	-	-	X	X	Stormwater, Wind, Fire	400+	Inconvenience	No	Yes
Empty Lot	-	-	-	X	Stormwater	400+	Inconvenience	No	Yes
Other Facilities (Not Town-Owned)									
Melfa Post Office	-	-	X	X	Stormwater, Wind, Fire	400+	Major Disruption	Yes	Yes
Internet Towers	-	-	X	X	Stormwater, Wind, Fire	400+	Major Distruption	Yes	Yes
Gas Stations	-	-	X	X	Stormwater, Wind, Fire	500+	Major Disruption	Yes	Yes
State Police Headquarters	-	-	-	X	Stormwater, Wind, Fire	45,000+	Devastating	Yes	Yes
Community College	-	-	-	X	Stormwater, Wind, Fire	3,000+	Major Disruption	No	Yes
Nandua High School	-	-	-	X	Stormwater, Wind, Fire	5,000+	Major Disruption	Yes	Yes
Melfa VFC	-	-	X	X	Stormwater, Wind	5,000+	Devastating	Yes	Yes

FINDINGS

1. Although no part of the Town lies within any flood zone and the highest point on the Eastern Shore is located within boundaries, due to soil types and flat topography, stormwater flooding is the most common hazard experienced by the Town. Additional culverts have been successful in mitigating stormwater flooding in the past, and the Town would like to see additional culverts be installed.

2. The Melfa Volunteer Fire and Rescue Company is vital to the Town and surrounding area not only for fire and rescue, but also as the location of important assets to the region for Hazard Materials and C.E.R.T. response.

3. Due to an aging building stock and mature trees, wind and ice storms pose a significant threat to the community through direct damages and damages to power distribution infrastructure.

CHAPTER 17: TOWN OF ONANCOCK

TOWN PROFILE

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 1884 when the railroad was built further inland. Today, the Town includes 665 acres (just over a square mile) and is a residential center, service area, and small active port with 91 business establishments, many located in its historic downtown area (*Town of Onancock Comprehensive Plan*, 2021).

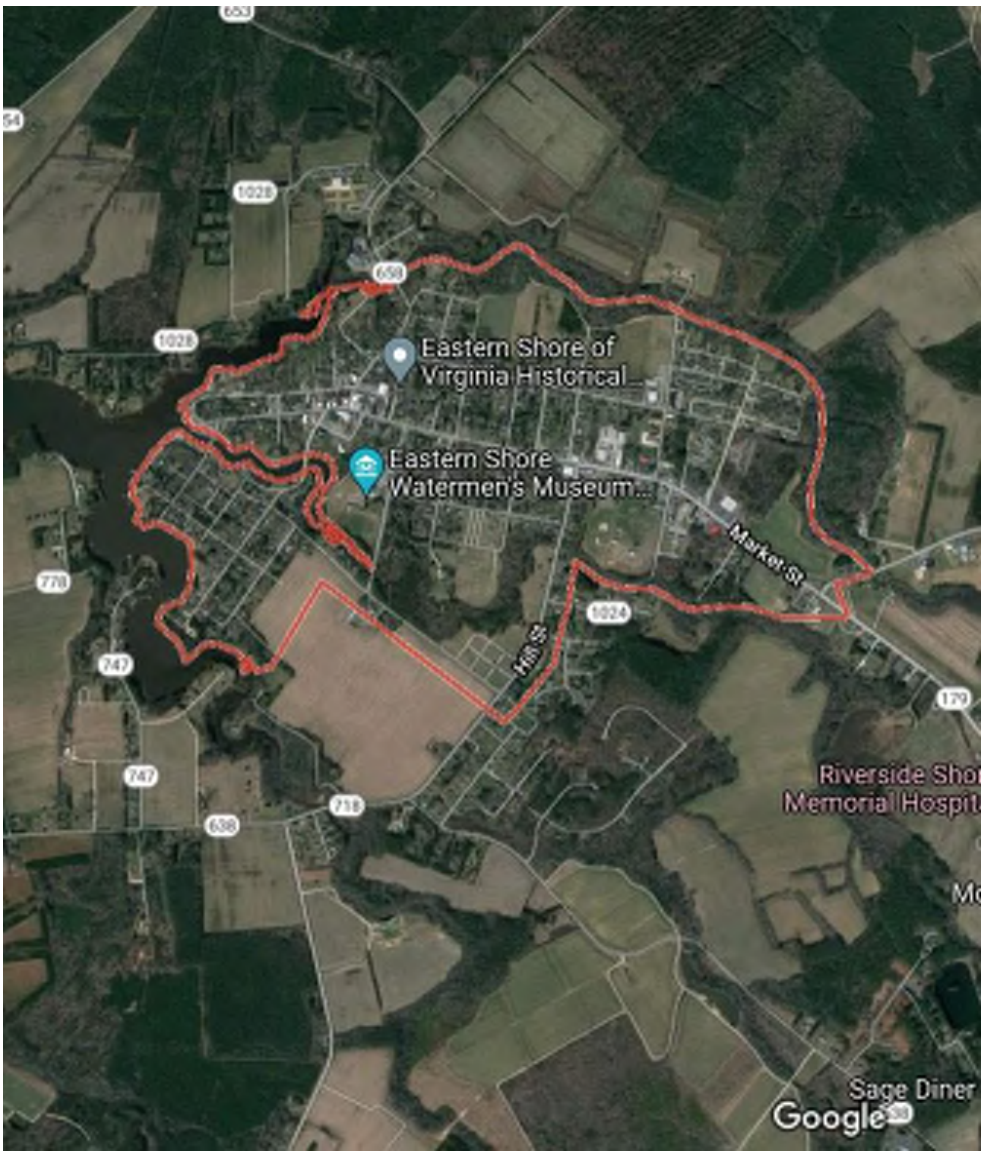


Figure 1: Onancock Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The 2010 Census indicates that the Town had 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. According to the 2019 American Community Survey estimates, the population has continued to decline, now estimated at 1,098. The median age for residents in 2019 was 57.3, signifying a population nearly 20 years older than the national average with 38.6% of the population over the age of 62. Older populations often require additional assistance in the event of a hazard. Over 10% of the population in Onancock speaks a language other than English, which is important to consider during a hazard in regards to accessing safety information. Most, if not all, of these residents are able to access hazard and safety information in a language they are able to understand (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

Table 1 : Onancock Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	1,098	1,226	1,381	1,263	1,525
Median Age	57.3	51.6	50.1	51.1	45.3
Disability	159	101	73	NA	NA
Income					
Median Household Income	$50,347	$39,927	$40,313	$41,372	$28,214
Poverty Level	15.3%	30.1%	25.6%	21.2%	NA
Language					
Only English	89.9%	92.7%	94.7%	93.5%	94.0%
Other	10.1%	7.3%	5.3%	6.5%	6.0%
Spanish	5.4%	0.3%	0.9%	6.3%	4.1%
Ind-Euro	2.8%	6.6%	4.2%	0.2%	0.8%
Asian	1.9%	0.0%	0.0%	0.0%	0.1%
Other	0.0%	0.3%	0.2%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population, 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. Additionally, they can identify where disruptions in employment and income might occur in the aftermath of a disaster.

Onancock has seen a declining workforce since 2000, as shown in Table 2. The majority of the workforce is employed in the educational, health care, and social services industry as well as the professional, scientific, and waste management industry, likely due to the Town's Waste Water Treatment Plant. A large portion of residents also work in retail trade, reflective of the downtown retail area, and manufacturing, due to the close proximity of various industrial poultry processing plants nearby. Following an emergency situation that caused significant negative impacts to the tourism industry, the rebound for the Town would most likely also be negatively impacted; however, the portion of the workforce employed in education, construction, professional services, and utilities would be in high need, potentially lessening the negative impact.

Table 2 : Onancock Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010*****		**2000******	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	7	1.7%	15	3.0%	16	2.2%	11	1.8%
Construction	3	0.7%	21	4.2%	72	10.0%	36	6.0%
Manufacturing	40	9.8%	91	18.1%	88	12.2%	86	14.3%
Wholesale trade	12	2.9%	6	1.2%	47	6.5%	51	8.5%
Retail trade	43	10.5%	49	9.7%	76	10.6%	81	13.5%
Transportation and warehousing, and utilities	19	4.6%	5	1.0%	27	3.8%	11	1.8%
Information	2	0.5%	10	2.0%	11	1.5%	16	2.7%
Finance, insurance, real estate, and rentals	33	8.0%	37	7.4%	22	3.1%	24	4.0%
Professional, scientific, waste management	63	15.4%	37	7.4%	47	6.5%	37	6.2%
Educational, health care, social services	88	21.5%	143	28.4%	126	17.5%	131	21.8%
Arts, entertainment, recreation, food	32	7.8%	48	9.5%	94	13.1%	42	7.0%
Public Administration	44	10.7%	33	6.6%	73	10.2%	48	8.0%
Other	24	5.9%	8	1.6%	20	2.8%	26	4.3%
TOTAL CIVILIAN EMPLOYED POPULATION	410	-	503	-	719	-	600	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Onancock is one of the few incorporated towns in the region that has an entity responsible for increasing the success of the community in order to enhance the quality of life for the citizenry. The Onancock Business & Civic Association fills this role and is an excellent resource for new residents, entrepreneurs, and information about businesses in the Town.

Onancock was once an active maritime shipping center for locally grown produce. Though it remains an active maritime port of seafood landings and commodity imports, the rail and truck shipping industry supplemented the transport of locally grown produce. The majority of Onancock's industry focuses on retail and commercial areas. There are also construction businesses, several food and accommodation services, retail shops, art galleries, theaters, museums, and more throughout the Town.

Table 3: Onancock Business Establishment Types

Industry Code Description	Total Establishments			
	2019	2013*	2011*	2009*
Agriculture, Forestry, Fishing and Hunting	-	1	1	1
Construction	~8	12	10	11
Manufacturing	1	2	1	1
Wholesale Trade	1	1	2	2
Retail Trade	18	14	11	14
Information	-	4	4	4
Finance and Insurance	5	5	4	4
Real Estate and Rental and Leasing	6	7	6	8
Professional, Scientific, and Technical Services	6	8	11	10
Management of Companies and Enterprises	1	1	1	1
Administrative and Support and Waste Management and Remediation Services	3	3	4	5
Health Care and Social Assistance	5	9	9	9
Arts, Entertainment, and Recreation	9	2	4	4
Accommodation and Food Services	17	10	10	8
Other Services (Except Public Admin)	18	11	14	14
Total, All Establishments	91+	90	92	96
Total Employees	-	590	518	533

Source: Directory of Businesses and Services | Town of Onancock, Virginia, * Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Vehicles available to households is one indicator of a household's ability to evacuate when necessary. The Town of Onancock does have some higher density, multi-family accommodations on the northwest area of Town. During educational outreach, these areas would be well-suited for additional focused attention.

In 2019, the ACS five-year estimates show a slight drop in total housing units from 794 to 771 and a dramatic increase in vacant housing units. The majority of these units are single-family housing and are owner-occupied. The presence of substandard housing in Onancock has been greatly reduced over the last 40 years. There is still a presence of some substandard housing in disrepair; however, the Town has a very active plan for removing housing blight. In the last few years, six structures have been demolished and removed and ten were repaired. Grant applications to continue this work are currently in progress (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

Generally, a large portion of vacant housing units can be hazardous during storms due to lack of maintenance and loose debris; however, the Town's efforts in removing dilapidated structures helps to mitigate this hazard. The remaining portion of vacant homes in the Town are largely in part due to seasonal residents, second homes, retirees, and vacation homes. Town officials have also stated they believe this number to be too high (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

Table 4: Onancock Housing

	2019*	2014**	2010***	2000****
Total Housing Units	771	794	753	733
Occupied	547	649	594	656
Vacant	224	145	159	77
Owner-Occupied	359	394	350	411
Renter-Occupied	188	255	244	245
Median Housing Value	$196,900	$183,000	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Market Street (Route 179) serves as Onancock's primary street and provides a direct route in and out of the Town to Route 13. Other major roads in Town include Hill Street (Route 179), Liberty Street, and North Street. Hill Street connects to communities from the south such as Cashville, East Point, and Pungoteague. The most active internal collector roadways in Town are Kerr Street and Boundary Avenue. VDOT maintains approximately 75% of the Town's roadways, with the Town maintaining the remaining 25% (*Town of Onancock Comprehensive Plan*, 2021). Vehicular traffic through the Town is a growing concern as many residents and visitors are walking and biking as a means of transportation and recreation at increasing rates. A "Road Diet" funded through SMART SCALE should help to mitigate this issue. VDOT has sponsored a transportation plan for Onancock that includes bike trails, and the Town plans to connect the bike trail to the future Eastern Shore Rail-to-Trail that will stretch approximately 49 miles from the Town of Cape Charles north to the Town of Hallwood. Planning efforts for these projects are ongoing. Several streets are in need of maintenance and repair to potholes that have formed due to regular vehicular traffic as well as repairs made to water and sewer lines.

STAR Transit offers weekday bus service to Chincoteague and Cape Charles, with stops to all major communities, shopping centers, health care facilities, and government offices. Shore Ride offers transportation services to and from almost anywhere on the Eastern Shore, including Salisbury, Maryland and Norfolk/Virginia Beach, Virginia. The seasonal Tangier Ferry offers regular service to Tangier Island and offers foot passengers and bicyclists the opportunity to connect to other boats travelling to Reedville, Virginia and Crisfield, Maryland (*Town of Onancock Comprehensive Plan*, 2021).

Table 5: Onancock Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	63	94	105	95
One	212	284	274	256
Two	165	172	218	200
Three or more	107	99	118	100

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***ACS, 2006-2010, ****U.S. Census 2000

Individuals with personal vehicles can most often more easily remove themselves and their families from harm's way in the event of an emergency. According to Table 5, as of 2019, 11.5% of the Town's occupied residences are without a single vehicle. Although this is a vast improvement from 2010 Census figures, it should still be taken into consideration in planning for a hazard. Golf carts and utility vehicles may also be used on certain streets within the Town where the speed limit is 25-mph or lower when driven by a licensed driver (*Town of Onancock Comprehensive Plan*, 2021). Golf carts have been increasingly utilized within several towns throughout the Region.

COMMERCIAL AREAS

Commercial activity in the Town is concentrated in three areas along Market Street and separated from each other by residential land uses. The first commercial area is referred as the "business highway" or "uptown" area and includes a laundromat, car service stations, and other businesses. The second commercial area is the "business downtown" area located farther west on Market Street. This is the Town's "Main Street" and is characterized by one-story and two-story brick buildings. Commercial activity in this area consists of local government administrative offices, retail shops, restaurants, and several other businesses. The third area of commercial activity is located along the Onancock Harbor or Wharf. Commercial uses include retail stores, a sand and gravel loading area, an oil company, a seasonal ferry service, and commercial fishing operations.

COMMUNITY SERVICES AND FACILITIES

Community facilities comprise all the public services and facilities provided by the Town to all residents. Those services include public water and sewage treatment facilities, police and fire departments, wharf, parks and recreation facilities, and solid waste management.

PUBLIC SAFETY

The Town employs five full-time police officers headquartered at the police station on North Street next to the Town Hall (Police | Town of Onancock, Virginia). Accomack County Sheriff's Department and Virginia State Police also provide assistance when needed. Fire protection and rescue services are provided by the Onancock Volunteer Fire Department. The fire department serves the Town of Onancock and the outlying areas of Deep Creek, Chesconessex, Bayside, Cashville, Nebo, East Point, and part of Savageville. A combination of paid and volunteer firefighters as well as volunteer non-firefighters provide 24/7 coverage. The department currently operates three ALS ambulances and an EMS first response vehicle. Fire apparatus includes one engine, one tanker, one ladder truck and one brush truck as well as a utility vehicle (Fire | Town of Onancock, Virginia). A 1993 tanker that could carry two individuals was recently replaced with a new one that is able to carry four and has recently applied for a FEMA grant to replace air packs for self-contained breathing apparatus (Vaughn, C., "OVFD Update" *Eastern Shore Post*, 2021).

PARKS AND RECREATION

Onancock's Town Square is located on Market Street and covers an area of about half an acre. It features a gazebo and two monuments. The Northeast Onancock Community Park is about 14 acres and has a basketball court, playground equipment, and benches. There are fields in the Town at Fireman's Field with no active courts or maintained fields. The fields at the water tower are leased for recreational sports use.

The Onancock Wharf and Marina facility includes 12 floating dock slips and two stationary slips available for local and transient use. Public restrooms and private bath houses as well as free laundry facilities for slip rental guests are also available. The Marina sells non-ethanol mid-grade gasoline and diesel fuel, 10 lb. bags of ice, and provides hourly or daily golf cart rentals (Wharf Information | Town of Onancock, Virginia). The public boat ramp is currently closed for renovations. Adjacent to the Marina, the Onancock Landing Park boasts a kayak and paddle board launch and several picnic benches. There are plans to construct a new nature trail, bike path, and dog park (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

The Historic Onancock School and Cultural Center contains 13 acres for recreation, exercise, and walking the Nature Trail along Onancock Creek. A playground, ball field, and additional open spaces are available for pet exercise, frisbee, picnics, and more (What to Do | Town of Onancock, Virginia). The Town also contains two cultural museums, the Roseland Theater hosting first-run films as well as monthly international films, and the North Street Playhouse staging live play and other productions throughout the year.

WATER SUPPLY AND WASTEWATER

The Town has a municipal water system supplied by groundwater wells at Hartman Avenue. Well depths are about 265 feet, and sodium hypochlorite is injected into the water at the water tank. Two smaller back-up wells are located at the Parker Street site along with a pump station. The water tower is 168-feet-high and contains a 300,000-gallon elevated storage tank. Water is distributed through 2-, 4-, 6-, and 8-inch water lines.

The Town owns and operates a wastewater treatment facility located on North Street. The facility serves all residents and businesses in Town, as well as the Airport Industrial Park and several businesses and commercial establishments located on the west side of Route 13 south of Route 179 in Onley. The facility was updated in 2012 from a capacity of 250,000-gallons-per-day to 750,000-gallons-per-day. Ownership of the facility is in the process of being transferred to Hampton Roads Sanitation District as part of a regional project that will eventually provide the opportunity for several towns up and down the Eastern Shore of Virginia to connect to the wastewater treatment plant (WWTP). The first phase of the project will connect from the Town of Nassawadox up to the Onancock facility.

SOLID WASTE

The Town contracts with Davis Disposal for weekly residential trash collection, which is transported to the Northern Accomack County Landfill. Many residents also use the Tasley Convenience Center regularly to recycle. The Town also provides monthly pick-up of yard debris (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

POWER AND COMMUNICATIONS INFRASTRUCTURE

Eastern Shore Communications has a contract with the Town to have a receiver on the Water Tower for broadband. AT&T antennae for wireless service and the broadband transmission is also on the water tower. A variety of services are primarily provided by Verizon, Spectrum, and Charter Communications, the latter of which is housed in the Town. The water tower is vital in providing communications during and following emergency situations. Onancock is served by multiple power substations, so the Town is less likely to have widespread power outages during a hazardous event. The Town is currently pursuing a grant to move utilities underground in the Downtown District of Onancock (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

NATURAL ENVIRONMENT

LAND USE LAND COVER

Almost 70% of Onancock is developed; however, this includes green space, such as parks and large grassy yards. This trend can easily be seen in the satellite imagery for the Town, presented in Figure 1, where the majority of the Town is residential. The percentage of wetland area is somewhat low relative to the waterfront property, approximately 3.3 miles, and many of the homes on waterfront properties are less than 80 feet from the water's edge. Because wetlands act as sponges during flooding events, typically areas with more extensive wetland fair better during these events. That said, the elevation of much of Onancock is over 20 feet, thus, the Town is less sensitive to flooding, except the westernmost areas of the Town. Onancock has an official Tree Board to improve their green space and long-term green-scape planning. The Town has also recently implemented a dark-sky policy to help mitigate light pollution for migrating birds and other wildlife (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Onancock has participated in the hazard mitigation planning process since 2006. The Town's primary risk is associated with coastal flooding. The Town updated their comprehensive plan in 2021.

Table 6 : Town of Onancock Hazard Mitigation Resources

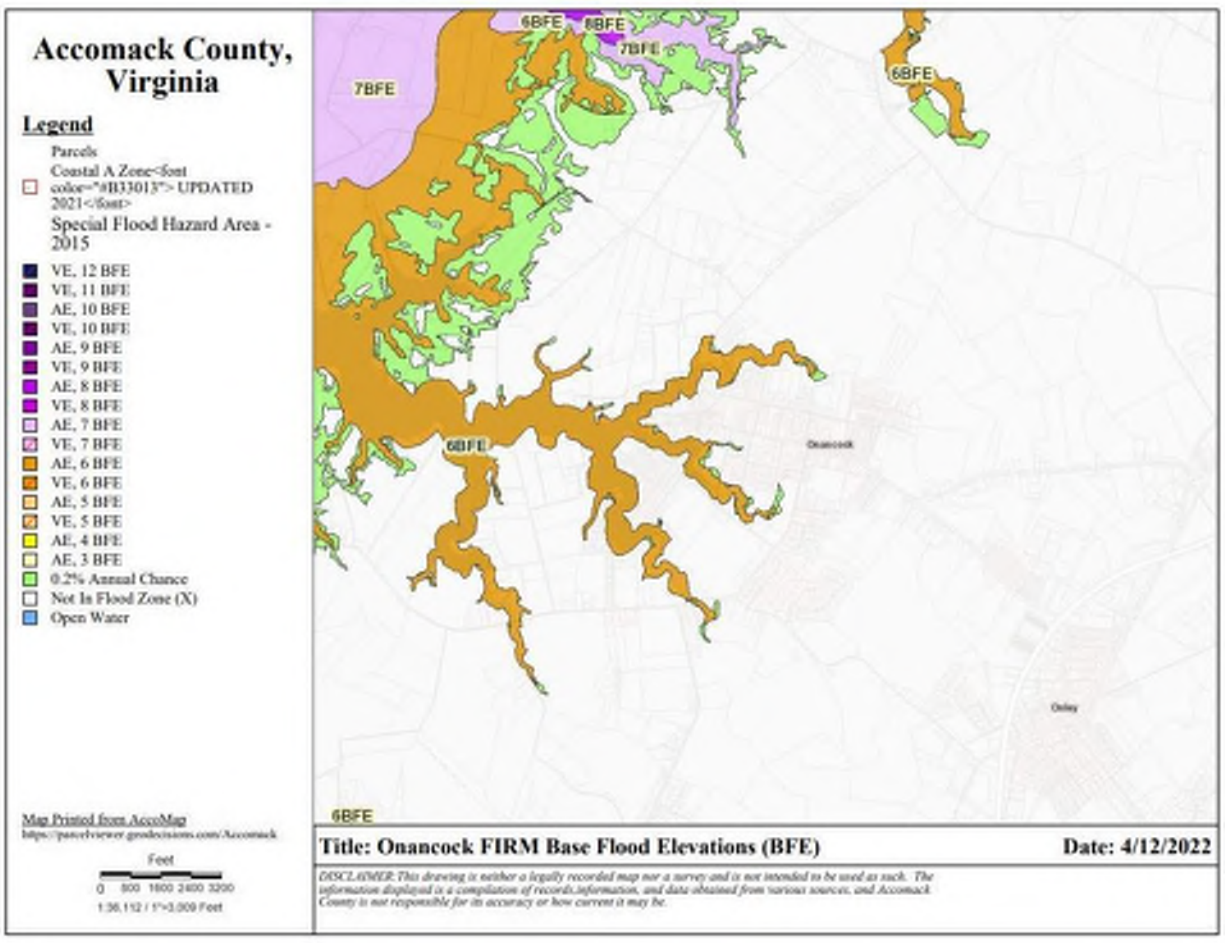
	Ordinances, Plans														Resources, Committees			
Agency	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climage Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional								*	*	*	*	*		*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on December 15, 1981. There are currently 30 active policies in the Town and two claims filed to date. The Town does not participate in the Community Ranking System (CRS). Unlike many of the coastal Towns on the Eastern Shore, the amount of land in the SFHA remained the same with the new 2015 FIRM. Although the area in the SFHA remained at 0.1-square-miles, the delineation shifted slightly, removing two buildings from the zone and adding three buildings for a net increase of only one building in the SFHA.

Figure 2: Town of Onancock FIRM Base Flood Elevation (BFE)



HMGP

The Town has not participated in the Hazard Mitigation Grant Program.

HAZARD PROFILE

PANDEMIC RESPONSE AND READINESS

The Town of Onancock responded to the COVID-19 pandemic in several ways. Matt Spuck, Town Manager, stated that the Town worked diligently with much success to retain all businesses and to keep their residents safe (Personal communications, July 29, 2021). The Town was able to develop and implement an Infectious Disease Plan that provided management the protocols to follow for the health and safety of employees and customers. The Town invested massive amounts of money in technology in order to allow for employees to work remotely and attend virtual meetings. Additional tools and supplies were also purchased to avoid sharing between employees and shifts were staggered to avoid the sharing of vehicles. Federal acts were implemented that governed sick-leave during COVID-19 and how the Town was required to compensate those employees that came into contact with an exposed individual, or were exposed themselves (Personal communications, Matt Spuck, Town Manager, July 29, 2021). The Town Hall remained closed to the public until CDC guidelines and State of Virginia emergency regulations allowed re-opening.

The Town secured several grants and distributed 100% of all funds to residents for utility payments and utility-in-arrears support. Residents also received personal protective equipment (PPE), such as masks, sanitizer, etc. on behalf of the Town. In addition, hundreds of thousands of dollars were distributed to businesses that remained open throughout the course of the pandemic and PPE was also provided to them by the Town. Not one business in Onancock was lost during the COVID-19 Pandemic (Personal communications, Matt Spuck, Town Manager, July 29, 2021).

WIND

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) 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, potentially leading to damaged 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. An old wood shop building located on school grounds is also a potential safety hazard, as high-winds could result in flying debris. The Town is currently seeking funding in order to remove the structure (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

The Hazus® model projects a total economic loss of approximately $10.1 million for a 1%-annual-chance hurricane, which represents 1.46% of the total replacement value of the region's buildings.

Building-related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are losses associated with inability to operate a business due to the damage sustained during the 1%-chance hurricane. Business interruption losses also include the temporary living expenses for displaced individuals.

The total property damage losses were projected at $10 million, with 3% of the estimated losses related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, making up over 96% of the total losses.

The model estimates that a total of 24,387 tons of debris will be generated. Of the total amount, 21,264 tons (87%) is Other Tree Debris. Of the remaining 3,123 tons, Brick/Wood comprises 16% of the total, Reinforced Concrete/Steel

comprises 0%, and the remaining is Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 20 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,626 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

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. The initial dredging of the Onancock Creek in the 1800's allowed the Town to develop and prosper. Regular dredging and maintenance of the Onancock Creek channel to prevent shoaling and ensure navigability is vital for the economics of the Town.

COASTAL FLOODING

The Flood Insurance Study (FIS) for Onancock, completed in 1981, identifies that the greatest threat of flood inundation comes from hurricanes and nor'easters. The Town is located inland from the Chesapeake Bay and development within the floodplain is minimal (Onancock FIS). 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 2015 *FEMA Flood Risk Report* for Accomack County, the Town of Onancock still 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. According to the Hazus® model, total building-related losses were $3.37 million, with 37% of the estimated losses related to business interruption of the region. The residential occupancies made up 66.47% of total losses during a 100-year storm event. As of 2016, there were only four NFIP policies in the A Zone, indicating that 7 properties and 5 structures in the flood zone are uninsured (FEMA NFIP Insurance Report, 2016).

The model also estimates that there will be a total of 111 tons, or 5 truckloads, of debris generated during a 100-year storm event. Twelve households, or 35 individuals, will be displaced due to flooding. Displacement includes households evacuated from within or very near inundated areas. Of these individuals, 14 will seek our temporary public shelters.

Figure 3: Town of Onancock Flood Hazards to Infrastructure

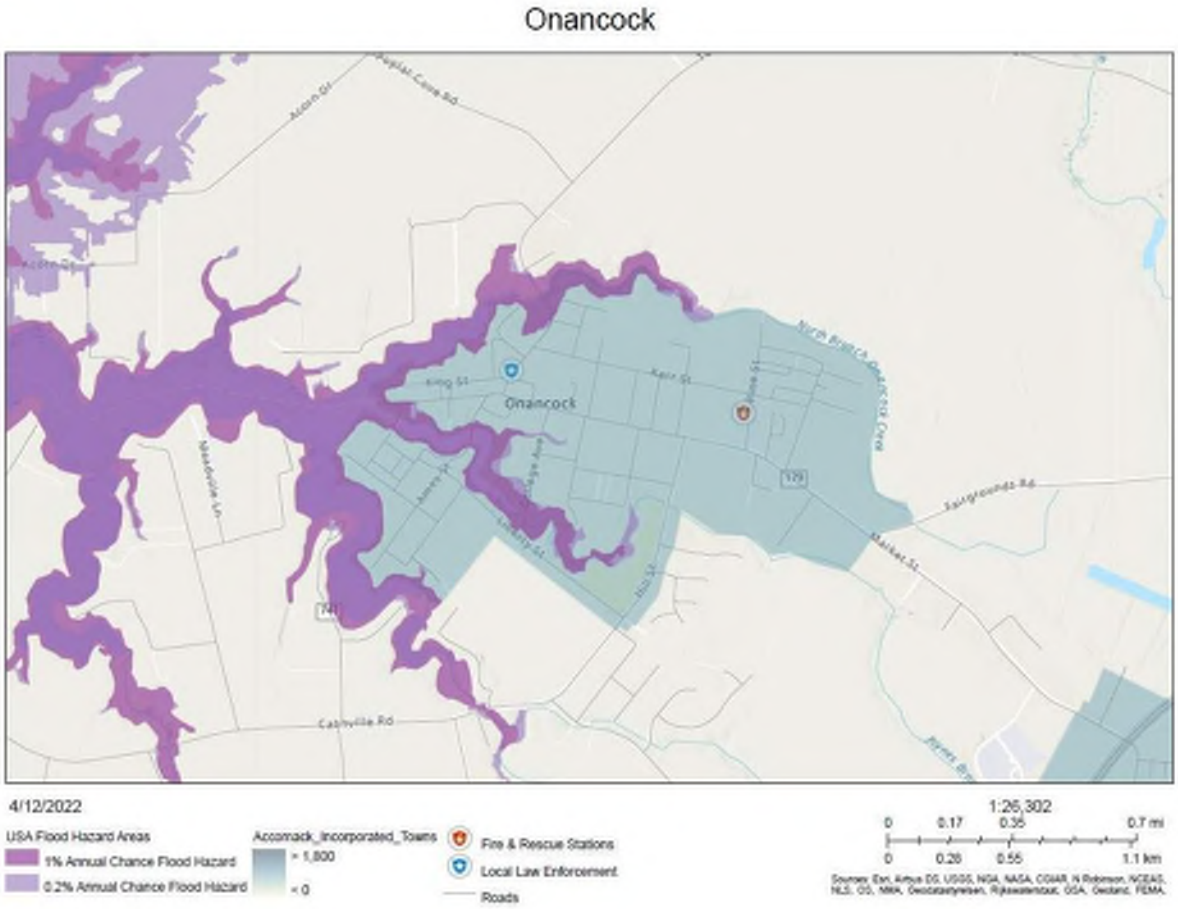
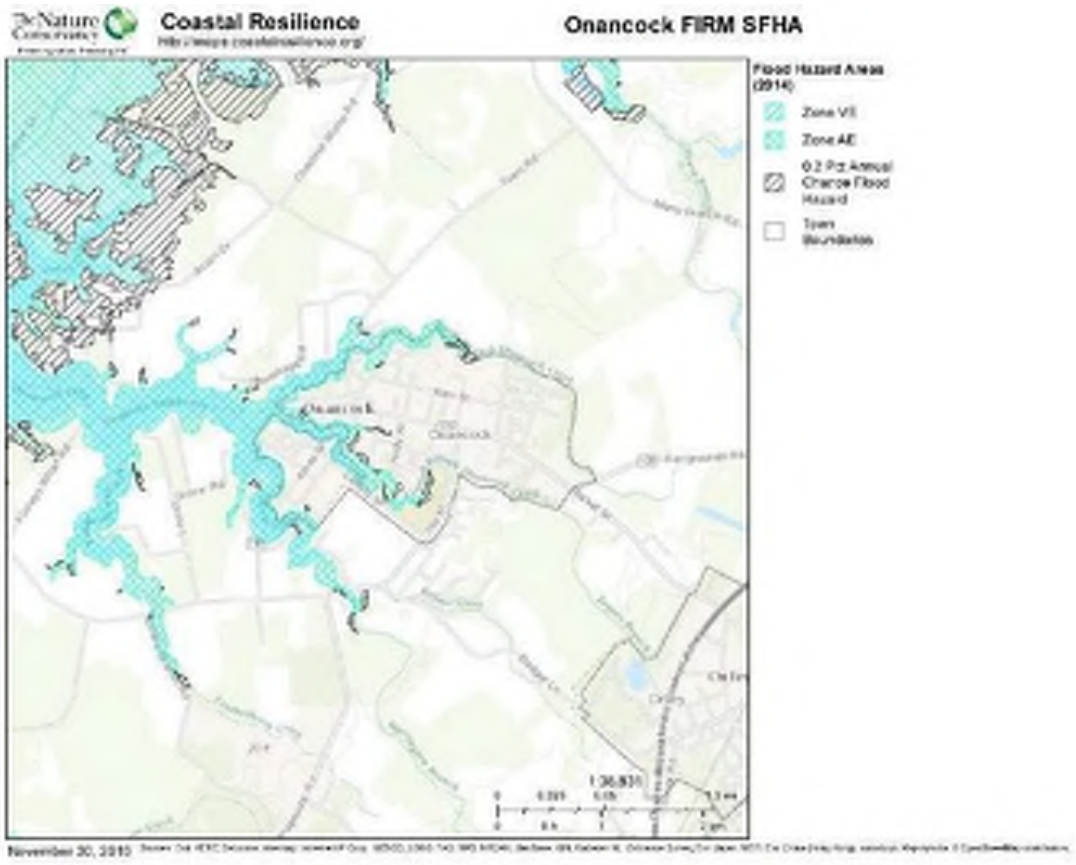


Figure 4: Onancock Special Flood Hazard Areas Identified, as presented in the TNC Coastal Resilience mapping tool



The Town also has three facilities that are affected by flooding: the wastewater treatment plant (WWTP), Onancock Wharf, and the Harbormaster's House. The WWTP could contaminate Onancock Creek and North Branch, and to a lesser extent, the Chesapeake Bay, if it 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. The Town now has a 4,000-gallon storage and dispensing tank at the Wharf. The new Onancock Wharf Harbormaster's House, completed in 2014, was built several feet higher than the previous building and is more resilient to flooding damages (Personal communications, Russell Jones, Town Mayor, June 2, 2016). Figure 4 reveals an increasingly more common flooding situation at the Onancock Wharf and Marina. Recent repairs were made to the parking lot and drain approaches, however, flooding during storm events continues to be a significant issue.

Figure 5: Clockwise from top: The historic Hopkins Store, the new Harbormaster's House, and the parking lot, all of the Onancock Wharf during the October 2015 North American storm complex, largely influenced by Hurricane Joaquin. Photo by Connie Morrison







STORM WATER FLOODING

An additional 19 structures carry flood insurance, but are not located in a flood zone (FEMA NFIP Insurance Report, January 2016). This may indicate potential storm water flooding issues within the Town. The total number of NFIP policies rose from 10 in 2003 to 30 in 2011, but fell to 23 in 2016 (FEMA NFIP Insurance Report, July 2003, May 2011, January 2016).

The soil in Onancock drains well compared to many areas on the Eastern Shore and due to its coastal location, there is a change in elevation (reaching sea level approaching the surrounding creeks). Despite this, the Town still experiences some stormwater flooding problems, including the building that houses the Town Office and Police Station. Of particular concern is Lilliston Avenue, west of Lee Street, which is partly paved right off of Market Street. VDOT is responsible for the maintenance of the ditches adjacent to state-owned roads; however, there are several roads that are owned by the Town for which the Town is responsible. The Town contracts for weed control in Town-owned drainage ditches (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

HAZARDS OF LOCAL SIGNIFICANCE

HAZARDOUS MATERIALS

Due to the existence of the fuel tanks at the Wharf, there is potential for a Hazmat incident to cause damage to Onancock Creek, North Branch, the existing homes on King Street, commercial buildings on Market Street, and the Onancock Wharf and Marina. There are also houses located on the Creek outside of the Town's boundaries that could be damaged by such an incident.

GROUNDWATER CONTAMINATION

Onancock's location on the Onancock Creek and its direct connection to the Chesapeake Bay cause the Town to be vulnerable to two types of saltwater intrusion. Wells further inland could lead to vertical movement of brackish water found below the lens of potable water. Because all of the Town residents rely on the municipal water system, which is supplied by groundwater wells, this is of high concern. Further south on the Bayside, the Town of Cape Charles has already experienced salt water intrusion.

NAVIGATION HINDRANCES

Hindrances to navigation or a lack of channel maintenance would negatively impact the Town's economy.

MOSQUITO-BORNE ILLNESSES

Like many areas on the Eastern Shore, the Town of Onancock experiences a high volume of mosquitoes that could potentially put residents and visitors at risk for mosquito-borne illnesses, such as West Nile and Zika virus. The Town contracts to have a twice-weekly Town-wide spray from April through October in order to reduce the number of mosquitoes and the associated diseases (Personal communications, Matt Spuck, Town Manager, March 31, 2021).

CRITICAL FACILITIES

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

Table 7: Town of Onancock Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Town Office/Police Station	X	X	X	X	Wind, Stormwater Flooding, Fire	1,098+	Major Disruption	No	Yes
Onancock Town Wharf and Marina	-	-	X	X	Wind, Coastal Flooding, Erosion, Ice, Groundwater Contamination	2,500+	Devastating	No	Yes
Waste Water Treatment Plant	X	X	X	X	Wind, Flooding	1,098+	Devastating	No	No
Water Supply Tower	X	X	X	X	Wind, Stormwater Flooding	1,098+	Major Disruption	No	No
South Street Pump Station	X	X	X	X	Coastal Flooding, Stormwater Flooding	1,098+	Major Disruption	No	Yes
Other Facilities (Not Town-Owned)									
National Guard Armory	X	X	X	X	Wind, Fire	1,098+	Major Disruption	No	Yes
Fire Station	X	X	X	X	Wind, Stormwater Flooding	3,500+	Major Disruption	No	Yes
Telephone Company Exchange Building	X	X	X	X	Wind, Stormwater Flooding, Fire	45,000+	Major Disruption	No	Yes
Gas Station	-	-	X	X	Wind, Stormwater Flooding, Fire	1,098+	Minor Disruption	Yes	Yes
Riverside Shore Memorial Hospital	-	-	-	X	Wind, Stormwater Flooding, Fire	45,000+	Devastating	No	Yes

FINDINGS

1. The greatest threat to the Town is the secondary effects of flooding. A 1%-annual-chance flood event would directly impact 9 structures within the Town and cause an estimated $555,806 in damages.

2. Most of the residential areas are older construction with mature trees. During a wind, snow, or ice event, branches and trees may come down causing secondary wind damage and power outages.

3. A 1%-annual-chance wind event is estimated to affect 65 buildings and cause approximately $3 million in damages.

4. The Town's wastewater treatment plant (WWTP) now has increased capacity and a backup power supply. Hampton Roads Sanitation District (HRSD) is taking over operations of the facility.

5. There are several higher occupancy housing areas in the Town that may not have access to personal vehicles and may require additional efforts in outreach for education about preparation for hazard events and for assistance during and following an event.

6. Other hazards facing the Town include hazardous materials incidents, groundwater contamination from saltwater intrusion and potential fuel spills at the Wharf, navigation hindrances, and mosquito-borne illnesses.

CHAPTER 18: TOWN OF ONLEY

TOWN PROFILE

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. The rest of the Town remains largely residential (*Town of Onley Comprehensive Plan*, 2017).

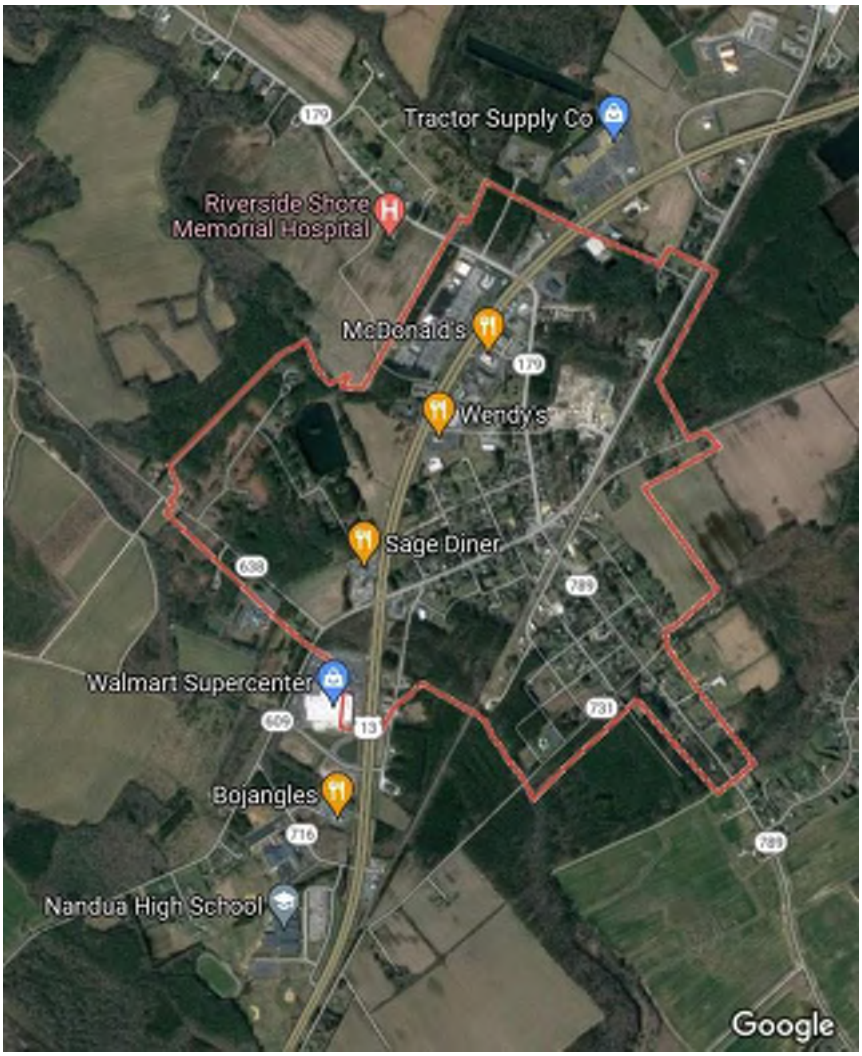


Figure 1: Onley Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information. The following sections are intended to provide insight in the make-up and characteristics of the community and how it relates to hazard vulnerability.

DEMOGRAPHICS

The Town's population grew from 415 in 1960 to an estimated 530 in 2015 (U.S. Census, 1960; Personal communications, John Pavlik, Zoning Administrator, February 18, 2016). According to the American Community Survey five-year estimates, the population in Onley in 2019 was 728. This may be an overestimate, as previous years have remained relatively stable in regards to population estimates. The median age of 40.0 is slightly older than the national and state median age, which is generally good in terms of preparing for a hazard. The high median household income displayed in Table 1 for 2010 and 2013 may be attributed to a large portion of the population nearing retirement and at the highest of their pay range during that time. This is also reflected by the decrease of the civilian employed population, shown in Table 2.

There has been a steady increase in residents that speak a language other than English since 2010 (ACS 2019). This is extremely important to consider when planning for a hazard. It is pertinent that residents in Town are able to access important safety information in a language they are able to understand.

Table 1: Onley Demographic Information

	2019*	**2014****	**2013*****	**2010******	**2000*******
Population	728	502	598	516	496
Median Age	40.0	50.0	45.3	48.6	46.3
Disability	59	31	33	NA	NA
Income					
Median Household Income	$53,690	$59,643	$80,813	$74,417	$36,750
Poverty Level	19.1%	13.3%	10.9%	NA	NA
Language					
Only English	80.4%	87.8%	89.8%	97.0%	91.3%
Other	19.6%	12.2%	10.2%	3.0%	8.7%
Spanish	13.2%	8.0%	9.6%	3.0%	3.8%
Indo-Euro	5.4%	4.2%	0.5%	0.0%	1.1%
Asian	1.0%	0.0%	0.0%	0.0%	3.8%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population, 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

The majority of the workforce in Onley works in education, health, and social services, with a large increase in manufacturing and public administration since 2014, according to ACS estimates. There are also substantial portions of the population that work in the construction, manufacturing, and public administration industries. The

manufacturing industry is likely dominated by the block and concrete company located in Town and poultry processing positions at nearby plants, such as Perdue Farms and Tyson Foods. These companies often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts on the Town. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local shops, nor family necessities, and other dependent agricultural businesses would be at a loss as well.

Riverside Shore Memorial Hospital relocated just outside of Town limits and opened in February of 2017 (*Town of Onley Comprehensive Plan*, 2017). New businesses have already began locating to the original downtown area and along the Route 13 corridor. This trend will likely continue and have an affect on the local workforce industry.

Table 2: Onley Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010******		**2000*******	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	0	0.0%	3	1.1%	0	0.0%	10	3.0%	9	3.9%
Construction	43	16.0%	27	9.5%	38	10.7%	16	4.8%	15	6.5%
Manufacturing	49	18.2%	23	8.1%	17	4.8%	0	0.0%	28	12.1%
Wholesale trade	10	3.7%	30	10.6%	54	15.3%	49	14.8%	3	1.3%
Retail trade	16	5.9%	14	4.9%	35	9.9%	45	13.6%	11	4.7%
Transportation and warehousing, and utilities	23	8.6%	7	2.5%	8	2.3%	0	0.0%	5	2.2%
Information	0	0.0%	0	0.0%	38	10.7%	39	11.8%	9	3.9%
Finance, insurance, real estate, and rentals	5	1.9%	3	1.1%	20	5.6%	24	7.3%	19	8.2%
Professional, scientific, waste management	14	5.2%	13	4.6%	9	2.5%	17	5.1%	11	4.7%
Educational, health care, social services	55	20.4%	123	43.3%	98	27.7%	91	27.5%	59	25.4%
Arts, entertainment, recreation, food	0	0.0%	12	4.2%	9	2.5%	0	0.0%	37	15.9%
Public Administration	44	16.4%	17	6.0%	16	4.5%	23	6.9%	15	6.5%
Other	10	3.7%	12	4.2%	12	3.4%	17	5.1%	11	4.7%
TOTAL CIVILIAN EMPLOYED POPULATION	269	-	284	-	354	-	331	-	232	-

Source: *ACS, 2014-2019, **ACS. 2012-2014, ***ACS, 2010-2012, ****U.S. Census 2010, *****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Onley is one of the larger commercial centers of the Virginia Eastern Shore. Because of its location on Route 13, this area is the County's hub of commercial activity. Businesses located adjacent to Route 13 include a variety of retail stores and services, restaurants, a grocery store, three banks, two motels, and professional offices (*Town of Onley Comprehensive Plan*, 2017). Another large shopping center, Chesapeake Square, lies adjacent to the Town's northwestern corporate limits, but the majority of the Town's commercial activity is concentrated along Route 13 and in the shopping center. A Wal-Mart is located on land adjacent to Onley's southern border. The Town expects that there will be a continuous increase in businesses with the new hospital located just outside Town limits. There

is no recent data for business types in the Town of Onley available and officials were not able to provide estimates (Personal communications, Chief of Police John Spivey, May 6, 2021); however, the Town of Onley Website states there are currently more than 80 retail businesses.

Table 3: Onley Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013*	2011*	2009*
Construction	-	6	6	7
Manufacturing	-	1	1	1
Wholesale Trade	-	1	3	2
Retail Trade	~80+	27	28	30
Information	-	1	2	2
Finance and Insurance	-	6	7	8
Real Estate and Rental and Leasing	-	3	3	4
Professional, Scientific, and Technical Services	-	3	3	4
Management of companies and enterprises	-	0	0	1
Administrative and Support and Waste Management and Remediation Services	-	2	2	2
Educational Services	-	1	0	0
Health Care and Social Assistance	-	10	9	9
Arts, Entertainment, and Recreation	-	1	3	4
Accommodation and Food Services	-	14	12	14
Other Services (Except Public Admin)	-	12	14	16
Total, All Establishments	-	88	93	104
Total Employees	-	1,273	1,230	1,138

Source: The Official Site of Onley, Virginia, *Census Zip Code Business Patterns, 2013, 2011, 2009

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Vehicles available to households is one indicator of a household's ability to evacuate when necessary.

Between 2000 and 2010, there were a significant number of housing units constructed, with the majority of them being single-family residential (U.S. Census, 2000, 2010). Although Town representatives indicated that the number of vacant housing units displayed in Table 4 was too high for each year, they confirm that there seems to be an increase in the number of homes that are occupied by renters as opposed to owners (Personal communications, John Pavlik, Zoning Administrator, February 18, 2016). Although most of the housing stock is in good condition in Onley, there are a few houses scattered throughout the Town that are in various states of disrepair and in need of rehabilitation (*Town of Onley Comprehensive Plan,* 2017).

Table 4: Onley Housing

	2019*	2014**	2010***	2000****
Total Housing Units	372	403	377	271
Occupied	296	313	321	223
Vacant	76	90	56	48
Owner-Occupied	227	198	229	166
Renter-Occupied	69	115	92	57
Median Housing Value	$210,200	$166,700	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

U.S. Route 13 provides north-south access, and State Routes 179 and 789 provide east-west access, making automobile traffic very convenient for Town residents. Streets in Town are maintained by VDOT and are generally in good condition. Public transportation is available through STAR Transit, with bus routes along Route 13. STAR Transit offers weekday bus service from Cape Charles to Chincoteague with stops at all major communities, shopping centers, health care facilities, and government offices (*Town of Onley Comprehensive Plan*, 2017). Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level.

The abandoned Bay Coast Railroad runs through the eastern portion of the Town and previously served as a freight carrier connecting Hampton Roads with the Delmarva Peninsula. The abandoned railroad is the future site for the Eastern Shore Rail-to-Trail that will run from the Town of Cape Charles north to the Town of Hallwood. The railroad right-of-way is maintained by the Town of Onley Public Works. An old freight station is located on the right-of-way, which is currently leased by the Town of Onley until the year 2034. The station is undergoing renovation by a civic organization, the Society of Preservation of the Onley Train Station (*Town of Onley Comprehensive Plan*, 2017).

Sidewalks in Onley are maintained by VDOT, and many are in various states of disrepair. Approximately 25% of the streets in Town are serviced by sidewalks (*Town of Onley Comprehensive Plan*, 2017).

Table 5: Onley Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	8	34	4	21
One	97	67	53	79
Two	111	116	70	72
Three or more	80	96	70	47

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

According to the 2019 American Community Survey five-year estimates, only 8 of the 372 occupied housing units are without a single vehicle. This is a substantial decrease from the 34 without a vehicle in 2014, which may have been an overestimate. In the case of an evacuation or an emergency situation which required immediate relocation, this portion of the Town's population is extremely vulnerable and would be in need of additional assistance.

COMMERCIAL AREAS

The majority of the commercial land is located along Route 13. There are various shopping plazas along the main corridor of the highway, including the Four Corners Plaza and Chesapeake Square. There is also a small concentration of businesses along Main Street, the Town's original business district (*Town of Onley Comprehensive Plan*, 2017). Just outside of the Town limits are additional concentrated business areas such as the Riverside Shore Memorial Hospital and a Wal-Mart, which is actually built partially in the Town limits and partially in the unincorporated area of Accomack County.

COMMUNITY FACILITIES

Community facilities include the services and functions provided by the Town government, in coordination with other public and private agencies. Such facilities are essential to support the Town and its development to enhance the overall quality of life for its residents. Community facilities include necessities such as public safety services, solid waste collection, mosquito control, and street lighting (*Town of Onley Comprehensive Plan*, 2017).

PUBLIC SAFETY

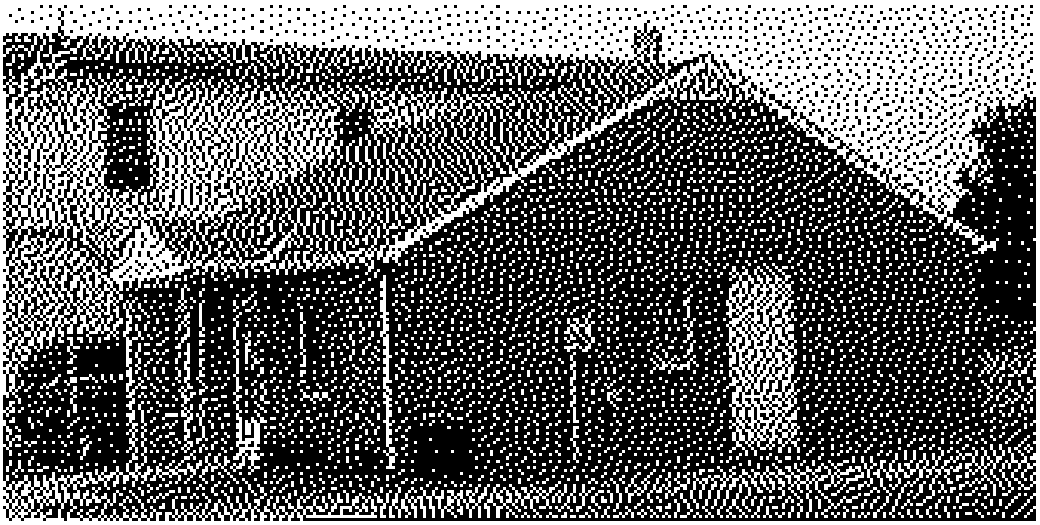
Police protection is provided by five sworn officers employed by the Town, with back up service provided by the Onancock Police Department, Accomack County Sheriff's Department, and the Virginia State Police. Fire and Rescue services have been terminated as of July 2017. These services are now provided by nearby Onancock, Tasley, and Melfa Fire and Rescue (*Town of Onley Comprehensive Plan*, 2017). *See Onancock and Melfa's respective chapters for personnel and inventory information.

TOWN OFFICE

Onley's Town Office, built in the late 1970s, houses the Town's administration services and Police Department. The Town employs a Town Treasurer, a part-time clerk, and a part-time Zoning Administrator to carry out administrative, zoning, and financial functions of the Town.

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.

Figure 2: Onley Town Office & Police Department. Photo by Ann Devletian, 2003



PARKS AND RECREATION

The George M. McMath Town Park, shown in Figure 3, opened officially on October 24, 2020. The Park is located at 21062 Colonial Avenue and offers a walking path, walking labyrinth, ornamental pond with a sculpture, pavilion, cooking grills, and playground equipment (Personal Communications, Chief Spivey, March 30, 2021).



Figure 3: George M. McMath Town Park. Photo by John Spivey

SOLID WASTE

The Town of Onley provides weekly residential trash collection services, contracted out to Davis Disposal. Private contractors are responsible for emptying large dumpsters within the Town that are used primarily by commercial establishments. The Town also conducts a general clean-up week for brush and debris removal twice a year. Recycling and waste disposal centers are located in the nearby Town of Tasley and further south in Painter (*Town of Onley Comprehensive Plan*, 2017).

WATER SUPPLY AND WASTEWATER

Residents and businesses in Onley rely on individual private wells for their water supply. All residents use private on-site septic systems for sewage and wastewater disposal, and the majority of businesses treat wastewater and sewage through mass drain-fields. Several businesses on Route 13 utilize a sewage trunk line which is connected to a wastewater treatment facility in Onancock that has the possibility of expanding in the future (*Town of Onley Comprehensive Plan,* 2017). The Wal-Mart, only partially within Town limits, has its own sewage disposal system.

DRAINAGE DITCHES

Drainage ditches are maintained by VDOT in order to help prevent stormwater flooding. East of Route 13, ditches lead out to Rat Trap Creek which handles approximately 75% of stormwater runoff from each of Route 13. Stormwater to the west of Route 13 drains to Joynes Branch, a tributary of Onancock Creek that drains into the Chesapeake Bay (*Town of Onley Comprehensive Plan*, 2017).

SCHOOLS

There are no schools or known daycares within the Town of Onley; however, Nandua High School is located less than a mile south of Town limits and is a designated shelter for Accomack County. Nandua Middle school is less than a half mile from Town limits.

NATURAL ENVIRONMENT

Elevations in Onley range from approximately 35 to 45 feet above mean sea level. Land is relatively flat with slopes from 0% to 1% (*Town of Onley Comprehensive Plan*, 2017). Soils in Onley are highly permeable and approximately 40% are hydric soils with a depth to groundwater of 0-36 inches. These soils are extremely susceptible to pollutant leaching and contaminating ground water and are poorly drained (*Town of Onley Comprehensive Plan*, 2017). Soils in Onley are a major limiting factor to development due to their inability to support on-site septic systems.

LAND USE LAND COVER

Total land area of the Town of Onley is 486 acres. Of that, approximately 32% is used for residential land use. Commercial land use accounts for 20% of acreage in Town and 46% of the land is undeveloped and consists of both vacant (woodlands and undeveloped parcels) and agricultural land. The majority of the undeveloped land is unsuitable for septic tank use due to the predominance of sensitive soil types and a shallow depth-to-groundwater table (*Town of Onley Comprehensive Plan*, 2017).

GROUNDWATER

Residents of Onley obtain their drinking water through individual private groundwater wells. There are 83 acres of Onley contained within the recharge spine located east of Route 13. This recharge spine is important to maintain good quality of ground water for Eastern Shore residents. Onley is located in Wellhead Protection Area C – Perdue Area. Major water withdrawals from this area are the Perdue Poultry Processing Plant, Pacific Tomato Growers packing facilities, Helena Chemical in Tasley, the towns of Onancock and Parksley, Riverside Shore Life Care Nursing Home, and Nandua High and Middle Schools. This Wellhead Protection Area is the largest on the Shore.

Accomack County's Comprehensive Plan promotes the Town of Onley as a future growth area and concentrates future growth around existing population centers to preserve agricultural land and the Eastern Shore's rural character. The policy promotes protection of the Eastern Shore's groundwater supply by reducing development pressures along the length of Route 13 and the recharge spine (*Town of Onley Comprehensive Plan*, 2017).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Onley has participated in the hazard mitigation planning process since 2011. Previously, the Town defaulted to the County plan. The Town's primary risk is associated with stormwater flooding. Onley last updated their comprehensive plan in 2017.

Table 6: Town of Onley Hazard Mitigation Resources

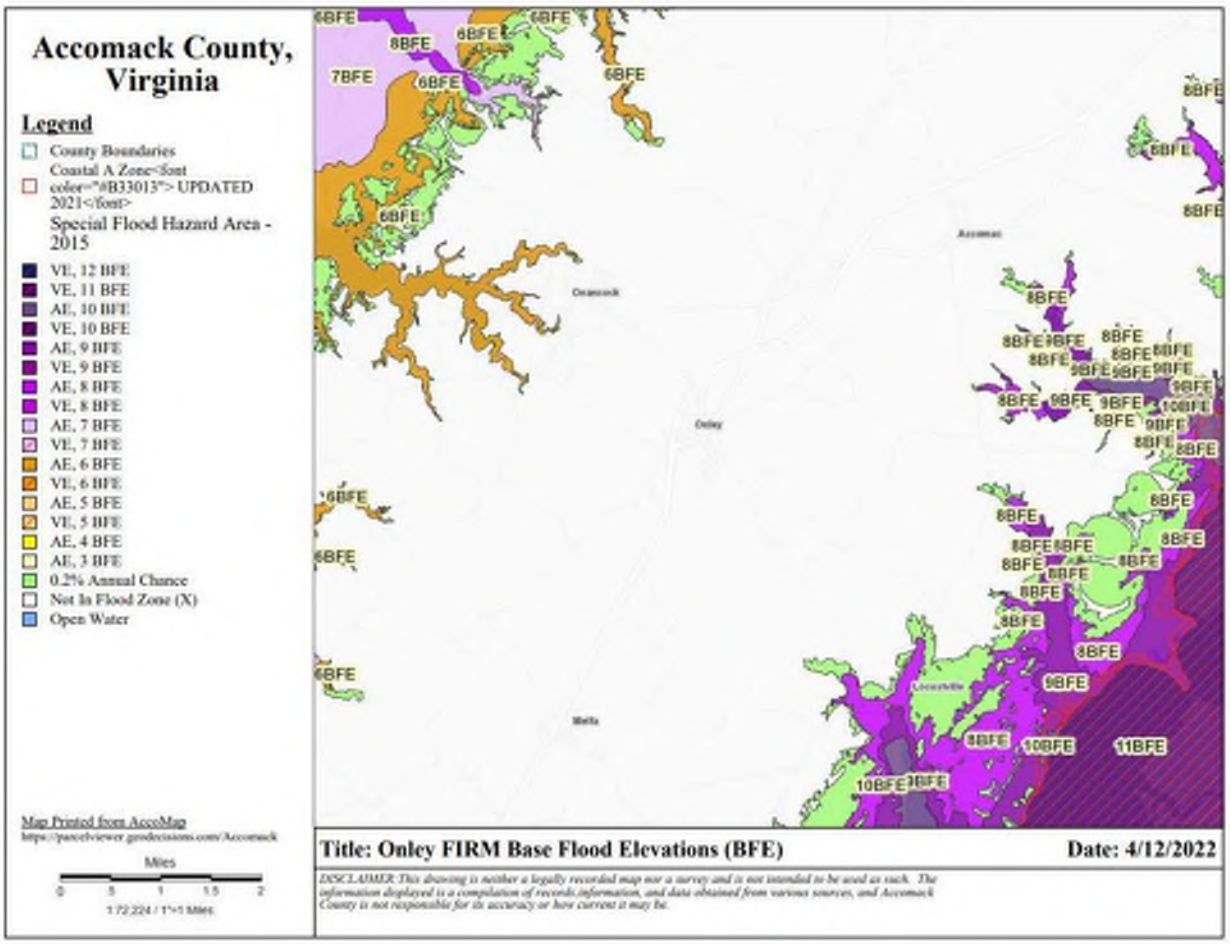
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local		*			*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town of Onley joined the NFIP on February 1, 2012. There is currently one active policy in Town. There are no Special Flood Hazard Areas within the Onley. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 4: Town of Onley FIRM Base Flood Elevation (BFE)



HMGP

The Town of Onley has not participated in the HMGP.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Storm water flooding poses the greatest risk to the Town and has the most frequent impact.

PANDEMIC RESPONSE AND READINESS

The Town of Onley made few changes to normal operations during the COVID-19 pandemic. CARES Act funding was not accepted by the Town and left with the County and no new local policies were put in place. The Town reacted to orders issued by the Governor's office (Personal communications, Chief Spivey, March 30, 2021).

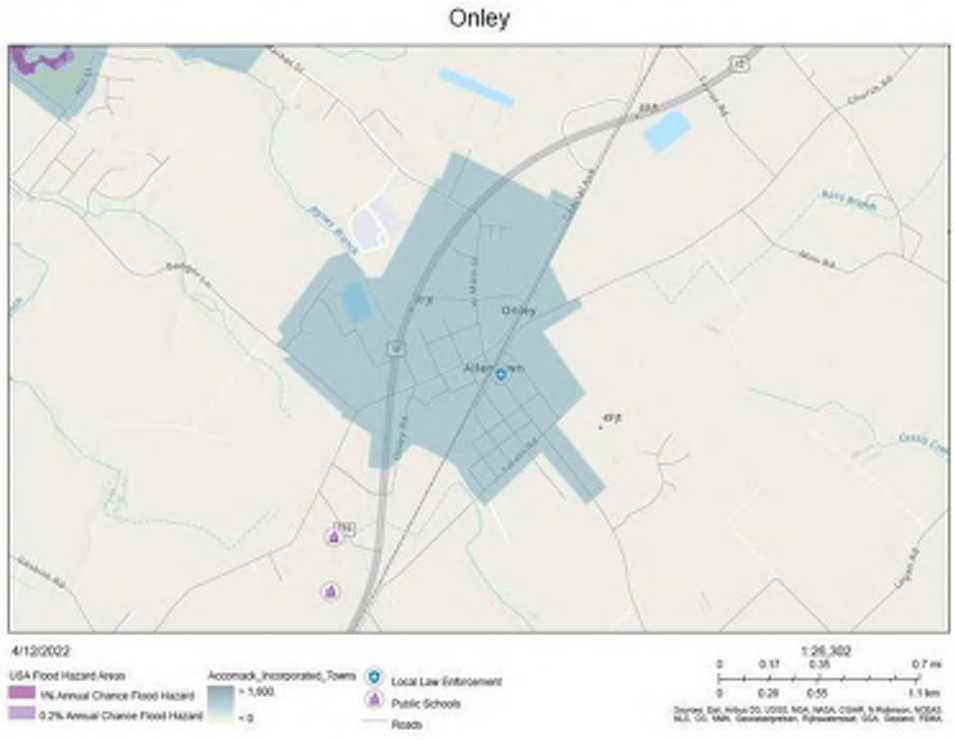
WIND

No parts of Town lie in the wind-borne debris hazard area. This area extends 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 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 FLOODING

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.

Figure 5: Town of Onley Flood Hazards on Infrastructure



COASTAL EROSION

No structures are at immediate risk to coastal erosion.

STORM WATER FLOODING

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.

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.

Areas which experience the most significant flooding are:

- 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
- Main Street near the eastern boundary of Town
- Residential area between Coastal Boulevard, Main Street, and Route 13

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

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 238 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 (*Town of Onley Comprehensive Plan*, 2017). The Town has no public water supply and residents and commercial users are solely reliant on private wells. Large withdrawals of ground water in the vicinity increase the possibility of well interference, salt water intrusion, and a deterioration of water quality (*Town of Onley Comprehensive Plan*, 2017). Presence of groundwater near the surface can cause septic system failure, resulting in groundwater contamination and a danger to public

health. Possible contaminants include nitrates, bacteria, viruses, and a variety of organic and inorganic chemicals from household products (*Town of Onley Comprehensive Plan*, 2017).

In April of 2016, the petroleum storage tanks for the Valero gas station were removed. New tanks were installed west of Route 13 with the new Royal Farms gas station and shop. The Wine Rack Exxon station also replaced their tanks (Personal communications, John Pavlik, Zoning Administrator, February 18, 2016). Aged tanks can pose a threat to the groundwater supply.

SNOW AND ICE

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

FIRE AND SMOKE

The Town faces a threat of fires, particularly during droughts. In the 1970s, there was a fire on Main Street that destroyed a majority of the buildings. Some were later rebuilt with a lower profile.

CRITICAL FACILITIES

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

Table 7: Town of Onley Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Old Town Office/Police Department	-	X	X	X	Flooding Stormwater Wind Fire	516+	Major Disruption	Yes	Yes
Other Facilities (Not Town-Owned)									
Post Office	-	-	X	X	Flooding Stormwater Wind Fire	516+	Major Disruption	Yes	Yes
Riverside Hospital (just outside of Town limits)	-	-	X	X	Flooding Stormwater Wind Fire	44,627+	Devastating	No	Yes
Gas Stations	-	-	X	X	Flooding Stormwater Wind Fire	516+	Major Disruption	No	Yes

FINDINGS

1. The hazards expected to have the greatest impact on the Town are stormwater flooding and high wind events, which have been experienced throughout the Town's history. Other hazards of local significance include groundwater contamination, ice storms, drought, and mosquito-borne disease.

2. Much of the residential areas have older construction and mature trees around homes and churches. During a wind event, branches and trees may come down causing secondary damages and power outages.

3. The combination of poorly drained soils and inadequate drainage has resulted in some stormwater flooding problems for residents and businesses. The Town is interested in mitigating these problems through drainage assessments, design, and construction projects.

CHAPTER 19: TOWN OF PAINTER

TOWN PROFILE

The coming of the New York, Pennsylvania, and Norfolk Railroad in the 1880s initiated a geographical population shift from the coasts to the center of the Eastern Shore. This created several new towns, including the Town of Painter, which lies at the exact center between the Chesapeake Bay Bridge Tunnel and the Maryland state line. Painter, previously called "Mappsburg", was incorporated by the Circuit Court of Accomack County in 1950 and has a total area of 400 acres. The main highway for the Eastern Shore, Route 13, intersects almost directly in the center of the Town (*Town of Painter Comprehensive Plan*, 2002).

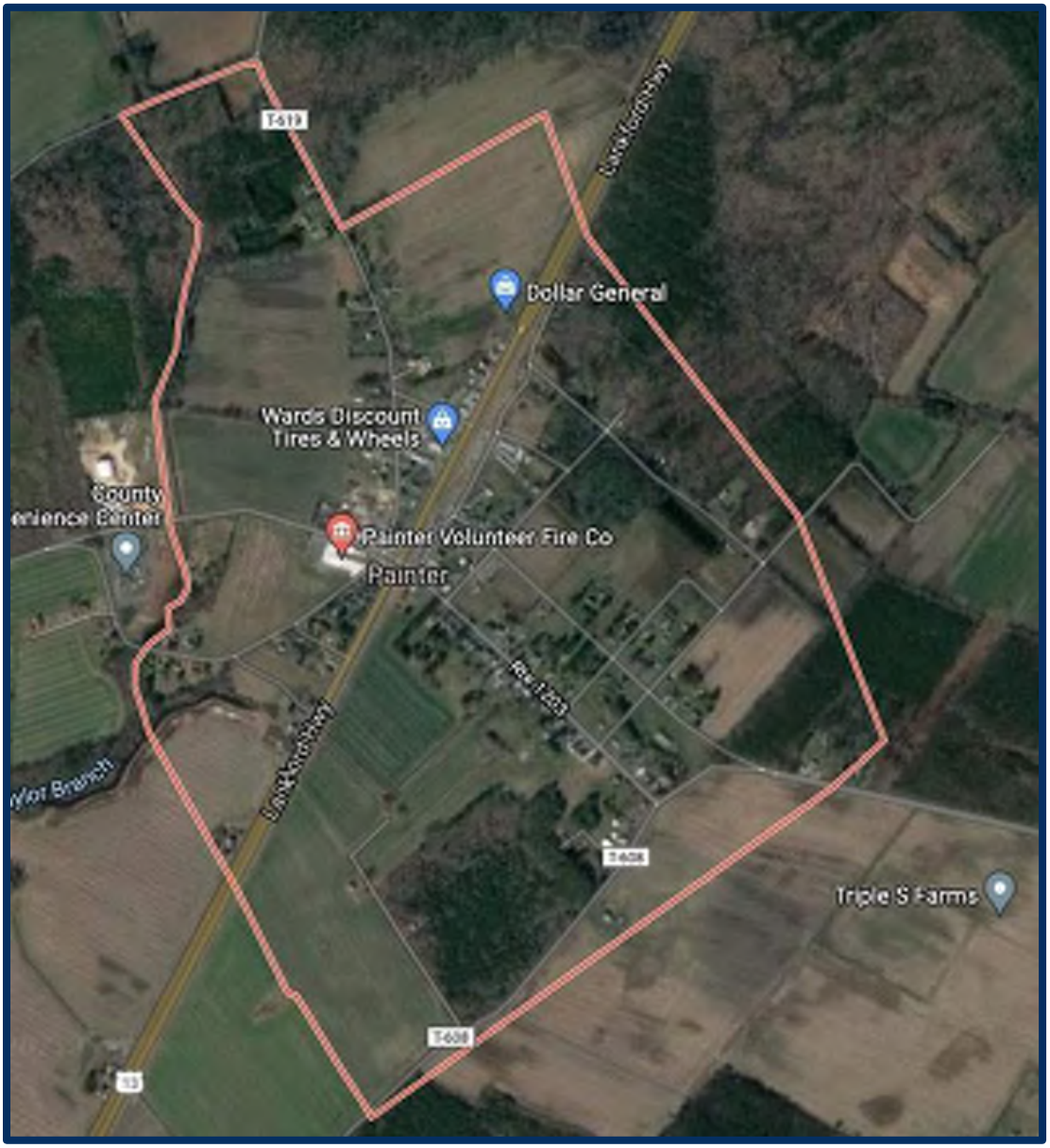


Figure 1: Painter Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to the American Community Survey five-year estimates, the Town of Painter had a population of 245 in 2019. The median age is only 32.5, indicating a younger population; however, Town officials believe that age should be higher (Personal communications, Mayor Connie Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). A younger population is generally good in regards to a hazard, unless there is a high population of young children; however, only 6.5% of the population in Painter is under the age of five. According to the ACS, the majority of the population is between the ages of 5-17 and 25-44 years.

The language residents speak is important to consider in the event of a hazard in regards to residents having the ability to access important safety information in a language they can understand. In the Town of Painter, 17% of residents speak a language other than English, that language being primarily Spanish. It is important for the Town to consider this when planning for hazards and to provide emergency information in both languages.

Table 1: Painter Demographic Information

	2019	2014	2010*
Population	245	308	229**
Median Age	32.5	35.8	39.7
Disability	25	12	NA
Income			
Median Household Income	$40,833	$51,667	$39,063
Poverty Level	33.9%	24.7%	NA
Language			
Only English	83.0%	86.3%	79.2%
Other	17.0%	13.7%	20.8%
Spanish	16.6%	12.6%	20.8%
Indo-Euro	0.4%	1.1%	0.0%
Asian	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%

Source: ACS, 2014-2019, *ACS, 2010, **U.S. Census, 2010

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

According to Table 2, the majority of the work force in Painter is employed in the Educational and Health Care Services industry, which has been on an upward trend since 2010. Previously, a large percentage of the Town also worked in the Arts, Entertainment. Recreation, and Food industry, but according to ACS 2019 estimates, that percentage has decreased significantly. Town officials believe the number of residents employed in the Retail

industry should be higher and the Education and Health Care Services industry is likely lower (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). The total civilian employed population has decreased since 2010 as well, which is likely due to a high number of residents retiring (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). The next two highest industries that employ residents of Painter are Construction and "Other".

Table 2: Painter Local Workforce Industry

Civilian Employed Population						
Industry	**2019**		**2014**		**2010***	
	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	2	1.7%	6	3.8%	10	7.4%
Construction	12	10.6%	5	3.2%	4	2.9%
Manufacturing	9	8.0%	13	8.3%	2	1.5%
Wholesale trade	4	3.5%	23	14.7%	5	3.7%
Retail trade	7	6.2%	13	8.3%	29	21.3%
Transportation and warehousing, and utilities	1	0.9%	15	9.6%	12	8.8%
Information	2	1.7%	0	0.0%	0	0.0%
Finance, insurance, real estate, and rentals	6	5.3%	8	5.1%	12	8.8%
Professional, scientific, waste management	6	5.3%	2	1.3%	2	1.5%
Educational and health care services	37	32.7%	28	17.9%	15	11.0%
Arts, entertainment, recreation, food	8	7.1%	27	17.3%	25	18.4%
Public Admin	6	5.3%	12	7.7%	11	8.1%
Other	13	11.5%	4	2.6%	9	6.6%
TOTAL CIVILIAN EMPLOYED POPULATION	113	-	156	-	136	-

Source: ACS, 2014-2019, *ACS, 2010

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. They can also serve as an indicator of community recovery resources. Finally, data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

The Town of Painter is primarily residential. Nearly all businesses in the Town are located just off Route 13. Some of these businesses include a gas station, Dollar General, a discount tire shop, United States Post Office, a food truck, farmers market, seafood stand, an HVAC shop, a nail salon, day care, and an antique shop (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). The majority of businesses in Painter are in the Retail Trade industry.

Table 3: Painter Business Establishment Types

	Total Establishments
Industry Code Description	**2021**
Agricultural, Forestry, Fishing, and Hunting	2
Construction	1
Manufacturing	0
Wholesale Trade	0
Retail Trade	14
Transportation and Warehousing	0
Information	0
Finance and Leisure	0
Real Estate and Rental and Leasing	0
Professional, Scientific, and Technical Services	1
Administrative and Support and Waste Management Remediation Services	0
Health Care and Social Assistance	1
Arts, Entertainment, and Recreation	0
Accommodation and Food Services	1
Other Services (Except Public Admin)	1
Total, All Establishments	21

Source: Personal Communications, Mayor Connie Campbell and Town Clerk Kerri Atkinson, May 26, 2021

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

According to the American Community Survey five-year estimates, Painter's total housing units dropped from 141 in 2014 to 107 in 2019; however, the 2019 number is estimated to be too low and is likely closer to 2014 and 2010 figures shown in Table 4 (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). Town officials also noted that the number of vacant housing units is likely closer to 15, with many dilapidated and in need of demolition. Although the Town currently does not have any demolition plans, they are interested in seeking funding opportunities to do so.

Another trend to note in Table 4 is the drastic decrease (over 50%) of owner-occupied housing units since 2010. This number is likely too low, whereas the number of renter-occupied units is too high (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021).

Table 4: Painter Housing

	2019	2014	2010*
Total Housing Units	107	141	142
Occupied	86	110	133
Vacant	21	31	9
Owner-Occupied	42	76	92
Renter-Occupied	44	34	41
Median Housing Value	$107,800	NA	NA

Source: ACS, 2014-2019, *ACS, 2010

TRANSPORTATION

U.S. Route 13 is Painter's most visible transportation feature, bisecting the town with 18,000 vehicles per day. The four-lane principal arterial is part of the national defense Strategic Highway Network (STRAHNET), a national system of highways necessary to support U.S. military operations, part of the National Highway System, and the Eastern Shore's only hurricane evacuation route.

The Town of Painter sits directly on Route 13. Just off the highway on both sides are the main residential areas, with the main commercial area being located on Route 13. The rest of the Town is made up of agricultural and wooded areas. Mappsburg Road in Painter connects the Town directly to the main highway, across the highway, and, in the other direction, to the Town of Quinby.

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. According to the 2019 five-year estimates by the American Community Survey, there are five occupied housing units without a vehicle in the Town of Painter; however, these residents have family and friends that would assist in the event of an evacuation (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021). Star Transit and Shore Ride are also available to transport residents up and down the Eastern Shore. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level.

Table 5: Painter Vehicles Available per Household

Vehicles Available	2019
None	5
One	21
Two	37
Three or more	23

Source: ACS, 2014-2019

COMMERCIAL AREAS

The commercial district in Painter is located along Route 13 and Railroad Avenue. Areas off the main highway in Town are primarily residential with agricultural and wooded areas throughout. The commercial district contains several retail shops, a gas station, Dollar General, food trucks and produce stands, as well as a few other businesses. There are two other businesses that are now closed, one of which was previously a bank and has recently been sold. Town officials are not aware of business plans for the former bank (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021).

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard. Community facilities in Painter include the Town Hall and the Fire Department, which are housed in the same building.



Figure 2: Painter Town Hall and Fire Department. Photo by Ashley Mills

PUBLIC SAFETY

Police protection is provided by the Accomack County Sheriff's Department and Virginia State Police. The Painter Volunteer Fire Company provides the Town with fire protection and EMS services. The Fire Company is an all-volunteer department with 24 volunteer firefighters and 5 non-firefighting volunteers. The Company utilizes 2 pump trucks, 1 tanker, 1 brush truck, and a rescue vehicle with the ability to go through high water and snow. There are 2-3 paid EMS staff provided by the Accomack County Department of Public Safety and two ambulances that run out of Painter and are owned by the Wachapreague Volunteer Fire Company (Personal communications, Chief of Painter Volunteer Fire Company, May 26, 2021). Accomack County and surrounding towns also respond to calls when needed.

WATER SUPPLY & SEWAGE DISPOSAL

All residential treatment of wastewater is done through on-site septic systems. The Town has no public water supply and residents and commercial users are solely reliant on private wells and septic systems for their water supply and wastewater disposal. Compared to other areas in the region, Town officials state that the soils in Painter are better for perking, although with heavy rains, septic issues may occur (Personal communications, Mayor Campbell, May 26, 2021).

SOLID WASTE DISPOSAL

The Town contracts with Davis Disposal for weekly residential trash collection, which is transported to a county transfer station. There is an Accomack County Convenience Center located just out of Town limits.

PARKS AND RECREATION

There are no parks within the Town of Painter; however, the Painter Garrison United Methodist Church has a playground and ball field available for residents (*Town of Painter Comprehensive Plan*, 2002).

DRAINAGE DITCHES

Maintenance of drainage ditches and storm drains in Town is the responsibility of VDOT and Accomack County. Stormwater drains are located along Main Street. Lack of maintenance previously resulted in flooding around this area; however, recent maintenance by VDOT has mitigated some of these flooding issues. Town officials stated that VDOT has been digging out ditches to improve drainage in areas just outside Town limits and expect they will be

digging within the Town soon (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021).

SCHOOLS

There are no schools within the Town of Painter. Keewee Cares is a private in-home daycare center located within Town limits (Personal communications, Kerri Atkinson, Town Clerk, May 26, 2021).

NATURAL ENVIRONMENT

The Town of Painter encompasses approximately 400 acres. Elevations in the Town range from a high of 37-feet and a low of 25-feet with overall slopes less than 1%, which may result in flooding due to poor drainage. Soils in Painter are either hydric or highly permeable and have a high potential for groundwater contamination. Presence of groundwater near the surface can cause septic system failure, which could result in groundwater contamination, putting the health of residents at risk (*Town of Painter Comprehensive Plan,* 2002).

LAND USE LAND COVER

The primary land uses in the Town are residential and agriculture, with commercial uses concentrated along the Route 13 corridor (*Town of Painter Comprehensive Plan*, 2002). Soil types in Painter are a major constraint to future development, as the Town has not experienced any new development in several years.

GROUND WATER

The Town of Painter is completely reliant on groundwater and faces a threat of contamination from several sources, including failed septic systems within the Town, leaks and spills of petroleum-based products from underground storage tanks, and major industrial facilities within the area.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Painter is participating in the hazard mitigation planning process for the first time. The Town's primary risk associated with hazards is stormwater flooding.

Table 6 : Town of Painter Hazard Mitigation Resources

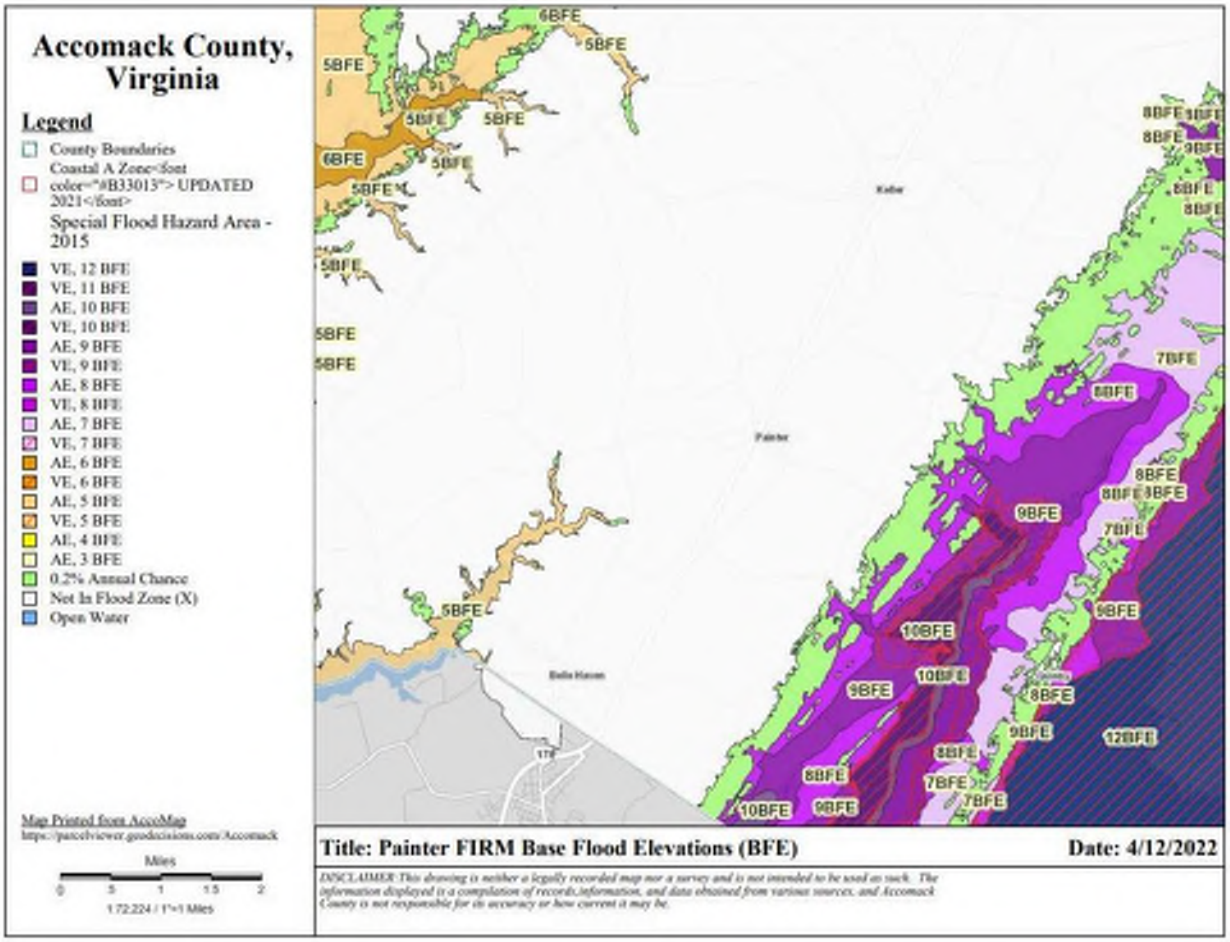
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Viginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town of Painter does not participate in the NFIP. There are no Special Flood Hazard Areas within the Town. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 3: Town of Painter FIRM Base Flood Elevation (BFE)



HMGP

The Town of Painter has not participated in the HMGP.

HAZARDS PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Storm water flooding poses the greatest risk to the Town and has the most frequent impact.

PANDEMIC RESPONSE AND READINESS

The Town of Painter made few adjustments from normal operations during the COVID-19 pandemic. Just one or two Town Council meetings needed to be canceled and were then held in the Painter Fire Department, which provides a larger space within the shared building. Attendees were able to abide by social distancing regulations and wore masks. Due to the Fire Department being a local polling place, the County provided Painter with plexiglass and other guidelines in order to allow voting. CARES Act funds and other federal funding were left with Accomack County by the Town (Personal communications, Mayor Campbell, May 26, 2021).

WIND

No parts of the 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 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.

COASTAL EROSION

No structures are at immediate risk to coastal erosion.

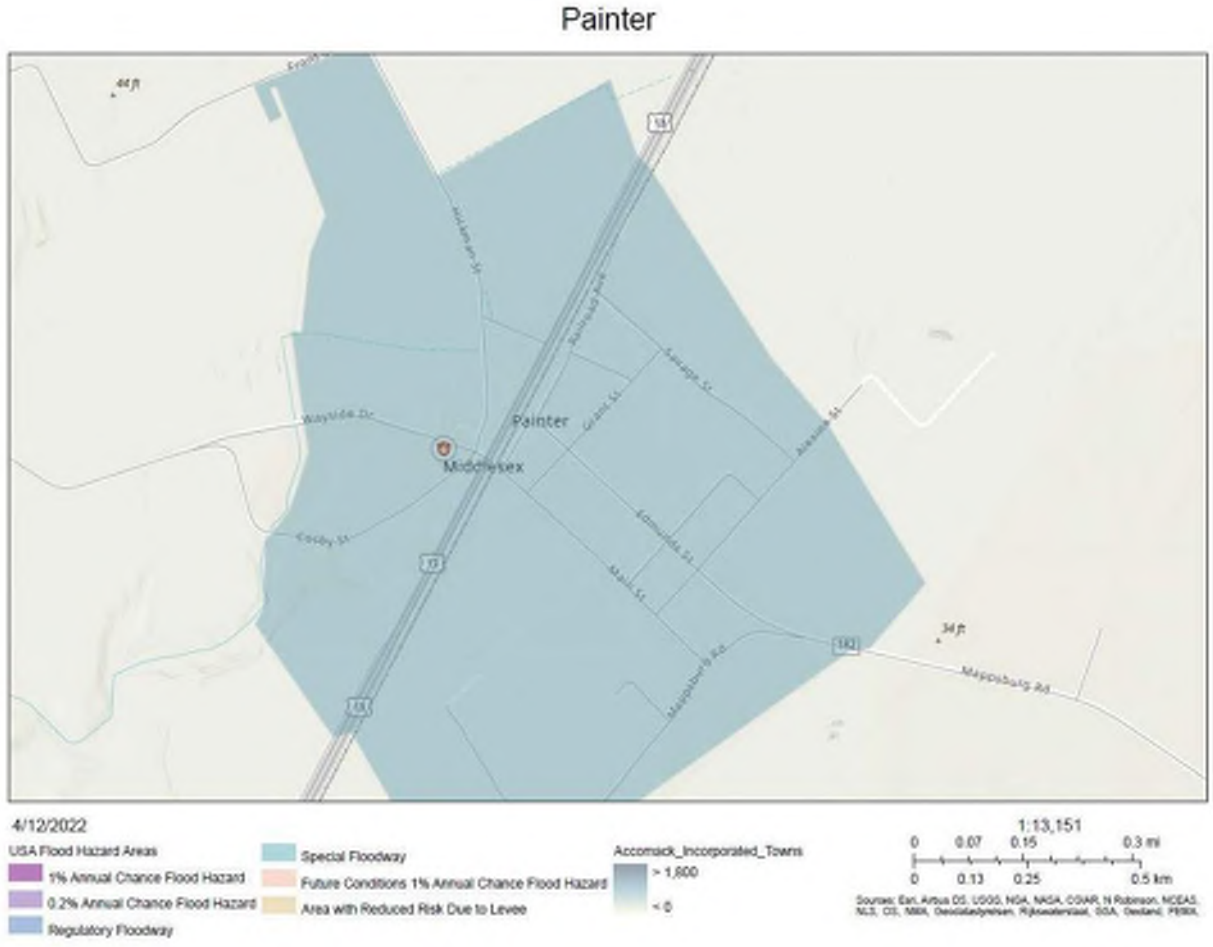
STORM WATER FLOODING

Storm water flooding has the greatest and most frequent impact on the Town. Due to the Town being relatively flat with slopes less than 1%, areas without adequate drainage and poorly drained soils are prone to storm water flooding (*Town of Painter Comprehensive Plan*, 2002). Drainage ditches in Town are maintained by VDOT and Accomack County. Recent and ongoing maintenance to drainage ditches has helped to mitigate some storm water flooding (Personal communications, Mayor Campbell, May 26, 2021).

COASTAL FLOODING

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.

Figure 4: Town of Painter Flood Hazards to Infrastructure



HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

The Town faces a threat of ground water contamination from several sources including failed septic systems within the Town, leaks and spills of petroleum-based products from underground storage tanks, and above-ground fuel tanks. There are also major industrial facilities and agricultural lands within the area. In Painter, all residential treatment of wastewater and sewage is done through on-site septic systems. The majority of soils in the developed areas of Town are generally unsuitable for these conventional on-site septic systems due to the high permeability, wetness, and shallow depth to ground water (*Town of Painter Comprehensive Plan*, 2002).

ICE & SNOW STORMS

The Town has historically been impacted by ice and snow storms that have left residents stranded for extended periods of time. A large ice storm impacted the Town in the late 1990s. The storm downed tree limbs and power lines, forcing local businesses to close and residents to go without electricity for several days (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021).

HAZARDOUS MATERIALS

The U.S. Route 13 highway corridor runs through the Town, putting residents at greater risk from HAZMAT incidents resulting from traffic accidents involving tractor trailers carrying hazardous materials. The location of the gas station in Town also poses a threat, as Town officials note there have been several traffic accidents at the intersection and the vicinity of the gas station's location. There have been several occasions where tractor trailers have experienced leakage of hazardous materials, including chicken byproduct, and has required HAZMAT cleanup (Personal communications, Mayor Campbell and Kerri Atkinson, Town Clerk, May 26, 2021).

TORNADOES

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town and are a relevant concern. Although not officially documented as a tornado, it is believed a tornado ripped off the roof of the Fire Department in the 1980s (Personal communications, Mayor Campbell, May 26, 2021). Another tornadic event occurred just out of Town limits in the 1990s and caused severe damage to vehicles in the vicinity (Personal communications, Kerri Atkinson, Town Clerk, May 26, 2021).

CRITICAL FACILITIES

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

Table 7: Town of Painter Critical Facilities

Facility	Hazards	HMP 2006	HMP 2011	HMP 2016	HMP 2021	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
There are no Town-Owned Facilities in Painter									
Other Facilities									
Painter Fire and Rescue Department	Storm Water Flooding, Contamination, Wind	-	-	-	X	7,500+	Devastating	No	Yes
Town Hall	Storm Water Flooding, Contamination, Wind	-	-	-	X	245+	Major Disruption	No	Yes
U.S. Post Office	Storm Water Flooding, Contamination	-	-	-	X	245+	Major Disruption	No	Yes
Gas Station	HAZMAT Incidents, Storm Water Flooding, Wind	-	-	-	X	245+	Major Disruption	No	Yes

FINDINGS

1. The hazards expected to have the greatest impact on the Town are stormwater flooding and high wind events, which have been experienced throughout the Town's history.

2. No part of the Town lies within any flood zone. The Town does not currently participate in the NFIP.

3. Secondary hazards facing the Town include groundwater contamination, HAZMAT incidents impacting water and air quality, ice and snow storms, and tornadoes.

4. The Town identified areas previously impacted by stormwater flooding and noted that maintenance to drainage ditches by VDOT has assisted in the mitigation of this issue. Regular maintenance and upkeep of drainage ditches is extremely important to reduce the risk of stormwater flooding in Town.

5. This is the Town's first time participating in the hazard mitigation planning process.

CHAPTER 20: TOWN OF PARSKLEY

TOWN PROFILE

Parksley is located in central Accomack County and was originally a planned development that was founded in 1885 along the railroad. The Town was incorporated in 1904 and in 1906 became the first town on the Eastern Shore to have electricity. Parksley was Virginia's only Civil Air Patrol base during World War II and operated from April 16, 1942 to August 31, 1943. Although the railroad is no longer active, it defined the Town's growth and prosperity and still remains a prominent feature of the Town (*Town of Parksley Comprehensive Plan*, 2006).

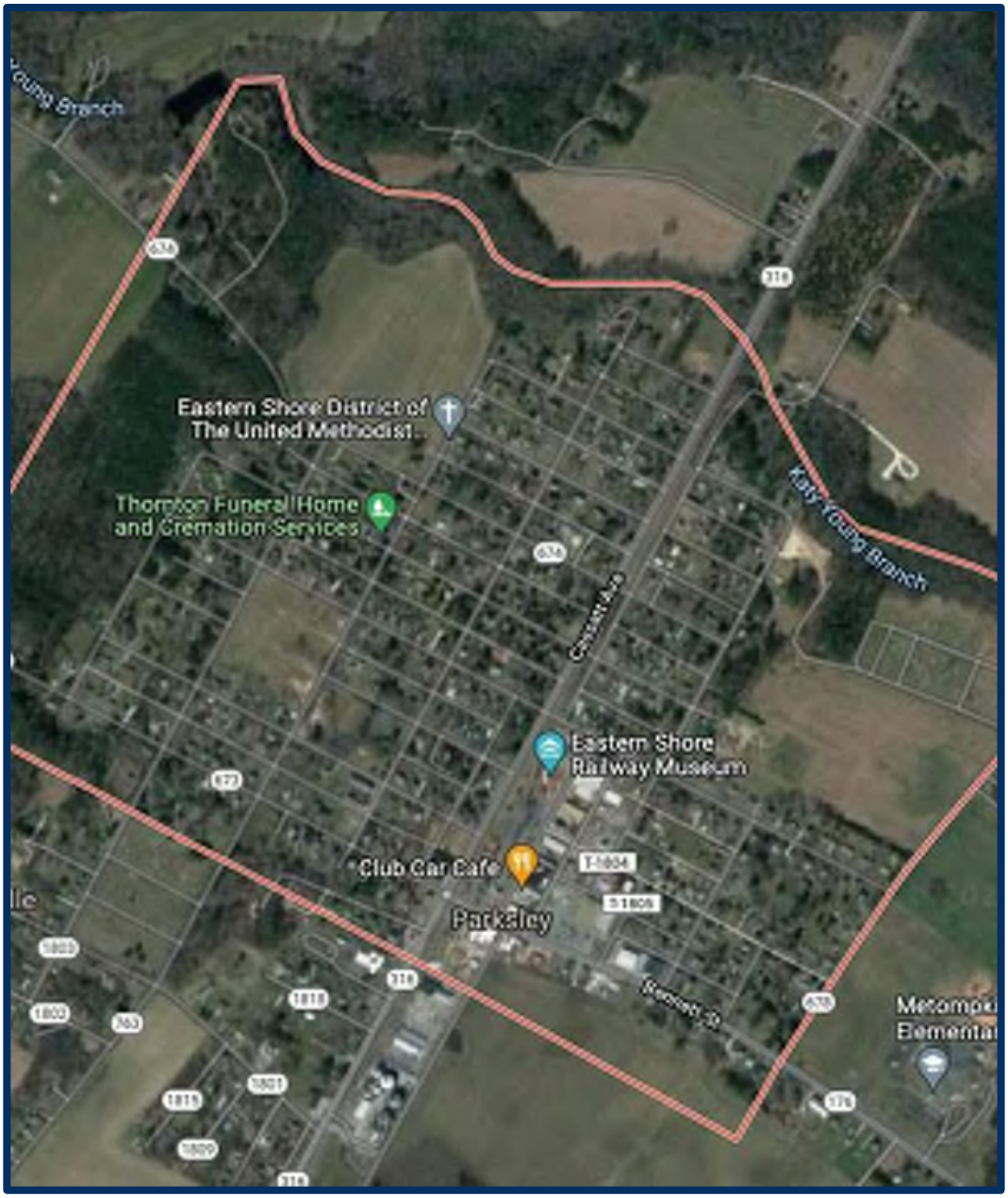


Figure 1: Parksley Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

Parksley's population remained relatively stable between 1960 and 2014 with the population reaching a high of 1,072 in 2013 and a low of 791 in 2019 (U.S. Census, 2000; U.S. Census, 2010; American Community Survey 2009-2013, 2014-2019). The 2019 American Community Survey 5-year estimates show the population at 791, which is a decrease of 150. As reflected in Table 1 below, the median age for residents in Parksley in 2019 was 40.5 years, slightly higher than the national median age. There has been an influx of young migrant families moving into the area, as nearly a quarter of the population is under the age of 18 and 17.5% are under the age of 9 (ACS 2019). Typically, younger adult residents are less of a high-risk population in times of hazards; however, families with young children may also need assistance in the case of an emergency. The population that speaks a language other than English increased by 10% from 2014 to 2019 (ACS, 2014-2019). This is an important factor to consider when there is a potential hazard in order to ensure all citizens are able to access important safety information in a language they can understand.

Table 1: Parksley Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	791	941	1,072	842	837
Median Age	40.5	32.9	31.6	40.1	40.6
Disability	78	81	68	NA	NA
Income					
Median Household Income	$52,841	$50,000	$42,917	$43,625	$35,313
Poverty Level	13.0%	11.4%	16.2%	14.1%	NA
Language					
Only English	73.7%	83.7%	82.6%	83.7%	NA
Other	26.3%	16.3%	17.4%	16.3%	NA
Spanish	2.9%	11.4%	14.5%	10.1%	NA
Indo-Euro	23.3%	4.9%	2.9%	2.0%	NA
Asian	0.0%	0.0%	0.0%	4.2%	NA
Other	0.0%	0.0%	0.0%	0.0%	NA

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010 – 2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

The household income reflected by the American Community Survey data in Table 1 for 2014 and 2019 is estimated to be a significantly higher than the true value (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). This overestimate masks the ability of the Town to rebound in the event of disaster.

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Table 2: Parksley Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010*****		**2000******	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	0	0.0%	31	6.6%	31	6.1%	44	8.1%	7	1.7%
Construction	55	12.9%	34	7.2%	38	7.5%	36	6.6%	36	8.9%
Manufacturing	150	35.0%	70	14.9%	70	13.7%	64	11.8%	74	18.3%
Wholesale trade	9	2.1%	22	4.7%	27	5.3%	22	4.1%	12	3.0%
Retail trade	47	11.0%	61	13.0%	57	11.2%	57	10.5%	63	15.6%
Transportation and warehousing, and utilities	14	3.3%	22	4.7%	30	5.9%	7	1.3%	12	3.0%
Information	0	0.0%	8	1.7%	7	1.4%	8	1.5%	0	0.0%
Finance, insurance, real estate, and rentals	12	2.8%	26	5.5%	4	0.8%	3	0.6%	19	4.7%
Professional, scientific, waste management	17	4.0%	8	1.7%	9	1.8%	21	3.9%	27	6.7%
Educational and health care services	45	10.5%	87	18.5%	98	19.2%	81	14.9%	76	18.8%
Arts, entertainment, recreation, food	35	8.2%	43	9.1%	73	14.3%	82	15.1%	28	6.9%
Public Admin	24	5.6%	29	6.2%	29	5.7%	80	14.7%	30	7.4%
Other	20	4.7%	29	6.2%	37	7.3%	38	7.0%	21	5.2%
TOTAL CIVILIAN EMPLOYED POPULATION	428	-	470	-	510	-	543	-	405	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

The largest employer of Town residents is the manufacturing industry, which more than doubled the number of individuals employed in 2019 and makes up 35% of the workforce (ACS, 2014-2019). This industry is most likely dominated by poultry processing positions at nearby plants such as Perdue Farms and Tyson Foods. These companies often have policies in place to mitigate the economic impact for both the company and the employees; however, long-term closures would have strong negative impacts on the Town. There would be a 'domino effect' from such a closure, as employees in that industry wouldn't have spending dollars for rent, local shops, family necessities, etc., and other dependent agricultural businesses would be at a loss as well.

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. They can also serve as an indicator of community recovery resources. Finally, data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Table 3 reveals a loss of eleven business establishments in Parksley since 2009. The Town is largely retail due to the historic downtown area supporting many small local shops and restaurants, but in the last several years, businesses such as Fresh Pride, Shay Refrigeration, Shore Bank, Lunch Box, What's Your Fancy, etc. either closed or moved out of the Town. Remaining businesses, such as Jaxon's Hardware, are still open but employ fewer employees due to economic challenges. There are also some health services and construction businesses located within Parksley. The County Library Board voted to relocate the library's main branch from the Town of Accomac to Parksley in the former Fresh Pride grocery store. Construction should be completed soon and will bring more clients to small businesses and restaurants in the Town, making the Town more attractive for potential residents (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). The ongoing Parksley Downtown Revitalization project will likely

encourage new businesses to open in the area. This is also the future location for the Eastern Shore Rail Trail, which will run directly through Downtown and will be beneficial for the Town's economy and new businesses.

Table 3: Parksley Business Establishment Types

	Total Establishments		
Industry Code Description	**2013**	**2011**	**2009**
Agricultural, Forestry, Fishing, and Hunting	1	1	1
Construction	5	7	8
Manufacturing	1	1	1
Wholesale Trade	1	1	1
Retail Trade	13	15	14
Transportation and Warehousing	1	1	2
Information	1	1	1
Finance and Leisure	1	1	1
Real Estate and Rental and Leasing	1	2	1
Professional, Scientific, and Technical Services	2	3	5
Administrative and Support and Waste Management Remediation Services	2	3	3
Health Care and Social Assistance	4	4	7
Arts, Entertainment, and Recreation	1	1	0
Accommodation and Food Services	3	3	3
Other Services (Except Public Admin)	8	10	8
Total, All Establishments	45	54	56
Total Employees	295	405	461

Source: Census Zip Code Business Pattern, 2013, 2011, 2009

The number of employees working in Parksley, provided in Table 3 above, gives a good indication of the number of people present in the Town during workweek business hours. During an emergency event, it is important to know the approximate number and distribution/location of people, so that their presence is known and may be more efficiently assisted. The drastic decrease in the number of employees that work in Parksley reflects the decrease of business presence in the Town.

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

Parksley's housing has remained relatively stable over the last decade. Although the American Community Survey data shown in Table 4 below would indicate a 16.5% increase in housing development from 2000 to 2014, Census data from 2010 refutes that estimate, as do local Town representatives, according to billing records (Personal communications, Mayor James Eichelberger, January 14, 2016). Data shown for 2019 seems to represent the housing in Parksley much more accurately, however, the number of vacant units is still likely too high (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). Many of these vacant units are used as second homes

and are mostly in good condition; however, there are a few dilapidated structures that could pose a threat during a high-wind event due to lack of maintenance and loose yard debris.

Table 4: Parksley Housing

	2019*	2014**	2010***	2000****
Total Housing Units	388	485	407	405
Occupied	311	380	349	363
Vacant	77	105	58	42
Owner-Occupied	158	255	240	256
Renter-Occupied	135	125	109	107
Median Housing Value	$147,900	$131,900	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Parksley is served by an adequate road system, with State Route 316 providing north-south access for the Town. Route 176 is located east of Parksley and intersects Route 13, the major north-south transportation corridor that bisects the Eastern Shore. The streets are maintained by the Virginia Department of Transportation and are in primarily good condition, although due to resurfacing, some are now believed to be too high. Alleys are maintained and owned by the Town. Sidewalks in the Town are owned and maintained by either VDOT or private property owners (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). With the library moving into Parksley, improvement to the Town's walkability is a high priority and is being addressed through the Downtown Revitalization project. The abandoned Bay Coast Railroad runs directly through Downtown, which was once centered around railroad activity. The Eastern Shore Railway Museum is located on Dunne Avenue and is very popular among train enthusiasts and visitors. Ongoing plans for the Eastern Shore Rail Trail would eventually convert the abandoned railway into a multi-use path that connects towns up and down the Eastern Shore from Cape Charles north to Hallwood.

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. According to Table 5 below, there are 14 residences without access to a vehicle in Parksley, although the actual number may be closer to ten (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). Many residents of the Town utilize Star Transit and are picked up at the pavilion, which is easily accessible to most areas of the Town. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. Shore Ride also provides transportation services up and down the Eastern Shore.

Table 5: Parksley Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	14	17	17	20
One	104	160	204	168
Two	81	141	212	114
Three or more	112	62	58	61

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

COMMERCIAL AREAS

The central business district (Downtown) is located near the center of Town along the railroad tracks. It contains a variety of retail stores, services, eating establishments, and professional offices. The business district went under

extensive revitalization in 1986 which included improvements on the storefronts, expansion of existing retail areas and services, drainage improvements, extensive landscaping, and the installation of parking lots, sidewalks, a Farmer's Market Pavilion, street lights, benches, and trash receptacles. There is currently a new Downtown Revitalization project ongoing that includes similar improvements regarding landscaping, signage, street lighting, signature art, informational kiosks, and more (*Parksley Downtown Revitalization Plan*, 2019).

Just south of Parksley, there is an active Industrial Agriculture facility, Bird Foods, that could affect the Town in the case of hazard which, in turn, could lead to major impacts on the economy.

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard. Community facilities in Parksley include the Parksley Police Department, Fire Department, the Accomack County Department of Public Safety main office located across from the Fire Department, Parksley Town Office, and a Farmer's Market.

Figure 2: Parksley Fire Department



PUBLIC SAFETY

Police protection is provided by the Parksley Police Department, stationed at the Municipal Building on Dunne Avenue. The Town currently employs one police officer and owns three police cars (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). Accomack County Sheriff's Department and the Virginia State Police also assist on calls when needed.

Fire protection and ambulance services for the Town and surrounding area, approximately 7,500 people, is provided by the Parksley Volunteer Fire Department, located on Dunne Avenue and shown in Figure 2. The Fire Department operates four ambulances, two engines, one tanker, one air trailer, one brush truck, one utility vehicle, and one rehab vehicle (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). The Fire Department is also the designated emergency staging area, and the Pavilion is the area for dispensing emergency supplies, such as food and medicine (*Town of Parksley Comprehensive Plan,* 2006).

WATER SUPPLY & SEWAGE DISPOSAL

The Town operates a public water supply system with ground water wells. There are two deep production wells operated on a regular basis, with a third well available for emergency backup operations and Fire Department use. Water is chlorinated at the well site and then pumped to a 75,000-gallon elevated storage tank for distribution. There are several wellhead-protection measures in place, such as fencing and locked well caps (*Town of Parksley Comprehensive Plan,* 2006).

Parksley's potable water supply is obtained from ground water through a municipal supply system. Parksley is located in Wellhead Protection Area C- Perdue Area. Major water withdrawers in this area are Perdue, the Towns of Onancock and Parksley, and Shore Rehab and Rehabilitation by Saber Healthcare. Additional large withdrawals could have an impact on water quality from salt water intrusion and deterioration of water quality.



Figure 3: Parksley Water Tower. Photo by Curt Smith

SOLID WASTE DISPOSAL

The Town contracts Davis Disposal for solid waste collection services on a weekly basis for Parksley residents and twice a week for commercial establishments (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021).

PARKS AND RECREATION

The Parksley Town Park is equipped with playground equipment, tennis courts, benches, and an athletic field. The Town also owns the Parksley Scout House, located adjacent to the Town Park. Located behind the playground equipment is a hockey field that many residents and non-residents utilize frequently on Sundays (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). Across the street from the Town Park is an athletic field that provides additional recreational opportunities. Parksley is also home to the Eastern Shore Railway Museum (*Town of Parksley Comprehensive Plan,* 2006).

DRAINAGE DITCHES

Maintenance of drainage ditches and storm drains in Town is the responsibility of VDOT. Stormwater drains are located in the commercial area along Dunne Avenue, Bennett Street, and at the Town Park. Drainage is less than satisfactory during periods of heavy rain. Ditches along Main Street and Bennett Street are prone to frequent flooding (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021).

SCHOOLS

Metompkin Elementary School teaches grades Pre-K-5 and is located just southeast of town limits on Bennett Street. There are no known private schools or daycare centers (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021).

NATURAL ENVIRONMENT

Parksley lies within the Chesapeake Bay watershed. The elevation ranges from 30 to 43 feet above sea level, with slopes from 0-6%. The Town itself is relatively flat and is not located within the 100-year floodplain. The soils are a major limiting factor for development due to their unsuitability for septic tanks (*Town of Parksley Comprehensive Plan*, 2006).

LAND USE LAND COVER

Parksley has a land area of 0.625 square miles or 400 acres. Approximately 30% of land in Parksley is developed with residential land use being the predominant land use category concentrated in the southeast portion of the Town. Commercial land uses are clustered throughout and agricultural land use is comprised of three large tracts of farmland located in the outlying areas of Town. A substantial portion of agricultural land contains soil types which would allow on-site septic systems, which offers an opportunity for future development. There are plans for towns further south on the Shore to connect to Hampton Roads Sanitation District (HRSD) sewer lines that will be running from Nassawadox in Northampton County to the Wastewater Treatment Plant (WWTP) in Onancock. Phases following these initial connections will focus further north in Accomack County, potentially allowing Parksley to connect. Connecting to a sewer system, if available, would allow for further development and would assist in the mitigation of groundwater contamination and other health risks that septic tanks pose. Until then, vacant land present in Town can be developed with alternative (above ground) septic systems (*Town of Parksley Town Plan*, 2006).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Parksley has participated in the hazard mitigation planning process since 2011. The Town's primary risk is associated with storm water flooding.

Table 6 : Town of Parksley Hazard Mitigation Resources

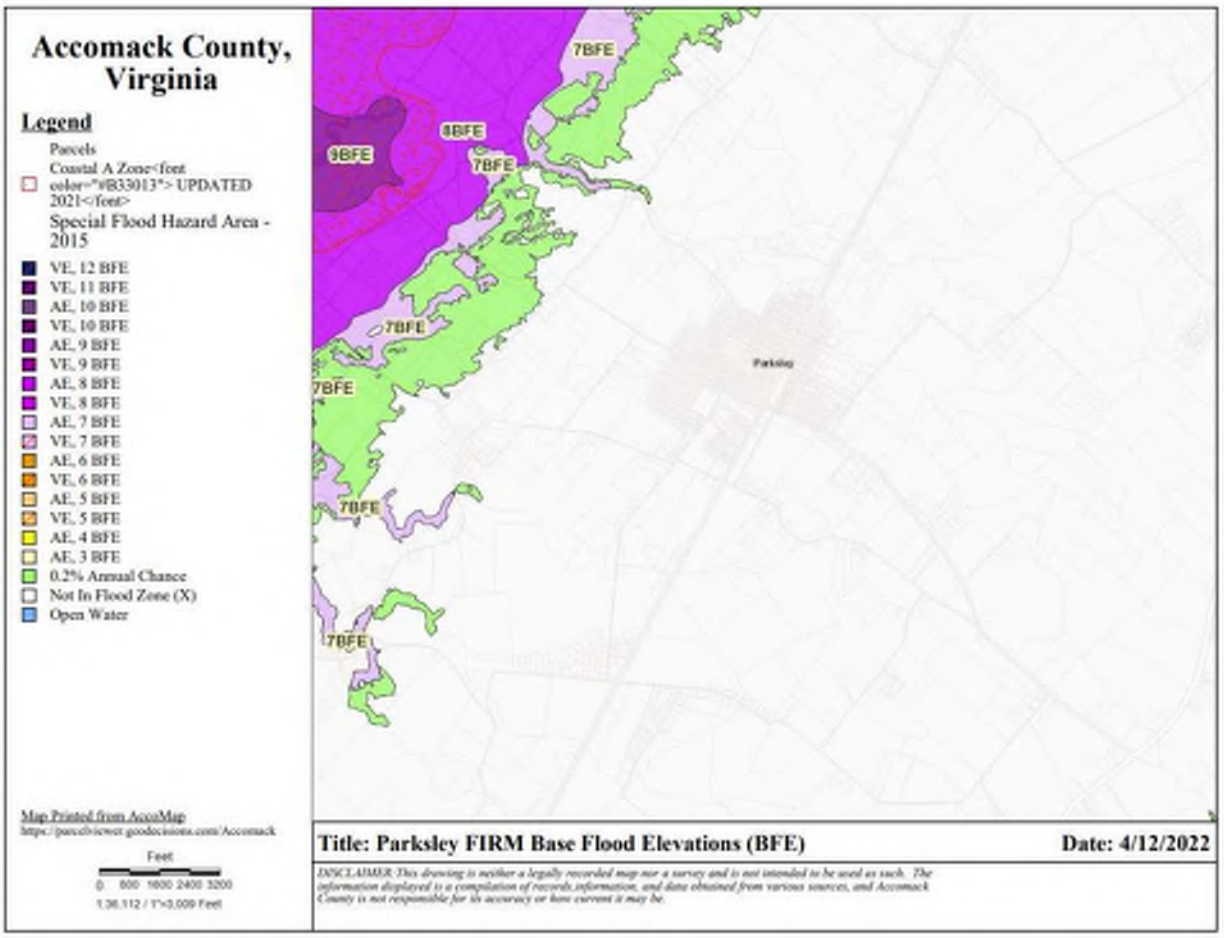
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on December 22, 2008. The Town has 2 NFIP policies. Neither policy is located in a flood zone, nor have there been any claims filed in the Town (FEMA NFIP Data Report, 2022). This may indicate potential storm water flooding issues within the Town.

Figure 4: Town of Parksley FIRM Base Flood Elevation (BFE)



HMGP

Parksley has not participated in the HMGP.

HAZARDS PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Parksley enacted several measures in order to combat the COVID-19 pandemic. The Town installed plexiglass and plastic as barriers between employees and the public in all Town-owned buildings that remained open. Signage encouraging masks and social distancing were placed along the sidewalks and around Downtown. High-touch surfaces were sanitized frequently and hand sanitizer was placed around the Town (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021).

CARES Act funding was used to purchase sanitizing equipment, signage, and masks; however, most of the funds were given to businesses. Twenty-three businesses in Parksley were able to benefit from these funds (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). In the event of a similar pandemic in the future, the Town held on to leftover supplies that can be distributed to residents again.

WIND

No parts of the Town lie in the wind-borne debris hazard area. This area extends 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. Falling branches or trees may cause damage to structures during a high-wind event.

In September of 1985, Hurricane Gloria damaged and up-rooted 23 mature trees in Town. Downed trees are hazardous to power lines and can cause extensive power outages. Hurricane Sandy wreaked similar havoc, as seen in Figure 4. The Parksley Water Tower, Figure 3, is the water source for the Town residents. Wind is the greatest hazard threatening the structure.



Figure 5: Uprooted tree during Hurricane Sandy. Photo by Denise Bernard

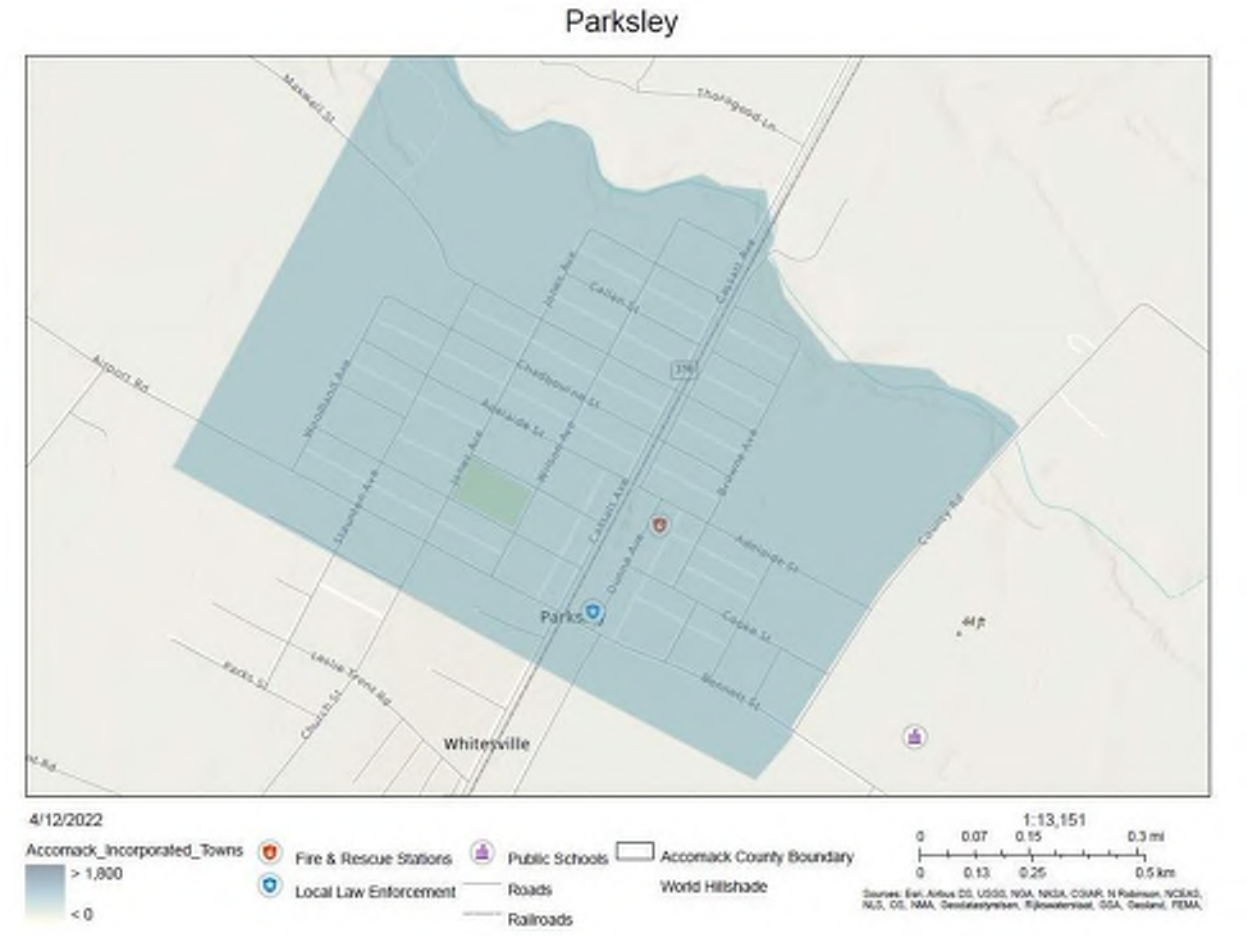
COASTAL EROSION

No structures are at immediate risk to coastal erosion.

COASTAL FLOODING

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.

Figure 6: Town of Parksley Flood Hazards to Infrastructure



STORM WATER FLOODING

Stormwater flooding has the greatest and most frequent impact on the Town. The Town is underlain by some soils that are unsuitable for drainage and rainwater. The 2006 *Town of Parksley Comprehensive Plan* indicates that the Town's hydric soils are located along Katy Young Branch to the north and in the western portion of the Town. A secondary hazard from standing water is the potential for mosquito-borne diseases that could impact the health of residents.

VDOT 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 (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021). Regular maintenance and upkeep of these drainage ditches is crucial to mitigate severe stormwater flooding. A large thunderstorm struck Parksley on September 3, 2003, just prior to Hurricane Isabel. It brought 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. Town officials have indicated that the storm water culverts around the Downtown Business District are undersized and have not historically been able to handle heavy rains. Rains from nor'easters and hurricanes have historically impacted the Town.

Table 7: Parksley Identified Flooding Locations, Causes, & Affected Critical Facilities

	HMP 2006	HMP 2011	HMP 2016	HMP 2021
Where is the flooding?	NA	Katy Young Branch to the north and western portion of the Town	Dunne & Adelaide; In front of Jaxon's, Perennial ditch on south side	Streets surrounding Dunne; Downtown areas
Cause of Hazard	NA	Significant rain events and inadequately maintained storm water ditches	Significant rain events and undersized drainage pipes	Significant rain events and inadequately maintained drainage ditches
Critical Facilities Identified	NA	Downtown Business District	Downtown Business District	Downtown Business District



Figure 7: Parksley Downtown Business District. Photo by Curt Smith

The Downtown Business District, shown in Figure 5, is regularly flooded during large rain events. Rainwater commonly becomes backed-up as a result, causing flooding in the streets and storefronts.

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

The Town faces a threat of ground water contamination from several sources including failed septic systems within the 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 within the 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 utilization in the area includes Perdue Farms, Byrd Foods, the Towns of Onancock and Parksley, and the Shore Rehab and Rehabilitation Center by Saber Health. Large withdrawals of ground water in the vicinity increase the possibility of well interference, salt water intrusion, and a deterioration of water quality (*Town of Parksley Comprehensive Plan,* 2006), which has been an ongoing issue for the Town. The Town has contracted with Environmental System Services and MSA to ensure water quality and to help prevent future groundwater contamination (Personal communications, Lauren Lewis, Town Clerk, March 25, 2021).

ICE & SNOW STORMS

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines, forcing local businesses to close for several days. Residents also had no electricity for an extended period of time.

DROUGHTS

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

TORNADOES

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town and are a relevant concern.

CRITICAL FACILITIES

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

Table 8: Town of Parksley Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-owned Facilities									
Parksley Town Office	-	X	X	X	Wind Stormwater Fire	791+	Major Disruption	Yes	Yes
Parksley Public Water Supply and Sewer System	-	X	X	X	Wind Stormwater	791+	Devastating	No	Yes
Parksley Town Park	-	X	X	X	Trees Wind	791+	Inconvenience	No	Yes
Parksley Pavilion (also staging area, recreational area, & farmers market)	-	-	X	X	Wind Fire Stormwater	791+	Major Disruption	No	Yes
Parksley Police Department	-	X	X	X	Wind Fire Stormwater	791+	Major Disruption	Yes	Yes
Town Parking Area	-	X	X	X	Wind Fire Stormwater	791+	Major Disruption	No	Yes
Other Facilities (Not Town-Owned)									
Eastern Shore Railway Museum	-	X	X	X	Wind Fire Stormwater	791+	Inconvenience	No	Yes
Parksley Fire & Rescue Department	-	X	X	X	Wind Fire Stormwater	7500+	Devastating	No	Yes
U.S. Post Office	-	-	X	X	Wind Fire Stormwater	791+	Major Disruption	Yes	Yes
Gas Station	-	-	X	X	Wind Fire Stormwater	791+	Major Disruption	Yes	Yes
Accomack County Department of Public Safety Main Office	-	-	-	X	Wind Fire Stormwater	7500+	Devastating	Yes	Yes

FINDINGS

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

2. Although no part of the Town lies within any flood zone, due to soil types, topography, and an inadequate drainage system, stormwater flooding is the most common hazard experienced by the Town. As of 2016, there were two flood insurance policies in the Town.

3. The Town has identified undersized drainage pipes and repeatedly paved, and thus raised, road levels, particularly Dunne Avenue in the Downtown Business District, due to the increasing effects of stormwater damages on adjacent buildings and vehicles.

4. Older construction and mature trees in residential areas increase risk of damages caused by wind and snow events, as tree debris is likely to cause secondary wind and/or snow damages, as well as power outages.

5. The Town's groundwater supply was contaminated within the last five years. Failed septic systems, leaks and spills, of petroleum-based products from underground storage tanks, and major industrial facilities in the area pose a high threat of groundwater contamination for the Town.

CHAPTER 21: TOWN OF SAXIS

TOWN PROFILE

Saxis Island juts into the 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. Saxis was incorporated in 1959 (*Town of Saxis Comprehensive Plan*, 1997).

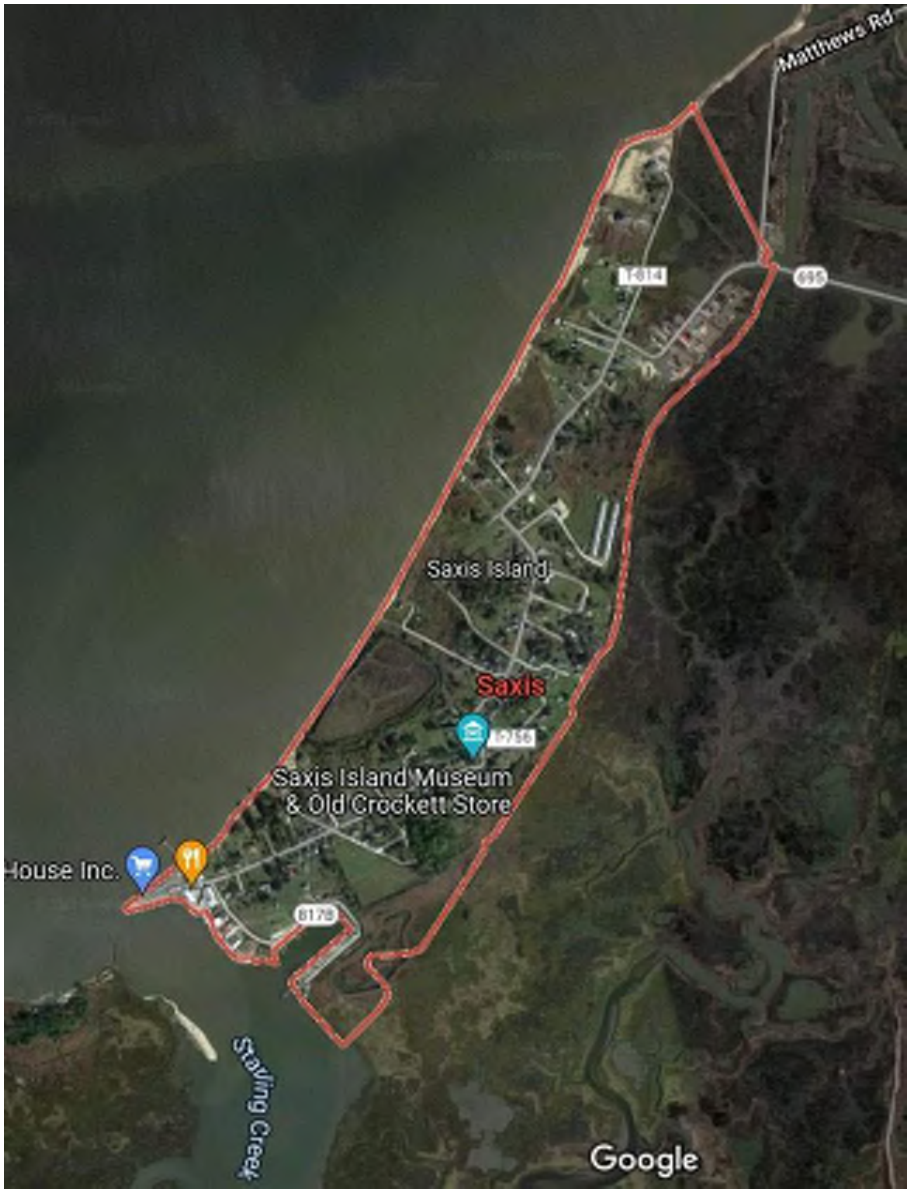


Figure 1: Saxis Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information. The following sections are intended to provide insight in the make-up and characteristics of the community and how it relates to hazard vulnerability.

DEMOGRAPHICS

The 2019 American Community Survey five-year estimates indicate that the Town has a population of 238 and has been relatively stable since the 2010 Census. The Town has experienced a decline in population since 1960 when the population was 577 (*Town of Saxis Comprehensive Plan*, 1997). The percentage of individuals who speak a language other than English is likely too high (Personal communications, Donna Croushore, Town Council Member, April 7, 2021) and all residents in the Town are able to access information in a language they are able to understand. As shown in Table 1, the median age for residents in Saxis in 2019 was 56.0. This is a population approximately 18 years older than the national and state average, with 31.5% of the population over the age of 65 (ACS, 2014-2019); however, Town officials believe this number may be too high and stated there has been an influx of young families in the Town (Personal communications, Donna Croushore, Town Council, April 7, 2021). Populations with a high percentage of elderly residents may require additional assistance in the event of a hazard.

Table 1: Saxis Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	238	216	218	241	337
Median Age	56.0	57.3	57.8	55.5	47.3
Disability	42	13	20	NA	NA
Income					
Median Household Income	$39,028	$30,500	$30,500	$29,545	$18,125
Poverty Level	13.8%	13.4%	18.3%	17.6%	NA
Language					
Only English	95.7%	97.4%	100.0%	NA	99.4%
Other	4.3%	2.6%	0.0%	NA	0.6%
Spanish	2.1%	2.6%	0.0%	NA	0.6%
Ind-Euro	2.1%	0.0%	0.0%	NA	0.0%
Asian	0.0%	0.0%	0.0%	NA	0.0%
Other	0.0%	0.0%	0.0%	NA	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population, 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Saxis is primarily a community of working watermen and the fisheries industry has provided the economic base for the community since the 19th Century. The fisheries industry is based on soft shell crabs and hard crabs resulting from the soft-shell catch. Some clamming and fin fishing also occur. From April to November, peeler crabs are caught in traps, scrapes, pots, and dip nets, held in floats until they shed, and sold as soft crabs (*Town of Saxis*

Comprehensive Plan, 1997). Although Table 2 initially indicated a steep 55% decrease in the fisherman workforce from 2010 to 2014, 2014 was actually the fourth season of improved oyster harvest; therefore, the numbers should have increased. Data from the 2019 ACS depicts the Saxis work force much more accurately, with the agriculture, forestry, and fishing industry accounting for nearly 35% of the workforce. Other dominating industries include educational, health care, and social services and retail.

Table 2: Saxis Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	40	34.8%	10	12.3%	15	14.9%	22	20.8%	21	16.2%
Construction	2	1.7%	8	9.9%	8	7.9%	5	4.7%	8	6.2%
Manufacturing	7	6.1%	8	9.9%	15	14.9%	13	12.3%	5	3.8%
Wholesale trade	3	2.6%	8	9.9%	9	8.9%	21	19.8%	9	6.9%
Retail trade	18	15.7%	4	4.9%	6	5.9%	2	1.9%	6	4.6%
Transportation and warehousing, and utilities	2	1.7%	3	3.7%	3	3.0%	3	2.8%	0	-
Information	0	0.0%	0	-	0	-	0	-	2	1.5%
Finance, insurance, real estate, and rentals	3	2.6%	4	4.9%	6	5.9%	3	2.8%	3	2.3%
Professional, scientific, waste management	7	6.1%	5	6.2%	10	9.9%	9	8.5%	3	2.3%
Educational, health care, social services	21	18.3%	13	16.0%	10	9.9%	13	12.3%	0	0.0%
Arts, entertainment, recreation, food	3	2.6%	7	8.6%	12	11.9%	8	7.5%	0	0.0%
Public Administration	4	3.5%	8	9.9%	4	4.0%	4	3.8%	2	1.5%
Other	5	4.3%	3	3.7%	3	3.0%	3	2.8%	4	3.1%
TOTAL CIVILIAN EMPLOYED POPULATION	115	-	81	-	101	-	106	-	130	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Fisheries have long provided the economic base for Saxis. There are seafood companies in Saxis that are concentrated around the harbor, which pack and package crabs and other seafood (*Town of Saxis Comprehensive Plan*, 1997). Due to the Town's dependence on seafood, the water quality within Chesapeake Bay is an important factor in the Town's economic sustainability. In the harbor, approximately 70% of the 75 slips are used by commercial fisherman and sublet to oystermen (Personal communications, Donna Croushore, Town Council, April 7, 2021). Many people in the Town are hoping that improvements to the public boat ramp, new restaurant options, the Saxis Island Museum, and potential improved public beach access facilities will open the Town to additional visitors and tourism-based businesses. The Town is looking into funding for a public access facility and a recreational area with a pavilion,

picnic area, and grills in hopes to draw additional visitors (Personal communications, Donna Croushore, Town Council, April 7, 2021).

Table 3: Saxis Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013*	2011*	2009*
Agriculture, Forestry, Fishing, and Hunting	2	-	-	-
Utilities	-	-	-	-
Construction	-	-	-	-
Manufacturing	1	1	1	1
Wholesale Trade	1	1	1	1
Retail Trade	1	-	-	-
Transportation and Warehousing	-	-	-	-
Finance and Insurance	-	-	-	-
Information	-	-	-	-
Real Estate and Rental and Leasing	-	-	-	-
Professional, Scientific, and Technical Services	-	-	-	-
Administrative, Support, and Waste Management	-	-	-	-
Education Services	-	-	-	-
Health Care and Social Assistance	-	-	-	-
Arts, Entertainment, and Recreation	1	-	-	-
Accommodation and Food Services	3	-	-	-
Other Services (Except Public Administration)	-	-	-	-
Industries not Classified	-	-	-	-
Total, All Establishments	~9	2	2	2
Total Employees	-	-	-	-

Source: Personal Communications, Donna Croushore, Town Council Member, April 7, 2021, Census Zip Code Business Patterns, 2009, 2011, 2013

Business presence in Saxis is limited other than the fishing industry. A “snack shack”, seafood market, and two restaurants, Martha’s Kitchen and Captain E’s Hurricane Grill and Bar, are located within the Town. Captain E’s also has a food truck that offers catering and frequently visits Tall Pines Campground, a popular camping destination located in the neighboring Town of Sanford, as well as other areas on the Shore. Campers frequently visit Saxis to explore the cultural history, utilize beaches and waterfront areas, eat breakfast at Martha’s Kitchen, and relax with live music by the water at Captain E’s. The loss of crab houses in the Town has resulted in the increase of the individual selling of crabs; however, there is still one crab house in operation. The Town also contains several rental properties, an oyster shucking operation, and kayak rentals at Captain E’s Hurricane Grill and Bar (Personal communications, Donna Croushore, Town Council, April 7, 2021).

Figure 2: The Saxis Harbor. Photo by Shannon Alexander



BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate.

HOUSING UNITS

The majority of homes in Town have previously remained occupied; however, the Town has experienced an increase in the number of vacation homes that remain vacant through the majority of the winter months. The influx of second homes in the Town is represented in Table 4, as estimates show the number of vacant properties has doubled since 2014. Although the number of vacant properties has certainly increased, the number displayed in Table 4 may still be too high, as well as the total housing units (Personal communications, Donna Croushore, Town Council, April 7, 2021). These properties are at greater risk to damage during the times they are vacant. The majority of housing stock in Saxis is in standard condition, although several houses are not maintained properly and could pose a threat to public health and safety. The Town has their own ordinance and the authority to enforce repairs or clearance of dilapidated buildings and has been systematically addressing this issue since the mid-1990s. There are currently two homes scheduled to be demolished and there has been an influx of retirees buying and rebuilding homes in need of repair (Personal communications, Donna Croushore, Town Council, April 7, 2021). These homes are expected to become primary residences.

Within the Town, a special use permit is required for mobile homes, and home age, electric condition, block foundation, etc. are strictly reviewed. There have been no new mobile homes since May of 2008. Because mobile homes are typically more susceptible to damages from winds and flooding, this process of review and permit reduces risks associated with hazards.

Table 4: Saxis Housing

	2019*	2014**	2010***	2000****
Total Housing Units	211	168	179	193
Occupied	111	118	117	148
Vacant	100	50	62	45
Owner-Occupied	91	98	93	127
Renter-Occupied	20	20	24	21
Median Housing Value	$112,500	$103,000	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2013, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Saxis is connected to U.S. Route 13 by State Route 695, a rural road approximately 11 miles long. Most of the Town's streets are maintained by the Virginia Department of Transportation; however, there are several unpaved private lanes that are not in adequate condition due to pot holes and regular flooding (*Town of Saxis Comprehensive Plan*, 1997). Frequent flooding near the Harbor has also resulted in several pot holes (Personal communications, Donna Croushore, Town Council, April 7, 2021).

Table 5 reveals that there are fewer households without a vehicle available than there were in 2000; however, ACS estimates show that there are still 13 residences without a vehicle in 2019. This is thought to be an overestimate

and the number of households without a vehicle is likely under 5; however, these households have family and friends that would be able to assist in the event of a necessary evacuation (Personal communications, Donna Croushore, Town Council, April 7, 2021). There is no public transportation that serves the Town, but the company Shore Ride provides transportation services up and down the Eastern Shore of Virginia and Maryland. State Route 695 provides the only road access to the Town and portions of the route are often inundated during storm events and astronomically or wind-driven tides. There are approximately 20 golf carts in Saxis, which are permitted on roads in Town. Although there is not ferry service to or from Saxis, transportation by water is often utilized.

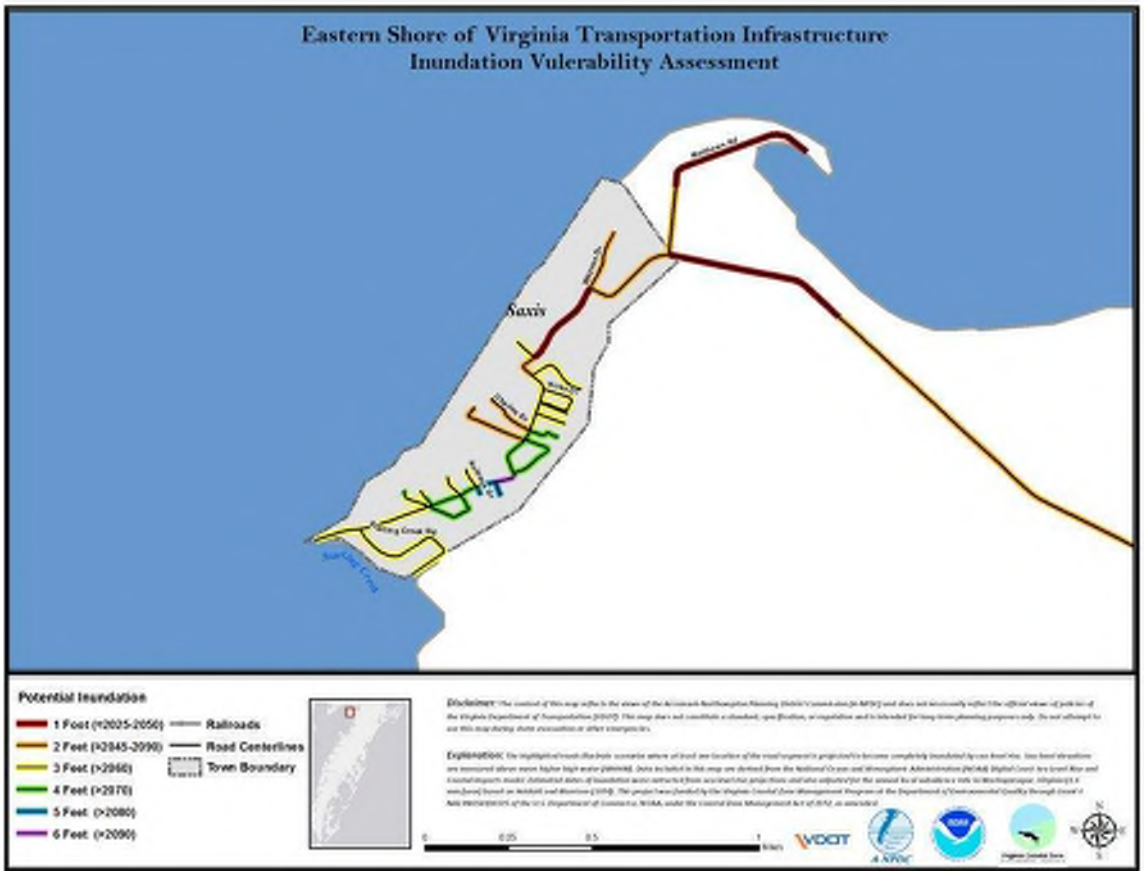
Table 5 : Saxis Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	13	16	13	23
One	49	51	77	55
Two	29	33	52	53
Three or more	20	18	19	17

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2000

With only one foot of sea level rise (SLR), it is estimated that the part of State Route 695 will be submerged with one foot of water. This is important to note, as it also reflects that with one foot of flooding about mean high tide, this section of the road would also be inundated, and the remainder of Route 695 leading towards Sanford vulnerable to two feet of SLR or flooding above mean high tide.

Figure 3: Town of Saxis Transportation Infrastructure Inundation Vulnerability



COMMUNITY SERVICES AND FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It is important to note what facilities are available in case of a hazard, and it is important to make an inventory of facilities that could be impacted by a hazard.

Most of the community facilities within the Town of Saxis focus upon the harbor and seafood industry. The Town has been looking for opportunities to increase tourism on the island and improve the lifestyle of residents with a library, cultural center, and a pavilion.

PUBLIC SAFETY

Fire protection for the Town is provided by the Saxis Volunteer Fire & Rescue Company, Inc. The fire company also provides ambulance service and includes one ALS ambulance, two engines, one tanker, and one brush unit. The brick building itself, a renovated schoolhouse, has five bays, one facing in the other direction in order to increase EMS response time, and the building contains the Town office. Police protection is provided by Accomack County Sheriff's Office and the intention is to utilize the patrol units as needed. The Town has initialized an emergency response communication effort to ensure the safety of residents and seasonal visitors in the wake of an impending hazard (Personal communications, Donna Croushore, Town Council, April 7, 2021).

Figure 4: Saxis Firehouse and Town Office – Located in Flood Zones. Photo by Elaine Meil



PARKS AND RECREATION

A public harbor and boat launch with public restrooms are located in Town as well as a public pier. There are two other boat launch facilities nearby, just outside of Town limits. The Saxis Wildlife Management Area, which borders the eastern half of the Town, offers opportunities for hunting, fishing, and bird watching. As part of a coastal resilience project, the Town is working towards constructing a public recreational area adjacent to the U.S. Army Corps of Engineers (USACE) leased dredge spoil site that will include a designated parking lot, restrooms, a native garden, covered picnic facilities, beach access, a boat ramp, a pier, and a playground (Personal communications, Donna Croushore, Town Council, April 7, 2021). A pavilion located at the Harbor was completed in 2016 and is accompanied by a restroom facility. These improvements to the Town will accommodate special Town events, such as popular oyster roasts, as well as personal events, such as weddings and picnics.

Figure 5: The Saxis Town Pier is located on the western shore of the island. Photo by Curt Smith



HARBOR

A public harbor was built in 1962 at the south end of Town adjacent to Starling Creek and funds were reinvested in 2005 to upgrade and maintain the facility. The harbor contains 75 boat slips rented out on a yearly basis for a fee. The harbor is equipped with electricity, lights, restrooms, a concrete boat ramp, and a working stall with a hoist. Approximately 70% of the boat slips are used by commercial boats (Personal communications, Donna Croushore, Town Council, April 7, 2021). While water depths within the Harbor appear to be adequate, maintaining the channel navigability is extremely important.

The entrance channel and turning basin were authorized by the River and Harbor Act of 1935. The Harbor was designated as a federal Harbor of Refuge by the USACE in July 1960. A jetty has been installed to protect the Island from erosion by trapping moving sand with the expectations that a beach will develop on the Island The last time that Starlings Creek and the harbor were dredged was in 2015 utilizing Hurricane Sandy funds at a cost of almost $700,000 which removed 82,500 cubic yards of sediment (*Starlings Creek Dredging*, 2015). Dredge spoils were used for beach nourishment and the finer sediments were pumped into the dredge spoil site on the property that the USACE leases from the Town.

CULTURAL RESOURCES

Saxis Island Museum was created in 2014 in the larger portion of the same building that hosts the Post Office. Saxis just received state and federal historical designation, leading to additional funding for mitigation and resilience projects. A federal grant allowed the Crockett Store to be fully renovated and house the museum's new location where they sell t-shirts, hats, koozies, and other items (Personal communications, Donna Croushore, Town Council, April 7, 2021). Outdoor public Wi-Fi is also available at the museum. The Town kept a small portion of the Post Office building to utilize as a "Life Museum" with a decorated window to peer into. The small room acts as a living museum, showing the Saxis way of life.

In Town and along the shoreline, arrowheads are frequently found, particularly following storms with high winds and associated erosion. To date, there have been no surveys to document these findings; however, this is a desired project, as it would create additional knowledge about Native American history in the area.

The cemeteries are a cultural resource in the Town. During Hurricane Floyd in 1999, and again during an extremely high-tide occurrence in July of 2020, several graves floated up on the north area of Town (Personal communications, Donna Croushore, Town Council, April 7, 2021). Cemeteries will be at increased risk as sea level continues to rise, increasing frequency and duration of inundation and erosion rates.

There are two curbside "little libraries" in the Town, as the nearest public library is approximately 25 miles away (Personal communications, Donna Croushore, Town Council, April 7, 2021). They are located one half of a mile from each other and are maintained on a weekly basis. The libraries are available for anyone to give and take any type of media including books, cd's, DVD's, VHS tapes, etc. and are often utilized by beach goers. The libraries have been knocked down during high-wind events and the Town is looking into cementing the poles into the ground (Personal communications, Donna Croushore, Town Council, April 7, 2021).

WATER SUPPLY AND WASTEWATER

Town residents obtain their water from private wells and dispose of wastewater with private septic systems. Due to Saxis' location near the coast, there is an increased chance of saltwater intrusion into the York-Eastover Aquifer, from which private wells source the residents' water, although no impacts have been measured to date. The majority of the developed portions of the Town are on Bojac sandy loam and Munden sandy loam soils, which are considered to be most and fairly suitable, respectively, for development on the Eastern Shore as they drain well, particularly the Bojac.

Public health risks may be encountered during and following coastal flooding events as septic system drainfields are inundated with flood waters. The Town's emergency response is working towards the ability to distribute potable water using pre-purchased sanitary containers from the water supply at the Saxis Fire House in the event of power loss, salt water intrusion, or contamination (Personal communications, Donna Croushore, Town Council, April 7, 2021).

The Town has applied for a USDA grant to obtain their own back hoe for maintenance and will be looking into additional grants for a building to house the back hoe and the mosquito truck that they own already; however, these projects have been delayed due to COVID-19 (Personal communications, Donna Croushore, Town Council, April 7, 2021).

SOLID WASTE

The Town now contracts out Davis Disposal to provide weekly trash pick-up for Saxis residents (Personal communications, Donna Croushore, Town Council, April 7, 2021). The nearest convenience center is located off Saxis Road in Temperanceville.

POWER AND COMMUNICATIONS INFRASTRUCTURE

Mobile service in Town can be inconsistent, depending on the service provider. There have not been issues with long-time power outages; however, the power lines are suspended along the Saxis Road (Rt. 695), the only road accessing the Town, which is prone to flooding, saturated marsh soils, and the risk of downed power line poles that accompanies these conditions. Eastern Shore of Virginia Broadband Authority is available in every incorporated Town in both Accomack and Northampton Counties, including the Town of Saxis.

The Saxis fire house is the designated staging area following an emergency and has a raised generator.

SCHOOLS

There are no schools in the Town of Saxis. There are some school-aged children home schooling; however, the majority primarily attend Kegotank Elementary and Arcadia Middle and High Schools (Personal communications, Donna Croushore, Town Council, April 7, 2021).

NATURAL ENVIRONMENT

Saxis is situated on a ridge of sand-rich soils on the western perimeter of Freeschool Marsh. It has a 9,000-foot-long shoreline, including a narrow beach along the Pocomoke Sound. The Town is adjacent to the Saxis Wildlife Management Area to the east and is bound by Starling Creek to the south. The entire Town lies within the Chesapeake Bay Watershed.

LAND USE LAND COVER

The Town of Saxis encompasses approximately 210 acres. Excluding the dredge spoil site, the highest elevation is five feet above mean low water (*Town of Saxis*, VIMS). The predominant land use is residential, while commercial land uses are mainly concentrated around the harbor and revolve primarily around the seafood industry (*Town of Saxis Comprehensive Plan*, 1997). Public and semi-public land uses are the recreational areas and churches, as well as a parcel of land leased to USACE for the placement of dredge material from Starling Creek. Vacant parcels in the Town are likely restricted from development due to physical constraints such as hydric soils and wetlands. Tidal wetlands are located along the northern half of the shoreline at the northern edge of Town. Soil types on the island are a major limiting factor in regards to development as most soils in Saxis are not suitable for septic tank use (*Town of Saxis Comprehensive Plan*, 1997) New above-ground septic tanks or the potential to connect to the Hampton Roads Sanitation District (HRSD) sewer line may allow for future development. HRSD will be running sewer from the Town of Nassawadox in Northampton County to the Wastewater Treatment Plant (WWTP) in the Town of Onancock, connecting towns in between. Future phases of the project also include towns located in northern Accomack County, although specifics have not yet been determined and these phases would not occur for several years.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3) §201.6(c)(3), §201.6(d)(3) Saxis has participated in the hazard mitigation planning process since 2006. The Town's primary risk is associated with coastal erosion and flooding.

Table 6 : Town of Saxis Hazard Mitigation Resources

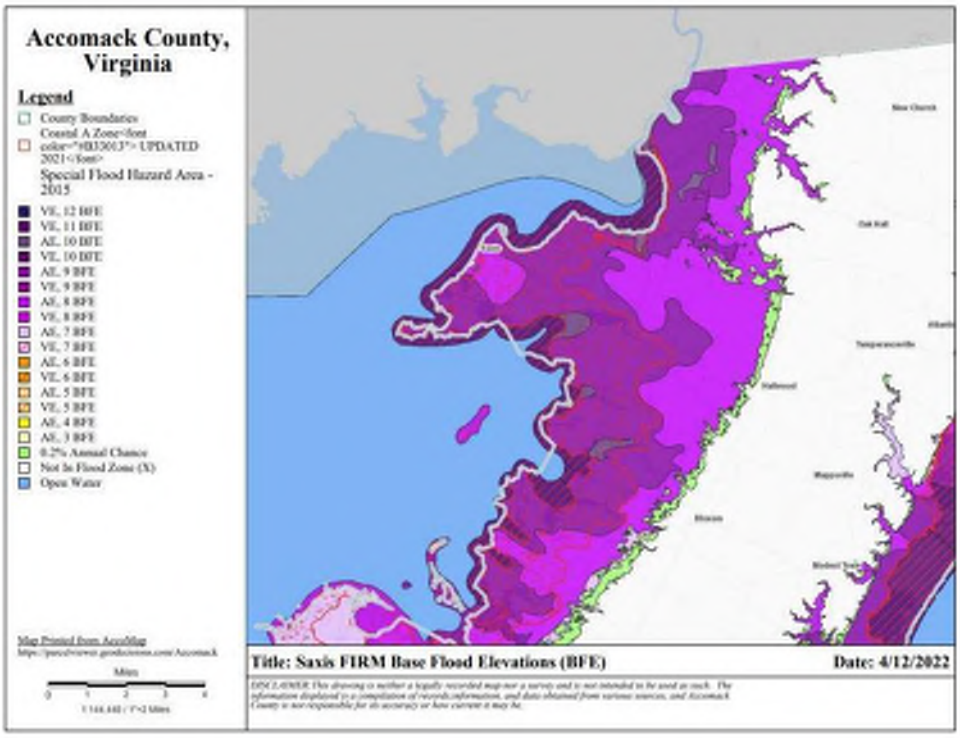
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Virginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*				*	*						*							
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on November 17, 1982. Saxis has had 37 flood insurance claims since 1982 (FEMA NFIP Data Report, 2022). There was only one claim in the Town from 2003 to 2011, with the average claim settled being $6,314 (*FEMA NFIP Flood Insurance Report*, May 2011), while there were 12 claims totaling approximately $210,000 between 2011-2016. All of these claims were likely from damage incurred during Hurricane Sandy (Personal communications, Denise Drewer, Town Mayor, June 9, 2016). More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 6: Town of Saxis FIRM Base Flood Elevation (BFE)



With the 2015 FIRM, the majority of the Town is still designated to lie within the A-zone of the Special Flood Hazard Area (SFHA), meaning that they will be inundated by the 1-percent-annual-chance flood (or 100-year storm) event. The base flood elevation (BFE) has increased throughout the Town to a current designation of eight-foot BFE, with the very southern and northern parts of Town designated at nine feet. The northern part of Town, although not yet built upon, is already subdivided with over 50 parcels, all of which fall within the 9-foot BFE, some of which have the shoreward portions of the lot in the velocity zones with a ten-foot BFE. This is a significant change from the previous FIRM, which indicated only the northern part of Saxis with a nine-foot BFE and the developed portion of Town as about evenly proportioned with seven- and eight-foot BFE's. Therefore, homes that were raised to the previous BFE are often either one or two feet below the new 2015 FIRM BFE. Although their policy premium should not increase due to these changes, if a storm event occurs which damages their home and/or contents, their policy cost will increase the following year. The Town zoning requires homes to be built at two feet above the FEMA BFE.

HMGP

The Town elevated 16 houses following Hurricane Isabel in 2003 using HMGP funds. Currently, there are three additional homes on the list to be elevated as well (Personal communications, Donna Croushore, Town Council, April 7, 2021).

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Coastal erosion, coastal flooding, and high winds are the biggest threat to the Town. Storm water flooding is primarily tidally dependent and thus considered more of a coastal flooding issue.

PANDEMIC RESPONSE AND READINESS

The Town of Saxis responded to the COVID-19 Pandemic in several ways. Cleaning and sanitizing materials were provided to every resident and the Town followed mask mandates and social distancing guidelines set forth by the State of Virginia. The Town Office remained closed and communications with residents occurred via postage letters, social media, emails, and fliers posted around Town (Personal communications, Donna Croushore, Town Council, April 7, 2021). CARES Act funds were issued to qualifying businesses and watermen in the Town and almost every waterman qualified. Funds were also used for the purchase of sanitizers and additional PPE.

Economic effects were seen primarily in the restaurant industry, specifically, Captain E's Hurricane Grill and Bar (Personal communications, Donna Croushore, Town Council, April 7, 2021). Restaurants in Virginia were closed for indoor seating until restrictions were lifted allowing limited occupancy. Although take-out and delivery were still options for restaurants, the majority of patrons that would normally visit Captain E's likely do not live in Town and would have to travel approximately 20+ minutes for pick-up. Restaurants all over the Region have struggled to keep their doors open throughout the Pandemic. As limited occupancy restrictions began to ease, restaurants in Saxis and other coastal towns with economies focused on tourism began to struggle with worker shortages due to the fact that many businesses in the Region previously hired employees on Temporary Work Visas.

HIGH WIND

The entire Town is located in the wind-borne debris hazard area. This area extends one mile inland. In 2006, the Eastern Shore of Virginia Wind Vulnerability Assessment estimated approximately $838,000 in wind damages.

Hazus® estimates are calculated as a single Census track with a geographical size of the 49.69 square miles and a total population of 2,335 people (2010 Census). The Town of Saxis is part of this track. Hazus® estimates a total of $2,850,000 in damages could occur within this Census Track from a 1% probabilistic wind storm event.

The model estimates that a total of 25,587 tons of debris will be generated within the defined Census Track. If the building debris tonnage is converted to an estimated number of truckloads, it will require 6 truckloads at 25 tons per truck to remove the building debris generated by the wind event. The number of Eligible Tree Debris truckloads will depend on how the 1,621 tons of Eligible Tree Debris is collected and processes. The volume of tree debris generally ranges from approximately 4 cubic yards per ton for chipped or compacted tree debris to approximately 10 cubic yards per ton for bulkier, uncompacted debris.

In addition to wind threats from hurricanes, there is also the potential for nor'easters, tornados, water spouts, and straight-line winds. The public pier has been destroyed and rebuilt two separate times due to damages caused by

high-wind events (Personal communications, Donna Croushore, Town Council, April 7, 2021). The Town Zoning does require 120-mph-gust zoning standards for renovations and new construction.

COASTAL EROSION

The Town recognizes that it has a serious erosion problem and has been working to resolve the issue since 1972. The average long term erosion rate for Saxis' 9,000-foot-long shoreline is 4.9 feet per year (*Town of Saxis*, VIMS); however, the Town believes it is possible 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 Bay facing shoreline with little buffer if erosion were to occur in the immediate vicinity of these structures.

The US Army Corps of Engineers (USACE) 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. In 2015, the USACE did place sand derived from the dredging of Starling Creek along the shoreline adjacent to the dredge spoil basin within Town to mitigate erosion occurring along that portion of the Town.

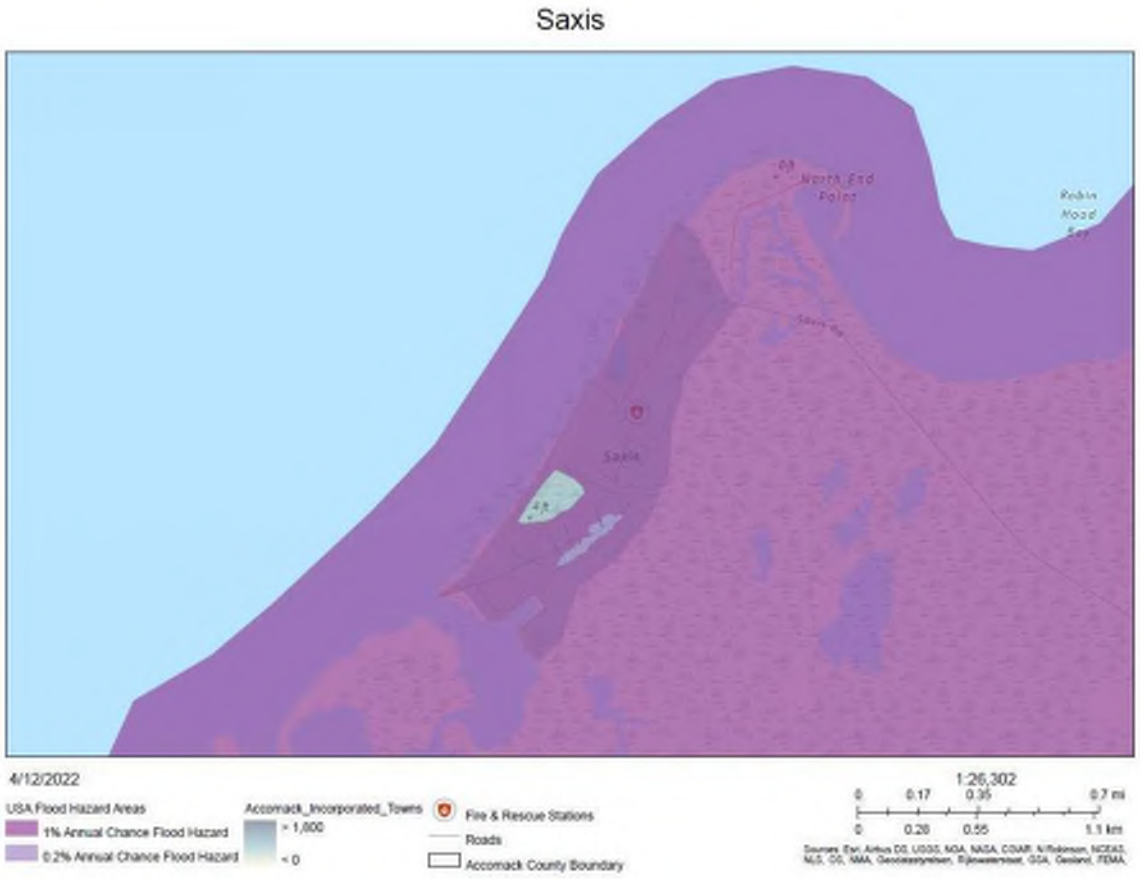
COASTAL FLOODING

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 in 1954, and Hurricane Donna in 1960 all caused flooding in the Town (Saxis FIS, 1982). Since this study, the Town has also experienced flooding during Hurricane Floyd in 1999, Hurricane Isabel in 2003, Nor-Ida in 2009, Hurricane Irene in 2011, and Hurricane Sandy in 2012.

In 2013, the Town was able to secure funding from the Virginia Port Authority for a 322-foot jetty to protect the Town, namely the harbor, from wave and storm action. During Hurricane Sandy, a year earlier, the Town pier was devastated, as were several crab shanties that are vital for many residents' livelihoods. Involvement by the Governor allowed for the reconstruction of some of the shanties. Up to 3 ½ feet of water flooded residents' garages and Saxis Road, the only road to and from the Island, was impassable for 24 hours due to vegetation covering the road as a result of salt water flooding (Personal communications, Donna Croushore, Town Council, April 7, 2021). A National Guard Truck was needed in order to provide assistance during the storm. In addition, about 60 mature trees were downed during the rain and winds. Town officials believe that if the jetty had been installed prior to the storm, there probably would have been much less damage (Personal communications, Mayor Denise Drewer, June 6, 2016). There has also been a USGS tide gauge installed at the public boat ramp, so more consistent and accurate data will be available.

According to the 2015 FEMA Flood Insurance Rate Map (FIRM), almost the entire Town lies within a Special Flood Hazard Area (SFHA), except for a small ridge and the dredge spoil deposit location on the west side of Town that are both in the 500-year flood or 0.2%-annual-chance zone, as revealed by Figure 6. Most of the structures lie within an A Zone, with Base Flood Elevations ranging from 8 to 9 feet. 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.

Figure 7: Town of Saxis Flood Hazards to Infrastructure



The causeway, 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. 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, but would be unable to do so during a flood event.

Figure 8: Westward View of Saxis Causeway. 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 and/or self-employment. FEMA notes that small businesses are particularly vulnerable after a disaster with some 30% not surviving (*Planning for Post Disaster Recovery and Reconstruction*, 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.

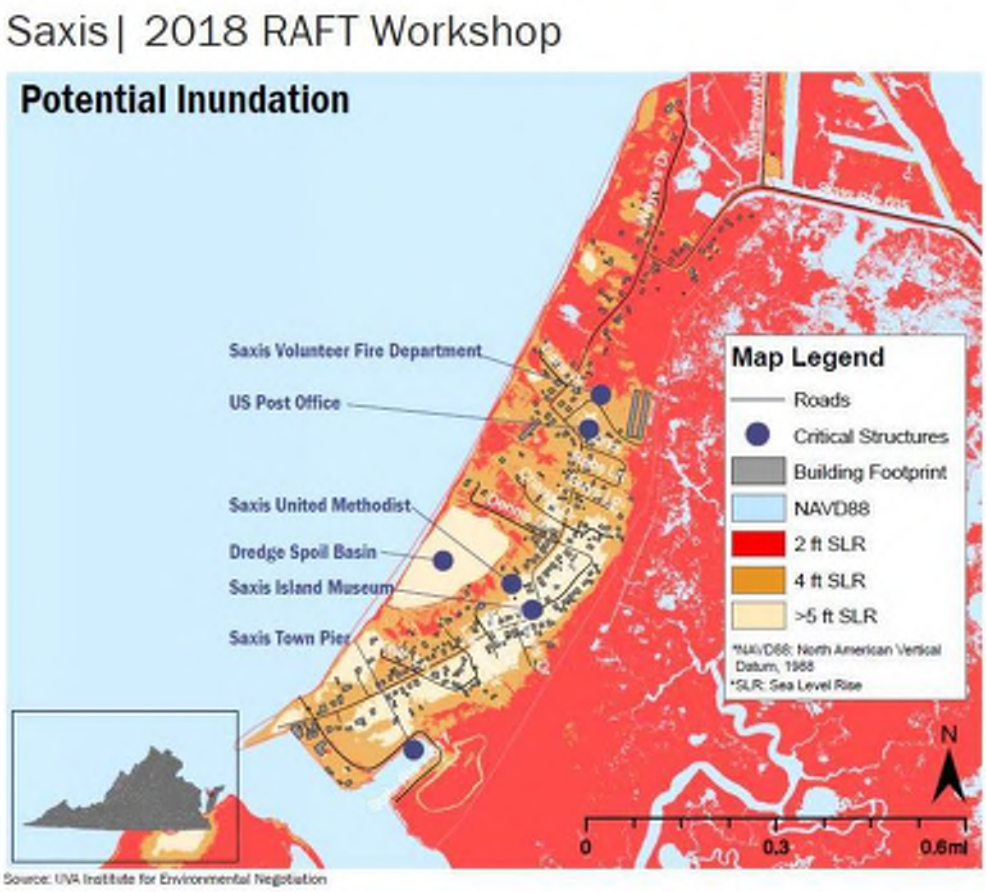


Figure 9: Captain E's Hurricane Grill and many fisheries businesses are located in the Intensely Developed Area (IDA) in Saxis. Photo by Shannon Alexander

A small commercial area is located in the center of the Town on Saxis Road. This area previously was classified as Zones A, B, and C; however, with the 2015 FIRM, this area is now primarily A Zone, with a small amount of area in the 0.2%-annual-chance flood. In the event of a 100-year or 1%-annual-chance flood, Hazus® predicts that Saxis would suffer a total of about $7.55 million dollars in building loss and business interruption. Twenty three percent of the loss is related to the impact of business interruption.

The Town participated in the 2018 Resilience Adaptation Feasibility Tool (RAFT) workshop where several priority projects for the Town were identified. The RAFT map displayed in Figure 10 below shows the potential inundation of roads and other critical infrastructure in Saxis. The repair of the causeway and erosion mitigation, as well as the 14 culverts under the causeway that are crushing and filling and not allowing water to go back and forth, are high priority projects that were identified for the Town (Personal communications, Donna Croushore, Town Council, April 7, 2021). An additional RAFT project includes reforestation in order to help mitigate flooding. The Department of Forestry donated over 100 trees, assessed properties, and selected the best trees for salt marsh areas to help mitigate tidal flooding. Trees were given to every resident that signed up and agreed to care for the trees. In February of 2020, the Department of Forestry came back to help the Town plan additional mitigation efforts regarding reforestation and coastal resilience gardening and will again return to assist the Town. The RAFT Committee also instituted the Emergency Response Program in order to ensure the safety of residents and visitors in preparation for hazards. This allows the Town to know who is at risk, who is on the island, whether residents and visitors are able to evacuate if necessary, and who needs to be contacted regarding impending hazards.

Figure 10: RAFT 2018 Potential Inundation Map - Saxis, VA



STORM WATER FLOODING

Storm water flooding also occurs in the Town. During heavy rains, the Town's roads are frequently flooded (*Town of Saxis Comprehensive 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, or common reed, can completely overtake a ditch preventing proper drainage and is almost impossible to eradicate. 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. The County Department of Public Works recently cleaned out one of the main ditches, and VDOT cleaned out several additional ditches in early 2016. The drainage is actually efficient so long as trash and yard debris are disposed of properly in order to avoid the clogging of ditches. Storm water flooding in the Town is tidally dependent. The Town has previously expressed interest in the ability to maintain their own ditches; however, it is currently still the responsibility of VDOT (Personal communications, Donna Croushore, Town Council, April 7, 2021).

HAZARDS OF LOCAL SIGNIFICANCE

WATER QUALITY

Since many people rely on the fisheries industry, fish kills and the declining health of the Chesapeake Bay greatly impact the Town. In July 1999, fish kills 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.

MOSQUITOS

The Town also has a significant mosquito problem and residents could potentially be at risk to mosquito-borne illnesses such as West Nile and Zika virus. In 2012, the Town purchased a mosquito control truck and has implemented a mosquito control abatement program. Weather depending, the truck generally sprays at least once weekly (Personal communications, Donna Croushore, Town Council, April 7, 2021).

SNOW AND ICE STORMS

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

WATERSPOUTS/TORNADOES

The Town of Saxis is also susceptible to waterspouts and tornadoes. In 2012, there were reports of several waterspouts, tornadoes, and funnel clouds forming up and down Accomack County. Multiple watermen reported to local news stations that they were working on the water near Saxis when the first waterspout touched down (*Va. Watermen Get Eyeful of Waterspouts*, 2012). More than one waterspout formed in the Saxis area as well as in the Chincoteague and Chesapeake Bays as a result of two slow-moving storm systems (*Waterspouts Spotted Over Accomack County*, 2012). The National Weather Service issued two tornado warnings on August 1, 2012 after Doppler Radar indicated a waterspout came onshore and a local law enforcement officer reported a tornado southeast of Onley. Although there were no damages or injuries were reported, it is extremely important to be prepared and ready for these types of hazards.

CRITICAL FACILITIES

Town officials evaluated the hazards that have or could affect critical facilities in Saxis. 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.

Table 7 : Town of Saxis Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Town Office	-	-	X	X	Flooding, Wind, Fire	238+	Minor Disruption	Yes	Yes
Saxis Harbor	-	X	X	X	Flooding, Wind, Erosion, Ice	10,000+	Devastating	No	Yes
Saxis Town Pier	-	X	X	X	Flooding, Wind, Erosion, Ice, Collision	400+	Minor Disruption	No	Yes
Pavilion	-	-	X	X	Flooding, Wind	400+	Inconvenience	No	Yes
Dredge Spoil Basin	-	-	X	X	Flooding, Erosion	10,000+	Devastating	Yes	Yes
Saxis Town Park/Beach	-	-	X	X	Flooding, Wind, Erosion	400+	Minor Disruption	No	Yes
Public Restroom Facilities	-	-	-	X	Flooding, Wind, Erosion	400+	Inconvenience	Yes	Yes
Public Boat Ramps	-	-	-	X	Flooding, Erosion, Ice	400+	Major Disruption	No	Yes
Other Facilities (Not Town-Owned)									
Saxis Volunteer Fire Company	-	X	X	X	Flooding, Wind, Fire	2,000+	Devastating	Yes	Yes
Saxis Causeway	-	X	X	X	Flooding, Erosion	400+	Devastating	No	Yes
Churches	-	X	X	X	Flooding, Wind, Fire	238+	Inconvenience	Yes	Yes
Saxis Island Museum	-	-	X	X	Flooding, Wind, Fire	400+	Minor Disruption	No	Yes
Post Office	-	-	X	X	Flooding, Wind, Fire	238+	Major Disruption	Yes	Yes
USGS Tide Gauge	-	-	X	X	Flooding	10,000+	Major Disruption	No	Yes

FINDINGS

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

2. Storm water flooding issues are tidal-dependent and often related to debris and invasive plant species, such as phragmites, clogging up ditches and drains.

3. 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.

4. The Town's office and fire station building has previously flooded and is located in the 100-year flood plain with a base flood elevation of 8 feet.

5. The Town is experiencing erosion and is actively pursuing projects and funding to construct protective wetlands to mitigate the problem. Reforestation and coastal resilience gardening RAFT projects are ongoing, as well as causeway repairs.

6. The Town's residents and FEMA need to document damages sufficiently in order for the various flood prone homes to receive mitigation assistance.

7. Structures are being built in the local hazard areas and older structures are being added to and remodeled, therefore, the amount of property at risk is increasing.

8. The Town has implemented an Emergency Response Program to ensure the safety of residents and visitors in preparation for hazards.

CHAPTER 22: TOWN OF TANGIER

TOWN PROFILE

The Town of Tangier is located on an island in the Chesapeake Bay. Tangier was first settled in 1686 as a farming community. At that time, the island was much larger and had woodlands. The community is very resilient, surviving an invasion by the British in 1812 and occupation until 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.

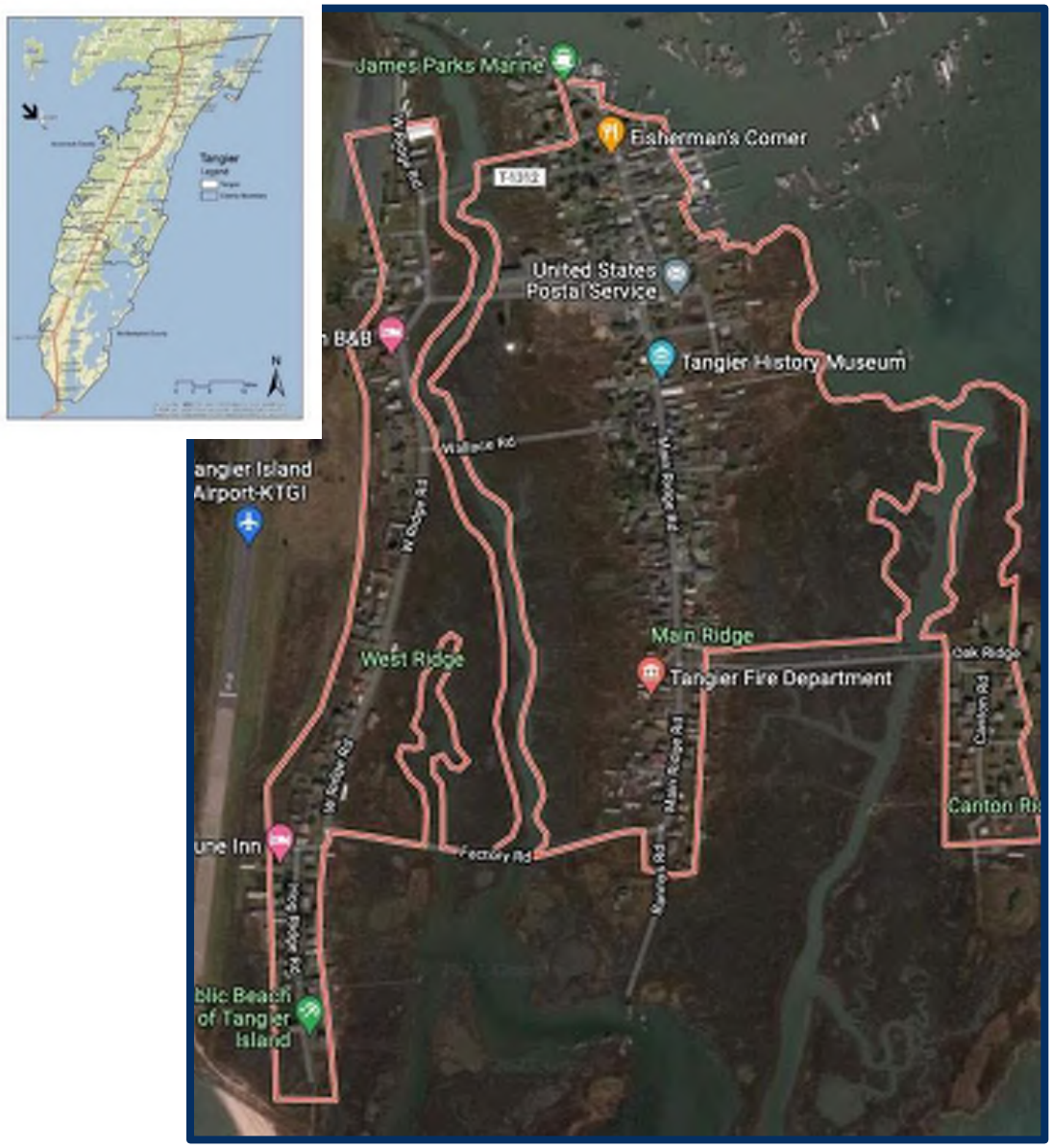


Figure 1: Tangier Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information. The following sections are intended to provide insight in the make-up and characteristics of the community and how it relates to hazard vulnerability.

DEMOGRAPHICS

In 2019, the American Community Survey five-year estimates indicate that the population in Tangier was 506, an increase from 2014 and 2013. Town officials agree that the population is currently around 500 (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). 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, which increased to 48.6 in the 2010 census, and again in the ACS 2019 estimates to 52.3, signifying an aging population and the number of younger residents who may be leaving the Island. In 2019, 31.4% of Tangier's population was over the age of 65. The Town experiences a seasonal increase in tourists visiting the Island between the months of May and October. It is estimated that about 5-10% of the population is seasonal (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

No parts of the population in Tangier speak a language other than English; therefore, everyone would be able to access important safety information regarding hazards.

Table 1: Tangier Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	506	485	483	727	604
Median Age	52.3	54.8	55.7	48.6	42.7
Disability	87	16	38	NA	NA
Income					
Median Household Income	$41,806	$38,056	$40,833	$40,556	$26,607
Poverty Level	17.2%	23.3%	21.3%	28.5%	NA
Language					
Only English	100.0%	99.2%	99.4%	99.5%	97.9.%
Other	0.0%	0.8%	0.6%	0.5%	2.1%
Spanish	0.0%	0.0%	0.0%	0.0%	1.6%
Ind-Euro	0.0%	0.8%	0.6%	0.5%	0.0%
Asian	0.0%	0.0%	0.0%	0.0%	0.5%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010 – 2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Due to Tangier being on an island, the majority of the workforce is employed in the seafood/fishing industry. Other industries that dominate the workforce in Tangier are education and health care and transportation and warehousing and utilities. The workforce has been steadily increasing since the 2000 Census. The commercial seafood industry has long provided the economic base for the Island community. Over a quarter of Tangier residents are licensed commercial watermen, hauling in seafood valued at $3.4 million in 2011, about 2% of the state landings that year (*Eastern Shore Hazard Mitigation Plan*, 2016). This represents a decline in watermen, which local representatives attribute to the increases in regulations and fees associated with fishing licenses. There have been five watermen lost in just the past year and a half (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). The increase of workforce in the transportation and warehouse industry can likely be attributed to an increase in tug boaters and marine merchants, and may be switching from the fishing/aquaculture fields (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

Table 2: Tangier Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	59	23.8%	55	25.7%	64	27.8%	72	33.6%	55	25.7%
Construction	0	0.0%	3	1.4%	0	0.0%	0	0.0%	3	1.4%
Manufacturing	0	0.0%	0	0.0%	3	1.3%	14	6.5%	0	0.0%
Wholesale trade	11	4.4%	13	6.1%	6	2.6%	12	5.6%	13	6.1%
Retail trade	7	2.8%	41	19.2%	38	16.5%	3	1.4%	41	19.2%
Transportation and warehousing, and utilities	50	20.2%	27	12.6%	15	6.5%	18	8.4%	27	12.6%
Information	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Finance, insurance, real estate, and rentals	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Professional, scientific, waste management	10	4.0%	4	1.9%	2	0.9%	0	0.0%	4	1.9%
Educational, health care, social services	56	22.6%	43	20.1%	48	20.9%	28	13.1%	43	20.1%
Arts, entertainment, recreation, food	28	11.3%	19	8.9%	20	8.7%	18	8.4%	19	8.9%
Public Administration	21	8.5%	7	3.3%	12	5.2%	13	6.1%	7	3.3%
Other	6	2.4%	2	0.9%	22	9.6%	40	18.7%	2	0.9%
TOTAL CIVILIAN EMPLOYED POPULATION	248	-	214	-	230	-	218	-	214	-

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Fishing grounds in the vicinity of Tangier produce crabs, which are processed on the Island. The fishing industry is based on the Atlantic blue crab, although some oystering and fin fishing also occur. From April to November, hard crabs are harvested in crab pots placed in local waters. Most of the catch is marketed in Crisfield, Maryland. The soft crab fishery is the most valuable industry, based on revenue, and Tangier is sometimes referred to as the “soft shelled crab capital of the world”. Retail and tourism also play an important role for businesses and income on Tangier. Tourists travel to the Island by passenger ferryboats from Onancock and Reedville, Virginia, and by way of

boat from Crisfield, Maryland. Visits are normally short term, just lasting a single day (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). The first aquaculture business began operating on Tangier in 2015. It is possible that this new business type on the Island could provide a new source of income for the Town's residents; however, aquaculture is more vulnerable to storm damage than historic fisheries operations.

There are also two Bed and Breakfasts, rental properties, several restaurants (although only one is open year-round) and ice creams shops, a museum, health centers, A&N Electric, and a marine supply store. The Town has issued 52 business licenses for 2021 (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

Table 3: Tangier Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013	2011	2009
Utilities	-	1	1	1
Wholesale Trade	-	1	1	1
Retail Trade	-	2	3	1
Accommodation and Food Services	-	6	5	6
Other Services (Except Public Admin)	-	1	1	1
Total, All Establishments	~15	11	11	11
Total Employees	-	15	18	17

Source: Personal Communications, Laurie Thomas, Town Manager, April 29, 2021; Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

Tangier is largely low marshland, so only about one-half of a square mile of the island is habitable and residents have been forced to make maximum use of the land available.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

According to the 2019 American Community Survey five-year estimates, Tangier contains 276 residential units. Data from the 2010 Census is likely an overestimate (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). These units are located along the three sand ridges of the Island, which are separated by marsh and tidal creeks, and connected by narrow wooden bridges. The lots are generally small with a combination of mobile homes and houses. There are few vacant lots left for development. Some existing homes could be demolished and perhaps rebuilt with newer homes (*Town of Tangier Comprehensive Plan*, 2001). In the last two years, there have been approximately five demolitions of derelict buildings on the Island. The number of vacant homes approximately doubled between 2000 and 2010 and is still increasing as of 2019 (ACS 2019), meaning that the housing stock on the Island may be more vulnerable to impacts from storms in general. An increase in vacant units is likely due to units being used as seasonal or second homes.

Table 4: Tangier Housing

	2019*	2010**	2000***
Total Housing Units	276	377	270
Occupied	214	324	244
Vacant	62	53	26
Owner-Occupied	196	293	227
Renter-Occupied	18	31	17
Median Housing Value	$89,700	NA	NA

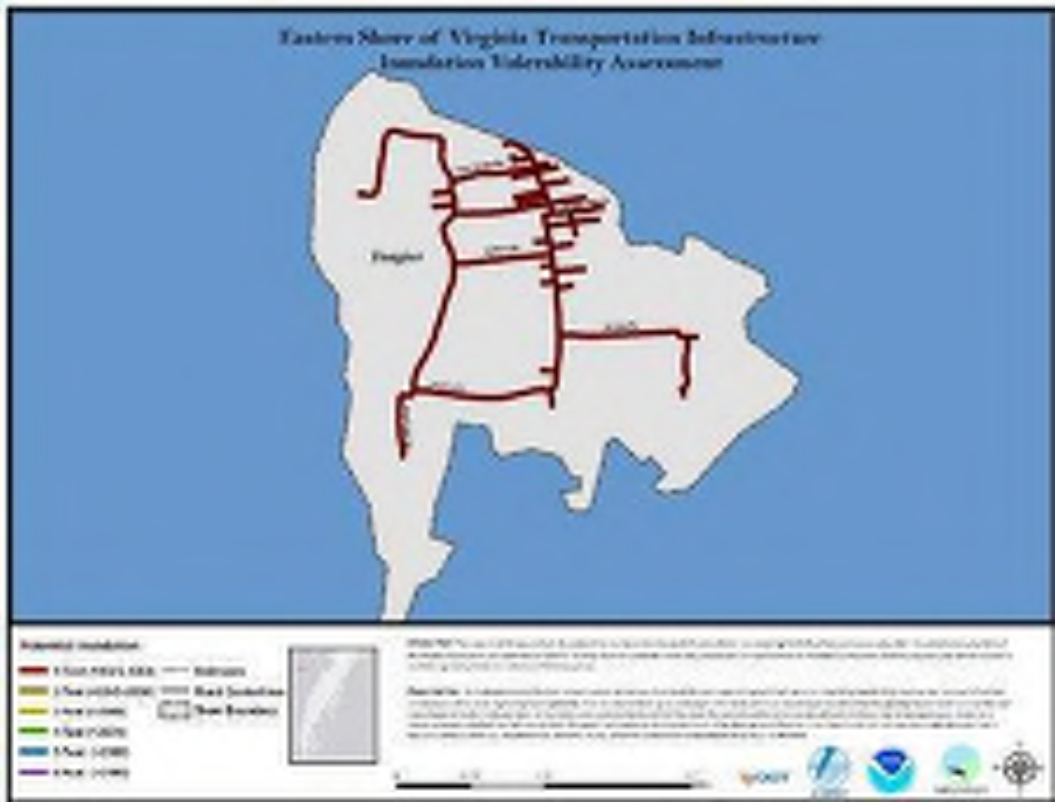
Source: *ACS, 2014-2019, **U.S. Census 2010, ***U.S. Census 2000

TRANSPORTATION

Water transportation is the primary mode of transport between the Town and the mainland. The harbor at Crisfield, Maryland is more heavily traveled than any in Accomack County; however, the Onancock Wharf is becoming more popular with the regular, seasonal ferry service. There are three other seasonal ferry services to and from the Town as well (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). Mail is routed through Crisfield and most residents travel to Crisfield for shopping, business, and entertainment purposes. Residents store over 100 cars in Crisfield's garages and parking lots. Grocery store supplies are brought by boat and large items, such as mobile homes and building supplies, are brought in by barge.

There is an airstrip owned by the Town located on the west side of the Island. This airport is the only link the Town has to the mainland when ice covers the Bay. The airport has no landing lights, but it has been paved recently.

Figure 2: Town of Tangier Transportation Infrastructure Inundation Vulnerability



Transportation on the island is by foot, bicycle, golf cart, 4-wheeler, ATV, or motorcycle. Vehicles available to households is typically an indicator of a household's ability to evacuate, but not for the Town of Tangier. The number, size, and condition of the boats owned would provide a more appropriate insight as to the residents' ability to evacuate in the face of an approaching hazard, as the majority of residents have their own boats (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

The streets are not conducive to regular automobile traffic, although the 2019 ACS estimates indicated that there were 77 vehicles on the Island. Tangier has 3 miles of narrow roadway (*Town of Tangier Comprehensive Plan*, 2001), all of which are susceptible to becoming inundated with a one-foot rise in water level above mean high tide (*ESVA Transportation Infrastructure Inundation Vulnerability Assessment*, 2015), as shown in Figure 2. There are many golf carts, some high occupancy, on the Island which can be of aid in quickly moving people and possessions to the harbor when needed (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

COMMUNITY FACILITIES

Community facilities are facilities required to support the services provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

PUBLIC SAFETY

The Tangier Volunteer Fire Department provides fire protection for the Town. The fire alarm is activated by the 911 Operations Center on the Eastern Shore. The Fire Department has 20-25 volunteer firefighters and one paid part-time EMT. Equipment includes one mini-pumper, one S-10 pick-up truck, and a Jeep with a pump. The fire company also provides ambulance service with one ambulance and a John Deere equipped with a stretcher when the ambulance cannot fit down narrow lanes (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

The State of Maryland provides emergency airlift services by helicopter. The Town is actively seeking one full-time police officer to be on call 24 hours a day. Tangier also has an agreement with the Virginia Marine Resources Commission (VMRC) whereby the one VMRC officer that lives on Tangier can provide back-up response in the absence of a permanent officer (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).



Figure 3: Tangier Firehouse. Photo by Shannon Alexander

MEDICAL SERVICES

The Tangier Health Center was constructed in 2010 in a manner that minimizes impacts from flooding and high winds. The clinic is staffed by a doctor on Tuesdays and Thursdays. There are two registered nurses that are residents of the Town and a full-time nurse practitioner. A dentist visits the Town regularly and an optometrist visits six times each year (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).



Figure 4: The Tangier Health Center - Constructed in 2010. Photo by Shannon Alexander

PARKS AND RECREATION

There is a neighborhood facility near the airport which provides an area for recreation, two conference rooms, and a kitchen. A baseball field was completed in 2018 for use by the school and community residents (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

HARBOR

The Tangier Channels were authorized by the River and Harbor Act of 2 March 1919 and modified by the P.W.A. Acts of 3 January 1934 and 30 August 1935 and River and Harbor Act of 2 March 1945. The U.S. Army Corps of Engineers (USACE) maintains channels 8-foot-deep, 100-foot-wide, and 1,300-foot-long in Tangier Sound and also 8-foot-deep, 60-foot-wide, and 4,800-foot-long to an anchorage basin 400-square-foot and 7-foot-deep adjacent to the Town.

There have been several dredging projects to ensure the safe navigation of vessels into the harbor. Typically, the Channels are dredged by the USACE at least every five years. With new technologies in alternative dredge spoil use, this is something that should be considered in efforts to reduce erosion and improve resiliency. A contract was issued in 2020 to construct a 685-foot-long stone jetty at the northern end of the seawall and the southern end of the Uppards to protect the harbor and increase navigability in the Channel. (See Coastal Erosion Section)

CULTURAL RESOURCES

The Town was designated as a historic district by the Commonwealth of Virginia in 2015 and has applied for Federal historic designation. The Tangier History Museum, open in 2007, also operates a small community library, provides free maps, contains public restrooms, and is responsible for the historical markers that line the streets, allowing visitors to do a self-guided history tour of the Island.

The Town is looking into opening public restrooms year-round due to all others being closed in the off-season and on Sundays (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).



Figure 5: Example of a small cemetery in Tangier. Photo by Shannon Alexander

The location of the former community located on the Uppards has been greatly impacted by erosion in recent years resulting in many cultural resources, including graves and artifacts, being lost to wave action. There are cemeteries and plots on private property on the main island that should be considered as well.

A public beach with a foot bridge is also located in Town at the end of West Ridge past the Jetty and B&B (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

WATER SUPPLY & WASTEWATER

The Town provides public water and sewage treatment to residents. The water comes from five 1,000-foot artesian wells sourcing the Eocene-aged Potomac Aquifer, which differs from the rest of the Eastern Shore. It is stored in a water tower with a tank capacity of 150,000 gallons, located on the western marsh of the Main Ridge. The Town's water supply is not affected by its own ground water recharge, yet it is still important to protect the resource due to its effect on the ecological diversity of the Island (*Town of Tangier Comprehensive Plan*, 2001).

The sewage treatment plant serves all the homes and businesses in the Town (*Town of Tangier Comprehensive Plan*, 2001). The treatment plant was retrofitted in the last decade and now has solar panels and releases less nitrogen and phosphorus into the Chesapeake Bay. It is located on the western part of the West Ridge, almost due west of the water tower, but outside of the extent of Figure 6.



Figure 6: Aerial view of West Ridge, West Ridge Creek, Main Ridge, and the Mail Channel, featuring the water tower west of the Swain Memorial United Methodist Church and one of the main cemeteries. Photo ©2016 Gordon Campbell/At Altitude Gallery

SOLID WASTE

The disposal of solid waste on Tangier proves to be a problem. The Town operates a waste incinerator for the disposal of most trash that is collected twice a week from homes and businesses. The Town incinerator was rehabilitated under the same contract that updated the waste water treatment plant. There is also a Town dump located on the northwest side of the Island for larger items that can't be put in the incinerator. Barges collect the trash approximately three or more times a year to bring to the mainland (*Town of Tangier Comprehensive Plan*, 2001; Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

POWER AND COMMUNICATIONS

Electricity is carried to the Island via submerged lines from the Delmarva Peninsula, with an 'extender' located at the south end of the uninhabited Watts Island. In June of 2016, there was construction done. There are two employees of the power company that are year-round residents (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).



Figure 7: Electric substation. Photo by Shannon Alexander

The microwave tower, built near the water tower, brought Dish Direct and internet to the Island. High speed internet was made available in the Spring of 2010.

The Town is in the process of having broadband connected to the island. This will be beneficial in several ways, as VMRC is doing away with paper notices and will be completing all work online. Once the cables are run and climbers complete the antennae, it is estimated to take one to two weeks for all residents to be hooked up (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

SCHOOLS

There is only one school on the Island which serves approximately 60 students total in all grade levels. The Chesapeake Bay Foundation also operates an education facility at Port Isobel to the north of Town.



Figure 8: The Tangier Combined School was elevated in 2006 to mitigate flood damages. Photo by Curt Smith

NATURAL ENVIRONMENT

A large portion of the land area of Tangier consists of marshes. The shoreline is characterized by salt marshes with occasional narrow, sandy beaches. Tangier is relatively uniform in topography with the highest elevation less than 6 feet above sea level and slopes effectively 0% (*Town of Tangier Comprehensive Plan*, 2001). The Island is comprised of beaches, marshes, and three sand ridges and is surrounded by tidal waters and cut by tidal creeks and guts.

LAND USE LAND COVER

The majority of Tangier is low marshland and very little of the Island is habitable. Nearly all development is located on the three sand ridges, Main Ridge, West Ridge, and Canton Ridge. Canton Ridge is the eastern-most ridge and is entirely residential, while West Ridge is primarily residential (*Town of Tangier Comprehensive Plan*, 2001). Nearly all commercial development and some residential development is located on Main Ridge. Soils along West Ridge are poorly drained and typically have severe limitations when it comes to development.

CHESAPEAKE BAY AND WILDLIFE

Tangier is highly dependent on the health of the Chesapeake Bay. The Bay provides more crabs for human consumption than any other water body on Earth (*Town of Tangier Comprehensive Plan*, 2001). Tangier's fishermen rely on good water quality to provide healthy crabs for the year. Tangier supports a variety of wildlife. It attracts a variety of migratory waterfowl, including Canada geese and tundra swans. Non-migratory species include mallards, widgeons, black ducks, and redhead ducks. Black ducks and redhead ducks are of particular importance due to their decline nationally, but their strong presence in Tangier. The dynamic nature of the Island means that the number of birds and habitat availability fluctuate. There are other species of wildlife including otters and muskrats. The Atlantic Blue Crab is the most important species due to its value as a resource for Tangier fishermen (*Town of Tangier Comprehensive Plan*, 2001).

Figure 9: Marsh view from bridge. Photo by Shannon Alexander



HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) A summary of the past planning efforts in regards to hazards can be seen below. This section focuses upon a review of what has already been examined and noted in relation to hazard preparedness. The Town began participating in the hazard mitigation planning process in 2006. The Town's comprehensive plan was last updated in 2001.

Table 5 : Town of Tangier Hazard Mitigation Resources

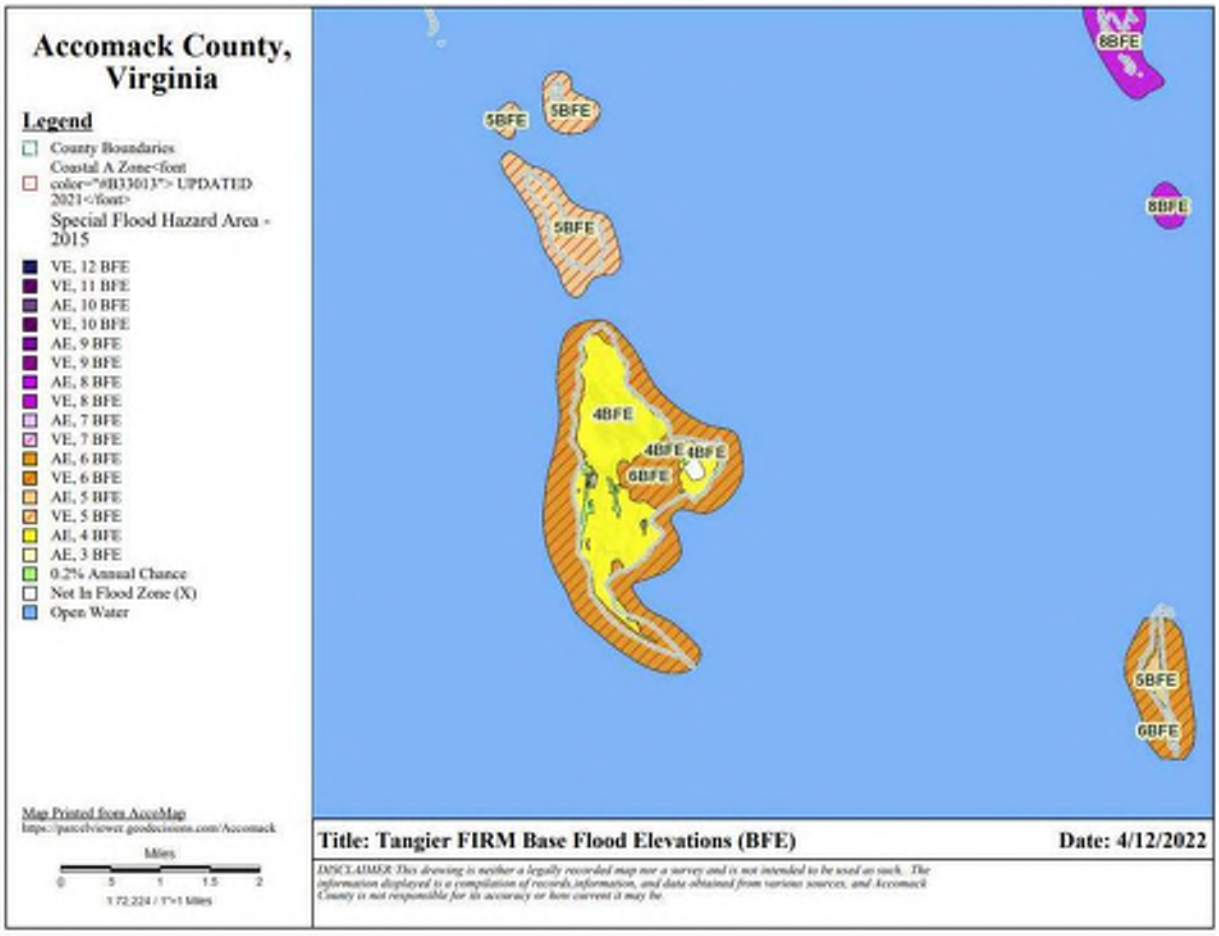
	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan (updated	Zoning (updated 1992) &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on October 15, 1982. There are 49 policies with 107 claims for the Town. Between May of 2011 and January of 2016, there were an additional 11 claims, averaging about $13,348 each. This could be a reflection of an increase in the frequency and intensity of storms, relative sea level rise, and the negative effects of erosion, and can certainly be attributed to damages from Hurricanes Irene and Sandy. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Figure 10: Town of Tangier FIRM Base Flood Elevation (BFE)



According to the 2015 Flood Insurance Rate Maps (FIRM), there are 3.8 mi^2 in the Special Flood Hazard Area (SFHA), and 2.4 mi^2 in the V Zone, both were reduced by 0.1 mi^2 (about 64 acres). The updated 2015 FIRM reveals a net reduction of 29 buildings in the SFHA. The new FIRM thus has more area in the 0.2-percent-annual-chance flood zone and in the X zone (not in any flood zone) than the previous FIRM. The base flood elevation (BFE) for the areas in the A zone are now only 4 feet, where previously many areas were indicated to need a BFE of 5 feet. The indication is that structures need only be built at 4 feet elevation in areas where they were previously required to be built at 5 feet. The Town uses Accomack County zoning requirements, which as of 2015 require homes to be built at 2 feet above the FEMA BFE; however, FEMA will only pay for homes to be built or raised to the BFE indicated by the FIRM. There are still a few houses prone to flooding that are waiting to be raised (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).



Figure 11: Sign indicative of the project that constructed six homes in 2003. Photo by John Aigner

Coastal Barrier Resource Act (CBRA) lands exist within the Town and are located in the southeast corner. 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 that cannot be expended in this area include: disaster assistance, Community Block Development Grants (CDBG), flood control projects, construction of new federal highways, and beach nourishment projects.

HMGP

The Town has not managed a grant under the HMGP. 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. No additional projects have been completed and it is thought to become increasingly difficult for residents to elevate additional homes as the program has become cost prohibitive (Personal communications, Eastern Shore Housing Alliance Staff, June 13, 2016).

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Coastal erosion has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Tangier was affected by the COVID-19 Pandemic in several ways and implemented policies and changes to help combat the virus.

Tangier Combined School immediately shut down on March 13 and seniors graduated at the airport located on the Island. The 2020-2021 school year consisted of two virtual days. Churches shut down, resulting in the temporary absence of the local foodbank, located in the Town's Sunday School building. The Town switched to virtual meetings and followed state mandates regarding masks, social distancing, indoor dining, etc. Ferries transporting residents and visitors to and from the Island had limited capacity or did not run at all. Seasonal ferry trips began late in the summer. Those with limited capacity also made the same number of trips, therefore limiting access to the Island for visitors. CARES Act and other federal funding was spent to help the community. The first round of funding was put towards small businesses and waterman grants. The second round was used to purchase additional masks, sanitizer, cleaning supplies, and anything else that may have been needed (Personal communications, Laure Thomas, Town Manager, April 29, 2021).

WIND

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) The entire Town is located in the wind-borne debris hazard area. This area extends one mile inland. Figure 11 shows that the west coast of the Island is anticipated to bear the brunt of the damages during such a wind event. According to the Hazus® model, 3% of the estimated losses is related to business interruption from winds during a 1-percent-annual-chance event. Figure 11 reveals which areas of the Island are to suffer the most damages financially.

In addition to what is referred to as the 1-percent-annual-chance wind event, there is the additional threat of tornadoes and/or waterspouts that occur from time to time (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

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 Town'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. Five former upland ridges have become marshes just since 1850 (Schulte et. al, 2015). One of the ridges, called Canaan, had a roadway until 1923 that connected it with the remaining three developed ridges, but is now separated by Tangier Creek and eroding at an annual rate of 15 feet (www.virginiaplaces.org).

Due to increasing rates of land loss, only 33.25% (about 790 acres) of the 1850 island mass is remained as of 2013 (Schulte et. al, 2015). By 2017, 22 more acres were lost (www.phys.org). The results of the 2015 study somewhat align with those of a 2003 study, as they both indicate that the Uppards, the island to the north of the main east-west navigation channel, will erode by about 2100; however, the more recent study indicates that in addition to the Uppards, Tangier Island itself will also be inundated by that time, unless remedial actions are taken. It is estimated that 75% of the land mass in 1850 disappeared by 2015 and less than 10% of the remaining land above water is currently habitable (www.virginiaplaces.org).

A seawall was built to stabilize the western shoreline of the Island and has prevented significant further erosion from occurring in this area; however, due to repeated storm action, the seawall has a history of accruing damage and needing repair, with the most recent repairs occurring in October 2020. The wall now sits at approximately 580-590 feet (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). Shoreline erosion, primarily from wind driven waves and ice sheets, was so great on the western side of the Island that it was threatening to damage the airport runway. It is important to maintain this protective asset and complete needed repairs as quickly as possible.

After Hurricane Sandy in 2012, Governor McDonnel and officials from the USACE pledged to build a jetty to reduce erosion and increase navigability in the Tangier North Channel. The feasibility phase was completed by the USACE in 2012 and indicated a total project cost of less than $4.5 million and follows the 1995 design plan. The jetty protects the mouth of Tangier Creek from further erosion and will extend south from the north shore of the channel on the western side of the Island, into the Federal channel, then dogleg southwest about 200 feet, paralleling the channel. Approximately 170 feet of revetment would armor the shoreline at the base of the structure and a small 50-foot spur jetty would also be constructed off of the seawall on the south shore adjacent to the North Channel to reduce wave action (USACE, 2012). In May of 2020, a contract was issued for $2.9 million to construct a 685-foot-long stone jetty at the entrance of the Tangier Island Federal Navigation Channel, located on the western side of the Island (www.nao.usace.army.mil). The new jetty provides an added layer of protection from wave action in the channel and where vital crab-processing facilities and fishing vessels are located. Limiting wave action helps to reduce the risk of damage to these facilities and vessels during storms.

The Tangier Channels were dredged in 2005 and 2006, when 49,768 cubic yards and 24,904 cubic yards were removed respectively, for a total cost of about $0.9 million. In 2011, the Tangier Channel was dredged again, when 86,000 cubic yards were removed, for a total cost of just over $1 million. The Tangier Channels were surveyed by the USACE in their FY2014 and were scheduled to be dredged in FY2017; however, this did not happen. Typically, the Channels are dredged by the USACE at least every 5 years. With new technologies in alternative dredge spoil use, this is something that should be considered in efforts to reduce erosion and improve resiliency.

Due to unsafe navigable conditions, there was emergency dredging at the mouth of the harbor by the Virginia Port Authority in October of 2020. A one-time dredging waiver for the USACE to dredge in May of 2021 was issued. By October 2021, dredging of the entire mouth and channel is scheduled to be completed (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

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 an increased risk from wind damage as well as flooding damage. In October of 2021, the Department of Forestry and the Town of Tangier will be planting trees and shrubbery near the jetty and the beach in order to help mitigate future erosion. There are also plans to plant additional trees and shrubs once the area behind the jetty has been filled in (Personal communications, Laurie Thomas, Town Manager, April 29, 2021).

COASTAL FLOODING

The Flood Insurance Study (FIS) for Tangier identifies that the greatest threat of flood inundation comes from hurricanes and nor'easters. Development within the Special Flood Hazard Area is extensive and includes numerous wood frame houses and commercial buildings (Tangier FIS). 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 Ridge Road, past the school, on Mailboat Harbor, the south end of Canton Road, South Main Ridge Road, 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. Today, that number has likely increased. In a 100-year storm these homes are the most vulnerable to damage.

In addition to nearly a quarter of the Town residents being licensed commercial fishermen, an even larger percentage of the Island's workers are employed in the seafood industry (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). The primary harvest is Atlantic blue crab (*Town of Tangier Comprehensive Plan*, 2001), but Tangier watermen also harvest clams and oysters. Large disasters, such as a 1-percent-annual-chance flood, will cut drastically into the Town's profits, the incomes of the residents, and the productivity of the workers, while 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 did not have any individuals employed in construction in 2019 (ACS 2014-2019). Additionally, most construction materials need to be shipped to the Island.

In September 2003, Hurricane Isabel, although not reaching the Base Flood Elevation, flooded 97 homes and almost wiped out the crabbing industry on Tangier. Some crab houses were completely washed away while others listed into the water. Out of 85 crab houses, approximately 34, or 40%, were destroyed or significantly damaged. 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. At that time, the crab houses cost approximately $25-$30 per square foot to rebuild. Commonly, crab houses typically range in dimension (in feet) from 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, whereas one float costs over $100 and a crab pot runs about $35. A waterman may have 700 crab pots and 30 floats. Crab season runs from April to November with a large portion of the harvest time corresponding along with hurricane season.



Figure 12: Crab and watermen houses on Tangier can easily be damaged during storms, such as Hurricane Isabel. Photo ©2016 Gordon Campbell/At Altitude Gallery

Other than the crabbing industry, tourism has also become a larger part of the local economy of Tangier. The tourism industry is primarily located around Mailboat Harbor and south along Main Ridge Road. This industry would also be slow to recover following an intense storm event.

Residential flood losses in the event of a 1-percent-annual-chance flood in the Town would be significant to include direct building losses and business interruptions. The Hazus® model estimates that a total of 9,343 tons of debris will be generated in a 1-percent-annual-chance flood event. Approximately 374 truckloads would be needed to

remove the debris. The Eastern Shore of Virginia Coastal Flood Vulnerability Assessment in 2011 estimated $4.2 million in building damages.

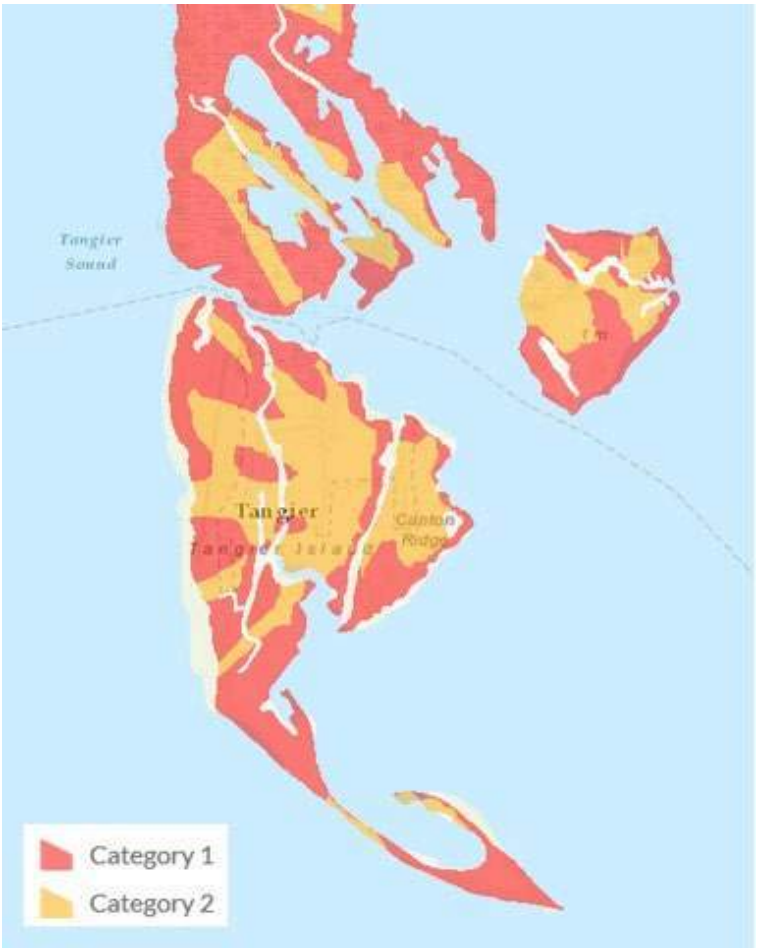
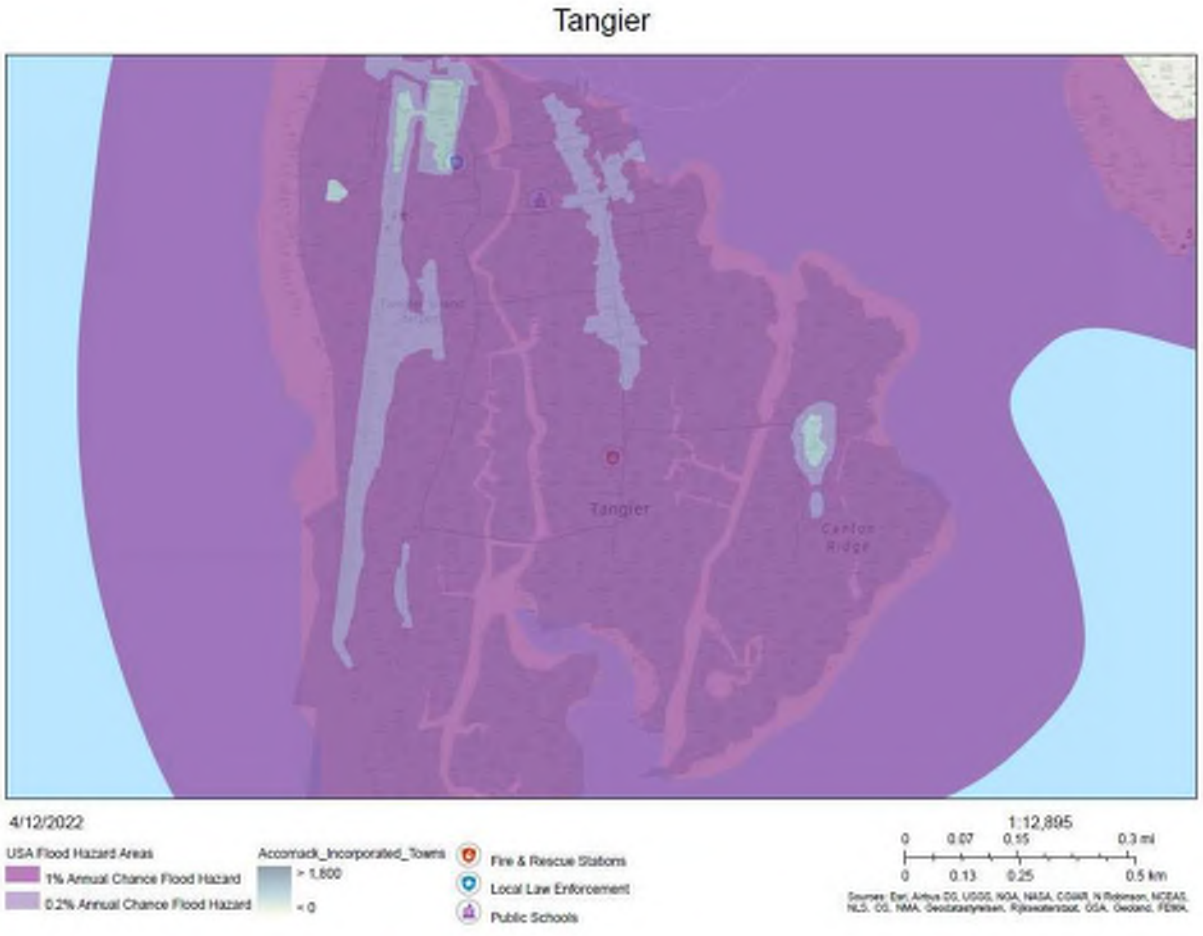


Figure 13: Estimated Hurricane Impacts; Source: Virginia DEM Storm Surge Tool

In 2016, it was indicated that historically and generally, residents have only evacuated the Island for storms of Category 2 strength or greater (Personal communications, Renee Tyler, Town Manager, June 16, 2016). 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 other than an off-road ATV; however, with high projected rates of relative sea level rise, it is likely that storms of lower intensity will have higher impacts.

Figure 14: Town of Tangier Flood Hazards to Infrastructure



STORM WATER FLOODING

The Island is susceptible to poor drainage due to high water and has localized ponding after storms. Most soils on Tangier Island are highly permeable, and much of the soil underlying the developed areas is hydric. Hydric soils are primarily wet and poorly drained. Currently, there is no storm water management on Tangier (*Town of Tangier Comprehensive 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.

Storm water flooding is tidally dependent and typically only occurs in tandem with tidal flooding. Pondarosa Road is a recognized problem area. The stretch of Parks Marina Lane and Main Ridge Road from James Parks Marine to Daley & Son Grocery is also prone to flooding, which is prime commercial area and the area most heavily used by tourism visitors.

Figure 15: Flood water ponding around homes on Tangier after Hurricane Isabel in September 2003. Photo by Deborah Mills



HAZARDS OF LOCAL SIGNIFICANCE

Other hazards for Tangier Island include, but are not limited to, winter weather, water quality, epidemics, fire suppression, and salt spray.

SALT SPRAY

Salt spray and salt air 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 with exposure to the salt air.

WINTER WEATHER

Unlike other places on the Eastern Shore, winter weather can be devastating to the community as the entire Island can become 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 also helped control Tangier's vulnerability to erosion at this site. In January of 2019, water distribution pipes froze and burst, causing 150,000 gallons of water from the water tower to drain out. Residents collected seawater in order to flush toilets and the fire hydrants were left dry for nearly three weeks (www.virginiaplaces.org). These freezes continue to happen unpredictably, as it did in 2003 (Figure 15) and in 2014.



Figure 16: Tangier in February 2003, a Coast Guard cutter came later to break the ice and deliver the mail. Photo by John Aigner

FIRE SUPPRESSION

Fire suppression is a problem if the water supply loses power. The water tank holds approximately one day's water supply. 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.

WATER QUALITY

Since many people rely on the fisheries industry, fish kills and the declining health of the Chesapeake Bay impact the Town. These water quality hazards represent a threat to the livelihood of residents in Tangier and various coastal communities on the Eastern Shore.

EPIDEMICS

There have been five epidemics on Tangier 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. In the 1880s, it was swept with smallpox. Today, such events are less likely due to medical advances, but with any small, isolated community that uses the same water supply and often eats from the same source (Chesapeake Bay seafood), they are still possible and of some concern, as seen with the recent COVID-19 outbreak.

In March of 2019, the COVID-19 pandemic struck. The Town of Tangier managed to not have a single positive COVID-19 test for eight months. In November of 2019, the first Town resident tested positive and the virus quickly spread throughout the Town, resulting in two deaths (Personal communications, Laurie Thomas, Town Manager, April 29, 2021). The positivity rate was nearly triple that of the national rate and was likely even higher, as several symptomatic residents self-quarantined and were never tested. Tangier immediately took action and put in place strict mask mandates and social distancing rules. Tangier Combined School, both churches, and nearly all businesses temporarily closed while residents quarantined to combat the spread of the virus.

INVASIVE SPECIES

Invasive species that would negatively impact the fisheries would be devastating for the residents of the Town. In addition, invasive species, such as the Nutria, negatively impact the Town by damaging the marsh vegetation that provides protection from storm surge and erosion.

CRITICAL FACILTIES

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

Three of the critical facilities on the island, The Health Center, Tangier Combined School, and History Museum and Interpretive Cultural Center (HMICC), were completed between the original Hazard Mitigation Plan in 2006 and the 2011 update. 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 17: The Tangier History Museum. Photo by Shannon Alexander



Table 6: Town of Tangier Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town Owned Facilities									
Tangier Town Office	X	X	X	X	Erosion Flooding Wind	506+	Devastating	Yes	Yes
Tangier Sewage Plant	X	X	X	X	Erosion Flooding Wind	506+	Devastating	No	Yes
Tangier Water Tower	-	-	X	X	Erosion Wind	506+	Devastating	No	Yes
Other Facilities (Not Town-Owned)									
Tangier Fire & Rescue Department	X	X	X	X	Erosion Flooding Wind	506+	Devastating	No	Yes
ANEC (power station)	X	X	X	X	Erosion Flooding Wind	506+	Devastating	No	Yes
Tangier Airport	X	X	X	X	Erosion Flooding	506+	Major Disruption	No	Yes
Tangier Combined School	X	X	X	X	Erosion Flooding Wind	506+	Major Disruption	No	Yes
Tangier Museum	-	-	X	X	Erosion Flooding Wind	506+	Major Disruption	Yes	Yes
Tangier Harbor	-	-	X	X	Erosion Flooding Wind	506+	Devastating	No	Yes
Tangier Health Center	X	X	X	X	Erosion Flooding Wind	506+	Major Disruption	No	Yes
Post Office	-	-	X	X	Erosion Flooding Wind	506+	Major Disruption	Yes	Yes
Gym	-	-	X	X	Erosion Flooding Wind	506+	Inconvenience	Yes	Yes

FINDINGS

1. Tangier is unique in our region and nationwide as one of the most at-risk communities to erosion, flooding, and wave action.

2. Erosion is the Town's greatest threat and is also aggravating the flooding that occurs on the Island. Loss of land on the east side of the Island has worsened flooding. A new jetty was constructed to help protect the harbor. In addition to shoreline stabilization, regular dredging of the channels and maintenance of the seawall should be considered in efforts to improve resiliency of the Island. The Town, with the help from the Department of Forestry, intends to plant trees and shrubbery around the jetty to further mitigate erosion.

3. Flooding disasters have an extremely adverse effect on the Town's economy and could potentially push it beyond recovery.

4. By its nature, the primary industry on the Island, the seafood industry, cannot obtain flood insurance. This will prolong the recovery period needed.

5. The 2015 FIRM lowers the BFE for many buildings; this may be an inaccurate assessment of flood water levels during a 1-percent-annual-chance storm. The result is that homes obtaining assistance through HMGP may not be adequately improved to mitigate the true risk of flooding in the Town.

6. There are a significant number of residents who are uninsured or underinsured from residential flood losses. Not only is insurance cost prohibitive, but there is currently only one private company that offers insurance for homes here.

7. Freezing conditions on the Island can affect the seafood industry and prevents the delivery of essential items to Island residents.

CHAPTER 23: TOWN OF WACHAPREAGUE

TOWN PROFILE

Wachapreague was originally a Native American fishing village settled by the Matchapungos, a subdivision of the Algonquin Tribe. Nathaniel Bradford first patented the land in 1662 for 1,000 acres. The Town settlement wasn't developed until the early 1800s. The Town's wharf was used to ship goods to other American cities in 1825. The late 1800s saw a successful fish oil and fertilizer company and a booming reputation as a tourist destination. The Wachapreague Hotel in 1902 attracted hunters and fisherman from all over the country until it burned down in 1978. Wachapreague has seen a history as a town that capitalized on its location for shopping, natural beauty, and fishing (*Town of Wachapreague Comprehensive Plan*, 2016).



Figure 1: Wachapreague Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to Table 1, the population in Wachapreague has remained relatively stable since 2000. The American Community Survey five-year estimates for 2019 indicate the population dropped from 232 in 2014 to 192 in 2019; however, Town officials believe the population is more accurately depicted in 2010 Census data and is actually around 246 (Personal communications, Robert Williams, Councilman and Floodplain Administrator/CRS Coordinator, March 17, 2021). Like many towns along the Shore, Wachapreague experiences an increase in transient populations during the warm seasons due to tourism. This is an important aspect to consider in response to emergency situations and mitigating hazards, as larger populations require more response and aid. Also, visitors often do not know where emergency facilities are located and are usually less familiar with local weather patterns and hazard potentials.

Town officials confirmed that 100% of residents in Wachapreague speak English (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021), which indicates that all residents should be able to access information regarding hazards by some means.

Table 1: Wachapreague Demographics

	2019*	2014**	2013**	2010***	2000****
Population	192	232	182	232	236
Median Age	61.5	63.1	63.2	57.9	55.6
Disability	39	31	24	NA	NA
Income					
Median Household Income	$42,386	$26,250	$40,625	$54,688	$36,625
Poverty Level	5.2%	16.4%	17.0%	24.2%	18.0%
Language					
Only English	100.0%	87.0%	83.0%	92.0%	97.8%
Other	0.0%	13.0%	17.0%	8.0%	2.2%
Spanish	0.0%	NA	14.8%	8.0%	0.0%
Ind-Euro	0.0%	NA	2.2%	0.0%	0.4%
Asian	0.0%	NA	0.0%	0.0%	1.8%

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

The majority of the workforce in Wachapreague is employed in retail trade, construction, administrative support and waste management services, and accommodation and food services. Many residents in Town work part-time and the low number of the total civilian employed population is thought to be accurate due to a high number of residents retiring (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021).

Table 2: Wachapreague Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010*****		**2000******	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	5	5.6%	2	2.4%	16	13.6%	3	2.4
Construction	12	13.5%	4	4.8%	22	18.6%	11	8.8%
Manufacturing	2	2.2%	14	16.9%	4	3.4%	7	5.6%
Wholesale trade	4	4.5%	5	6.0%	9	7.6%	8	6.4%
Retail trade	18	20.2%	9	10.8%	14	11.9%	13	10.4%
Transportation and warehousing, and utilities	2	2.2%	2	2.4%	0	0.0%	17	13.6%
Information	1	1.1%	1	1.2%	7	5.9%	0	0.0%
Finance, insurance, real estate, and rentals	2	2.2%	2	2.4%	10	8.5%	5	4.0%
Professional, scientific, waste management	12	13.5%	7	8.4%	8	6.8%	14	11.2%
Educational, health care, social services	11	12.4%	16	19.3%	20	16.9%	20	16.0%
Arts, entertainment, recreation, food	12	13.5%	11	13.3%	3	2.5%	14	11.2%
Public Administration	4	4.5%	5	6.0%	0	0.0%	13	10.4%
Other	4	4.5%	5	6.0%	5	4.2%	0	0.0%
TOTAL CIVILIAN EMPLOYED POPULATION	89	-	83	-	118	-	125	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census Bureau Center for Economic Studies (OnTheMap), ****U.S. Census 2000

BUSINESSES

Wachapreague's surrounding natural beauty means that most of its economic vitality stems from fishing, hunting, boats, and tourism. Wachapreague has a working waterfront and navigable waterways. This allows the local fishing and recreation facilities of the Town to support a variety of businesses consisting of marinas, tackle shops, restaurants, and lodging services. The Wachapreague Inlet enables access to the Atlantic Ocean and its opportunities for commercial and recreational seafood. The Town's economy is also heavily dependent on tourism. In 2015, there were a reported 24 town business licenses relating to lodging, restaurants, artisan/crafts, tourism, construction services, and commercial seafood enterprises (*Town of Wachapreague Comprehensive Plan*, 2016). The industries and number of establishments shown in Table 3 for 2013 is thought to still be accurate (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021).

Table 3: Wachapreague Business Establishment Types

Industry Code Description	**Total Establishments**			
	2021	**2013**	**2011**	**2009**
Construction	1	1	1	2
Retail Trade	1	1	1	1
Transportation and warehousing	1	1	1	1
Professional, Scientific, and Technical Services	1	1	1	1
Arts, Entertainment, and Recreation	1	1	1	1
Accommodation and Food Services	2	2	2	2
Total, All Establishments	7	7	8	10
Total Employees	-	65	68	NA

Source: Personal Communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021; Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

According to the American Community Survey five-year estimates, there is a total of 267 housing units in Wachapreague; however, this number may be too high and is probably more accurately depicted in 2010 Census data displayed in Table 4 (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). Like many towns on the Eastern Shore, the high number of vacant housing units is likely due to the high volume of transient occupants, particularly seasonal residents and fisherman. Generally, Wachapreague's housing is in good condition; however, with the decreasing population and a steady increase in seasonal residences, there are housing units that are in a poor state of repair (*Town of Wachapreague Comprehensive Plan*, 2016).

Table 4: Wachapreague Housing

	2019*	2014**	2010***	2000****
Total Housing Units	267	249	230	225
Occupied	113	112	124	133
Vacant	154	137	106	92
Owner-Occupied	90	84	95	107
Renter-Occupied	23	28	29	26
Median Housing Value	$127,500	$138,900	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***US Census 2010, ****US Census 2000

TRANSPORTATION

Wachapreague has approximately 5.6 miles of state-maintained roads, including primary and secondary roads. The primary roads are Route 180 and Route 180-Y. Route 180 connects Wachapreague to U.S. Route 13. Route 180-Y provides an alternate route through Town and connects to Route 624. All other roads are secondary roads. STAR Transit and Shore Ride serve up and down the Eastern Shore, but STAR Transit does not go into Wachapreague Town limits. With the abundant amount of waterfront activity and residents utilizing the park as well as walking, fishing, and launching vessels, in combination of the increased population in the summer months, there is a concern about the speed of vehicles entering Town and about sufficient parking (*Town of Wachapreague Comprehensive Plan*, 2016). Individuals with personal vehicles can most often remove themselves and their families from harm's way in the event of an emergency. According to Table 5, there are five occupied housing units without a vehicle. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level.

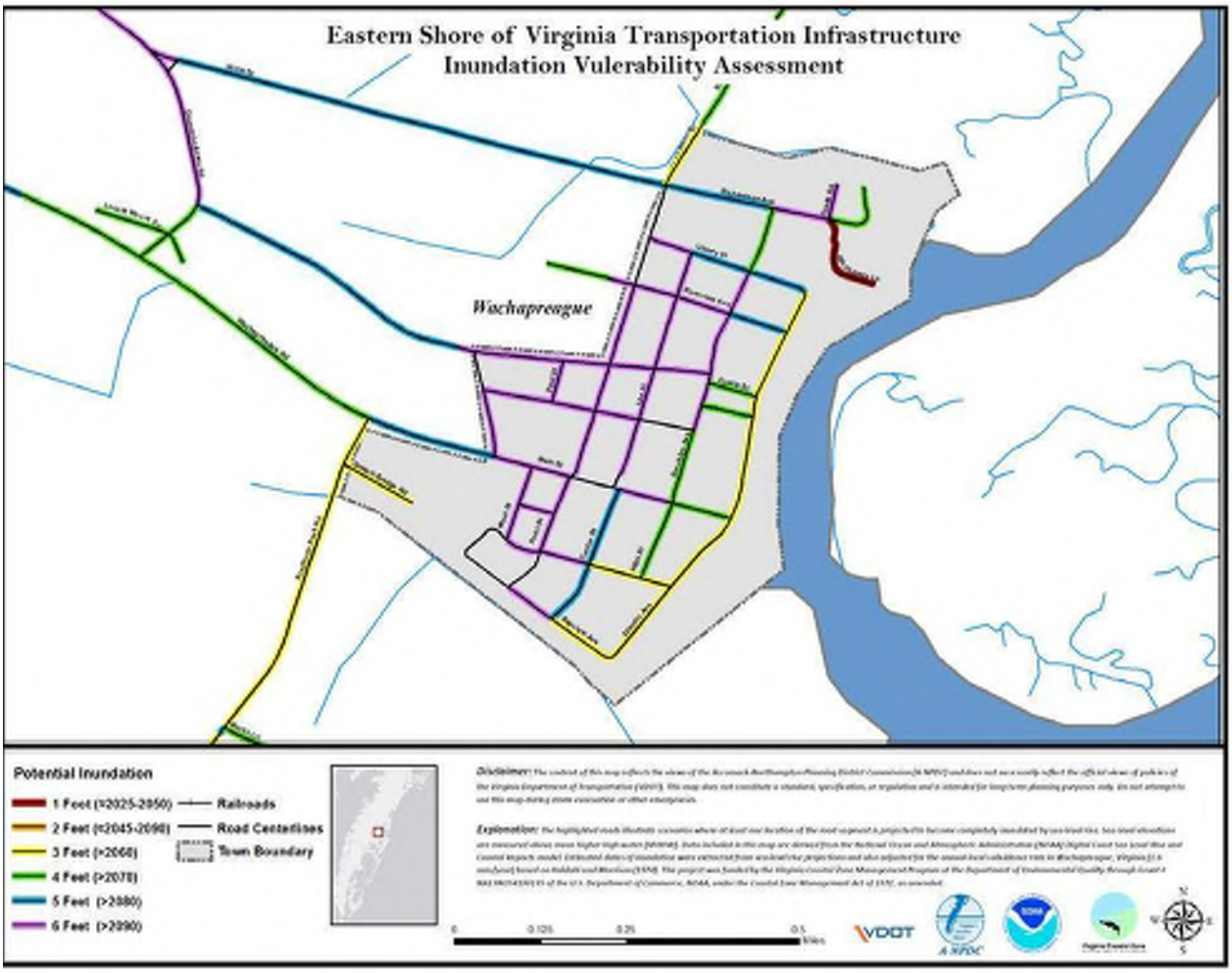
Table 5: Wachapreague Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	5	12	11	12
One	47	25	42	48
Two	51	64	57	60
Three or more	10	12	15	11

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****US Census 2000

With only two feet of sea level rise (SLR), it is estimated that Atlantic Avenue, the main waterfront commercial street, will be at least partially inundated with water. This is important to note, as it also indicates that with two feet of flooding at mean high tide, this section of the road would also be inundated. Fortunately for the Town, the majority of the residential area roads will not likely experience flooding unless storm surge or SLR reaches six feet. Much of Wachapreague Road, the main access road to the Town and its evacuation route, is within the floodplain as well, which can be seen in Figure 2.

Figure 2: Town of Wachapreague Transportation Infrastructure Inundation Vulnerability



COMMERCIAL AREAS

The commercial center is found along Main Street and Atlantic Avenue and consists of lodging, a Post Office, marinas, restaurants, and the Virginia Institute of Marine Science Eastern Shore Laboratory facilities. The majority of the Town has already been developed. There are remaining undeveloped lots gradually being filled up with new buildings. The Town is looking into future development and revitalization of the Waterfront Business District; however, septic issues have been preventing this. The Town is looking into connecting to the Hampton Roads Sanitation District (HRSD) sewer line in the future to help mitigate this issue.

Figure 3: Wachapreague Waterfront Commercial Area. Photo by Elaine Meil



COMMUNITY SERVICES AND FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

PUBLIC SAFETY

Police protection is provided by the Accomack County Sheriff's Department and Virginia State Police. The Volunteer Fire Company is located at 1 High Street and also serves as the Town polling place. The Fire Company is all volunteer and no longer provides rescue services. The Town has two ambulances stationed out of Painter to provide Emergency Medical Services which are staffed by the Accomack County Department of Public Safety. The Town's fire station features five engine bays to house an engine, tanker, brush unit, and utility/support vehicle. There are about 25 volunteers and no paid firefighting or non-firefighting personnel (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). Due to the current Station being located in a flood plain, the Town has purchased property on higher ground just outside of Town limits with the intent to relocate.



Figure 4: Wachapreague Volunteer Fire Company

WATER SUPPLY AND WASTEWATER

Wachapreague residents rely on private wells for their water supply. There is no central sewage collection or treatment in the Town; however, the Town is hoping to connect to the new HRSD line in the future and is currently seeking funding options. Wastewater disposal is by septic systems. In addition, residential water supplies can be threatened by failing septic systems. In the past, flooding that has damaged homes and destroyed possessions has also caused failed septic systems (*Town of Wachapreague Comprehensive Plan*, 2016). Also see the Hazards of Local Significance section in reference to salt water intrusion.

SOLID WASTE DISPOSAL

There is a private waste disposal service located within Wachapreague. The Accomack County Convenience Center on Wachapreague Road in Grangeville is just over 2.5 miles from Town.

PARKS AND RECREATION

The 15-acre Powell Memorial Park has two tennis courts, a baseball field, a recently added dog park in addition to a pet waste station, picnic facilities, and playground equipment. The Park also serves as the storage location for the Town vehicles (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). The 1.5-acre Wachapreague Seaside Park, which was completed in December 2010, sits on the parcel on Atlantic Avenue where the historic Wachapreague Hotel once stood and boasts native plants, beneficial in water retention. Nearby, the fairgrounds bring a significant amount of traffic to the Town and the Wachapreague Fireman's Carnival located there provides much of the funds for the Volunteer Fire Company.

Water access is of vital importance for watermen, recreational fishermen, birders, marine research, outdoor enthusiasts, special events, and fishing tournaments, such as the Marlin Tournament. In addition to the private Wachapreague Marina, LLC, there is also the Town Marina, which offers free use of the boat ramp for all Wachapreague taxpayers and offers transient and monthly slip rentals for boats up to 44' length over all. This facility provides access to paddle sport enthusiasts with a floating dock and a launch site on the Eastern Shore Seaside Water Trail.

DRAINAGE DITCHES

The Town's drainage system is maintained by VDOT and Accomack County. The Town has developed and implemented a bi-annual ditch-cleaning plan. This involves a commercial grade vacuum system and two part-time Town employees to rake and pull the vacuum with the Town tractor, which may take up to two weeks to complete (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021).

POWER AND COMMUNICATIONS INFRASTRUCTURE

Mobile service in the Town is inconsistent and often unreliable. This has been and continues to be a major issue for the Town. Although there is a cell tower located at the Fire Department, there have been unsuccessful attempts at getting a provider to set up antennas on the tower (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). This is a huge vulnerability for the Town, as residents and visitors without access to Wi-Fi or cellular service would be unable to call for emergency services, as well as individuals out on the water or at the marinas.

SCHOOLS

There are no schools within the Town boundaries. The Virginia Institute of Marine Science Eastern Shore Laboratory is located on the northern side of Town and has multiple buildings, including dormitories, and will soon be expanding.

NATURAL ENVIRONMENT

Wachapreague lies within the geological region known as the Coastal Plain. All of the Eastern Shore is included in the Coastal Plain geological region, which is a low-lying region composed of sands, silts, and clay deposited by glacial melt water. Some of the soils in Wachapreague are generally not suited for conventional septic tank drain fields; however, due to alternative on-site wastewater treatment systems such as mound systems, it is now possible to develop on some of these soils (*Town of Wachapreague Comprehensive Plan*, 2016).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) The Town has participated in the Hazard Mitigation Planning process since 2006. The Town's primary risk is associated with coastal flooding. Wachapreague's comprehensive plan was last updated in 2016.

Table 6: Town of Wachapreague Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*				*	*													
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

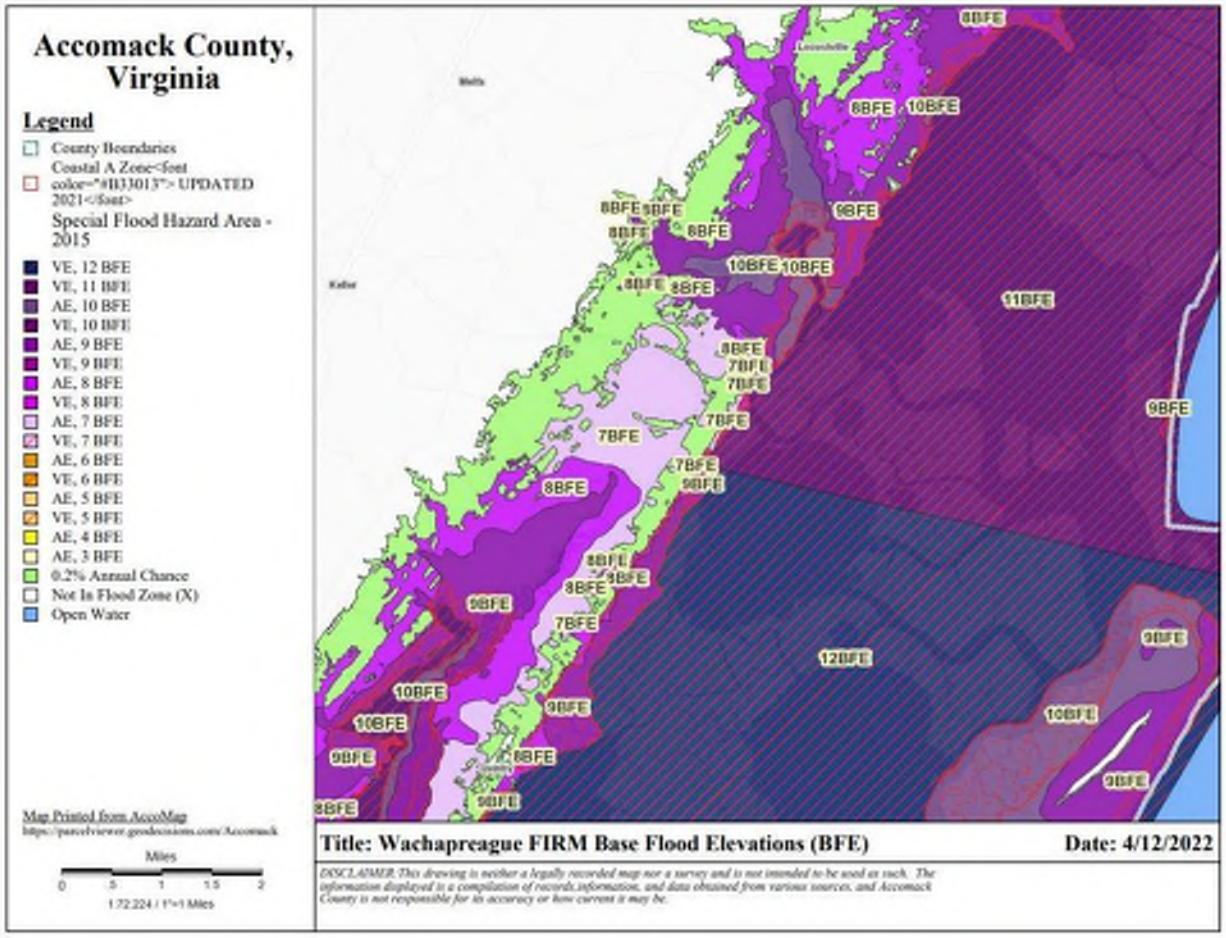
§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town has been a participant in the NFIP program since 1982. Every year, there are a few policies for structures that were not located in the 100-year floodplain, which potentially indicates a stormwater flooding problem. Most of the Town lies in the 100-year flood plain with the remainder lying in the 500-year floodplain. There are currently 72 policies in the Town with 29 claims to date (FEMA NFIP Data Report, 2022). More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

Resilience Adaptation Feasibility Tool - RAFT (virginia.edu) From the RAFT Resilience Action Workshop August 2018:

- Upgrade and improve Town emergency response and communications
- Develop emergency response system, which includes: identify vulnerable populations (senior and disabled), emergency evacuation plan, identify responsible authorities and contact lists, identify shelter center (fire department, homes, churches), volunteer help list.
- Develop/create a coastal resilience resource list
- Create a list to help the Town quickly and effectively identify resources for emergencies, funding, planning, etc. when needed.
- Work collaboratively to install cell phone towers/broadband internet in our communities
- Work collaboratively with other localities to place additional pressure on cell companies and prompt a response from companies or leverage resources from state government. Wachapreague Resilience Action Checklist.pdf (virginia.edu)

Wachapreague also participates in the voluntary Community Rating System (CRS), which encourages the community to establish sound programs to recognize and encourage floodplain management activities that exceed the minimum NFIP requirements (*Town of Wachapreague Comprehensive Plan*, 2016). The Town previously had a rating of 9, but was able to lower this rating to an 8 in 2018. This new rating qualifies policy holders in Wachapreague an average of $94.00 in savings on their annual premiums, as well as additional discounts for policy holders located in the SFHA (FEMA, 2018).

Figure 5: Town of Wachapreague FEMA Base Flood Elevation (BFE)



HMGP

The Town received funding following Hurricane Isabel in 2003 to elevate six homes that had been impacted during the storm. One house was elevated in 2016 as a result from a 2012 grant.

HAZARD PROFILE

PANDEMIC RESPONSE AND READINESS

The Town responded to the COVID-19 pandemic in several ways. Wachapreague received a $40,000 grant, which they used to help local businesses as well as to purchase sanitizer, masks, and a screen projector to assist with social distancing during meetings. The Town rented space from the Wachapreague Volunteer Fire Department in order to continue Town Council meetings twice a month to review and update ordinances. Plexiglass was donated from the County to hold elections. Town officials believe they are better prepared if a similar pandemic were to occur again (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021).

HIGH WIND

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) No parts of Town lie in the wind-borne debris hazard area. This area extends one mile inland from the barrier islands. The Town lies in the 110-120 mph design wind zone (Accomack County Building Code). According to the Hazus® model, about $36,800 in damages would be sustained from winds from a 100-year probabilistic scenario storm, with the waterfront buildings being the most at risk to higher levels of damages. 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. During Hurricane Isabel, more trees were downed than in any other event in the past twenty years.

Figure 6: Wind Damage from the Hurricane of 1933. Photo Credit-Unknown



Figure 7: 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. The constantly shifting barrier islands and extensive marshes have historically protected the Town from the wave energies of the Atlantic Ocean. For Wachapreague, the erosion of Cedar Island is a major concern, as this island provides their primary protection from Atlantic storms. The images in Figure 8 partially reveal the rate and intensity of Cedar Island erosion. This rate has continued to increase, as by the summer of 2016 the entire southern end of Cedar Island, including all land shown in both images in Figure 8, are entirely submerged at all stages of the tide (*Town of Wachapreague Comprehensive Plan*, 2016 and Personal communications, Robert Hodgson, Town Council, November 10, 2016).

Not only are the man-made structures in the Town at increased risk with the loss of the protections that the barrier island afforded, but the marsh is also vulnerable to damages and erosion from increased storm surge exposure. The marsh is vital in reducing flooding risks and as habitat to a variety of commercially valuable harvest species.



Figure 8: Aerial Comparison Photos for Cedar Island 2006 & 2013. By the summer of 2016, the entire area represented in both photos is entirely under water at all tidal levels. Photo Courtesy of Gordon Campbell, At Altitude Gallery

An ongoing Continuing Authorities Program (CAP) project by the U.S. Army Core of Engineers (USACE) for Cedar Island will help to mitigate the growing concerns of erosion on the island. Beneficial-use dredged materials will be used for enhancement, expansion, and protection of shoreline wetlands and marsh islands. The project intends to enhance existing shorelines for the Town through wetland and marsh island creation, enhancement, and protection. For more information on the project, visit Cedar Island Dredging (2019). Projects to protect navigation of waterways in the area as well as further mitigate coastal erosion have been in the works over the last few years as well.

There are the remains of a Works Progress Administration earthen protection dike along the east side of Finney Creek 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; however, this is Town-owned property and the Town is investigating its use as a spoil location site, and more importantly, an area to build up to serve as a wave break for the Town (Personal communications, Former Mayor John Joeckel, April 19, 2016 & Personal communications, Robert Hodgson, Town Council, November 10, 2016).

COASTAL FLOODING

The Flood Insurance Study (FIS) for Wachapreague identifies that the greatest threat of flood inundation comes from nor'easters and hurricanes.

The Special Flood Hazard Area (SFHA) boundaries have changed based on new LiDAR-based topographic data, there was a decrease of 0.1 mi^2 and thus 150 buildings. Within the Coastal High Hazard Areas (CHHA) the Town of Wachapreague has two A Zones within the corporate limits where the Base Flood Elevations range from base flood

elevation of 7- to 8-feet. The 2015 FIRM shows approximately 91 structures within those zones (See Figure 10). Although the FIRM does not show the V Zone exceeding the immediate shoreline, it is thought that there would be damage from the wave action of floodwaters further inland. This is particularly of concern as the berm or break water opposite the channel from the waterfront has been settling and does not provide the same protection as it did years ago. Additionally, the southern end of Cedar Island has eroded significantly in the last several years, vastly increasing the size of Wachapreague Inlet, therefore increasing the vulnerability of the interior marsh system and the Town to incoming wave action from the Atlantic during a wind or storm event.

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 was estimated that the Town could experience $12.5 million in damages, which was nearly a $6 million increase over the previous five years (*Eastern Shore of Virginia Coastal Flood Vulnerability Assessment*, 2011). An assessment done by Hazus® Version 5.0 reveals a total economic loss of $8.14 million and the total building-related losses at 3.14 million. Although the VIMS construction standards are extremely high, the Hazus® model estimates substantial (about 13%) building damage. The loss from inventory and contents of the VIMS facility far exceeds the cost of damages to the buildings, however, and makes up a large portion of the total loss.



Figure 9: The Wachapreague Waterfront Commercial Area during Hurricane Isabel in 2003. Photo by Dan Bilicki

The Hazus® model estimates that a total of 121 tons of debris would be generated during such a storm. This would require 5 truckloads (at 25 tons/truck) to remove the debris generated by the flood. This debris along the rack line often interferes with vehicular travel and creates a burden on the local residents. Additionally, the model estimates that 18 households will be displaced due to the flood, and that 2 people from these households would seek temporary public shelter.

The Town's Fire Department and Town Hall are located in the floodplain as is the commercial center; however, the Town hopes to relocate in the near future to avoid potential flooding (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). Wachapreague's economy is based on the businesses centered on the waterfront. There are seven main docking facilities located in the Waterfront Business District consisting of the 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. The Eastern Shore VIMS Lab will be expanding and built to anticipate 100+ years of flood conditions. Most other businesses are also located close to Atlantic Avenue. This flood prone area represents most of the commercial activity that occurs in the Town as previously emphasized in Figure 2.

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 be problematic were any development to occur there.

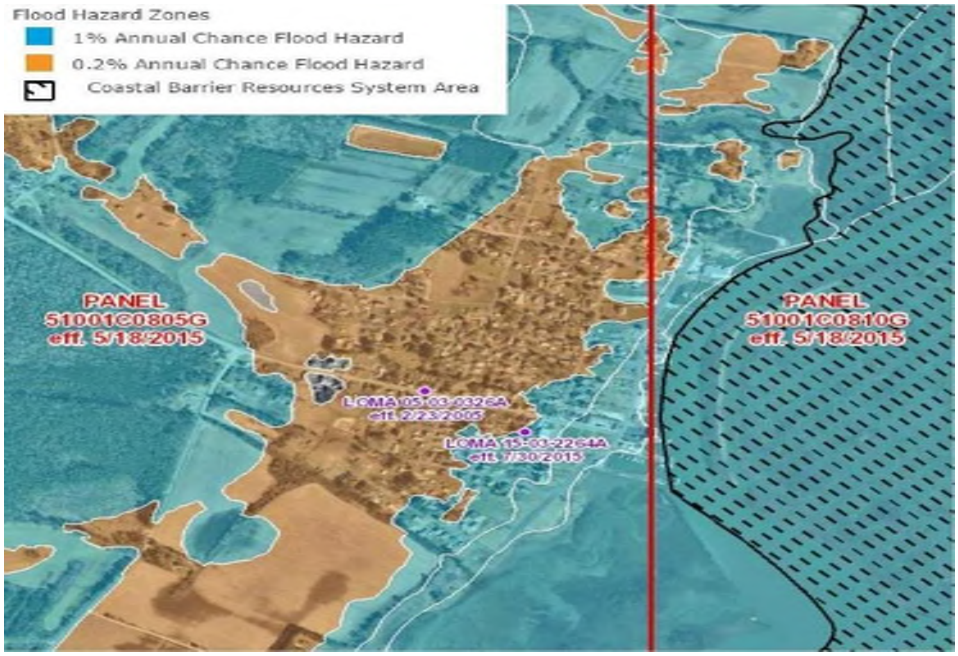


Figure 10: FEMA's National Flood Hazard Layer (effective May 18, 2015) Source: Accomack.mapsdirect.net

Figure 11: Town of Wachapreague Flood Hazards to Infrastructure

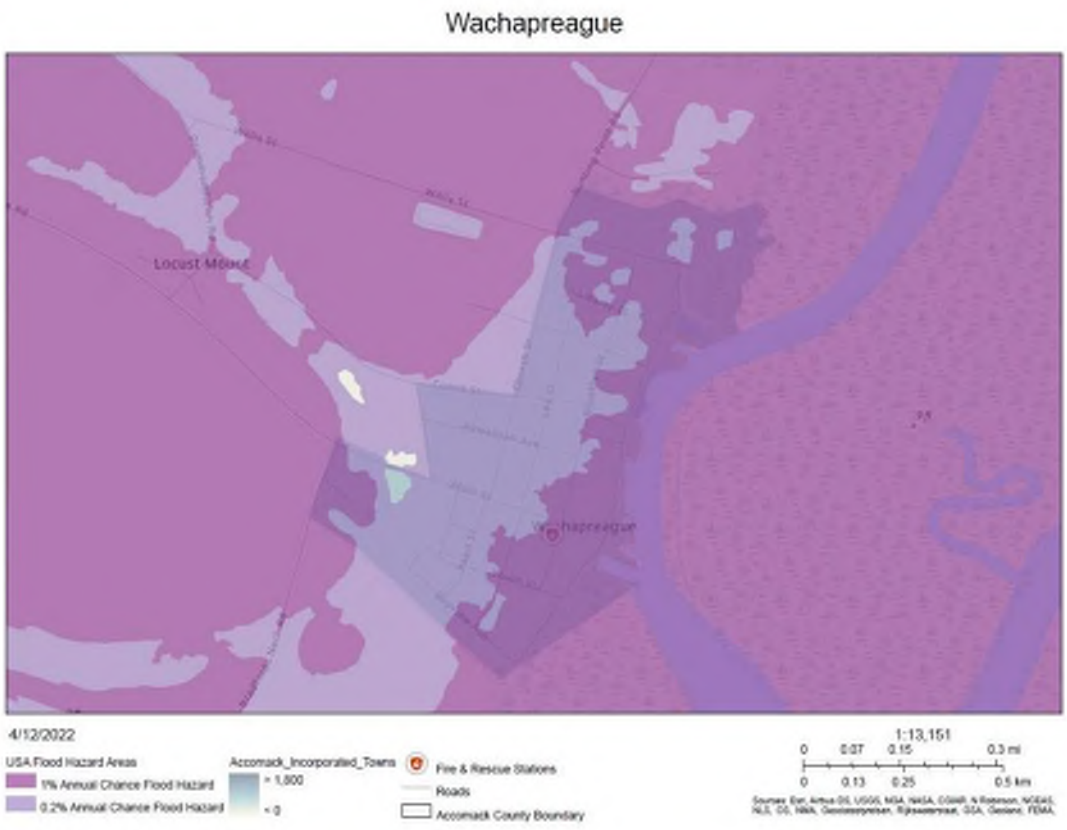




Figure 12: Surge impacting the location of the Seaside Park, marina, and Island House Restaurant during a storm event in October 2005. Photo by Dan Bilicki



Figure 13: Photograph showing the surge from Hurricane Isabel in September 2003 impacting the same area depicted in Figure 11. Photo by Dan Bilicki

STORM WATER FLOODING

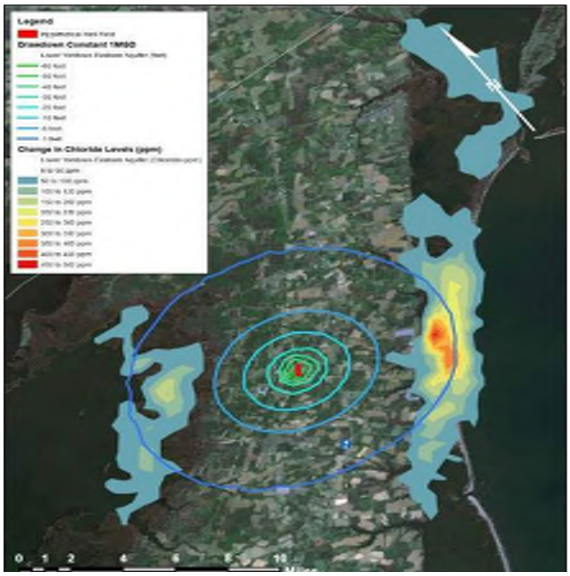


Figure 14: Hypothetical Withdrawal Effects

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. Areas in the Town Park south of the baseball field is also an area that water will sit until it drains into the soil or evaporates. The majority of the soil in the Town is sandy loam (fine, Dragston, Magotha, and Bojac), which typically drains well, but generally doesn't hold a significant amount of water (*Town of Wachapreague Comprehensive Plan*, 2016). Portions of a third basin are within the Town. The area affected includes 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. Like many coastal areas, tides can have an impact on the storm water flooding, as when the tide is high, water cannot readily drain.

On the corner of South and Center Street, there is an empty lot that frequently floods due to the lot next to it being raised and containing a mount septic tank (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021). Town officials noted that the south ditch needs maintenance; however, the County is unable to provide maintenance for the ditch without a permanent easement. Renegotiations are currently in progress and the Town has implemented a new Drainage Improvement Plan (Personal communications, Robert Williams, Floodplain Administrator/CRS Coordinator, March 17, 2021).

Figure 15: 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



HAZARDS OF LOCAL SIGNIFICANCE

In addition to the four primary hazards described above, the Town has various other potential threats. These are described below; however, additional hazards may exist.

GROUND WATER CONTAMINATION

Wachapreague's location on the Wachapreague Channel and its direct connection to the Atlantic Ocean causes the Town to be vulnerable to two types of ground water disturbances. Excessive fresh water removal from the waterfront could cause saltwater intrusion. Wells further inland could lead to vertical movement of brackish water found below the lens of potable water (*Town of Wachapreague Comprehensive Plan*, 2016). Because all of the Town residents rely on wells for their water, this is of high concern.

Figure 13 to the right models a hypothetical withdrawal near the center of the peninsula and the devastating effects that would most likely occur on the Bay and Seaside adjacent coastal areas. Although Wachapreague is just to the south of the area represented in the map, similar effects would occur around the Town if a large withdrawal were to be installed in the area west of the Town.

FIRE

In 1978 the Town's hotel was destroyed in a fire. In 2010, the VIMS Eastern Shore Laboratory's Seaside Hall was a total loss of all the contents. The replacement Seaside Hall was built elevated and to much higher construction standards than the dated destroyed building. Due to the aging housing stock, the risk for fire could be higher due to aging electric wiring.

WATER QUALITY

Since many people rely on the fisheries and aquaculture industries, both commercial and recreational, the health of the seaside bays and the Atlantic Ocean is fiscally and culturally vital. Pollution, nutrients, and oxygen levels need to be maintained at healthy levels, and monitoring for invasive species and diseases needs to be a high priority to prevent damaging fisheries and the scenic coastal ecosystem.
Even potential offshore activities such as shipping or oil exploration could threaten the health and livelihood of the community.

HINDERANCES TO WATERWAY NAVIGATION

Shoaling of nearby inlets and channels could negatively impact flushing and water quality in addition to creating a hazard for boaters. As a major access point to the seaside, and with events like the Marlin Tournament, ensuring the safe and easy navigation of channels surrounding the Town is economically imperative. In addition, shoaling and shifting aquatic sediments could have a negative impact on clam and oyster aquaculture, both of high economic importance to the Region and to the Commonwealth. An application was accepted recently for Wachapreague Inlet 2020 VPA Waterway Maintenance Fund effort in order to address navigation and other issues.

CRITICAL FACILTIIES

The following table lists the critical facilities and their relative importance to the Town. Although lightning is not included as a primary hazard in this Plan, it is important to note that the Town has three tall structures that are vulnerable to lightning, the Ferris wheel and two churches.

Table 7: Town of Wachapreague Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Town Marina	-	-	X	X	Flooding, Wind	200+	Devastating	No	Yes
Dredge Spoil Basin	-	-	X	X	Erosion	200+	Devastating	No	No
Parks	-	-	X	X	Flooding, Fire	200+	Major Disruption	No	Yes
Town Vehicles	-	-	X	X	Flooding, Wind, Fire	200+	Inconvenience	Yes	Yes
Town Hall	-	-	-	X	Flooding, Wind	200+	Major Disruption	Yes	Yes
Other Facilities (Not Town-Owned)									
Coast Guard Station	-	X	X	X	Wind	10,000+	Devastating	No	No
Fire Station	-	X	X	X	Flooding, Wind	11,885+	Devastating	Yes	Maybe
Churches	-	X	X	X	Flooding, Wind	50+	Inconvenience	No	Maybe
Commercial Area	-	X	X	X	Flooding, Wind	200+	Devastating	No	No
VIMS Campus and Dock 50’	-	X	X	X	Flooding, Wind	200+	Devastating	No	Maybe
Carnival Grounds	-	X		X	Flooding, Wind	1,000+	Major Disruption	No	No
Post Office	-	-	X	X	Flooding, Wind	200+	Major Disruption	Yes	Yes
Potential New Fire Department Location	-	-	-	X	Wind	11,885+	Major Disruption	No	Yes
Phone Tower	-	-	-	X	Wind	1,000+	Major Disruption	No	Yes

FINDINGS

1. Most structures in the Town are in the 1%-annual-chance floodplain, including its entire commercial area, which does not require a 1%-annual-chance flood to suffer damages. Coastal flooding is the greatest imminent threat to the Town. Hazus® estimates a total loss of $6.5 million, including building content, inventory, and business interruption should this 1%-annual-chance flood event occur.

2. The southern end of Cedar Island has eroded significantly in the last 5 years, vastly increasing the size of Wachapreague Inlet, thus increasing the vulnerability of the interior marsh system and the Town to incoming wave action from the Atlantic during a wind or storm event. In addition, the long-ago created berm opposite the channel from the waterfront has been settling and does not provide the same protections. Due to these issues, it is thought that the Town is more susceptible to damage from wave action during a storm event than indicated by the FIRM V Zone. Mitigation projects are underway to help keep the Town more resilient to erosion and flooding.

3. Approximately 92% of all homes were built before the NFIP building code requirements were adopted. After a 1%-annual-chance 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 1%-annual-chance flood to have water in the buildings. 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. The Town has plans to relocate the Fire Department out of the floodplain, but the timeline of this project is unknown.

5. The Town now has a CRS score of 8, down from 9 during the 2016 HMP. This allows policy holders to save an average of $94.00 on their annual premiums. The Town is

working to continue lowering their CRS score and allow residents to receive discounted rates.

6. The Town has noted several stormwater flooding problems within its limits.

7. Several Wachapreague residents are proactively trying to protect themselves from flood damage by purchasing flood insurance, even though it is not mandatory.

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; however, homeowner's policies usually will not cover this expense. Although Hazus® estimates only $36,800 in damages from a 1%-annual-chance wind event, this value does not take into account any flooding damages.

CHAPTER 24: NORTHAMPTON COUNTY

COUNTY PROFILE

Northampton County is the southernmost county on Virginia's Eastern Shore. It was settled by the English in 1614, named Northampton in 1642, and divided into Accomack County and Northampton County in 1663. 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. There are six incorporated towns in the County: Belle Haven (portion located in Accomack County as well), Cape Charles, Cheriton, Eastville, Exmore, and Nassawadox.



Figure 1: Northampton County Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to the 2019 American Community Survey, the County had a population of 11,885, indicating that the population has been relatively stable with a slight decline since 2000. The median age for residents in Northampton County in 2019 was 49 years, which is over 10 years higher than that of both the state and nation, with 31.4% of the population over the age of 62 (ACS 2019). This indicates an older population in the County, which may require additional assistance during a hazard. Table 1 also indicates disability and poverty rates higher in Northampton County than the nation. The median household income for 2019 is likely an underestimate, as in 2018, the median household income was $57,492 (Personal communications, Susan McGhee, Director of Planning, Permitting, and Enforcement, March 22, 2021). This can be attributed to a large influx of retirees moving to towns like Cape Charles and Cheriton.

Table 1: Northampton County Demographic Information

	2019*	2014**	2010***	2000****
Population	11,885	12,121	12,389	13,093
Median Age (Years)	49.0	48.0	47.8	42.4
Disability	15.6%	12.9%	NA	NA
Income				
Median Household Income	$47,227	$34,656	$35,760	$28,013
Poverty Level	18.0%	17.1%	15.8%	15.8%
Language				
Only English	90.4%	10,547	11,117	11,670
Other	9.6%	482	403	703
Spanish	7.3%	401	379	340
Ind-Euro	1.6%	41	0	18
Asian	0.6%	34	24	0
Other	0.0%	0	0	0

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. Secondly, they can identify where disruptions in employment and income might occur in the aftermath of a disaster.

As of the 2019 American Community Survey 5-year estimates, over a quarter (27%) of the workforce in Northampton County is employed in the educational and health care services industry. This number has increased since 2014 estimates, despite Riverside Shore Memorial Hospital relocating in Accomack County. In 2020, the hospital moved from Nassawadox in Northampton County to Onancock in Accomack County. It is likely that this number is still mostly accurate and that Northampton County residents are still employed at the new location and are commuting to Accomack County. Over half of the residents in Northampton County travel outside of the County to their place of employment (Personal communications, Susan McGhee, March 22, 2021), with many commuting as far as the Hampton Roads area (*Northampton County Comprehensive Plan*, 2021). This is important to consider for the

community's ability to rebound following a severe event, as there are many variables that could prevent them from reaching their place of employment, i.e., damages to vehicle, damages or closure to roadways or bridge and tunnel systems, flooding, etc.

The number of individuals currently employed in the Agriculture and Retail trade industries more closely align to Census numbers from 2010 (Personal communications, Susan McGhee, March 22, 2021). The decline of the civilian employed population is likely due to a high number of County residents retiring.

Table 2: Northampton County Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010*****		**2000******	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	254	5.2%	522	10.5%	627	11.2%	411	7.9%
Construction	384	7.9%	379	7.6%	473	8.4%	359	6.9%
Manufacturing	376	7.7%	346	7.0%	403	7.2%	634	12.2%
Wholesale trade	227	4.6%	340	6.8%	312	5.6%	187	3.6%
Retail trade	647	13.2%	513	10.3%	532	9.5%	498	9.6%
Transportation and warehousing, and utilities	163	3.3%	119	2.4%	300	5.3%	332	6.4%
Information	49	1.0%	22	0.4%	41	0.7%	62	1.2%
Finance, insurance, real estate, and rentals	146	3.0%	195	3.9%	318	0.7%	211	4.1%
Professional, scientific, waste management	258	5.3%	516	10.4%	256	4.6%	240	4.6%
Educational and health care services	1,319	27.0%	1,272	25.6%	1,270	22.6%	1,242	24%
Arts, entertainment, recreation, food	558	11.4%	387	7.8%	537	9.6%	415	8%
Public Admin	283	5.8%	122	2.5%	237	4.2%	295	5.7%
Other	227	4.6%	233	4.7%	307	5.5%	291	5.6%
TOTAL CIVILIAN EMPLOYED POPULATION	4,891	-	4,966	-	5,613	-	5,177	-

Source: *ACS 2014-2019, **ACS 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

According to Table 3, the County has seen a slow but steady decline in business presence over the last eight years. The total civilian employed population (Table 2) and overall population (Table 1) have also experienced a decline. The County's primary economies are affiliated with agriculture, working waterfronts, and local government (*Northampton County Comprehensive Plan*, 2021), with some of the largest employers in the County being Northampton County Schools, The County of Northampton, the Chesapeake Bay Bridge Tunnel (CBBT), Heritage Hall (now The Citadel), Food Lion, Ballard Fish and Oyster Company, David's Nursery, Eastern Shore Rural Health System (ESRH), Coastal Precast Systems, and several tourism and agricultural based businesses (Virginia Employment Commission, 2020).

Table 3: Northampton County Business Establishment Types

Industry Code Description	Total Establishments			
	2017*	2014	2012	2010
Agriculture, Forestry, Fishing, and Hunting	8	8	8	**6**
Utilities	-	1	1	**1**
Construction	22	26	28	33
Manufacturing	9	11	9	9
Wholesale Trade	19	17	20	17
Retail Trade	60	61	70	77
Transportation and warehousing	-	3	2	3
Finance and insurance	17	18	19	18
Information	4	6	2	2
Real Estate and Rental and Leasing	14	15	12	11
Professional, Scientific, and Technical Services	22	23	21	19
Management of Companies and Enterprises	-	1	1	2
Administrative, Support, Waste Management	8	8	9	9
Education Services	4	4	5	5
Health Care and Social Assistance	35	37	40	36
Arts, Entertainment, and Recreation	6	5	7	6
Accommodation and Food Services	40	38	41	43
Other Services (except Public Administration)	38	39	37	40
Industries not classified	-	4	-	-
Total, All Establishments	310	325	332	337

Source: *Census Annual Economic Surveys, 2017, Census Zip Code Business Patterns, 2014, 2012, 2010

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate safely.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk.

As Table 4 reveals, there has been very little change in the number of housing units in the County in the last decade; however, the number of vacant housing units has been steadily increasing, with over 30% of the total housing units in the County vacant. Often, unoccupied houses are not properly maintained and can cause additional debris hazards during high-wind events. According to the County's comprehensive plan update, nearly one in four of the estimated 7,396 housing units is at least 80-years old (*Northampton County Comprehensive Plan*, 2021). The aging housing stock combined with the high number of vacant housing units could create a significant amount of debris and additional surrounding damage during a high-wind event. The County has been aggressively working on demolishing derelict structures, with dozens having already been demolished since 2016 (Personal communications, Susan McGhee, March 22, 2021). County representatives indicated that families often own multiple homes, and, due to the decreasing population, one or more may be unused. The high percentage of vacant units could also be due to second homes, especially in the incorporated areas of the County, such as Cape Charles and Cheriton. The U.S. Census definition of a vacant housing unit includes those units entirely occupied by persons who have a usual

residence elsewhere. There has been an abundance of new construction in many of the towns, which would lead to a high number of vacant units as well due to the purchase of second homes. County representatives state there is a housing study currently underway (Personal communications, Susan McGhee, March 22, 2021).

In 2009, 13% of the housing units in the County were single-wide mobile homes (*Northampton County Comprehensive Plan*, 2009). The plan emphasized their vulnerability and inability to maintain value; however, this percentage has been gradually decreasing over the last ten years, whereas in 2019, that number decreased by more than 50% (ACS, 2019). Manufactured homes are typically more susceptible to storm damages incurred from winds and flooding than other types of homes. The current percentage of mobile homes is a great improvement in the resiliency of the housing infrastructure for Northampton County.

In addition, the ACS five-year estimates for 2019 reveal there are 29 occupied housing units without phone service available. These residents are a high risk, as they may not be able to reach out for aid in the event of an emergency.

Table 4: Northampton County Housing

	2019*	2014**	2010***	2000****
Total Housing Units	7,396	7,322	7,301	6,547
Occupied	5,148	5,237	5,323	5,321
Vacant	2,248	2,085	1,978	1,226
Owner-Occupied	3,356	3,662	3,553	3,649
Renter-Occupied	1,792	1,575	1,770	1,672
Median Housing Value	$176,800	$162,500	-	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary.

In 2019, 10.7% of occupied residences were without a single vehicle (ACS 2019). Although a slight decrease since 2000, a significant number of people remain at high risk of not being able to remove themselves from harm's way in the event of a disaster. This, coupled with the 29 residences without phone service available, should be considered during the event of an approaching storm and potential mandatory evacuation. It is important to note that during times of heavy rain, particularly coupled with high tides and storm surge, many roads become inundated quickly. This situation will only worsen in the coming years with anticipated sea level rise.

The Chesapeake Bay Bridge Tunnel (CBBT) provides residents access to Virginia Beach and the greater Hampton Roads metropolitan area. Although the official evacuation route is north on Route 13, many residents of the County still use the CBBT. During the summer of 2016, proposals for the Parallel Thimble Shoal Tunnel project were received and construction is currently underway. Ideally, this will ensure continued safe continuity between the Eastern Shore and the rest of the Commonwealth for safe travel, tourism, and to serve the over 1,000 residents who commute to work via the CBBT.

Table 5: Northampton County Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	549	598	563	672
One	1,728	1,731	1,911	1,988
Two	1,762	2,054	1,710	1,898
Three or more	1,109	854	904	763

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***ACS, 2006-2010, ****U.S. Census 2000

Star Transit provides substantial, daily services up and down the Eastern Shore. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. The Greyhound bus line offers travel times from the Eastern Shore across the Chesapeake Bay Bridge Tunnel, but only provides one stop in the Region. The cost is moderate; however, this service would likely not run during an emergency and it does not have the capacity to evacuate all residents without a vehicle.

Although the Region's airport and the helipad for Riverside Shore Memorial Hospital is located in Accomack County to the north, Northampton County does have Campbell Field, the Cheriton Volunteer Fire Company parking lot, and a parking lot located at the North Toll area of the Chesapeake Bay Bridge Tunnel that is often secured by police and fire personnel as a makeshift landing site for emergency transport via helicopter.

Prior to the construction of the railroad in 1884, water-based transportation dominated the Region and is still vital in the County. Used both commercially and recreationally for enjoyment and fishing activities, the waterways are essential to the economy of the County. Maintenance of the channels of the waterway in the County is of concern, particularly after large storm events where wind, waves, and flooding can greatly change the location of channels and increase the amount of erosion and thus, the sedimentation of channels and harbors.

Although the train tracks are no longer active, the Eastern Shore Rail Trail project is underway to turn the abandoned tracks into a bicycle and pedestrian trail that will serve 49.1 miles of the Eastern Shore. The trail will begin in Cape Charles in Northampton County and will follow the abandoned tracks north into the Town of Hallwood in Accomack County. Efforts to seek funding for construction, that would likely begin with the Cape Charles segment, is underway.

COMMUNITY SERVICES AND FACILITIES

Community facilities support the services and functions provided by the County government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the County and its citizens. It is important to note what facilities are available in case of a hazard, and it is important to make an inventory of facilities that could be affected by a hazard.

According to FEMA estimates using Hazus®, none of the fire stations, police stations, or schools would be damaged during either a 1-percent-annual-chance flood or wind event.

PUBLIC SAFETY

Fire protection is provided by five independent all-volunteer fire companies. Community Fire Company (Exmore), Northampton Fire & Rescue Company (Nassawadox), Eastville Volunteer Fire Company, Cheriton Volunteer Fire Company, and Cape Charles Volunteer Fire Company work independently and through mutual aid to provide fire protection throughout the County (Personal communications, Hollye Carpenter, EMS Director/Chief, April 12, 2021). Information detailing apparatus for each locality can be found in their respective chapters.

Ambulance services for 911 and emergency calls are provided from three locations in the County: Community Fire Company (Exmore), Northampton County EMS (Machipongo), and Cape Charles Rescue Service (Cheriton). While there are a few volunteers still active, services are primarily provided by 27 full-time and 15 part-time medics (Personal communications, Hollye Carpenter, April 12, 2021). The respective Town Chapters have details on the capabilities of each response facility. The relocation of the hospital from Nassawadox to Onancock has forced EMS in Northampton County to expand their workforce in order to maintain services (*Northampton County Comprehensive Plan*, 2021).

The Northampton County Sheriff's Office and the Eastern Shore Regional Jail are located in the Town of Eastville. The Sheriff's Office operates the 24-hour Regional Jail, which employs 53 people and is currently the largest department in the County government (Northampton County Website). The jail is a 248-bed facility and houses minimum and maximum male and female offenders. In addition, the Sheriff's Office dispatches to all County deputies, the Town of Exmore, Town of Eastville, and Town of Cape Charles and relays calls with Virginia Marine Resource Officers, Game Wardens, State Parks, and more (Northampton County Website).

The Department of Emergency Management (EM) coordinates efforts to ensure the County can mitigate, prepare for, respond to, and recover from any type of natural or human-caused disaster. The County uses an all-hazards approach to emergency preparedness, which means planning efforts consider all types of natural and human-caused disasters that could occur in the County. Also, the Department of Emergency Management provides disaster preparedness presentations, Emergency Response Training (CERT), and community CPR training. In 2012, the County established a Citizen Emergency Alert Program that provides critical information related to severe weather, road closures, missing persons, and evacuations (Northampton County EMS Website).

MEDICAL SERVICES

Riverside Shore Memorial Hospital is now located in the Town of Onancock in Accomack County and provides medical services to the Region. Please see the Public Safety section above for information about emergency medical and ambulance services.

There are two Eastern Shore Rural Health System Medical Centers in Northampton County: Eastville Community Medical Center and the Franktown Community Medical Center, which provides only Dental services (Personal communications, Susan McGhee, March 22, 2021).

PARKS AND RECREATION

The Northampton County Department of Parks and Recreation maintains one park, Indiantown Park, located in Eastville (52 acres). Indiantown Park is equipped with picnic shelters, a lit ball field, playground, a soccer field, recreation center, and 36-hole disc golf course. In addition to park maintenance, Northampton County Parks and Recreation offers programs such as summer camp, basketball, volleyball, softball, disc golf, dances, and more. The Northampton Middle School gym and soccer field are also used for summer camps (Personal communications, Susan McGhee, March 22, 2021).

The County maintains four water access sites of varying infrastructure, none which incur any fee for use. These facilities include: Oyster Harbor, Willis Wharf Harbor, Morley's Wharf, and Red Bank Boat Ramp (owned by the VA Department of Game and Inland Fisheries, but maintained by the County). The beaches of Cape Charles, Kiptopeke State Park (which also offers a wide variety of educational programs), and the Savage Neck Dunes Natural Area Preserve provide the only sand beaches publicly accessible by land. The Northampton County Preserve walkway and observation platform is located adjacent to the County landfill (Personal communications, Susan McGhee, March 22, 2021).

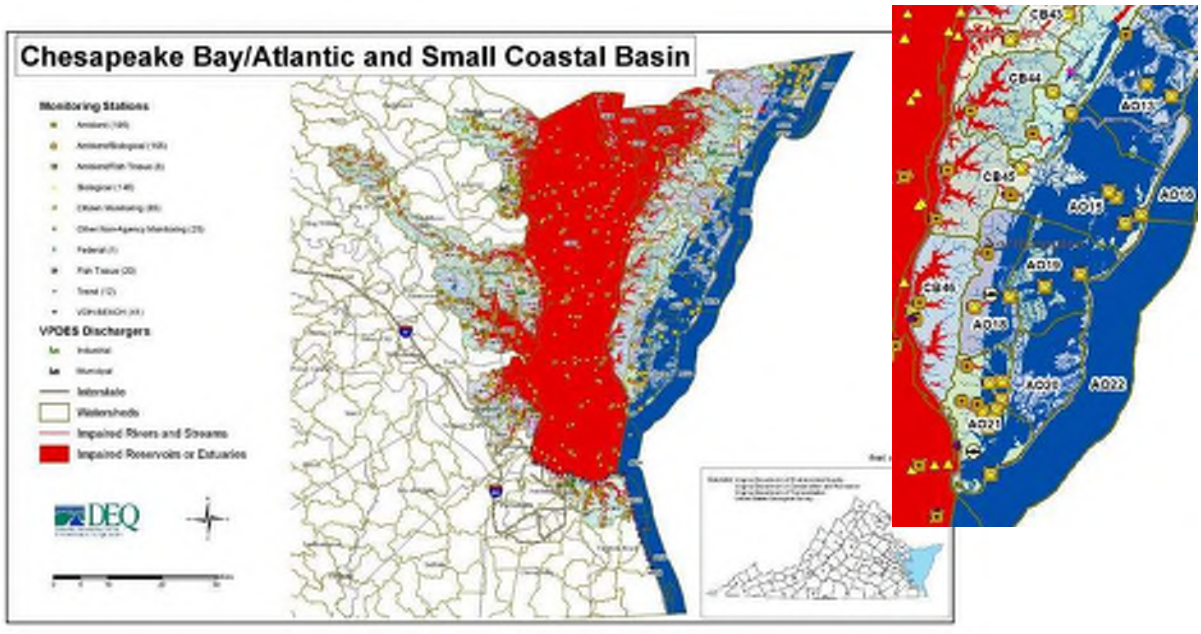
The Eastern Shore of Virginia National Wildlife Refuge (NWR) and Fisherman Island National Wildlife Refuge (NWR) are located on the very southern part of the County. Although there is no public access to Fisherman Island NWR, there is a natural kayak launch and a paved motor boat ramp available as well as walking trails, Refuge Visitor Center, and many public programs. The Nature Conservancy owns the majority of barrier islands on the Seaside of the County and all of their beaches are available for day use activities unless otherwise noted.

WATER SUPPLY AND WASTEWATER

Most residents rely on private wells and septic systems for their water supply and wastewater disposal; however, about a quarter of the County's population relies on the municipal water systems of Cape Charles, Eastville, Exmore, Bayview, Riverside, and the County Complex. There are three waste water treatment plants (WWTP) in the County for residential sewage treatment, located in Machipongo, Exmore, and Bayview. These facilities serve approximately 15-25% of residents (*Northampton County Comprehensive Plan*, 2009). The remaining residents rely on septic tank and drainfield systems and cesspools or pit privies. In the past, poor soils limited development on some vacant parcels of land in the County, but above-ground septic technologies have made some previously undevelopable parcels available; however, these systems are much more expensive to build and to maintain than traditional systems.

Discharge from WWTP and proper maintenance of private systems is important to maintain the health of both the surface and ground water. Although surface water in the County is not used for human consumption, it is important for recreation and shellfish harvesting, and thus water quality must be protected in accordance with the State Water Control Law. According to the 2016 Virginia Department of Environmental Quality (VDEQ) *Water Quality Assessment Integrated Report*, all of the bayside creeks and most of the seaside creeks in the County are considered impaired (see Figure 2) due to various causes such as pH, Enterococcus, Fecal Coliform, benthic-macroinvertebrate bioassessment, E. Coli, dissolved oxygen levels, etc.

Figure 2: Impaired Waters of the Chesapeake Bay/Atlantic and Small Coastal Basin area of Eastern Virginia



The Eastern Shore's designation as a sole source aquifer is discussed in the 2009 *Northampton County Comprehensive Plan*, and strategies for preventing additional salt water intrusion can be found in the *Eastern Shore Ground Water Supply Protection and Management Plan*. The areas of the County near shorelines are expected to be the most vulnerable to salt water intrusion, which has been experienced in specific areas, such as the Town of Cape Charles, where steps have been taken to treat their water for iron and salinity. The Eastern Shore of Virginia Ground Water Committee has historically and will continue to assist the County in monitoring the quantity and quality of ground water in the County.

In October of 2020, a circuit court determined that Northampton and Accomack Counties could benefit from joining the Hampton Roads Sanitation District (HRSD) and the two counties were incorporated into HRSD's jurisdiction. The Counties are now able to negotiate contracts with HRSD for operation, maintenance, and updates to sewer systems (*Northampton County Comprehensive Plan*, 2021). It is also important to note that localities within both Counties are not obligated to transfer services to HRSD, but have the option if they choose. The first phase is scheduled to be completed in 2023 and will connect the Northampton County towns of Exmore and Nassawadox to the Town of Onancock's treatment facility in Accomack County. Another phase of the project could potentially connect the towns of Eastville and Cheriton to the treatment facility in Cape Charles (*Northampton County Comprehensive Plan*, 2021). This project will have significant effects on Northampton County, as with additional water resource protection, businesses, jobs, and housing are extremely likely to increase throughout the area.

SOLID WASTE

The County operates six waste collection sites, all of which offer recycling, used oil, and scrap metal, including appliances. None accept commercial waste, yard waste, or tire disposal (Personal communications, Susan McGhee, March 22, 2021). The County now operates a single transfer station located adjacent to the previous landfill near the community of Oyster. The waste is regularly transferred to the landfill by tractor trailers. This meets the disposal needs for commercial operations, construction companies, and households.

POWER AND COMMUNICATIONS INFRASTRUCTURE

The main Accomack & Northampton Electric Cooperative (ANEC) power line was replaced in 2014 between Tasley and Exmore. Maintaining and advancing our infrastructure is key to increasing our resiliency in the occasion of a hazard. One 20-megawatt solar project has been completed in Northampton County. This is a new land use and has required rezoning and additional permits.

The Eastern Shore of Virginia Broadband Authority (ESVBA) network of fiber cable stretches from Virginia Beach to the Maryland border and serves as the electronics 'backbone' by providing high-speed internet to both Counties. There is a high percentage of underserved households in the County, as the majority of service is provided along Route 13. Wide-spread high-speed internet provides residents the capability to take advantage of educational opportunities, work from home, apply to jobs, etc.

DRAINAGE DITCHES

VDOT is responsible for the maintenance of ditches along state-maintained roadways and for all ditches along County roads and between properties that drain state ditches. Maintenance of ditches along privately-owned roadways is the responsibility of the owner (Personal communications, Susan McGhee, March 22, 2021).

SCHOOLS

Schools are important to consider for disaster readiness and during an actual emergency. Schools offer an opportunity to teach children and adults how to effectively and efficiently respond to many emergency situations. They are also areas of concentrated high-risk individuals, particularly primary schools with the youngest students.

The Northampton County Public School Division has a Crisis Management Team that is responsible for emergency planning.

There are three schools in the Northampton County School District, two elementary schools, and one comprehensive middle/high school. In addition, there are four private schools in the County, including Broadwater Academy, Montessori School, Shore Christian Academy, and Cape Charles Christian School, all of which also have pre-kindergarten programs (Personal communications, Susan McGhee, March 22, 2021). According to FEMA estimates using Hazus®, during a 1-percent-annual-chance wind event, all eight of the schools would be damaged to some degree. Occohannock Elementary is anticipated to suffer the most, perhaps creating enough damages to cause a closure of 106 days. There are also an estimated 14 daycare facilities in the County, with locations in Cheriton, Exmore, Machipongo, Nassawadox, Franktown, and Cape Charles (Personal communications, Susan McGhee, March 22, 2021). There are no emergency shelters in the County for wind events, but the Northampton High school serves as the designated emergency shelter for non-wind events. Northampton works with Accomack County to share congregate shelter facilities as needed. Additional emergency shelter could potentially be at the old middle school and eventually the Community Center.

CULTURAL RESOURCES

The only County owned museum is in its Administrative Building. The Court House located in Eastville maintains the oldest running court records in the nation. There are several additional cultural and historical entities, resources, and museums, including Cape Charles Historical Society, Eastern Shore's Own Art Center, Barrier Island Center, and Arts Council of the Eastern Shore, to name a few. The Barrier Island Center offers an interpretive art center that comprehensively teaches about the history of the Eastern Shore and its culture.

The County is steeped with history, as 28 buildings are registered with the Virginia Department of Historic Resources (VDHR) as official Historic Places. The County Courthouse Historical District is part of the Eastville Historical District at the county seat of Eastville.

NATURAL ENVIRONMENT

Northampton County, entirely within the Atlantic Coastal Plain, is relatively flat with the elevation ranging from sea level to 50 feet above mean sea level (*Northampton County Comprehensive Plan*, 2021). Flat areas are typically more prone to flooding problems, particularly where the water table is high and the hydric soils dominate.

There are 12 barrier islands in Northampton County, which all play a large role in protecting the area from erosion. There are five large creek basins leading to the Chesapeake Bay and six significantly smaller creeks on the east coast leading to a series of seaside marshes and bays and ultimately, the Atlantic Ocean. The County's natural environment consists of wetlands, dunes, beaches, forests, and waterways.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(d)(3) Northampton County has participated in the hazard mitigation planning process since 2006. The County's Comprehensive Plan was just updated and adopted in April of 2021.

Table 6: Northampton County Hazard Mitigation Resources

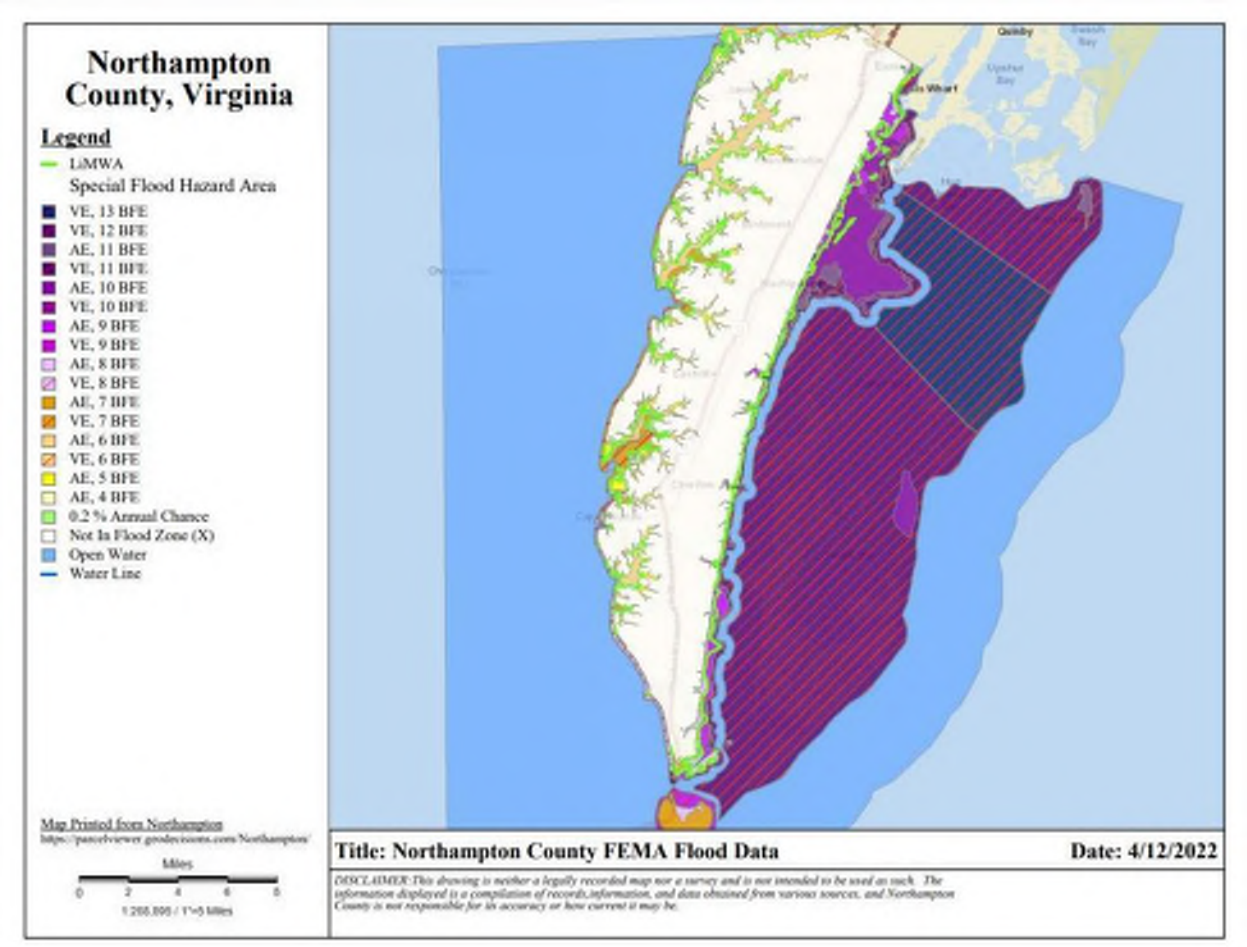
	Ordinances, Plans, & Publications														Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climage Adaptation Working Group	ES Disaster Preparedness Coalition
County	*		*		*	*													
Regional								*	*	*	*	*		*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(d)(3) As of 2022, there have been 15 Federal Disaster Declarations for flooding in the County for hurricanes, flooding, and severe storms (FEMA Disaster Declarations, 2022). According to the 2022 FEMA NFIP Data Report, the County contains one severe repetitive loss (SRL) and 11 repetitive loss (RL) properties, which is a substantial increase from having no SLR or RL in 2015. Similar to Accomack County, there has been a steady decrease in the total number of insurance policies as more homeowners learn of the changes to the 2015 Flood Insurance Rate Map (FIRM).

Figure 3: Northampton County FIRM Base Flood Elevation (BFE)



With the 2015 updates to the FIRM, there were changes to the associated Special Flood Hazard Area (SFHA) for the unincorporated areas of the County. The total area of the SFHA is now 221.8 square miles, representing a gain of 2.9 square miles and loss of 6.9 square miles for a net decrease of 4.0 square miles including 341 buildings. The area within the V zone is now 181.7 square miles, representing a gain of 2.9 square miles and a loss of 29.3 square miles for a net decrease of 25.7 square miles including 65 buildings. The 406 total buildings removed from the SFHA and V zone are no longer required to have flood insurance when under a mortgage (FEMA Flood Risk Report Northampton County, 2016). The number of buildings with policies, as shown in Table 7, decreased significantly from

2011 to 2016, which is extremely important as there are 139 previously insured buildings that no longer carry flood insurance. Without insurance, should a major storm cause flooding, it would take the resident, business, and overall community much longer to rebound following a disaster. Net loss of lands and buildings that are in the FIRM SFHA and V zone may give the residents and communities a misconception about vulnerability.

The County does not participate in the Community Rating System (CRS) program. The only Town in the County that participates in the program is Cape Charles. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

The County of Northampton has historically participated in the Hazard Mitigation Grant Program. To date, 24 structures in the County have been elevated out of the flood plain, but no houses have been relocated or razed under the program. See Table 7 for more details.

HAZARD PROFILE

§201.6(d)(3) The County's primary risk is associated with coastal and stormwater flooding.

PANDEMIC RESPONSE AND READINESS

Northampton County followed guidelines put forth by the Commonwealth. The Northampton County website provided residents updates and educational resources in regards to mask requirements, closures/openings, businesses, available grants, vaccine information, symptoms and quarantine protocols, fact sheets, executive orders, town orders, food, housing, and energy assistance, elections, schools, mental health, and so-on. Residents were encouraged to stay home and were provided information on complimentary delivery services for prescriptions, food, and other supplies. Visitors were encouraged to delay their vacation and return once it was safe. Northampton County public schools provided free meals for students that were on a 5-day virtual plan during the 2020 school year. Students were able to receive both breakfast and lunch through curbside pick-up.

WIND

The peak wind gusts predicted by Hazus® during a 1-percent-annual-chance wind event are between 90 and 93 mph for the County. Hazus® damage estimates are flawed, as the input data is flawed. Because the data used to run the Hazus® simulation for the County did not include the number of stories of the buildings, the Hazus® estimate can be assumed to be a gross underestimate of damages that the County would incur. Hazus® estimates approximately 92 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 7 buildings that will be completely destroyed. Figures 4, 5, and 6 summarize the expected building damage by occupancy and type as well as the expected loss resulting from wind damage.

Figure 4: Hazus® Expected Building Damage by Occupancy

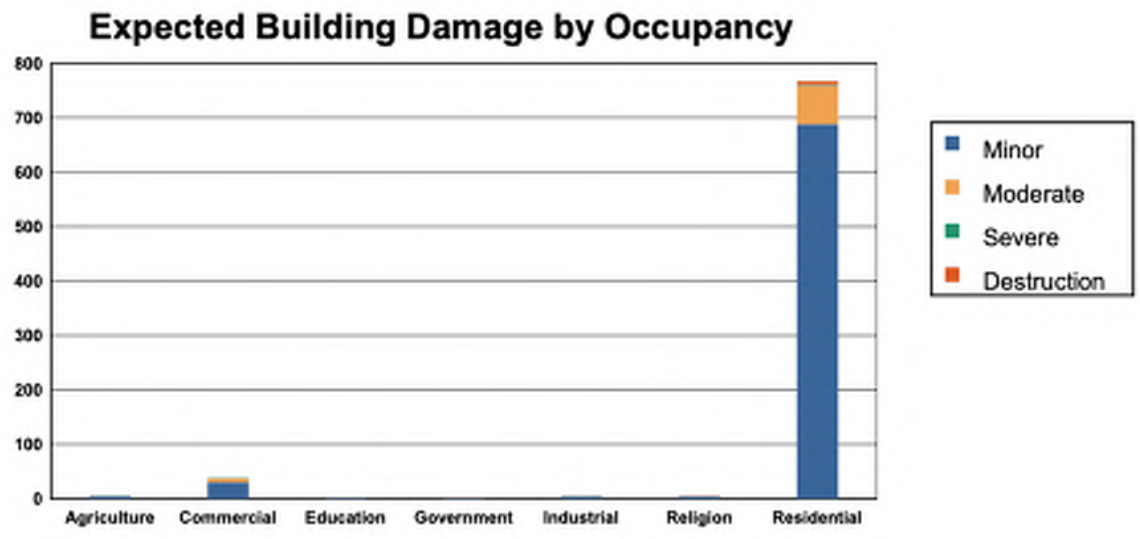


Table 2: Expected Building Damage by Occupancy : 100 - year Event

Figure 5: Hazus® Building Exposure by Type

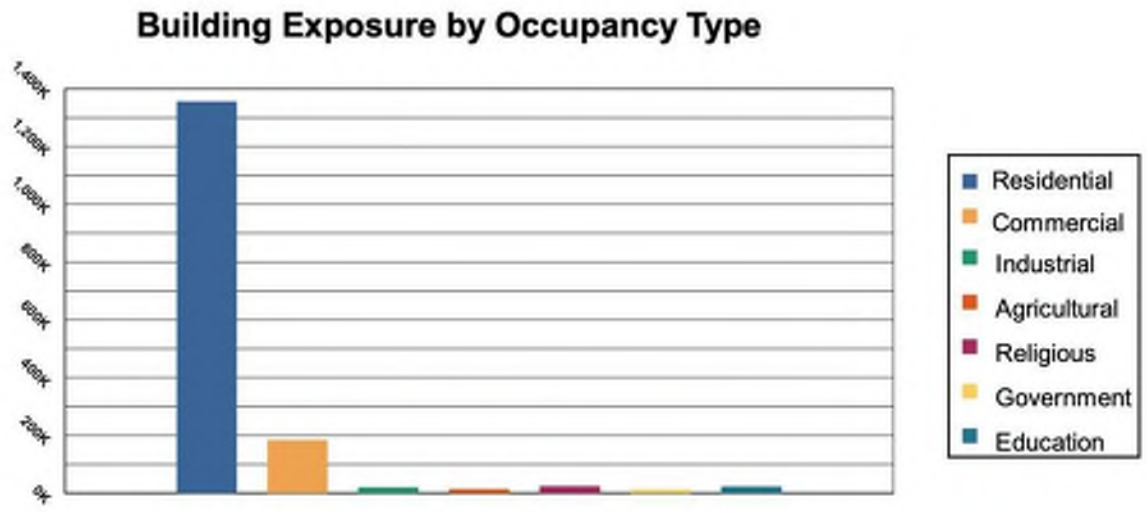


Table 1: Building Exposure by Occupancy Type

Figure 6: Hazus® Expected Loss Estimates

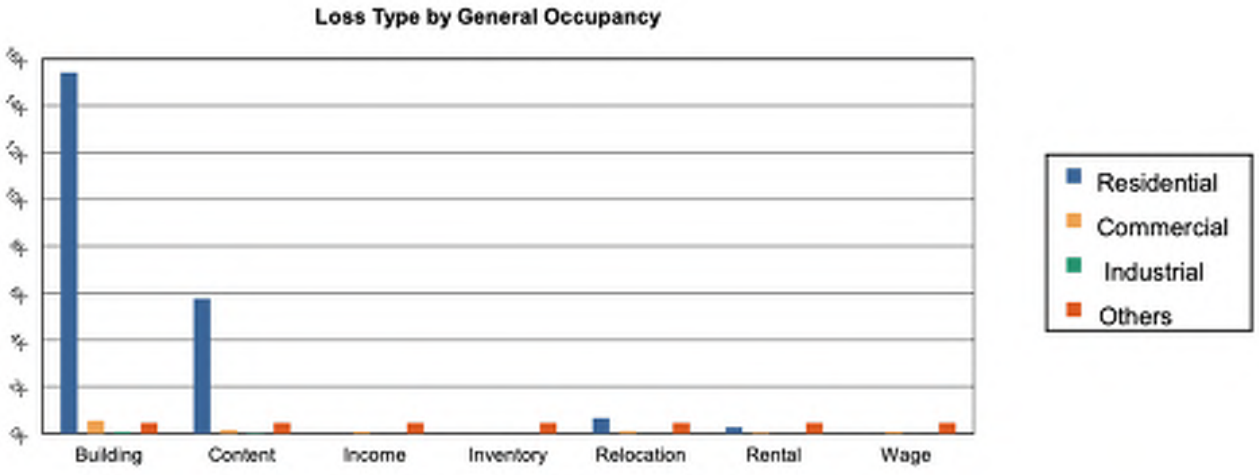


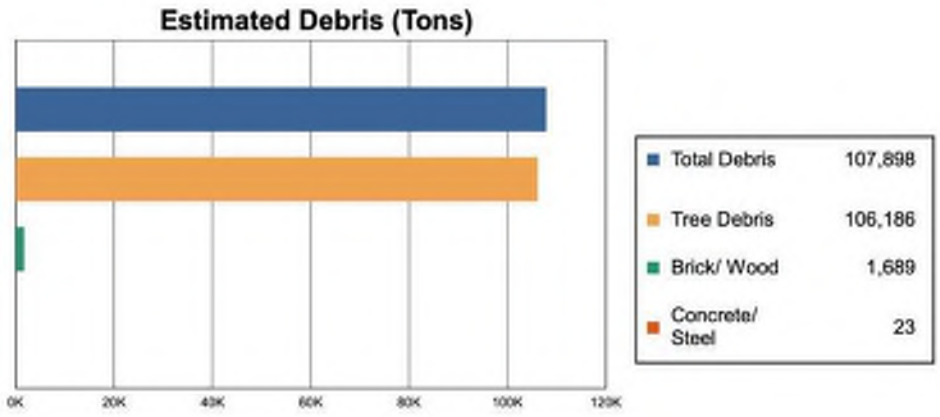
Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Hazus® estimates the number of households that are expected to be displaced from their homes due to a 100-year hurricane and the number of displaced people that will require accommodations in temporary public housing shelters. The model estimates that 9 households will be displaced and five people will seek temporary shelter.

The Hazus® model also estimates debris generated by a 100-year event and breaks down the debris into four general categories: brick/wood, reinforced concrete/steel, eligible tree debris, and other tree debris. This distinction is due to different equipment being needed to handle different type of debris. The model estimates that a total of 107,898 tons of debris will be generated. Of the total amount, 95,921 tons (89%) is Other Tree Debris. Of the remaining 11,977 tons, Brick/Wood comprises 14% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 68 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 10,265 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Figure 7: Hazus® Estimated Debris



After the 2014 tornado that ripped through Cherrystone Family Campground and RV Resort, a large amount of clean-up and debris removal was required and VDOT came in to assist (Personal communications, Susan McGhee, March 22, 2021).

The Chesapeake Bay Bridge Tunnel (CBBT), the County's connection to the rest of the Commonwealth, has travel restrictions and will close to all traffic when winds exceed 65-mph; therefore, the official evacuation route is north. The Virginia Department of Emergency Management (VDEM) provides residents with clarity on whether they should evacuate. This information can be accessed through their website: Know Your Zone (vaemergency.gov).

COASTAL EROSION

Northampton 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. That said, the shifting and erosion of the barrier islands and loss of marshes to habitat migration and rising seas may leave the inland seaside shoreline in a more exposed position in the future. Ongoing dredging and living shoreline projects around these barrier islands have helped to protect the land inland.

The erosion rates on the barrier islands range on average from 7 to 17 feet per year, but a single high intensity nor'easter or hurricane could erode more than that in just a few days. The "Resilient Environment" chapter in the 2020 Northampton County Comprehensive Plan seeks to ensure that existing shorelines are preserved to the maximum extent possible. The Plan lists strategies to help mitigate erosion which includes enforcing regulations and land conservation programs, providing education on conservation and shoreline management, pursuing funding to complete shoreline restoration projects such as living shorelines, and more (Northampton County Comprehensive Plan, 2020). Considering the barrier islands protect the peninsular shorelines, it is important to continue to target high erosion areas and have a plan to address these issues.

Table 8 illustrates the areas in the County identified by the 2002 VIMS *Shoreline Situation Report* and updated with 2016 information from local County representatives. Arlington Plantation, not listed in Table 8, is also experiencing coastal erosion at unknown rates (Personal communications, Susan McGhee, March 22, 2021).

Table 7 : Northampton County Areas Experiencing Coastal Erosion

Area	Location Description	Erosion Rate (feet/year)	Mitigation Strategy
Critically Eroding Areas			
Tankards	Savage Neck, southwest of Eastville	20	
Moderately Eroding Areas			
Smith	Savage Neck, north of Tankards	with maintained groins & bulkheads, ~0	Groins, bulkheads
Silver Beach	Occohannock Neck	with maintained groins, bulkheads, rip-rap, ~1	Groins, bulkheads, rip-rap (since the 1940's)
Pickett's Harbor Beach	Between William b. Trower Bayshore NAP & Butler's Bluff	>1	None
Butler's Bluff	Between Kiptopeke State Park & Arlington, bayside	with maintained groins, bulkheads, and breakwaters, ~ 0	Groins, bulkheads, and breakwaters

COASTAL FLOODING

According to the 2016 FEMA Flood Risk Report, 222.2 square miles of the County are in the SFHA and 181.8 square miles are in the V zone. There are an estimated 7,556 buildings in the County with a total building replacement value (excluding contents) of $1.637 billion dollars. Approximately 92.79% of the building exposure are associated with residential housing (FEMA Hazus®).

Hazus® estimates that approximately 3 buildings will at least be moderately damaged in the event of a 1-percent chance flood event. This is over 8% of the total number of buildings in the scenario. It's estimated that at least one building will be completely destroyed.

Figure 8: Hazus® Expected Building Flood Damage

Table 3: Expected Building Damage by Occupancy

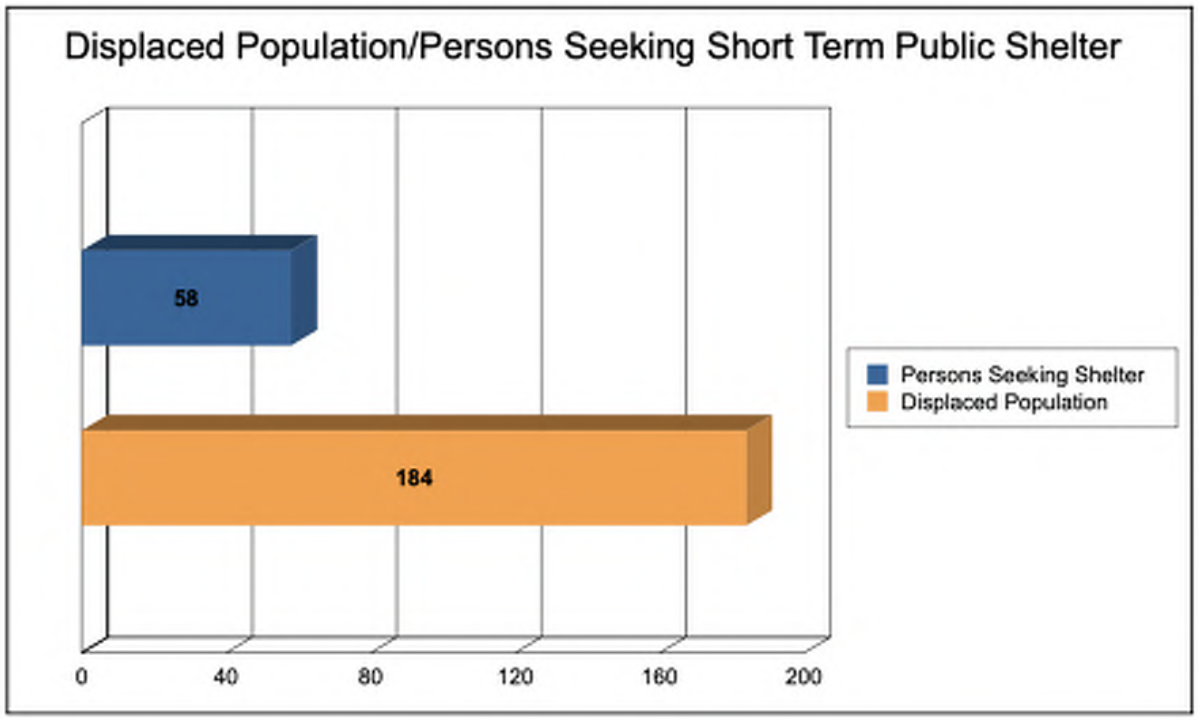
	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	1	100
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	0	1	50	1	50	0	0	0	0	0	0
Total	**0**		**1**		**1**		**0**		**0**		**1**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	0	0	1	50	1	50	0	0	0	0	0	0

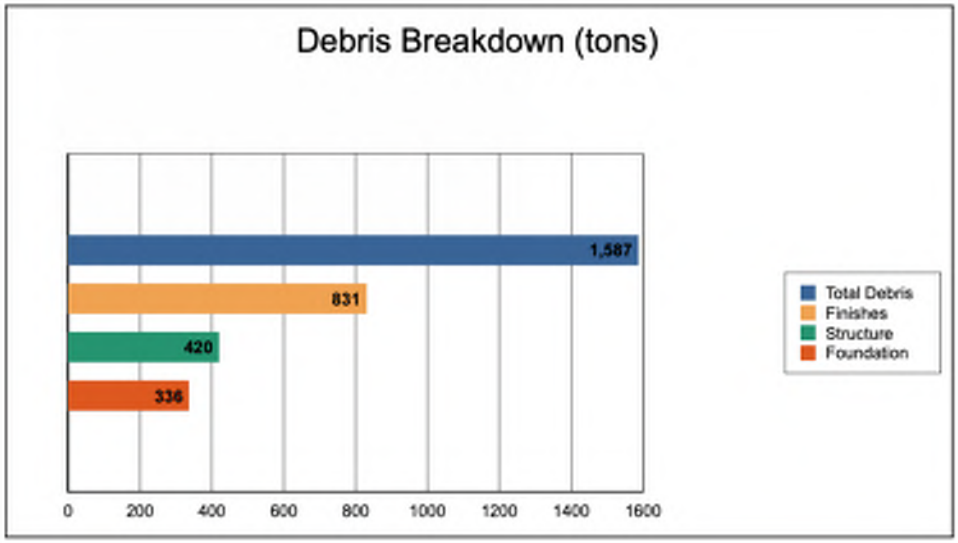
The model estimates the number of households expected to be displaced from their homes, the associated potential evacuation, and the number of those displaced that will require accommodations in temporary public shelters. The model estimates 61 households (or 184 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 58 people (out of a total population of 12,389) will seek temporary shelter in public shelters.

Figure 9: Hazus® Estimated Displaced Population



Hazus® also estimates the debris generated by a 1-percent-annual-chance flood event. This model breaks down debris into three categories: finishes (dry wall, insulation, etc.), structural (wood, brick, etc.), and foundations (concrete slab, block, rebar, etc.). The model estimates that a total of 1,587 tons of debris will be generated. Of the total amount, Finishes comprises 52% of the total, Structure comprises 26% of the total, and Foundation comprises 21%. If the debris tonnage is converted into an estimated number of truckloads, it will require 64 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Figure 10: Hazus® Estimated Debris Generated from a 1-percent-chance-flood



The total economic loss estimated in this scenario is $10.49 million, which represents 2.13% of the total replacement value of the buildings. Building losses are broken down into two categories: direct building losses and business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are associated with the inability to operate a business due to damage sustained during the flood event as well as the temporary living expenses for those displaced from their homes. Total building related losses totaled $6.55 million with 38% related to business interruption. Residential occupancies made up 65.45% of the total loss. Figure 11 provides a summary of the losses associated with building damage while Figure 12 provides a visual of risks to infrastructure.

Figure 11: Hazus® Estimated Losses Associated with Building Damage

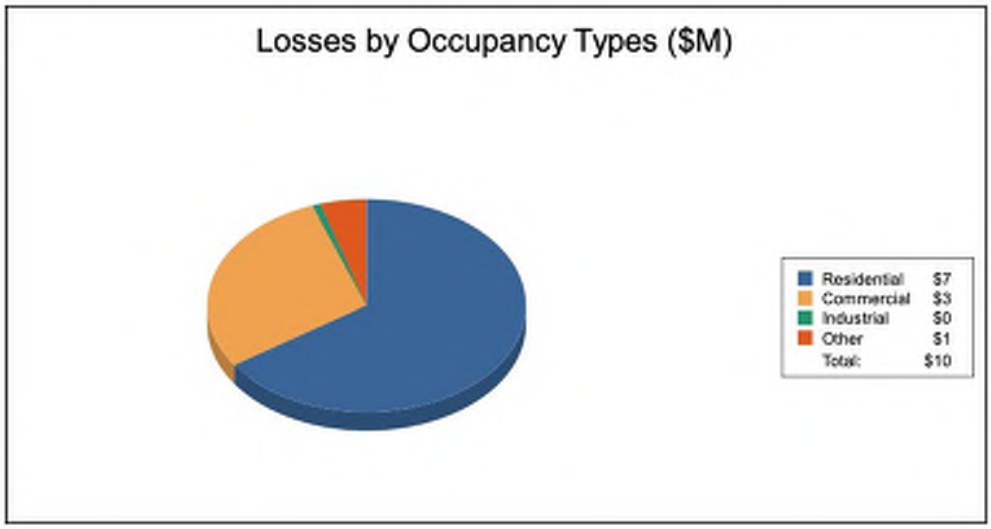
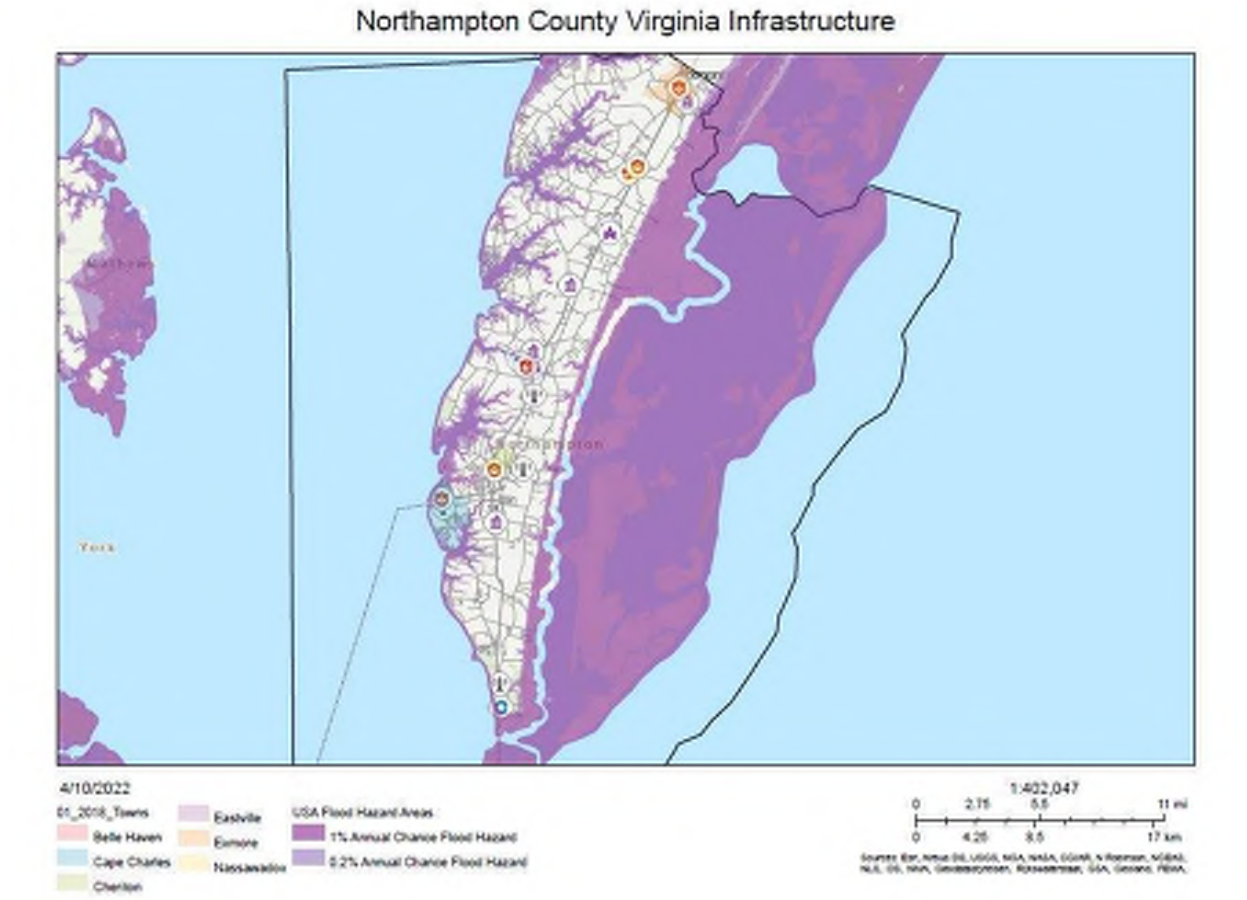


Figure 12: Flood Hazards to Infrastructure in Northampton County



SEA-LEVEL RISE

Of the County's 502 miles of roads, two miles (0.4%) is projected to be inundated with one foot of sea-level rise (SLR) (estimated year 2025-2050), 16 miles (3.2%) with two feet (within 2045-2090), and 26 (5.2%) with three feet (sometime after 2060) (*Eastern Shore of Virginia Transportation Infrastructure Inundation Vulnerability Assessment (TIIVA)*, 2015). Even small amounts of SLR make rare floods more common by adding to tides and storm surge. With three feet of SLR, there are many communities and economically critical facilities (including various working waterfront areas) that would be disconnected, inaccessible, or have the majority of the roads inundated. Without significant engineering solutions in the coming years, it should be expected that the livelihood and safety of communities and the integrity of these roadways in the County will largely decline. Figure 5 shows a map from the TIIVA assessment of the areas more susceptible to SLR effects in the County.

Figure 13: Northern Northampton County Transportation Infrastructure Inundation Vulnerability Assessment

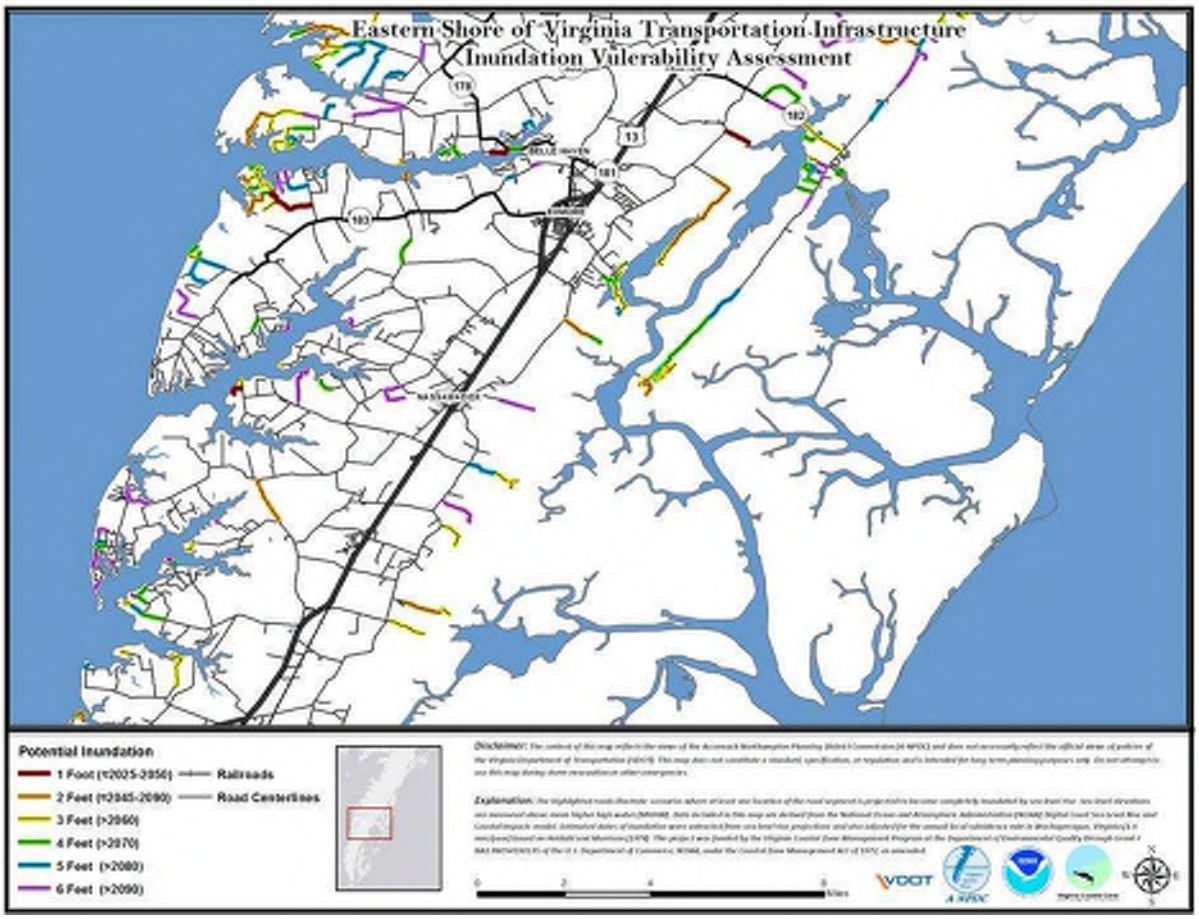


Figure 14: Northampton County, 2040 Conditions

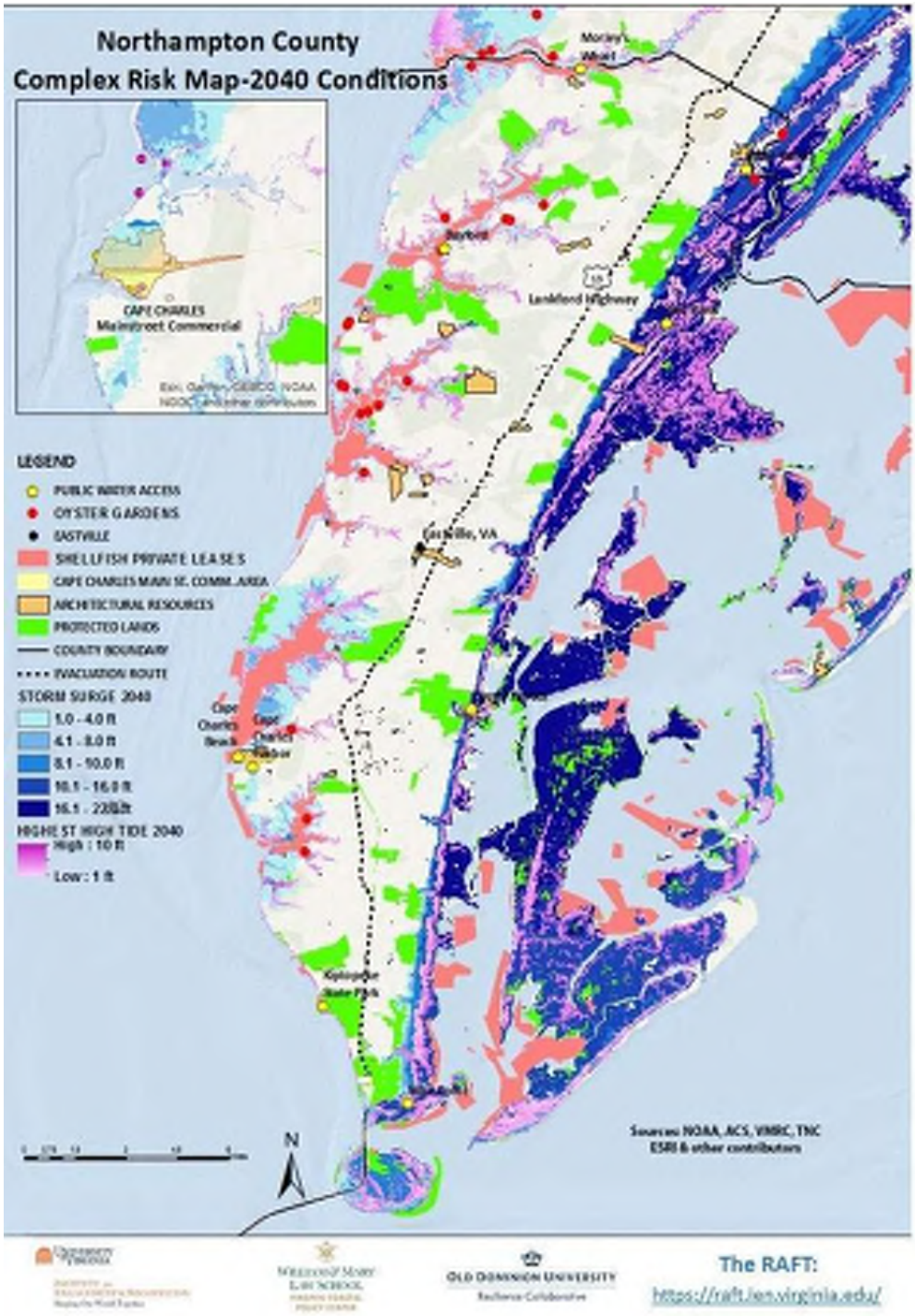
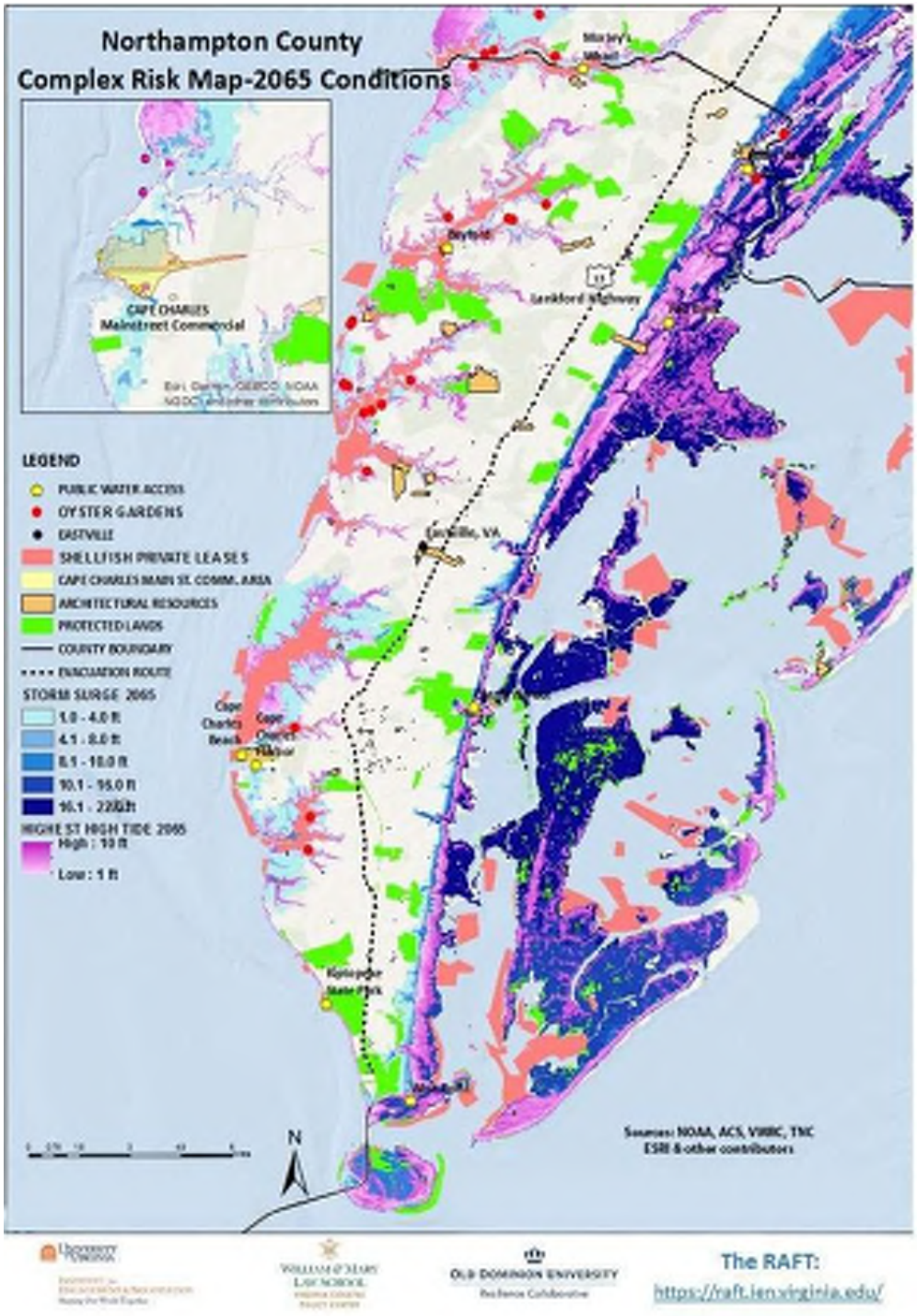


Figure 15: Northampton County, 2065 Conditions



STORMWATER FLOODING

Educating residents about the risks associated with stormwater flooding and standing water, such as septic contaminants and mosquito-borne illnesses, is an important step in mitigating potential negative impacts to the population.

Local officials identified various areas in the unincorporated portions of the County that have stormwater flooding problems. These areas include, but are not limited to:

- Village of Hare Valley
- Village of Weirwood
- Village of Cheapside - Between Arlington and Rt 13, septic systems and private wells
- Village of Townsend
- Village of Johnsontown

HAZARDS OF LOCAL SIGNIFICANCE

Additional hazards to those included below can be found in Chapter 9: The Region.

WATER QUALITY

Since County residents all rely on private wells and many people in the County rely on the fisheries and aquaculture industries, fish kills and the declining health of the Chesapeake Bay impact the residents and the economics of the Region. In addition, bacterial impairments can discourage tourism and recreational use of our beaches and waters.

MOSQUITOS-BOURNE ILLNESSES

Mosquito-borne illnesses such as West Nile and Zika virus pose a potential risk, especially with standing water from intense rain events and subsequent stormwater flooding.

SNOW AND ICE STORMS

With snow and ice storms there are often school closures, power outages, CBBT closures, and economic issues from damages to agriculture.

FIRE AND SMOKE

According to 2019 ACS five-year estimates, the majority (61.6%) of residents in Northampton County rely on electricity to heat their homes. Other County residents heat their homes with fuel oil, kerosene, etc. (15.3%), bottled, tank, or LP gas (18.2%), or wood (3.1%). In times of low humidity and high winds, the County is susceptible to field and forest fires as well.

CRITICAL FACILITIES

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

Table 8: Northampton County Critical Facilities

Facility	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
County-Owned Properties						
County Courthouse Complex	X	Wind	11,885+	Devastating	No	Yes
Sheriff's Department/Emergency Operations Center	X	Wind	11,885+	Devastating	No	Yes
Fire/EMS	X	Wind	11,885+	Devastating	Yes	Yes
Regional Jail	X	Wind	11,885+	Devastating	No	Yes
Not County-Owned						
Chesapeake Bay Bridge	X	Wind, Flooding, Ice	45,000+	Devastating	No	Yes
Eastville Center	X	Wind	11,885+	Devastating	Yes	Yes
Cape Charles VORTAC Beacon	X	Wind, Flooding, Ice, Erosion	Transcontinental air traffic	Inconvenience	No	No
Schools	X	Wind, Flooding	5,000+	Major Disruption	Yes	Yes
County Courthouse Complex Water Tower	X	Wind, Ice	500+	Devastating	No	No
County Courthouse Complex Waste Water Treatment Plant	X	Wind, Flooding	500+	Disruption	No	Yes
Oyster, Willis Wharf Harbors	X	Wind, Flooding, Ice	11,885+	Disruption	No	Yes
Cell Phone/Communication Towers	X	Wind, Ice	11,885+	Devastating	No	Yes
Broadband Network	X	Wind, Flooding	11,885+	Disruption	No	No
Bayview Waste Water Treatment Plant	X	Wind, Flooding	81 Residential Connections	Disruption	No	Yes

FINDINGS

1. The greatest threats to Northampton County are coastal flooding and high wind events. Erosion, stormwater flooding, winter storm events, and water quality issues also pose significant threats to the County.

2. 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. Damages reflected by Hazus® are inaccurate, as they only assume single story buildings (based on County data).

3. Private flood insurance policies for homes within Special Flood Hazard Areas are becoming increasingly difficult to attain within the County. The new FIRM includes 406 fewer buildings in the SFHA and V zones. A combination of these factors has resulted in 139 fewer buildings being insured in 2016 than in 2011. This creates a vulnerability in the County and lessens the ability to rebound following a flood event.

4. The 2015 FIRM shows a reduction in area within the SFHA and the V zone, which does not take into account erosion rates and relative sea level rise, and may instill a false sense of security in the County in regards to risk from flooding.

5. Hurricane 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 in damages 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.

6. The Chesapeake Bay Bridge Tunnel is a critical facility that affects the local economy, communications, and emergency response capabilities.

7. 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.

8. The County currently does not have a designated emergency shelter. The lack of an emergency shelter could put thousands of residents at risk if evacuations are ordered or homes become flooded or destroyed.

CHAPTER 25: TOWN OF CAPE CHARLES

TOWN PROFILE

The Town of Cape Charles was created in 1884 as a planned community at the southern terminus of the railroad. It is located in southern Northampton County on the Chesapeake Bay and it was incorporated in 1886. An area west of the Town on the Bay was called the Sea Cottage Addition and was incorporated in 1909. The Town was designated as a Natural Historic District in 1989 due to the architectural diversity and integrity. Further annexations occurred in the southern and northern portions of the neck in the 1990s which have been undergoing significant new development and renovations (*Town of Cape Charles Comprehensive Plan*, 2016).

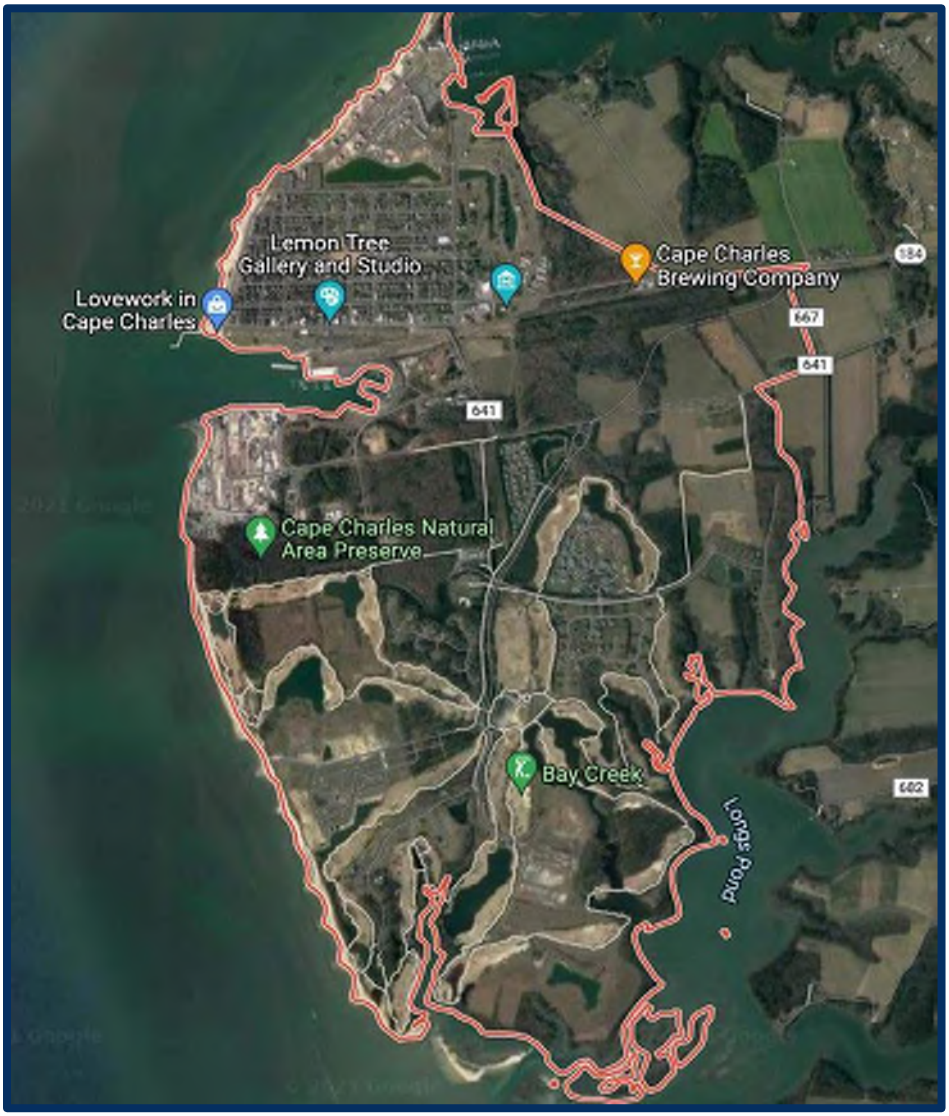


Figure 1: Cape Charles Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income, and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The 2019 American Community Survey five-year estimates indicated that the Town had a population of 1,239, which is an increase of 230 since the 2010 U.S. Census (Table 1). The Town has become a popular destination for retirees, tourists, and second homeowners in the last decade and is experiencing a greater influx of seasonal residents during the warmer summer months. This trend is expected to continue to grow in the future, and the Town is planning accordingly (*Town of Cape Charles Comprehensive Plan*, 2016).

Town representatives indicated in 2015 that the year-round population estimates and Census data for 2000-2014 may be a bit high; however, they anticipated the number to grow significantly, as reflected in the 2019 estimates shown in Table 1. Owners that were previously leasing their properties have been retiring and moving to the Town as their primary residence (Personal communications, Jeb Brady, Building Official, March 23, 2021). The above average median age of 58 is nearly 20 years higher than the national median age and reflects this trend, which is anticipated to continue. According to the ACS 2019 estimates, 43.7% of the population in Cape Charles is over the age of 62. This population generally requires additional assistance and outreach in hazard preparation and mitigation education.

Table 1: Cape Charles Demographic Information

	2019*	**2014****	**2013*****	**2010******	**2000*******
Population	1,239	1,009	1,009	1,009	1,134
Median Age	58.0	NA	50.6	48.7	44.2
Disability	185	NA	62	NA	NA
Income					
Median Household Income	$54,643	NA	$27,132	NA	$22,237
Poverty Level	21.1%	NA	24.9%	NA	NA
Language					
Only English	95.9%	94.8%	95.3%	95%	97.1%
Other	4.1%	5.2%	4.7%	5%	2.9%
Spanish	0.8%	1.5%	2%	2.3%	1.4%
Ind-Euro	2.3%	2.8%	2%	2.2%	1.5%
Asian	1.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

As shown in Table 2, most of the local workforce in Cape Charles works in the education, health care, and social services industry. There is also a large portion of the population working in arts, entertainment, recreation,

accommodation, and food services, which is reflective upon the large seasonal and tourist population in the Town. Between 2000 and 2010, the workforce grew significantly. The estimated values provided by the American Community Survey for 2014 would indicate a severe and rapid decline in the workforce, but Town representatives indicated that this is inaccurate and a continued increase since 2010 is more likely, which is represented by the 2019 ACS estimates. This may have come as a result of a temporary decrease in employment at Bayshore Concrete, or due to a large portion of the population in the Town retiring. Bay Shore Concrete closed for approximately 1.5 years and reopened in November 2019 as Coastal Precast Systems, creating 50-100 new jobs consisting of laborers, operators, mechanics, technicians, and journeymen (Personal communication, Jeb Brady, Building Official, March 23, 2021).

The poverty level in Cape Charles is over double that of the state of Virginia, despite the decrease seen in Table 1. Many jobs held by residents in the Town require few specialized skills and offer low wages (*Town of Cape Charles Comprehensive Plan*, 2016). This is also true with nearly all towns on the Eastern Shore of Virginia and is likely due to a lack of diverse employment options and education opportunities.

Table 2: Cape Charles Local Workforce Industry

Civilian Employed Population								
Industry	**2019***		**2014****		**2010*****		**2000******	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	4	0.9%	15	4.5%	0	0.0%	13	2.9%
Construction	24	5.1%	21	6.3%	42	7.6%	31	7%
Manufacturing	23	4.9%	17	5.1%	37	6.7%	68	15.3%
Wholesale trade	12	2.6%	4	1.2%	9	1.6%	7	1.6%
Retail trade	46	9.8%	49	14.7%	51	9.3%	30	6.8%
Transportation and warehousing, and utilities	15	3.2%	2	0.6%	25	4.5%	31	7%
Information	16	3.4%	3	0.9%	4	0.7%	10	2.3%
Finance, insurance, real estate, and rentals	27	5.8%	15	4.5%	25	4.5%	19	4.3%
Professional, scientific, waste management	60	12.8%	52	15.6%	56	10.2%	38	8.6%
Educational and health care services	106	22.6%	85	25.5%	146	26.5%	85	19.1%
Arts, entertainment, recreation, food	82	17.5%	46	13.8%	83	15.1%	51	11.5%
Public Admin	29	6.2%	22	6.6%	41	7.5%	13	2.9%
Other	24	5.1%	2	0.6%	31	5.6%	48	10.8%
TOTAL CIVILIAN EMPLOYED POPULATION	468	-	333	-	550	-	444	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census, 2010, ****U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Cape Charles has seen a steadily growing business market since 2000. The Bay Creek Resort and Club is the largest residential and mixed-use development in Town and also provides a variety of housing options; therefore, the Resort is a major economic impactor for the Town (*Town of Cape Charles Comprehensive Plan*, 2016). Seasonal tourism along with the Cape Charles Yacht Center and Coastal Precast Systems provide opportunities for economic growth and development. The decline in total number of employees could be related to Bayshore Concrete closing and

transitioning to Coastal Precast Systems (Personal communication, Jeb Brady, Building Official, March 23, 2021). Many of the surrounding towns in Northampton County have citizens that commute into Cape Charles to work. Town officials believe the total number of establishments displayed in Table 3 for 2019 is likely underestimated, as there have been an increasing number of new business establishments in the Town (Personal communications, Jeb Brady, Building Official, March 23, 2021).

Table 3: Cape Charles Business Establishment Types

Industry Code Description	**Total Establishments**		
	2013	**2011**	**2009**
Agriculture, Forestry, Fishing and Hunting	1	1	1
Utilities	1	1	0
Construction	3	5	9
Manufacturing	2	2	2
Wholesale Trade	5	5	5
Retail Trade	15	14	19
Transportation and Warehousing	1	1	1
Information	1	1	2
Finance and Leisure	5	3	3
Real Estate and rental and leasing	3	3	5
Professional, Scientific, and Technical Services	10	6	7
Management of companies and enterprises	0	0	1
Administrative and Support and Waste Management and Remediation Services	2	2	2
Educational Services	2	2	3
Health Care and Social Assistance	5	5	5
Arts, Entertainment, and Recreation	1	4	3
Accommodation and Food Services	18	17	19
Other Services (Except Public Admin)	8	9	8
Industries not classified	0	0	1
Total, All Establishments	83	81	96
Total Employees	587	837	864

Source: Census Zip Code Business Pattern, 2009, 2011, 2013

BUILT INFRASTRUCTURE

§201.6(d)(3) Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazard events, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Vehicles available to households is one indicator of a household's ability to evacuate when necessary.

According to the ACS, between 2000 and 2014 there was almost a 20% increase in housing units built in Cape Charles. This is a statement with which the Town of Cape Charles Building Official agrees, however, does not believe that there was a decrease in units between 2010 and 2014, as Table 4 indicates. Between 2014 and 2019, over 100 more units were built according to the ACS estimates. The Town consists of a historic downtown area with many older,

historic homes. Many of these homes are either renovated, seasonal homes, or they are older homes in poor condition (*Town of Cape Charles Comprehensive Plan*, 2016). There is also the Bay Creek Golf Resort which has two 18-hole golf courses as well as residential development. Although property values have increased for homeowners, this has caused an increase in rent and housing prices that create difficulties for low- and moderate-income households (*Town of Cape Charles Comprehensive Plan*, 2016).

The high number of vacant housing units are primarily for seasonal, recreational, or occasional use in Cape Charles and have decreased since 2014 due to retirees moving into their second home (Personal communications, Jeb Brady, Building Official, March 23, 2021). These kinds of vacant buildings are typically well-kept and pose less of a hazard during high wind events.

As of 2016, approximately 150 of the older homes have been redeveloped and renovated since 2000 – and there have been 90 new housing units built since 2010 (Personal communications, Jeb Brady, Building Official, March 23, 2021). Because Cape Charles has been in the SFHA for many years, new homes were built above BFE and many restorations involved raising the building and/or building new editions above BFE.

The highest density areas are in the Seabreeze complex, where the property has experienced significant erosion problems during storms in the past. These populations could be considered high-risk during an emergency situation.

Table 4: Cape Charles Housing

	2019*	**2014****	**2010*****	**2000******
Total Housing Units	1,048	936	958	740
Occupied	658	498	516	536
Vacant	390	438	442	204
Owner-Occupied	344	278	247	248
Renter-Occupied	314	220	269	288
Median Housing Value	$345,500	$356,600	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

The local transportation system links the Town to the rest of the Region. Routes 184 and 642 are the Town's two main arterial roads, which both intersect U.S. Route 13. The historic downtown area exhibits a historic grid system. There are also many alley ways, sidewalks, and multi-use paths throughout the Town. The railroad, although now abandoned, and the harbor have both played an important role historically to the Town and continue to do so to this day (*Town of Cape Charles Comprehensive Plan*, 2016). The Southern Tip Hike & Bike Trail was converted from the abandoned railroad and is located at the Eastern Shore of Virginia Wildlife Refuge south of Cape Charles and connects to Kiptopeke State Park. There are plans underway to extend the trail north along the railroad which would connect towns and communities along Route 13. The segment of abandoned railroad in Cape Charles will be one of the firsts to be transitioned into the multi-use path as part of the Eastern Shore Rail Trail project. There is an anticipated increase in industrial activity at the Harbor due to a new Harbor Access Road, which will intersect Stone Road with a widened shoulder for pedestrians and bicyclists. This new project will aid in providing safe walkability to grocery stores and supplies before or after an emergency. Several other transportation related projects have been identified for the Town that will promote safety, increase parking, improve bicycle, pedestrian, and functional and access needs, and create an attractive and desirable environment for residents and visitors (*Town of Cape Charles Comprehensive Plan*, 2016).

While there is still potential for new development, Cape Charles Harbor currently serves Coastal Precast Systems, Cape Charles Yacht Center, United States Coast Guard, Mid-Atlantic Maritime Academy, commercial fisherman, recreational boaters, and more (Personal communications, Jeb Brady, Building Official, March 23, 2021).

There are only two roads leading into the Town, therefore, lack of accessibility is a risk factor. In the past, accidents have closed the main road leaving only one route accessible. Both roads have matured trees that could also close the road in a wind event. Ice and snow events occasionally threaten accessibility to the Town on both roads. According to the *ESVA Transportation Infrastructure Inundation Vulnerability Assessment*, roads in the historic area are more vulnerable to inundation than Bay Creek or other areas of the Town.

The measure of vehicles available to households is one indicator of a household's ability to evacuate when necessary. As of 2019, over 15% of the Town's occupied residences are estimated to not own a vehicle (ACS 2019); however, much of this may be attributed to the high percentage of second homes for which there is no locally registered vehicle. Star Transit's Yellow Lower Shore Loops Line, as well as the Red (North) and Purple (South) Lines, all serve the Town and immediate surrounding area and provides additional transportation options for residents of the Town to medical services, grocery stores, etc. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. Shore Ride also provides transportation services up and down the Eastern Shore of Virginia and Maryland; however, this service is not likely to operate during a hazard. There are an estimated 400 golf carts in the Town (Personal communications, Jeb Brady, Building Official, March 23, 2021), which could serve as an important resource during times of emergency. The Town is considered a golf cart community and their usage is encouraged as an alternative mode of transportation (*Town of Cape Charles Comprehensive Plan,* 2016).

Table 5: Cape Charles Vehicles Available per Household

Vehicles Available	2019*	2010**	2000***
None	100	61	159
One	264	195	214
Two	242	155	118
Three or more	52	68	43

Source: *ACS, 2014-2019, **U.S. Census 2010, ***U.S. Census 2000

COMMERCIAL AREAS

The main commercial activity in Cape Charles is located within the historical core of the Town. The historical commercial core has increased and will continue to do so as the demand for goods increases with the growing population. The Town has experienced an increase in commercial activity around the harbor with several new restaurants opening as well as the new Cape Charles Yacht Center (*Town of Cape Charles Comprehensive Plan*, 2016).

COMMUNITY SERVICES AND FACILITIES

Community facilities comprise all the public services and facilities provided by the Town to all residents. Those services include public water and sewage treatment facilities, police and fire departments, wharf, parks and recreation facilities, and solid waste management.

PUBLIC SAFETY

Cape Charles has the basic services required for the safety and convenience of its citizens. The Cape Charles Police Department works in conjunction with county and state resources. The Department currently has six officers and six police vehicles (Personal communications, Jeb Brady, Building Official, March 23, 2021). The Cape Charles Volunteer Fire Company and the Cape Charles Rescue, Inc. work cooperatively with other local fire departments and rescue

squads to provide fire protection and emergency medical services (*Town of Cape Charles Comprehensive Plan*, 2016). Cape Charles Rescue Service is located outside of town limits at 22215 S Bayside Road and is staffed 24/7 with a minimum of two certified EMS personnel provided by a combination of volunteers and career personnel by Northampton County Department of EMS. Cape Charles Rescue Service has two ALS licensed ambulances.There are no paid employees at the Fire Company, but there are approximately ten auxiliary volunteers and twenty volunteer firefighters. Town employees that are also volunteers of the Fire Company are permitted to respond to calls while in paid status, which aids in improved responses. The Fire Company is equipped with two engines, two tankers, one brush truck, and no medics and/or ambulances (Personal communications, Jeb Brady, Building Official, March 23, 2021).

SCHOOLS

Cape Charles Christian School is located in the historic district, but outside of the .2%-annual-chance flood zone. The school serves pre-kindergarten through eighth grade and has about 50 students. Other schools nearby that serve Cape Charles students are Kiptopeke Elementary, Northampton Middle, and Northampton High.

PARKS AND RECREATION

Cape Charles has a variety of community facilities available including the Cape Charles Harbor, the public beach, the Fun Pier, Library, and Central Park, with recent new and expanded facilities including the Beach Club at Bay Creek, the Palace Theatre, and Kings Creek Marina (*Town of Cape Charles Comprehensive Plan*, 2016). There is also a plan to put in a divided median with lighted sidewalks on North Peach Street and lighted sidewalks from Fig to the Bay along Washington Avenue, as well as to connect the entire town with non-motorized trails (Personal communications, Jeb Brady, Building Official, March 23, 2021).

Cape Charles Beach is one of the only two public beaches on the Chesapeake Bay on the Eastern Shore of Virginia, the other being Savage Neck Dunes Natural Area Preserve in the Town of Eastville. The Cape Charles beach provides an important recreational function and vital protection against hazards. Almost half of the historic area of Cape Charles is considered to be in the 500-year flood plain, but the beach is identified as being in the VE Zone (zone of high velocity waters). The wide shallow water area, the development of the dunes, and the breakwaters are necessary to provide a storm buffer between the Chesapeake Bay and the historic housing area (*Town of Cape Charles Comprehensive Plan*, 2016).

WATER SUPPLY AND WASTEWATER

The Town's public utility systems have allowed more dense development in Cape Charles than the rest of Northampton County. The Town prohibits new private deep wells and septic systems due to them threatening the Town's water supply (*Town of Cape Charles Comprehensive Plan*, 2016). According to the Town's 2018 Drinking Water Consumer Confidence Report, the drinking water, which is drawn from two wells in the Upper and Middle Yorktown-Eastover Aquifers, there were no contaminants at violation level. With its two new wells, the Town has the capacity to provide 500,000 gallons per day of production and additional wells and filtering equipment could carry production to over one million gallons per day, when needed (*Town of Cape Charles Comprehensive Plan,* 2016).

The Cape Charles Waste Water Treatment Plant (WWTP) was upgraded in 2008 and is now capable of treating 250,000 gallons per day. Although the design flow stayed the same, the amount of discharged nutrients has subsequently decreased to about a quarter of pre-retrofit levels.

SOLID WASTE

The Town contracts with Davis Disposal for weekly residential trash collection, which is transported to a Northampton County transfer station. There is also a community cardboard recycling bin from Davis Disposal and weekly yard debris pick-up (Personal communications, Jeb Brady, Building Official, March 23, 2021).

POWER AND COMMUNICATIONS INFRASTRUCTURE

The Town does not typically have problems with long-term power outages during or following storm events. Most mobile service is consistent throughout the Town. The Town of Cape Charles is part of the Eastern Shore Broadband Network Project, and has a community network that is connected to the fiber running the length of the Shore from the Maryland state line. Eastern Shore Broadband Authority is now available to residents in every incorporated town in both Northampton and Accomack Counties.

NATURAL ENVIRONMENT

There is an abundance of natural resources in Cape Charles. Wetlands, natural areas, and the public beach are present within the Town's boundaries and provide important buffers to natural hazards. They also provide an important economic function related to tourism and recreation that provides jobs for Northampton County (*Town of Cape Charles Comprehensive Plan*, 2016).

LAND USE LAND COVER

Cape Charles consists of land which is largely developed and agricultural. The north end of the Town is where the historical, planned community exists with smaller pockets of urban development near the southern ends of the Town. The overall trend towards increasing developed lands is valid. There are many challenges that accompany increased development and increased populations, from impervious surfaces and storm water to increased demand for utility and emergency services.

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Cape Charles has participated in the hazard mitigation planning process since 2006. The primary hazard for Cape Charles has been coastal flooding, storm water flooding, and winds associated with hurricanes and nor'easters. Cape Charles is currently updating its Comprehensive Plan. The previous update is from 2016, and it does not mention coastal hazards within the document. Due to the Town's participation in the hazard mitigation process, they use this document as the primary resource for preparing for coastal hazards.

The following table contains authorities, policies, programs and resources, and intentions or ability to expand to address reductions in hazard vulnerability.

Table 6 : Town of Cape Charles Hazard Mitigation Resources

	Ordinances, Plans, & Publications														Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow	Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*				*	*												
County			*															
Regional				*				*	*	*	*	*		*	*	*	*	*
State		*					*						*					
Federal		*																

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP on February 2, 1983. The Town currently has 170 policies, a decrease of 64 since January 2016 (FEMA NFIP Data Report, 2022). The new Flood Insurance Rate Map (FIRM) is most likely the cause of the vast reduction in the number of overall policies.

Cape Charles participates in the Community Rating System (CRS) program, which provides incentives for NFIP 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, but anticipate a new score of 8 in the near future (Personal communications, Jeb Brady, Building Official, March 23, 2021). The highest CRS score is a one. The Town is at a five-year review and is working diligently to improve its CRS rating to earn its residents an even greater discount in the future. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

The Town has not participated in the Hazard Mitigation Grant Program.

HAZARD PROFILE

PANDEMIC RESPONSE AND READINESS

The Town of Cape Charles responded to the COVID-19 pandemic in several different ways. The Town was able to use CARES Act funding and other federal funds towards public facilities such as the public beach and Central Park. Additional staff was hired in order to ensure social distancing and safety guidelines were being followed and bathrooms and other high-touch surfaces were frequently cleaned and disinfected (Personal communication, Jeb Brady, Building Official, March 23, 2021). The Town also purchased plexiglass in order to keep the Town Hall open as well as several other pandemic related items such as masks, sanitizer, cleaning products, etc. The Town was able to continue having concerts in the park for residents and guests by requiring temperature checks and placing sanitizing stations throughout Central Park and Mason Avenue (Personal communications, Jeb Brady, Building Official, March 23, 2021).

WIND

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) During a 1%-chance-annual storm event, Cape Charles is estimated to sustain $10.2 million in economic loss (Hazus®), including costs from building damages, content damages, inventory, relocation, and lost income and wages. A large portion of the Town is within the wind-borne debris hazard area, which is defined as the area extending 1-mile inland from the shoreline. Hazus® estimates that about 49 buildings will be at least moderately damaged. This is over 2% of the total number of buildings in the region. There are an estimated 4 buildings that will be destroyed

In addition to direct wind damage, much of the Town has mature trees that are a potential secondary hazard to the structures in that area as well as accessibility for emergency services. As seen during Hurricane Isabel in 2003, historic

nor'easters, and other high-wind events, structures are vulnerable to being damaged by large trees that may come down. Cape Charles building stock in the older part of Town consists of larger historic homes and is more susceptible to wind damage; however, new transient residents updating older homes has improved resiliency to this area (Personal communications, Jeb Brady, Building Official, March 23, 2021).

Straight-line winds are also a threat to the Town and were credited with some of the damage incurred from the Cherrystone tornado, particularly damages to a crane at Bayshore Concrete. In mid-February 2012, the train storage building, built to withstand 110-mph gusts, sustained damages from straight line winds as well. These kinds of intense wind events may become more common with changes in the climate.

COASTAL EROSION

During the past 13 years, the Town of Cape Charles has had an aggressive plan to mitigate erosion along its entire shoreline and harbor area. Several offshore breakwaters have been built to protect the northern Marina Village, Town Beach, Harbor entrance, and the Bay Creek Beach on the south end. These have been built with both private and public funds. There are now three breakwaters at the mouth of the Harbor and the height of the two older breakwaters were increased. 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 from both public and private sources. Due to the breakwater locations being on private land, landowners can choose to continue the mitigation process, however, it is very cost intuitive (Personal communications, Jeb Brady, Building Official, March 23, 2021).

In 2015, the inner and outer harbor was dredged and the sand was used for nourishment for the Town Beach. In 2016, the Federal Channel was dredged and any sand spoil was again used to nourish the beach. Dunes have now begun to build up (Personal communications, Jeb Brady, Building Official, March 23, 2021).

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 an NFIP flood insurance policy.

During Hurricane Sandy in 2012, significant erosion occurred along the shoreline adjacent to the Seabreeze Apartment Building on Washington Avenue. These repair costs were not included in the NFIP claims. The erosion undermined the foundation of the apartment building to the extent that the building was deemed unsafe for occupancy. Seven families were displaced for several months as a result, but they are now currently inhabited (L. Cicoira, *Eastern Shore Post*, November 2, 2012). About 15-feet of land eroded in approximately 2 hours (Personal communication, Jeb Brady, Building Official, March 23, 2021). This building and the adjacent house are within 50 feet of the shoreline and at immediate danger to damage from erosion during a storm event.

During Hurricane Sandy, the water almost got into the Shanty Restaurant. All of the stationary docks were completely submerged, but the roads were not. In general, erosion to the more susceptible golf courses and beach is a higher threat to the Town than damages. There is some bulk heading to protect these areas on Nicklaus Drive and more bulkheading has occurred recently on Niklaus as well as Palmer Drive. During Hurricane Isabel in 2003 and Nor'Ida in November of 2009, many portions of the northern section of the Town were eroded (Personal communication, Jeb Brady, Building Official, March 23, 2021).

COASTAL FLOODING

The Flood Insurance Study for Cape Charles identifies that the greatest threat of flood inundation comes from hurricanes and nor'easters. 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. A series of offshore breakwaters exist off the public beach and the mouth of the harbor and are designed to prevent erosion and attenuate wave action. Further down near the golf course, riprap was used rather than bulkheading as a less expensive option (Personal communications, Jeb Brady, Building Official, March 23, 2021). These provide protection against coastal flooding and are described in greater detail in the Coastal Erosion section.

Figure 2: Cape Charles 100 Year Flood Estimates

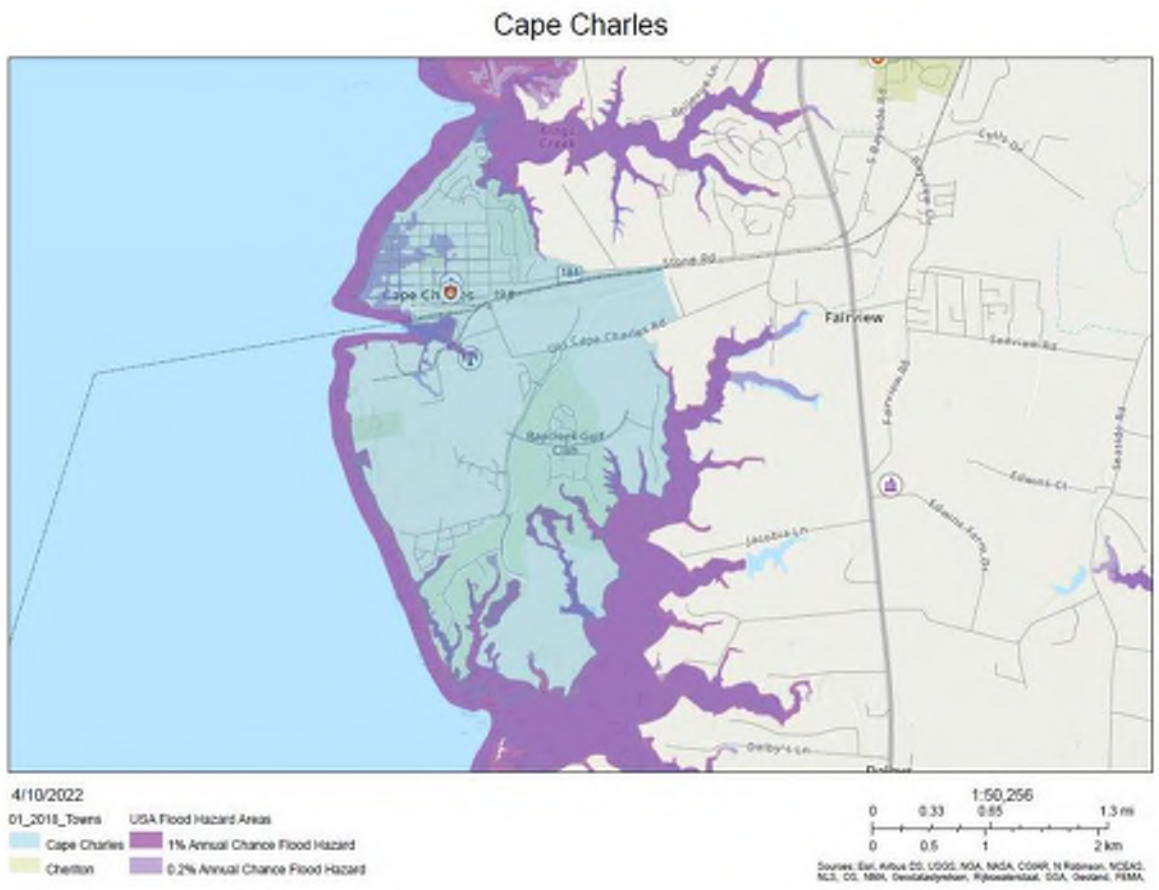
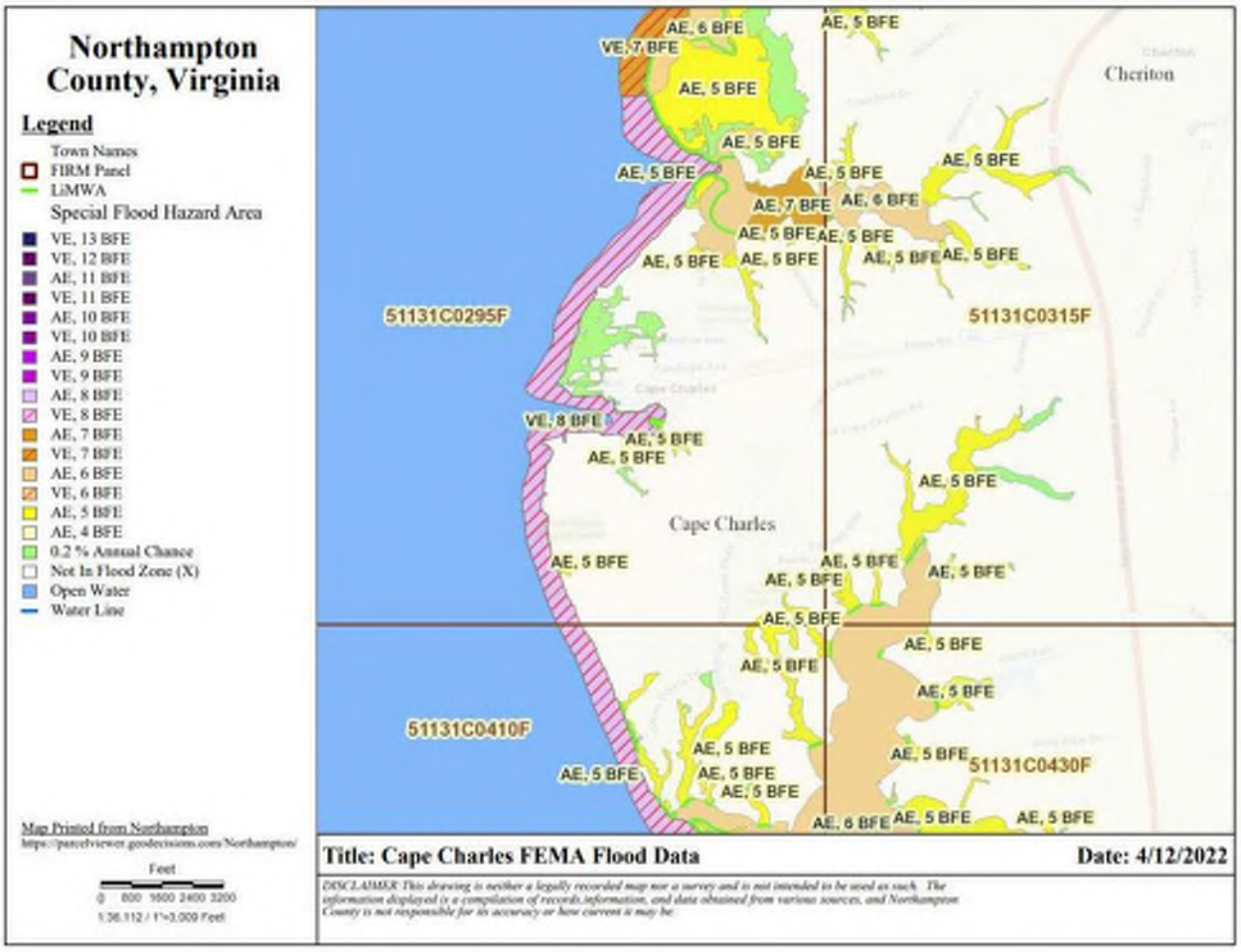


Figure 3: Cape Charles FEMA Flood Data



The 2015 FIRM removed half of a square mile of land from the Special Flood Hazard Area (SFHA), and with it, some 431 buildings. Although the V Zone total area did not change, there was a net loss of two buildings from this zone. The current estimated flood damage loss from buildings and contents just exceeds $20,000 according to Hazus®, which is a vast change from the 2011 estimated $52.9 million in structure and content damages (*ESVA Hazard Mitigation Plan*, 2011).

STORM WATER FLOODING

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 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 responsibility of the maintenance of ditches along public streets within the Town falls on VDOT. The Peach Street and Washington Avenue intersection now drains to Crystal Lake instead of directly into the Chesapeake Bay, which seems to help with storm water flooding in this area and will help with fresh water retention and reducing runoff. During high tides, storm water has nowhere to drain, creating additional flooding issues in the Town (Personal communications, Jeb Brady, Building Official, March 23, 2021).

Storm water flooding also occurs during significant rain events at the intersection of Plum Street and Madison Avenue, as 75% of the Town's streets drain to this location (Personal communications, Jeb Brady, Building Official, March 23, 2021). During a nor'easter in 2007, storm water completely inundated the streets of the western portion of the Town due to floodwaters being unable to drain. A few homes even experienced minor flooding during this event. During a short rain event on August 2, 2016, there was significant water flowing quickly over the intersection of Tazewell Avenue and Plum Street, which appeared to be a consistent problem throughout the Historic District (Personal communications, Shannon Alexander, A-NPDC, August 3, 2016).

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

Contamination from saltwater intrusion has already been documented for the Town's water supply. With sea-level rise and continued drawdown of our sole-source aquifer, this is a continued concern for the Town.

SEA-LEVEL RISE

According to the *ESVA Transportation Infrastructure Inundation Vulnerability Assessment*, roads in the historic area are more vulnerable to inundation than Bay Creek or other areas of the Town, but the rail yard and harbor, two vital economic drivers, are first at risk. In addition, sea-level rise would threaten the Town beach, Coastal Precast Systems, the Coast Guard Station, and other various low-lying areas in the Town.

TORNADOES/WATERSPOUTS

Although tornadoes are somewhat uncommon in the Region, it is still extremely important to be prepared and for residents to be educated on what safety precautions to take during such a hazard. The nearby Cherrystone Campground endured a deadly tornado in 2014 that flipped campers, brought down trees, and killed three campers. Strong, fast-moving thunderstorms that frequently occur in the Region can quickly produce unexpected tornadoes or waterspouts that could potentially cause damage to the economy, infrastructure, personal property, and the lives of visitors and residents in Cape Charles.

HAZARDOUS MATERIALS

Large industrial facilities and shipping containers in the Chesapeake Bay may also pose a threat to the Town.

CRITICAL FACILITIES

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

Table 7: Town of Cape Charles Critical Facilities

Facility	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities						
Waste Water Treatment Plant and Water Tower	X	Flooding, Wind	1,239+	Devastating	No	Yes
Police Departments & Municipal Building	X	Flooding, Wind	1,239+	Devastating	No	Yes
Central Park	X	Flooding, Wind	1,239+	Inconvenience	No	Yes
Town Beach	X	Flooding, Wind, Erosion, Waterspouts	1,239+	Major Disruption	No	Yes
Town Pier	X	Flooding, Wind, Erosion	1,239+	Major Disruption	No	Yes
Town Harbor	X	Flooding, Wind	44,558+	Devastating	No	Yes
Pump Stations (4 in the old Town, 1 in the marina, 3 more in Bay Creek - those 3 are vacuum stations)	X	Flooding	1,239+	Major Disruption	No	Yes
Town Wells	X	Salt Water Intrusion, Contamination	1,239+	Major Disruption	Yes	Yes
Public Works and Utility Buildings (behind Rayfield's Pharmacy) and vehicles (~30 including tractors)	X	Flooding, Wind	1,239+	Minor Disruption	Yes	Yes
Other Critical Facilities						
Post Office	X	Flooding, Wind	1,239+	Major Disruption	No	Yes
Riverside Medical Center	X	Flooding, Wind	1,239+	Inconvenience	No	Yes
Pharmacy	X	Flooding, Wind	1,239+	Major disruption	No	Yes
Volunteer Fire	X	Flooding, Wind	11,885+	Major Disruption	No	Yes
Dredge Spoil Basin (Federally owned)	X	Erosion	1,239+	Minor Disruption	No	No
Coast Guard Station	X	Flooding, Wind	11,885+	Major disruption	No	Yes
Cape Charles Christian School	X	Flooding, Wind	500+	Inconvenience	No	Yes
Civic Center	X	Flooding, Wind	1,239+	Inconvenience	Yes	Yes
Museum & Welcome Center	X	Flooding, Wind	1,239+	Inconvenience	Yes	Yes
Cape Charles Memorial Library	X	Flooding, Wind	1,239+	Inconvenience	No	Yes

FINDINGS

1. The 2015 FIRM shows a reduction of 431 structures now located in the 100-year flood zone. This may increase a false sense of security in the Town regarding flooding.

2. The Town has 234 flood insurance policies, a decrease of 82 policies since 2011, but still 51 policies more than in 2003. The new FIRM is most likely the cause of the vast reduction in the number of overall policies; however, as of January 2016, there were still 150 low-risk policies, indicating that residents would still like to be prepared for flood events.

3. The most reasonable worst-case scenario for the Town is a storm that pushes water towards Cape Charles and increase the tidal elevation.

4. 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, therefore, the first floor above grade is generally above the flood level.

5. Most critical facilities are subject to flooding and high wind.

6. Multifamily dwellings at Washington Avenue are highly susceptible to damages during storm events, as evident by damages during Hurricane Sandy.

7. Transient population increase and updates to the older homes make them more resilient to damages.

8. 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.

CHAPTER 26: TOWN OF CHERITON

TOWN PROFILE

Cheriton started out as a railroad town and can trace its beginnings to 1884, when the New York, Philadelphia, and Norfolk Railroad Company was extended from Maryland to Cape Charles. The land was owned by Dr. William Stratton Stoakley, who, in 1886, laid out the western part of his land as a town. Cheriton merged with another town called Sunnyside, where downtown Cheriton is currently located. The Town prospered during the early 1900s due to its role as a local agricultural shipping point and service center. The Town of Cheriton became incorporated in 1951. Today, Cheriton has many historic homes and churches (*Town of Cheriton Comprehensive Plan*, 2010).

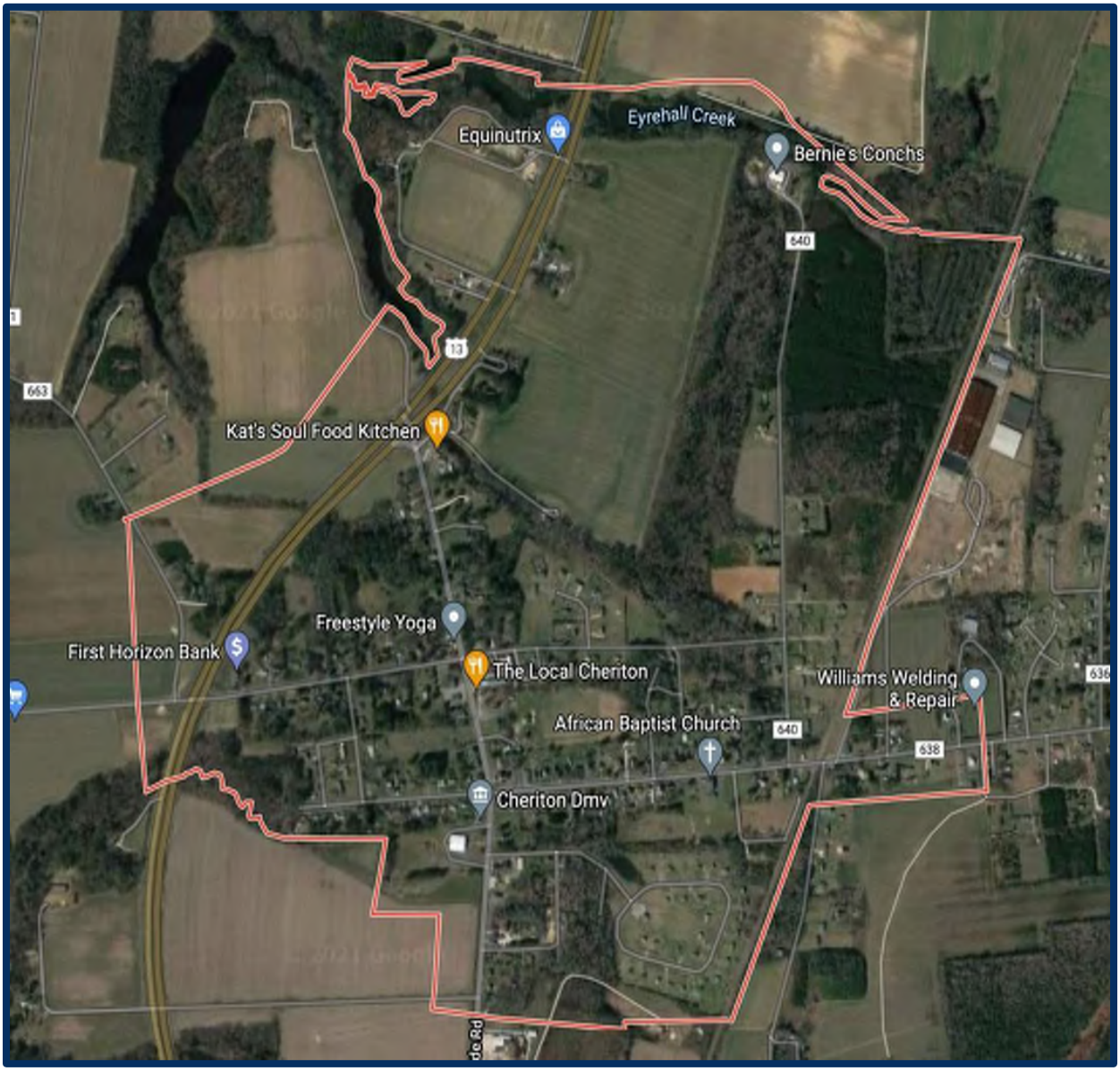


Figure 1: Cheriton Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The Town of Cheriton had a population of 461 in 2019 according to the American Community Survey (ACS). This shows a steady population for the Town, aligning with both 2000 and 2010 Census. The median age for the Town is 55.5, compared to the nation's 38.1, signifying an older and aging population with 35.8% over the age of 65 in 2019 (ACS 2014-2019). This portion of the population would likely require additional assistance during a hazard. There has, however, been an influx of younger individuals and families moving to the area (Personal communications, Mayor Jackie Davis, March 25, 2021), so future estimates may differ.

Table 1: Cheriton Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	461	471	624	487	499
Median Age	55.5	49.7	46.3	45.3	44.2
Disability	66	39	34	-	0
Income					
Median Household Income	$31,250	$32,969	$28,393	$35,550	$26,429
Poverty Level	12.0%	21.8%	16.5%	8.8%	NA
Language					
Only English	98.2%	90.7%	87.1%	86.9%	98.1%
Other	1.8%	9.3%	12.9%	10.4%	1.9%
Spanish	1.8%	7.3%	10.4%	7.4%	1.5%
Indo-Euro	0.0%	1.1%	1.8%	3.0%	0.4%
Asian	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.9%	0.7%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. They can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. They can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

The Town of Cheriton's workforce is primarily a residential and retail/service-oriented community. Because of this, most people commute outside of the Town and work in wholesale/retail trade, agriculture, education/health services, accommodation and food services, or manufacturing (ACS 2014-2019). Many of the County's largest employers are located just outside the Town and include Northampton County Schools, County of Northampton, Chesapeake Bay Bridge Tunnel (CBBT), Coastal Precast Systems, and several other aquafarms and accommodation services. Some of these employment entities operate in waterfront areas, and thus are more exposed to winds and water damages during a storm event, which may slow the following recovery time for both the business, the workforce, and the Town. The decrease in the total civilian employed population may be attributed to an aging population in Cheriton and a number of residents retiring.

Table 2: Cheriton Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	15	8.7%	11	5.1%	6	2.4%	13	5.1%	16	7.0%
Construction	9	5.2%	8	3.7%	16	6.3%	20	7.8%	11	4.8%
Manufacturing	11	6.4%	3	1.4%	42	16.7%	42	16.4%	38	16.6%
Wholesale trade	16	9.2%	42	19.4%	28	11.1%	12	4.7%	20	8.7%
Retail trade	15	8.7%	11	5.1%	14	5.6%	0	0.0%	32	14.0%
Transportation and warehousing, and utilities	6	3.5%	0	0.0%	0	0.0%	0	0.0%	14	6.1%
Information	0	0.0%	5	2.3%	0	0.0%	18	7.0%	2	0.9%
Finance, insurance, real estate, and rentals	2	1.2%	10	4.6%	11	4.4%	21	8.2%	5	2.2%
Professional, scientific, waste management	3	1.7%	29	13.4%	48	19.0%	69	27.0%	10	4.4%
Educational, health care, social services	41	23.7%	26	12.0%	22	8.7%	28	10.9%	41	17.9%
Arts, entertainment, recreation, food	28	16.2%	17	7.8%	8	3.2%	4	1.6%	17	7.4%
Public Administration	0	0.0%	24	11.1%	23	9.1%	24	9.4%	11	4.8%
Other	27	15.6%	11	5.1%	6	2.4%	13	5.1%	12	5.2%
TOTAL CIVILIAN EMPLOYED POPULATION	173	-	217	-	252	-	256	-	229	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. They can also serve as an indicator of community recovery resources. Finally, data can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

The presence of businesses within Town has been on the rise, with 31 current businesses in Cheriton Town limits; however, the majority of residents still commute to jobs outside of the Town (Personal communications, Mayor Jackie Davis, March 25, 2021). The Retail, Health Care, and Accommodation industries dominate the businesses in Cheriton. Due to the influx of tourism and tourism-based businesses in the Town, a significant storm event would greatly affect Cheriton's growing economy.

Table 3: Cheriton Business Establishment Types

Industry Code Description	Total Establishments				
	2021*	2015**	2013***	2011***	2009***
Agriculture, Forestry, Fishing, and Hunting	2	0	2	2	2
Construction	3	4	2	3	2
Manufacturing	2	1	1	1	1
Wholesale Trade	0	3	3	5	4
Retail Trade	6	1	2	4	5
Finance and Leisure	3	2	1	1	1
Real Estate and Rental Leasing	1	2	2	3	1
Professional, Scientific, and Technical Services	0	2	2	2	2
Administrative and Support and Waste Management and Remediation Services	0	2	2	2	2
Health Care and Social Assistance	5	2	2	4	5
Accommodation and Food Services	5	4	2	1	2
Other Services (Except Public Admin)	4	4	4	2	4
Total, All Establishments	31	26	25	31	32
Total Employees	-	-	323	285	316

Source: *Personal Communications, Mayor Jackie Davis, 2021 **Personal Communications, Town Council, 2016 ***Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to leave towards safety.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. According to the American Community Survey, in 2019 there were 248 total housing units in Cheriton. This number has remained steady since the 2000 Census, with the exception of what the Cheriton Town Council determined to be an overestimate in 2014 (Personal communications, Greg Hardesty and Mary Mears, Town Council, January 14, 2016). The majority of properties are occupied, with only 41 vacant housing units in 2019 (ACS 2014-2019). This number is believed to be an over estimate, as the Town has been working diligently to keep vacant structures in compliance with Town policies (Personal communications, Mayor Jackie Davis, March 25, 2021). Many of these vacant units may also be second homes or vacation homes due to Cheriton's growing tourism and the close proximity of the beach in the Town of Cape Charles.

Table 4: Cheriton Housing

	2019*	2014**	2010***	2000****
Total Housing Units	248	276	243	239
Occupied	207	219	211	219
Vacant	41	57	32	20
Owner-Occupied	135	163	146	155
Renter-Occupied	72	56	65	64
Median Housing Value	$162,200	$173,900	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Cheriton has an adequate road system which is maintained by the Virginia Department of Transportation. Route 13 provides good regional access and directs major traffic flow away from the town, while Business Route 13 provides safe access in to and out of Town. With the addition of a new traffic light, signage, reduced speed limits, and a contractual deputy to help enforce speed limits, there are generally no major traffic issues in Cheriton (Personal communications, Mayor Jackie Davis, March 25, 2021). The former Bay Coast Railroad is now abandoned and has not been an active railroad since 2018. The plan is to railbank and turn the now abandoned railway into a multi-use path as part of the Eastern Shore Rail Trail, which will extend 49.1 miles from Cape Charles north to the Town of Hallwood in Accomack County.

Vehicles available to households is one indicator of a household's ability to evacuate when necessary. Table 5 shows that there are 28 households without a vehicle available. This is an important factor to consider in the event of a hazard in order to ensure all residents are able to evacuate if needed by providing additional assistance. Star Transit serves the Town, connecting it to the rest of the Eastern Shore, with several stops in Cheriton on the Red (North), Purple (South), and Yellow (Loop) lines. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. The Town has applied for a grant to provide a bus shelter for Star Transit riders on North Bayside Road by the new park and playground (Personal communications, Mayor Jackie Davis, March 25, 2021).

Table 5: Cheriton Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	28	25	53	34
One	97	108	86	75
Two	49	58	92	79
Three or more	33	28	44	29

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

COMMERCIAL AREAS

The downtown area is an important local retail center. Commercial buildings house local retail businesses such as Barrier Island Salt Co., ESVA Boxing Club, Northampton Farm Store, Northampton Firearms, LLC., The Sheep Factory, two barber shops, and American Legion Post 56 (Personal communications, Mayor Jackie Davis, March 25, 2021). U.S. Route 13 has directed traffic away from Business Route 13 and Downtown Cheriton; therefore, the presence of Cheriton's business district is not obvious to highway travelers (*Town of Cheriton Comprehensive Plan*, 2010).

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

PUBLIC SAFETY

A contractual deputy, the Northampton County Sheriff's Department, and the Virginia State Police provide police protection for Town residents. Fire protection for the Town is provided by approximately 25 volunteer firefighters and 5 volunteer non-firefighters in the Cheriton Volunteer Fire Department; however, the Town recently has had difficulty recruiting volunteers (Personal communications, Mayor Jackie Davis, March 25, 2021). This station has a primary engine, engine/tanker combination, super brush truck (rescue and brush), and a teleport water tower. Ambulance service is provided by the Cape Charles Rescue, Inc., which is only 0.5-1 mile from Town limits (Personal communications, Mayor Jackie Davis, March 25, 2021).

WATER SUPPLY AND WASTEWATER

Residents rely on individual private wells and septic systems for their water supply and wastewater disposal. Due to new regulations, new septic field construction requires alternative disposal designs that avoid having the septic field too close to the water table (*Town of Cheriton Comprehensive Plan*, 2010).

SOLID WASTE DISPOSAL

Collection services are provided to the Town by Davis Disposal. Northampton County transfer station is located close by for disposal services as well.

PARKS AND RECREATION

Currently, the Town has one park located in the downtown area. The Park boasts a stage area, picnic facilities, and a playground with a paved parking lot for ADA accessibility. The Park hosts several Town events such as Children's Fun Day, Christmas Parade, and caroling. Most of the sidewalks in Town have been replaced and the Town is working on getting permission from store owners to repair privately owned sidewalks and ensure ADA accessibility of all sidewalks in the Town (Personal communications, Mayor Jackie Davis, March 25, 2021). A Parks and Recreation Committee has also been formed to ensure continued improvements for the park and downtown areas.

DRAINAGE DITCHES

Maintenance of drainage ditches is the responsibility of VDOT and were just recently inspected. They have been regularly maintained by VDOT in order to provide sufficient drainage and mitigate stormwater flooding (Personal communications, Mayor Jackie Davis, March 25, 2021).

SCHOOLS

Small Wonders Childcare Center is the only school in Town limits (Personal communications, Mayor Jackie Davis, March 25, 2021). Public schools nearby serving students in the Town include Kiptopeke Elementary and Northampton Middle and High.

POWER AND COMMUNICATIONS INFRASTRUCTURE

The Eastern Shore of Virginia Broadband Authority, Spectrum, Bay Shore Communications, and Hugh's Net all provide communication services to the Town of Cheriton (Personal communications, Mayor Jackie Davis, March 25, 2021). The Town typically does not experience lengthy service outages.

NATURAL ENVIRONMENT

Elevation in Cheriton ranges from 26 feet, from a high point of 36 feet where the abandoned railroad crosses Sunnyside Road, to a low point of 10 feet where Eyrehall Creek crosses Route 13. The small elevation change of 26 feet results in overall slopes in Cheriton of less than 2%, which contributes to flooding due to poor drainage (*Town of Cheriton Comprehensive Plan*, 2010).

GROUND WATER

The Town does not provide water. Potable water is supplied by individual private wells, which withdraw from ground water aquifers. The Town's water supply is mostly withdrawn from the upper Yorktown aquifer. The majority of land in Cheriton lies within the spine ground water recharge area and is in Wellhead Protection Area E. Protecting the spine recharge is extremely important to assure good quality and sufficient quantities of ground water on the Eastern Shore (*Town of Cheriton Comprehensive Plan*, 2010).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3) §201.6(c)(3), §201.6(d)(3) The Town of Cheriton began participating in the hazard mitigation planning process in 2016. The Town was formerly covered under the County's Hazard Mitigation Plan. The Town updated their comprehensive plan last in 2010.

Table 6: Town of Cheriton Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*				*	*													
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town joined the NFIP in July of 2020 after adopting a floodplain management ordinance and enforcement procedures (Personal communications, Mayor Jackie Davis, March 25, 2021). More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

The Town has not participated in the HMGP.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding has the greatest and most frequent impact on the Town. The Town of Cheriton website provides residents and visitors with information on emergency preparedness as well as links to other resources. The Northampton County Emergency Preparedness information and a Disaster Preparedness Brochure are among some of the hazard information the Town has provided on their website.

PANDEMIC RESPONSE AND READINESS

The Town of Cheriton responded to the COVID-19 pandemic is several ways. The Town was able to stay open for residents and visitors by purchasing glass barriers, blue lights, sanitary stations, and a canopy shelter for residents waiting outside for DMV Select and Town business. The Town provided care packages for their residents which included masks, gloves, sanitizer, and thermometers and the Town Park remained off limits until deemed safe (Personal communications, Mayor Jackie Davis, March 25, 2021). Extra supplies have been kept on-hand in the case of a resurgence or another similar event in the future.

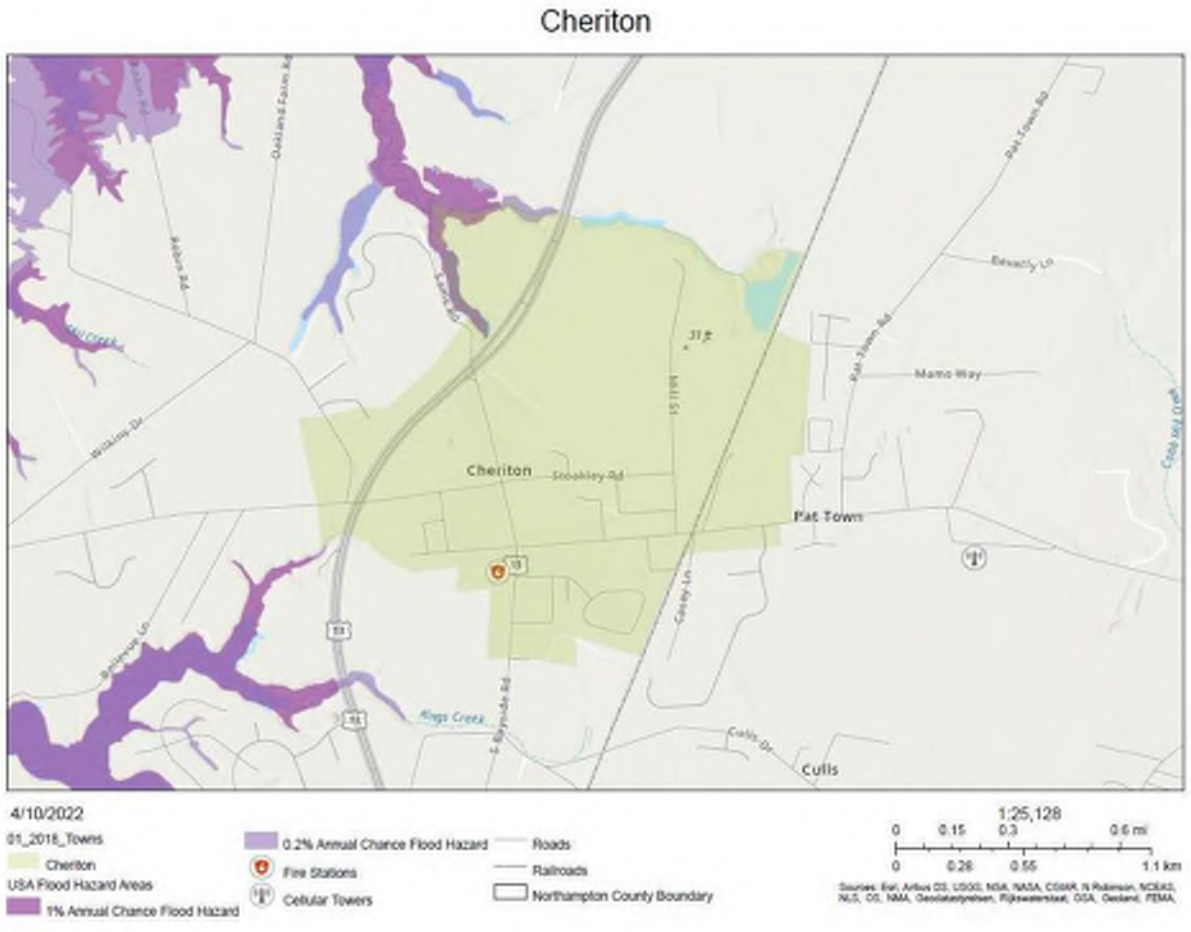
WIND

No parts of the 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 (*Northampton County Building Code*, 2016); however, like many towns on the Eastern Shore, the Town has several mature trees around the homes that could come down during high-wind events. These trees pose a threat of damage to homes, personal property, businesses, and infrastructure.

COASTAL FLOODING

The Town is almost entirely out of the flood zone (Zone X), except for the areas at the headwaters of both Kings and Eyrehall Creeks, where there are small portions in the 0.2%-annual-chance flood zone and in the A zone with a BFE of 5 feet. There are very few businesses or residents that are near these flood zones. The Town of Cheriton joined the NFIP after adopting a floodplain management ordinance and enforcement procedures. Residents in the Town are now able to purchase insurance through the NFIP (Personal communications, Mayor Jackie Davis, March 25, 2021).

Figure 2: Cheriton Flood Hazards to Infrastructure



COASTAL EROSION

No structures are at immediate risk to coastal erosion.

STORM WATER FLOODING

Drainage and flooding are problems in Cheriton due to the flat topography and inadequate maintenance of drainage ditches. Drainage of storm water flooding has historically been and continues to be a major issue for Cheriton (Personal communications, Mayor Jackie Davis, March 25, 2021). Recently, maintenance of these ditches has been ongoing and has helped to mitigate some stormwater flooding; however, the continuance of maintenance to all drainage ditches in Town is pertinent for proper drainage and mitigation of stormwater flooding. Stormwater flooding occurs frequently on Mill Street, Holland Road, and Cherrystone Road (Personal communications, Mayor Jackie Davis, March 25, 2021). Other areas throughout the Town have been affected from inadequate drainage and flooding issues as well.

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

Due to the high permeability of the soils in Cheriton, they are generally not well suited for septic tank filter fields. When soils are saturated, waste may not be sufficiently treated (*Town of Cheriton Comprehensive Plan*, 2010). The Town is following Northampton County and Virginia Department of Environmental Quality (VDEQ) guidelines by enforcing septic pump outs every five years. The Town notifies residents via letters when their five years is approaching (Personal communications, Mayor Jackie Davis, March 25, 2021).

ICE & SNOW STORMS

Snow and ice storms in 2009 and 2015 impacted the Town of Cheriton, creating dangerous travel conditions for residents. These types of storms may cause damage to infrastructure and create extensive power outages due to ice build-up on power lines, downed trees, and vehicular crashes.

FIRE & SMOKE

In the 1950s, two fires almost destroyed Downtown Cheriton. Many of the buildings were rebuilt using brick, but there are still a lot of wooden structures located in Town limits that may pose a fire hazard risk, particularly during times of extreme heat and droughts.

TORNADOES

In July of 2014, three people were killed and 20 injured when a tornado ripped through the Cherrystone Campground in Cheriton. The storm left several overturned campers and boats and several downed trees throughout the area. Although tornadoes aren't extremely common in the Region, there have been several other suspected tornadoes and waterspouts throughout the area. It is extremely important for the Town to ensure residents and visitors are educated and diligent in regards to safety information and precautions to take during such hazards. Strong, fast-moving thunderstorms occur frequently in the Region during the warmer months and are capable of producing strong winds, rain, hail, waterspouts, and tornadoes.

CRITICAL FACILITIES

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

Table 7: Town of Cheriton Critical Facilities

Facility	HMP '06	HMP '11	HMP '16	HMP '21	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Cheriton Town Office	-	-	X	X	Stormwater Flooding, Wind, Tornadoes	461+	Major Disruption	Yes	Yes
Other Facilities (Not Town-Owned)									
Cheriton Volunteer Fire Department	-	-	X	X	Stormwater Flooding, Wind, Tornadoes	461+	Devastating	No	Yes
Cheriton Post Office	-	-	X	X	Stormwater Flooding, Wind, Tornadoes	461+	Major Disruption	No	Yes
Cherrystone Family Camping Resort	-	-	-	X	Stormwater Flooding, Wind, Tornadoes	11,885+	Inconvenience	No	Yes

FINDINGS

1. The hazards expected to have the greatest impact on the Town are stormwater flooding and high-wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are groundwater contamination, ice and snow storms, fire, and tornadoes.

2. The upkeep and maintenance of drainage ditches in the area are pertinent to the mitigation of stormwater flooding in the Town. Recently, the ditches have been properly maintained and it is essential for effective maintenance to continue.

3. The Town has no Special Flood Hazard Areas, but does experience significant stormwater flooding.

4. The Town joined the National Flood Insurance Program (NFIP) in July of 2020 after adopting a floodplain management ordinance.

5. A tornado in 2014 tore through the Town, killing three individuals at Cherrystone Campground and injuring several others. Although uncommon, it is important for the Town to consider mitigation and education of residents and visitors for these types of sudden storms.

CHAPTER 27: TOWN OF EASTVILLE

TOWN PROFILE

Eastville is located near the central spine of the Eastern Shore in the central region of Northampton County and now encompasses approximately 412 acres after a recent boundary adjustment, which more than doubled the previous land size (Personal communications, Mayor Jim Sturgis and Chief of Police David Eder, May 25, 2021). Approximately 60% drains into the Chesapeake Bay and 40% drains into 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 large County and local government presence and a relatively smaller commercial district (*Town of Eastville Comprehensive Plan*, 2018).

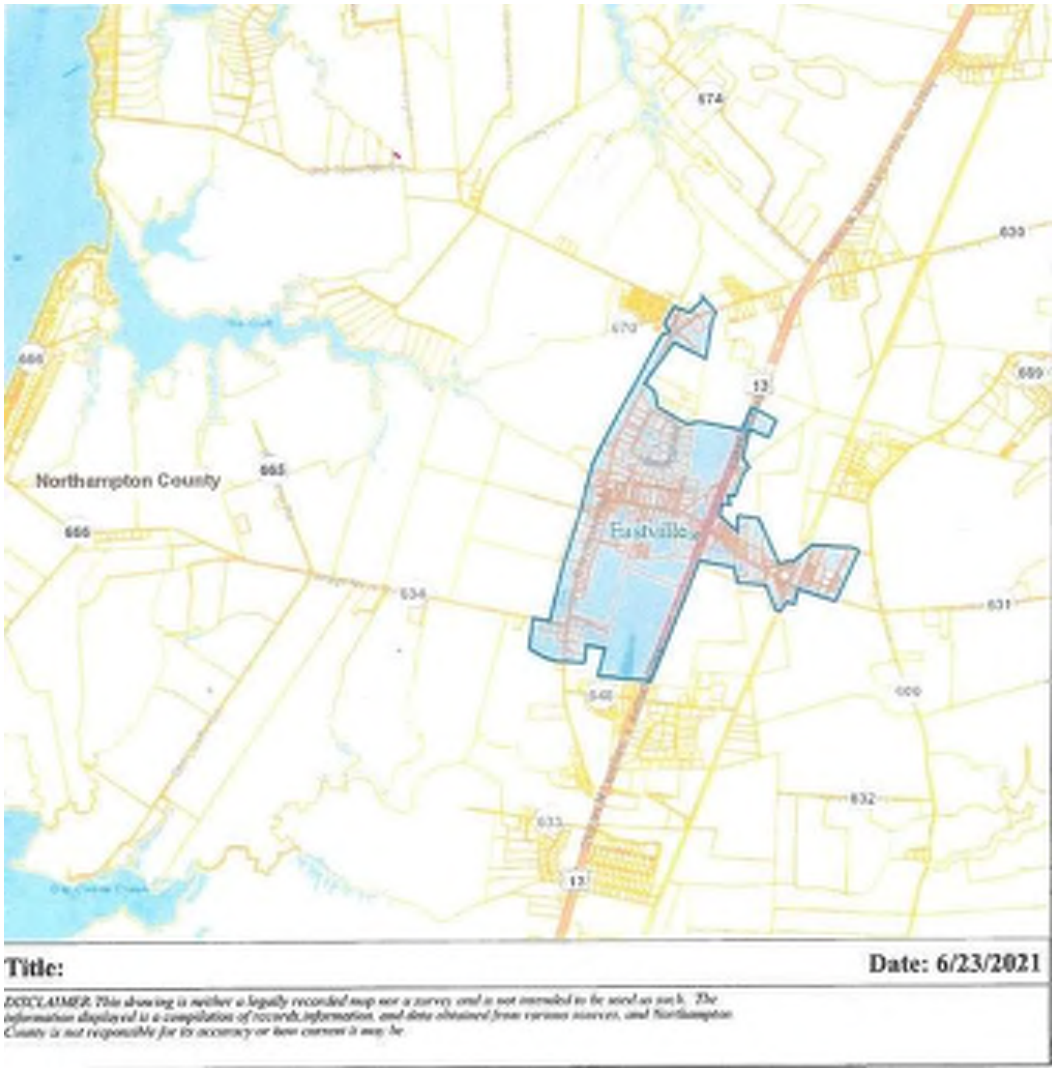


Figure 1: Eastville Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The Town of Eastville underwent a boundary adjustment in 2017, which is now being reflected in the 2019 American Community Survey five-year estimates. According to Table 1 below, the population in Eastville was 611 in 2019; however, that number is likely higher due to many individuals moving from cities to rural areas, such as Eastville, as a result of the COVID-19 pandemic (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Town officials also noted an influx of younger individuals and families moving to the Town, which is reflective of the 38.9 median age in 2019, and is likely even lower. The median age for the state of Virginia is 38.2 and the nation is 38.1 (US Census Bureau). Nearly 30% of residents speak a language other than English, that language being primarily Spanish. Town officials state they provide emergency information in both English and Spanish to residents through bulletin board postings and other various types of community outreach efforts (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

Table 1: Eastville Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	611	236	252	305	203
Median Age	38.9	39.1	48.8	37.4	40.8
Disability	56	0	8	NA	NA
Income					
Median Household Income	$43,319	$73,333	$50,000	$55,179	$36,250
Poverty Level	39.4%	11.0%	NA	NA	NA
Language					
Only English	70.7%	100%	100%	NA	98.9%
Other	29.3%	0.0%	0.0%	NA	1.1%
Spanish	28.0%	0.0%	0.0%	NA	0.0%
Ind-Euro	0.0%	0.0%	0.0%	NA	1.1%
Asian	1.3%	0.0%	0.0%	NA	0.0%
Other	0.0%	0.0%	0.0%	NA	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Due to the boundary adjustment, the percentage of the work force in specific industries shown below has fluctuated drastically. Town officials noted that some of the data collected from the 2019 ACS estimates are likely inaccurate. The Town's employed population works in a variety of industries. Educational and Health Care, Agriculture, and Manufacturing are the primary industries in which Eastville residents are employed, although it seems the Manufacturing industry has seen a recent decline (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Town officials stated there are approximately 45 residents that work in Public Administration and 2010 Census

data is likely more accurate for the Professional industry (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Due to the boundary adjustment, there were also increases within Agriculture, Wholesale Trade, Finance and Real Estate, and Education and Health Services.

Table 2: Eastville Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Agriculture, forestry, fishing/hunting, or mining	42	18.4%	10	9.4%	10	10.1%	7	8.8%	9	11.4%
Construction	20	8.8%	16	15.1%	7	7.1%	5	6.3%	4	5.1%
Manufacturing	58	25.4%	4	3.8%	0	0.0%	2	2.5%	7	8.9%
Wholesale trade	27	11.8%	1	0.9%	2	2.0%	0	0.0%	4	5.1%
Retail trade	6	2.6%	13	12.3%	21	21.2%	15	18.8%	5	6.3%
Transportation and warehousing, and utilities	6	2.6%	7	6.6%	5	5.1%	7	8.8%	2	2.5%
Information	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Finance, insurance, real estate, and rentals	12	5.3%	0	0.0%	0	0.0%	0	0.0%	3	3.8%
Professional, scientific, waste management	0	0.0%	21	19.8%	23	23.2%	16	20.0%	8	10.1%
Educational, health care, social services	49	21.5%	20	18.9%	27	27.3%	8	10.0%	22	27.8%
Arts, entertainment, recreation, food	3	1.3%	6	5.7%	0	0.0%	0	0.0%	7	8.9%
Public Administration	5	2.2%	8	7.5%	4	4.0%	20	25.0%	1	1.3%
Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7	8.9%
TOTAL CIVILIAN EMPLOYED POPULATION	228	-	106	-	99	-	80	-	79	-

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2000

BUSINESSES

As the site of the Northampton County Seat, the primary activity in Eastville is government, justice, and government services (*Town of Eastville Comprehensive Plan*, 2018). There has been a steady increase in business presence in the Town of Eastville since 2013, representing a wide variety of industries. The majority of these businesses are in Retail Trade and Professional services. The Town has seen growth in the Healthcare industry with the addition of the Eastern Shore Rural Health Eastville location and the Health Department (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

Table 3: Eastville Business Establishment Types

Industry Code Description	Total Establishments			
	2021	2013*	2011*	2009*
Agriculture, Forestry, Fishing, and Hunting	3	1	1	1
Construction	3	3	3	4
Manufacturing	1	1	1	1
Wholesale Trade	3	1	0	1
Retail Trade	8	7	9	8
Transportation and Warehousing	1	1	1	1
Information	3	1	1	1
Finance and Insurance	3	2	3	3
Real Estate and Rental and Leasing	4	3	1	1
Professional, Scientific, and Technical Services	9	9	9	7
Administrative and Support and Waste Management and Remediation Services	3	3	2	3
Health Care and Social Assistance	4	1	2	4
Accommodation and Food Services	4	2	3	3
Other Services (Except Public Admin)	6	6	6	6
Industries not classified	0	1	0	0
Total, All Establishments	55	43	42	44
Total Employees	-	117	176	224

Source: Personal Communications, Mayor Sturgis and Chief Eder, May 25, 2021, *Census Zip Code Business Patterns, 2009, 2011, 2013

BUILT INFRASTRUCTURE

Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate.

HOUSING UNITS

The housing stock in Eastville is primarily occupied. The drastic influx of housing units shown in Table 4 below is due to the boundary adjustment in 2017. Town officials state there are actually 372 total housing units in the Town and only 7 vacant structures, the majority of which are in good condition, despite many older residential areas (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). One dilapidated structure is scheduled to be demolished. Town officials noted that many young families are buying homes in Town, and due to the strong housing market in the area, there are very few homes left vacant or for sale. The median housing value in Eastville has likely doubled within recent years (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

Table 4: Eastville Housing

	2019*	2018*	2014**	2010***	2000****
Total Housing Units	363	108	104	79	75
Occupied	287	82	92	69	69
Vacant	76	26	12	10	6
Owner-Occupied	146	50	65	49	50
Renter-Occupied	141	32	27	20	19
Median Housing Value	-	$216,700	$267,900	NA	NA

Source: *ACS, 2014, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

U.S. Route 13 provides regional access and directs major traffic flow away from the Town, while Business Route 13 provides safe access into and out of the Town. Public transportation is provided by STAR Transit which provides daily bus service along Route 13, as well as a good connector route across the Chesapeake Bay Bridge Tunnel (CBBT). Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. Shore Ride also provides transportation services up and down the Eastern Shore. The streets and sidewalks are generally in good condition. The Town has hired a part-time employee to work with VDOT to push for repair on roads (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Town employees and contractors also assist with repairs and maintenance throughout Eastville. The Town has expressed interest in purchasing equipment to complete these repairs on their own (Personal communication, Mayor Sturgis and Chief Eder, May 25, 2021).

According to Table 5 below, there are no households without a vehicle, which indicates the capability for all residents to readily evacuate if needed. Town officials stated that the total number of vehicles registered in the Town could easily be triple the number displayed below (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Many residents in Eastville that commute across the CBBT for employment could face delays and closures during high-wind events and may be unable to cross. If damage were to occur to the bridge-tunnel as a result of a hazard or vehicular accident, residents in Eastville and other portions of Northampton County may be out of employment for some time, depending on the extent of damages. This is important to consider in regards to recovering from a hazard.

Table 5: Eastville Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	0	2	0	5
One	155	28	36	19
Two	105	52	26	28
Three or more	27	10	33	14

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2000

COMMUNITY SERVICES AND FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard.

COMMERCIAL AREAS

Commercial activity in the Town has been steadily increasing over the last few years. Commercial activity consists of a number of law offices, an insurance company, a Dollar General, and a thrift shop. Other commercial establishments within the Town include a bank and a convenience store located on Route 13, as well as a few restaurants (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

PUBLIC SAFETY

Police protection is provided by the Eastville Police Department, which was established in 2009. The Department consists of five full-time, two part-time, and one auxiliary officer, as well as six police vehicles, all of which are four-wheel drive and would allow officers to assist more frequently and effectively during hazards (Personal communications, Chief Eder, May 25, 2021). Fire protection for the Town is provided by the Eastville Volunteer Fire Department, consisting of 19 volunteer firefighters, two engines, two tankers, one brush truck, and one utility vehicle (Personal communications, Chief Eder, May 25, 2021). Ambulance service is provided by the Cape Charles Rescue Squad located in Bayview (*Town of Eastville Comprehensive Plan*, 2018).

Town officials stated that in the event of a hazard, the Eastville Fire Department has a generator and is a very safe, sturdy structure with the ability to house residents when needed. During the storms that produced a deadly tornado in the nearby Town of Cheriton in 2014, the Firehouse sheltered over 100 Eastville residents (Personal communications, Chief Eder, May 25, 2021).

WATER SUPPLY AND WASTEWATER

The Town of Eastville relies on two wells. The primary well is located at the intersection of Route 13 and Route 631, while the backup well is located just outside the Town's corporate limits, situated near the 75,000-gallon water tank located east of the northern section of Courthouse Road. The water supply is good in both quantity and quality. The Town has a generator to serve as a backup source for electricity for the water pump (Personal communications, Mayor Sturgis, May 25, 2021). Town officials also stated that there is another water tank that is not normally connected, but has the ability to shuttle water back and forth between the Town of Eastville and Northampton County. The Town supplies water to several County municipal buildings. Town officials estimate that approximately 60%-80% of Northampton County could not operate if there was no access to this water supply (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021); therefore, it is pertinent to protect this vital infrastructure as well as the back-up generators.

SOLID WASTE

The Town contracts for weekly residential solid waste removal. There is a Northampton County waste facility located in Town on Courthouse Road that contains recycling facilities and accepts waste oil and vehicle batteries. In addition, Northampton County partners with Special Olympics Virginia and offers clothing collection bins at the Eastville location as well as all other waste facility locations in the County (Northampton County Solid Waste, 2021).

PARKS AND RECREATION

Indiantown Park is a 52-acre, mixed-use County-owned park that contains a 36-hole disc golf course and is located in the Town of Eastville. Park facilities include parking, picnic areas, and restrooms (Virginia DWR, 2021).

SCHOOLS

The Town of Eastville is home to Northampton Middle and High School and is part of the Northampton County School District. The new Northampton Junior High will be located within Town with construction expected to begin this Fall (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

NATURAL ENVIRONMENT

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 (*Town of Eastville Comprehensive Plan*, 2018). Drainage ditches in the eastern half of Eastville drain towards Indiantown and Taylor Creeks, ultimately draining into the Atlantic Ocean. Drainage ditches on the western side of Town drain towards the Gulf leading to the Chesapeake Bay.

LAND USE LAND COVER

The Town of Eastville is comprised of 412 acres of land, most of which is developed (*Town of Eastville Comprehensive Plan*, 2018). The developed land is primarily residential with single-family housing situated on large lots; however, the Town contains several municipal and school buildings and is steadily increasing commercial business presence. There is a limited amount of undeveloped land that is used for agriculture purposes.

GROUND WATER

The Town of Eastville provides public water through a well that withdraws water from ground water aquifers. There are numerous wells in Town; however, only two of these wells are active (Personal communications, Mayor Sturgis, May 25, 2021). The Town's water supply is mostly withdrawn from the upper Yorktown aquifer. The majority of the Town lies within the Eastern Shore's spine recharge area. Limiting impervious surfaces in the spine recharge area will allow rainfall to recharge the aquifers. The Town's water supply is protected by public well lots surrounding the Town's well offering wellhead protection. State-mandated regulations are enforced in order to restrict potential sources of contamination within the well lots (*Town of Eastville Comprehensive Plan*, 2018).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3) §201.6(c)(3), §201.6(d)(3) Eastville has participated in the hazard mitigation planning process since 2011. During the 2006 Hazard Mitigation Plan, the Town defaulted to the County. Eastville's comprehensive plan was last updated in 2018. The Town's primary hazard relates to storm water flooding.

Table 6: Town of Eastville Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State	*	*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town does not participate in the NFIP. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

The Town has not participated in the HMGP.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Storm water flooding poses the greatest risk to the Town and has the most frequent impact.

PANDEMIC RESPONSE AND READINESS

Town officials stated that they have allocated a portion of CARES Act funding and other federal funding received to address any future, similar events such as the COVID-19 pandemic. The Town created programs to address safety issues for residents and Town employees and implemented several policies to ensure the safety of all. Public access to Town-owned buildings ceased temporarily, and masks, sanitizer, plexiglass, and thermal thermometers were purchased to assist in slowing the spread of the virus (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

The Eastern Shore Rural Health Eastville location (Eastville Community Health Center) has the ability to administer vaccinations as soon as they are made available in their parking lot or the Northampton High School parking lot, if needed. Eastern Shore Rural Health administered over 1,000 vaccinations in one day during the month of April. The Town has implemented policies in order to quickly revert back to the previous COVID-19 mandates and is fully prepared in the event of another similar hazard in the future (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

WIND

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, 2021).

The vast majority of homes were constructed prior to the 1970s and are now over 40 years old. Although the majority of the housing in Eastville is in good condition, Town officials state it has gotten worse since the turn of the century (Personal communications, Mayor Sturgis, May 25, 2021). The Town's aging building stock can be at greater risk to damage from high-wind events. Most of the residential areas are older and have mature trees around the homes, which is a primary concern for the Town. There are many Willow Oaks and Pecan trees around the Town that are more than 100-years old. Eastville is actually home to the largest Willow Oak in the nation; however, it has sustained some damage from high-wind events over the years (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). During these high-wind events, falling branches or trees may damage some properties and important infrastructure, such as power lines. The Town previously indicated that hurricane-force winds could be extremely damaging to trees, Town facilities, personal residences, and electrical poles and wires.

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 several 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 and Emergency Operations Center. In August of 2011, a power outage during Hurricane Irene lasted for nearly 24 hours, impacting the Town of Eastville as well as several County facilities. A&N Electric (ANEC) has had a significant number of issues with the power grid, which is likely due to the aging infrastructure (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

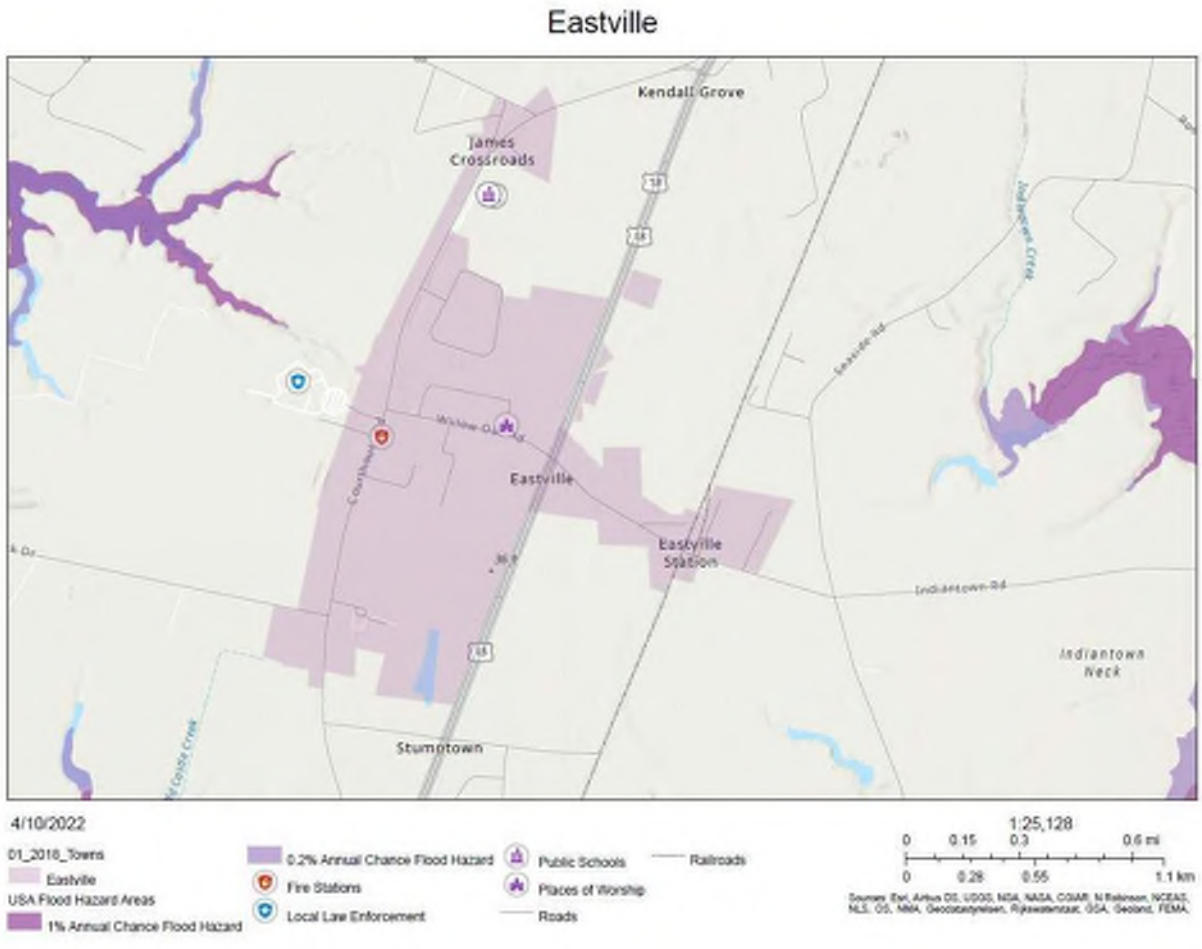
COASTAL EROSION

No structures in the Town are at an immediate risk for coastal erosion.

COASTAL FLOODING

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.

Figure 2: Eastville Flood Hazards to Infrastructure



STORM WATER FLOODING

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 Courthouse Road, Willow Oak Road east of Route 13, at the northwestern side of the intersection on Route 13, and Willow Oak Road where the ditches aren't 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. After the boundary adjustment in 2017, the Town began to experience storm water flooding on Indiantown Road and Station Lane. The Town is beginning to address ditch maintenance issues through VDOT and Northampton County; however, the Town of Eastville will likely end up maintaining drainage ditches themselves (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021).

HAZARDS OF LOCAL SIGNIFICANCE

GROUND WATER CONTAMINATION

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 271 hook-ups, with only 1 outside Town limits (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). The Town has generators for both active wells to serve as a backup power supply for the water pump serving the public water supply wells. No ground water problems currently exist in the vicinity of the Town, as the shallowest well is 155 feet down and the rest are at 165 feet (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Eastville has not had any drawdown issues or inadequate flows; however, increased water supply demand within the Region could pose a future threat to the ground water supply quantity and quality.

SNOW AND ICE

Winter snow and ice storms impacted the Town in the late 1990s and again in 2010. These winter storms downed tree limbs and power lines, resulting in extended power outages for residents as well as multiple businesses, which were ultimately forced to close for several days. Emergency generators filled the needs for drinking water during the time of the outages. Sudden and severe changes in weather and sudden temperature drops have historically caused damages to the Town's water distribution system (Personal communications, Mayor Sturgis and Chief Eder, May 25, 2021). Town officials stated they had five major breaks at one time to the water distribution system. During these events, pipes froze and burst, leaving the Town's water supply at risk of contamination. In 2016, 16-17 inches of snow fell over the Town in a span of 5-6 days, creating several transportation issues. The Eastville Police Department utilized their 4-wheel drive vehicles to assist the County and to provide medications and other necessities to functional and access-based needs residents in the area (Personal communications, Chief Eder, May 25, 2021).

DROUGHT

Although the Town now has less agricultural lands due to development, the remaining lands are still impacted during droughts.

TORNADOES

Tornadoes have not historically hit within Town limits, but they have occurred on the outskirts of Town. There have been at least three down-wind spouts in recent years that did not quite form (Personal communications, Mayor Sturgis, May 25, 2021). In 2014, the nearby Town of Cheriton experienced a deadly tornado that formed as a result of severe thunderstorms affecting lower Northampton County. Over 100 Eastville residents took shelter at the Eastville Fire Department until the threat diminished.

CRITICAL FACILITIES

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

Table 7: Town of Eastville Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Eastville Town Office/Police Department	-	X	X	X	Wind	13,000+	Major Disruption	No	Yes
Eastville Water Tower	-	X	X	X	Wind, Ice	1,500	Devastating	No	Yes
Eastville Water Distribution System	-	X	X	X	Wind, Ice	1,500	Devastating	Yes	Yes
Eastville Municipal Wells	-	X	X	X	Stormwater flooding, Groundwater contamination	1,500	Major Disruption	Yes	No
Other Facilities (not Town-owned)									
Eastville Volunteer Fire Department	-	X	X	X	Wind, Stormwater flooding	13,000+	Devastating	No	Yes
Eastville Community Health Center	-	-	-	X	Wind, Stormwater flooding	1,500	Major Disruption	No	Yes
Eastern Shore Regional Jail	-	-	-	X	Wind, Storm water flooding	300+	Major Disruption	No	Yes

FINDINGS

1. The hazards expected to have the greatest impact on the Town are stormwater flooding and high-wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are groundwater contamination, snow and ice storms, tornadoes, and droughts.

2. Residential areas contain older construction and many mature trees. During a high-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 it does experience significant stormwater flooding. The Town has not joined the National Flood Insurance Program and has not participated in the Hazard Mitigation Grant Program.

4. The Town is interested in purchasing their own equipment and hiring employees to maintain drainage ditches in and around the Town rather than relying on VDOT. In the past, the Town has been forced to provide the funding and perform maintenance of State ditches on their own. Town officials state this is still currently an issue.

5. The Town's water distribution system is becoming increasingly fragile and vulnerable to sudden and extreme cold weather events.

CHAPTER 28: TOWN OF EXMORE

TOWN PROFILE

Exmore resides in Northampton County near the border of Accomack County. It is located on the central spine of the Eastern Shore and encompasses approximately 590 acres. The Town of Exmore was established in 1884 with the designation of the first stop in Northampton County for the New York-Pennsylvania-Norfolk Railroad. The railroad brought with it commerce due to the Eastern Shore's produce, and its growing tourist market to the barrier islands. The Town was incorporated in 1950 due to a second wave of population growth. Exmore became the transportation nexus for the Eastern Shore, and to this day, the Town has one of the largest concentrations of commercial activity in Northampton County. Route 13 allows Exmore to remain an important commercial hub for the Eastern Shore (*Town of Exmore Comprehensive Plan*, 2015).

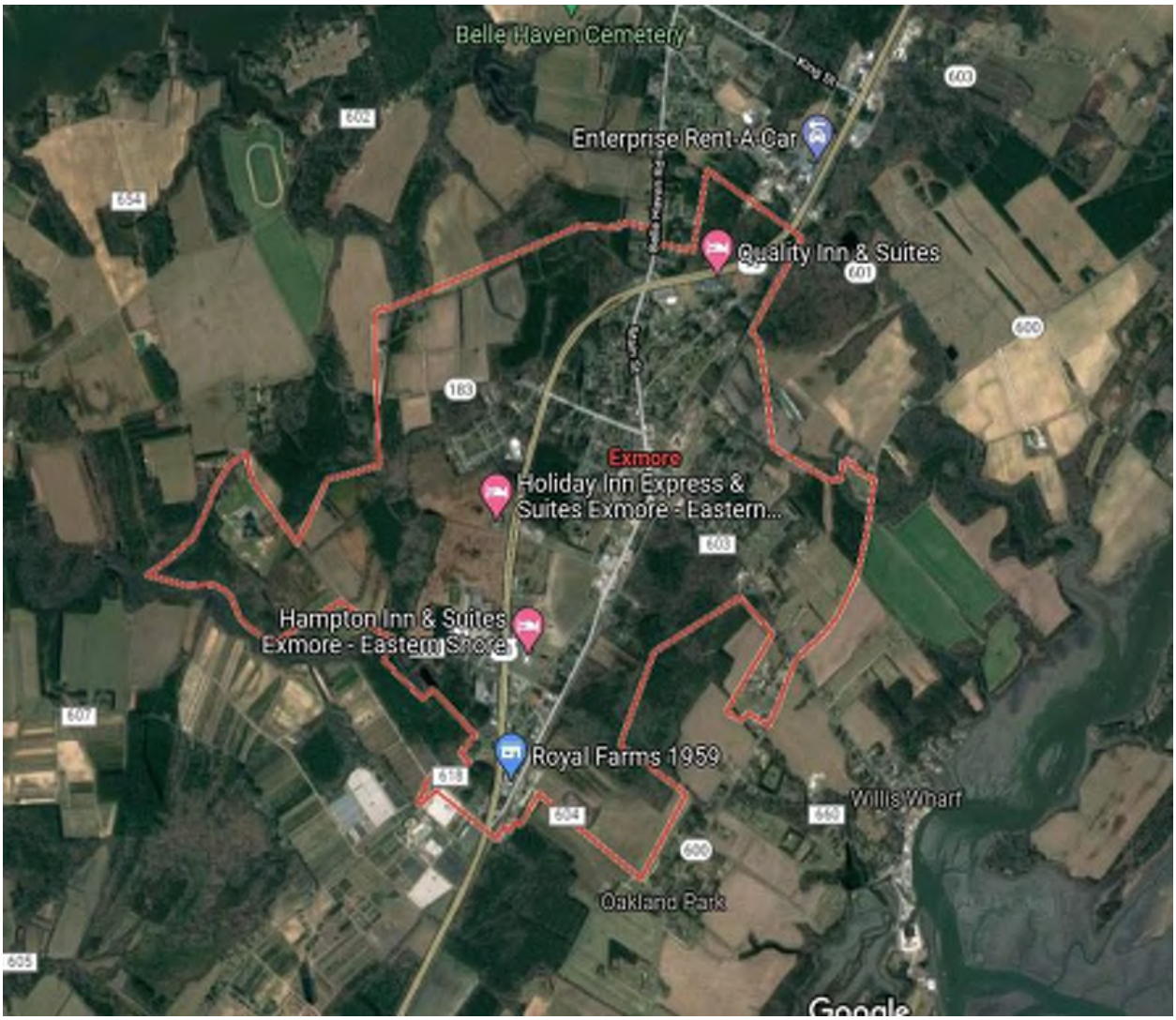


Figure 1: Exmore Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors that relate to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

According to the American Community Survey five-year estimates, the Town of Exmore had a population of approximately 1,501 in 2019. The population has remained fairly stable, with an influx in 2010 due to the annexation that occurred (U.S. Census 2010). The transient population in the Town is thought to be substantial (*Town of Exmore Comprehensive Plan,* 2015).

Exmore has concentrations of senior and functional and access-based needs residents in its Peter Cartwright Apartments and Exmore Village I and II Apartment Villages. The poverty level (33.6%), percentage of the population with functional and access-based needs (20.6%), and the percentage of the population that is over the age of 62 (27%) all show levels much higher than that of the rest of the nation (ACS 2019). This is important to consider, as these populations would likely require additional assistance in the event of a hazard.

Table 1: Exmore Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	1,501	1,445	1,460	1,460	1,136
Median Age	41.8	NA	37.7	44.4	38.6
Disability	309	NA	80	NA	NA
Income					
Median Household Income	$27,679	NA	23,958$	NA	31,143$
Poverty Level	33.6%	NA	30.4%	NA	NA
Language					
Only English	96.9%	97.3%	NA	NA	97.1%
Other	3.1%	2.7%	NA	NA	3.9%
Spanish	3.1%	1.8%	NA	NA	2.0%
Ind-Euro	0.0%	0.2%	NA	NA	0.8%
Asian	0.0%	0.7%	NA	NA	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS, 2014-2019, **Annual Estimates of the Residential Population: 2010-2014, ***ACS, 2010-2014, ****U.S. Census 2010, *****U.S. Census 2000

WORK FORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

According to Table 2, the Exmore workforce is largely employed in the retail trade, educational and health services, and accommodation and food services industries; however, according to the U.S. Census Bureau, most of Exmore's work force is employed elsewhere. The 2019 American Community Survey five-year estimates indicate that 56.4% of the workforce in Exmore commutes outside of the Town to their place of employment.

Table 2: Exmore Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	0	0.0%	20	4.1%	39	5.5%	35	5.7%	14	2.7%
Construction	27	5.7%	50	10.4%	46	6.5%	24	3.9%	50	9.8%
Manufacturing	34	7.2%	38	7.9%	68	9.6%	64	10.3%	73	14.3%
Wholesale trade	51	10.8%	27	5.6%	6	0.8%	17	2.7%	25	4.9%
Retail trade	82	17.4%	91	18.9%	129	18.3%	86	13.9%	71	13.9%
Transportation and warehousing, and utilities	20	4.2%	8	1.7%	15	2.1%	39	6.3%	20	3.9%
Information	0	0.0%	0	0.0%	15	2.1%	19	3.1%	8	1.6%
Finance, insurance, real estate, and rentals	3	0.6%	8	1.7%	26	3.7%	27	4.4%	10	2.0%
Professional, scientific, waste management	18	3.8%	40	8.3%	44	6.2%	17	2.7%	21	4.1%
Educational, health care, social services	128	27.1%	139	28.8%	207	29.3%	173	27.9%	130	25.4%
Arts, entertainment, recreation, food	59	12.5%	38	7.9%	64	9.1%	65	10.5%	44	8.6%
Public Administration	16	3.4%	9	1.9%	14	2.0%	9	1.5%	20	3.9%
Other	34	7.2%	14	2.9%	33	4.7%	47	7.6%	26	5.1%
TOTAL CIVILIAN EMPLOYED POPULATION	472	-	482	-	706	-	619	-	512	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

The retail industry makes up the majority of business types in the Town of Exmore (Table 3). Exmore has three hotels in the Town that support a substantial transient population of travelers and tourists, which is much greater during the summer season (*ESVA Hazard Mitigation Plan,* 2016). The Town also features several locally-owned shops, such as consignment and antique shops, and the popular Exmore Diner. Exmore hosts the 7th largest employer in the County, New Ravenna, with over 100 employees (Exmore - Northampton County). This reflects the high percentage of the total civilian employed population in the retail industry shown in Table 2. A Dollar Tree and a Dollar General have also been built in the Town over the last few years.

The Town of Exmore hosts five aquaculture businesses at Willis Wharf, as well as the three largest clam culture businesses on the East Coast. The seed stock is necessary to support 100% of clam and aquaculture businesses in the Region. This industry staffs over 100 employees and 50 subcontractors and accumulates approximately $30 million in gross sales. The clam industry alone has a $40 million farm gate value of mature shellfish annually. Water quality in the Region is vital to the security of ongoing economic prosperity of the businesses located in Exmore, as well as the Region as a whole (Personal communications, Robert Duer, Town Manager and Taylor Dukes, Zoning and Utilities Official, March 23, 2021).

The number of businesses in the Exmore zip code (not all are with the Town limits) has remained relatively stable, but with shifts among types of businesses. The combined estimated annual payroll of all businesses in 2013 was around $20 million (Census Zip Code Business Patterns, 2013). There are currently 131 active business licenses in the Town of Exmore (Personal communication, Robert Duer, Town Manager, March 23, 2021).

As of current, the wastewater collection system in Exmore is unable to serve the demands of businesses downtown and along Route 13 (Personal communications, Robert Duer, Town Manager, March 23, 2021). The anticipated new sewer lines (see Water Supply and Wastewater Section) would allow for new businesses to open and for the Town to continue to grow economically.

Table 3: Exmore Business Establishment Types

Industry Code Description	**Total Establishments**			
	2021*	**2013**	**2011**	**2009**
Utilities	-	0	1	1
Construction	-	6	5	5
Manufacturing	-	3	3	3
Wholesale Trade	-	2	2	2
Retail Trade	-	27	30	31
Transportation and Warehousing	-	0	1	1
Finance and Leisure	-	8	6	6
Real Estate and Rental Leasing	-	4	2	3
Professional, Scientific, and Technical Services	-	1	2	2
Educational Services	-	2	2	2
Health Care and Social Assistance	-	13	8	9
Arts, Entertainment, and Recreation	-	2	1	1
Accommodation and Food Services	-	8	10	11
Other Services (Except Public Admin)	-	10	12	13
Total, All Establishments	131 (Business Licenses)	86	85	90
Total Employees	-	913	NA	NA

Source: *Personal Communications, Robert Duer, Town Manager, March 23, 2021; Census Zip Code Business Patterns, 2013, 2011, and 2009

BUILT INFRASTRUCTURE

Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Table 4 shows an increase of 73 new housing units and 100 new unoccupied units since 2010. Town officials believe this to be inaccurate and estimate that there have only been five new housing units since 2010. Due to septic system limitations, new development is currently extremely limited (Personal communications, Robert Duer, Town Manager, March 23, 2021).

Table 4: Exmore Housing

	2019*	2013**	2010***	2000****
Total Housing Units	842	815	769	524
Occupied	655	751	682	475
Vacant	187	64	87	49
Owner-Occupied	255	337	341	302
Renter-Occupied	400	414	341	173
Median Housing Value	$116,000	$120,900	NA	NA

Source: *ACS, 2014-2019, **ACS, 2009-2013, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

The number of vehicles available to households is one indicator of a household's ability to evacuate when necessary. Out of the 655 occupied housing units in Exmore, nearly 30% are without access to a vehicle (ACS 2014-2019). This could be extremely problematic if evacuation is necessary in the event of a hazard. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. Shore Ride also offers transportation services on the Eastern Shore. Town officials believe the high number of those without a vehicle is likely due to a high number of senior and functional and access-based residents in its Peter Cartwright Apartments and Exmore Village I and II Apartment Villages. These populations will need additional assistance in the event an evacuation is necessary.

Table 5: Exmore Vehicles Available per Household

Vehicles Available	2019*	2014**	2010***	2000****
None	191	190	122	42
One	184	291	260	196
Two	209	200	170	174
Three or more	71	70	63	29

Source: *ACS, 2014-2019, **ACS, 2009-2014, ***U.S. Census 2010, ****U.S. Census 2000

COMMUNITY SERVICES AND FACILITIES

Community facilities are facilities required to support the services and functions provided by the Town government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It is important to note what facilities are available in case of a hazard, and it is important to make an inventory of facilities that could be impacted by a hazard.

PUBLIC SAFETY

Fire protection for the Town is provided by the Exmore Volunteer Fire Department, for which there are 18-20 volunteer firefighters, two ambulances, one engine, one tanker, one brush truck, and one support vehicle (Personal communications, Chief Greg DeYoung, March 23, 2021). Ambulance service is provided by Northampton County. The Town of Exmore has their own police department which includes seven full-time officers serving approximately 1,500 residents. Northampton County Sheriff's Office and Virginia State Police also provide additional police assistance when needed.

PARKS AND RECREATION

The Exmore Town Park has recently been renovated with the addition of new restrooms. The parking area has been enhanced and the Town is beginning to use the Park for activities and events beyond just the playground.

CULTURAL RESOURCES

The closest public library is in Nassawadox and is part of the Eastern Shore Public Library system. Exmore developed as a result of the completed railroad in 1884. There are historic buildings that go back to this age, such as the Exmore Historic Train Station pictured in Figure 2 below.

Figure 2: Exmore Historic Train Station. Photo by A-NPDC Staff



WATER SUPPLY AND WASTEWATER

The Town of Exmore had one new well installed approximately 24-36 months ago and another that is in process of being replaced (Personal communications, Robert Duer, Town Manager, March 23, 2021). Both wells pump to a chlorination facility and to a water tower with a single-day storage capacity.

Failing septic systems in the late 1990s led to the construction of two sewage systems. The one on the north end of Town was constructed in 1999 and collects sewage from individual septic tanks to a mass drain field. The 2005 septic tank effluent pump modified individual septic tanks in the downtown area and diverts the settled effluent to a waste water treatment plant on the east side of Town. The newer system suffered from malfunctions and the USDA granted Exmore $30,000 in planning funds to study sewer collection and treatment (*Town of Exmore Comprehensive Plan*, 2015). The Town plans to connect to Hampton Roads Sanitation District (HRSD) sewer lines in the near future, which will allow for new residential and commercial developments. Installation of the collection system and treatment facility will increase the Town's ability to get back to business following stormwater and flooding events and will protect businesses both within and near the Town and Region.

SOLID WASTE

The Town provides solid waste removal services within Town limits to approximately 540 households and 75 businesses (Solid Waste - Northampton County). There is an Accomack County Convenience Center about four miles north of the Town on Route 13 in Painter.

POWER AND COMMUNICATIONS INFRASTRUCTURE

Electricity is provided by A&N Electric Cooperative (ANEC), and all lines are less than 100 kilovolts. The Town does not typically experience long-term or widespread outages. Broadband service runs along Route 13, thus through the Town of Exmore.

SCHOOLS

Three schools are located within the boundaries of the Town, including one public school, Occohannock Elementary School, and two private schools, Broadwater Academy (PreK-12) and Shore Christian Academy (*Town of Exmore Comprehensive Plan*, 2015).

NATURAL ENVIRONMENT

Exmore ranges in elevation from 27 to 43 feet above the mean sea level. There are no perennially flowing surface water bodies in the Town. Drainage ditches on the eastern half of the Town drain towards Parting Creek and the Atlantic Ocean. Drainage ditches on the western side of Town drain towards Occohannock or Nassawadox Creeks and to the Chesapeake Bay. Hydric soils are the most prevalent soil type in the Town, located on the eastern, southern, and western sides of the Town. There are some highly permeable soils located in the northern and central areas of Town (*ESVA Hazard Mitigation Plan*, 2016). Hydric soils are currently a major limiting factor in Exmore due to their severe limitations in respect to constructing on-site septic systems. A majority of residents in Exmore utilize on-site septic systems for residential and commercial waste disposal.

LAND USE LAND COVER

Prior to the annexation in 2000, residential development constituted the majority of the Town's development. Since 2000; however, in addition to several more residential areas, many farmlands and forested lands are now within the Town's boundaries (*Town of Exmore Comprehensive Plan*, 2015).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Exmore did not participate in the 2006 Hazard Mitigation Plan (HMP), but did become actively involved for the 2011 update. The following table contains authorities, policies, programs and resources, and intentions or ability to expand to address reduce vulnerability to hazards. Exmore updated its Comprehensive Plan in 2015 and is currently undergoing another minor update (Personal communications, Robert Duer, Town Manager, March 23, 2021).

Table 6: Town of Exmore Hazard Mitigation Resources

	Ordinances, Plans, & Publications															Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help	Viginia Hurricane Evacuation	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local	*				*	*													
County			*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

Stormwater flooding was identified as the Town's primary risk in 2011, 2016, and 2021.

Stormwater flooding rose to the top of issues identified by Town residents as ones they wanted Town leadership to address, along with high-winds and threats of groundwater contamination. The comprehensive plan included action steps to protect citizens from hazards by:

- Informing citizens of risks from stormwater flooding and wind hazards and how to protect themselves and property;
- Participating in the Hazard Mitigation Planning Team, the Disaster Preparedness Coalition, and other activities that help to coordinate resources; and
- Seeking hazard mitigation funds to alleviate effects of repeated stormwater flooding.

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) Exmore joined the National Flood Insurance Program on February 8, 2001 as a No Special Flood Hazard Area Participating Community due to the town having no identified Special Flood Hazard Areas. Claims in Exmore are most likely the result of stormwater floodings. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

Exmore has not participated in the Hazard Mitigation Grant Program.

HAZARDS AND RISK ASSESSMENT

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding and wind have the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Exmore used CARES Act funding and other federal funds to purchase plexiglass, masks, sanitizer, and sanitation stations. Town officials stated no funds were used for themselves and all were allocated to residents of Exmore (Personal communications, Robert Duer, Town Manager, and Taylor Dukes, Zoning and Utilities Official, March 23, 2021). Officials state that the Town is better prepared for the possibility of another similar event in the future.

WIND

No parts of the 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 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 power lines. Hurricane-force winds would be extremely damaging to residences, Town facilities, trees, and electrical infrastructure. Although there have been no documented accounts of tornadoes within Town limits, this is a hazard for which all localities on the Eastern Shore should be as prepared as possible. Two high-wind events were recorded by the NWS in 2006 (50-mph), a derecho in 2012 (50-mph), and 11 more between 1984 and 2012. Total recorded damage from all events was approximately $115,000 in 2015 dollars (Personal communications, Town Officials, December 7, 2015).

The Hazus® hurricane wind model indicates that there would be wind damages from a storm with a return period of 100 years. Such a storm could be expected to generate three-second gusts of between 90 and 93 mph in the vicinity of Exmore. Figure 4 reveals that the highest monetary damages are anticipated to be in the areas between Willis Wharf Road and Virginia Avenue on the east side of the railroad. Those census blocks include primarily residential structures, including some apartments.

STORMWATER FLOODING

Stormwater flooding poses the greatest risk to the Town of Exmore and occurs with the most frequency. The public noted difficulties with stormwater flooding and it was also named the top concern for commercial businesses located in Exmore (*Town of Exmore Comprehensive Plan*, 2015). The majority of the Town contains hydric soils that are unsuitable for drainage and readily retain rainwater. These hydric soils are located within the eastern, southern, and western areas of the Town. A small area of highly permeable soils is located in the northern and central areas of Town. The depth to groundwater for hydric soils is typically shallower than three feet below ground surface, resulting in relatively less accommodation capacity than coarser-grained soils.

In 2019, 18-inches of rain fell over the Town. Just days before a tropical system hit the region, a storm cell sat over the Towns of Exmore and nearby Nassawadox for nearly 12 hours, leaving two feet of rain water. Main Street, as well as nearly all other roads in Town, were inundated (Personal communications, Robert Duer, Town Manager, and Taylor Dukes, Zoning and Utilities Official, March 23, 2021).

Table 7: Exmore Stormwater Flooding Areas

	HMP 2006	HMP 2011	HMP 2016	HMP 2021
Stormwater Flooding Area	Main St. between Route 13 and Business Route 13 -Driveways -Septic systems -Crawlspaces	Monroe Ave. between Madison Ave. and Jefferson St.; Westfield Ave.; Virginia St.; Main St. between Hadlock Rd. and Bright St.; Poplar Ave.; Broad St. in vicinity of grading shed; Bright Ave. between Broad St. and Main St.; Main St. between Commercial St. and Bright Ave.	Town-wide except along railroad tracks and New Roads housing area (west of US Route 13, and south of Occohannock Neck Rd).	Unchanged
Source of Hazard	None listed	-Hydric soils -Depth to ground water is less than three feet -Inadequately maintained drainage infrastructure	-Hydric soils -Depth to ground water is less than three feet -Inadequately maintained drainage infrastructure -Frequency of high-volume rainstorms.	-Hydric soils -Depth to ground water -Inadequately maintained drainage infrastructure
Effects	None listed	None listed	Damage to buildings and personal property; Standing water public health hazard for mosquito-borne illnesses; Water deep enough to affect mobility of non-automobile travelers; Erosion cutting away parking lots	Unchanged

Source: Eastern Shore of Virginia Hazard Mitigation Plan, 2016, 2011, 2006

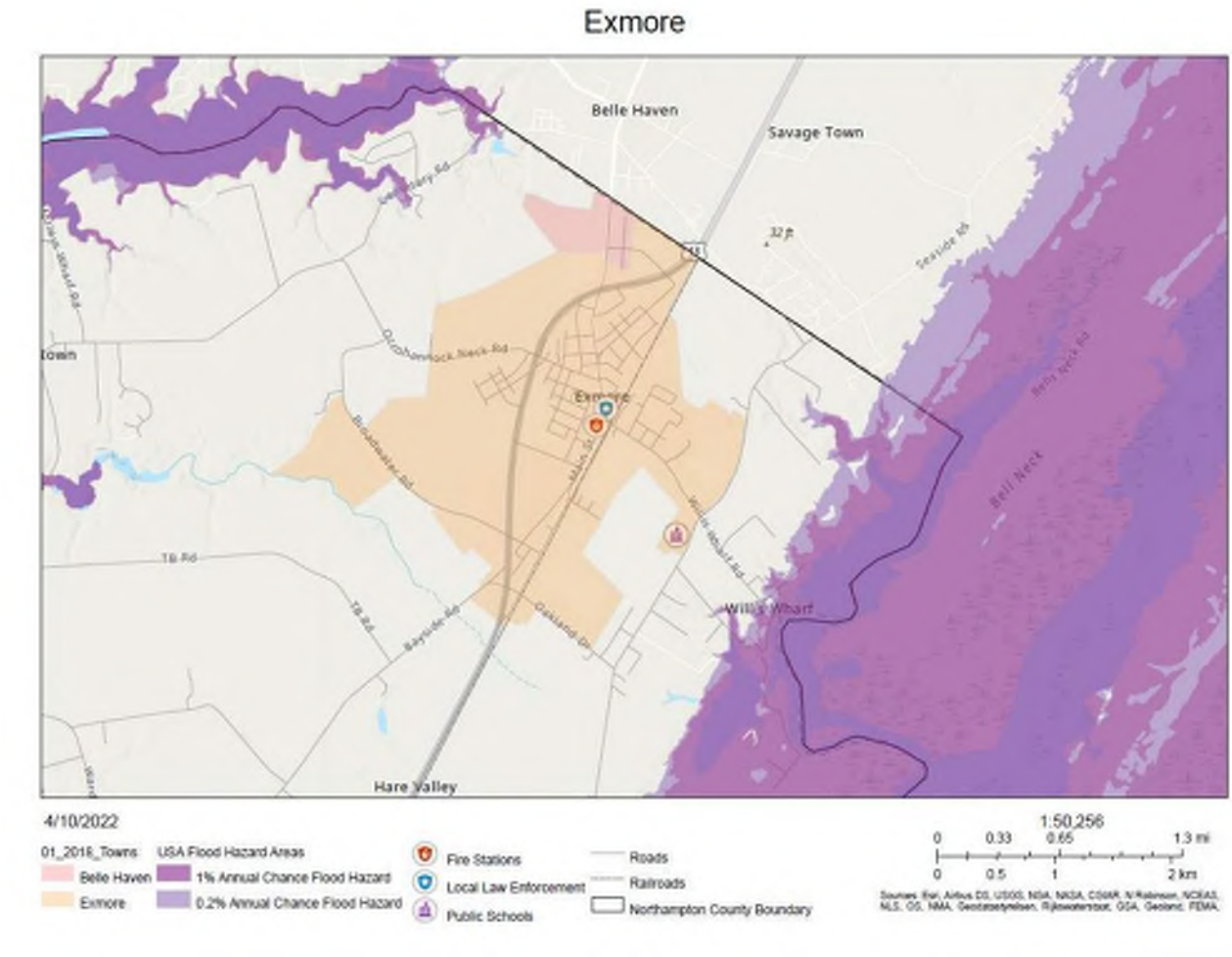
COASTAL EROSION

No structures are at immediate risk from coastal erosion.

COASTAL FLOODING

No portions of the Town lie within a Special Flood Hazard Area. The entire Town is located within the X zone, which means that it is not in the floodplain and there is thought to be no threat of coastal flooding.

Figure 3: Exmore Flood Hazards to Infrastructure



HAZARDS OF LOCAL SIGNIFICANCE

SNOW AND ICE

A large ice storm impacted the Town in the late 1990s. The ice storm downed tree limbs and power lines, leaving residents without electricity and forcing local businesses to close for several days. Emergency energy generators filled the needs for drinking water during the time of the outage. Extreme cold weather events have historically caused damages to the Town's water distribution systems. During these events, pipes froze and burst, leaving the Town's water supply at risk of contamination (Personal communications, Robert Duer, Town Manager and Taylor Dukes, Zoning and Utilities Official, March 23, 2021).

In 2016, the NOAA National Climatic Data Center, now the National Center for Environmental Information, recorded 37 instances of winter weather in Northampton County between 1996 and 2005. Exmore has a long stretch of U.S. Route 13 within its Town limits, and winter weather poses an accident risk for residents and through-travelers, stretching its emergency response resources. Ice and snow also pose a slip and fall risk to portion of the population traveling by foot, wheelchair/scooter, or bicycle (almost 30% of households have no vehicle access), and the concentrations of seniors and functional and access-based needs residents. The services of Star Transit, which provides transportation services up and down the Eastern Shore primarily to seniors, low-income populations, and individuals with disabilities, are also affected by ice, snow, and flooding.

FIRE AND SMOKE

Officials noted the amount of vegetation cover that surrounds Exmore, the history of large fires in Town, and the strain that fighting large fires places on its water system. For example, during a local restaurant fire, water system pressure dropped from 60 lbs. to 36 lbs., and public works employees were roused during the night to kick on another pump to keep water supplied. A downtown fire in the 1980s required a foam truck from Wallops Flight Facility (the only fire company with fire suppression chemicals) to finally put out the fire. By the time it was extinguished, officials report it had burned from the downtown area almost to Countyline Road, a distance of about one mile (Personal communications, Town Officials, December 7, 2015; verified March 23, 2021).

GROUNDWATER CONTAMINATION

The Town faces a threat of ground water contamination from several sources including failed septic systems within the 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 (*Town of Exmore Comprehensive Plan*, 2015).

The Town has a public water supply that is protected according to state-mandated wellhead protection regulations. Town officials indicated that there are approximately 20 individual residential wells in Town that could potentially be impacted. According to the *Eastern Shore of Virginia Groundwater Resource Protection and Preservation Plan* (2013; verified March 23, 2021), no ground water problems currently exist within 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 adopted a Water Conservation Ordinance in May of 2011.

Exmore recently drilled two new wells, thought to be located in the paleo channels (Personal communications, Robert Duer, Town Manager and Taylor Dukes, Zoning and Utilities Official, March 23, 2021).

CRITICAL FACILITIES

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

Table 8: Town of Exmore Critical Facilities

Facility	2006 Plan	2011 Plan	2016 Plan	2021 Plan	Hazards	No. of People Affected	Loss Potential	Relocation Potential	Retrofit Potential
Town-owned Facilities									
Exmore Town Office/Police Department Building	-	X	X	X	Stormwater flooding, Wind	1,501+	Major disruption	Yes	Yes
Exmore Water Tower (located inside corporate village limits of Belle Haven) and Filtration Building	-	X	X	X	Wind	1,501+	Devastating	Yes	No
Exmore Municipal Wells	-	X	X	X	Stormwater flooding, Groundwater contamination	1,501+	Devastating	Yes	No
Exmore Water Distribution System	-	X	X	X	Stormwater flooding, Snow and ice	1,501+	Major disruption	No	Yes
Exmore Public Sewer Systems(2)	-	X	X	X	Stormwater flooding	1,501+	Major disruption	No	Yes
Exmore Town Park	-	X	X	X	Stormwater flooding, Wind	1,501+	Inconvenience	No	Yes
Exmore Public Works	-	-	X	X	Stormwater flooding, Wind	1,501+	Major disruption	Yes	Yes
Facilities not Town-owned									
Post Office	-	-	X	X	Stormwater flooding	1,501+	Major Disruption	Yes	Yes
Exmore Village/AP Apartments/	-	-	X	X	Wind, Fire	400+	Devastating	No	Yes
Power Sub-Station	-	-	X	X	Wind, Fire	1,501+	Devastating	No	Yes
CSB	-	-	X	X	Wind	500+	Major disruption	Yes	Yes
Communication Tower (behind old A&N building)	-	-	X	X	Wind	1,501+	Major Distruption	Yes	Yes
Associated Grain Bins	-	-	X	X	Wind	100+	Inconvenience	Yes	Yes
Exmore Volunteer Fire and Rescue Department	-	X	X	X	Stormwater flooding, Wind	11, 885+	Devastating	No	Yes
Exmore Schools	-	X	X	X	Stormwater flooding, Wind	1,501+	Major disruption	No	Yes

FINDINGS

1. The hazards expected to have the greatest impact on the Town are stormwater flooding and high-wind events, which have been experienced throughout the Town's history. Other hazards facing the Town are snow and ice, fire and smoke, and groundwater contamination. Like other areas on the Eastern Shore, Exmore is also susceptible to tornadoes, drought, and mosquito-borne illnesses.

2. Most of the Town's residential areas have older construction and many mature trees around homes and churches. During a high-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 stormwater flooding damages.

4. The Town has identified undersized drainage pipes in the downtown business district that cannot handle large amounts of rain water, causing flooding in the area.

5. The Town's water distribution system is aging and becoming increasingly fragile and vulnerable to winter weather as well as stormwater flooding events.

6. The Town's system for managing wastewater has ongoing incidences of failure and is need of redesign and maintenance/repairs.

7. New development is currently limited in the Town due to soils not suitable for individual septic tanks and malfunctions to the Town's two septic systems. Hampton Roads Sanitation District (HRSD) will begin serving some areas of the Eastern Shore, including the Town of Exmore. Connecting to HRSD sewer lines will allow for new development in the Town.

CHAPTER 29: TOWN OF NASSAWADOX

TOWN PROFILE

Nassawadox is located in Northampton County along the central spine of the Eastern Shore. The Town is just 5 miles south of Exmore and 25 miles north of the Chesapeake Bay Bridge Tunnel. The name "Nassawadox" derives from a Native American word meaning "land between two waters". The Town is made up of an area of approximately 0.4 square miles and is located on US Route 13. In the late 1800s, there was little evidence of a community where Nassawadox now exists. A mail route and post office were influential on the development of the Town, and when the Pennsylvania Railroad was established in 1884, it allowed the Town to further expand (*Town of Nassawadox Comprehensive Plan*, 2000).

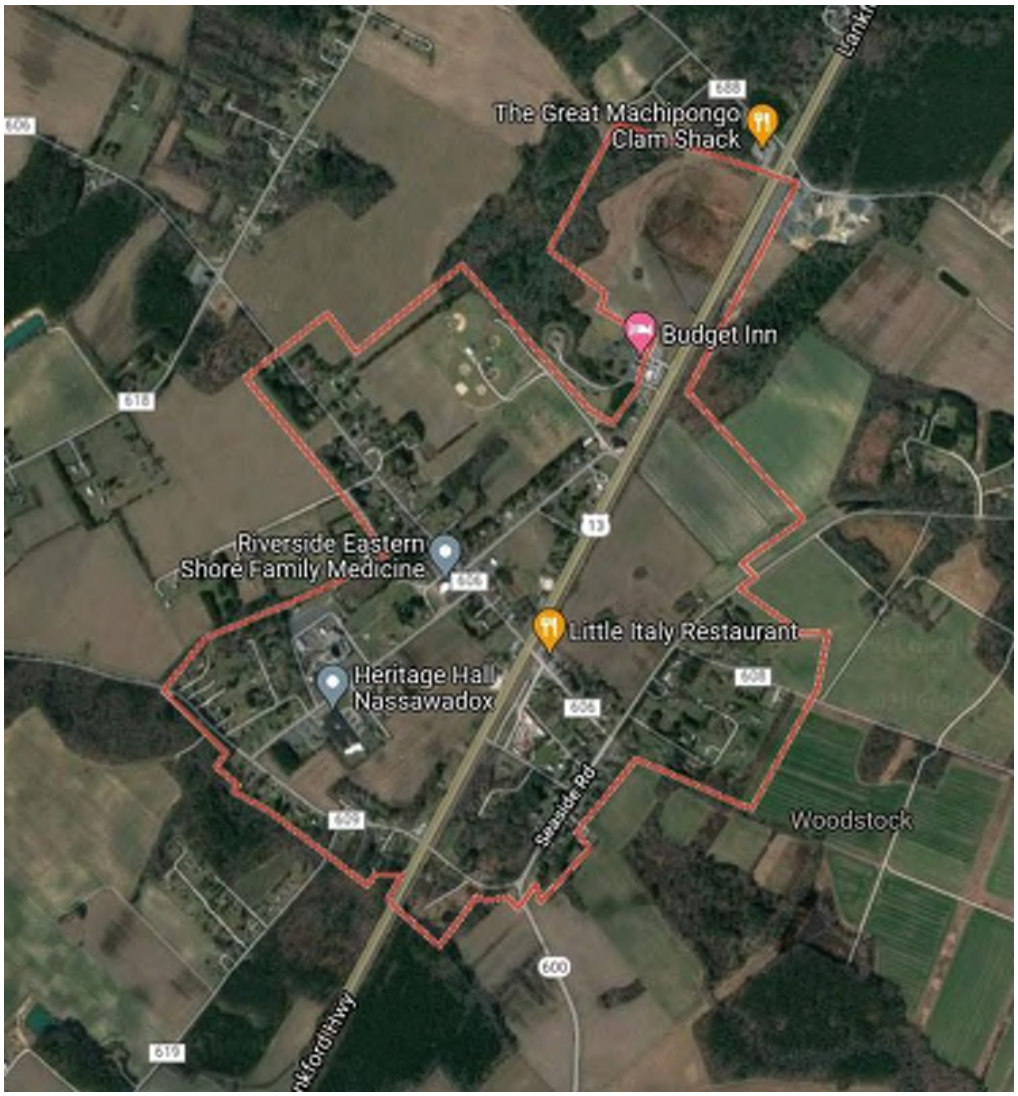


Figure 1: Nassawadox Context and Google Map

SOCIO-ECONOMIC

Part of assessing hazards in relation to their risk is understanding the people affected. Not all people are affected equally. Some are affected by the factors relating to their ability to understand risks posed by hazards, and some by their ability to remove themselves from harm's way. Those factors include age, mobility, income and the languages individuals speak and the languages in which individuals are able to access information.

DEMOGRAPHICS

The Town of Nassawadox had a population of 486 in 2019 according to the American Community Survey five-year estimates. The Town has seen a steady population decrease since the 2000 US Census, as Town representatives have discredited the results from the 2013 and 2014 American Community Survey shown in Table 1 (Personal communications, Town Council, January 27, 2016). The median age in 2019 was 58.1, revealing a population significantly older than the state or nation, whereas 41.8% of the population is over the age of 65 (ACS 2014-2019). This is likely due to The Citadel nursing home/rehabilitation center that is located in Nassawadox. This is extremely important to consider when planning for a hazard, as this population could be considered high risk and would likely require additional support. The majority of residents speak English and would be able to access pertinent emergency information in the event of a hazard.

Table 1: Nassawadox Demographic Information

	2019*	2014**	2013***	2010****	2000*****
Population	486	771	698	499	572
Median Age	58.1	50.1	46.6	61.8	53.5
Disability	69	31	23	NA	NA
Income					
Median Household Income	$41,250	$45,000	$45,769	$35,893	$21,250
Poverty Level	10.9%	14.3%	NA	NA	NA
Language					
Only English	97.5%	99.9%	100.0%	96.7%	97.1%
Other	2.5%	0.1%	0.0%	3.3%	2.9%
Spanish	1.9%	0.1%	0.0%	0.0%	2.9%
Ind-Euro	0.0%	0.0%	0.0%	0.0%	0.0%
Asian	0.6%	0.0%	0.0%	3.3%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%

Source: *ACS 2014-2019, **Annual Estimates of the Residential Population, 2010-2014, ***ACS, 2009-2013, ****U.S. Census 2010, *****U.S. Census 2000

WORKFORCE

Employment patterns are important to examine for two reasons. It can help to identify concentrations of people for hazard information dissemination or hazard rescue and evacuation. It can also identify where disruptions in employment and income might occur in the aftermath of a disaster.

Even after a decrease of approximately 16%, Nassawadox still has the highest percentage of their workforce in the education and health care services industry, despite the relocation of Riverside Shore Memorial Hospital that was once located within the Town. The majority of Nassawadox residents commute to work outside of the Town (*Town of Nassawadox Comprehensive Plan,* 2000), which has likely increased dramatically following the relocation and opening of the new Riverside Shore Memorial Hospital in Accomack County's Town of Onancock. It is likely that many residents commute to the hospital's new location or are employed at The Citadel, the Northampton County Department of Health, Northampton Free Library, Riverside Eastern Shore Family Medicine, or Rayfield's Pharmacy.

Many local businesses, particularly restaurants, retailers, and the pharmacy, have been negatively impacted by the move of the hospital.

Despite a recent influx of younger families moving to the Town, officials state the decrease in the total employed population may be due to a high number of residents retiring (Personal communications, Mayor Patsy Stith and Town Officials Andrea Fox and Kim Fitzpatrick, May 5, 2021). Other industries that dominate the work force in Nassawadox include retail trade, manufacturing, and wholesale trade

Table 2: Nassawadox Local Workforce Industry

Civilian Employed Population										
Industry	**2019***		**2014****		**2012****		**2010****		**2000*****	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Agriculture, forestry, fishing/hunting, or mining	2	1.3%	17	6.3%	15	6.5%	16	5.8%	3	1.8%
Construction	13	8.2%	19	7.1%	8	3.5%	16	5.8%	4	2.4%
Manufacturing	25	15.7%	32	11.9%	15	6.5%	19	6.9%	11	6.6%
Wholesale trade	16	10.1%	24	8.9%	18	7.8%	16	5.8%	1	0.6%
Retail trade	29	18.2%	18	6.7%	19	8.3%	15	5.5%	26	15.6%
Transportation and warehousing, and utilities	11	6.9%	7	2.6%	3	1.3%	0	0.0%	4	2.4%
Information	0	0.0%	19	7.1%	0	0.0%	2	0.7%	7	4.2%
Finance, insurance, real estate, and rentals	9	5.7%	0	0.0%	4	1.7%	10	3.6%	10	6.0%
Professional, scientific, waste management	1	0.6%	1	0.4%	0	0.0%	3	1.1%	13	7.8%
Educational and health care services	32	20.1%	92	34.2%	77	33.5%	99	36.0%	58	34.7%
Arts, entertainment, recreation, food	0	0.0%	27	10.0%	51	22.2%	48	17.5%	17	10.2%
Public Admin	14	8.8%	0	0.0%	8	3.5%	11	4.0%	6	3.6%
Other	7	4.4%	13	4.8%	12	5.2%	20	7.3%	7	4.2%
TOTAL CIVILIAN EMPLOYED POPULATION	159	-	269	-	230	-	275	-	167	-

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

BUSINESSES

Business data provides basic information used in projecting potential economic losses from business and employment disruption, along with wage losses to employees. It can also serve as an indicator of community recovery resources. Finally, it can help to prioritize restoration of utility and infrastructure functions following a high-intensity hazard.

Nassawadox hosts several various businesses such as a hardware store, post office, farmers market, art and frame shop, two restaurants, a florist, an insurance company, medical offices, a nursing home, a pharmacy, gas station, the Northampton Free Library, and the Northampton County Health Department (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021). Many employees are commuting from outside of the Town. The hospital's former location has attracted medical services, community health services, and mental health services to open within the Town. Town officials stated there are only approximately 15 businesses still open within Nassawadox town limits (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021).

Table 3: Nassawadox Business Establishment Types

	Total Establishments			
Industry Code Description	**2021**	**2013***	**2011***	**2009***
Mining, Quarrying, and Oil and Gas Extraction	0	1	0	0
Construction	0	3	4	4
Manufacturing	0	1	2	3
Wholesale Trade	0	3	2	3
Retail Trade	6	6	9	7
Finance and Leisure	1	3	3	4
Management of Companies and Enterprises	0	1	1	1
Administrative and Support and Waste Management Remediation Services	0	1	2	2
Health Care and Social Assistance	4	13	12	15
Accommodation and Food Services	2	4	4	4
Other Services (Except Public Admin)	2	2	2	2
Total, All Establishments	~15	39	42	43
Total Employees	-	658	764	891

Source: Personal Communications, Mayor Patsy Stith and Town Officials Andrea Fox and Kim Fitzpatrick, May 5, 2021, *Census Zip Code Business Pattern, 2013, 2011, 2009

BUILT INFRASTRUCTURE

Housing units, community facilities, and transportation are all important factors when considering hazard resiliency. They provide the social services necessary during hazardous scenarios, safe cover for those wanting to stay, and a way to evacuate.

HOUSING UNITS

Knowledge of a community's housing base contributes to hazard and vulnerability analysis by identifying how many homes are at risk. Town officials previously indicated the number of total housing units displayed in Table 4 for 2014 was an overestimate. Data from the American Community Survey for 2019 depicts total housing in the Town more accurately. According to Table 4, there are 42 vacant housing units; however, Town officials state this number is also inaccurate and there are only approximately 12-15 vacant housing units (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021).

Nassawadox has an ordinance that governs hazardous structures to enforce the repair or clearance of dilapidated buildings (*Nassawadox Comprehensive Plan,* 2000), which restricts the vacant homes to those that are in decent condition. There have been five dilapidated structures demolished since 2016 (Personal communications, Mayor Stith, May 5, 2021). Often, vacant structures are not properly maintained and can cause additional hazardous debris during high-wind events. This is important to consider when preparing for a hazard.

There is only one high-density housing development in the Town and one just on the outskirts of Town. High-density housing areas are often the lower cost option for residents and can be more vulnerable to displacement and are least able to access safe and affordable housing after a disaster.

Table 4: Nassawadox Housing

	2019*	2014**	2010***	2000****
Total Housing Units	207	317	239	207
Occupied	165	264	188	186
Vacant	42	53	51	21
Owner-Occupied	86	NA	127	124
Renter-Occupied	79	NA	61	62
Median Housing Value	$115,200	$125,000	NA	NA

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2010, ****U.S. Census 2000

TRANSPORTATION

Vehicles available to households is one indicator of a household's ability to evacuate when necessary. Table 5 indicates that there are 13 households without a single vehicle in 2019, which has decreased significantly since the 2000 Census. The number of homes without access to a vehicle is important to note, as in emergency situations, they would be unable to evacuate to a safer area without assistance. There are also evacuation concerns regarding The Citadel and the Dialysis unit located within the Town (Personal communications, Mayor Stith, May 5, 2021).

US Route 13 bisects the Town making automobile transportation convenient for residents. Public transportation is made available through Star Transit, with bus routes within the Town and along Route 13. Star Transit will operate during incoming hazardous events to help assist those without a vehicle and citizens with functional access needs evacuate; however, operations will cease once the hazard reaches a certain level. Shore Ride also provides transportation services up and down the Eastern Shore and even across the Chesapeake Bay Bridge Tunnel; however, it is highly unlikely that Shore Ride would operate during a hazard. The former Bay Coast Railroad has been inactive since 2018 and runs through the middle of Town. There are ongoing plans to convert the railroad into a rail-to-trail multi-use path, which would give residents in Nassawadox and other towns in the Region safe access to stores, restaurants, jobs, exercise, recreation, and more. The railroad right of way also houses pertinent infrastructure, such as the Virginia Broadband Authority and the future Hampton Roads Sanitation District (HRSD) sewer lines. Streets and sidewalks are maintained by VDOT and several areas are in need of repair (Personal communications, Mayor Stith, May 5, 2021).

Table 5: Nassawadox Vehicles Available per Household

Vehicles Available	2019*	2014**	2010**	2000***
None	13	32	20	44
One	73	92	64	51
Two	56	86	121	77
Three or more	23	54	26	20

Source: *ACS, 2014-2019, **ACS, 2010-2014, ***U.S. Census 2000

COMMERCIAL AREAS

Route 13 runs through the middle of the downtown area of Nassawadox. There are three commercial clusters located along Route 13 at State Route 606, State Route 678, and State Route 609. Between these clusters are residential housing. The commercial center consists of a restaurant, several variety shops, Post Office, lumber yard, library, and several other businesses.

COMMUNITY FACILITIES

Community facilities are facilities required to support the services and functions for the Town. For Nassawadox, there functions are provided by the Northampton County government or in coordination with other public and private entities. These facilities enhance the overall quality of life for the Town and its citizens. It's important to note what facilities are available in case of a hazard, and it's important to make an inventory of facilities that could be affected by a hazard. Some facilities located within the Town include a Post Office and the Northampton Free Library.

PUBLIC SAFETY

Public safety is extremely important in a hazard scenario. Police protection is provided by the Northampton County Sheriff's Department and the Virginia State Police. Fire protection for the Town is provided by the Nassawadox Volunteer Fire Company, which has 20 members, 10 of whom are active fire and rescue members. Equipment at the facility includes one engine, one tanker, one brush truck, one supply/accident truck, and one personnel/command truck (Personal communications, Mayor Stith, May 10, 2021). Ambulance and EMS response is provided by Northampton County and surrounding Towns. The Nassawadox Volunteer Fire Department responds to calls throughout Northampton County (*Town of Nassawadox Comprehensive Plan*, 2000), particularly the area between Exmore and Eastville, including Hare Valley, Franktown, Bayford, Vaucluse Shores, Marionville, Red Bank, Wierwood, Birdsnest, Treherneville, and other outlying areas.

WATER SUPPLY AND WASTEWATER

Residents rely on individual private wells for their water supply and individual septic systems for their wastewater disposal. The Town invested in a central public sewage system, which they have found to be overly expensive and unnecessary. The hospital was one of the main entities driving conversion to a waste water treatment plant (WWTP). Although the hospital has moved north, other medical services have connected to the WWTP. There are no private residences connected (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021). The Hampton Roads Sanitation District (HRSD) will begin serving the Eastern Shore of Virginia over the next several years. There are multiple phases of the project, with the first phase to construct sewer lines from Nassawadox up to the Town of Onancock in Accomack County. The option to connect to HRSD's sewer system will allow for additional development in Nassawadox and several other towns that are included in the project's first phase.

SOLID WASTE

The Town residents benefit from free weekly residential pickup by Davis Disposal that's paid for by the Town. Commercial waste is collected by private haulers and must be taken to Accomack County. The Hare Valley Convenience Center is located just one mile north of the Town.

POWER AND COMMUNICATIONS INFRASTRUCTURE

There are no electric substations in the Town. Because the Town lies on the Route 13, it typically does not have lengthy power outages and is able to take advantage of the Virginia Broadband Authority fiber cable for internet services. Older trees in and surrounding Nassawadox could pose a threat to power lines and other infrastructure during winter weather and high-wind events.

PARKS AND RECREATION

The Randy Custis Memorial Park is located within the Town and contains a playground, concession stand, picnic area, and several various sports fields. There is an indoor complex with a gym floor for residents in the area to utilize as well (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021). The Northampton Free Library is also located in Nassawadox.

STORM WATER DRAINAGE

The Town does not finance the annual maintenance of ditches along roadways throughout the Town and relies on the Virginia Department of Transportation for ditch maintenance. Ditches on private land are contracted by the Town for maintenance as close to annually as necessary and affordable. An ongoing VDOT project involving culvert replacement and maintenance of drainage ditches has been effective in mitigating stormwater flooding (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021).

SCHOOLS

There are no schools in Nassawadox.

NATURAL ENVIRONMENT

Nassawadox is very flat with slopes ranging from 0% to 2%. Most of the land is at an elevation of 35 to 40 feet above sea level. The soils in Nassawadox are either hydric or highly permeable, with a depth to groundwater of 0-36 inches. Hydric soils are a major limiting factor in Nassawadox due to their severe limitations in respect to constructing on-site septic systems. Residents in the Town are completely reliant upon on-site septic systems for waste disposal. The presence of groundwater near the surface can cause septic system failure resulting in ground water contamination (*Town of Nassawadox Comprehensive Plan*, 2000). Connecting to HRSD's sewer lines in the future would help to alleviate these issues.

LAND USE LAND COVER

Nassawadox is just over 50% developed. With only about 5% natural forest and shrub cover, and an excess of developed areas, areas with high percentage of constructed materials (including asphalt, concrete, buildings, etc.), the Town is more susceptible to stormwater complications and issues (*Town of Nassawadox Comprehensive Plan*, 2000). Cultivated crop covers approximately a fifth of the Town, indicating the importance of agriculture in the Region.

GROUND WATER

The Town's water supply is obtained from groundwater through individual private wells. The majority of the Town lies within the spine recharge area. It is critical to protect the spine recharge area in order to assure the continuance of good quality and large quantities of groundwater on the Eastern Shore. Although barren land has remained undeveloped due to the soils being unsuitable for septic systems, new technologies in above ground septic tanks as well as the option to connect to HRSD would allow for further development. Any development needs to be done with consideration of the effects of impervious surfaces on groundwater recharge and quality (*Town of Nassawadox Comprehensive Plan*, 2000).

HAZARD PREPAREDNESS & COMMUNITY CAPABILITIES

PREVIOUS HAZARD MITIGATION PLANS

§201.6(b)(3), §201.6(c)(3), §201.6(d)(3) Nassawadox did not participate in the 2006 or 2011 HMP. The Town deferred to the County for hazard preparedness and was only mentioned within the context of the National Flood Insurance Program. The Town has not updated its Comprehensive Plan since 2000 and is currently seeking assistance to update. The Town's zoning ordinance was amended in 2015.

Table 6 : Town of Nassawadox Hazard Mitigation Resources

	Ordinances, Plans, & Publications														Resources, Committees			
Authority	Building Code	Chesapeake Bay Act	SWMP	Hazard Mitigation Plan	Comprehensive Plan	Zoning &/or Subdivision Ordinance	Storm Water Regulations	Transportation Infrastructure Inundation Vulnerability Report	All Hazards Preparedness Brochure	Emergency Operations Plans	Mutual Aid Agreements/Documents	Neighborhood Emergency Help Plan	Viginia Hurricane Evacuation Guide	Oil & HazMat Response Plan; HazMat Commodity Flow		Ground Water Committee	Navigable Waterways Committee	Climate Adaptation Working Group	ES Disaster Preparedness Coalition
Local					*	*													
County	*		*																
Regional				*				*	*	*	*			*		*	*	*	*
State		*					*						*						
Federal		*																	

NATIONAL FLOOD INSURANCE PROGRAM & HAZARD MITIGATION GRANT PROGRAM

NFIP

§201.6(c)(2)(ii), §201.6(c)(3)(ii), §201.6(d)(3) The Town of Nassawadox joined the NFIP program on May 8, 2007. Nassawadox does not have any identified Special Flood Hazard Areas. Claims filed in the Town are likely a result of stormwater flooding. More information on repetitive loss properties, NFIP policies and claims, and the CRS program can be found in Chapter 6: Coastal Flooding and Chapter 9: The Region.

HMGP

The Town has not participated in the Hazard Mitigation Grant Program.

HAZARD PROFILE

§201.6(c)(2)(i), §201.6(c)(2)(ii), §201.6(d)(3) Stormwater flooding has the greatest and most frequent impact on the Town.

PANDEMIC RESPONSE AND READINESS

The Town of Nassawadox made few changes in response to the COVID-19 pandemic, as local businesses took care of putting mandated COVID-19 restrictions in place. Town meetings were held at the Fire Department in order to maintain social distancing and all those attending wore masks. The Town did not accept any rounds of CARES Act or other federal funding and provided local businesses with information on how to apply and receive available funding assistance with the County (Personal communications, Mayor Stith, May 5, 2021).

WIND

No parts of the Town lie in the wind-borne debris hazard area. This area extends one mile inland from the Bay shoreline. Many of the housing stock is aging, but most are well maintained. There are a significantly high number of mature trees and, particularly after extensive rain events saturate the soils, these can pose a threat to buildings, roadways, and electric services. In August of 2020, damaging winds ripped through the Town leaving behind several downed trees and branches (Personal communications, Mayor Stith and Town Officials Fox and Fitzpatrick, May 5, 2021). Tornados and straight-line winds, despite their infrequency in the region, pose a threat to the Town.

STORMWATER FLOODING

Following heavy rain events, the Town experiences severe drainage problems resulting in flooding, particularly north of Rogers Drive and perpendicular to Pine Avenue (*Town of Nassawadox Comprehensive Plan*, 2000). Town officials noted that this area is currently being worked on to improve drainage issues (Personal communications, Mayor Stith, May 5, 2021). In the Woodstock residential area, a ditch was dug out when the subdivision developed, but it has not been maintained regularly to ensure continued proper operation. Several residences in the area experience flooding in their basements and crawl spaces (Personal communications, Mayor Stith, May 5, 2021).

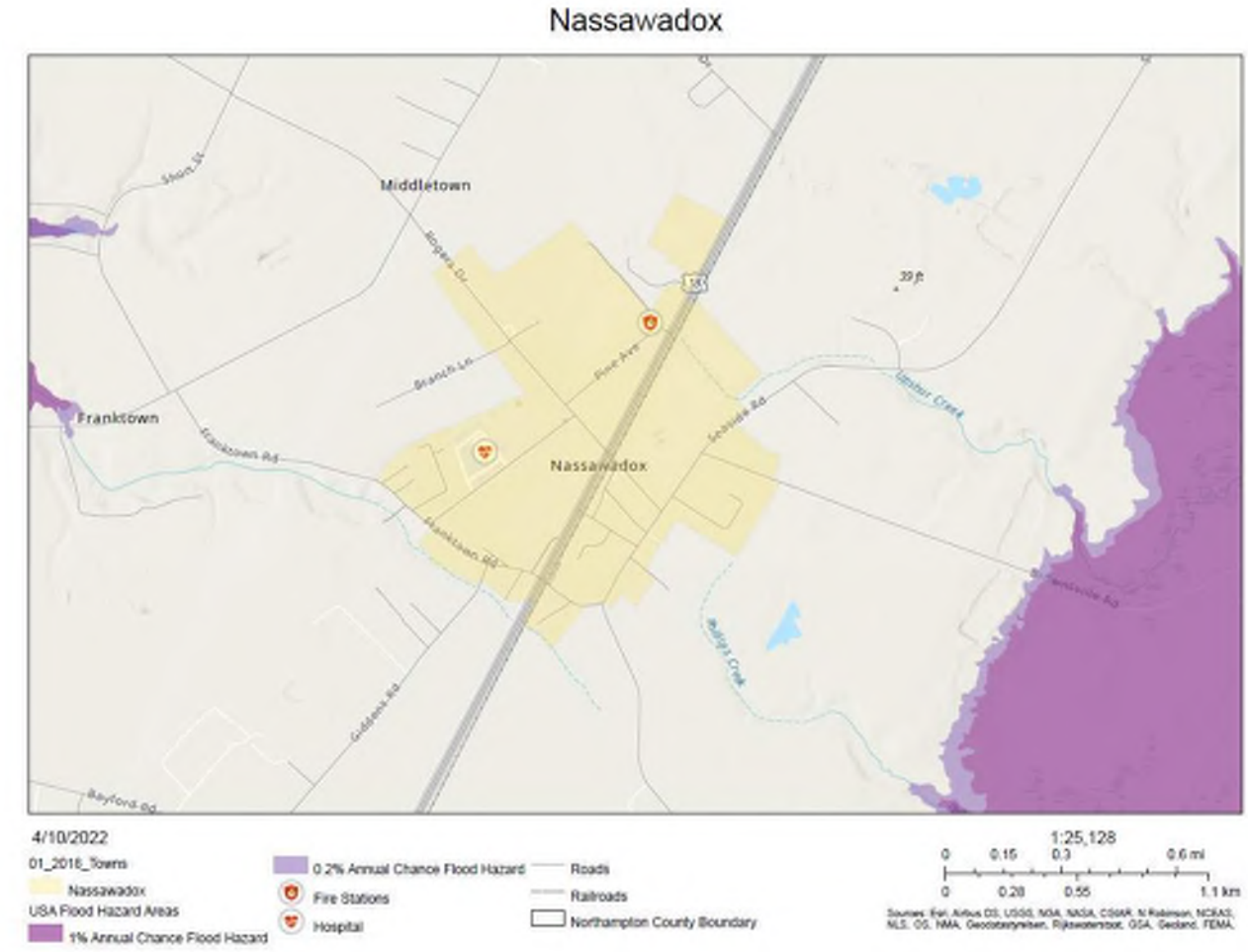
COASTAL EROSION

The Town is not at risk to coastal erosion due to inland location.

COASTAL FLOODING

Nassawadox does not have any identified Special Flood Hazard Areas.

Figure 2: Nassawadox Flood Hazards to Infrastructure



HAZARDS OF LOCAL SIGNIFICANCE

GROUNDWATER CONTAMINATION

Groundwater quality is threatened by contaminants that are discharged, leached, or disposed into the ground. The major contamination threats to groundwater in Nassawadox are on-site septic system failure, underground storage tanks, and above ground storage tanks (*Town of Nassawadox Comprehensive Plan*, 2000). Nassawadox is in Wellhead Protection Area E. The Town has implemented a 5-year plan required by the Virginia Department of Environmental Quality (VDEQ) to pump out septic tanks, starting along drainage ditches. The Town is seeking funding for low-income households to cover costs of the required pump outs (Personal communications, Mayor Sith, May 5, 2021).

SNOW AND ICE

Beyond potential road hazards, snow and ice can pose a hazard by increasing stress on mature trees and causing branches to come down, damaging buildings, vehicles, power lines, and/or hindering transportation. VDOT is responsible for maintaining the roads during winter weather storms.

FIRE AND SMOKE

In 1920, a combination hotel, barroom, and theater building caught fire and burned to the ground. The replacement building is brick with asphalt roofing, but the majority of the remaining downtown businesses are wooden and connected, allowing for the quick spread of fires in the Town.

CRITICAL FACILITIES

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

Table 7 : Town of Nassawadox Critical Facilities

Facility	HMP 2006	HMP 2011	HMP 2016	HMP 2021	Hazards	No of People Affected	Loss potential	Relocation Potential	Retrofit Potential
Town-Owned Facilities									
Town Office	NA	NA	NA	X	Fire, Wind, Stormwater Flooding	1,000	Minor Disruption	Yes	Yes
Other Facilities									
Vol. Fire Department	NA	NA	X	X	Fire, Wind, Snow/ice	10,000	Devastating	Yes	Yes
Randy Custis Memorial Park	NA	NA	X	X	Fire, Wind, Stormwater flooding	1,000	Inconvenience	No	Yes
Northampton Free Library	NA	NA	X	X	Fire, Wind, Stormwater flooding	10,000	Inconvenience	No	Yes
Post Office	NA	NA	X	X	Fire, Wind, Stormwater flooding	1,000	Major Disruption	No	Yes
Shore Stop (gas station)	NA	NA	X	X	Fire, Wind, Stormwater flooding	2,000+	Major Disruption	No	Yes
Water tower (at hospital)	NA	NA	X	X	Fire, Wind, Snow/ice	1,000+	Major Disruption	No	Yes

FINDINGS

1. Due to the Town's central locations, the hazards expected to have the greatest impact on the Town are stormwater flooding and high-wind events.

2. There are no defined Special Flood Hazard Areas within the Town, but the Town does participate in the NFIP and there is one insurance policy in effect.

3. The Town owns two plots of land and the Town Office, which also hosts a framing and art supply shop.

4. The Town has implemented a 5-year septic pump-out plan required by DEQ to help mitigate potential groundwater contamination. The Town is currently seeking funding to assist low-income households with pump-outs.

5. Residential areas have older construction and many mature trees in and around the Town. During a high-wind event, branches and trees may come down causing secondary wind damage and power outages.

CHAPTER 30: MITIGATION STRATEGIES DEVELOPMENT

The first iteration of the Eastern Shore Hazard Mitigation Plan was developed in November 2004. At that time, members of the Steering Committee determined the vision for 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. In June of 2016, the Eastern Shore Hazard Mitigation Steering Committee agreed to maintain the Vision Statement as written and included in the 2011 Plan. In the Spring of 2021, the Committee revisited the 2016 Plan and updated locality information and strategies and again 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
- 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, many of 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 Steering Committee identified the following goals to work toward. Goal 1 was revised slightly for language. Goal 2 was amended to include language for post-hazard event response. Goal 3 was unchanged. Goal 4 was revised to model FEMA's Community Lifelines. Goal 5 was revised slightly to incorporate all populations.

Goal 1 – **The Hazard Mitigation Plan will serve as a guide to local governments for comprehensive mitigation to include public education and ongoing hazard assessments.**

Goal 2 – **Improve resiliency through harnessing community partnerships (residents, businesses, local governments, and other community partners) working to minimize disruption during and following hazard events.**

Goal 3 – **Local governments encourage self-sufficiency and personal responsibility for managing risk.**

Goal 4 – **Local governments will work to improve infrastructure for resiliency and provide the appropriate redundancies for the operations of critical infrastructure during an event.**

Goal 5 – **Local governments will make efforts to reach all populations during preparation to, response of and mitigation of all risks.**

MITIGATION PROJECT DEVELOPMENT

The Eastern Shore of Virginia Hazard Mitigation Plan Steering Committee collectively identified specific mitigation projects that would benefit the entire region. 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. Non-participating towns are currently not eligible for FEMA Hazard Mitigation Assistance grant award funds. Participating towns indicated that mitigation projects included in their respective county's mitigation strategies, when relevant, should also apply to the town.

PROJECT PRIORITIZATION

Prioritization ranking is directly based on the rank of the hazard(s) which it addresses. A ranking of 1 indicates a "highest" level of priority and indicates that the mitigation action would address at least one of the highest ranked hazards (high wind, coastal erosion, coastal flooding, stormwater flooding, and pandemic). A ranking of 2 indicates "higher" level of priority and indicates that the highest ranked hazard that the mitigation action would address would be one of the medium ranked hazards (well contamination, biological hazards, storm surge, non-coastal flooding, and road and highway). A ranking of 3 indicates "high" level of priority and indicates that the mitigation action only addresses one or more of the low prioritized hazards (substance use and overdose, communications failure, active threat, electrical energy failure, and tornado). Because the prioritization of the hazards took into account the potential number of affected structures, impacts, likelihood of success, and availability of implementable mitigation options, this way of ranking the mitigation actions incorporates and carries on these fundamental criteria. Rankings for all of the hazards are found in Table 1 of Chapter 3: Risk Assessment. Also, in Chapter 3 (pages 1 and 2), you'll find more information about the criteria for the ranking of the hazards.

ADOPTION

Adoption Resolutions of this plan are included at the end of the plan in **Appendix E**.

CHAPTER 31: ACCOMACK COUNTY MITIGATION STRATEGIES

INTRODUCTION

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 30. The other towns in Accomack County were invited to contribute to the Eastern Shore of Virginia Hazard Identification and Risk Assessment (ESHIRA) and Hazard Mitigation Plan. For the first time since the inception of the Hazard Mitigation Plan in 2006, every town in the county joined the planning process

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, 2022, 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 each have a Comprehensive Plan for their respective jurisdiction. 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.

See Chapter 2, page 7 and 8 for additional information about plan maintenance and evaluation.

IDENTIFIED MITIGATION GOALS & STRATEGIES – ACCOMACK COUNTY

Goal 1 - The Hazard Mitigation Plan will serve as a guide to local governments for comprehensive mitigation to include public education and ongoing hazard assessments.
Strategy 1.1 - Train County staff for mitigation duties. *Strategy 1.2 – Promote mitigation programs throughout the County.*
Goal 2 - Improve resiliency through harnessing community partnerships (residents, businesses, local governments, and other community partners) working to minimize disruption during and following hazard events.
Strategy 2.1 - Reduce damages from flooding. *Strategy 2.2 – Reduce damages from non-flooding natural disasters, if that type of event occurs.*
Goal 3 - Local governments encourage self-sufficiency and personal responsibility for managing 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.*
Goal 4 - Local governments will work to improve infrastructure for resiliency and provide the appropriate redundancies for the operations of critical infrastructure during an 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.*
Goal 5 - Local governments will make efforts to reach all populations during preparation to, response of and mitigation of all risks.
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.*

IDENTIFIED MITIGATION PROJECTS – ACCOMACK COUNTY

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program Including Public Education and Ongoing 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	Hazard(s) Addressed	Responsible Department	HMP Year/Start Timeline	Status as of 2016	Status as of 2021	Add'l. Info.
1	Set a regional compatibility standard for emergency communications	ALL	ESDPC	2006/2006	Ongoing	Ongoing	
1	Upgrade communications systems and provide for backup in the event of a communication failure	ALL	ESDPC	2006/2009	Not Complete	Not Complete	Funding needed
1	Research allowed reimbursement under a Presidentially Declared Disaster and offer to train staff to take on emergency response tasks for pay during disaster events	ALL	Accomack Co. Administration	2006/2007	Ongoing	Ongoing	
3	Institute a recruitment program for volunteer firefighters. Publicize details on how to volunteer on the County website.	Fire	Accomack Co. Administration	2006/2007	Ongoing	Ongoing	On County website
1	Formalize and maintain the Residential Mitigation Project Waiting List	ALL	AC B&Z	2011/Ongoing	Ongoing	Ongoing	
1	Promote Hazard Mitigation at local community events and meetings.	ALL	Accomack Co. Emergency Management (ACEM)	2011/Ongoing	Ongoing	Ongoing	
1	Emergency radio communications within the region are to be interoperable.	ALL	ES 911 Commission	2011/2011	Ongoing	Ongoing	
1	Assess and define County staff emergency response responsibilities during disaster events and incorporate these duties into their job descriptions.	ALL	Accomack Co. Administration	2011/2012	Ongoing	Ongoing	
1	Offer county staff CERT training.	ALL	Accomack Co. Administration	2011/2013	Ongoing	Ongoing	Annual classes offered

Priority Rank	Accomack County – Completed Projects	Hazard(s) Addressed	Responsible Department	HMP Year/Start Timeline	Status as of 2016	Status as of 2021	Add'l. Info.
---	Produce Responder Bilingual Cards with English on back. An example of the type of message to be included is "Do not drink the water."	ALL	Health Dept. and the Eastern Shore Disaster Preparedness Coalition (ESDPC)	2006/2006	Complete*	---	
---	Obtain more changeable warning signs	ALL	VDOT	2006/2006	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.	ALL	Accomack Co. Administration	2006/2007	Complete	---	
1	Obtain funding for a generator hookup for the Eastern Shore Community College	Flood, Ice & Snow, Wind	Eastern Shore Community College	2006/Post-declared disaster	Ongoing	Complete	
1	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.	Flood	Accomack Co. Building & Zoning (ACB&Z)	2006/2007	Not Complete	Complete	
1	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.	Flood	AC B&Z	2006/2007	Partially Complete	Complete	Accomac, Bloxom, Onley, and & Parksley currently participate in the NFIP

*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, Local Governments, and other Community Partners Will Work Independently and Together to Minimize Community Disruption Through Planning and 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Formalize and maintain the Residential Mitigation Project Waiting List	ALL	Accomack Co. Building & Zoning (ACB&Z)	2006/2006	Ongoing	Ongoing	
1	Drainage Survey of Nelsonia, north of Fisher Corner and Route 13	Storm Water Flood, Biohazard	VDOT, Accomack Co. Public Works	2006/2008	Not Complete	Not Complete	Must coordinate with VDOT
1	After any presidentially declared disaster, manage Residential and Commercial Mitigation Projects that address the most critical damage that has occurred.	ALL	ACB&Z	2006/Post-declared disaster	Ongoing	Ongoing	
1	Continue a comprehensive drainage plan that identifies specific projects to improve drainage.	Flood	Accomack Co. Public Works, VDOT	2011/Ongoing	Ongoing	Ongoing	
1	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.	Erosion	Accomack Co. Planning	2011/Ongoing	Ongoing	Ongoing	
1	Mitigate public infrastructure against damage caused by natural disasters. For example, hurricane shutters, flood-proofing, etc.	ALL	Accomack Co. Public Works	2011/Post-declared disaster	Ongoing	Ongoing	
1	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).	Flood	ACB&Z	2011/Post-declared disaster	Ongoing	Ongoing	
3	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.	Flood, Erosion	Accomack Co. Administration, The Nature Conservancy, Eastern Shore of Virginia Land Trust	2011/Ongoing	Ongoing	Ongoing	
1	Maintain the Residential Mitigation Project Waiting List	ALL	ACB&Z	2011/Ongoing	Ongoing	Ongoing	

Priority Rank	Accomack County – Completed Projects	Hazard(s) Addressed	Responsible Department	HMP Year/Start Timeline	Status as of 2016	Status as of 2021	Add'l. Info.
---	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Accomack County Comprehensive Plan.	ALL	Accomack Co. Planning	2011/During next Comp. Plan update	Not Started	Complete (2014 Amended County Comp Plan)	
---	Amend the future land use map and zoning ordinance to direct highdensity 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.	Erosion	Accomack Co. Planning	2006/Ongoing	Complete*	---	
---	Manage a Residential Elevation and Mitigation Project, using benefit-cost analysis provided by FEMA to target structures at risk to flooding.	Flood	Accomack Co., Towns of Onancock, Tangier, Wachapreague, Saxis and Belle Haven	2006/Post-declared disaster	Complete**	---	
---	In the Town of Belle Haven, dig ditches along King Street near the ESO to improve drainage.	Storm Water Flood, Biohazard	VDOT, Accomack Co. Public Works	2006/2008	Complete.	---	
---	Produce a comprehensive drainage plan that identifies specific projects to improve drainage.	Flood	Accomack Co. Public Works	2006/2008	Complete	---	

*The Future Land Use Map was updated in 2012. The Zoning Ordinance is up to date

**2011 – 2016 Project Status included in each town's mitigation project list

Goal 3 - Local Governments Encourage Self-sufficiency and Personal Responsibility for Managing 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	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.	Flood	Accomack Co. Public Safety	2006/Yearly	Ongoing	Ongoing	Funding done semi-regularly in repetitive loss areas
1	Put out an education brochure on tree plantings benefits. Consider using the information developed by VDEM for Hurricane Isabel.	Erosion, Flood	ACEM	2011/2012	Not Started	Not Started	
1	Put out an education brochure on benefits from burying property power lines. Consider using the information developed by VDEM for Hurricane Isabel.	Ice & Snow, Wind, Fire	ACEM	2011/2012	Not Started	Not Started	
1	Disseminate information encouraging residents and businesses to purchase contents and structure flood insurance.	Flood	ACEM	2011/2012	Ongoing	Ongoing	In brochure mailed to all residence as well as handed out during preparedness talks
1	Maintain an Emergency Management website that contains emergency preparedness information for residents and businesses.	ALL	ACEM	2011/Ongoing	Ongoing	Ongoing	A subset of the County website and has information on there
3	Include details of volunteer opportunities on the County website.	ALL	Accomack Co. Admin.	2011/2012	Not Started	Ongoing	
1	Produce an emergency preparedness brochure that includes local information to be mailed to residents and businesses.	ALL	ACEM	2011/2013	Ongoing, Pending Funding	Ongoing	Sent in 2017, needs to be sent again, Funding
1	Disseminate information on wind-protection systems (hurricane shutters, etc.) to residents and businesses.	Wind	ACEM	2011/2012	Not Started	Ongoing	Information handed out during presentations
1	Provide FEMA mitigation-related publications to residents and businesses via the public library.	ALL	ACEM	2011/2012	Ongoing	Ongoing	Information handed out during presentations

Priority Rank	Accomack County – Completed Projects	Hazard(s) Addressed	Responsible Department	HMP Year/Start Timeline	Status as of 2016	Status as of 2021	Add'l. Info.
---	Publish an Annual Press Release about Emergency Preparedness	ALL	Accomack Co. Emergency Management (ACEM)	2006/Yearly	Complete, Ongoing	---	
---	Investigate the potential for an increased CRS rating to reduce flood insurance premiums.	Flood	Accomack Co. Planning	2006/2007	Complete	---	
---	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	Flood	Accomack Co. Public Safety	2006/2006	Complete	---	

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
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	Ice & Fire, Wind	VDOT	2006(1-2) 2011(3-5)/2007	Pending	Pending	Funding allocation and priorities
1	Encourage implementation of emergency generator power serving public water and wastewater systems.	Ice & Snow, Wind	Accomack Co. Public Works	2011/2013	Not Started	Not Started	Funding
Priority Rank	**Accomack County – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
---	Ensure all Accomack County Fire Stations are wired for generator hook-up.	Ice & Snow, Wind	Accomack Co. Public Safety	2006/Post-declared disaster	Complete	---	
---	After consultation with the Hazard Mitigation Planning Committee, that included input from the Accomack Sheriff's Office, the following traffic lights were retrofitted to have backup power installed: 1. Rt. 13 and Rt. 176 in Parksley 2. Rt. 13 and Rt. 626 in Melfa 3. Rt. 13 and Rt. 182 in Painter	Ice & Snow, Wind	VDOT	2006/2007	Complete	---	
1	Obtain funding for a generator hookup for the Eastern Shore Community College.	Ice & Snow, Wind	ESCC	2011/Post-declared disaster	Ongoing	Complete	New building will have a commercial generator

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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Coordinate with Town Staffs to man town shelters	ALL	Accomack Co. Administration	2006/2007	Not Complete	Not Complete	Staff
1	Investigate a paid reservist program to man up to 7 emergency shelters.	ALL	Accomack Co. Administration	2006/2008	Not Complete	Not Complete	Staff
1	Approach local growers thru the Migrant Council to ask for tax-deductible donations to support and offset sheltering costs for migrants during natural disasters.	ALL	Accomack Co. Administration	2006/2008	Not Complete	Not Complete	Staff/ Coordination
1	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.	Flood, Wind, Ice & Snow	Accomack Co. Public Safety	2006/2006	Not Complete	Not Complete	Funding/ Coordination
1	Define special needs populations in the County.	ALL	ACEM	2011/2012	Ongoing	Ongoing	
1	Develop an emergency coordination plan for defined special needs populations in the County.	ALL	ACEM	2011/2013	Ongoing	Ongoing	
1	Assure that the residents of Tangier Island have access to emergency shelters on the mainland during a disaster.	ALL	ACEM	2011/Ongoing	Ongoing	Ongoing	Will be housed in existing shelters on the mainland
1	Disseminate Spanish language emergency preparedness information to the Hispanic community via camps, churches, Telemon, and other primarily Hispanic outlets.	ALL	ESDPC	2011/Ongoing	Ongoing	Ongoing	This is in progress as well as information on how to access emergency notifications via phone

Priority Rank	Accomack County – Completed Projects	Hazard(s) Addressed	Responsible Department	HMP Year/Start Timeline	Status as of 2016	Status as of 2021	Add'l. Info.
---	Produce County-specific emergency information in Spanish	ALL	ESDPC	2011/Ongoing	Ongoing	Complete	
---	Develop a plan for sheltering of household pets.	ALL	ACEM	2011/2013	Not Started	Complete	
---	Produce County-specific emergency information in Spanish	ALL	Accomack Co. Administration & Public Safety	2006/2007	Complete		
---	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	ALL	Accomack Co. Public Safety	2006/Ongoing	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.	ALL	Accomack Co. Administration	2006/2007	Complete		
---	Provide a mass notification system for relay of emergency information to residents and visitors.	ALL	Accomack Co. Administration	2011/Post-declared disaster	Not Complete	Complete, Ongoing	CodeRED

IDENTIFIED MITIGATION PROJECTS – ACCOMACK COUNTY TOWNS*

Town	Action	Hazard(s) Addressed	Responsible Party	Strategy	HMP Year/Start Timeline	2016 Status	2021 Status	Add'l. Info.
Bloxom	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Bloxom Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Ongoing	No Town Plan update yet.
Bloxom	Mitigate against natural disasters.	ALL	Town Staff, Residents	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Bloxom	Join the National Flood Insurance Program.	Flood	Town Staff	1.1	Post-declared disaster	Not Started	Complete	
Bloxom	Retrofit the undersized box culverts in Bloxom to mitigate stormwater flooding.	Storm Water Flood, Biohazard	VDOT	2.1	Post-declared disaster	Not Started	Not Started	VDOT
Bloxom	Promote Hazard Mitigation at local community events and meetings. Acquire or develop materials to cater to the increasing diversity of the population.	ALL	Town & County Staff	3.1, 3.2, 5.1	2011	Ongoing	Ongoing	
Bloxom	Regular maintenance of the stormwater drains and the ditches to prevent flooding.	Storm Water Flood, Biohazard	VDOT, Town Staff, Residents	2.1, 4.1	Immediately, 2017	Not Started	Ongoing	
Bloxom	Build a staging area (point of distribution), ideally with electric (and generator), water, and minimum commercial equipment (such as microwave, refrigerator, etc.). Ideal location is the Town Square area.	ALL	Town, FEMA	1.2, 4.2	Immediately, 2017	Not Started	Not Started	Funding
Bloxom	Groundwater resources research, particularly to address shallow well concerns.	Well Contamination, Drought	Town, Ground Water Committee	1.2, 3.2	Immediately, 2017	Not Started	Not Started	Funding
Bloxom	Dredge the ditches in order to alleviate stormwater flooding damages and dangers.	Storm Water Flood, Biohazard	VDOT	2.1, 4.1	2011	Complete	Complete	

Hallwood	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Hallwood Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town. Plan update	Ongoing	Ongoing	
Hallwood	Mitigate flooding and wind hazards in Hallwood.	Flood	Town, FEMA, Residents	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Hallwood	Retrofit the undersized box culverts in Hallwood to mitigate stormwater flooding problems.	Storm Water Flood, Biohazard	VDOT	2.2	Post-declared disaster	Not Started	Not Started	VDOT
Hallwood	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1	2011	Not Started	Ongoing	
Hallwood	Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	Flood	Town Staff, Coordinator (*if regional position created/funded)	3.1	2011	Ongoing	Ongoing	
Hallwood	Provide educational information to residents about the burn permit process.	Fire	Town Staff, County Emergency Management	3.1	2011	Ongoing	Ongoing	
Hallwood	Investigate the use of large drainage ditches as fuel breaks to mitigate wildfires.	Fire, Storm Water Flood	Town Staff, County Emergency Management	2.2	2011	Not Started	Not Started	Lack of Staff, Funding
Hallwood	Encourage water conservation among residents during droughts.	Drought	Town & County Staff	3.2	2011	Ongoing	Ongoing	
Hallwood	Removal of dilapidated structures	Flood, Fire, Wind	Town Council	1.2, 2.1, 2.2	2016	Ongoing	Ongoing	
Hallwood	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.	Flood	Town Staff, Coordinator (*if regional position created/funded)	3.1	2011	Complete	Complete	
Keller	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Keller Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town. Plan update	Not Started	Ongoing	No Town Plan update yet
Keller	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1	2011	Not Started	Ongoing	Lack of Staff

Keller	Join the National Flood Insurance Program.	Flood	Town Staff, Residents	1.1	2011	Not Started	Ongoing	In process of joining
Keller	Cooperate with Accomack County to implement the Emergency Operations Plan to put residents at less risk during an emergency.	ALL	Town & County Staff	1.1	Post-declared disaster	Ongoing	Ongoing	
Keller	Maintain and ensure adequate drainage ditches to mitigate stormwater flooding problems in Keller.	Storm Water Flood, Biohazard	VDOT, Town must request	2.2	2011	Not Started	Ongoing	
Melfa	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Melfa Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town. Plan update	Not Started	Not Started	No Town Plan update yet
Melfa	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1	2016	Not Started	Not Started	Lack of Staff
Melfa	Cooperate with Accomack County to implement the Emergency Operations Plan to put residents at less risk during an emergency.	ALL	Town & County Staff	1.1	Post-declared disaster	Ongoing	Ongoing	
Melfa	Maintain and ensure adequate drainage ditches to mitigate stormwater flooding problems in Melfa. Install culvert pipes where needed to mitigate stormwater flooding on Woodland Avenue and anywhere else needed.	Storm Water Flood, Biohazard	VDOT, Town Staff	2.2	2016	Not Started	Ongoing	
Melfa	Construct a pavilion facility with electricity for use as a staging area following a hazard event.	ALL	Town, FEMA	4.2	2016	Not Started	Not Started	Funding
Melfa	Purchase a mobile generator that can be used at any facility (including the pavilion distribution area) during a prolonged power outage.	Wind, Ice & Snow	Town, FEMA	4.2	2016	Not Started	Not Started	Funding
Onancock	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Onancock Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town. Plan update	Ongoing	Complete	2021 update in progress
Onancock	Mitigate the Town's infrastructure against flooding and wind.	Flood, Wind	Town, Residents, FEMA	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Onancock	Retrofit Town sewage pump station and manholes to prevent damages from flooding and maintain continuous operation during flood events.	Flood	Town Public Works	4.2	Post-declared disaster	Not Started	Not Started	Funding

Onancock	Retrofit the Onancock Town Office, Police Department Office, and Town fuel tank pumps for generator hookups.	ALL	Town, FEMA	4.2	Post-declared disaster	Not Started	Not Started	Funding
Onancock	Purchase portable generator (for fuel tank pumps, etc.)	Flood, Wind, Ice & Snow	Town, FEMA	4.2	2016	Not Started	Not Started	Funding
Onancock	Participate in the Community Rating System (CRS) to create a discount for Town residents.	Flood	Town Staff, Residents, Coordinator (*if regional position created/funded)	1.2, 3.2	2016	Not Started	Not Started	Staffing
Onancock	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1, 5.2	2016	Not Started	Ongoing	Lack of outreach materials
Onancock	Cooperation with Accomack County to implement the Emergency Operations Plan to put residents at less risk during an emergency.	ALL	Town & County Staff	1.1	Post-declared disaster	Ongoing	Ongoing	
Onancock	Removal of dilapidated structures.	Flood, Fire, Wind	Town Staff	1.2, 2.1, 2.2	2021	-	Ongoing	
Onancock	Conduct Storm Water Management studies and draft Plans	Flood	Town Staff	2.2	2021	-	Not Started	Staffing
Onley	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Onley Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Complete	
Onley	Mitigate the Town's Infrastructure against flooding and wind.	Flood, Wind	Town, Residents, FEMA	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Onley	Join the National Flood Insurance Program.	Flood	Town Staff, Residents, Coordinator (*if regional position created/funded)	1.1	2011	Not Started	Complete	
Onley	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1	2011	Not Started	Ongoing	
Onley	Take the necessary actions to satisfy pre-requisites for mitigation funding (e.g., maintain stormwater event log).	Storm Water Flood, Biohazard	Town Public Works	1.1	2011	Not Started	Not Started	Staffing

Onley	Cooperate with VDOT to mitigate stormwater drainage in Onley.	Storm Water Flood, Biohazard	VDOT, Town	2.1	2011	Not Started	Ongoing	
Painter	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Painter Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	-	Not Started	No Plan update yet
Painter	Maintain and ensure adequate drainage ditches to mitigate stormwater flooding problems.	Storm Water Flooding, Biohazards	VDOT, Town Staff	2.1, 2.2, 4.1	2021	-	Ongoing	
Painter	Cooperate with Accomack County to implement the Emergency Operations Plan to put residents at less risk during an emergency.	ALL	Town & County Staff	1.1	2021	-	Ongoing	
Painter	Mitigate against natural disasters	ALL	Town, Residents, FEMA	2.1, 2.2	2021	-	Ongoing	
Parksley	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Parksley Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Not Started	No Plan update yet
Parksley	Mitigate against natural disasters.	ALL	Town, Residents, FEMA	2.1, 2.2	2016	Ongoing	Ongoing	
Parksley	Retrofit the undersized box culverts in Parksley to mitigate stormwater flooding.	Storm Water Flood, Biohazard	VDOT, Town must request	2.1	2011	Not Started	Not Started	Funding
Parksley	Coordinate with VDOT for proper maintenance of roads that need to have the levels lowered.	Storm Water Food, Biohazard	VDOT, Town	2.1	2016	Not Started	Not Started	Funding
Parksley	Promote Hazard Mitigation at local community events and meetings. Acquire or develop materials to cater to the increasing diversity of the population.	ALL	Town & County Staff	3.1, 3.2, 5.1	2011	Ongoing	Ongoing	
Parksley	Regular maintenance of the stormwater drains and the ditches to prevent flooding.	Storm Water Flood, Biohazard	VDOT – Town must request	2.1, 4.1	2016	Not Started	Not Started	
Parksley	Develop multi-lingual emergency plans, preparedness handouts, and evacuation plans.	ALL	Town & County Staff	1.3, 3.2, 5.1, 5.2	2016	Not Started	Ongoing	
Parksley	Backup power for electric substation supplying Parksley and resistors on feeder lines from the substation.	Ice & Snow, Wind	ANEC, County	4.2	2016	Not Started	Not Started	Funding

Parksley	Establish weather station.	Flood, Drought, Heat Wave, Wind, Ice & Snow	NWS, Town must initiate	3.1. 3.2	2016	Not Started	Not Started	Funding
Parksley	Additional street lighting.		Town	1.2	2016	Not Started	Complete	
Parksley	Retrofit the pavilion roof (staging area and farmers market location) to withstand higher wind conditions.	Wind	Town, FEMA	1.2, 2.2, 4.2	2016	Not Started	Ongoing	
Parksley	Acquire generator for the Town Office.	ALL	Town, FEMA	4.2	2016	Not Started	Not Started	Funding
Parksley	Install evacuation signage.	ALL	Town, County, State	3.1	2016	Not Started	Not Started	Funding
Saxis	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Saxis Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Not Started	No Plan update yet
Saxis	Retrofit the Saxis Town Hall and Firehouse to protect against wind and flood hazards.	Wind, Flood	Town, FEMA	2.1, 2.2	Post-declared disaster	Not Started	Complete	
Saxis	Obtain funding to construct an erosion control structure along the western shoreline of the Town.	Erosion	Town must initiate	2.1	Post-declared disaster	Actively Seeking Funding	Actively Seeking Funding	
Saxis	Retrofit harbor infrastructure to mitigate against wind, coastal erosion and flooding.	Erosion, Flood, Wind	Town must initiate	2.1	Post-declared disaster	Actively Seeking Funding	Actively Seeking Funding	
Saxis	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	3.1	2011	Ongoing	Ongoing	
Saxis	Explore CRS	Flood	Town Staff, Coordinator (*if regional position created/funded)	2.1	-	Not Started	Ongoing	
Saxis	Education and outreach to new and transient or seasonal guests or residents.	ALL	Town & County Staff	3.1, 3.2	-	Not Started	Ongoing	
Tangier	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Tangier Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Not Started	No Plan update yet

Tangier	Mitigate erosion, flooding, and wind hazards in Tangier.	Erosion, Flood, Wind	Town, FEMA	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Tangier	Retrofit the undersized box culverts in Tangier and have regular maintenance to ensure culverts are not blocked to mitigate stormwater flooding problems.	Storm Water Flood, Biohazard	VDOT, Town must request	2.1	Post-declared disaster	Not Started	Not Started	Funding
Tangier	Retrofit critical facilities in Tangier with backup power supplies.	Flood, Wind, Ice & Snow	Town	4.2	2011	Ongoing	Ongoing	
Tangier	Obtain funding to purchase an emergency boat for the Tangier Fire Department to better protect residents and structures from fire damage during flood events	Fire, Flood	Town, FEMA	4.2	2011	Not Started	Not Started	Funding
Tangier	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	1.1, 1.2, 3.1, 3.2, 5.1, 5.3	2011	Ongoing	Ongoing	
Tangier	Properly maintain and regularly sample the Town wells to ensure safe water supply and a system that is able to cope with a dynamic natural system.	Well Contamination	Town	2.1, 2.2	2016	Ongoing	Ongoing	
Tangier	Retrofit the electric line elevated power point on Watts Island, which is currently being negatively impacted by erosion, to ensure continued, uninterrupted power on the Island.	Flood, Erosion, Wind	ANEC	2.1, 2.2, 4.1	2016	Ongoing	Ongoing	ANEC willing, permit process challenging
Tangier	Repair and reinforce the sea wall on the western shore of the Island to reduce erosion and protect the airfield.	Erosion, Flood	FEMA, USACE, Town must request	2.1, 2.2, 4.2	2016	Ongoing	Complete	
Tangier	Create shoreline protection on the eastern shore of the Island.	Erosion, Flood	FEMA, USACE, Town must request	2.1, 2.2	2016	Ongoing	Ongoing	Working with A-NPDC
Tangier	Investigate use of sediment (from dredging operations) to address marsh loss.	Erosion, Flood	FEMA, USACE, Town must request	2.1, 2.2	2016	Ongoing	Ongoing	Working with A-NPDC
Tangier	Work towards having the health center as the location for an emergency shelter, as it is the best rated against winds, etc.	ALL	Town	2.1, 2.2	2016	Not Started	Ongoing	

Tangier	Create and implement a mosquito control plan to prevent potential illnesses such as Zika.	Biohazards	Town	2.1, 3.2	2016	Not Started	Not Started	Funding
Tangier	Work with VDOT on current issues with the roads and on a long-term plan for addressing flooding and SLR.	ALL	VDOT, Town must request	2.1, 2.2, 4.1	2016	Not Started	Not Started	Funding, VDOT
Wachapreague	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Wachapreague Town Plan.	ALL	Town Staff	2.1, 2.2	During next Town Plan update	Not Started	Ongoing	
Wachapreague	Mitigate the Town's Infrastructure against flooding and wind.	Flood, Wind	Town, FEMA	2.1, 2.2	Post-declared disaster	Ongoing	Ongoing	
Wachapreague	Manage a Residential Elevation and Mitigation Project, using benefit-cost analysis provided by FEMA to target structures at risk to flooding.	Flood	Town	2.1	Post-declared disaster	Ongoing	Ongoing	
Wachapreague	Attain "High Water" and "Flooding" signs to be used primarily along Atlantic Ave. during flood events.	Flood	Town	4.1	Post-declared disaster	Ongoing	Complete	
Wachapreague	Cooperate with VDOT to mitigate stormwater drainage in Wachapreague.	Storm Water Flood, Biohazard	VDOT, Town must request	2.2	2011	Ongoing	Ongoing	
Wachapreague	Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	Flood	Town Staff, Coordinator (*if regional position created/funded)	3.1	2011	Ongoing	Ongoing	
Wachapreague	Conduct public education and outreach efforts within Town to raise awareness of hazard mitigation.	ALL	Town & County Staff	3.1	2011	Ongoing	Ongoing	
Wachapreague	Develop and implement a plan to use available funds (from the County perhaps) to start a clean-up of all Town drainage ditches.	Storm Water Flood, Biohazard	VDOT, Town	1.2, 2.1	2016	Not Started	Ongoing	
Wachapreague	Encourage Town residents to maintain any ditches connected to their properties.	Storm Water Flood, Biohazard	Town, Residents	3.2	2016	Not Started	Ongoing	

Wachapreague	Develop project(s) that would minimize major storm wave damage to the Town's commercial and residential structures by rebuilding the berm/dyke on the east side of the Wachapreague Channel.	Flood, Erosion	FEMA, USACE, Town must request	1.2, 2.1	2016	Ongoing	Not Started	Working with USACE
Wachapreague	Identify and implement program(s) to reduce the loss of marshes and bay grasses and support their enhancement from increased exposure due to the erosion of the southern portion of Cedar Island.	Erosion, Flood	FEMA, USACE, Town must request	1.2, 2.1	2016	Ongoing	Ongoing	Working with USACE
Wachapreague	Relocate Wachapreague Town Hall out of the 7-foot Flood Plain.	Erosion, Flood	Town & County Staff	2.1, 2.2	2021	-	Not Started	
Wachapreague	Relocated Wachapreague Fire Company Station out of the 7-foot Flood Plain.		ALL	1.1, 2.1 2.2	2021	-	Not Started	

*The Town of Accomac did not provide any Mitigation Strategies

CHAPTER 32: 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.

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, 2022, 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 Comprehensive 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.

See Chapter 2, page 7 and 8 for additional information about plan maintenance and evaluation.

IDENTIFIED MITIGATION GOALS & STRATEGIES – TOWN OF CHINCOTEAGUE

Goal 1 - The Hazard Mitigation Plan will serve as a guide to local governments for comprehensive mitigation to include public education and ongoing hazard assessments.
Strategy 1.1 – Ensure emergency management and government operations can continue during and after a hazard event.
Goal 2 - Improve resiliency through harnessing community partnerships (residents, businesses, local governments, and other community partners) working to minimize disruption during and following hazard events.
Strategy 2.1 – Retrofit housing to withstand a 1%-annual-chance 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.*
Goal 3 - Local governments encourage self-sufficiency and personal responsibility for managing risk.
Strategy 3.1 – Promote the benefits of flood insurance from the National Flood Insurance Program. *Strategy 3.2 – Expand outreach and education of residents and businesses on potential hazards.*
Goal 4 - Local governments will work to improve infrastructure for resiliency and provide the appropriate redundancies for the operations of critical infrastructure during an 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.*
Goal 5 - Local governments will make efforts to reach all populations during preparation to, response of and mitigation of all risks.
Strategy 5.1 – Identify locations of seasonal housing including mobile homes, campgrounds, etc.

IDENTIFIED MITIGATION PROJECTS – TOWN OF CHINCOTEAGUE

Goal 1 – Local Governments Guide a Comprehensive Mitigation Program Including Public Education and Ongoing Hazard Assessments							
Strategy 1.1 – Ensure emergency management and government operations can continue during and after a hazard event.							
Priority Rank	**Town of Chincoteague – Goal 1: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Set a regional compatibility standard for emergency communications	ALL	ESDPC	2006	Ongoing	Ongoing	
1	Study and map critical infrastructure including new FEMA wave analysis	Flood	Planning & Zoning	2013	Not Started	Complete	
1	Investigate potential tertiary locations for a Chincoteague Emergency Operations Center located off the Island in northern Accomack County	ALL	Emergency Services	2009	Ongoing	Complete	
1	Raise, retrofit, or replace Causeway with a bridge so the Island is still accessible during flooding events	Flood	VDOT	2016	Not Started	Not Started	Funding
Priority Rank	**Town of Chincoteague – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Conduct a Phase 2 Storm Water Master Plan to improve drainage infrastructure for the Town and mitigate flooding hazards	Storm Water Flood, Biohazard	Public Works	2006	Complete	-	
-	Produce Responder Bilingual Cards	ALL	ESDPC & Health Dept	2006	Complete	-	
-	Obtain more changeable warning signs	ALL	VDOT	2006/2021	Complete	Ongoing	
-	Upgrade communications systems and provide for backup in the event of communication failure	ALL	ESDPC, Town	2009/2021	Complete	Not Started	
-	Coordinate studies and maps with Emergency Operations Plan and Comprehensive Plan	ALL	Planning & Zoning	Annually	Ongoing	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, Local Governments, and other Community Partners Will Work Independently and Together to Minimize Community Disruption Through Planning and Mitigation Activities							
Strategy 2.1 – Retrofit housing to reduce risk of coastal flooding *Strategy 2.2 – Utilize mitigation funds made available following a natural hazard event to retrofit commercial and residential structure to withstand flooding or other hazards*							
Priority Rank	**Town of Chincoteague – Goal 2: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Partner with federal agencies to perform beach nourishment on Assateague Island to mitigate erosion and flooding hazards	Erosion, Flood	NPS, USFWS, USACE	2016	Ongoing	Ongoing	
1	Mitigation of flood prone properties to include acquisition, elevation, relocation, dry and wet flood proofing, mitigation reconstruction for NFIP defined SRL properties, and drainage infrastructure improvements	Flood, Erosion, Storm Water	A-NPDC & Town	Post-declared disaster	Ongoing	Some Complete, Ongoing	
1	Prepare and plan for mitigation of coastal erosion along the southern shoreline	Erosion, Flood	Planning Council	2012	Not Started	Ongoing	
1	Flood proof commercial buildings along Main Street to mitigate flooding hazards	Flood	Town & Main Street Merchants	2012	Not Started	Not Started	
1	Use hazard mitigation funds to retrofit commercial and residential structures	Flood	Building & Zoning	Post-declared disaster	Ongoing	Ongoing	
1	Manage a home elevation project; using a cost-benefit analysis, focus on reducing risk to the most vulnerable primary housing	Flood	Building & Zoning	Post-declared disaster	Ongoing	Ongoing	
1	Investigate the possibility of shoulders or enlarging pull-offs on the causeway to aid traffic control during evacuations	Flood, Fire, Snow, Ice	VDOT	2006	Not Started	Not Started	Funding
4	Increase the safety of residents and visitors by increasing shoulders and improving sidewalks	Flood, Fire, Ice	VDOT	2016	Not Started	Sidewalks Ongoing	
Priority Rank	**Town of Chincoteague – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Increase the safety of residents and visitors by replacing the bridge	ALL	VDOT	2006	Complete	-	
-	Protect new construction by continuing to enforce the building code provisions protecting structures from flooding and wind events	Flood, Wind, Fire	Building & Zoning	Ongoing	Ongoing	Ongoing	
-	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Chincoteague Comprehensive Plan	ALL	Planning Council	2011/2015	Complete	-	

Goal 3 – Local Governments Encourage Self-sufficiency and Personal Responsibility for Managing 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 hazards.*							
Priority Rank	**Town of Chincoteague – Goal 3: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Implement a public information campaign on the benefits of flood insurance with a focus on Chincoteague's local needs.	Flood	Town	Annually	Ongoing	Ongoing	
1	Protect new construction by continuing to enforce the building code provisions protecting structures from flooding and wind events.	Wind, Flood, Fire	Building & Zoning	Ongoing	Ongoing	Ongoing	
Priority Rank	**Town of Chincoteague – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Start a public information campaign on the benefits of flood insurance with a focus on Chincoteague's local needs.	Flood	Town	2006/2007	Complete, Ongoing	Complete, Ongoing	
-	Review FEMA Region III Coastal Analysis Risk Map and amend Town ordinances, if required.	Flood	Planning Council	2012	Complete, Ongoing	Complete, Ongoing	
-	Develop and provide residents and businesses with hazard risk assessment maps and response plan. Consider creating in non-English language(s) as well. Distribute to transient population/visitors through chamber and rental companies.	ALL	Planning Council	2012	Complete, Ongoing	Complete, Ongoing	

Goal 4 – Local Governments to Ensure Infrastructure will Continuously Function During and After a 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	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	Storm Water, Biohazards	Public Works	2012	Ongoing	Ongoing	
1	Develop enforceable standards for fill and drainage to mitigate flooding hazards.	Flood, Storm Water, Biohazards	Town	2012	Ongoing	Ongoing	
2	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.	Flood, Fire, Ice, Snow	VDOT, State	2011	Not Started	Not Started	Funding
Priority Rank	**Town of Chincoteague – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Obtain and install a generator on the high-rise water tower in the Town	ALL	Public Works	2008/2021	Ongoing	Complete	
-	Develop a cooperative agreement between Chincoteague and the U.S. Fish and Wildlife Service and incorporate a short-term response plan to ensure access to the Assateague Island National Seashore following a hazard event	ALL	Town, USFWS, NPS	2011	Ongoing	Complete	

Goal 5 – Local Governments will Make Efforts to Reach Functional and Access Needs Population							
Strategy 5.1 – Identify locations of seasonal housing including mobile homes, campgrounds, etc.							
Priority Rank	**Town of Chincoteague – Goal 5: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Identify and map tourist lodging for use in emergencies	ALL	Town & USFWS	2006	Ongoing	Ongoing	
1	Identify locations of functional and access needs populations using newest U.S. Census data and emergency management/response personnel personal knowledge	ALL	Planning Council & EMS	2011	Ongoing	Ongoing	
1	Coordinate functional and access needs assessment into the Town's Emergency Operations Plan	ALL	Planning Council & EMS	2011	Ongoing	Ongoing	
Priority Rank	**Town of Chincoteague – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	-	-	-	-	-	-	-

CHAPTER 33: NORTHAMPTON COUNTY MITIGATION STRATEGIES

Northampton County is the southernmost 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.

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, 2022, 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 the 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.

See Chapter 2, page 7 and 8 for additional information about plan maintenance and evaluation.

IDENTIFIED MITIGATION GOALS & STRATEGIES – NORTHAMPTON COUNTY

Goal 1 - The Hazard Mitigation Plan will serve as a guide to local governments for comprehensive mitigation to include public education and ongoing hazard assessments.
Strategy 1.1 – Increase the capacity of Northampton mitigation program through training and coordination with federal, state and local governments.
Goal 2 - Improve resiliency through harnessing community partnerships (residents, businesses, local governments, and other community partners) working to minimize disruption during and following hazard events.
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.*
Goal 3 - Local governments encourage self-sufficiency and personal responsibility for managing 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.*
Goal 4 - Local governments will work to improve infrastructure for resiliency and provide the appropriate redundancies for the operations of critical infrastructure during an 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.*
Goal 5 - Local governments will make efforts to reach all populations during preparation to, response of and mitigation of all risks.
Strategy 5.1 – Improve communications with special needs residents before and after hazard events.

IDENTIFIED MITIGATION PROJECTS – NORTHAMPTON COUNTY

Goal 1 - Local Governments Guide a Comprehensive Mitigation Program including Public Education and Ongoing 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Major upgrade of police, fire and EMS communication system to include providing interoperability and redundancy	ALL	911	2021	-	Ongoing	
1	Identify areas that are flood-prone, impacted by erosion, coastal flooding or stormwater then either acquire property, limit development rights or mitigate with stormwater best management practice.	Flood	A-NPDC and County	2021	-	Ongoing	
1	Recommend that the Town of Cape Charles identify potential shelter locations within the town in case the town becomes isolated during an emergency.	ALL	Emergency Services	2006	Not Started	Not Started	
1	Evaluate and develop a priority list of residential and commercial properties that qualify for the HMGP	Flood	A-NPDC & localities	2011	Ongoing	Ongoing	
3	Institute a recruitment program for volunteer firefighters and EMS. Publicize details on how to volunteer on the County website.	Fire	County	2006/2007	Ongoing	Ongoing	
Priority Rank	**Northampton County – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Produce Responder Bilingual Cards with English on back. An example of the type of message to be included is "Do not drink the water."	ALL	Health Department & ESDPC	2006/2006	Complete*	Complete	
-	Obtain more changeable warning signs	ALL	VDOT	2006/2006	Complete	Complete	
-	Create a formal waiting list of residential and commercial projects for the Hazard Mitigation Grant Program.	ALL	County	2006	Complete	Complete	
-	Upgrade communications systems and provide for backup in the event of a communication failure, provide for interoperability and redundancy	ALL	911	2006/2009	Complete	Ongoing	
-	Set a regional compatibility standard for emergency communications	ALL	911	2006	Ongoing	Complete	
-	Upgrade communications systems and provide for backup in the event of a communication failure, provide for interoperability and redundancy	ALL	911	2011	Ongoing	Complete	

*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, Local Governments, and other Community Partners Will Work Independently and Together to Minimize Community Disruption Through Planning and 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Maintain a Conservation Preservation Zoning District encompassing coastal areas.	Flood, Erosion, Well Cont.	County	2006	Ongoing	Ongoing	
1	Enforce the primary dune ordinance.	Flood, Erosion, Well Cont.	Planning & Zoning	2006	Ongoing	Ongoing	
1	Consider incentives in the zoning ordinance for developers who reserve land or take other measures to preserve the resource protection area.	Flood, Erosion, Well Cont.	Planning Commission & BOS	2006	Not Started	Not Started	Staff
1	Enforce buffer zone widths set forth in the zoning ordinance along the bayside and seaside waterfront.	Flood, Erosion, Well Cont.	Planning & Zoning	2006	Ongoing	Ongoing	
1	Revise floodplain management regulations aligned with new FEMA guidance	ALL	Planning & Zoning	2011/2012	Ongoing	Ongoing	
1	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Northampton County Comprehensive Plan.	ALL	Planning & Zoning	2011/During next update	Ongoing	Ongoing	
1	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).	Flood	Planning & Zoning, A-NPDC	Post-declared disaster	Not Started	Not Started	A-NPDC requested for input
Priority Rank	**Northampton County – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Conduct a drainage survey of Cheapside	Storm Water	Planning & Zoning	2006/2007	Complete	Complete	
-	Manage a Residential Mitigation Project	ALL	Emergency Services	Post-declared disaster	Complete	Complete	
-	After any presidential declared disaster, manage Residential and Commercial Mitigation Projects that address the most critical damage that has occurred.	ALL	Emergency Services	Post-declared disaster	Complete	Complete	
-	Install new storm shutters to withstand hurricane winds on EOC building	Wind	Emergency Services	2006/2009	Complete	Complete	

Goal 3 – Local Governments Encourage Self-Sufficiency and Personal Responsibility for Managing Risk							
Strategy 3.1 – Increase resident preparedness in the County *Strategy 3.2 – Educate residents about flood insurance availability and encourage participation in the National Flood Insurance Program*							
Priority Rank	**Northampton County – Goal 3: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Notify and encourage residents to purchase contents and structure flood insurance to all homes and business located in the County's regulated flood zones	Flood	Planning Commission	2006/Yearly	Ongoing	Ongoing	County does not mail to residents
1	Provide updated preparedness information on the County's website to include materials for the Hispanic population	ALL	Emergency Services	2011/2007	Ongoing	Ongoing	
Priority Rank	**Northampton County – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	Investigate whether to pursue a better CRS rating to reduce flood insurance premiums for County residents	Flood	County	2006/2008	Complete	-	
-	Provide preparedness information on the County website	ALL	Emergency Services	2006/2007	Complete, Ongoing	Complete, Ongoing	EverBridge alert system available

Goal 4 - Local Governments Will Work to Ensure That Infrastructure Will Continuously Function During and After a 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**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	Assess and identify emergency generator power serving public water and wastewater systems for adequacy.	Wind, Ice & Snow, Heatwave	Public Works	2011/2011	Complete	Complete	
1	Retrofit existing emergency shelters against flooding and wind including backup power supplies.	Flood, Wind	Emergency Services	2011/2012	Ongoing	Ongoing	
1	Identify and mitigate drainage problems at major intersections along Route 13 in Northampton County.	Storm Water Flood, Biohazards	VDOT	2011/2012	Ongoing	Ongoing	Maintenance improvements
1	Shelter with back-up power will be considered with the prior middle school upgrades.	Flood, Wind	County & Emergency Services	2021	-	Ongoing	
3	Encourage food service and gas stations to have emergency generators.	Flood, Wind, Storm Water	County	2021	-	Ongoing	
Priority Rank	**Northampton County – Completed Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year/Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
-	• Retrofit three lights for backup power to facilitate traffic movement during a large power outage. • The light serving the hospital at Rogers Drive (Rt. 606) and Route 13 in Nassawadox • A light at the following intersections, Rt. 13 and Rt. 178 in Belle Haven • The light at Stone Road (Rt. 184) and Route 13 serving the Town of Cape Charles.	ALL	VDOT	2006/2009	Complete	Complete	
-	Assess and identify emergency generator power serving public water and wastewater systems for adequacy.	Wind, Ice & Snow, Heatwave	Public Works	2011/2011	Complete	Complete	

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. *Strategy 5.2 – Improve cellular and internet capabilities*							
Priority Rank	**Northampton County – Goal 5: Description of Projects**	**Hazard(s) Addressed**	**Responsible Department**	**HMP Year / Start Timeline**	**Status as of 2016**	**Status as of 2021**	**Add'l. Info.**
1	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.	ALL	Emergency Services	2011	Not Started	Ongoing	Prior to a hazard event, EMS identifies residents in hazardous situations
1	Work with VDH to maintain a list of seasonal migrant housing locations.	ALL	Emergency Services & ESDPC	2011	Ongoing	Ongoing	EMS works with VDH to identify locations pre-storm
1	Consider plan for sheltering of domestic pets.	ALL	Emergency Services	2011	Still Considering	Ongoing	
1	Increase citizen opt-in to emergency alert system.	ALL	Emergency Services	2021	-	2021	
Completed Projects							
-	Acquire and implement an updated communications system that can be used for citizen notifications.	ALL	Emergency Services	2011	Complete	Complete	

IDENTIFIED MITIGATION PROJECTS – NORTHAMPTON COUNTY TOWNS

Town	Action	Hazard(s) Addressed	Responsible Party	Strategy	HMP Year/Start Timeline	2016 Status	2021 Status	Add'l. Info.
Cape Charles	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Cape Charles Town Plan.	ALL	Town Planning & Zoning Staff	2.1, 2.2	next Town Plan update	Not Started	Complete	
Cape Charles	Mitigate the Town's Infrastructure against flooding and wind.	Flood, Wind	Town Building/Code Enforcement + Planning & Zoning Staff	2.2	Post-Declared Disaster	Ongoing	Ongoing	
Cape Charles	Maintain records of stormwater flooding events.	Storm Water Flood, Biohazard	Town Public Works & Utilities Staff	2.2	2011	Ongoing	Ongoing	
Cape Charles	Take actions to improve Community Rating System ranking in order to decrease residents' flood insurance rates.	Flood	Town Building/Code Enforcement + Planning & Zoning Staff	2.2	2011	Ongoing	Ongoing	
Cape Charles	Mitigate risk to Town water supply by constructing new water tower on south side of Town.	Well Contamination, Wind	Town Public Works & Utilities Staff	2.3	Unknown	Not Started	Not Started	Funding
Cape Charles	Implement coastal erosion mitigation actions into the Town's Beach Management Plan.	Erosion	Town Planning & Zoning Staff	2.2	2011	Ongoing	Ongoing	
Cape Charles	Promote Hazard Mitigation at local community events and meetings.	ALL	Town Staff, Manager, & Mayor	1.1, 3.2	2011	Ongoing	Ongoing	
Cape Charles	Educate residents, real estate agents, and lenders about recent changes to flood zones in the Town.	Flood	Town Building/Code Enforcement + Planning & Zoning Staff	1.1, 3.2	2016	Not started	Ongoing	

Town	Action	Hazard(s) Addressed	Responsible Party	Strategy	HMP Year/Start Timeline	2016 Status	2021 Status	Add'l. Info.
Cheriton	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Cheriton Town Plan	ALL	Town Staff	1.1	During next Plan update.	Not Started	Ongoing	
Cheriton	Cooperate with VDOT to mitigate stormwater drainage in Cheriton.	Storm Water Flood, Biohazards	Town Staff, VDOT	2.2, 4.1	2016	Not Started	Ongoing	
Cheriton	Develop and implement a drainage plan to ensure appropriate repairs and regular maintenance to prevent stormwater flooding in the Town.	Storm Water Flood, Biohazards	Town Staff, or contracted entity	2.2, 4.1	2016	Not Started	Ongoing	
Cheriton	Promote Hazard Mitigation at local community events and meetings.	ALL	Town Staff	1.1, 3.1, 3.2	2016	Not Started	Ongoing	
Cheriton	Develop and distribute multilingual emergency plan & preparedness handouts/signage.	ALL	Northampton County, Town	3.2, 5.1	2016	Not Started	Ongoing	
Cheriton	Work with VDOT to ensure safety of major intersection at Route 13, which is featured in the VDOT Safety Study of April 2016. Most likely adding an arrow to the traffic light signal.	ALL	Town, VDOT	2.3, 4.1	2016	Not Started	Complete	
Eastville	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Eastville Town Plan	ALL	Town Staff	2.1, 2.2	During next Plan update.	Not Started	Complete	
Eastville	Adopt minimum standards such that the Town can participate in the National Flood Insurance Program	Flood	Town Staff	1.1	2011	Not Started	Complete	
Eastville	Cooperate with VDEQ to ensure adequate water supply and quality.	Well Contamination, Drought, Heat Wave	Town Staff, VDEQ	2.2	2011	Started	Complete	
Eastville	Upgrade aging water distribution lines in Eastville.	Well Contamination, Drought, Biohazards	Town Staff	4.1	2011	Not Started	Ongoing	
Eastville	Cooperate with VDOT to mitigate stormwater drainage in Eastville.	Storm Water Flood, Biohazards	Town Staff, VDOT	2.2	2011	Not Started	Ongoing	
Eastville	Promote Hazard Mitigation at local community events and meetings.	ALL	Town & County Staff	1.1	2011	Ongoing	Complete	
Eastville	Conduct a drainage survey of the Town as well as the areas to the east and south of the Town	Storm Water Flood, Biohazard	Town & County Staff	2.2, 2.3	2021	-	Not Started	

Town	Action	Hazard(s) Addressed	Responsible Party	Strategy	HMP Year/Start Timeline	2016 Status	2021 Status	Add'l. Info.
Exmore	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Exmore Town Plan	ALL	Town Manager & Clerk	1.1	2011 / During next Town Plan update.	Partially Complete	Complete	.
Exmore	Conduct public education and outreach efforts within Town to raise awareness and promote participation of the NFIP.	Flood	Town Staff	3.1, 3.2, 5.1	2011	Not Started	Not Started	Staff Expertise
Exmore	Replace the Town's aging public water supply wells.	Well Contamination	Town Staff	2.3, 4.2	2011	Not Started	Completed	
Exmore	Cooperate with VDOT and the County to mitigate stormwater drainage in Exmore.	Storm Water Flood, Biohazard	Town Staff, VDOT	2.2, 4.1	2011	Not Started	Ongoing	
Exmore	Produce a drainage and stormwater study of Exmore's flooding issues in downtown.	Storm Water Flood, Biohazard	Town Staff	2.2, 4.1, 4.2	2011	Not Started	Not Started	Funding, Coordination
Exmore	Upgrade aging water distribution lines in Exmore.	Well Contamination	Town Staff	4.2	2011	Not Started	Not Started	Funding
Exmore	Culvert Hadlock Lane ditch to mitigate erosion.	Erosion, Storm Water Flood, Biohazard	VDOT	2.2, 4.1	2016	Not Started	Not Started	Funding, Coordination
Exmore	Develop emergency plan to utilize treated gray water for fire suppression.	Fire, Well Contam.	Town Staff, County Emergency Management	4.3	2016	Not Started	Not Started	Funding, Staff Expertise
Exmore	Conduct a drainage and storm water study of the Downtown area	HazMat, Well Contamination, Storm Water Flood, Biohazard	Town Staff	2.2	2021	-	Not Started	

Town	Action	Hazard(s) Addressed	Responsible Party	Strategy	HMP Year/Start Timeline	2016 Status	2021 Status	Add'l. Info.
Nassawadox	Incorporate the Eastern Shore of Virginia Hazard Mitigation Plan into the Nassawadox Town Plan	ALL	Town Staff	1.1	During next Town Plan update.	Not Started	Ongoing	Town is seeking assistance
Nassawadox	Cooperate with VDEQ and others to ensure adequate water supply and quality.	Well Contamination	Town Staff, Riverside, VDEQ, GWC	4.2	2016	Not Started	Ongoing	
Nassawadox	Cooperate with VDOT to mitigate stormwater drainage in Nassawadox.	Storm Water Flood, Biohazard	Town, VDOT	2.2, 4.1	2016	Not Started	Ongoing	
Nassawadox	Develop and implement a drainage plan to ensure appropriate repairs and regular maintenance to prevent stormwater flooding in the Town.	Storm Water Flood, Biohazard	Town, VDOT	2.2, 4.1	2016	Not Started	Ongoing	
Nassawadox	Promote Hazard Mitigation at local community events and meetings.	ALL	Town	1.1, 3.1, 3.2	2016	Not Started	Ongoing	Staff
Nassawadox	Replace flat roofing of critical facilities and residential structures with pitched roofs built to (or to exceed) minimum wind standards.	Wind	Town, FEMA	2.1, 2.2, 2.3, 4.3	2016	Not Started	Not Started	Funding
Nassawadox	Develop a location that could serve as the Town Hall and a staging area, equip this building with a generator.	ALL	Town, FEMA	4.3	2016	Not Started	Complete	Funding
Nassawadox	Coordinate with The Nature Conservancy to address drainage issues in Town	Storm Water Flood, Biohazard	Town, TNC	2.2, 4.1	2021	-	Ongoing	
Nassawadox	Develop Storm Water Plan to assist in the maintenance of drainage ditches	Storm Water Flood, Biohazard	Town Staff	2.2, 4.1	2021	-	Not Started	Ditch maintenance is ongoing

APPENDIX A: REFERENCES

HAZARD MITIGATION PLAN REFERENCES

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APPENDIX B: HAZUS® RISK ANALYSIS

HAZUS® RISK ANALYSIS

Hazus® version 5.1 is a nationally standardized risk modeling methodology that identifies areas with high risk for natural hazards and estimates physical, economic, and social impacts of earthquakes, hurricanes, floods, and tsunamis.

Managed by FEMA's Natural Hazard Risk Assessment Program, Hazus® partners with other federal agencies, research institutions, and regional planning authorities to ensure the latest scientific and technological approaches are applied to determine potential losses from disasters and to identify the most effective mitigation actions for minimizing those losses.

Hazus® can quantify and map risk information such as:

- **Physical Damage** to residential and commercial buildings, schools, critical facilities, and infrastructure.
- **Economic Loss** to include job loss, business interruptions, and repair and reconstruction costs.
- **Social Impacts** to include estimates of displaced households, shelter requirements, and populations exposed to floods, earthquakes, hurricanes, and tsunamis.
- **Cost Effectiveness** of common mitigation strategies, such as elevating structures in a floodplain or retrofitting unreinforced masonry buildings.

Each Hazus® model uses inventory information (buildings, infrastructure, and population), hazard extent and intensity data, and damage functions to estimate the impacts of disasters. Estimated impacts vary by model, but include building damages, economic losses, displaced households, casualties, debris, and the loss of function for essential facilities. Two specific model for the Eastern Shore of Virginia were evaluated to update the current hazard mitigation plan.

The Hazus® Flood Model calculates physical damage and economic loss due to coastal flooding. Losses are calculated using functions that relate the depth and type of flooding to the degree of damage for various categories of buildings.

The Hazus® Hurricane Model estimates physical and economic damage to buildings due to wind and windborne debris. Wind hazard data are generated at the census track level. The model considers gusts, terrain roughness, and tree coverage data for incoming hurricanes, historic storms, or probabilistic hazards.

Because the Eastern Shore is roughly 70 miles long, storm events affect areas of the Shore differently, depending upon their direction of approach, approach speed, circumference, and other factors. The Steering Committee and Accomack-Northampton PDC staff chose to reflect the results of the 100-year scenarios, or 1-percent-annual-chance storm event, to present in the Hazard Mitigation Plan. The software offers other scenarios and their associated wind speed as well as flood impacts, as the Hazus® model offers a wide variety of variables.

HAZUS® METHODOLODY

The Hazus® Methodologies generated an estimate of the consequences to a community from a natural hazard scenario or from a probabilistic hazard. The resulting "loss estimate" will generally describe the scale and extent of damage disruption that may result from a potential event. The following information can be obtained.

- *Quantitative Estimates of Losses* in terms of direct costs for repair and replacement of damaged buildings and system components, direct costs associated with loss of function, (e.g., loss of business revenue and relocation costs), casualties, household displacements, quantity of debris, and regional economic impacts.
- *Functionality Losses* in terms of loss-of-function and restoration times for critical facilities such as hospitals, components of transportation and utility systems, and simplified analyses of loss-of-system-function for electrical distribution and potable water systems.
- *Extent of Induced Hazards* in terms of exposed population and building value due to potential flooding or fire following an earthquake.

To generate this information, the Hazus® Methodology contains baseline inventory data to include:

- Classification systems used in assembling inventory and compiling information on the building stock, the components of transportation and utility systems, and demographic and economic data.
- Standard calculations for estimating type and extent of damage and for summarizing losses.
- National and regional databases containing information for use as baseline (built-in) data useable in the calculation of losses, if there is an absence of user-supplied data.

HAZUS® SOFTWARE

The Hazus® software uses GIS technologies for performing analyses with inventory data and displaying losses and consequences on applicable tables and maps. The Flood Model allows practitioners to estimate the economic and social losses from flood events; however, this model requires data to be applied to each report and can vary based on adopted methodology.

DATA ELEVATION MODEL SELECTION

The data needed to obtain the Digital Elevation Model Selection (DEMs) is available for download and is part of developing the Coastal Flood Model.

Figure 1: Hazus® Software: Data Elevation Model Extent



SHORELINE IDENTIFICATION

The user of Hazus® also needs to identify the shorelines that will impact the community prior to creating the Coastal Flood Model.

- Hazus® has a built-in default national shoreline that is delineated by county. In Study Regions that are sub-county or a combination of multiple sub-counties all of the associated shorelines of the counties will be brought in. This is by design to account for coastal flooding at specific locations that does not necessarily originate from the closest shorelines to those locations.
- Once the shorelines have been selected, the next step in the process is to characterize the chosen shorelines.

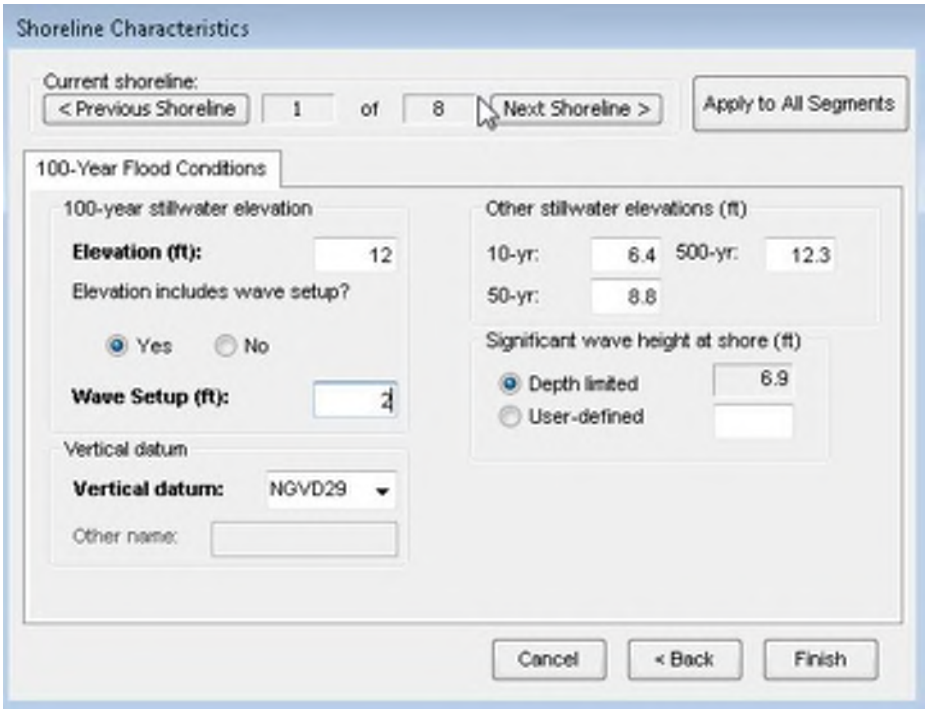
Figure 2: Hazus® Software: New Scenario Selection



SHORELINE CHARACTERIZATION

Shoreline Characterization – Stillwater Flood Conditions represent the water surface absent wave height and wave runup. Data that is developed and provided by FEMA under the Flood Insurance Study (FIS) was used in both Accomack and Northampton Counties as well as the incorporated areas. This data is authorized by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The elevation at Stillwater for a 1-percent event are listed in the document and used in each Hazus® Coastal Flood Model. A wave setup was set at a default of two feet per recommendation of Hazus® Help Desk for this region.

Figure 3: Hazus® Software: Shoreline Characteristics



DATA AND MODELING ISSUES

Although the Hazus® software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that uncertainties are inherent in any estimation methodology, even with state-of-the-art techniques. Any region or city studied will have an enormous variety of buildings and facilities of different sizes, shapes, and structural systems build over a range of years under varying design codes. A variety of components contribute to transportation and utility system estimations in certain hazard models.

There are also insufficient comprehensive data from past events or laboratory experiments to determine precise estimates of damage based on different measures of hazard severity, such as known flood depths or wind speeds. To deal with this complexity and lack of data, buildings and components of systems are grouped into categories based on key characteristics. The relationships between measures of hazard severity and average degree of damage with associated losses for each building category are based on current data and available theories.

The results of a natural hazard loss analysis should not be looked upon as a prediction. Instead, they are only an estimate, as uncertainty inherent to the model will be influenced by quality of inventory data and the hazard parameters.

Current models often extended beyond the boundaries of the towns impact quality of the data. In most cases, larger models, such as a census tract or county model, were defined correctly and aligned geographically with the size of the community, and the number of housing units compared favorably to Census numbers. Other model data was determined to be unreliable without additional information from FEMA and the NFIP.

The most significant challenge while running the Hazus® models was the lack of historical approaches and data from previous years. Not having access to certain historical models did not allow for the Steering Committee to evaluate and provide discrepancies.

FEMA HAZUS® Program: https://www.fema.gov/flood-maps/products-tools/hazus

APPENDIX C: MEETINGS & OUTREACH

This appendix includes the agendas, meeting summaries, and advertisements (when available) for all Hazard Mitigation Plan Steering Committee meetings. They are presented in chronological order.

JURISDICTION MEETINGS

Below is a table indicative of meetings held with each participating jurisdiction to present and review their respective draft chapters, ensuring the accuracy and acquiring first-hand accounts of past hazard events. Meetings were held with administrative staff, town councils, mayors, and/or police officers in the jurisdiction. Due to social distancing guidelines to fight the spread of COVID-19, the majority of these meetings were held virtually through; however, six of the listed jurisdictions elected to meet in-person.

Table 1: Locality Meeting Dates

Jurisdiction	Meeting Date
Accomack County	March 2, 2021
Town of Accomac	July 15, 2021
*Town of Bloxom	March 16, 2021
*Town of Chincoteague	April 7, 2021
*Town of Hallwood	May 24, 2021
*Town of Keller	April 16, 2021
Town of Melfa	June 8, 2021
Town of Onancock	March 31, 2021
Town of Onley	March 30, 2021
*Town of Painter	May 26, 2021
Town of Parksley	March 25, 2021
Town of Saxis	April 7, 2021
Town of Tangier	April 29, 2021
Town of Wachapreague	March 17, 2021
Northampton County	March 22, 2021
Town of Cape Charles	March 23, 2021
Town of Cheriton	March 25, 2021
Town of Eastville	May 25, 2021
Town of Exmore	March 23, 2021
*Town of Nassawadox	May 5, 2021

*Indicates Meeting Held In-Person

STEERING COMMITTEE MEETINGS

Due to social distancing guidelines and to fight the spread of COVID-19, all Hazard Mitigation Plan Steering Committee meetings were held virtually. The Kick-Off meeting was held in December 2020 and the Final Plan Review meeting occurred in October 2021. The following sections include the agenda and summary for each Steering Committee meeting held.

Eastern Shore of Virginia
Hazard Mitigation Plan Steering Committee Meeting

- Welcome, the meeting will begin shortly!
  - Please remain muted to prevent background noise during introductory and guest presentations.
    - Difficulty with your audio? *Click the up arrow by the "Mute" mic symbol*
    - *You can also click the mic symbol to mute and unmute yourself*
    - *If you've called in via phone you can mute & unmute by pressing **



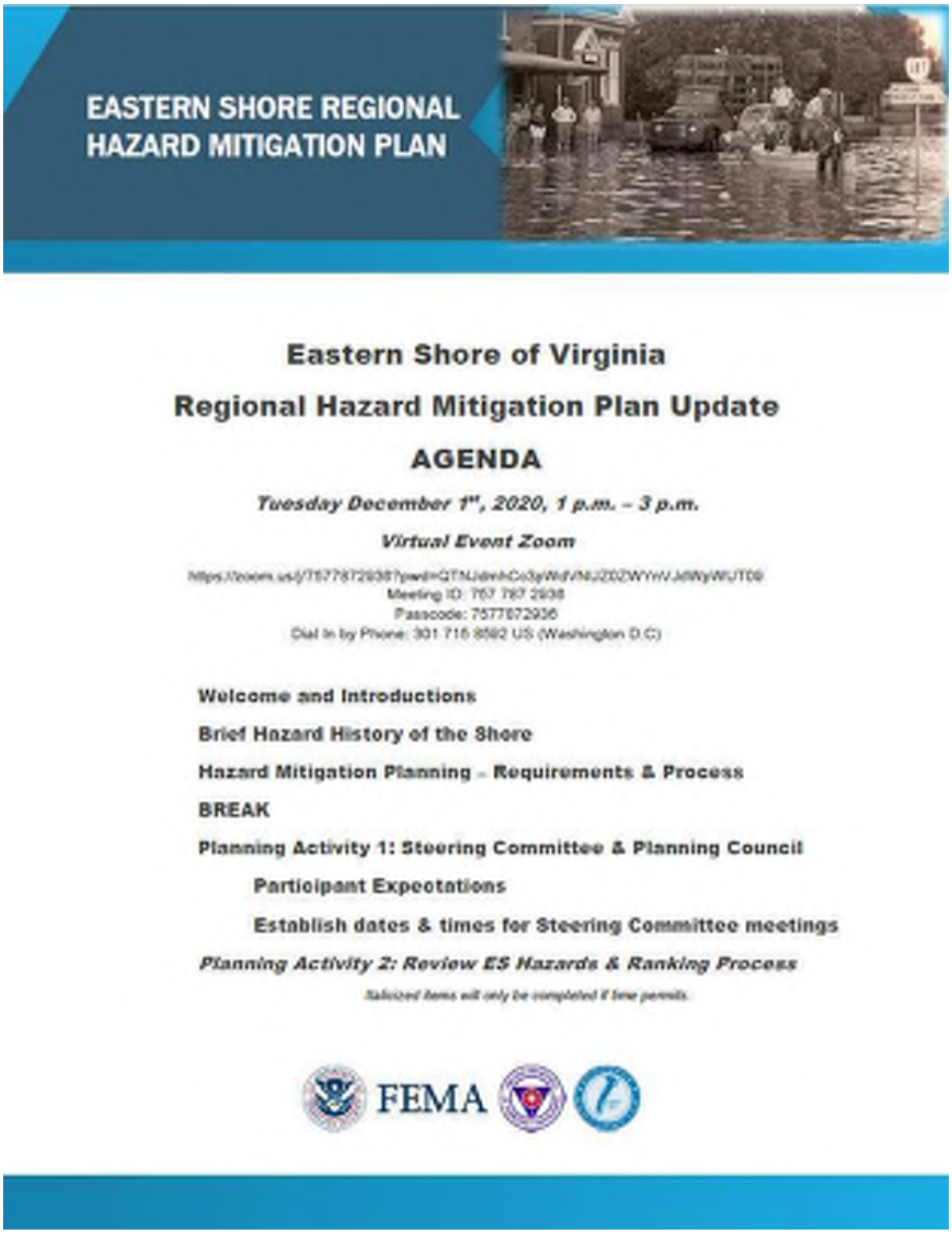
  - If possible, please turn your video ON so we can see the face that goes with the voice – especially during the breakout sessions. *You can do this by clicking the video camera symbol.*
    - *If you are having difficulty with your video, click the up arrow by the video camera symbol.*
  - Use the Chat feature to communicate with participants & hosts!



  - Change your name to be correct and add affiliation by clicking the ellipsis (3 dots) at the top right of your video feed or the 'more' option when you hover over your name in the participant list.
  - *If you cannot use the chat, please contact Ashley Mills at 757-787-2936 x127*

DECEMBER 1, 2020 KICK-OFF HMP STEERING COMMITTEE MEETING

AGENDA



ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of December 1, 2020 Kickoff Meeting held Virtually via Zoom 1:00-3:00PM

Presentations, support documents, and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/.

Steering Committee Members Present:
Thomas Beasley, Town of Bloxom
Greg Hardesty, Town of Cheriton
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jackie Davis, Town of Cheriton
Keith Greer, Town of Parksley
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
Jayme Salazar, Town of Onley
Bryan Rush, Town of Chincoteague

Steering Committee Members Absent:
Charles Pruitt, Accomack County (alt pres)
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Nassawadox
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Onancock
Town of Melfa

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom
Danny Siegert, Town of Parksley
Mark Bowden, Town of Chincoteague
Billie Jean Miles, Accomack County
Chris Guvernator, Accomack County

VDEM Present:
Bruce Sterling, Region V Coordinator
Harrison Bresee, All Hazards Planner

A-NPDC Staff Present:
Shannon Alexander
Jessica Steelman
Bobbie Wert
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group

Planning Council Members Present:
Susan Bates, The Nature Conservancy
Jill Bieri, The Nature Conservancy
Mark Belknap, A&N Electric Cooperative
Lynn Brankley, A&N Electric Cooperative
Scott Hall, ESCC
Julie Head, ES SWCD
Chris Isdell, VDOT
Robie Marsh, ESVA Chamber of Commerce
Paul Muhly, Accomack County
Hali Plourde-Rogers, ESLT
Evelyn Shotwell, Chincoteague Chamber
Curtis Taylor, A&N Electric Cooperative

Welcome and Introductions

Shannon Alexander, Accomack-Northampton Planning District Commission (A-NPDC) Director of Planning welcomed participants and guided all participants to introduce themselves, identify their affiliation, if they've been

Brief Hazard History of the Shore

Jessica Steelman, Coastal Planner for A-NPDC, reviewed the Eastern Shore's hazard history. High winds, coastal flooding, and coastal erosion from hurricanes, tropical storms, and nor'easters, constitute the majority of hazards.

Storm records date back to the 1600, but data are lacking regarding the extent of damage for most of the historical storms. What can be said is they occur with some regularity and the category of storm does not necessarily dictate its potential for danger. Storm track, speed, and direction, current ground conditions (i.e. soils that are already saturated from a recent storm), tide cycle, and other factors contribute to its potential to cause harm to people and property.

Other hazards discussed included storm water flooding from brief, high intensity rainfall that exceeds stormwater drainage capacity, blizzards and other ice and snow events, drought, pandemic/biohazards, and extreme heat and cold.

Hazard Mitigation Planning - Requirements & Process

Shannon Alexander described Hazard Mitigation Planning as a plan of policies and sustained actions to reduce or eliminate the long-term risk to human life and property from hazards. At their most basic, the plans require jurisdictions to identify hazards and their vulnerabilities to them, and then identify goals, strategies and actions to reduce losses caused by these hazards.

The plan not only improves conditions before disasters, but also guides post-disaster recovery. A well-coordinated plan can be integrated into other plans, such as comprehensive plans, housing plans, and transportation plans, and can be implemented through local tools such as county zoning and building ordinances.

Once goals are set and strategies developed, mitigation actions are selected and prioritized. The plan is sent to VDEM and FEMA for approval and local units of government adopt it by resolution. From there, communities work towards meeting their goals, documenting progress, and updating the plan with additional strategies.

Communities that participate in hazard mitigation planning, and that adopt the final plan, are eligible for FEMA hazard mitigation grants. Some mitigation grants are pre-disaster, but large

amounts also become available during disaster recovery. Those localities that choose not to participate in hazard mitigation planning will not be eligible for any mitigation funding.

Planning Activity 1: Steering Committee & Planning Council

Participant Expectations

Shannon Alexander explained the Steering Committee and Planning Council roles. The Steering Committee is made up primarily of representatives of participating county and town governments. They will vote on the contents of the plan, because they are the ones who will have to adopt the plan in the end. The Planning Council is a wide-reaching stakeholder group that will participate throughout the process, offering expertise and experience. Planning Council members will be invited to attend all Steering Committee meetings and will receive all agenda and supporting materials.

A-NPDC staff and partners with the Berkley Group, LLC will provide technical assistance, process management, and accountability for meeting state and federal plan requirements.

Establish dates & times for Steering Committee meetings

After much discussion, the third Tuesday of each month at 2:00pm was chosen for the monthly virtual meetings.

Planning Activity 2: Review ES Hazards & Ranking Process

Shannon Alexander showed a table representing the hazards and their ranks included in the 2006, 2011, and 2016 iterations of the Plan. She quickly reviewed the process and stated that the first meetings of the Committee in 2021 would be completing this process.

The meeting ended at approximately 3:10 p.m.

JANUARY 19, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



Eastern Shore of Virginia

Regional Hazard Mitigation Plan Update

AGENDA

Tuesday January 19, 2021, 2 p.m. – 4 p.m.

Virtual Event Zoom

https://zoom.us/j/99345792642?pwd=T2pIZTNRUTg0eCtWR0dDZHdHb3hwQT09
Meeting ID: 993 4579 2642
Passcode: 7577872908
Dial In by Phone: (301) 715 – 8592 US (Washington D.C)

Welcome and Introductions

Roll Call

Election of the Chair and Vice Chair

In-Kind Contributions

Vision Statement and Mitigation Goals

Project Roadmap and Deliverables

BREAK

Hazard Identification and Risk Assessment

Sample Locality Review

Italicized items will only be completed if time permits.

FEMA

ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of January 19, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/

Steering Committee Members Present:
Susan McGhee, Northampton County
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jamye Salazar, Town of Onley
Bryan Rush, Chincoteague Emergency Services
Michael Tolbert, Town of Chincoteague

Steering Committee Members Absent:
Charles Pruitt, Accomack County (alt pres)
Town of Painter
Town of Accomack
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Nassawadox
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Onancock
Town of Melfa
Town of Cheriton
Town of Parksley
Town of Wachapreague

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom

VDEM Present:
None

A-NPDC Staff Present:
Shannon Alexander
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

Planning Council Members Present:
Scott Hall, ESCC
Hali Plourde-Rogers, ESLT
Evelyn Shotwell, Chincoteague Chamber

Welcome and Introductions

Shannon Alexander, Accomack-Northampton Planning District Commission (A-NPDC) Director of Planning, and Thomas Hicks, The Berkley Group, welcomed participants and directed participants to take roll call using an online form.

Election of Chair & Vice Chair

Shannon Alexander and Thomas Hicks discussed the need for a Chair and Vice Chair of the committee and provided a brief overview of the process from the previous iteration of the plan. The floor was opened for discussion and to nominate candidates for Chair and Vice Chair. The decision was made to table the selection of Chair and Vice Chair until the following meeting. Members can be nominated using this link: https://www.sli.do/ and entering the code #88712.

In-Kind Contributions

Shannon Alexander went over the In-Kind Contributions form, which is a requirement for grant tracking purposes. Committee Members must use the online In-Kind Match Form to record their work during the planning process. Members can fill out this form using by clicking this link.

Vision Statement & Mitigation Goals

Thomas Hicks led the group through a discussion of the current vision statement and opened the floor to discuss any changes to the statement. The groups offered some critiques, which the consultant will incorporate and bring back for discussion at the following meeting.

Thomas Hicks discussed the current mitigation goals. Committee members were asked to reflect on the goals and come back to the following meeting ready to discuss any potential changes.

Project Roadmap & Deliverables

Thomas Hicks discussed the five areas of the project roadmap, including a review of community capabilities, the hazard identification and analysis, the development of mitigation strategies, public involvement, and the final review.

Hazard Identification & Risk Assessment

Thomas Hicks reviewed the need for and requirements of the hazard identification and risk assessment portion of the mitigation plan. Committee members were asked to help identify the critical risks to the Eastern Shore using an online form to rank a wide variety of hazards. This information will be used to develop hazard models in HAZUS.

Homework

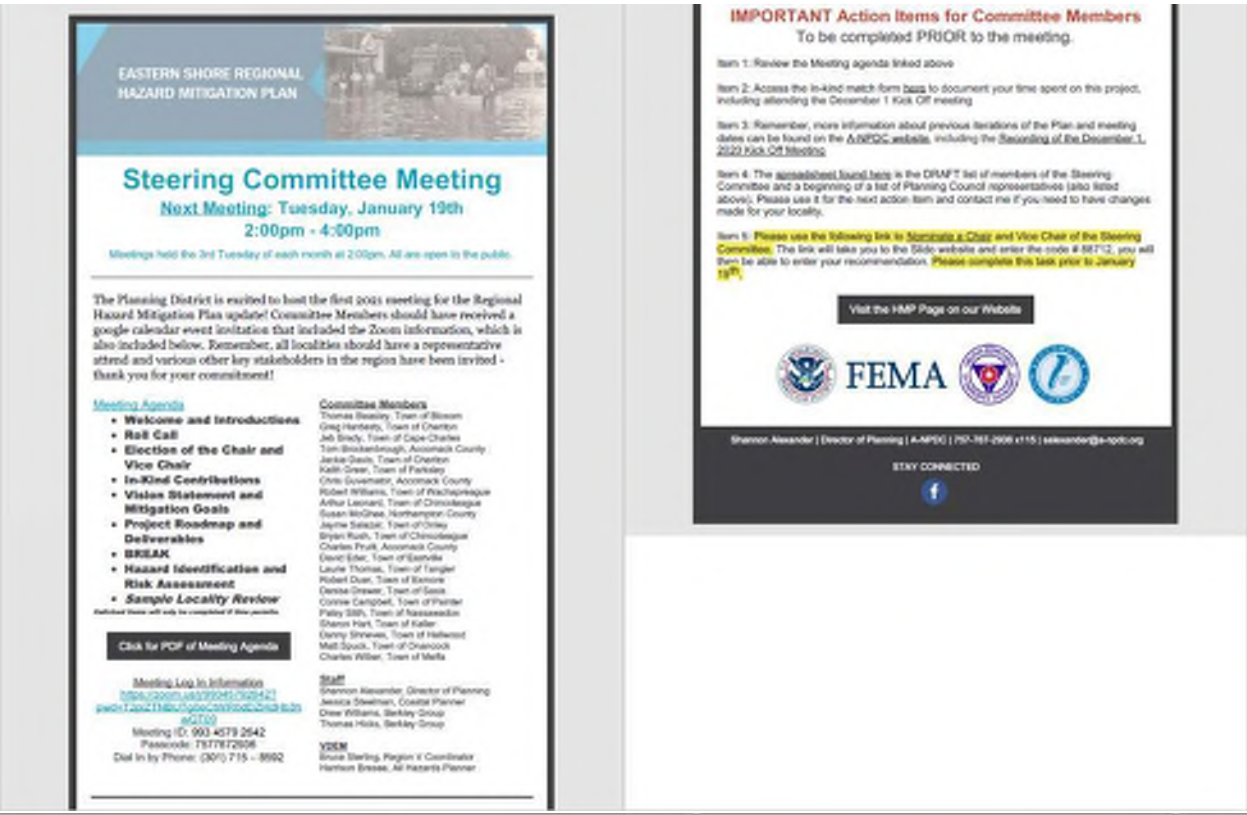
Jonathan McCoy discussed homework for the committee members. The members were asked to review their locality's chapter of the current hazard mitigation plan and make note of information that will require updating. A-NPDC staff will update the Census data (population, housing data, etc) but committee members should review transportation data, community services and facility data, land use

data, and recent storm data. The Town of Hallwood was reviewed and areas in need of updating were highlighted as an example.

Next Meeting

The meeting ended at approximately 3:40. The next meeting will be held on February 16.

OUTREACH


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Next Meeting: Tuesday, January 19th

2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

The Planning District is excited to host the first 2021 meeting for the Regional Hazard Mitigation Plan update! Committee Members should have received a google calendar event invitation that included the Zoom information, which is also included below. Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment!

Meeting Agenda

- Welcome and Introductions
- Roll Call
- Election of the Chair and Vice Chair
- In-Kind Contributions
- Vision Statement and Mitigation Goals
- Project Roadmap and Deliverables
- BREAK
- Hazard Identification and Risk Assessment
- *Sample Locality Review*

Click for PDF of Meeting Agenda

Meeting Log In Information

Meeting ID: 993 4579 2642

Passcode: 7577872606

Dial In by Phone: (301) 715 - 8592

Committee Members

Thomas Beasley, Town of Bloxom
Greg Hardesty, Town of Chariton
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Janice Davis, Town of Chariton
Keith Greer, Town of Parksley
Chris Guvernator, Accomack County
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
Jayme Sabalan, Town of Onley
Bryan Rush, Town of Chincoteague
Charles Pruitt, Accomack County
David Eder, Town of Eastville
Laurie Thomas, Town of Tangier
Robert Duer, Town of Exmore
Denise Dreese, Town of Saxis
Connie Campbell, Town of Painter
Patsy Gibb, Town of Nassawadox
Sharon Hart, Town of Keller
Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Melfa

Staff

Shannon Alexander, Director of Planning
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group

VDEM

Bruce Sterling, Region V Coordinator
Harrison Bresee, All Hazards Planner

IMPORTANT Action Items for Committee Members

To be completed PRIOR to the meeting.

Item 1: Review the Meeting agenda linked above

Item 2: Access the In-kind match form here to document your time spent on this project, including attending the December 1 Kick Off meeting

Item 3: Remember, more information about previous iterations of the Plan and meeting dates can be found on the A-NPDC website, including the Recording of the December 1, 2020 Kick Off Meeting.

Item 4: The spreadsheet found here is the DRAFT list of members of the Steering Committee and a beginning of a list of Planning Council representatives (also listed above). Please use it for the next action item and contact me if you need to have changes made for your locality.

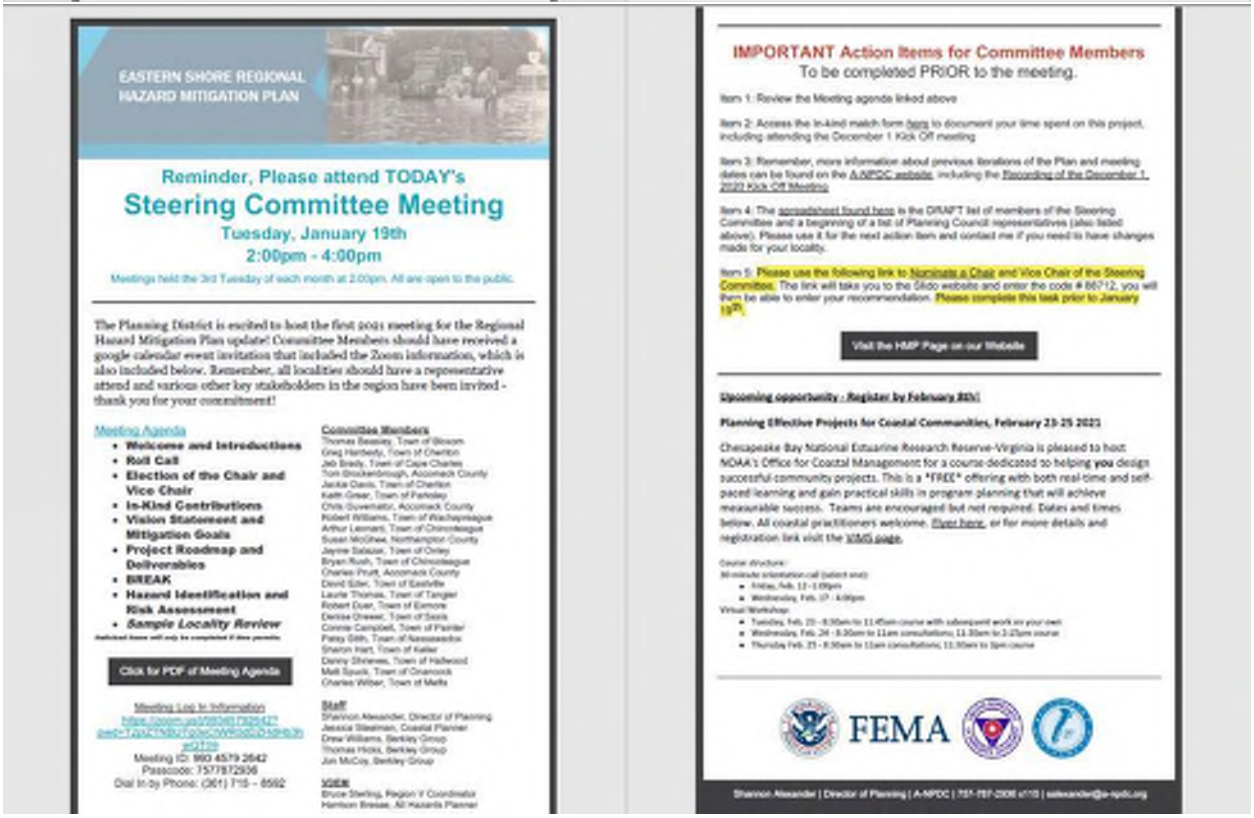
Item 5: Please use the following link to Nominate a Chair and Vice Chair of the Steering Committee. The link will take you to the Slido website and enter the code # 86712, you will then be able to enter your recommendation. Please complete this task prior to January 19th.

Visit the HMP Page on our Website

FEMA

Shannon Alexander | Director of Planning | A-NPDC | 757-787-2606 x115 | salexander@a-npdc.org

STAY CONNECTED


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Reminder, Please attend TODAY's

Steering Committee Meeting

Tuesday, January 19th

2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

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Click for PDF of Meeting Agenda

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Passcode: 7577872606

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Jeb Brady, Town of Cape Charles
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Denise Dreese, Town of Saxis
Connie Campbell, Town of Painter
Patsy Gibb, Town of Nassawadox
Sharon Hart, Town of Keller
Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Melfa

Staff

Shannon Alexander, Director of Planning
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

VDEM

Bruce Sterling, Region V Coordinator
Harrison Bresee, All Hazards Planner

IMPORTANT Action Items for Committee Members

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Visit the HMP Page on our Website

Upcoming opportunity - Register by February 8th!

Planning Effective Projects for Coastal Communities, February 23-25 2021

Chesapeake Bay National Estuarine Research Reserve-Virginia is pleased to host NOAA's Office for Coastal Management for a course dedicated to helping you design successful community projects. This is a *FREE* offering with both real-time and self-paced learning and gain practical skills in program planning that will achieve measurable success. Teams are encouraged but not required. Dates and times below. All coastal practitioners welcome. Flyer here, or for more details and registration link visit the VIMS page.

Course structure:

30-minute orientation call (select one):

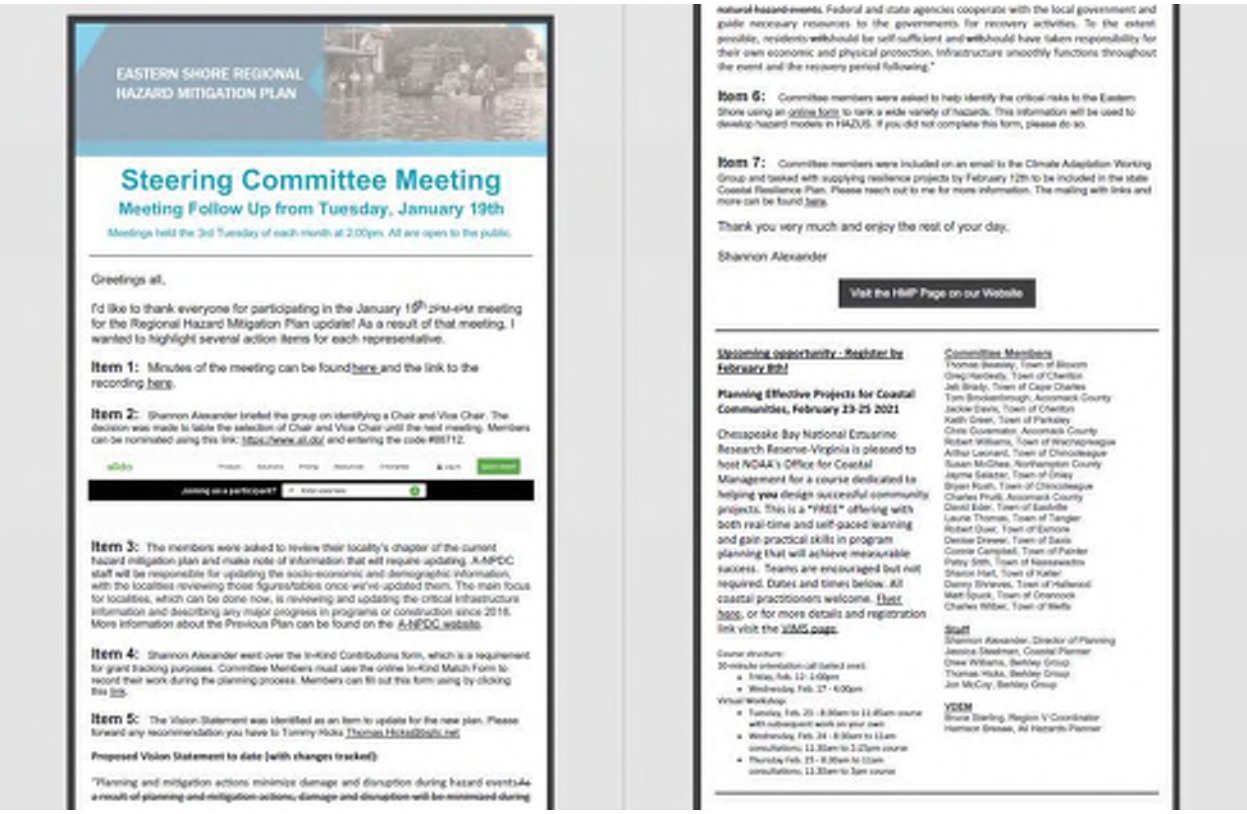
- Friday, Feb. 12 - 1:00pm
- Wednesday, Feb. 17 - 4:00pm

Virtual Workshop:

- Tuesday, Feb. 23 - 8:30am to 11:45am course with subsequent work on your own
- Wednesday, Feb. 24 - 8:30am to 11am consultations; 11:30am to 2:25pm course
- Thursday Feb. 25 - 8:30am to 11am consultations; 11:30am to 3pm course

FEMA

Shannon Alexander | Director of Planning | A-NPDC | 757-787-2606 x115 | salexander@a-npdc.org



EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Meeting Follow Up from Tuesday, January 19th

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

Greetings all,

I'd like to thank everyone for participating in the January 19th 2PM-4PM meeting for the Regional Hazard Mitigation Plan update! As a result of that meeting, I wanted to highlight several action items for each representative.

Item 1: Minutes of the meeting can be found here and the link to the recording here.

Item 2: Shannon Alexander briefed the group on identifying a Chair and Vice Chair. The decision was made to table the selection of Chair and Vice Chair until the next meeting. Members can be nominated using this link: https://www.sli.do/ and entering the code #88712.

Item 3: The members were asked to review their locality's chapter of the current hazard mitigation plan and make note of information that will require updating. A-NPDC staff will be responsible for updating the socio-economic and demographic information, with the localities reviewing those figures/tables once we've updated them. The main focus for localities, which can be done now, is reviewing and updating the critical infrastructure information and describing any major progress in programs or construction since 2018. More information about the Previous Plan can be found on the A-NPDC website.

Item 4: Shannon Alexander went over the In-Kind Contributions form, which is a requirement for grant tracking purposes. Committee Members must use the online In-Kind Match Form to record their work during the planning process. Members can fill out this form using by clicking this link.

Item 5: The Vision Statement was identified as an item to update for the new plan. Please forward any recommendation you have to Tommy Hicks Thomas.Hicks@dphc.net

Proposed Vision Statement to date (with changes tracked):

"Planning and mitigation actions minimize damage and disruption during hazard events~~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~~should be self-sufficient and ~~will~~should have taken responsibility for their own economic and physical protection. Infrastructure smoothly functions throughout the event and the recovery period following."

Item 6: Committee members were asked to help identify the critical risks to the Eastern Shore using an online form to rank a wide variety of hazards. This information will be used to develop hazard models in HAZUS. If you did not complete this form, please do so.

Item 7: Committee members were included on an email to the Climate Adaptation Working Group and tasked with supplying resilience projects by February 12th to be included in the state Coastal Resilience Plan. Please reach out to me for more information. The mailing with links and more can be found here.

Thank you very much and enjoy the rest of your day.

Shannon Alexander

Visit the HMP Page on our Website

Upcoming opportunity - Register by February 8th!

Planning Effective Projects for Coastal Communities, February 23-25 2021

Chesapeake Bay National Estuarine Research Reserve-Virginia is pleased to host NOAA's Office for Coastal Management for a course dedicated to helping **you** design successful community projects. This is a *FREE* offering with both real-time and self-paced learning and gain practical skills in program planning that will achieve measurable success. Teams are encouraged but not required. Dates and times below. All coastal practitioners welcome. Flyer here, or for more details and registration link visit the VAMS page.

Course structure:
30-minute orientation call (date3 ones).
- Friday, Feb. 12 - 1:00pm
- Wednesday, Feb. 17 - 4:00pm

Virtual Workshop:
- Tuesday, Feb. 23 - 8:30am to 11:45am course with subsequent work on your own
- Wednesday, Feb. 24 - 8:30am to 11am consultations; 11:30am to 2:15pm course
- Thursday Feb. 25 - 8:30am to 10am consultations; 11:30am to 3pm course

Committee Members
Thomas Beasley, Town of Bloxom
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Jackie Davis, Town of Cheriton
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Charles Pruitt, Accomack County
David Eder, Town of Eastville
Laurie Thomas, Town of Tangier
Robert Duer, Town of Exmore
Denise Dresser, Town of Savis
Connie Campbell, Town of Painter
Patsy Sith, Town of Nassawadox
Sharon Hart, Town of Keller
Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Wells

Staff
Shannon Alexander, Director of Planning
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

VDEM
Bruce Sterling, Region V Coordinator
Harrison Bresee, All Hazards Planner

FEBRUARY 16, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



Eastern Shore of Virginia

Regional Hazard Mitigation Plan Update

AGENDA

Tuesday February 16, 2021, 2 p.m. – 4 p.m.

Virtual Event Zoom

Meeting ID: 993 4579 2842
Passcode: 7577672936
Dial In by Phone: (301) 715 – 8592 US (Washington D.C)

Welcome

Roll Call

Round Robin

Election of the Chair and Vice Chair

Vision Statement & Mitigation Goal Modifications

Locality Meetings & HMP Chapter Update

BREAK

Round Robin

HIRA Facilitation

Next Steps

ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of February 16, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, and other resources can be found at *http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/*

Members may access a recording of this call at: tinyurl.com/4wn6p937

Steering Committee Members Present:
Susan McGhee, Northampton County
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jamye Salazar, Town of Onley
Bryan Rush, Chincoteague Emergency Services
Michael Tolbert, Town of Chincoteague
Robert Williams, Town of Wachapreague
Matthew Spuck, Town of Onancock
Jackie Davis, Town of Cheriton
Thomas Beasley, Town of Bloxom

Steering Committee Members Absent:
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Nassawadox
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Melfa
Town of Parksley

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom

VDEM Present:
Harrison Bresee, VDEM

A-NPDC Staff Present:
Shannon Alexander
Jessica Steelman
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

Planning Council Members Present:
Scott Hall, ESCC
Hali Plourde-Rogers, ESLT
Evelyn Shotwell, Chincoteague Chamber
Susan Bates, The Nature Conservancy

Welcome and Introductions

Shannon Alexander, Accomack-Northampton Planning District Commission (A-NPDC) Director of Planning, and Thomas Hicks, The Berkley Group, welcomed participants and directed participants to take roll call using an online form.

Shannon Alexander thanked participants for their engagement and reiterated the importance of the hazard mitigation planning process and the plan's impact on the community. The Hazard Mitigation Plan is required by FEMA for various funding opportunities, as well as positioning the communities for funding through the upcoming Community Flood Preparedness Fund.

Round Table Discussion: *What historic storm/event impacted your community the most?*

Committee members were asked to share what historic storm or event impacted their communities the most. A range of events were discussed, including Hurricane Andrew, the 1962 Ash Wednesday storm, Hurricane Gloria in 1985, Hurricane Isabel, 2009 twin Nor'easters, Hurricane Irene, Hurricane Sandy, 1999 Hurricane Floyd and the storm of 1933. These storms share high winds and heavy precipitation as common factors. Drainage issues compound the heavy precipitation events to create risk for the community.

Discussion of Chair & Vice Chair

In review of Federal guidelines, it was determined that a chair and vice chair are not a necessity for the hazard mitigation planning process. Shannon Alexander proposed to the steering committee that the planning process move forward in a collaborative fashion, forgoing a formal chair and vice chair. A unanimous vote by all localities present was taken and the steering committee decided to proceed without a formal chair and vice chair.

Adoption of Vision Statement

Jonathan McCoy covered the proposed changes to the vision statement from the January meeting. All committee members present voted unanimously to adopt the new vision statement, which reads:

"Planning and mitigation actions minimize damage and disruption during hazard events. Federal and state agencies cooperate with the local governments and guide necessary resources to the governments for recovery activities. To the extent possible, residents should be self-sufficient and should have taken responsibility for their own economic and physical protection. Infrastructure smoothly functions throughout the event and the recovery period following."

Locality Meetings & Review

Shannon Alexander announced the addition of a new planner to the planning district commission staff. The new planner, Ashley Mills, will begin conducting virtual (or potentially some in-person) one-on-one meetings with representatives of each local government by Mid-March and will likely continue these meetings through April. These meetings will be held to review and develop the draft chapters of the plan.

Round Table Discussion: *What is the biggest risk to your community today?*

Jonathan McCoy led the group through a discussion of the biggest risks to their communities today. Many answers were given, including flooding from both flood waters and coastal flooding, high winds, and wave action in coastal communities during high surf. Overwhelming existing infrastructure in the region was another risk, including telecommunications, sewer systems (both the collection systems and private septic systems), and the ability to provide potable drinking water. Environmental concerns were also a major risk factor, with the loss of natural environment areas being a potential impact on both health and economic activities. An additional risk factor involves rocket launches from Wallops Island. This facility is a driver for tourism and is heavily impacted by weather. It can also severely disrupt travel and tourism activities in the event of a rocket launch failure. Pandemic concerns were discussed in light of the current COVID-19 pandemic

Through this discussion it was highlighted that prior to worrying about costs of mitigation projects, the risk associated with hazard events must be fully discussed in the plan. This will assist in the pursuit of mitigation funding.

HIRA Facilitation

Tommy Hicks reviewed the high, medium, and low hazard priorities from the 2016 HMP. The survey from the January meeting divulged 55 different potential risks facing the Eastern Shore. Tommy led the group through a HAZUS report conducted on Northampton County, identifying the potential impacts from hazard events.

Using the survey results and reports pulled from HAZUS, Tommy Hicks identified high priority, medium priority, and low priority hazard. Shannon also reinforced the option for localities to include a hazard in their own chapter of the HMP that may not have risen to the high, medium, or low list, if they feel it is an important concern for their locality. The committee and council members discussed these hazard rankings and decided locality representative's present unanimously chose to rank the hazards as follows:

Four high risk factors:

- High Wind Events
- Coastal Flooding
- Coastal Erosion
- Non-Coastal Flooding
- Biological Hazards

Six medium risk factors were identified:

- Water and Wastewater Quality and Management
- Road and Highway
- Substance Use and Overdose
- Communications Failure

Six low risk factors were identified:

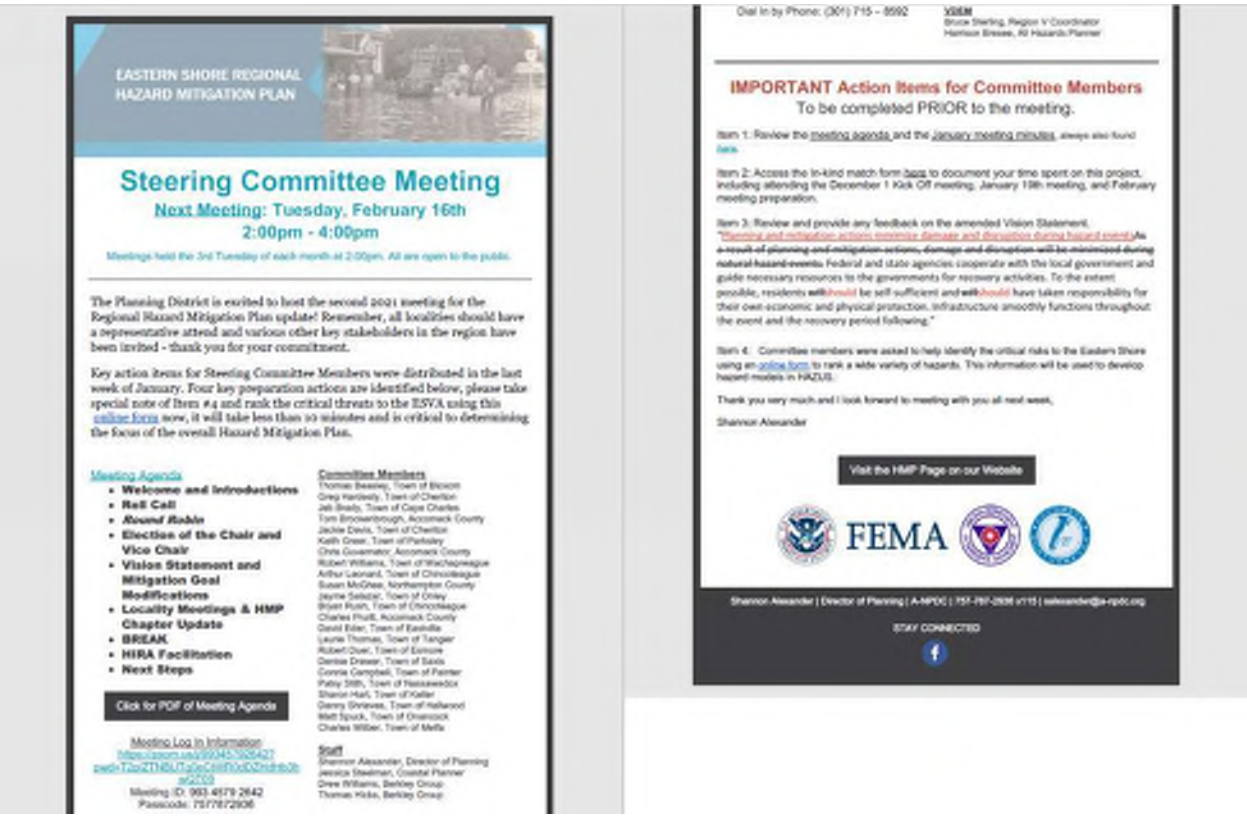
- Active Threat
- Electrical Energy Failure

- Tornado
- Invasive Environmental Disease

Next Meeting

The meeting ended at 4:00 p.m. The next meeting is scheduled for March 16.

OUTREACH



EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Next Meeting: Tuesday, February 16th
2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

The Planning District is excited to host the second 2021 meeting for the Regional Hazard Mitigation Plan update! Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment.

Key action items for Steering Committee Members were distributed in the last week of January. Four key preparation actions are identified below, please take special note of Item #4 and rank the critical threats to the ESVA using this online form now, it will take less than 10 minutes and is critical to determining the focus of the overall Hazard Mitigation Plan.

Meeting Agenda

- **Welcome and Introductions**
- **Roll Call**
- ***Round Robin***
- **Election of the Chair and Vice Chair**
- **Vision Statement and Mitigation Goal Modifications**
- **Locality Meetings & HMP Chapter Update**
- **BREAK**
- **HIRA Facilitation**
- **Next Steps**

Click for PDF of Meeting Agenda

Meeting Log In Information
https://zoom.us/j/99345762842?pwd=T2o2T1NDUTg0eCtmRXodDhdmb3hpQT09
Meeting ID: 993 4576 2842
Passcode: 7577872906

Committee Members
Thomas Beasley, Town of Elkton
Greg Hardesty, Town of Cheriton
Jeb Brady, Town of Cape Charles
Tom Brooksbrough, Accomack County
Jackie Davis, Town of Cheriton
Keith Greer, Town of Parksley
Chris Guvernator, Accomack County
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
Jayme Sebolzer, Town of Onley
Bryan Rush, Town of Chincoteague
Charles Pruitt, Accomack County
David Eder, Town of Eastville
Laurie Thomas, Town of Tangier
Robert Duer, Town of Exmore
Denise Drewer, Town of Savis
Connie Campbell, Town of Painter
Patsy Stith, Town of Nassawadox
Sharon Hunt, Town of Keller
Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Melfa

Staff
Shannon Alexander, Director of Planning
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group

Dial in by Phone: (301) 715 – 8592

VISION
Bruce Sterling, Region V Coordinator
Harrison Bresee, RI Hazards Planner

IMPORTANT Action Items for Committee Members
To be completed PRIOR to the meeting.

Item 1: Review the meeting agenda and the January meeting minutes, always also found here.

Item 2: Access the In-kind match form here to document your time spent on this project, including attending the December 1 Kick Off meeting, January 19th meeting, and February meeting preparation.

Item 3: Review and provide any feedback on the amended Vision Statement.
"Planning and mitigation actions minimize damage and disruption during hazard events. ~~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~~should be self sufficient and ~~will~~should have taken responsibility for their own economic and physical protection. Infrastructure smoothly functions throughout the event and the recovery period following."

Item 4: Committee members were asked to help identify the critical risks to the Eastern Shore using an online form to rank a wide variety of hazards. This information will be used to develop hazard models in HAZUS.

Thank you very much and I look forward to meeting with you all next week,

Shannon Alexander

Visit the HMP Page on our Website

FEMA

Shannon Alexander | Director of Planning | A-NPDC | 757-787-2936 x115 | salexander@a-npdc.org

STAY CONNECTED

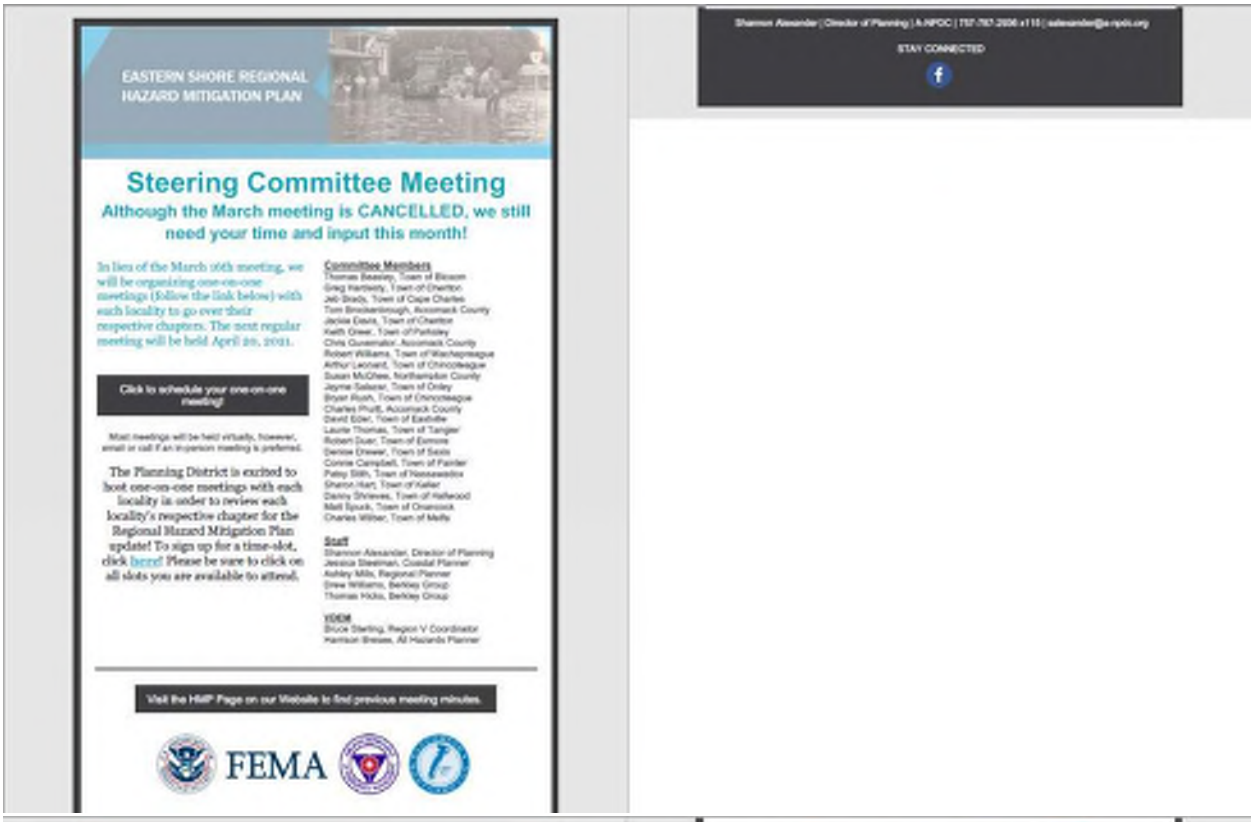
MARCH, 16, 2021 NO HMP STEERING COMMITTEE MEETING HELD

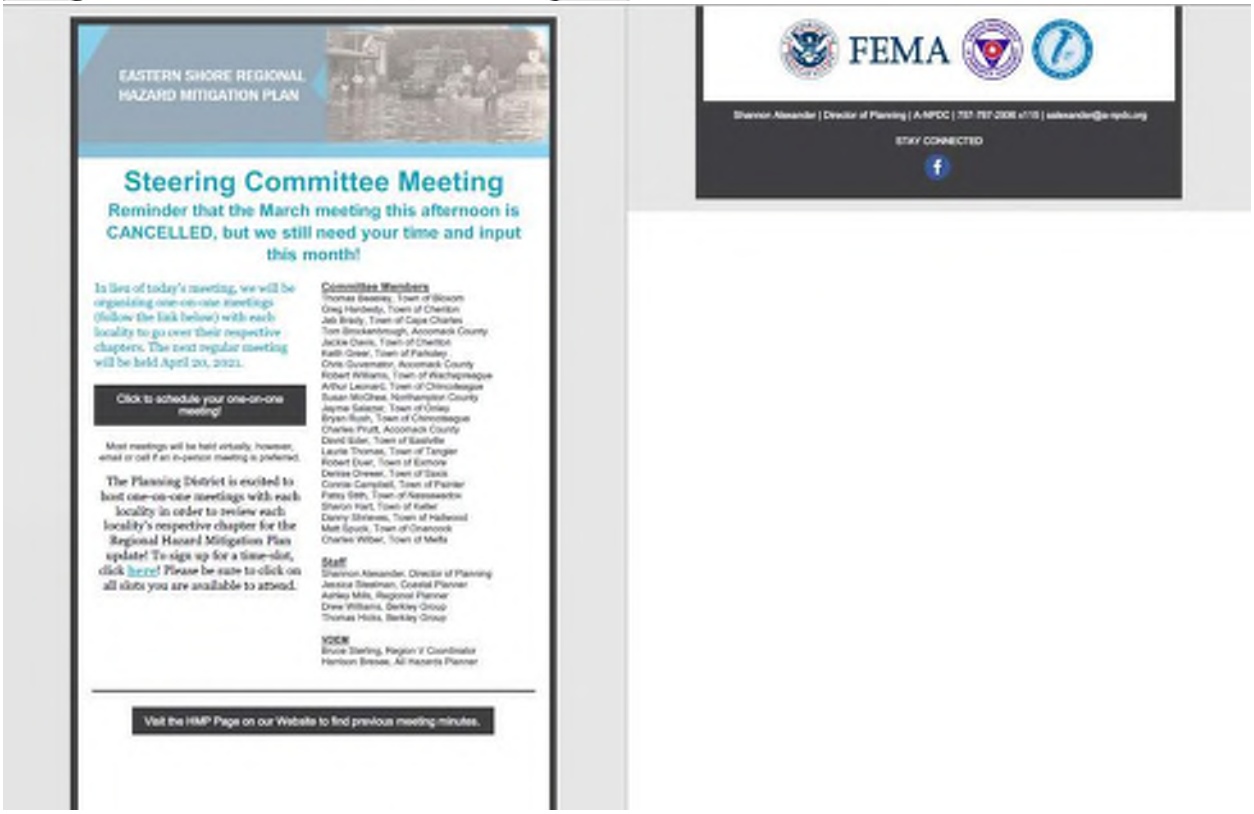
In lieu of the March 16th meeting, one-on-one meetings with each jurisdiction were organized, with the majority of these meetings held during the month of March.

JURISDICTION MEETING TRACKING

Locality	Chapter Review Date	Review Method	Complete?	Locality Representative(s) Present
Accomack County	03/02/2021	Email/Phone	Yes	Tom Brockenbrough
Accomac	07/15/2021 @ 4:30	Phone	Yes	Pat Smith
Bloxom	03/16/2021 @ 12:00	In-Person	Yes	Jeanette Eby
Chincoteague	04/07/2021 @ 2:00	In-Person	Yes	Bryan Rush, Mike Tolbert, Mark Bowden
Hallwood	05/24/2021 @ 10:00	In-Person	Yes	Danny Shrieves, Jackie Poulson
Keller	04/16/2021 @ 10:45	In-Person	Yes	Teresa Guy, Beth Hart
Melfa	06/08/2020 @ 2:00	Phone	Yes	Charles Wilbur
Onancock	03/31/2021 @ 1:00	Virtual	Yes	Matt Spuck
Onley	03/30/2021	Email/Phone	Yes	John Spivey
Painter	05/26/2021 @ 10:00	In-Person	Yes	Kerri Atkinson, Connie Campbell
Parksley	3/25/2021 @ 10:00	Virtual	Yes	Lauren Lewis
Saxis	04/07/2021 @ 10:00	Virtual	Yes	Donna Croushore
Tangier	04/29/2021 @ 10:00	Virtual	Yes	Laurie Thomas
Wachapreague	03/17/2021 @ 2:00	Virtual	Yes	Robert Williams, Taylor Dukes
Northampton County	03/22/2021 @ 10:00	Virtual	Yes	Susan McGhee
Cape Charles	03/23/2021 @ 9:00	Virtual	Yes	Jeb Brady
Cheriton	03/25/2021 @ 1:00	Virtual	Yes	Jackie Davis
Eastville	05/25/2021 @ 10:00	Virtual	Yes	David Eder, Jim Sturgis
Exmore	3/23/2021 @ 1:00	Virtual	Yes	Robert Duer, Taylor Dukes
Nassawadox	05/05/2021 @ 10:00	In-Person	Yes	Patsy Stith, Andrea Fox, Kim Fitzpatrick

OUTREACH


EASTERN SHORE REGIONAL
HAZARD MITIGATION PLAN
Steering Committee Meeting
Although the March meeting is CANCELLED, we still need your time and input this month!
In lieu of the March 16th meeting, we will be organizing one-on-one meetings (follow the link below) with each locality to go over their respective chapters. The next regular meeting will be held April 20, 2021.
Click to schedule your one-on-one meeting!
Most meetings will be held virtually, however, email or call if an in-person meeting is preferred.
The Planning District is excited to host one-on-one meetings with each locality in order to review each locality's respective chapter for the Regional Hazard Mitigation Plan update! To sign up for a time-slot, click here! Please be sure to click on all slots you are available to attend.
Committee Members
Staff
VDEM
Visit the HMP Page on our Website to find previous meeting minutes.
FEMA
STAY CONNECTED


EASTERN SHORE REGIONAL
HAZARD MITIGATION PLAN
Steering Committee Meeting
Reminder that the March meeting this afternoon is CANCELLED, but we still need your time and input this month!
In lieu of today's meeting, we will be organizing one-on-one meetings (follow the link below) with each locality to go over their respective chapters. The next regular meeting will be held April 20, 2021.
Click to schedule your one-on-one meeting!
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VDEM
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FEMA
STAY CONNECTED

APRIL 20, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



Eastern Shore of Virginia

Regional Hazard Mitigation Plan Update

AGENDA

Tuesday April 20, 2021, 2 p.m. – 4 p.m.

Virtual Event Zoom

Meeting ID: 993 4579 2942
Passcode: 7577872936
Dial In by Phone: (301) 715 – 8592 US (Washington D.C)

Welcome

Roll Call

Round Robin

Key Takeaways and Updates

Summary: Resilience, New Federal Money, Broadband, Large Scale Infrastructure

RAFT Presentation

Locality Meetings & HMP Chapter Updates

BREAK

Goal and Strategy Development

Demonstrations of Resources*

Next Steps

**Time permitting*

ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of April 20, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/

Members may access a recording of this call at: tinyurl.com/4wn6p937

Steering Committee Members Present:
Susan McGhee, Northampton County
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Bryan Rush, Chincoteague Emergency Services
Robert Williams, Town of Wachapreague
Matthew Spuck, Town of Onancock
Jackie Davis, Town of Cheriton
Patsy Stith, Town of Nassawadox
Charles Wilbur, Town of Melfa

Steering Committee Members Absent:
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Parksley
Town of Onley

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom
Sarah Dickey, Accomack County

VDEM Present:
Harrison Bresee, VDEM

A-NPDC Staff Present:
Shannon Alexander
Ashley Mills
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

Planning Council Members Present:
Evelyn Shotwell, Chincoteague Chamber
Susan Bates, The Nature Conservancy

Planning Council Members Absent:
Hali Plourde-Rogers, ESLT
Scott Hall, ESCC

Welcome and Introductions

Shannon Alexander, Accomack-Northampton Planning District Commission (A-NPDC) Director of Planning, and Thomas Hicks, The Berkley Group, welcomed participants and directed participants to take roll call using an online form.

Shannon Alexander shared that she has accepted a position in the Department of Conservation and Recreation, Natural Heritage Division and that her last day with the PDC is May 6. Ashley Mills, the new Regional Planner with the PDC, and the Berkley Group will ensure the plan moves forward in Shannon's absence.

Round Table Discussion: *What has been your experience with debris removal?*

Committee members were asked to share their experience with debris removal. Mayor Stith, Town of Nassawadox, shared her experience on removing derelict structures as a mitigation action prior to a hazard event. The group discussed the difficulties of removing derelict structures and brainstormed funding programs to assist with the removal of these structures. Harrison Bresee, VDEM, suggested the mitigation program through FEMA to address repetitive loss properties. He will research further for other programs available to address derelict structures as well.

Tom Brockenbrough shared the removal of the Whispering Pines Hotel but was unsure of the funding sources for removal. Susan McGhee shared that public works deals with debris removal and are trained annually to do so. Matthew Spuck asked if any locality has ordinances for spot blight abatement. Shannon shared the Town of Parksley has ordinances, as well as both counties.

Key Takeaways and Updates

Shannon Alexander shared a brief presentation of upcoming programs and opportunities to benefit the local governments. These include:

- The Community Flood Preparedness Fund managed by the Department of Conservation and Recreation. The public comment period ends **May 12**.
- RAFT Community Workshop on "Building Resiliency into Comprehensive Planning" on April 23 from 9-11:30am.
- Chesapeake Bay Preservation Act Amendments.
- New Federal Relief Funds.
- Broadband Update.
- Large Scale Infrastructure.
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE) applications (formerly BUILD and TIGER) are due July 12, 2021.
- VDOT Revenue Sharing Program.
- VA Department of Conservation and Recreation Recreational Trails Program grant is open April 1-June 30. Virginia Land Conservation Foundation funding will be open next winter for the FY22 application cycle.

Shannon Alexander's presentation is available with hyperlinks in the PDF version of the PowerPoint presentation.

RAFT Status Update

Wie Yusuf, Professor and Assistant Director of Old Dominion University's Institute for Coastal Adaptation and Resilience, shared a presentation on the Resilience Adaptation Feasibility Tool (RAFT). This intent of this presentation was to update the steering committee with RAFT's recent projects. Her presentation is available in the PDF version of the PowerPoint presentation.

Locality Meetings & HMP Chapter Updates

Ashley Mills, Regional Planner, met with several localities to update their chapters of the HMP. Robert Williams asked if there is a date the Wachapreague chapter would be completed. Ashley Mills indicated there is no date currently set for completion of that chapter, however, the deadline for adoption of the plan by each jurisdiction is January 2022.

Thomas Hicks and Shannon Alexander discussed potential methods to ensure the plan is reviewed and updated annually. An annual review and update will ensure the plan is current and easier to update at the five-year update.

Mitigation Strategies

Thomas Hicks led a discussion on the update to the mitigation goals. The committee decided to adopt regionwide mitigation goals with specific projects defined at the local level. Strategic Goal 1 was adopted without changes. The committee decided to amend Strategic Goal 2 to include language for post-hazard event response. The committee discussed a greater focus on education to address repetitive loss structures in the strategies for Strategic Goal 3. No changes were made to the wording of Strategic Goal 3. The Federal Emergency Management Administration (FEMA) "Community Lifelines" guided the development of Strategic Goal 4. The steering committee expressed a desire to capture each community's individual needs but agreed to the direction of Strategic Goal 4. Specific needs are recommended to be included in each locality's mitigation programs. The committee discussed including the migrant agricultural worker population as a specific strategy under Strategic Goal 5. Accomack and Northampton communities utilize services to target the migrant population for education and outreach regarding hazard events. The committee directed Berkley Group staff to further research other locality efforts to address migrant populations in hazard mitigation plans.

New Resources

Thomas Hicks shared FEMA's Geospatial Resource Center, a virtual tool that provides content to local governments to assist in hazard modeling. This tool is useful to combine with existing GIS capabilities. Some of the other programs included in this tool are the Prioritization Operations Support Tool, Lifeline Dashboards, Crowdsourcing-Partner Products, and the Storm Simulation Tool in Hurrevac.

Next Steps

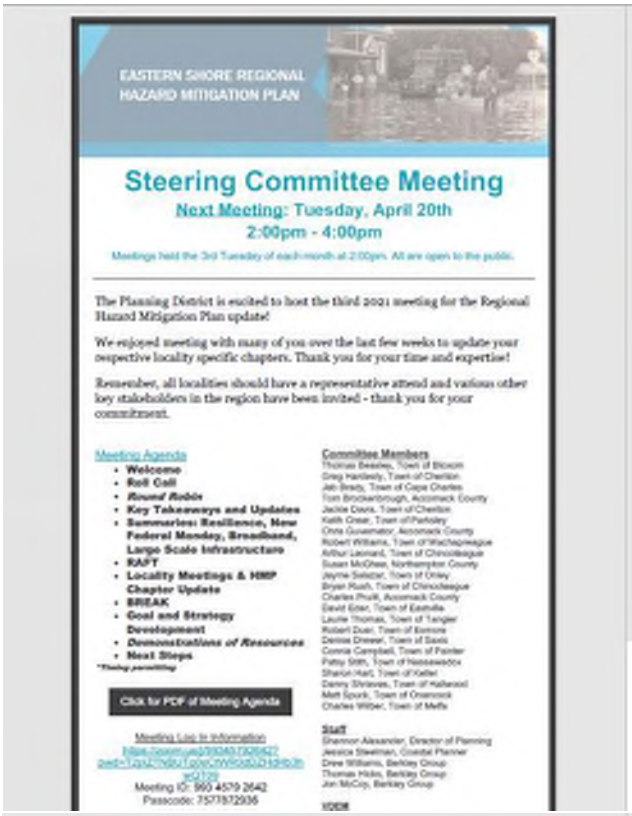
The next steps of the project will be to review the existing regional mitigation objectives from the previous edition of the plan. Localities will need to review these objectives and determine if they have been accomplished or if they need to be brought into the new plan. Berkley Group and ANPDC staff will work together to send these mitigation objectives to the localities for their review.

Steering committee members will receive a link to approve the strategic goals and strategies as amended during the meeting. Ashley Mills requested any locality who has not already met with her individually to update their individual chapter to make an appointment with her at amills@a-npdc.org

Next Meeting

The meeting ended at 4:00 p.m. The next meeting will be held on May 18.

OUTREACH


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Next Meeting: Tuesday, April 20th

2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

The Planning District is excited to host the third 2021 meeting for the Regional Hazard Mitigation Plan update!

We enjoyed meeting with many of you over the last few weeks to update your respective locality specific chapters. Thank you for your time and expertise!

Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment.

Meeting Agenda

- Welcome
- Roll Call
- *Round Robin*
- Key Takeaways and Updates
- Summaries: Resilience, New Federal Monday, Broadband, Large Scale Infrastructure
- RAFT
- Locality Meetings & HMP Chapter Update
- BREAK
- Goal and Strategy Development
- *Demonstrations of Resources*
- Next Steps

*Timing permitting

Click for PDF of Meeting Agenda

Meeting Log In Information

https://zoom.us/j/99045792642?pwd=TGpsZTNBU1pqeUVWSnd2Z1dHb3hwQT09

Meeting ID: 990 4579 2642

Passcode: 7577872936

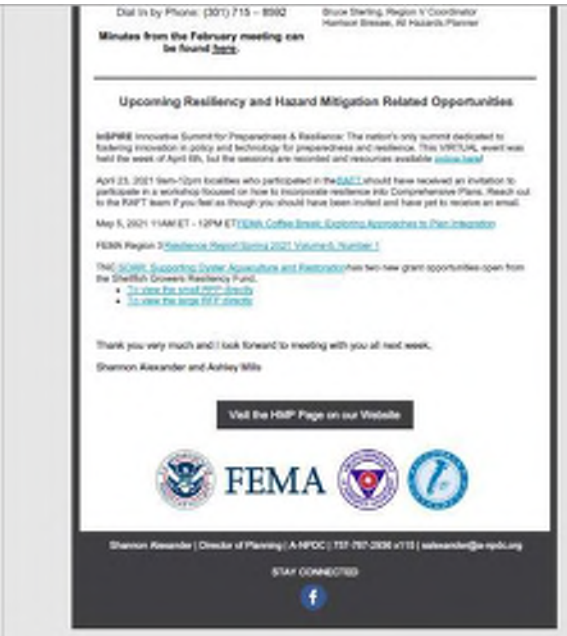
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Greg Hardesty, Town of Cheriton
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Tom Brockenbrough, Accomack County
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Staff

Shannon Alexander, Director of Planning
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

VDEM


Dial in by Phone: (301) 715 – 8592

Bruce Sterling, Region V Coordinator
Harrison Bresee, All Hazards Planner

Minutes from the February meeting can be found here.

Upcoming Resiliency and Hazard Mitigation Related Opportunities

InSPIRE Innovative Summit for Preparedness & Resilience. The nation's only summit dedicated to fostering innovation in policy and technology for preparedness and resilience. This VIRTUAL event was held the week of April 6th, but the sessions are recorded and resources available online here!

April 23, 2021 9am-12pm localities who participated in the RAFT should have received an invitation to participate in a workshop focused on how to incorporate resilience into Comprehensive Plans. Reach out to the RAFT team if you feel as though you should have been invited and have yet to receive an email.

May 5, 2021 11AM ET - 12PM ET FEMA Coffee Break: Exploring Approaches to Plan Integration

FEMA Region 3 Resilience Report Spring 2021 Volume 6, Number 1

TNC SOAR: Supporting Oyster Aquaculture and Restoration has two new grant opportunities open from the Shellfish Growers Resiliency Fund.

- To view the small RFP directly
- To view the large RFP directly

Thank you very much and I look forward to meeting with you all next week,

Shannon Alexander and Ashley Mills

Visit the HMP Page on our Website

FEMA

Shannon Alexander | Director of Planning | A-NPDC | 757-787-2936 x113 | salexander@a-npdc.org

STAY CONNECTED


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

REMINDER:

Steering Committee Meeting

Next Meeting: THIS Tuesday, April 20th

2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

NEW: See new event announcement and registration information below the agenda and member list!

Meeting Agenda

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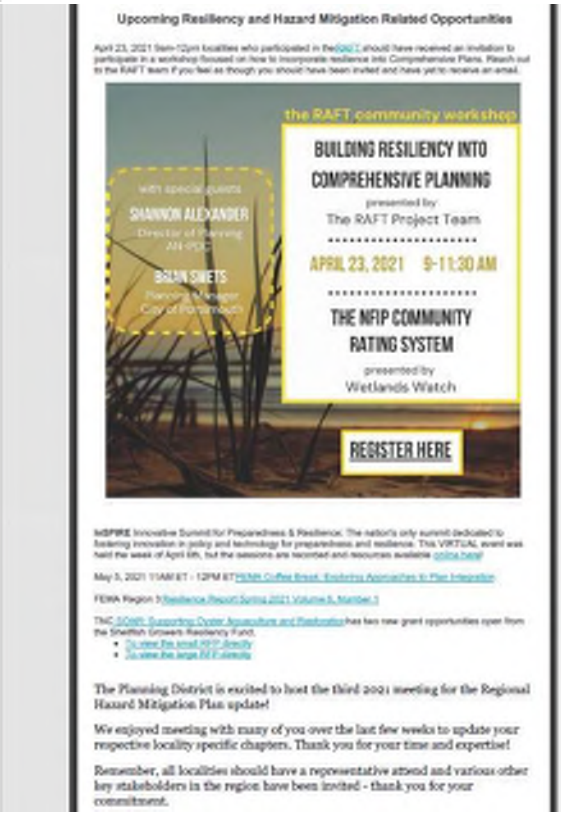
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FEMA Region 3 Resilience Report Spring 2021 Volume 6, Number 1

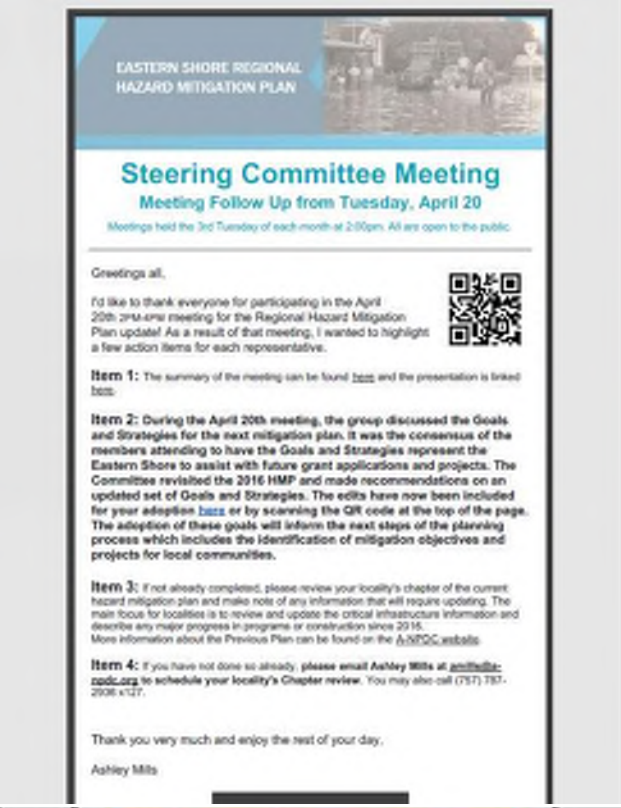
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EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Meeting Follow Up from Tuesday, April 20

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

Greetings all,

I'd like to thank everyone for participating in the April 20th 2PM-4PM meeting for the Regional Hazard Mitigation Plan update! As a result of that meeting, I wanted to highlight a few action items for each representative.

Item 1: The summary of the meeting can be found here and the presentation is linked here.

Item 2: During the April 20th meeting, the group discussed the Goals and Strategies for the next mitigation plan. It was the consensus of the members attending to have the Goals and Strategies represent the Eastern Shore to assist with future grant applications and projects. The Committee revisited the 2016 HMP and made recommendations on an updated set of Goals and Strategies. The edits have now been included for your adoption here or by scanning the QR code at the top of the page. The adoption of these goals will inform the next steps of the planning process which includes the identification of mitigation objectives and projects for local communities.

Item 3: If not already completed, please review your locality's chapter of the current hazard mitigation plan and make note of any information that will require updating. The main focus for localities is to review and update the critical infrastructure information and describe any major progress in programs or construction since 2016.
More information about the Previous Plan can be found on the A-NPDC website.

Item 4: If you have not done so already, **please email Ashley Mills at amills@a-npdc.org to schedule your locality's Chapter review.** You may also call (757) 787-2936 x127.

Thank you very much and enjoy the rest of your day.

Ashley Mills



Visit the HMP Page on our Website

Funding Opportunity!

SOAR: Supporting Oyster Aquaculture and Restoration

The SOAR program issued a request for proposals (RFP) for the new $1 million Shellfish Growers Resiliency Fund (Fund). **To learn more about the Fund and the applications process, visit the SOAR website.**

SWOT Webinar Learn, share, and discuss the Eastern Shore's **strengths, weaknesses, opportunities, and threats**. Help to guide the next 5-year Economic Development Plan! To register, click here

The Virginia Oyster Trail (VOT) is investigating new opportunities to better serve our members, their communities, and the oyster industry and would like your input. Please take just a few minutes out of your busy day to help VOT better serve you. Visit eCommerce Survey

ESVA Great American Clean-Up

In honor of Clean the Bay Day

Help prevent storm water flooding by keeping roads and ditches clean of litter and debris.
Saturday, June 5th 9 AM - 12 PM
Meet at Exmore Town Park

Committee Members

Thomas Beasley, Town of Elkton
Greg Hardesty, Town of Chariton
Jen Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jackie Davis, Town of Chariton
Keith Greer, Town of Parksley
Chris Guvernator, Accomack County
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
Jaythe Salacuse, Town of Onley
Bryan Rush, Town of Chincoteague
Charles Pruitt, Accomack County
David Ecker, Town of Eastville
Laurie Thomas, Town of Tangier
Robert Duer, Town of Exmore
Denise Drewer, Town of Saxis
Connie Campbell, Town of Painter
Patsy Stith, Town of Nassawadox
Sharon Hart, Town of Keller
Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Melfa

Staff

Shannon Alexander, Director of Planning
Ashley Mills, Regional Planner
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

VDEM

Bryce Starling, Region V Coordinator
Harrison Shreve, All Hazards Planner



EASTERN SHORE BUSINESS RESILIENCY TRAINING

Join us to learn from our featured guest speakers on how EDOs can remain RESILIENT as a business and business owner through changing times and seasons

Featured Guest Speakers from:

ESVA

REGISTER @ REBRAND.LY/RESILIENTESVA

May 18th - Day 1
1:00pm - 3:00pm
What is Resiliency? Everything You Need to Know to Get Started Planning Ahead!

- Learn about the history and types of threats faced on the Eastern Shore
- Take a closer look at how to identify your level of resiliency
- Hear about regional, state, and federal assistance resources

May 19th - Day 2
1:00pm - 12:00pm
Resiliency & Tourism, Training Opportunities & Customer Service

- Learn how to remain resilient through the tourism lens
- Address economic disruptions caused by COVID-19
- Identify ways to be proactive and how you can be involved in hazard mitigation planning
- Hear what local business sectors have to say about resiliency
- Learn customer service basics and principles

Join us for a 2-day virtual event!

FEMA

Ashley Mills | Regional Planner | A-NPDC | 757-787-2936 x127 | amills@a-npdc.org

STAY CONNECTED



the RAFT community workshop

BUILDING RESILIENCY INTO COMPREHENSIVE PLANNING

presented by
The RAFT Project Team

APRIL 23, 2021 9-11:30 AM

THE NFIP COMMUNITY RATING SYSTEM

presented by
Wetlands Watch

with special guests

SHANNON ALEXANDER
Director of Planning
AN-PDC

BRIAN SWETS
Planning Manager
City of Portsmouth

REGISTER HERE

MAY 18, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



Eastern Shore of Virginia

Regional Hazard Mitigation Plan Update

AGENDA

Tuesday May 18, 2021, 2 p.m. – 4 p.m.

Virtual Event Zoom

Meeting ID: 993 4570 2942
Passcode: 7577872936
Dial In by Phone: (301) 715 – 8592 US (Washington D.C)

Welcome

Roll Call

Round Robin

Strategic Goals & Strategies

Locality Meetings & HMP Chapter Updates

BREAK

Online Exercise

Regional Mitigation Objectives

Next Steps

ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of May 18, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, recordings, and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/

Steering Committee Members Present:
Susan McGhee, Northampton County
Jeb Brady, Town of Cape Charles
Robert Williams, Town of Wachapreague
Patsy Stith, Town of Nassawadox
Thomas Beasley, Town of Bloxom
Tom Brockenbrough, Accomack County

Steering Committee Members Absent:
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Nassawadox
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Melfa
Town of Parksley

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom

A-NPDC Staff Present:
Ashley Mills, A-N PDC
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group
Aaron Berryhill, Berkley Group

Planning Council Members Absent:
Scott Hall, ESCC
Hali Plourde-Rogers, ESLT
Evelyn Shotwell, Chincoteague Chamber
Susan Bates, The Nature Conservancy

Welcome and Introductions

Thomas Hicks, The Berkley Group, welcomed participants and directed participants to take roll call using an online form. He gave a round of introductions and detailed the changes to the planning team working on the Hazard Mitigation Plan. He explained the In-Kind contributions tracking form and asked for all work on this project to be tracked using the google drive link to ensure that funding for projects and grants can be maximized.

HMP Updates

Thomas Hicks and Ashley Mills provided a brief review of updates on the plan. Ashley informed the committee that she has recently met with many of the towns and counties involved in this process to obtain the updated chapter information.

Round Table Discussion: *How can the region use the hazard mitigation plan to develop relationship that will improve local infrastructure?*

Committee members were asked to share how they felt that the hazard mitigation plan can be used to develop relationships to improve local infrastructure. Some respondents mentioned that they have been working on drainage but are lacking the funding and equipment to complete the necessary projects to improve drainage. Committee members identified cooperation issues with private landowners as a concern for maintaining drainage ditches as well. Thomas Hicks reiterated that the HMP can be a tool to apply for and secure funding for specific projects.

Since the issues facing local communities includes a lack of funding as well as policy guidance, the plan can help to clarify the process for making infrastructure improvements. The plan can also help to build the necessary relationships and connections with relevant actors to make necessary infrastructure improvements.

Discussion of Strategic Goals and Strategies

The results of the survey were explained, demonstrating overall acceptance of goals and strategies. The committee discussed changes to Strategic Goal #3 and #5.

Committee members explained that not all communities participate in the Community Rating System (CRS) program and do not identify repetitive loss areas. FEMA conducts the identification of repetitive loss areas in these locations and identification is not the responsibility of local communities. The committee decided to amend Strategic Goal #3 to include FEMA's role in the process.

Committee members suggested including coastal towns in Strategic Goal #5. Committee members felt that coastal towns and island residents face similar issues in disaster and emergency response. Berkley Group staff and A-NPDC staff will review and incorporate these suggestions into the plan.

Round Table Discussion: What are your recollections of storm events in the past 5 years?

The 2016 HMP includes testimonials, quotes, and archived memories of storm events during the five years prior to drafting that plan. Jonathan McCoy asked for input about recent community experience with

storm events to include in the drafting of this plan. He encouraged committee members to share personal testimonials, as well as photos of storm events, either on the call or by email (jon.mccoy@bgllc.net).

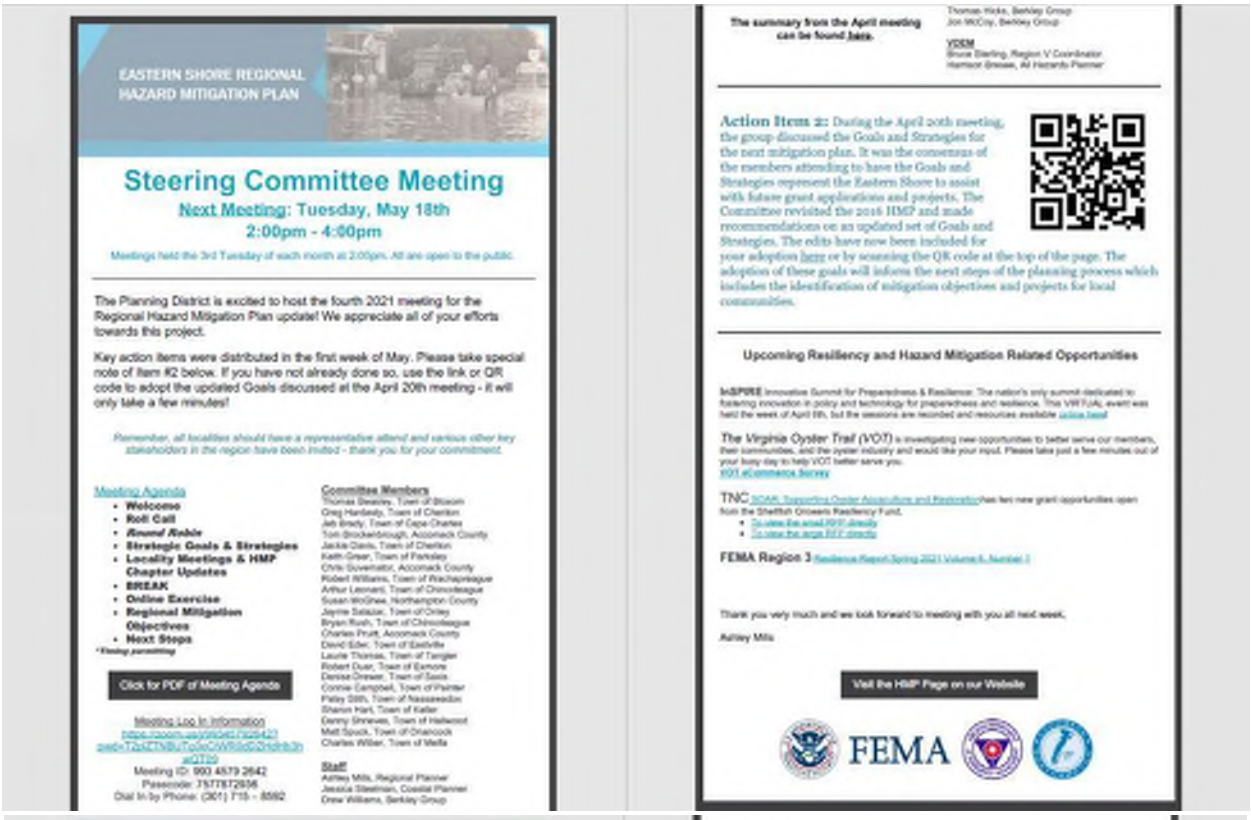
Regional Mitigation Objectives

Thomas Hicks explained the purpose of the Mitigation Objectives and the need for these objectives to be specific, targeted, and actionable. These objectives have been ongoing for many years and should be assessed for this plan to understand if they have been completed or need to be included in this update. The committee members were asked to complete a form (https://arcg.is/bf54K) to verify the status of their locality's mitigation objectives. Berkley Group and A-NPDC staff will use this information in drafting the plan.

Next Steps

The next steps for the project will be to update and draft content of plan chapters. This content will be initially presented in the next June meeting. The meeting ended at 3:15 p.m. The next meeting will be held on June 15.

OUTREACH


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Next Meeting: Tuesday, May 18th
2:00pm - 4:00pm

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

The Planning District is excited to host the fourth 2021 meeting for the Regional Hazard Mitigation Plan update! We appreciate all of your efforts towards this project.

Key action items were distributed in the first week of May. Please take special note of item #2 below. If you have not already done so, use the link or QR code to adopt the updated Goals discussed at the April 20th meeting - it will only take a few minutes!

Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment.

Meeting Agenda
- **Welcome**
- **Roll Call**
- ***Round Robin***
- **Strategic Goals & Strategies**
- **Locality Meetings & HMP Chapter Updates**
- **BREAK**
- **Online Exercise**
- **Regional Mitigation Objectives**
- **Next Steps**

*Timing permitting

Click for PDF of Meeting Agenda

Meeting Log In Information
https://zoom.us/j/99546170284?pwd=T2dZTVBuTnpleCtWRldDZHdHb3haQT09
Meeting ID: 995 4617 0284
Passcode: 757787
Dial In by Phone: (301) 715 - 8592

Committee Members
Thomas Beasley, Town of Bloxom
Greg Hartlesby, Town of Cheriton
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jackie Davis, Town of Cheriton
Keith Greer, Town of Parksley
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Danny Shreves, Town of Hallwood
Matt Spuck, Town of Onancock
Charles Wilber, Town of Wella

Staff
Ashley Mills, Regional Planner
Jessica Steelman, Coastal Planner
Drew Williams, Berkley Group

The summary from the April meeting can be found here.

Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group

VDEM
Bruce Sterling, Region V Coordinator
Harrison Dresser, All Hazards Planner

Action Item 2: During the April 20th meeting, the group discussed the Goals and Strategies for the next mitigation plan. It was the consensus of the members attending to have the Goals and Strategies represent the Eastern Shore to assist with future grant applications and projects. The Committee revisited the 2016 HMP and made recommendations on an updated set of Goals and Strategies. The edits have now been included for your adoption here or by scanning the QR code at the top of the page. The adoption of these goals will inform the next steps of the planning process which includes the identification of mitigation objectives and projects for local communities.

Upcoming Resiliency and Hazard Mitigation Related Opportunities

InSPIRE Innovative Summit for Preparedness & Resilience. The nation's only summit dedicated to fostering innovation in policy and technology for preparedness and resilience. This VIRTUAL event was held the week of April 5th, but the sessions are recorded and resources available online here!

The Virginia Oyster Trail (VOT) is investigating new opportunities to better serve our members, their communities, and the oyster industry and would like your input. Please take just a few minutes out of your busy day to help VOT better serve you.
VOT eCommerce Survey

TNC SOAR: Supporting Oyster Aquaculture and Restoration has two new grant opportunities open from the Shellfish Growers Resiliency Fund.
- To view the small RFP directly
- To view the large RFP directly

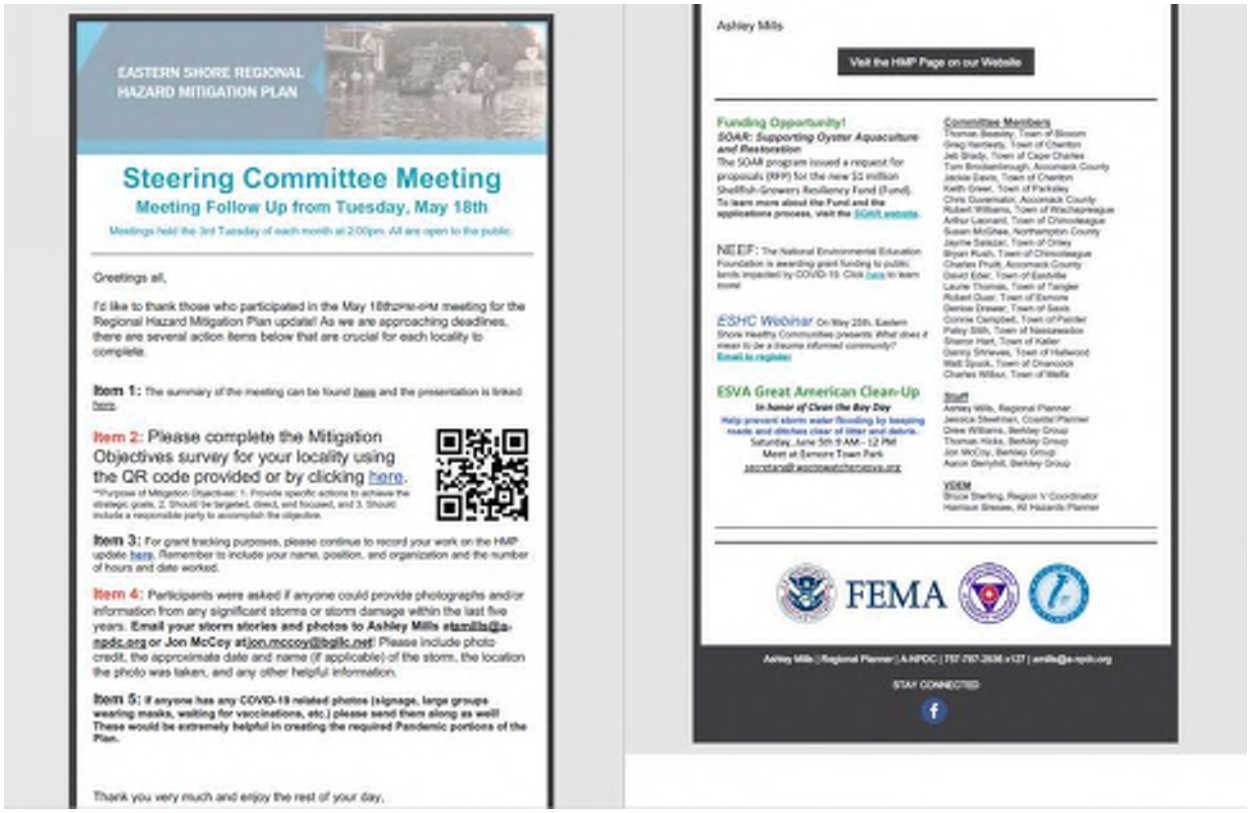
FEMA Region 3 Resilience Report Spring 2021 Volume 6, Number 1

Thank you very much and we look forward to meeting with you all next week.

Ashley Mills

Visit the HMP Page on our Website

FEMA


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Meeting Follow Up from Tuesday, May 18th

Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

Greetings all,

I'd like to thank those who participated in the May 18th2PM-4PM meeting for the Regional Hazard Mitigation Plan update! As we are approaching deadlines, there are several action items below that are crucial for each locality to complete.

Item 1: The summary of the meeting can be found here and the presentation is linked here.

Item 2: Please complete the Mitigation Objectives survey for your locality using the QR code provided or by clicking here.
**Purpose of Mitigation Objectives: 1. Provide specific actions to achieve the strategic goals, 2. Should be targeted, direct, and focused, and 3. Should include a responsible party to accomplish the objective.

Item 3: For grant tracking purposes, please continue to record your work on the HMP update here. Remember to include your name, position, and organization and the number of hours and date worked.

Item 4: Participants were asked if anyone could provide photographs and/or information from any significant storms or storm damage within the last five years. **Email your storm stories and photos to Ashley Mills asmills@a-npdc.org or Jon McCoy at jon.mccoy@bgllc.net!** Please include photo credit, the approximate date and name (if applicable) of the storm, the location the photo was taken, and any other helpful information.

Item 5: If anyone has any COVID-19 related photos (signage, large groups wearing masks, waiting for vaccinations, etc.) please send them along as well! These would be extremely helpful in creating the required Pandemic portions of the Plan.

Thank you very much and enjoy the rest of your day.

Ashley Mills

Visit the HMP Page on our Website

Funding Opportunity!
SOAR: Supporting Oyster Aquaculture and Restoration
The SOAR program issued a request for proposals (RFP) for the new $1 million Shellfish-Growers Resiliency Fund (Fund). **To learn more about the Fund and the applications process, visit the SOAR website.**

NEEF: The National Environmental Education Foundation is awarding grant funding to public lands impacted by COVID-19. Click here to learn more!

ESHC Webinar On May 25th, Eastern Shore Healthy Communities presents: *What does it mean to be a trauma informed community?* Email to register!

ESVA Great American Clean-Up
In honor of Clean the Bay Day
Help prevent storm water flooding by keeping roads and ditches clear of litter and debris.
Saturday, June 5th 9 AM - 12 PM
Meet at Exmore Town Park
secretary@eastvaenhancevva.org

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Jessica Steelman, Coastal Planner
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Thomas Hicks, Berkley Group
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VDEM
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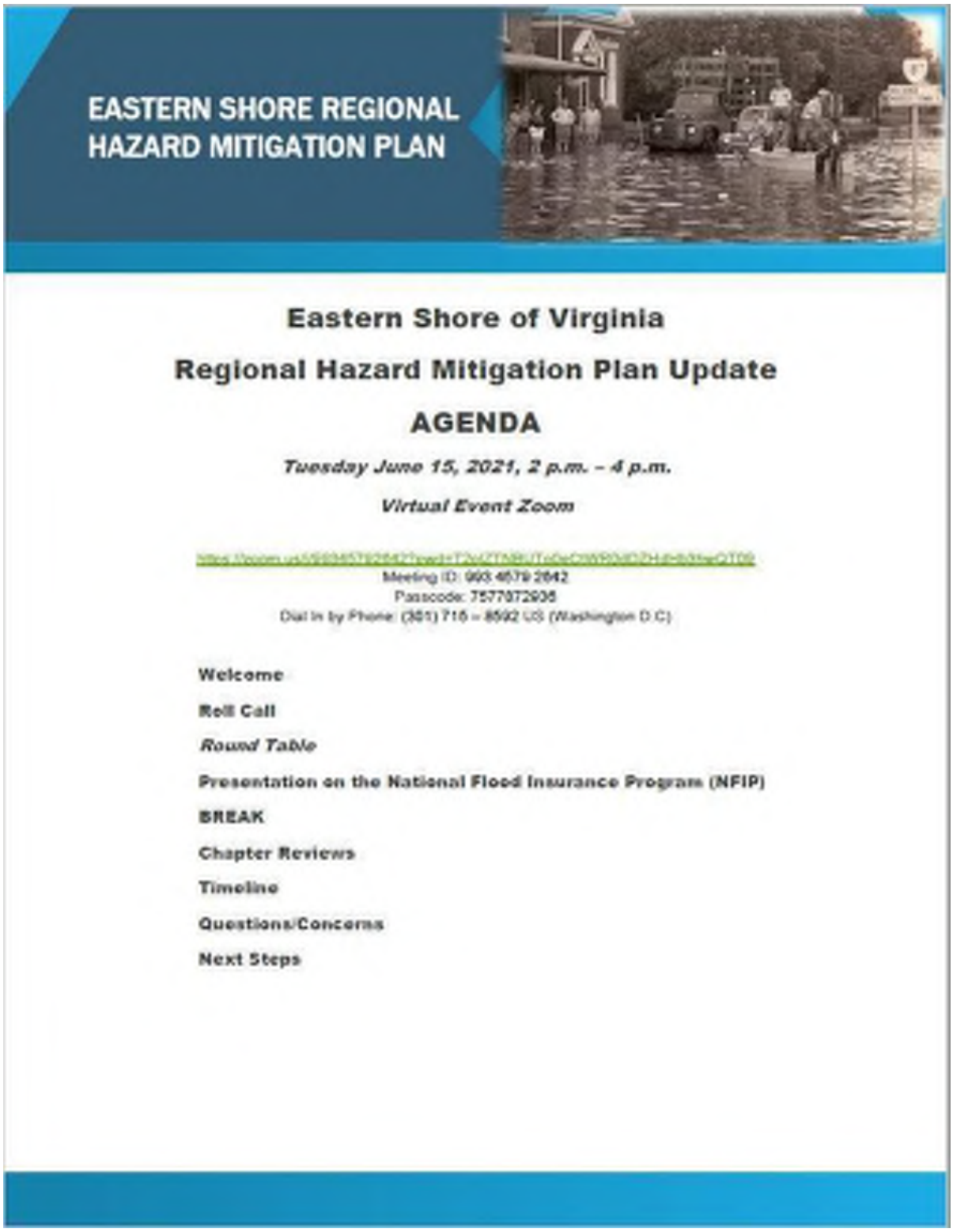
FEMA

Ashley Mills | Regional Planner | A-NPDC | 757-787-2636 x127 | amills@a-npdc.org

STAY CONNECTED

JUNE 15, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of June 15, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, recordings and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/

Steering Committee Members Present:
Susan McGhee, Northampton County
Tom Brockenbrough, Accomack County
Bob Williams, Town of Wachapreague
Patsy Stith, Town of Nassawadox

Steering Committee Alternates Present
Jeanette Eby, Town of Bloxom

Steering Committee Members Absent:
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Melfa
Town of Parksley

A-NPDC Staff Present:
Ashley Mills, A-N PDC
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group
Aaron Berryhill, Berkley Group

Planning Council Members Absent:
Scott Hall, ESCC
Hali Plourde-Rogers, ESLT
Evelyn Shotwell, Chincoteague Chamber
Susan Bates, The Nature Conservancy

Welcome and Introductions

Thomas Hicks, The Berkley Group, welcomed participants. He gave a round of introductions for the planning team working on the Hazard Mitigation Plan. Ashley Mills from A-NPDC also provided a brief introduction and explained the In-Kind contributions tracking form. This form collects information on all work conducted on the project by various stakeholders. Using a google drive link, this form tracks activity to ensure that funding for projects and grants can be maximized.

Funding Announcement

Thomas started by sharing a new funding announcement for the Community Flood Preparedness Fund from the Virginia Department of Conservation and Recreation. Local communities should consider obtaining funding from this grant as they consider flooding hazards in their communities and begin to adopt the Hazard Mitigation Plan later this year.

Round Table Discussion: *What recent funding opportunities has your community secured? Do you have any advice to share regarding your experience?*

Committee members were asked to consider the discussion question about local funding opportunities for local communities related to hazard mitigation. Some respondents stated that most recent hazard mitigation efforts have been funded by money from local taxes, but that many communities are optimistic that the bail out money from the federal government can help fund hazard mitigation needs. Expertise and time to write grant applications is one barrier to receiving grant funding.

To improve access to grant funding, towns may coordinate grant writing and application strategies with their respective counties and with the PDC. Proactive strategizing for grants will be more successful in receiving funding as well. Finally, communities should also be careful to make sure that any outside help that works on grant funding truly understands the needs of the local community.

Presentation on the National Flood Insurance Program

The presentation on the National Flood Insurance Program was postponed for this meeting due to a last-minute cancellation from the presenter.

Chapter Updates

Next, the planning team provided an update of the progress of finalizing the draft of the Hazard Mitigation Plan. Thomas and Jon gave an overview of each chapter in the plan that explained the status of each chapter and any remaining needs.

Chapter 1: This chapter gives a broad overview of the hazards in the Eastern Shore along with any recent updates. Thomas noted that the previous plan version covered major storm events up until Hurricane Sandy. He asked committee members if there were any notable storm events since that time that would be worth mentioning in the first chapter.

One attendee noted a storm in the summer of 2019 that downed multiple trees on Chincoteague and Assateague Islands. Committee members also noted a strong storm from 2018 that caused damage to roads. That storm specifically washed out the main road to Hillsborough and VDOT had to completely

reconstruct the road. The links below were shared during the meeting that provide pictures and descriptions of some of the recent storm events discussed in the meeting.
https://www.delmarvanow.com/story/news/local/virginia/2019/05/16/washed-out-hillsborough-road-accomack-county-reopens-after-repairs/3691097002/
https://www.flickr.com/photos/vadot/albums/72157706484077335

Chapters 2 & 3: These chapters discuss the overall planning process as well as the initial risk assessment of local hazards. These chapters are mostly complete and document the recent planning process for this plan. They also address the possible risks of various hazards in each community.

Chapters 4-7: These chapters expand on the high hazard risks identified in Chapter 3. This includes High Wind, Coastal Erosion, Coastal Flooding, Stormwater, Pandemic. These chapters are almost complete and have been updated with new references and adjusted to be consistent with the rest of the plan. The remaining need for these chapters is updated stories, details, and personal accounts as well as photos of recent hazardous events. Jon requested that committee members assist with providing any relevant information.

Chapter 8: This chapter takes a regional view of hazard mitigation while the subsequent chapters dive into the details for each respective local community. This chapter has been revised from previous iterations of the plan to remove redundant and repetitive information.

Chapters 9-26: These chapters address county and local community specific needs. Ashley has been in touch with each community to draft these chapters. These chapters are almost complete, but local communities are encouraged to respond to any outstanding requests from Ashley.

Chapters 27-30: These chapters contain the mitigation strategies for the localities. Thomas reminded the committee to update their mitigation objectives using the survey link (https://arcg.is/bf54K). Thomas stressed the importance of the mitigation objectives and encouraged all committee members to provide their update.

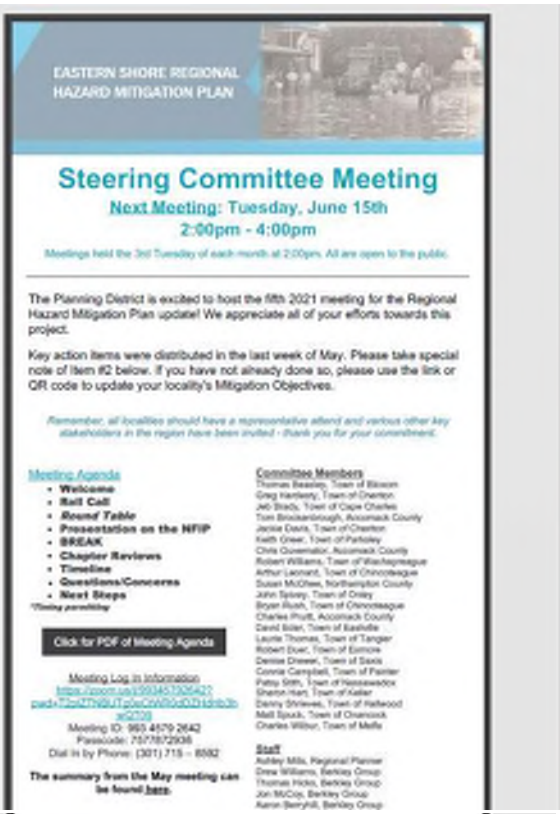
Timeline

The meeting concluded with a brief overview of the timeline for the project. The project is on schedule and a complete draft will be submitted to the Virginia Department of Emergency Management (VDEM) by August 1. VDEM will provide input and feedback on the draft for the planning team to address and change. Tentatively, a call will be scheduled in October to address any final needs and provide direction for proceeding towards final adoption by local communities at the end of year.

Next Steps

The next steps for the project will be to complete all updates to the plan. A-NPDC staff will reach out to localities to ensure their chapter content is accurate. This content will be compiled into a complete draft to submit to VDEM by August 1. The meeting ended at 3:00 p.m.

OUTREACH



EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

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Key action items were distributed in the last week of May. Please take special note of item #2 below. If you have not already done so, please use the link or QR code to update your locality's Mitigation Objectives.

Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment.

Meeting Agenda
- **Welcome**
- **Roll Call**
- ***Round Table***
- **Presentation on the NFIP**
- **BREAK**
- **Chapter Reviews**
- **Timeline**
- **Questions/Concerns**
- **Next Steps**

Timing permitting

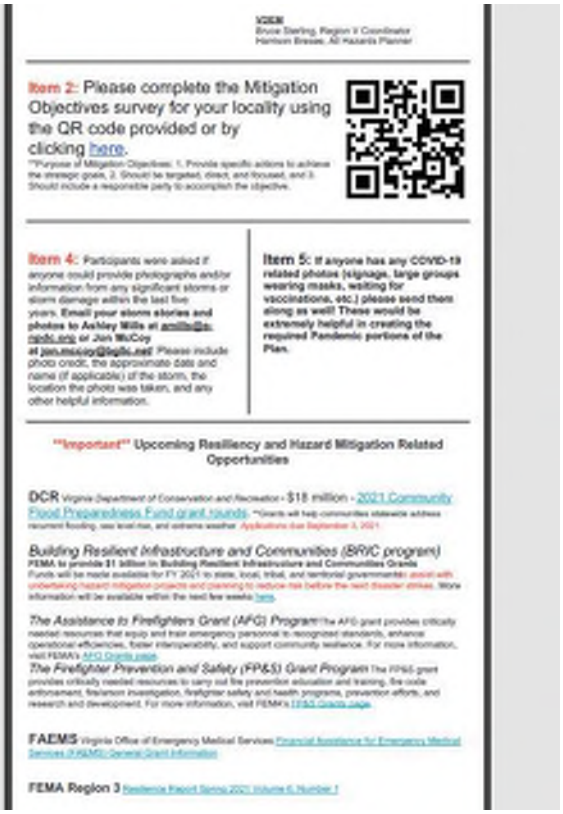
Click for PDF of Meeting Agenda

Meeting Log in Information
https://zoom.us/j/99345792642?pwd=T2pIZTN6UTg0eCtxWlhqdDZ1dnlp3z09
Meeting ID: 993 4579 2642
Passcode: 7577872936
Dial in by Phone: (301) 715 – 8592

The summary from the May meeting can be found here.

Committee Members
Thomas Beasley, Town of Bloxom
Greg Hardesty, Town of Chincoteague
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jacqie Davis, Town of Cheriton
Keith Greer, Town of Parksley
Chris Guvernator, Accomack County
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
John Spivey, Town of Onley
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Charles Pruitt, Accomack County
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Denise Drewer, Town of Saxis
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Sharon Hunt, Town of Keller
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Matt Spuck, Town of Chincoteague
Charles Wilbur, Town of Melfa

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Item 5: If anyone has any COVID-19 related photos (signage, large groups wearing masks, waiting for vaccinations, etc.) please send them along as well! These would be extremely helpful in creating the required Pandemic portions of the Plan.

"Important!" Upcoming Resiliency and Hazard Mitigation Related Opportunities

DCR Virginia Department of Conservation and Recreation - $18 million - 2021 Community Flood Preparedness Fund grant rounds. **Grants will help communities statewide address recurrent flooding, sea level rise, and extreme weather. Applications due September 3, 2021.

Building Resilient Infrastructure and Communities (BRIC program)
FEMA to provide $1 billion in Building Resilient Infrastructure and Communities Grants
Funds will be made available for FY 2021 to state, local, tribal, and territorial governments to assist with undertaking hazard mitigation projects and planning to reduce risk before the next disaster strikes. More information will be available within the next few weeks here.

The Assistance to Firefighters Grant (AFG) Program The AFG grant provides critically needed resources that equip and train emergency personnel to recognized standards, enhance operational efficiencies, foster interoperability, and support community resilience. For more information, visit FEMA's AFG Grants page.

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FAEMS Virginia Office of Emergency Medical Services Financial Assistance for Emergency Medical Services (FAEMS) General Grant Information

FEMA Region 3 Resilience Report Spring 2021 Volume 6, Number 1



Thank you very much and we look forward to meeting with you all next week,

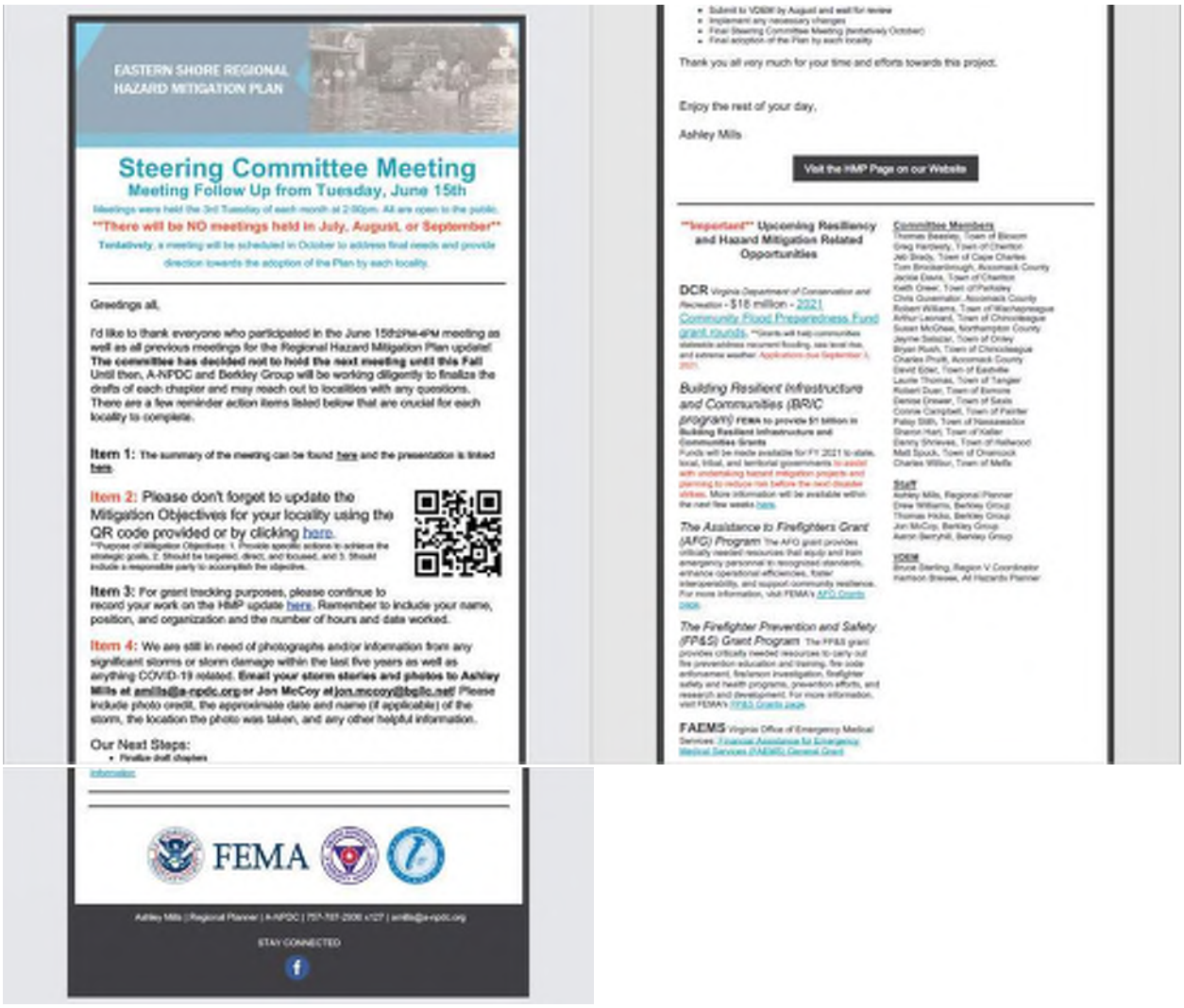
Ashley Mills

Visit the HMP Page on our Website

FEMA

Ashley Mills | Regional Planner | A-NPDC | 757-787-2936 x127 | amills@a-npdc.org

STAY CONNECTED



EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Meeting Follow Up from Tuesday, June 15th

Meetings were held the 3rd Tuesday of each month at 2:00pm. All are open to the public.

"There will be NO meetings held in July, August, or September"

Tentatively, a meeting will be scheduled in October to address final needs and provide direction towards the adoption of the Plan by each locality.

Greetings all,

I'd like to thank everyone who participated in the June 15th/2PM-4PM meeting as well as all previous meetings for the Regional Hazard Mitigation Plan update! **The committee has decided not to hold the next meeting until this Fall** Until then, A-NPDC and Berkley Group will be working diligently to finalize the drafts of each chapter and may reach out to localities with any questions. There are a few reminder action items listed below that are crucial for each locality to complete.

Item 1: The summary of the meeting can be found here and the presentation is linked here.

Item 2: Please don't forget to update the Mitigation Objectives for your locality using the QR code provided or by clicking here.

**Purpose of Mitigation Objectives: 1. Provide specific actions to achieve the strategic goals, 2. Should be targeted, direct, and focused, and 3. Should include a responsible party to accomplish the objective.

Item 3: For grant tracking purposes, please continue to record your work on the HMP update here. Remember to include your name, position, and organization and the number of hours and data worked.

Item 4: We are still in need of photographs and/or information from any significant storms or storm damage within the last five years as well as anything COVID-19 related. **Email your storm stories and photos to Ashley Mills at amills@a-npdc.org or Jon McCoy at jon.mccoy@bgllc.net!** Please include photo credit, the approximate date and name (if applicable) of the storm, the location the photo was taken, and any other helpful information.

Our Next Steps:

- Finalize draft chapters
- Submit to VDEM by August and wait for review
- Implement any necessary changes
- Final Steering Committee Meeting (tentatively October)
- Final adoption of the Plan by each locality

Thank you all very much for your time and efforts towards this project.

Enjoy the rest of your day,

Ashley Mills

Visit the HMP Page on our Website

"Important" Upcoming Resiliency and Hazard Mitigation Related Opportunities

DCR Virginia Department of Conservation and Recreation - $18 million - 2021 Community Flood Preparedness Fund grant rounds. **Grants will help communities statewide address recurrent flooding, sea level rise, and extreme weather. Applications due September 1, 2021.

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FAEMS Virginia Office of Emergency Medical Services: Financial Assistance for Emergency Medical Services (FAEMS) General Grant

Committee Members
Thomas Beasley, Town of Bloxom
Greg Hartlewitz, Town of Chariton
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Jackie Davis, Town of Chariton
Keith Greer, Town of Parksley
Chris Guvernator, Accomack County
Robert Williams, Town of Wachapreague
Arthur Leonard, Town of Chincoteague
Susan McGhee, Northampton County
Jayme Sabolcik, Town of Onley
Bryan Rush, Town of Chincoteague
Charles Pruitt, Accomack County
David Eder, Town of Eastville
Laurie Thomas, Town of Tangier
Robert Duer, Town of Exmore
Denise Drewer, Town of Saxis
Connie Campbell, Town of Painter
Patsy Stith, Town of Nassawadox
Sharon Hart, Town of Keller
Danny Shreves, Town of Nelwood
Matt Spuck, Town of Chanco
Charles Wilson, Town of Melfa

Staff
Ashley Mills, Regional Planner
Drew Williams, Berkley Group
Thomas Hicks, Berkley Group
Jon McCoy, Berkley Group
Aaron Berryhill, Berkley Group

VDEM
Bruce Sterling, Region V Coordinator
Harrison Breese, All Hazards Planner

FEMA

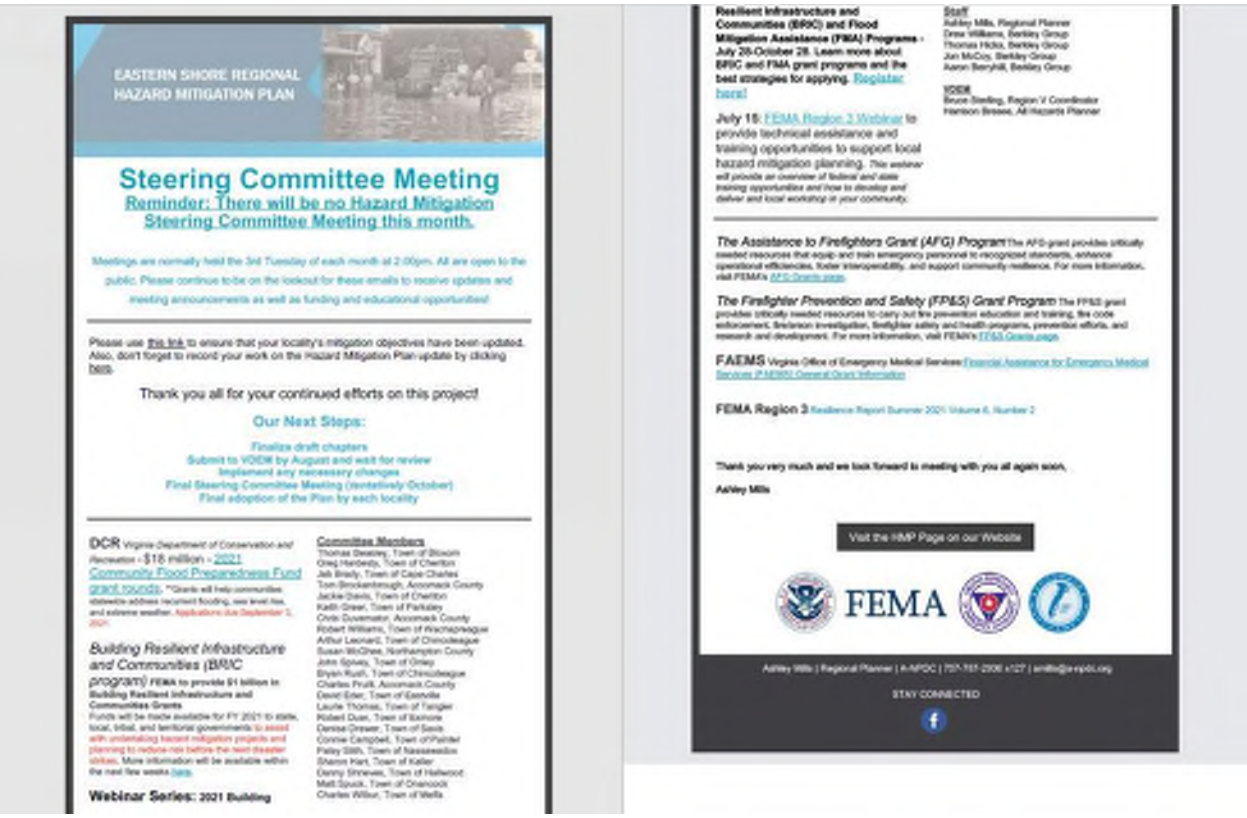
Ashley Mills | Regional Planner | A-NPDC | 757-787-2936 x127 | amills@a-npdc.org

STAY CONNECTED

NO HMP STEERING COMMITTEE MEETINGS – JULY, AUGUST, SEPTEMBER

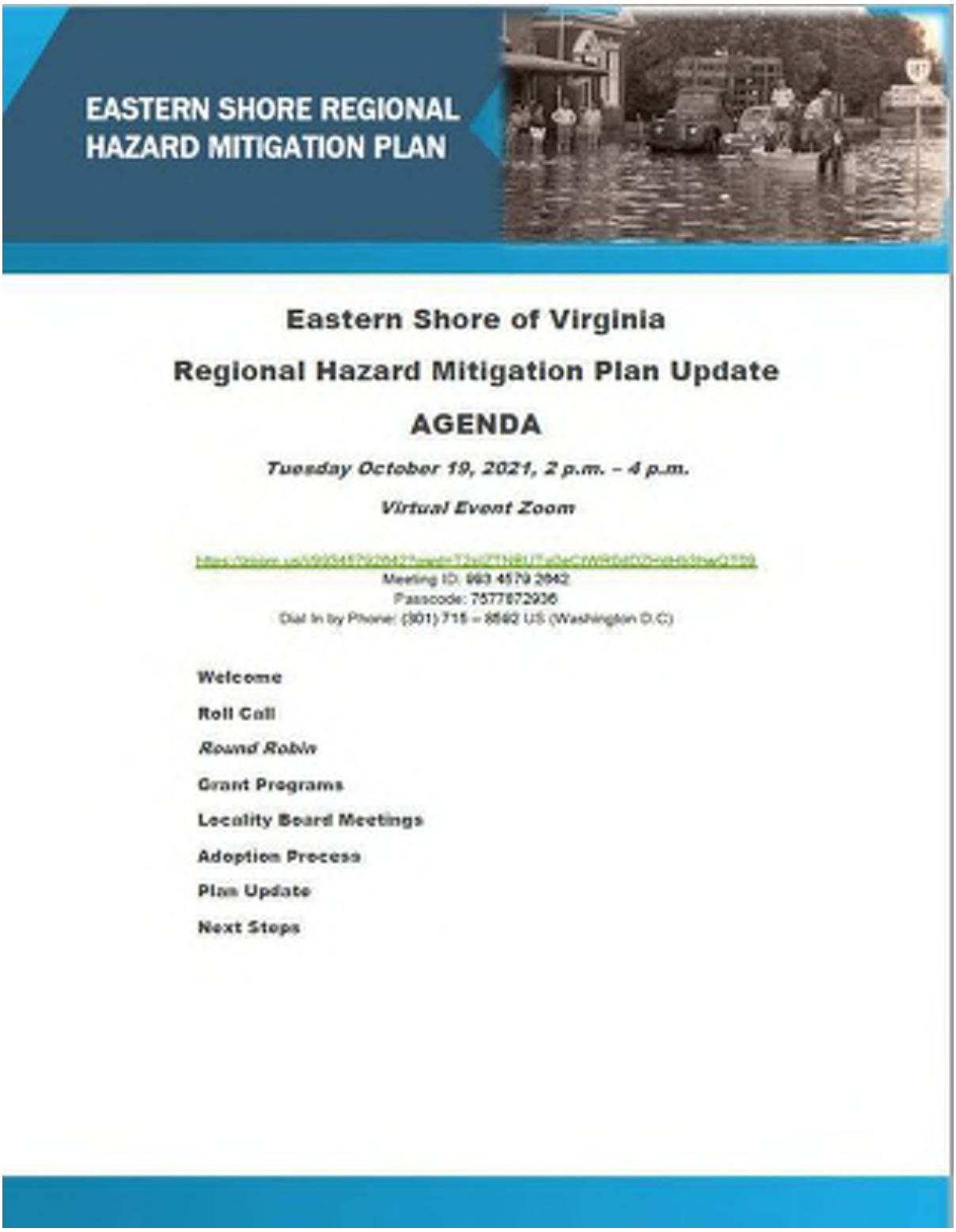
During the June 15th meeting, the Hazard Mitigation Steering Committee, along with the A-NPDC and those involved in the Planning Council, determined the next Steering Committee meeting would be held again in October. This allowed time to complete the Plan draft prior to October's meeting for the Committee to review and comment. A-NPDC continued regular communication efforts with Steering Committee members through email blasts, website updates, person emails, and phone calls.

OUTREACH



OCTOBER 19, 2021 HMP STEERING COMMITTEE MEETING

AGENDA



ATTENDANCE AND MEETING SUMMARY

Eastern Shore Hazard Mitigation Plan

Summary of October 19, 2021 Steering Committee Meeting held Virtually via Zoom 2:00-4:00pm

Presentations, support documents, and other resources can be found at http://www.a-npdc.org/accomack-northampton-planning-district-commission/coastal-resources/hazard-mitigation-planning/

Members may access a recording of this call at: tinyurl.com/4wn6p937

Steering Committee Members Present:
Susan McGhee, Northampton County
Jeb Brady, Town of Cape Charles
Tom Brockenbrough, Accomack County
Bryan Rush, Chincoteague Emergency Services
Laurie Chamberlain, Town of Onley
Bshpil ? , *Unknown*

Steering Committee Members Absent:
Town of Painter
Town of Accomac
Town of Saxis
Town of Exmore
Town of Eastville
Town of Tangier
Town of Keller
Town of Belle Haven
Town of Hallwood
Town of Parksley
Town of Wachapreague
Town of Onancock
Town of Cheriton
Town of Nassawadox
Town of Melfa

Steering Committee Alternates Present:
Jeanette Eby, Town of Bloxom
Sarah Dickey, Accomack County

VDEM Present:
Chris Bruce

A-NPDC Staff Present:
Anne Doyle
Thomas Hicks, Berkley Group

Planning Council Members Present:

Planning Council Members Absent:
Hali Plourde-Rogers, ESLT
Scott Hall, ESCC
Evelyn Shotwell, Chincoteague Chamber
Susan Bates, The Nature Conservancy

Welcome and Introductions

Tommy Hicks, The Berkley Group, welcomed participants and directed participants to take roll call.

Anne Doyle introduced herself and welcomed everyone to the committee as the Director of Planning for the Eastern Shore Planning District.

Key Takeaways and Updates

This meeting provided an overview of local, state, and federal grants which are available for the region to consider assisting in preparedness and mitigation activities. The presentation is available with hyperlinks in the PDF version of the PowerPoint presentation.

An update was provided on each of the HMP Chapters, and the review conducted by VDEM. The current schedule will allow the final document to be available for submittal and adoption by localities. FEMA has still not been able to provide information on the National Flood Insurance Program even after many requests. The next steps are to move the plan forward using the existing data sets in the NFIP.

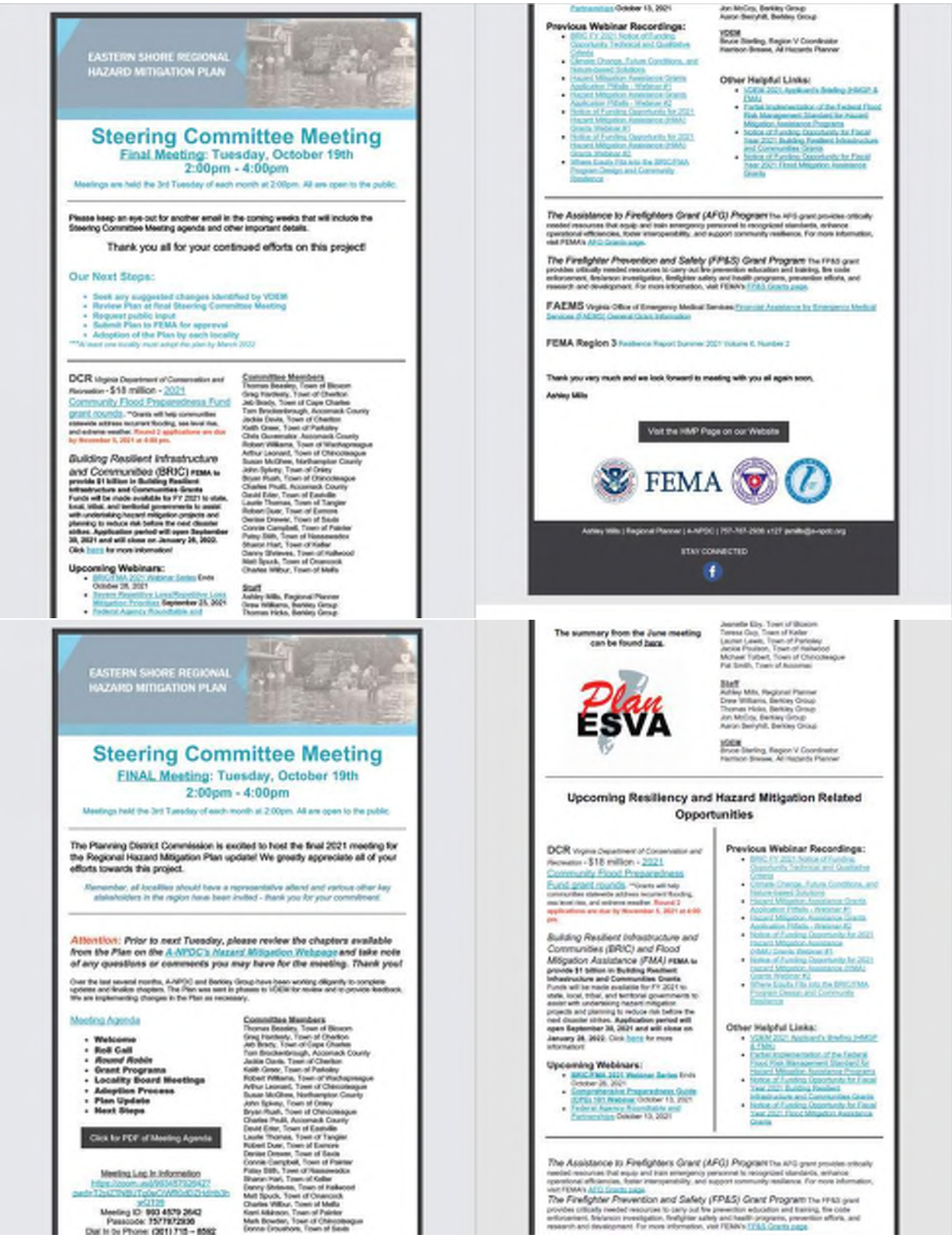
Locality Meetings

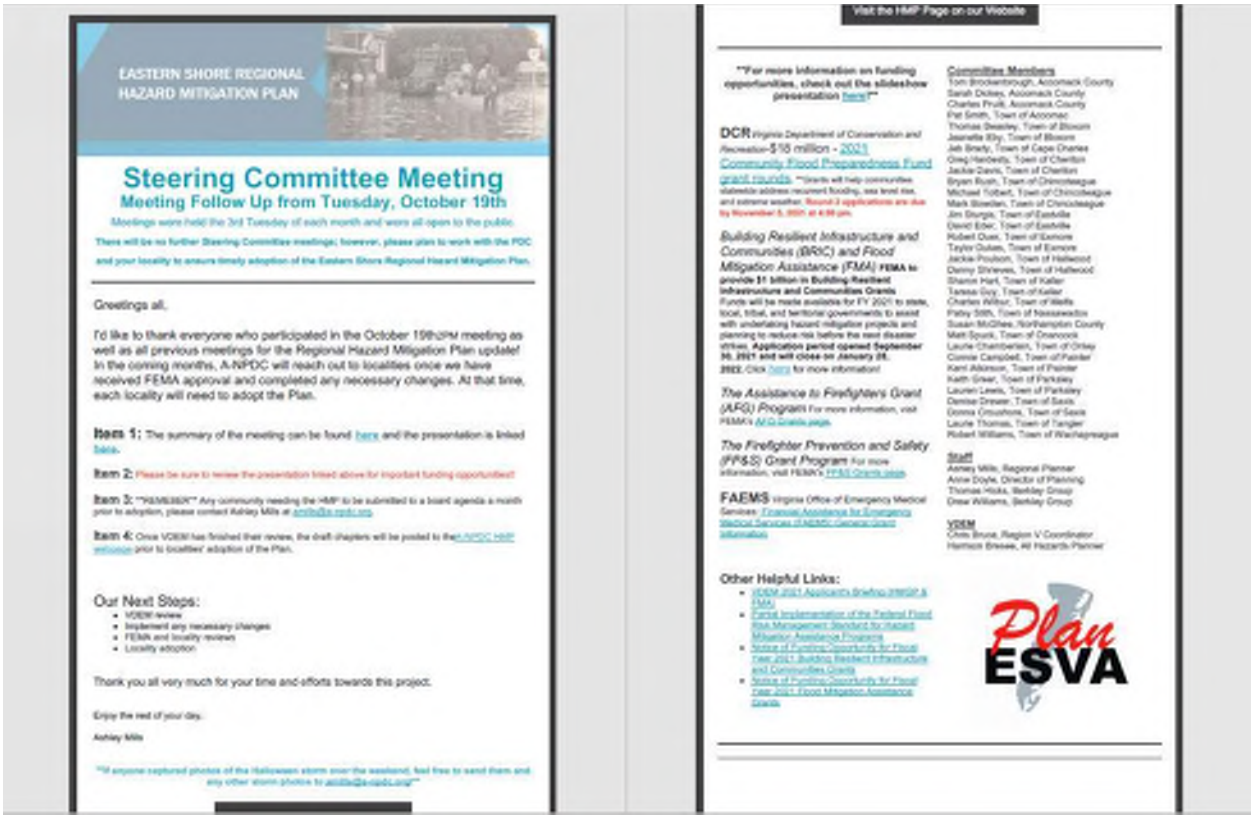
Tommy Hicks discussed the council and board meeting schedules for each month and requested that any community needing the HMP to be submitted to the board agenda a month prior to board adoption to please contact Ashley Mills.

Next Steps

This meeting concluded the 6 HMP Meetings needed to help develop the plan. After VDEM reviews, the chapters will be posted to the Eastern Shore Planning District's website prior to adoption at the community level.

OUTREACH


EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN
Steering Committee Meeting
Final Meeting: Tuesday, October 19th
2:00pm - 4:00pm
Meetings are held the 3rd Tuesday of each month at 2:00pm. All are open to the public.
Please keep an eye out for another email in the coming weeks that will include the Steering Committee Meeting agenda and other important details.
Thank you all for your continued efforts on this project!
Our Next Steps:
Seek any suggested changes identified by VDEM
Review Plan at final Steering Committee Meeting
Request public input
Submit Plan to FEMA for approval
Adoption of the Plan by each locality
Committee Members
Upcoming Webinars:
Previous Webinar Recordings:
Other Helpful Links:
The Assistance to Firefighters Grant (AFG) Program
The Firefighter Prevention and Safety (FP&S) Grant Program
FAEMS
FEMA Region 3
Thank you very much and we look forward to meeting with you all again soon,
Ashley Mills
Visit the HMP Page on our Website
FEMA
STAY CONNECTED
EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN
Steering Committee Meeting
FINAL Meeting: Tuesday, October 19th
2:00pm - 4:00pm
Meetings held the 3rd Tuesday of each month at 2:00pm. All are open to the public.
The Planning District Commission is excited to host the final 2021 meeting for the Regional Hazard Mitigation Plan update! We greatly appreciate all of your efforts towards this project.
Remember, all localities should have a representative attend and various other key stakeholders in the region have been invited - thank you for your commitment.
Attention: Prior to next Tuesday, please review the chapters available from the Plan on the A-NPDC's Hazard Mitigation Webpage and take note of any questions or comments you may have for the meeting. Thank you!
Meeting Agenda
Welcome
Roll Call
Round Robin
Grant Programs
Locality Board Meetings
Adoption Process
Plan Update
Next Steps
Click for PDF of Meeting Agenda
Meeting Log In Information
Committee Members
The summary from the June meeting can be found here.
Plan ESVA
Upcoming Resiliency and Hazard Mitigation Related Opportunities
Previous Webinar Recordings:
Other Helpful Links:
The Assistance to Firefighters Grant (AFG) Program
The Firefighter Prevention and Safety (FP&S) Grant Program



EASTERN SHORE REGIONAL HAZARD MITIGATION PLAN

Steering Committee Meeting

Meeting Follow Up from Tuesday, October 19th

Meetings were held the 3rd Tuesday of each month and were all open to the public.

There will be no further Steering Committee meetings; however, please plan to work with the PDC and your locality to ensure timely adoption of the Eastern Shore Regional Hazard Mitigation Plan.

Greetings all,

I'd like to thank everyone who participated in the October 19th@PM meeting as well as all previous meetings for the Regional Hazard Mitigation Plan update! In the coming months, A-NPDC will reach out to localities once we have received FEMA approval and completed any necessary changes. At that time, each locality will need to adopt the Plan.

Item 1: The summary of the meeting can be found here and the presentation is linked here.

Item 2: Please be sure to review the presentation linked above for important funding opportunities!

Item 3: **REMEMBER** Any community needing the HMP to be submitted to a board agenda a month prior to adoption, please contact Ashley Mills at amills@a-npdc.org.

Item 4: Once VDEM has finished their review, the draft chapters will be posted to the A-NPDC HMP webpage prior to localities' adoption of the Plan.

Our Next Steps:

- VDEM review
- Implement any necessary changes
- FEMA and locality reviews
- Locality adoption

Thank you all very much for your time and efforts towards this project.

Enjoy the rest of your day.

Ashley Mills

If anyone captured photos of the Halloween storm over the weekend, feel free to send them and any other storm photos to amills@a-npdc.org!

Visit the HMP Page on our Website

For more information on funding opportunities, check out the slideshow presentation here!

DCR Virginia Department of Conservation and Recreation-$16 million - 2021 Community Flood Preparedness Fund grant rounds. **Grants will help communities statewide address recurrent flooding, sea level rise, and extreme weather. Round 2 applications are due by November 5, 2021 at 4:99 pm.

Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) **FEMA to provide $1 billion in Building Resilient Infrastructure and Communities Grants** Funds will be made available for FY 2021 to state, local, tribal, and territorial governments to assist with undertaking hazard mitigation projects and planning to reduce risk before the next disaster strikes. **Application period opened September 30, 2021 and will close on January 28, 2022.** Click here for more information!

The Assistance to Firefighters Grant (AFG) Program For more information, visit FEMA's AFG Grants page.

The Firefighter Prevention and Safety (FP&S) Grant Program For more information, visit FEMA's FP&S Grants page.

FAEMS Virginia Office of Emergency Medical Services: Financial Assistance for Emergency Medical Services (EMS) General Grant Information

Other Helpful Links:

- VDEM 2021 Applicants Briefing (HMGP & FMA)
- Partial Implementation of the Federal Flood Risk Management Standard for Hazard Mitigation Assistance Programs
- Notice of Funding Opportunity for Fiscal Year 2021 Building Resilient Infrastructure and Communities Grants
- Notice of Funding Opportunity for Fiscal Year 2021 Flood Mitigation Assistance Grants

Committee Members

Tom Brockenbrough, Accomack County
Sarah Dickes, Accomack County
Charles Pruitt, Accomack County
Pat Smith, Town of Accomac
Thomas Beasley, Town of Bloxom
Jeanette Irby, Town of Bloxom
Jeb Brady, Town of Cape Charles
Greg Hardesty, Town of Chincoteague
Jackie Davis, Town of Chincoteague
Bryan Bush, Town of Chincoteague
Michael Tolbert, Town of Chincoteague
Mark Bowden, Town of Chincoteague
Jim Sturgis, Town of Eastville
David Eder, Town of Eastville
Robert Duer, Town of Exmore
Taylor Dukes, Town of Exmore
Jackie Poulson, Town of Hallwood
Danny Shreves, Town of Hallwood
Sharon Hart, Town of Keller
Teresa Guy, Town of Keller
Charles Wilbur, Town of Wattsville
Patsy Stith, Town of Nassawadox
Susan McGhee, Northampton County
Matt Spurck, Town of Onancock
Laurie Chamberlain, Town of Onley
Connie Campbell, Town of Painter
Kent Atkinson, Town of Painter
Keith Greer, Town of Parksley
Lauren Lewis, Town of Parksley
Denise Dreyer, Town of Savis
Donna Croushore, Town of Savis
Laurie Thomas, Town of Tangier
Robert Williams, Town of Wachapreague

Staff

Ashley Mills, Regional Planner
Anne Doyle, Director of Planning
Thomas Hicks, Berkley Group
Drew Williams, Berkley Group

VDEM

Chris Bruce, Region V Coordinator
Hamlock Breese, All Hazards Planner

Plan ESVA

FEMA

Ashley Mills | Regional Planner | A-NPDC | 757-787-2936 x127 | amills@a-npdc.org

STAY CONNECTED

APPENDIX D: RESOLUTIONS OF ADOPTION

The following section contains each jurisdiction's adopted resolutions for the Eastern Shore of Virginia Hazard Mitigation Plan 2021.